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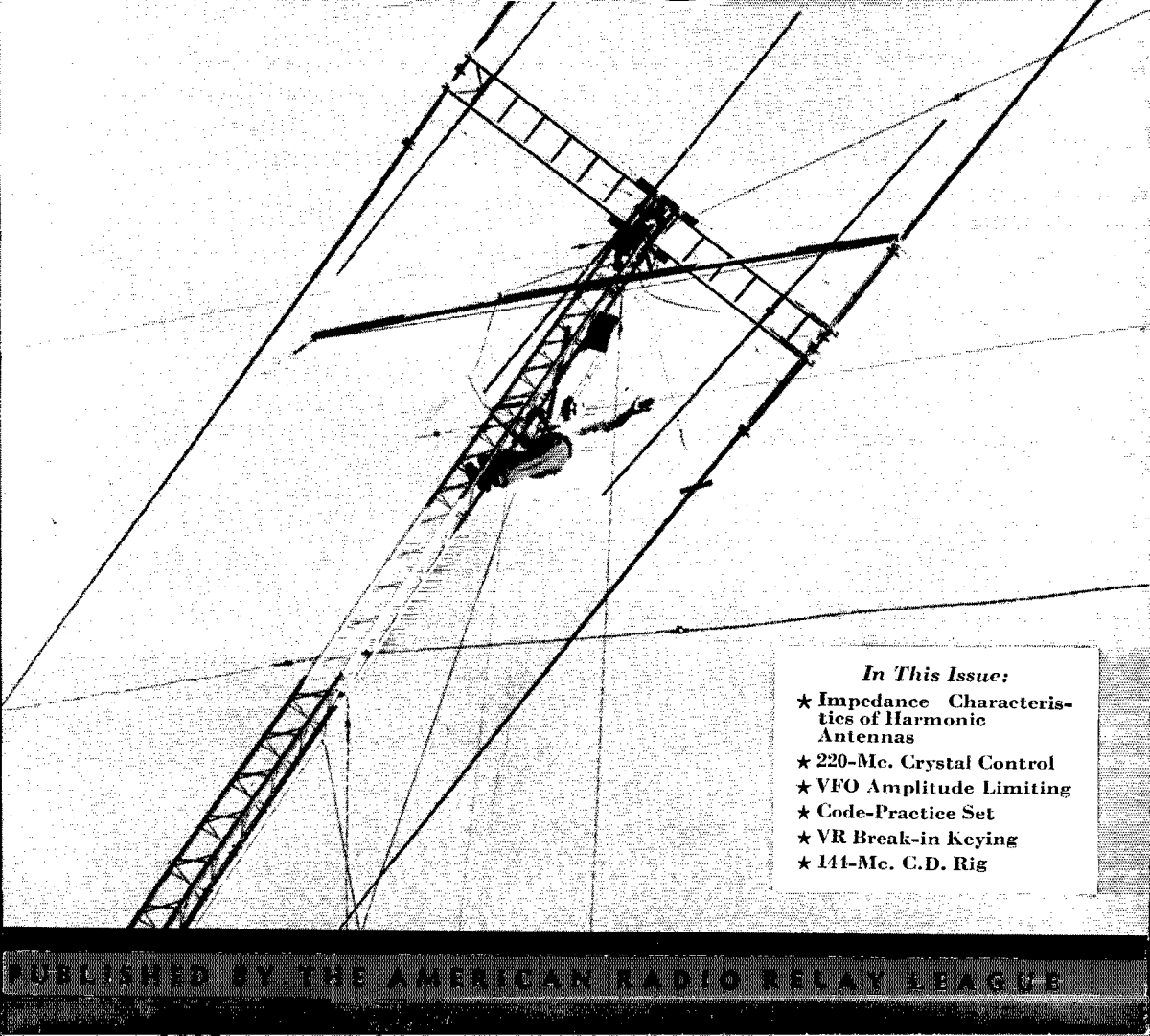

In This Issue:

- ★ Impedance Characteristics of Harmonic Antennas
- ★ 220-Mc. Crystal Control
- ★ VFO Amplitude Limiting
- ★ Code-Practice Set
- ★ VR Break-in Keying
- ★ 144-Mc. C.D. Rig

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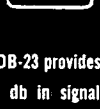

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YOUR "S" METER TELLS THE STORY...

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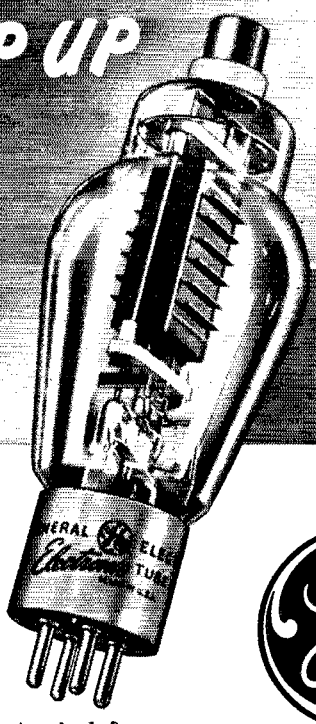

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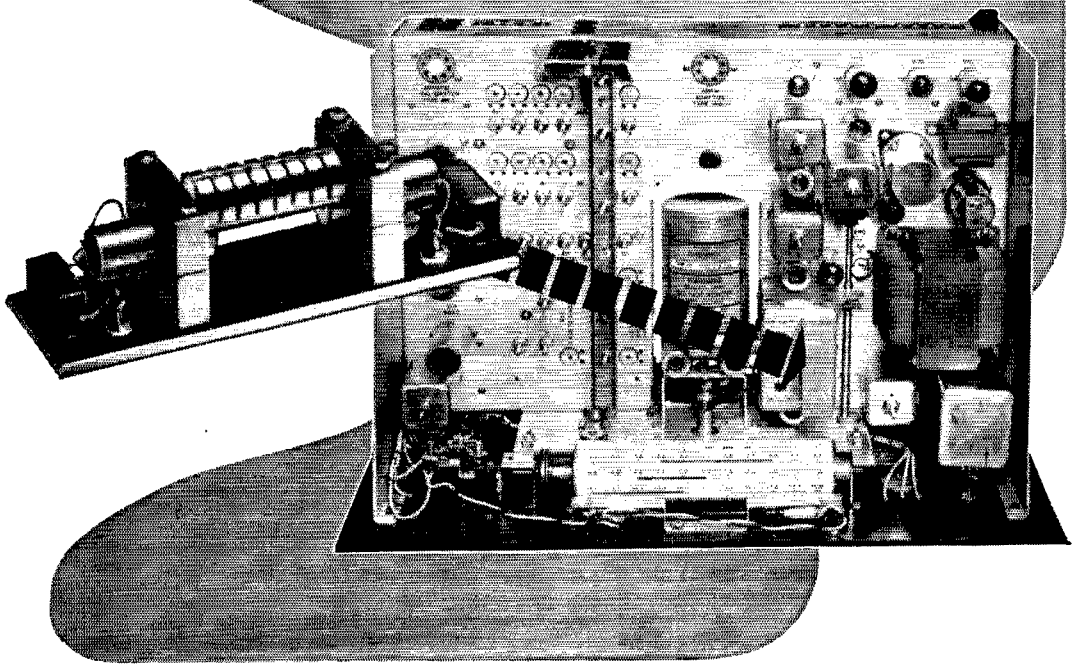

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FEBRUARY 1954

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INDEXED BY
INDUSTRIAL ARTS INDEX

—CONTENTS—

TECHNICAL —

Impedance Characteristics of Harmonic Antennas — *William B. Wrigley, W4UCW* — 10

Checking R.F. Chokes with the G.D.O. — *Neil A. Johnson, W2OLU* — 15

Crystal Control on 220 Mc. — *Edward P. Tilton, W1HDQ, and Mason P. Southworth, W1VLH* — 16

'Phone Selectivity for the BC-312 — *Howard L. Morrison, W7ESM* — 19

Amplitude Limiting for the VFO — *Marvin Bernstein, W2PAT* — 24

A Simple 144-Mc. Rig for C.D. Work — *Albert Newland, W2IHW* — 31

VR Break-In Keying — *Byron Goodman, W1DX* — 33

Post-Phasing Distortion — *(Technical Topics)* — 40

A Vacuum-Tube Insulation-Resistance Tester — *Otto Kosa, W1IYB* — 42

MOBILE —

Bandpass Circuit Design for Crystal-Controlled Converters — *Calvin F. Hadlock, W1CTW* — 27

BEGINNER —

A Beginner's Code-Practice Set — *Lewis G. McCoy, W1ICP* — 36

OPERATING —

20th Annual ARRL DX Contest — 39

Results — 1953 VE/W Contest — 120

GENERAL —

"It Seems to Us..."	9	The World Above 50 Mc.	53
Our Cover	35	Operating News	56
Quist Quiz	35	With the AREC	58
On the Air with Single Sideband	38	Station Activities	63
Happenings of the Month	43	Hamfest Calendar	110
YL News and Views	44	ARRL QSL Bureau	112
Hints & Kinks	45	Military Affiliate Radio System	126
How's DX?	47	United States Naval Reserve	128
Correspondence from Members	51	In *QST* 25 Years Ago	130
He Makes What We Hams Use	52	Feed-back	130
New Apparatus	52	Silent Keys	130

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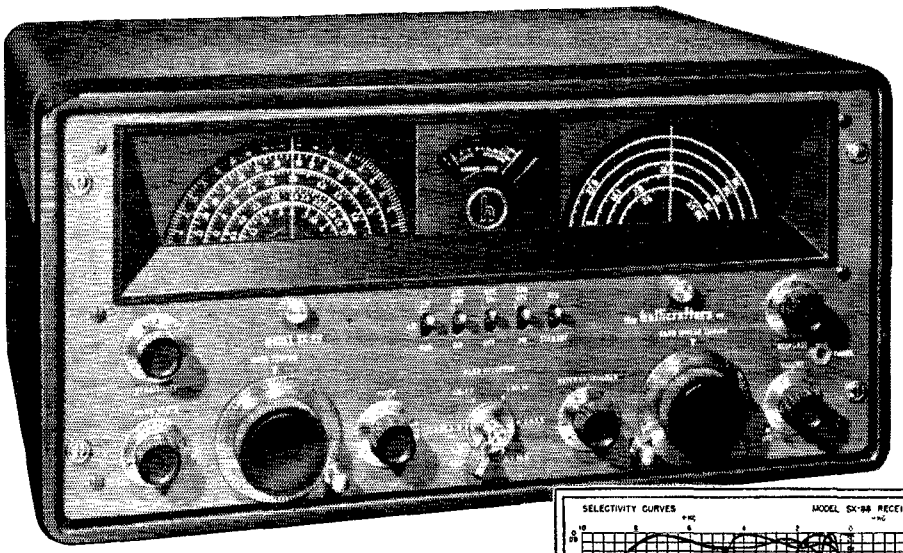

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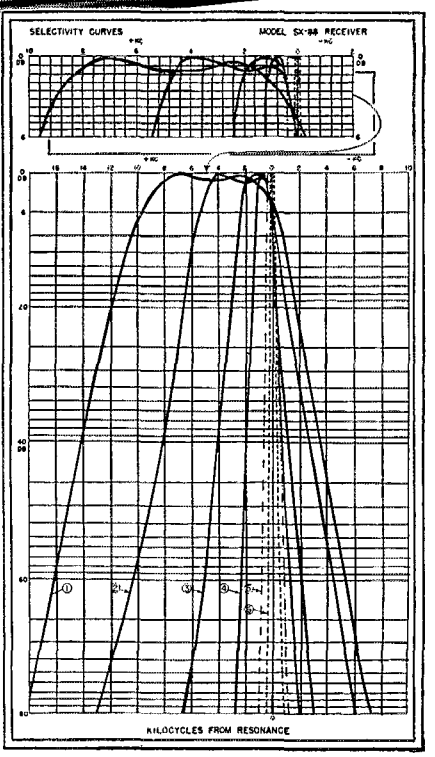

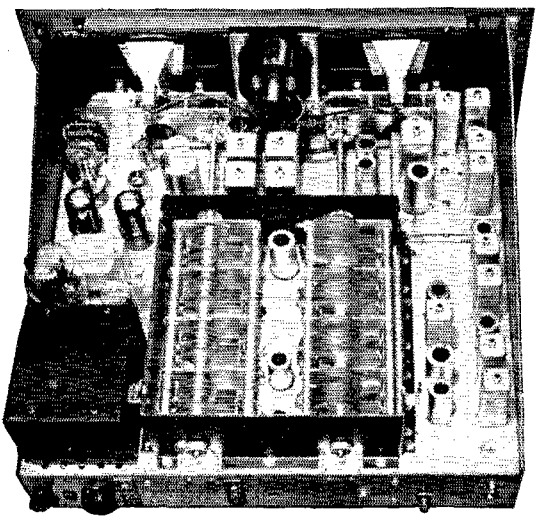

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **All ARRL Field Organization appointments** are now available to qualified League members. These include ORS, OES, OPS, OO and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM and PAM. In addition to station and leadership appointments for Members, *all amateurs* in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).

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

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

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

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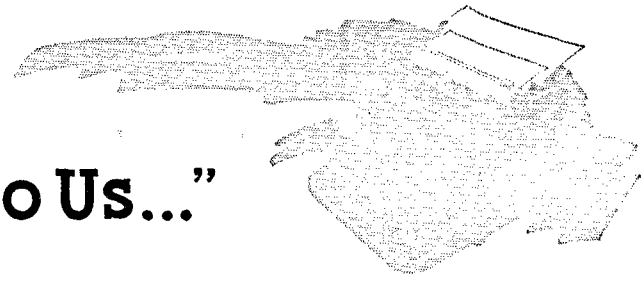

"It Seems to Us..."

LICENSE FEES

For the first time in the history of domestic radio licensing, it now appears likely that some time later this year U. S. amateurs will be required to pay a federal fee for the issuance of their tickets.

Not amateurs alone, but all FCC licensees; for that matter, not just FCC licensees either, but users of a host of other government licensing and similar services such as pilots and aircraft, patent applicants, travelers using passports and visas, small boat owners, etc. This announcement of a directive by the Budget Bureau is a reflection of the firm intention of the new Administration in Washington "to reduce the cost to the general taxpayer of those services which provide a special benefit to limited groups." Government agencies involved have been directed to formulate proposed fees and make them public by February 1st to provide an opportunity for comment.

A license fee, eh? It will be quite a break with tradition in the radio field at least, though it has plenty of parallels elsewhere. Actually, although it's a new animal for us in the sense that it is actually materializing, it has been the subject of discussion off and on in government circles for a great many years.

We don't suppose that anyone especially likes the idea, any more than we like the idea of any kind of fee or tax. Why should we pay a fee for a federal service? Well, to quote the Budget Bureau again, "while government licenses are generally for the welfare and protection of all the people, they usually give some special benefit as well to limited groups." The Administration believes that these limited groups should help offset the costs of the federal service now provided at the general taxpayer's expense. This means that the aspect of noncommercialism in amateur radio isn't a factor; instead, in the view of the Administration, it boils down to the fact that in order to issue us our tickets, it takes specially-hired people and paper and equipment, and that we should contribute to offset these expenditures. The proposed fee, in other words, is not a tax on radio stations or — in our case — on the privilege of engaging in amateur radio; nor is it regarded as a source of new revenue. It is intended to recover a reasonable portion of the cost to the government in administrative and clerical paperwork in issuing the ticket. Broadcasters obviously are going to have to pay a much larger fee than most others; FCC's cost in processing complicated b.c. applications is considerably higher than the average. In our favor, too, is the fact that in recent years our parent Safety & Special Radio Services Bureau has streamlined its license-processing activities on almost a mass-production basis; our paperwork costs are relatively low per individual.

No proposed figure has as yet been announced for amateurs or any other class of station, but we should know soon. Such ideas as have been expressed informally so far indicate thinking that the amateur licensee fee may be on the order of $1. It would be required for renewals as well as new tickets, and probably for modifications also. For radio services such as ours, a suggestion has been made that the fee be paid by means of a special stamp sold through post offices, to be attached to license applications.

We hope to have more information soon.

NOVICES AND DX

As Novices now have some frequencies which hold a reasonable promise of a bit of DX now and then, we'd like to suggest to WNs — especially those of you who have had time to acquire a little operating experience and would like to try something new — that you fire up on those bands during the ARRL contest in February and March. No, we don't suggest you go out to win in your section, for you'll be up against some pretty tough competition; but a little perseverance should bring you a few new countries, especially the second week end when the big guns go hunting for the rare ones because they've filled their quotas from the more populous countries. Don't let power worry you too much; if the 21-Mc. band behaves itself at all during the contest week ends, your 50 or 75 watts can put a fighting signal on the other side of the ocean. So, if you've had a full measure of success in the January Round-up and are seeking new fields to conquer, here's a project to keep you occupied for the next couple of months.

Impedance Characteristics of Harmonic Antennas

The Possibilities of Flat-Line Multiband Operation

BY WILLIAM B. WRIGLEY,* W4UCW

HARMONIC OPERATION of multiband antennas is discussed in the *Antenna Book*[1] with primary emphasis on tuned feeders. This appears to be the only practical method of feed when we realize that end effect prevents the harmonic frequencies of a long wire from being exact integral multiples, and when we consider also that the reactance varies about n times as fast with frequency variation about the nth harmonic as it does for the same percentage frequency variation about the fundamental. Further

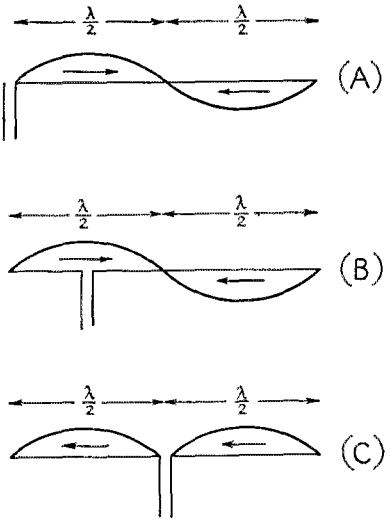

Fig. 1 — Harmonic operation of an antenna is shown at A and B. The antenna at C is not being operated on a harmonic since the current does not reverse direction in adjacent half-wave sections.

study of the impedance characteristics of harmonic antennas might reveal, however, that under certain circumstances flat-line feed on more than one band may be possible although perhaps not very practical. It is not our intention to recommend such operation but merely to assemble and organize the available information on this subject and, in addition, to present some further data which have apparently not appeared in previous literature. Consideration of flat-line harmonic operation will serve only as a means to present our information with some continuity.

Before proceeding with a detailed discussion of these impedance characteristics we must establish a few definitions so that no confusion may arise from our terminology. These definitions follow in general those of the *Antenna Book*.

1) Harmonic operation implies that there is a reversal in current flow in adjacent half-wave sections of the antenna as shown in Figs. 1A and B. The center-fed full-wave doublet, Fig. 1C, is not operating on a harmonic.

2a) A feed line shall be considered flat if the standing-wave ratio is not more than two to one.

2b) The bandwidth of an antenna and feeder system shall be the frequency range over which the feeder standing-wave ratio does not exceed two to one. If the system is matched at resonance, this means that the antenna may be detuned to the frequency at which the reactance equals 0.7 times the resistance. For a system which is unmatched at resonance the range will be more restricted but can readily be determined from a Smith chart.

Free-Space Resistance

The free-space radiation resistance, measured at a current loop (current maximum),

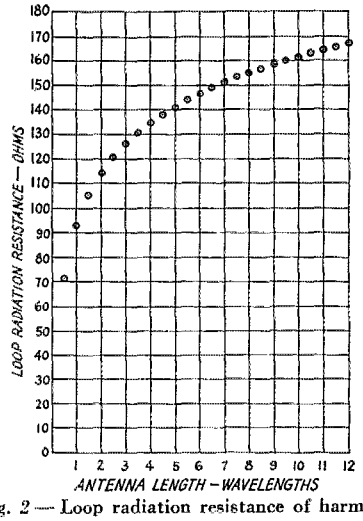

Fig. 2 — Loop radiation resistance of harmonic antennas.

of harmonic antennas increases with the order of the harmonic. Carter,[2] using the induced e.m.f. method, derived an expression which is valid for integral multiples of a half wavelength. These values are plotted in Fig. 2, which is

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[1] *The ARRL Antenna Book*, American Radio Relay League, Inc. (1949).

[2] Carter, P. S., "Circuit Relations in Radiating Systems and Applications to Antenna Problems," *Proc. I.R.E.*, June, 1932. The formula is $R_{11} = 30\ [0.5772 + ln\ (2\pi n) - Ci\ (2\pi n)]$ ohms, where n is the number of half wavelengths or the order of the harmonic.

similar to Fig. 2-23 in the *Antenna Book*. The latter, however, was taken directly from Carter's paper which unfortunately contained computational errors.

If it is assumed that the antenna can be fed properly (this will be discussed later) the resonant resistance at a point which is not a current maximum may be calculated from an assumed current distribution. The sinusoidal approximation is very good in the vicinity of a current loop and hence we may calculate the constant-power radiation resistance variation about this point by multiplying the loop resistance by the reciprocal-cosine-squared of the angular deviation:

$$\text{Power} = W = I^2R$$

$$\text{For constant power } R \propto \frac{1}{I^2}$$

$$\text{Near current loop } I = I_0 \cos^2 \theta$$

$$\text{and } R = R_0 \frac{1}{\cos^2 \theta}$$

Fig. 3 shows this relationship for a half-wave doublet. Near the ends of the doublet, or near the current nodes of harmonic antennas, this

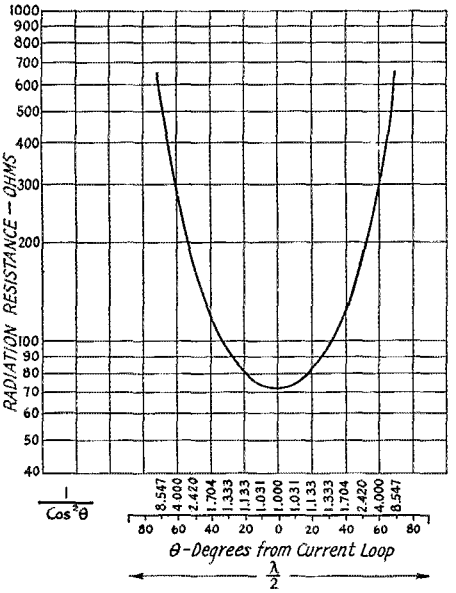

Fig. 3 — Radiation resistance of a half-wave doublet as the feed point is varied about the current loop at the center.

relationship fails since the calculated resistance approaches infinity. This is because the sinusoidal approximation breaks down near these points since the current does not actually become zero anywhere along the wire. Furthermore, as the feed point approaches any current node, except at the ends, the operation of the antenna changes to a nonharmonic mode as shown in Fig. 1C.

[3] These curves were interpolated from data presented in Technical Report No. 155, Cruft Laboratory, Harvard University, Cambridge, Massachusetts, entitled "Experimental and Theoretical Impedances and Admittances of Center Driven Antennas," by Phyllis A. Kennedy and Ronald King, April 1, 1953.

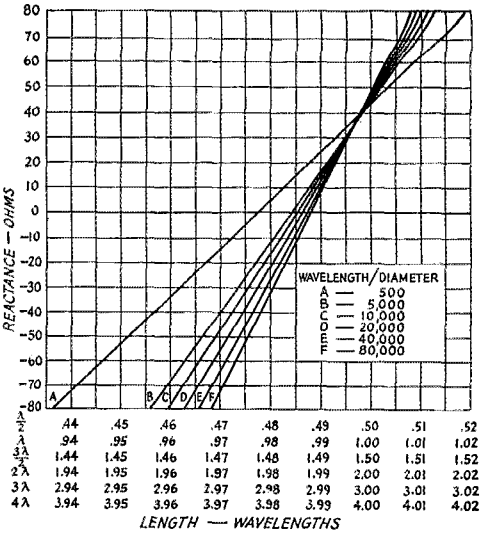

Fig. 4 — Loop reactance *vs.* length of harmonic antennas, not including insulator end effect.

Free-Space Reactance

The rate at which the reactance of an antenna changes as the length is varied about resonance is the principal factor that determines the antenna's selectivity or bandwidth. This rate is a function of the wavelength-to-diameter ratio and the thicker the wire the broader the bandwidth. Fig. 4 shows the reactance *versus* length curves for center-driven half-wave dipoles of various wavelength-to-diameter ratios.[3] The curves *B*, *C*, *D*, and *E* were selected to represent No. 12 wire at 10, 20, 40 and 80 meters, respectively. While these curves apply precisely to half-wave doublets only, the extension of the horizontal scale to cover harmonic operation up to four wavelengths introduces negligible error (less than two-tenths of one per cent in over-all length at second harmonic resonance). These extended scales follow the accepted approximation mentioned previously, that the reactance-frequency variation of harmonic antennas is directly proportional to the order of the harmonic.

The slopes of the curves of Fig. 4 are, of course, the important figures. For fundamental resonances they are as follows:

10 meters (curve *B*) — 27.9 ohms per one per cent change in frequency
20 meters (curve *C*) — 30.5 ohms per one per cent change in frequency
40 meters (curve *D*) — 33.3 ohms per one per cent change in frequency
80 meters (curve *E*) — 36.4 ohms per one per cent change in frequency

and at the *n*th harmonic they are *n* times these values.

For a feed point near, but not at, a current loop the reactance is increased by the same reciprocal-cosine-squared factor as in the case of the radiation resistance. In other words, the curve slopes in Fig. 4 are increased by this factor.

Resonant Length

While the resonant length of a harmonic antenna is affected by the wavelength-to-diameter ratio as shown in Fig. 4, insulators cause sufficient additional end loading to produce a total shortening of about five per cent of a half wavelength. As mentioned in the *Antenna Book*, the

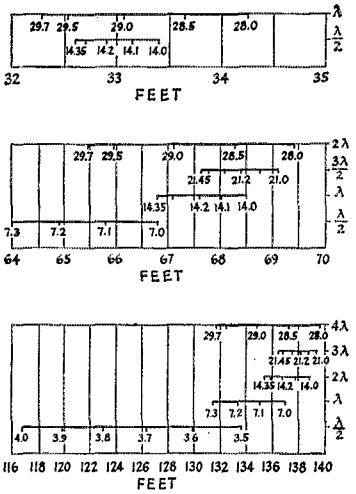

Fig. 5 — Resonant frequency of harmonic antennas as a function of wire length in feet. Length = $1/f_{\text{Mc.}} \times 492 \left[n \left(\frac{\lambda}{2} \right) - 0.05 \right]$.

following formula has proven to be quite satisfactory in practice:

$$\text{Length (feet)} = \frac{492 \left[n \left(\frac{\lambda}{2} \right) - 0.05 \right]}{f \text{ (megacycles)}}$$

where $n \left(\frac{\lambda}{2} \right)$ is the order of the harmonic or the number of half-waves in the antenna.

Fig. 5 shows the harmonic resonant frequency opposite length in feet for wires cut to 80-, 40- and 20-meter fundamentals. Unless the bandwidths are reasonably large it appears from Fig. 5 alone that flat-line harmonic operation is not very practical.

Ground-Plane Effects

The impedance effect of a perfectly conducting ground under a horizontal antenna may be calculated by substituting for the ground plane an image antenna at a depth equal to the antenna height and with an equal and opposite current distribution. Formulas for the mutual resistance and reactance of parallel resonant harmonic antennas have been developed by Carter.[4] Subtracting these values from the self resistance (Fig. 2) and reactance (zero at resonance) will give impedance values as a function of height above a perfect ground. Fig. 6 shows the radiation resistance *versus* height above a ground plane for several harmonics. There is a separate horizontal scale for each harmonic, so arranged that the resistances of any given antenna at its various harmonics fall along the same vertical line for a particular physical height.

Now, as we all know, the ground is not a perfect conductor as assumed in the calculations. However, measurements made in a range from less than ten-meter wavelengths to greater than twenty meters over a good ground[5] indicate remarkably close agreement with theory above 0.2λ. Below 0.2λ the resistance increases rapidly above theoretical due to ground conductivity losses or absorption of the induction field. The encircled points in Fig. 6 show some of the measurement data for a half-wave doublet. When the wavelength is increased above twenty meters, as explained in the *Antenna Book*, the ground acts even more like a good conductor. This is evidenced by the measurements recently made by W1IYI[6] at 75 meters, indicated by the crosses on Fig. 6. Consideration of the measurement data indicates that the dashed curve below 0.2λ is no doubt better than the theoretical curve in this region.

While this increase above theoretical radiation resistance near the ground may appear attractive for matching purposes, it actually represents a loss in radiated energy. As mentioned before, it is due to absorption of the induction field, which means power dissipated in the ground.

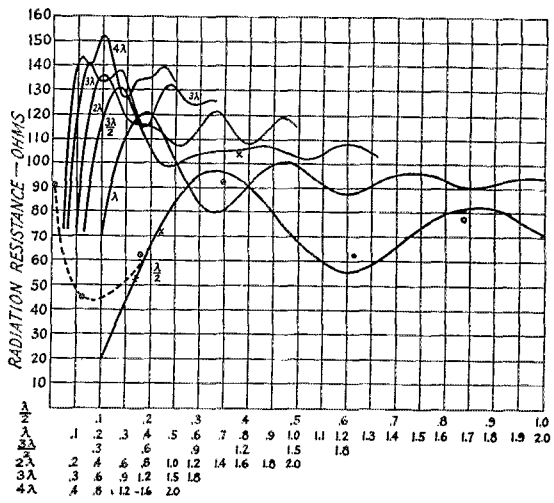

Fig. 6 — Radiation resistance of harmonic antennas *vs.* height above perfect ground plane. The dashed curve approximates the effect of imperfect ground, for fundamental resonance, based on the measured points shown.

[4] Carter, *loc. cit.*, the formulas are:
$R_{12} = 60\,\text{Ci}(A) - 30\,\text{Ci}(B) - 30\,\text{Ci}(C)$ ohms
$X_{12} = -\{60\,\text{Si}(A) - 30\,\text{Si}(B) - 30\,\text{Si}(C)\}$ ohms
where
$A = 2\pi d$
$B = 2\pi\,(\sqrt{d^2 + l^2} + l)$
$C = 2\pi\,(\sqrt{d_2 + l^2} - l)$
l = antenna length in wavelengths
d = antenna separation (twice the height above the ground plane) in wavelengths.

[5] Friis, H. T., Feldman, C. B., and Sharpless, W. M., "The Determination of the Direction of Arrival of Short Radio Waves," *Proc. I.R.E.*, Jan., 1934, p. 47.

[6] Avery, J. D., "Multi-Impedance Dipoles," *QST*, May, 1953, p. 42.

It should be pointed out here that the effective ground plane is usually not coincident with the surface of the ground but is usually several feet down, depending on the wavelength, and can only be determined by experiment.

Fig. 6 shows many interesting facts. For instance, a 40-meter doublet about 0.3λ to 0.4λ high would be a good resistance match to one hundred ohms at both 40 and 15 meters $\left(\frac{3\lambda}{2}\right)$.

The reactance effect of the ground plane on harmonic antennas is shown in Fig. 7, which may be interpreted as showing the reactance *versus* height above the ground of harmonic antennas cut to length in accordance with the formula. Above about 0.6λ, this introduced reactance effect is apparently quite small and indeed negligible in conjunction with corresponding radiation resistances.

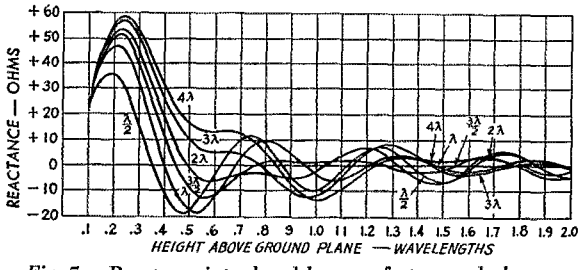

Fig. 7 — **Reactance introduced by a perfect ground plane as a function of height for harmonic antennas.**

Measurement data which would indicate departure from these curves due to an imperfect ground plane are apparently not available. Consequently, we will be optimistic in using the curves below 0.2λ since the theoretical reactance decreases very close to the ground as does the theoretical resistance.

• This article is a study of the impedance variations along an antenna, for fundamental and harmonic operation, with the results expressed in graphical form for ease of use in the design of feed systems and determining bandwidths. If you have been puzzling over the question "Is real flat-line multiband operation possible?", here is the answer.

Sample Calculations

We have now presented the necessary fundamental data and we shall proceed to tie it all together by considering a few examples of specific antennas.

Height is a most important factor so let us assume for the first example that we are limited to 25 feet, a very common situation. Since this height is approximately 0.1λ at 80 meters, 0.2λ at 40 meters, etc., we determine from Fig. 6 that the resonant loop resistances are 44 ohms at $\frac{\lambda}{2}$, 71 ohms at λ, 136 ohms at 2λ, 134 ohms at 3λ, and 151 ohms at 4λ which is the eighth harmonic or 10 meters. Next we construct Fig. 8, which consists of many curves similar to Fig. 3, arranged horizontally according to harmonic current distributions and oriented vertically according to the above loop resistances. A logarithmic vertical scale is used in Fig. 8 (and also Fig.

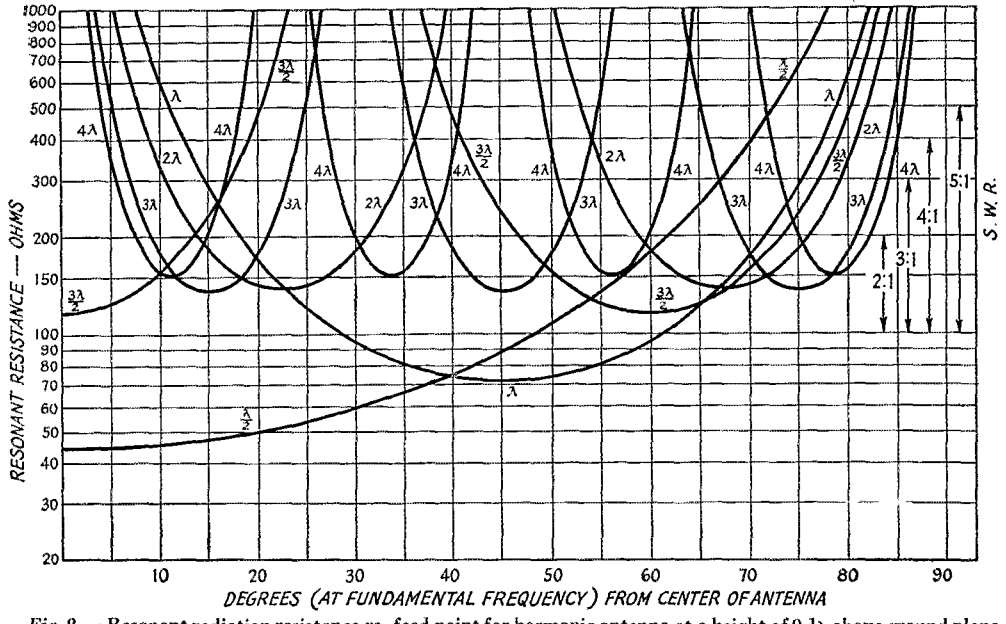

Fig. 8 — **Resonant radiation resistance *vs.* feed point for harmonic antenna at a height of 0.1λ above ground plane at the fundamental frequency (λ/2). The height is 0.2λ at the second harmonic (λ), 0.3λ at the third harmonic (3λ/2), etc.**

3) for two reasons. First, the shape of the curve for any particular harmonic remains the same regardless of the loop or minimum point. Consequently, after having plotted one complete set, a similar set for a different height and different loop points may be readily produced by tracing. Second, a given s.w.r. is represented by the same vertical distance regardless of position on the plot. These s.w.r. intervals are shown on the right edge of Fig. 8.

Now we look over Fig. 8 to find a feed point where the harmonic resistance curves of interest all pass within a minimum s.w.r. interval. We notice immediately that there is no universal intersection point for all harmonics. Unfortunately, this is true for any antenna height we might have selected.

If we are interested in 80- and 40-meter operation only, we find an intersection of the $\frac{\lambda}{2}$ and λ curves very close to 72 ohms at 39 to 40 fundamental $\left(\frac{\lambda}{2}\right)$ degrees from the center of the antenna or left edge of the plot. Since end effect occurs only at the end of the wire, we should make all our measurements in free-space wavelengths from the center.

From Fig. 5 we select a length based on the $\frac{\lambda}{2}$ and λ plots only. Choosing 133 feet gives free-space resonance at about 3.51 and 7.22 megacycles. A first order correction for these frequencies due to ground effect reactance is then made from Fig. 7 and the slope data of Fig. 4. The introduced reactance at the fundamental is about 21 ohms inductive which means the resonant frequency is actually lower. At 80 meters, the reactance slope is 36.4 ohms per one per cent change in frequency so resonance occurs near $3.51 - \frac{21}{36.4} \times 0.0351 = 3.49$ megacycles. At 40 meters the slope is twice 33.3 ohms per one per cent frequency change ($n = 2$) and the reactance is about $+47$ ohms giving actual resonance near $7.22 - \frac{47}{66.6} \times 0.0722 = 7.17$ megacycles. These corrections may well be small enough to be neglected as being within the accuracy limitations of some of our calculations,[7] but we will retain them in this example.

To determine the bandwidths on 80 and 40 we recall our flat-line definition which allows detuning until the reactance is 0.7 times the resistance. Since we are feeding at a point which is not a current loop at the fundamental, the reactance slope is increased by the reciprocal-cosine-squared factor as is the resistance. At 40 degrees from the loop this factor is 1.70. We can detune till the reactance is 0.7 times 72 ohms or 50 ohms either side of resonance; that is, $\frac{50}{36.4 \times 1.70} \times 0.0349 = 0.0282$ megacycles. Our flat-line bandwidth is therefore from $3.49 - 0.28 = 3.46$ megacycles to $3.49 + 0.28 = 3.52$ megacycles, a little over 55 kc., less than half of which is in the band. At 40 meters we have $\frac{50}{2 \times 33.3} \times 0.0717 = 0.054$ megacycles, giving a bandwidth from 7.12 to 7.22 megacycles. At this point it might be well to choose a more appropriate wire length for 80 meters such as 132 feet and repeat all our calculations, but let us proceed to the consideration of operation on more bands.

Since none of the other harmonic curves of Fig. 8 are within a 2-to-1 s.w.r. of 72 ohms at the feed point just considered, we must search for a better position along the wire. We find that at about 59 fundamental degrees from the center we will have a fair match to 150 ohms at 80 meters $\left(\frac{\lambda}{2}\right)$, 40 meters ($\lambda$), 20 meters ($2\lambda$), and 10 meters ($4\lambda$). The $\frac{3\lambda}{2}$ curve is also close here, but it was included in Fig. 8 to provide for a third harmonic (15 meters) of a 40-meter fundamental, which is not our present case. The 15-meter curve in our case (3λ) is completely out of range at this feed point.

From Fig. 5 it appears that a length of 136 feet would be the best compromise for all four bands, but from the previous example we can predict that we will be completely out of the 80-meter band. However, this length will serve for getting an idea of the bandwidths to be expected at the higher harmonics.

The bandwidth calculations are more complicated in this case since the resistance as well as the reactance mismatch must be considered. The detailed calculations will not be given but can be easily accomplished with the aid of a Smith chart on which a 2-to-1 s.w.r. circle is drawn. The results are as follows:

a bandwidth of 51 kc. centered at 3.42 Mc.,
a bandwidth of 88 kc. centered at 7.01 Mc.,
a bandwidth of 194 kc. centered at 14.27 Mc., and
a bandwidth of 214 kc. centered at 28.75 Mc.

On 80 meters, none of the flat-line bandwidth is in the band. The bandwidth on 20 meters is the first reasonable figure we have encountered; it covers the 20-meter 'phone band. At 10 meters the bandwidth turns out to be perhaps tolerable, but only covers a small part of the active 'phone band.

These calculations are not very encouraging, but before abandoning the project let us investigate the possibilities for an antenna height of about 65 feet. This is a quarter-wave at 80 meters, one half-wave at 40, etc., and on constructing a chart similar at Fig. 8 for this height the best feed compromise is found to be 150 ohms at 30 to 31 fundamental degrees from the center although the sixth harmonic (3λ) or 15 meters is

(*Continued on page 100*)

[7] Among other things, we have neglected the effect of the ground plane on the reactance slope, which is an optimistic assumption.

Checking R.F. Chokes with the G.D.O.

A Simple Method of Determining Relative Effectiveness in Parallel Feed

BY NEIL A. JOHNSON,* W2OLU

• For more than one reason, the use of parallel plate feed is on the increase. However, difficulty is often encountered when a single choke is required to operate efficiently in several bands. W2OLU describes a simple method of predicting the effectiveness of various chokes at any frequency.

In many cases the literature of late has mentioned the fact that radio-frequency chokes, as used by amateurs, are apt to be deficient, either at one frequency or another. This fact has been pointed up, of late, by the opening of the 21-Mc. amateur band, and subsequent attempts to get orthodox circuits and components to work on this frequency with normal efficiencies. Grammer has discussed this fact in his excellent article.[1]

The exact nature of radio-frequency chokes, and their apparent intended functioning, seems to be somewhat of a mystery to the average amateur. Most hams will tell you that an r.f. choke ought to look like an infinite impedance at the desired frequency. At the same time, it should have no undesirable characteristics, such as excessive d.c. resistance. Thus the ideal r.f. choke would have all the attributes of a parallel-tuned circuit, with infinitely-high impedance over a wide band of frequencies! Since this is obviously impossible, even the best radio-frequency choke must become something of a compromise.

Following the reasoning that the ideal r.f. choke would look like an infinite impedance at any frequency to be used, the idea took form in the writer's mind that it should be possible to judge the efficiency, or at least the relative worth of any given r.f. choke, by connecting it in parallel with a given tuned circuit, powered by some sort of signal generator. Then, checking upon a following grid circuit, it could be seen what, if any, the effect might be. It was reasoned that the best choke would be the one that exhibited neither positive nor negative reactance, but which changed the drive to the following grid by a minor factor, if at all.

First efforts along this line were rather revealing. However, a little correspondence with the leading lights of the ARRL Technical Department raised a question as to whether the method under consideration could be considered valid. It was pointed out that the paralleling of the tuned circuit under consideration by a given unknown — in this case an r.f. choke under test — would result in a wide frequency shift in some cases, due to the paralleled inductances.

These observations were, to a certain extent, true. So a more definite and positive method was sought. It was hoped that a means could be found whereby the simple set-up might still be utilized, but with prospects of enhanced accuracy. After a good deal of further study, it came to mind that if the signal generator — in this case a g.d.o. — could be coupled rather tightly to the choke under test, then the frequency shift that ensued would be a tip-off to the loading effect of the choke. This idea was then tried. In fact, different chokes were connected directly across the tank of the g.d.o. in an effort to find out what loading they manifested upon the generator frequency. In practice, it was learned that those chokes which exhibited the least effect upon the generator frequency were the most desirable chokes for the particular frequency under consideration.

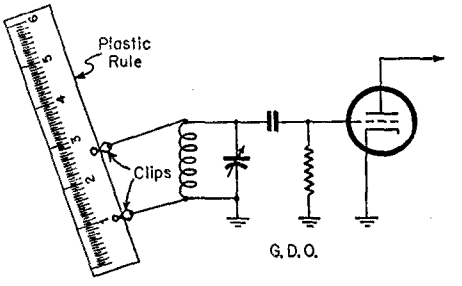

Fig. 1 — Test set-up for checking r.f. choke by observing the frequency change when the choke is connected across the tuned circuit of a g.d.o. (See text.)

The test set-up utilized is shown in Fig. 1. It calls for a minimum of test equipment. Thus it should be applicable to many ham shacks around the country. The only items required are a grid-dip oscillator and a communications receiver whose calibration is known. The g.d.o. is similar to the Hartley type described in the ARRL *Handbook*. The clip leads are first set on a plastic rule to same spacing as length of choke. This is important so that the lead capacitance will not change when the choke is connected. The g.d.o. is then set to the test frequency without the choke connected. The choke is then connected, while keeping the clip and lead spacing constant, and the change in frequency is

(Continued on page 102)

* 10 North 10th Ave., Mt. Vernon, N. Y.

[1] Grammer, "Pi-Network Tank Circuits for High Power," *QST*, October, 1952.

Crystal Control on 220 Mc.

Stepping Up from the Modulated Oscillator in the Beginner's Station

BY EDWARD P. TILTON,* WIHDQ, AND MASON P. SOUTHWORTH,** W1VLH

• Nearly everyone who intends to work on 220 Mc. will want a stabilized transmitter eventually. This three-tube r.f. section is designed to replace the simple oscillator in the beginner's 220-Mc. station recently described in a series of *QST* articles. Though it uses only low-cost receiving tubes, its signal will be of a quality that will hold its own in any company. Additional amplifier stages can be added, for higher power, when the builder is ready for them.

THE simple modulated-oscillator r.f. section for 220 Mc. described in *QST* for November, 1953, admittedly leaves quite a bit to be desired. While its signal is adequate for short-range work with stations having broadband receivers, the rig must be adjusted and operated with some care if it is to be readable when communications receiver selectivity is employed. As most v.h.f. operators now use converters working into communications receivers, it is obvious that our 220-Mc. beginner is going to want something better in the way of a transmitter before very long.

Probably the only reason for starting off with the simple oscillator is that its elementary design may encourage some beginners to try their hands at transmitter construction, while they might be a bit wary of even a three-tube rig like the one described herewith. If you have built the simple oscillator, perhaps you are ready for the next step up the transmitting ladder by now. This crystal-controlled r.f. section can be operated

At the left end are the crystal and oscillator-multiplier tube. The push-pull tripler is in the middle, and the final stage and antenna socket at the right.

with power supply and speech equipment designed for the simple job. It uses three of the same tubes, 12AT7s, and some of the other components of the oscillator can be salvaged for this or later projects. The power output will be only slightly more than with the single-tube oscillator, but because it is capable of being modulated fully without the frequency modulation that is characteristic of the simple oscillator, it will be much more effective in work with stations having selective receivers.

Circuit Details

Don't let the schematic diagram, Fig. 1, scare you. The photographs show the simplicity of the circuit and construction to better advantage. This is often the case with equipment that uses mainly small and simple parts; schematic presentation, necessary though it is, actually makes the rig appear more complicated than it looks to the eye. Three tubes are used, the first serving two functions. Its first half is an overtone crystal oscillator, using either 8- or 24-Mc. crystals. This drives the second triode section operating as a frequency tripler to 73 Mc. The third stage (second tube) is a push-pull tripler to 220 Mc., and the final stage is a neutralized amplifier on the same frequency. Useful output is about two watts.

From the schematic diagram it may be seen that capacity coupling is used between the first three stages. The push-pull tripler and final stages are coupled inductively. The plate circuit of the first tripler is arranged to provide balanced excitation to the following stage. The trimmer, C_3, is set to a value approximately equal to the output capacitance of the tube, so that equal values of drive will be delivered to the following grids.

Metering of individual stages is made possible by the use of an 8-pin power connector, with the various plate and grid leads brought to separate pins. Use of this method is explained in the section on adjustment procedure.

Construction

All the parts are mounted on an aluminum plate 5 by 9½ inches in size. This is fastened to an inverted standard chassis of the same dimensions, 2 inches deep, affording both shielding and mechanical support. Power wiring is made with shielded wire, so that TVI prevention measures can be applied if needed.

Parts layout is not extremely critical, but the general arrangement shown should be followed for best results. The tube sockets, the crystal and antenna sockets, and trimmers C_2, C_4 and C_7 are mounted on a line drawn down the middle of the base plate. The first tube socket is 1¾ inches in from the left edge, and the three sockets are 2¼

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** Laboratory Assistant, *QST*.

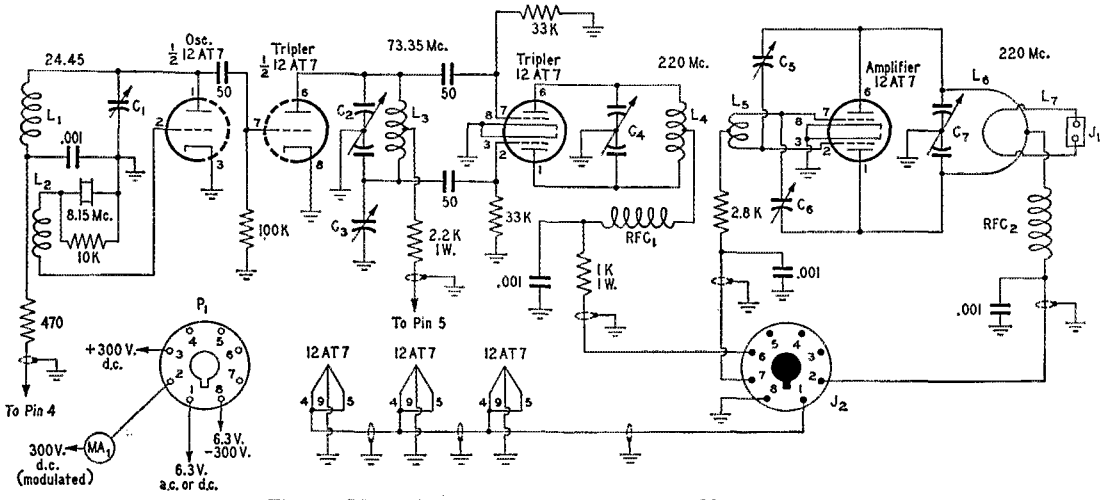


Fig. 1 — Wiring diagram of the low-powered 220-Mc. transmitter.

C_1 — 50-$\mu\mu$f. miniature trimmer (Hammarlund MAPC-50).
C_2 — 11-$\mu\mu$f. miniature butterfly variable (Johnson 11MB11).
C_3, C_5, C_6 — 3–30 $\mu\mu$f. mica trimmer.
C_4, C_7 — 8-$\mu\mu$f. miniature butterfly variable (Johnson 9MB11).
L_1 — 10 turns No. 20 tinned, ½-inch diam., spaced diam. of wire.
L_2 — 4 turns No. 20 tinned similar to L_1. L_1 and L_2 made from single piece of B & W Miniductor No. 3003; see text.
L_3 — 12 turns No. 18 tinned, ⅜-inch diam., spaced diam. of wire, center-tapped.
L_4 — 2 turns No. 18 enam., ½-inch diam., spaced ⅛ inch, center-tapped.
L_5 — 2 turns No. 18 enam., ⅜-inch diam., spaced ⅛ inch, center-tapped.
L_6 — U-shaped loop No. 16 tinned, made from 5 inches of wire. Sides of U are 1 inch apart, bent at right angles 1 inch from open end, center-tapped.
L_7 — Similar to L_6, but no center tap. Cover both loops with insulating spaghetti.
J_1 — Output terminal (crystal socket).
J_2 — Male power fitting, 8-pin (Amphenol 86-CP8).
P_1 — Matching cable fitting, 8-pin (Amphenol 78-PF8).
RFC_1, RFC_2 — 18 turns No. 22 enam., close-wound on 1-watt resistor of high value.

inches apart. The first is mounted perpendicular to the long side of the chassis, with Pins 1 and 9 on the low side, as seen in the bottom view. The others are at an angle of 45 degrees, with Pins 1 and 9 above the center line. This results in the shortest possible r.f. leads, an important factor in 220-Mc. design.

The principal components may be identified readily in the photographs. From left to right, in either view, we see the crystal and its associated components, the oscillator-tripler tube, the first tripler plate circuit, the push-pull tripler stage and its plate circuit, with the amplifier grid coil coupled to it, and the final amplifier stage. The neutralizing capacitors, C_5 and C_6, obscure the amplifier socket in the bottom view. The U-shaped plate tank inductance and output coupling loop and antenna socket are at the far right.

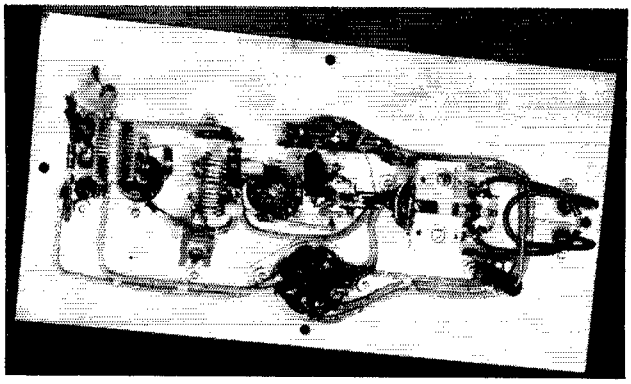
The oscillator coils, L_1 and L_2, are made from a single piece of B & W Miniductor, though, of course, they may be wound by hand if one desires. If the Miniductor is used it should be cut to about 16 turns in length, unwinding one turn from each end, leaving a total of 14 turns. The wire should then be cut at the 10th turn, making two separate coils of 9¾ and 3¾ turns each, after ¼ turn of each is used for leads.

When all the parts are mounted in place, we can proceed with wiring. Neatness and freedom from trouble will result from generous use of tie-points for mounting small parts. Single-terminal strips were used for the oscillator and tripler plate decoupling resistors and RFC_2 in the final plate circuit. A 4-terminal strip takes the tripler plate and final grid resistors, and their associated by-pass condensers. All other parts are supported by the components themselves. Make all connections that will carry r.f. energy with the shortest possible leads. Leads carrying heater or plate voltage can be laid around the base plate in any convenient way, disregarding lead lengths. If shielded wire is used, the shield braid of adjacent wires should be soldered together at intervals of one to two inches. The shields should also be grounded to the base plate at convenient points such as soldering lugs placed under the nuts that hold the sockets in place.

Where the tube socket connections are grounded (as with Terminals 3, 8 and 9) these terminals should be bent up against the metal sleeve in the center of the socket and soldered in place. The sleeve is then connected to a grounding lug under one of the mounting nuts. Rotors of C_2, C_4 and C_7 are grounded by mounting them directly on the metal plate.

Adjustments

The 8-pin plug and socket for connecting the power supply to the transmitter provides for operating the stages individually or in any combination. The power supply for testing should deliver 150 to 300 volts d.c. and 6.3 volts at one ampere or more. The latter can be either a.c. or d.c., so the rig can be operated from a 6-volt storage battery and a dynamotor or vibrator



Interior view of the 220-Mc. transmitter. Components appear in the same order, left to right, as in external view. Trimmer at upper left is C_1.

supply, for mobile or portable work, if desired.

In the schematic diagram, P_1 is a plug that is connected on a 4-wire cable. If the rig is to be substituted for the simple oscillator described in November *QST*, the 8-pin cable socket will be used in place of the 4-pin socket shown in Fig. 6 of the December issue. The power fitting, J_2 in Fig. 1, is the connector mounted on the base plate. We supply power to the various plate circuits by connecting a test meter between Pin 3 and the pin that connects to the circuit to be activated.

For the first adjustments, our power supply voltage should be 150 to 250 volts. If it is more than 250, connect a 5000-ohm 10-watt resistor in series with the lead to Pin 3. This will drop the voltage when high current is drawn, and protect the tubes from damage if there is anything wrong with the transmitter.

We start with the oscillator, connecting a 50- or 100-ma. meter between Pins 3 and 4. Leave Pin 2 open for the present. Apply plate voltage and note the plate current as C_1 is rotated. There should be a sharp dip as the tube goes into oscillation. This oscillation should be on the desired frequency (you will be able to hear the harmonic in your receiver) and it should not change frequency appreciably as the condenser is varied. If it does shift widely, the tube is oscillating without crystal control. This may result from excessive feed-back, in which case the size of L_2 should be reduced a half turn at a time until only crystal-controlled oscillation is found. The oscillator plate current will run around 10 ma. at 250 to 300 volts. The coil value for L_2 is for use with 8-Mc. crystals. With a 24-Mc. crystal 1 to 2 fewer turns may be used.

When the oscillator is working properly, solder a jumper between Pins 3 and 4 in P_1, and connect the meter between Pins 3 and 5. This will apply plate voltage to the first tripler and measure its plate current drain, while allowing the oscillator to run without metering. Set C_3 near minimum capacitance, and tune C_2 for a dip in plate current. Output from this stage, and from the oscillator, may be checked with a lamp load consisting of a 2-volt 60-ma. pilot lamp, with a loop of insulated wire a half inch in diameter connected across its terminals. When this is inserted between the turns of L_3 or adjacent to L_1, there should be enough output from either stage to make the lamp glow. The frequency can be checked with a calibrated wavemeter or grid-dip meter. The trimmer C_3 should be adjusted for maximum output, retuning C_2 each time the setting of C_3 is changed. The plate current will be similar to the oscillator portion, about 10 ma.

Now solder a jumper between Pins 3 and 5 and connect the meter between Pins 3 and 6 to measure the push-pull tripler plate current, which should be about 20 ma. It may not show a pronounced dip when the stage is tuned to resonance, so the grid current produced in the final amplifier stage is a better indication of optimum adjustment. This is measured by connecting a 10- or 25-ma. meter between Pins 7 and 8. Meters with higher-reading scales can be used, of course, but the indication will not be as sensitive to small changes in adjustment.

The next step is neutralization of the final stage. Set the neutralizing capacitors near their minimum (open) position. Repeak C_4 for maximum grid current indication, and adjust the position of L_5 with respect to L_4 for maximum grid current, retuning C_4 as this is done. Now tune the final amplifier plate capacitor, C_7, while watching the grid current. If there is a change in grid current as this is done, adjust the neutralizing capacitors (keeping them at approximately equal settings) until there is no drop in grid current as the plate circuit is tuned through resonance. There may be a slight rise, but there should be no sudden dip.

When the kick in grid current has been eliminated by proper neutralization, the plate voltage may be applied to the final stage by connecting the plate meter between Pins 3 and 2, or by applying plate voltage through the meter, as shown in the schematic. Connect a lamp load across the antenna terminals. This may be a 6.3-volt 250-ma. blue-bead pilot lamp. Tune C_7 for maximum brilliance indication. This should occur at minimum plate current, which will be about 30 ma. with 300 volts applied, and the lamp should show close to full brilliance with everything working properly. The plate current readings given throughout the text are for the full 300 volts applied. If the 5000-ohm dropping resistor is used in the adjustment phases, as

(*Continued on page 104*)

'Phone Selectivity for the BC-312

Q5-ing with a Dual-Crystal Filter

BY HOWARD L. MORRISON,* W7ESM

• The dual-crystal filter modification described here not only comes just about as close as possible to making a "1954" receiver out of the still-prevalent army surplus sets, but is applicable to any receiver that does not have enough of the right kind of selectivity to cope with present-day 'phone QRM. In addition, it contains practical information on moving the frequencies of low-frequency surplus crystals, plus methods of alignment that will be useful not only in receiver applications, but to the s.s.b. man who is building a crystal-filter type exciter.

MANY effective ideas for improving the BC-312 and BC-342 have appeared in *QST* ever since these receivers became items of war surplus, but not much has been said about directly improving their 'phone selectivity. That this feature needs considerable improvement is painfully obvious to those who have tried to use them in today's 'phone bands. The dashed curve in Fig. 2 shows why.

Various external means are of course applicable, such as the BC-453 "Lazy Man's Q5-er" and more elaborate 50-kc. i.f. strips like those of By Goodman's.[1, 2] However, Goodman has explained why the BC-453 type of Q5-er has limited effectiveness; a BC-453 Q5-er was actually used here, and the net improvement in making 'phone signals more *readable* through QRM seemed negligible, despite a noticeable increase in sharpness of tuning. On the other hand, to build one of Goodman's amplifiers for a BC-312 would be like putting a Cadillac body on a Model A chassis — the signal-to-noise ratio of the 312's head end, despite "souping-up" procedures, still limits the over-all performance of the receiver.

The selectivity obtained with two i.f. crystals by Bill Good, W2CVI,[3] seemed to be just what the doctor ordered for the BC-312, since crystals in the neighborhood of 470 kc. are still available. These are the FT-241-A series, labeled according to channel number and transmitter (not crystal) frequency. Of crystals in the group whose labeled frequency is the 54th harmonic of the crystal frequency, Channels 53 (468.5 kc.) and 54 (470.4 kc.) are closest to the 470-kc i.f. of the BC-312. Channels 54 and 55 (472.2 kc.) are also suitable. Of crystals in the group whose labeled frequency is the 72nd harmonic, Channels 338 (469.4 kc.) and 340 (472.2 kc.) are the most suitable, but will provide a wider bandwidth than that described here, since they are 2.8 kc. apart as compared to the 1.9-kc. separation in the first group. Means of changing the crystal frequency by plating and grinding methods will be discussed further on, and make it possible to utilize crystals other than those in the desired channels as well as to obtain the desired bandwidth.

Modification Details

Since all BC-312s have a first-i.f. transformer with either center-tapped secondary or split tank capacity, it seemed at first that Good's dual-crystal filter circuit, Fig. 1, could be applied with

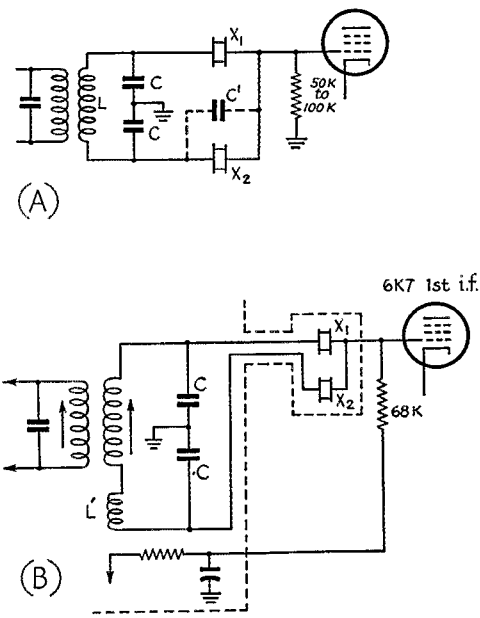


Fig. 1 — A — Basic dual-crystal filter circuit. The trimmer, *C'*, is discussed in the text.
B — Basic circuit applied to the BC-312. Unmarked components are the same as in the original receiver. *L'* is discussed in the text. Condensers marked *C* should be zero-temperature coefficient ceramic or silver mica. Values between 150 and 200 $\mu\mu$f. are satisfactory, but both should have the same capacitance.

very little trouble, and a pair of crystals were installed alongside the i.f. shield can as shown in the photograph. Leads from both ends of the secondary coil are covered with braid and come out the top of the i.f. can and enter the side of

* Mount St. Michael's, Spokane 28, Wash.

[1] Goodman, "A Sharp I.F. Amplifier for 'Phone or C.W.," *QST*, Dec., 1950.

[2] Goodman, "An All-Purpose Super-Selective I.F. Amplifier," *QST*, March, 1953.

[3] Good, "A Crystal Filter for 'Phone Reception," *QST*, October, 1951.

the aluminum bracket which clamps the crystals in place. The 6K7 grid lead and resistor come out the opposite side of the bracket as shown. The crystals are mounted with pins facing, and are held apart by the same screws that fasten the bracket to the shield can. This arrangement provides good capacity balance to ground and also insures that signals reach the 6K7 grid via the crystals only. The lead from the 6K7 grid resistor reënters the i.f. can and connects to the original grid by-pass condenser and decoupling resistor.

The whole i.f. amplifier was aligned exactly on a frequency midway between the two crystal frequencies, but the double-humped selectivity curve shown dashed in Fig. 3 was the best that could be obtained, and a listening test confirmed Good's statement that a pronounced dip between the peaks will destroy the value of the filter. Separation of stations was greatly improved, but the resulting harsh voice quality was very undesirable. After a considerable amount of experimenting it was found that both the L/C ratio of the tuned circuit which feeds the crystals and the degree of coupling between it and the primary affect the selectivity curve considerably. The i.f tank circuits in these receivers have 400 $\mu\mu$f. capacity. When the capacity across the first secondary was reduced to 100 $\mu\mu$f. by making each of the condensers (C in Fig. 1) 200 $\mu\mu$f., with an additional coil placed in series with L so that the resonant frequency was adjustable to 469.8 kc., the solid curve in Fig. 2 resulted.

The coil can be either dielectric core and adjusted by peeling off turns, or slug tuned. A fixed b.f.o. coil from the junk box was used here, although a slug-tuned one would have obviated the tedious process of peeling turns a few at a time. The coil is mounted adjacent to the main secondary inside the i.f. can, and equidistant from the wider sides. Since it has some mutual coupling with the main secondary, connecting it one way will give a greater total inductance than the other; the connection which gives the greater inductance (as indicated by a lower resonant frequency) should be used in order to realize the greatest Q. For the same reason, a coil so large that it comes closer than a quarter inch to any side of the can should not be used without cutting a one-inch hole in the latter. This procedure is necessary for most any coil if a BC-312N is modified, because this model has a smaller i.f. can than that shown in the photograph. If a slug-tuned coil is used, the slug should be insulated from the can so as to minimize additional unbalanced capacity to ground.

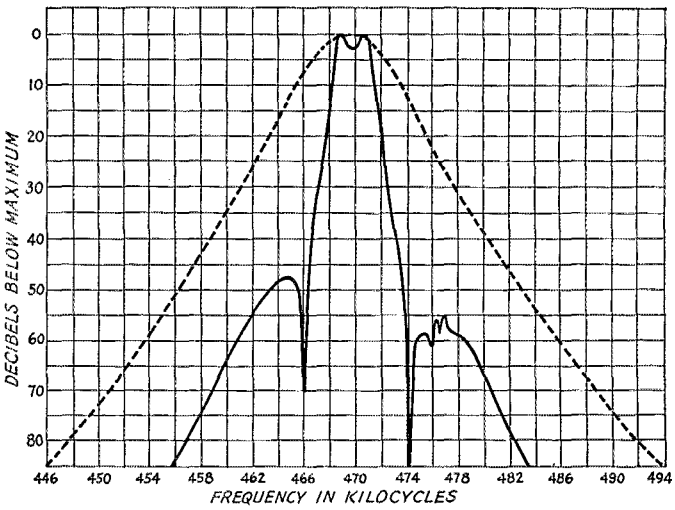


Fig. 2 — The dashed curve is the straight i.f. selectivity of the unmodified BC-312. The solid curve is the selectivity with the dual-crystal filter installed as described. The latter is 2.7 kc. wide at 3 db. down and 0.5 kc. wide at 40 db. down.

Trimmer Condenser Considerations

If the physical arrangement shown and the construction details mentioned above are followed the trimmer C', Fig. 1A, will not be required to obtain the best selectivity characteristic. Fig. 3 shows the effect of trimmer capacity across the crystals. If a different physical layout is used, it may be necessary to add a slight amount of trimming capacity across one or the other of the crystals. Good, for example, used between one and two $\mu\mu$f. across the high-frequency crystal to obtain the best characteristic.[3] Just how slight the trimmer capacity need be to cause large changes in skirt shape is shown by the solid curve of Fig. 3. The "trimmer" consisted of the inner conductor and polyethylene insulation of a short length of RG-59/U cable running at *right angles* to the pins of the low-frequency crystal, one end of the wire being soldered to one pin, with the insulated end lying across the other pin and extending beyond it for only $\frac{1}{16}$ inch. This probably represents a capacity less than $\frac{1}{2}$ $\mu\mu$f.

Selectivity Characteristic and Performance

The solid curve in Fig. 2 represents, in this ham's estimation, the best that can be done with a single-stage dual-crystal filter in the BC-312. The rather large side lobes at first prompted a change to the solid curve in Fig. 3, but actual comparison tests showed the superiority of the first arrangement in making 'phone signals readable, which is the goal. The sharp nulls on both sides of the characteristic are very helpful in sinking heterodynes, even though the quality of reproduction is somewhat "brittle." By Goodman's remarks on fidelity *vs.* copyability are very pertinent.[1] (Users of the 312 are quite

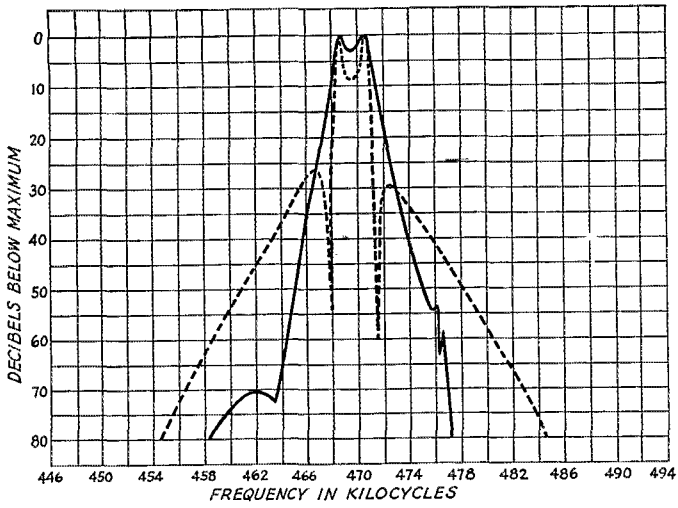


Fig. 3 — Effect of trimmer capacitance on shape of selectivity curve. Dashed curve: i.f. selectivity obtained with dual-crystal filter and original L/C ratio in i.f. transformer secondary (C in Fig. 1 equal to 800 $\mu\mu$f.), with 2-$\mu\mu$f. trimmer at C', Fig. 1A, across high-frequency crystal. Solid curve: same conditions as solid curve in Fig. 2, but with very small C' (less than ½ $\mu\mu$f.) across low-frequency crystal.

aware that the tone quality of this receiver even in its original form leaves something to be desired.) Lest the wrong impression be given, the fidelity of reproduction when using the characteristic of Fig. 2 is not disagreeable, nor will you have any trouble recognizing the voices of your friends. Signals which splatter will be copied only with difficulty or not at all, which is of course to be expected.

Operating with the modified receiver is very gratifying. In the majority of instances it will bring a signal which is Q2 on a regular BC-312 up to Q3 or Q4, and will reduce or eliminate heterodynes that mar even Q4 sigs on a standard 312. The modified receiver ran such competition to the main communications receiver at W7ESM that the latter is now in the process of getting a two-stage dual-crystal filter.

One disadvantage of the modification described here is the lack of provision for switching out the filter. A switch could be mounted in the space between the i.f. can and audio output tube, and operated from the front panel by a flexible shaft coming out through the dial-light rheostat hole.[4] Such a switch would be desirable for operation in some nets where the members are not too careful to zero on the n.c.s. However, the mechanical complication involved did not seem to be justified for the receiver here. With 75 meters what it is these days, sharp selectivity is frequently required even for net operation. If a switch is used, it will be necessary to experiment with trimmer capacity to offset the intercontact switch capacities.

It may be noticed that the selectivity shown in Fig. 2 is not quite as good as that obtained by Bill Good.[3] It is possible that the measuring method employed accounts for the difference. Good used his receiver's S-meter, while a scheme to be described later was used here. With due regard to Bill's S-meter, it must be realized that 70 db. represents a voltage (or current) ratio of 3160:1, and good accuracy cannot be expected when such a range is covered on one meter scale, even with a logarithmic movement. The experience described below with shunt crystals seems additional confirmation.

Shunt Crystals

The method of increasing skirt selectivity by crystals shunted across the tuned circuit ahead of series crystals is advocated by Good, but did not seem very effective when tried on two different receivers here. The skirts became a little steeper, but new side lobes appeared at the antiresonant frequencies of the shunt crystals, and were sometimes only 40 db. down. Perhaps other shunting crystals with resonant frequencies equal to the antiresonant frequencies of the crystals closest to the passband could be used, but the whole affair becomes rather cumbersome for the improvement obtained. It seems, as Good has stated, that more selectivity than that provided by a single-stage filter is best obtained by adding another stage.

Alignment

The alignment procedure is easy if you have a test oscillator or signal generator with plenty of bandspread in the neighborhood of 470 kc. A BC-221 or LM-7 frequency meter is ideal, but the average serviceman's oscillator is out. It is not very difficult, however, to make a test oscillator for the occasion: A standard circuit taken from *The Radio Amateur's Handbook* and built around a tuned circuit from an old b.c. set is readily made. Such an oscillator should be padded to 470 kc. by an air, silver-mica, or ceramic condenser, together with a 25-$\mu\mu$f. bandspread tuning condenser that has semicircular (straight-line capacity) rotor plates. A BC-221 was used here; connections are shown in Fig. 4. For the home-built oscillator, the outer terminals of the potentiometer can be connected to a one- or two-turn pick-up coil loosely coupled to the oscillator tank. Since the bandspread tuning con-

[4] Early models of the BC-312 and, we believe, all models of the BC-342 had conventional crystal filters, with the phasing control brought out through the dial-light rheostat hole mentioned by the author. The built-in crystal filter should be disconnected when making the modification described here. Alternatively, it might be possible to use the existing crystal if an extra one having the right frequency separation can be obtained. The second crystal could be substituted for the phasing condenser. Capacity trimming probably would be unavoidable with such an arrangement. — Ed.

denser represents only a small fraction of the total tank capacity, two or three calibration points (obtained by beating a harmonic of the oscillator with local b.c. stations) are sufficient to determine the straight-line calibration curve for the oscillator.

Fig. 4 — **Using the BC-221 frequency meter as a signal generator for filter and i.f. alignment. If a 221 is not available, any oscillator covering the necessary frequency range with adequate bandspread may be used, as described in the text.**

A sensitive (20,000 ohms/volt or a v.t.v.m.) d.c. meter is necessary for measuring i.f. amplifier output. It is connected across the diode load resistance (potentiometer R_{24}) of the receiver, and should be *kept* on the lowest scale in the case of a 20,000 ohms/volt meter, or on the 10-volt scale of a v.t.v.m., to prevent overloading the i.f. amplifier. The pointer can be reset to zero with the receiver turned on, in order to buck out the small voltage developed by the diode emission current. The h.f. oscillator tube in the receiver should be removed, the b.f.o. turned off, the manual gain control used, and the bandswitch set to one of the higher frequencies during the course of the alignment. The receiver manual volume control and test oscillator output always are adjusted so as to keep all readings on the same scale of the output meter.

Before installing the crystals in the set, their series-resonant frequencies should be measured by connecting them one at a time in series with the lead from the test oscillator to the 6K7 grid, and isolating this junction from the tuned circuit by a 50,000-ohm resistor. As the oscillator is tuned from lower to higher frequency, a sharp rise in the output meter reading will occur at the series-resonant frequency of the crystal, followed by a dip which indicates the antiresonant point. This test can also be used to check roughly the *Q* of the crystals; the amplitudes of peaks and dips should be the same for both crystals, and the ratio of peak to dip about 50 to 1. A defective crystal is indicated by a small ratio of peak to dip, and such should not be unexpected among quantities of surplus at bargain prices. Crystals which are stamped "Limited Test" are not necessarily low *Q*, however.

With the test oscillator still connected to the 6K7 grid, set it midway between the crystal series-resonant frequencies and align the 2nd and 3rd i.f. transformers for maximum output. Modify the 1st i.f. transformer as shown in Fig. 1B with 200-$\mu\mu$f. condensers (as low as 150 $\mu\mu$f. can be used) and a trial series coil, and reconnect the original grid lead to the 1st i.f. 6K7. Then clip the test oscillator to the grid lead of the 6L7 mixer and adjust or prune the series coil until peak response is obtained at the alignment frequency with the core in the main secondary coil about half in. Caution! Do not use this core as a means of determining whether the secondary circuit is higher or lower than the alignment frequency; it will give misleading information because an increase in output which may result from screwing in the core can be due to increased coupling to the primary and not to lowering the resonant frequency to bring it nearer the alignment frequency, as might be thought. The best indication of which direction to head with the series coil is had by using a small (around 10 $\mu\mu$f.) test condenser. If the output decreases when this condenser is touched between the 6K7 grid and ground, the series coil has too much inductance, and vice versa.

Next, connect up the two crystals as in Fig. 1B, and with the test oscillator on the alignment frequency, peak both primary and secondary of the 1st i.f. transformer. Then tune the test oscillator between 460 and 480 kc. and note the two maximum-response peaks. The frequency exactly midway between them is the final alignment frequency, and the entire i.f. amplifier should be carefully tuned for maximum output at this frequency. Again check the two peaks; they should now be equal within a few per cent, and the depression between should be around 70 per cent of the peak. If one peak is noticeably less than the other, the cores can be *very slightly* readjusted so as to favor it.

Measurement

The following method is recommended for finding the side-lobe response and the final selectivity characteristic:

With the test oscillator set on one of the peaks, and the manual volume control at about 2.5, adjust the test oscillator output until the output meter reads at some division near full scale which can be taken as "10." (For example, on a 20,000 ohms/volt meter, the 2.5-volt meter range is used, but the 5-volt scale multiplied by 2 is *read.*) Since decibels are obtained from voltage *ratios*, the actual voltage measured is unimportant so long as all voltages are measured proportionately. Tune the oscillator from the peak until the meter reads "1" on the scale of "10." This will be the 20-db. point. Leaving the test oscillator output fixed, increase the receiver's manual gain until the meter again reads "10"; then tune the oscillator until the meter reads "1." The output is now 100 times down, which is the 40-db. point. Again increase the manual gain until the meter reads "10." This is the range in which the side lobes can be measured. Full scale ("10") corresponds to 40 db.; "1" corresponds to 60 db., and "0.1" to 80 db. Intermediate values are calculated according to the formula

$$\text{db.} = 20 \log_{10} \frac{e_1}{e_2}$$

in which e_1 is taken as 1000 if full-scale e_2 is 10, because we are two decades (100 times) down from our original starting point.

If any side lobe is greater than "5" on this scale (46 db.), a slight amount of trimmer capacity should be added across the low-frequency crystal; if the main nulls are more than 8 kc. apart, trimmer capacity should be added to the high-frequency crystal.

Moving the Crystals Around

It may happen that the two crystals to be used have resonant frequencies less than the nominal 1.9 kc. apart due to manufacturing tolerances. (The crystals used here were actually 2.0 kc. apart.) It can also happen that the only crystals available are not in the vicinity of 470 kc. Two procedures can be used to remedy these situations: plating and edge grinding.

Crystals can be lowered several kc. by plating them, as suggested by G3COJ.[5] However, it was found here that whenever a simple copper sulfate solution was used, Brian's "black deposit" was formed regardless of the concentration of the solution. The addition of a small amount of sulfuric acid and alcohol cleared up the trouble. It is recommended that before any crystal plating be attempted, the process be tried out on less expensive objects such as alligator clips! The sulfuric acid and alcohol are added until a copper-colored plating is formed. A standard formula is 15 gm. of copper sulfate, 5 cc. of sulfuric acid, and 5 cc. of alcohol in 100 cc. of distilled water, but these proportions are not critical.

In all cases the electroplating scheme was found superior to merely dipping the object in the solution. Put the solution in a glass tumbler, bend a piece of clean No. 12 copper wire so that it clamps the edge of the tumbler and extends the depth of the solution, and connect it in series with a 330-ohm resistor (not critical) to the *positive* terminal of a 1.5 volt dry cell or flashlight cell. (The idea of limiting the plating current comes from W3USX.[6] Better control of the frequency change is had, and the plating is more uniform. Without the resistor, repeated "dunkings" will cause a noticeably thicker plating on that part of the crystal which enters the solution first and leaves it last. The series resistor seems more convenient than W3USX's scheme of adjusting the depth of the positive electrode.) The object to be plated is connected to the negative terminal. When plating crystals connect both pins in parallel. The crystal frequency is lowered according to the amount of plating, and changes up to 2 kc. can be obtained without seriously lowering the *Q*. Because of differences in solutions no time *vs.* frequency-change data are given, but a preliminary short immersion and frequency check will provide a basis for estimating the total time needed. As Brian points out, the nice thing about plating is that if you go too far you merely reverse the battery polarity and take off some of the plating. With a few trials, a crystal can be jockeyed around to just where you want it. After removing the crystal from the plating solution it is important to rinse it in clean water and dry it completely before making any measurements. Placing it near a 100-watt lamp is a good way of accelerating the drying.

With tough fingers and a big supply of patience a crystal can be raised 15 kc. or more by edge grinding. For small frequency changes, grinding the upper edge alone is sufficient; but for changes greater than a kilocycle it is necessary to grind all four edges equally and squarely. If grinding is attempted, buy three or four extra off-frequency crystals to practice on and acquire the knack! Before any grinding can be done it is necessary to remove the crystal from the supporting wires: Fasten an octal socket to the bench; bring a lamp near, and have several different-sized blocks available for hand rests. A sheet of metal or asbestos is used so that the barrel of the soldering iron can be solidly rested. Having carefully pried off the bakelite holder cover, plug the crystal in the bench socket and apply the tip of a well-tinned iron to one junction of crystal wire and holder wire, and with tweezers hold the latter away from the former

Showing the two crystals clamped to the side of the first i.f. transformer. The two mounting screws shown go to tapped holes in the i.f. can, and also serve to keep the crystals separated. A third screw is located on the far side and just below the top. The 6K7 grid resistor is shown covered with varnished tubing. The mounting screw for *L'* can be seen at the extreme right on top of the transformer. The crystals are mounted with pins facing, and leads are soldered to them, after filing off the nickel plating. A piece of felt is located between the crystals and i.f. can, but is not necessary.

(*Continued on page 102*)

[5] "On the Air with Single Sideband," *QST*, April, 1953.
[6] "On the Air with Single Sideband," *QST*, November, 1953.

Amplitude Limiting for the VFO

A Stable Unit of Small Dimensions

BY MARVIN BERNSTEIN,* W2PAT

• Here is a VFO circuit for 3.5 Mc. with some novel features. Space requirements are minimized by the use of a high-Q iron-cored toroid inductor, and stability is improved by the use of a circuit that limits the amplitude of the oscillator output.

THE need for greater frequency stability of the emissions from amateur transmitters is increasing for a number of reasons. Single-sideband and RTTY transmitters require short-term carrier stabilities which are of the order of ten or twenty c.p.s. at the operating frequency, while the increasing use of more selective receivers restricts the allowable instability of the usual 'phone or c.w. equipment. Quartz-crystal control can achieve frequency stabilities as great as that required, but due to certain operating conditions, it is necessary that the frequency of the controlling oscillator be easily varied. The requirement for precise frequency control over a wide frequency range obviously imposes severe design considerations on the oscillator circuit.

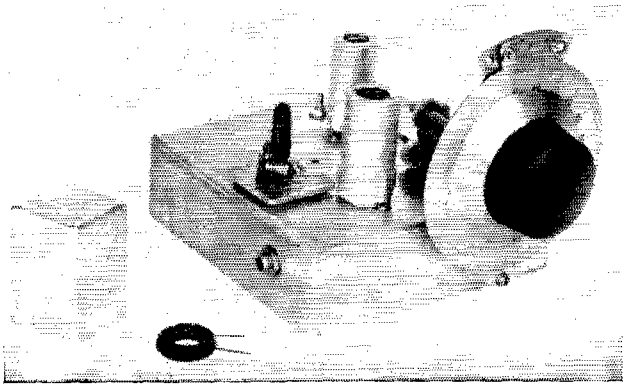
A variable-frequency oscillator circuit has been designed which has several features believed to be unusual and which result in a high order of frequency stability with changes in plate voltage, tube characteristics and reactive effects in the oscillator circuit. No claims are made for improved stability with temperature changes, since this effect can and must be minimized by careful temperature compensation in each individual case.

Circuit Description

The circuit, shown in Fig. 1, is a grounded-plate Colpitts type, operating in the frequency range 3.5 to 4 Mc., with component values which make it suitable for use as a crystal oscillator. The circuit has an r.f. voltage-amplifier stage, using the second half of the 12AT7 tube, with a voltage gain of about ten. The amplified voltage is rectified and the negative voltage obtained from the germanium rectifier is used to provide bias for the oscillator tube. The frequency-determining circuit is composed of the inductor L_1 and capacitors C_1 through C_6, plus tube and stray capacitance. The inductor L_1 is an iron-core toroid, wound with 48 turns of No. 20 enameled wire, and has an unloaded Q of 275. This coil is mounted inside an hermetically sealed can along with C_1, C_3 and C_2, an 18-$\mu\mu$f. temperature-compensating capacitor (750 parts per million per degree C). The can was exhausted of air and filled with dry nitrogen before sealing, to eliminate humidity effects in the inductor. The circuit includes a buffer stage which delivers approximately 25 milliwatts into a 50-ohm load.

The Colpitts oscillator circuit was selected because of the simplicity and reliability of this type of circuit. The grounded-plate configuration was used in order that one terminal of the oscillator resonant circuit could be grounded. The resonant circuit, composed of L_1 and $C_1 + C_2$ in parallel, and C_3 connected in series, is analogous to the equivalent circuit of a vibrating-quartz-crystal unit. This circuit exhibits a low impedance at the frequency where the parallel circuit L_1, C_1, C_2 is inductive and has a reactance equal and opposite to that of C_3. This corresponds to the resonance frequency of a quartz-crystal unit. At a somewhat higher frequency, the reactance of L_1 and $C_1 + C_2$ are equal and opposite, and this frequency corresponds to the antiresonance frequency of the quartz-crystal unit. The frequency interval between the resonance and antiresonance frequencies is about 15 kc. for this

* Signal Corps Engineering Laboratories, Fort Monmouth, N. J.



An experimental VFO employing an iron-cored toroid inductor and amplitude limiting. The toroid permits enclosing the inductor in a shield can of small dimensions. The output-circuit slug-adjusting screw is at the rear.

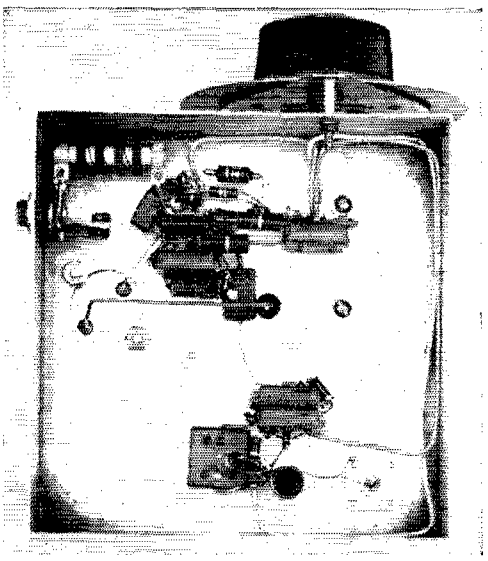
equivalent crystal unit, and is about ten times the corresponding interval for a real crystal resonator.

The capacitance ratio $(C_1 + C_2 + C_4)/C_3$ determines the frequency interval between resonance and antiresonance; it would be desirable, if possible, to make this ratio much larger than the one used in the equivalent crystal circuit. The ratio of capacitances in this circuit varies over the frequency range and averages only about 25 as compared to capacitance ratios of the order of 300 for fundamental-mode quartz-crystal units. The maximum ratio used depends upon the Q factor of the inductor and, if core material having low loss and higher permeability becomes available, the series capacitor, C_3, can be reduced in value so as to obtain increased frequency stability. The inductor losses primarily affect the maximum usable capacitance ratio, because the effective resistance of the circuit increases rapidly as the capacitance ratio increases. Finally a point is reached where the effective resistance is so large that the vacuum tube cannot supply enough power to maintain the circuit in oscillation.

The equivalent crystal unit, represented by L_1, C_1, C_2, C_3 and C_4, is interchangeable with a quartz-crystal unit so that, if a very stable crystal oscillator is desired, this circuit is applicable. The crystal unit should be connected from grid to ground in place of these components.

Amplitude Limiter

The amplified output of the oscillator is rectified to furnish bias for and to amplitude-limit the oscillator tube. All usual oscillator circuits have amplitude limiting to a greater or less degree. In most cases, however, the only limiting provided is that which comes about as a result of grid-leak biasing. This has two distinct faults. Some of the energy normally appearing in the resonant circuit of the oscillator is dissipated in the input resistance of the tube; thus the effective Q of the circuit is degraded. A second effect is that the limiting action is not great enough to maintain essentially constant output. For any small change in oscillation amplitude due to changes in tube, circuit components or voltage in this circuit, a 10-times change is generated by the amplified and rectified output. The input impedance of the tube in this circuit remains very high, since the d.c. bias voltage is about twice the r.f. grid voltage. The tube does not draw grid current and therefore operates as a Class A oscillator.



Bottom view of the VFO with amplitude limiting.

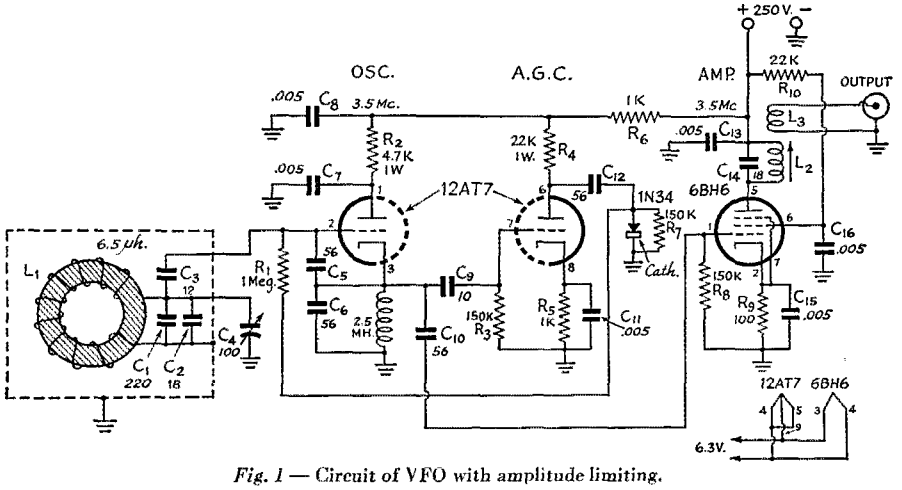


Fig. 1 — Circuit of VFO with amplitude limiting.

C_1, C_5, C_6 — Silvered mica.
C_2 — Centralab TCN-18 neg.-temp. ceramic.
C_3 — Centralab TCZ-12 zero-temp. ceramic.
C_4 — Hammarlund MC-100.
C_7, C_8, C_{11}, C_{13}, C_{15}, C_{16} — Disk ceramic or mica.
C_9, C_{10}, C_{12}, C_{14} — Mica.
All unrated resistors — ½ watt.
L_1 — 6.5-μh. — 48 turns No. 20 Formvar on Pyroferric PY13A powdered-iron toroid — see text. (Where space is available for a large enclosure, an equivalent air-wound inductance might consist of a B & W JEL-40 coil minus 5 or 6 turns.)
L_2 — Approx. 80 μh. — CTC LS3-5 Mc. slug-tuned.
L_3 — 5 turns No. 30 enam., over ground end of L_2.

The Inductor

The most critical component in the oscillator circuit is the inductor, because at least two very important characteristics are required of it. The unloaded Q should be as large as possible, and the mechanical stability must be excellent. The core material of the toroid should be of the powdered-iron type, suitable for frequencies in the 3- to 5-Mc. region. The toroid should have large dimensions so as to have a high Q. The one used was $\frac{5}{8}$-inch inside diameter, and $\frac{5}{32}$ inch thick. Crowley Corporation F-1 or FD-1, National Moldite grade 14 or Pyroferric Corporation type PY13-A materials are all suitable for use as the core material. The Q factor obtainable, in general, is dependent upon the size of the wire wound upon the core, and varies directly with the wire diameter. Inductors have been wound with various sizes of wire from No. 26 to No. 14 gauge. Nos. 18 to 20 enameled wire result in a reasonable Q factor and are not as difficult to handle as the larger sizes. After winding, the toroid should be dipped into some type of liquid cement, such as polystyrene coil dope, and allowed to dry. A number of coatings should be put on in order to obtain a substantial and rigid assembly. It is imperative that the winding not move, since large inductance variations will occur and consequently poor frequency stability will result. Poor temperature-frequency retrace characteristics (temperature hysteresis) will also be encountered if the winding is not securely attached to the core of the toroid.

The powered iron core toroid is used primarily because a small, compact shielded inductor can be obtained with a Q factor that is high. There is almost no electromagnetic coupling between the inductor and the shield can and, therefore, the shield diameter need not be much larger than the outside diameter of the coil. The lack of coupling between the inductor and shield prevents the temperature-resistance coefficient of the shield material from influencing the inductance of the coil and thereby affecting the frequency stability. The temperature-inductance coefficient of powdered iron is better than that of ferrite cores, but it is much poorer than the usual air-core inductor, and a larger amount of compensation is required. The small space required by the iron-core toroid and its excellent mechanical stability, due to its compact nature, more than outweigh the additional efforts needed to obtain adequate temperature compensation.

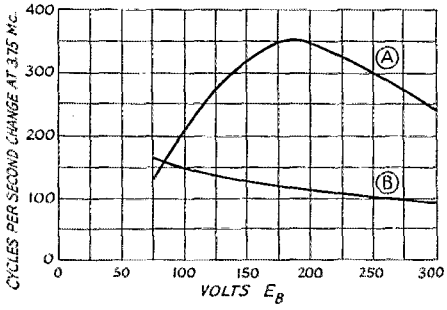


Fig. 2 — **Curves showing change in frequency with change in oscillator plate voltage. Curve A is for the oscillator without amplitude limiting. Curve B shows the improvement when a.g.c. is added.**

The negative-temperature-coefficient compensating capacitor should be mounted adjacent to and in contact with the toroid. This step will result in better compensation, as is quite obvious. The toroid inductor has a relatively large mass and, as a result, changes temperature slowly with fast ambient temperature changes. The temperature change of the compensating capacitor should occur at the same rate as the inductor in order that good stability will result. The 12-$\mu\mu$f. series capacitor in the equivalent crystal circuit should be a good ceramic zero-temperature-coefficient capacitor, and the rest of the capacitors in the oscillator can be silvered-mica units.

The voltage output of the VFO is rather low — of the order of 0.5 volt. A check on the effectiveness of the automatic gain control can be made by comparing the normal oscillator output with that obtained when the 1N34 diode output is grounded. The output of the oscillator should be greater by a factor of more than four times, and the output level should drop to its original value upon removing the ground.

Oscillator Performance

Fig. 2 is a graph showing the improvement in frequency stability with the amplitude-control circuit in operation. The frequency change is quite linear and amounts to approximately −0.1 cycle per megacycle, per volt change. This compares very favorably with the usual quartz-crystal oscillator circuit. Without amplitude control, the frequency is more dependent upon voltage; the frequency-voltage curve has a slope of about +0.7 cycle per megacycle per volt, between 75 volts and 150 volts. The maximum change in frequency between 150 volts and 300 volts amounts to only 110 cycles at 3.75 Mc., however, and indicates that the oscillator is quite stable even without the amplitude control.

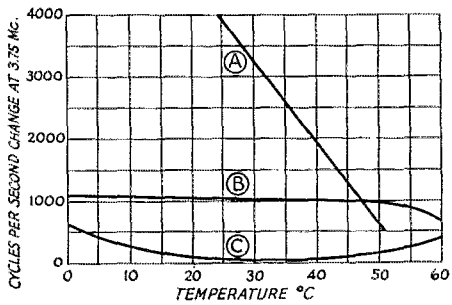


Fig. 3 — **Temperature vs. frequency characteristics of the VFO. Curve A was obtained applying test heat to the inductor only, without temperature compensation. Curve B shows the improvement under similar conditions, but with compensation added. Curve C is with test heat applied to entire oscillator unit.**

Fig. 3 is included to show the temperature effects on frequency. The fairly large temperature coefficient before compensation shows that

(*Continued on page 104*)

Bandpass Circuit Design for Crystal-Controlled Converters

A Different Approach for Mobile or Home Use

BY CALVIN F. HADLOCK,* W1CTW

• **Most of the bandpass crystal-controlled converters have used stagger-tuned or low-*Q* single circuits, or inductively-coupled double circuits that are difficult to adjust. In this article W1CTW describes a method (and a design) that has several advantages over the others.**

ALTHOUGH satisfactory for home use, the circuit design to be described is particularly suitable for amateur mobile installations. A common method used to obtain a suitable mobile receiving installation is to build a one- or two-tube converter and connect the output to the broadcast receiver already available in most cars. The broadcast receiver is usually tuned to a frequency near the high end of the broadcast band and becomes a fixed intermediate-frequency amplifier. The converter is then tuned to cover the desired amateur band. This necessitates making the converter readily accessible to the operator, usually on the steering-wheel post. A tunable converter also calls for a ganged multisection tuning condenser and its consequent complication.

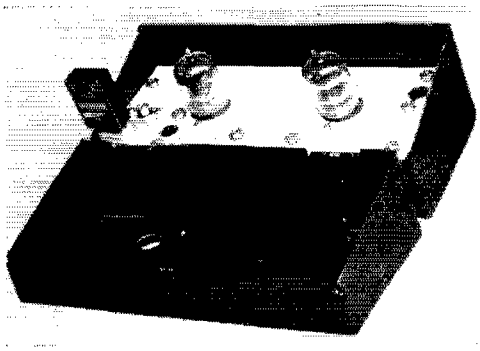
If an efficient circuit were used for bandpassing the r.f. amplifier and mixer input circuits, to pass the entire band to be used, the tuning capacitor could be reduced to a single section and tracking difficulties would be eliminated. Now, if the variable high-frequency oscillator could be replaced by a fixed-frequency oscillator, the variable capacitor could be eliminated and it would no longer be necessary to mount the converter in a place readily accessible to the operator. It could be placed anywhere in the car so long as it is connected between the antenna and the broadcast receiver. The unit to be described is of this type, and it was bolted to the bottom of the broadcast receiver, up under the dash and out of sight. Heater and B+ power was stolen from the receiver and the added drain compensated for by changing the push-pull audio output stage to a single tube.

Of course, if the high-frequency oscillator is fixed, the intermediate frequency must be tunable. But this is no problem, since the broadcast receiver is already tunable over at least a one-megacycle range. Now that the high-frequency oscillator is fixed-frequency, advantage can be taken of the vastly superior stability of crystal-controlled oscillators to provide an over-all receiving system of excellent stability. Since warm-up drift is nil, the receiver calibration stays put and the frequency will show no sign of bobble even when driven over the famed English cobblestones of Nantucket Island with no precautions taken to shock-mount the unit.

The 1.05-Mc. range of the broadcast band is more than enough to cover all h.f. amateur bands except ten meters. Here a slight sacrifice is necessary. Either the low end near 28.5 Mc. or the high end near 29.7 Mc. will have to be chopped off. Since the writer was more mindful of the application of ten-meter mobiles for c.d. than DX, the unit illustrated was made to tune from 28.65 to 29.7 Mc., to allow reception of the Boston mobile frequency near the very high end of the band. With the circuit used, however, it is possible to use two crystals, either plugged in by hand or switched, to cover either range. It is not necessary to retune the oscillator tank if it is first tuned up on the lower frequency crystal.

The one drawback of bandpass circuits in place of sharply-tuned circuits is that the latter afford much better protection from cross-modulation interference and overload desensitizing of the front end of receivers due to extremely strong local signals operating in the more remote parts of the band. This drawback is minimized for mobile work on the premise that a ham who finds himself trying to operate alongside a local kilowatter can always start the engine and move a bit!

Too many so-called bandpass circuits are really nothing more than "*Q* killers." Invariably, a single tuned circuit is used loaded with resistance to a point where the response of the tuned circuit over the desired range is equally bad. Even



This crystal-controlled bandpass converter is small enough to be mounted out of the way anywhere in the car between antenna and b.c. receiver

*% National Company, Malden, Mass.

though sufficient gain may still remain so that the noise figure is not adversely affected, a minimum of protection is afforded against interference from very strong signals outside the desired range, such as local TV or f.m. stations that may get through to the mixer strongly enough to beat with harmonics of the h.f. oscillator and produce spurious signals in the desired range. On the other hand, high-Q overcoupled double-tuned circuits are exasperating to handle without special equipment such as a Mega-Sweep, which is usually unavailable to the ham working at home. It would be preferable to use circuits that produce a flat nose wide enough to pass the desired band but with skirts as steep as possible outside the band to minimize the possibility of the above-mentioned spurious signals. This type of circuit can be lined up at home with nothing more than a grid-dip oscillator, although access to a Q-meter to measure L and C will be a material aid. It

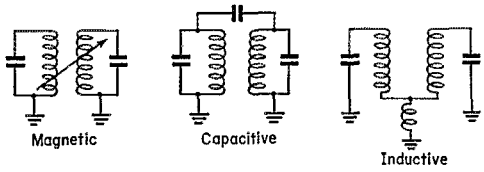


Fig. 1 — Three possible methods of coupling two tuned circuits.

would also be very much of an added feature if one could sit down with paper and pencil, figure out the complete circuit values and then make up the components, solder them into place and have the unit work, correctly adjusted, right off the bat. This is more of a professional approach than the traditional amateur one, but it can be done. The methods for doing this are to be described.

Because of the type of antenna input circuit that is used, one assumption must be made. It is assumed that the antenna input impedance is known and is equivalent to a resistive load of rather low value, perhaps 300 ohms or less. This is reasonably true of the majority of ham antennas such as beams or dipoles operating on one frequency and fed by coax or Twin-Lead, and it also includes the mobile whips used for the higher h.f. bands. For example, one ten-meter whip that was measured varied from about 45 ohms to about 120 ohms over the entire U. S. 'phone band. In designing a front end for this typical whip antenna, a value of 70 ohms would be a good one and was used in the calculations. (See Appendix.)

Methods of Coupling

Three types of basic coupling for double-tuned circuits are available as shown in Fig. 1.

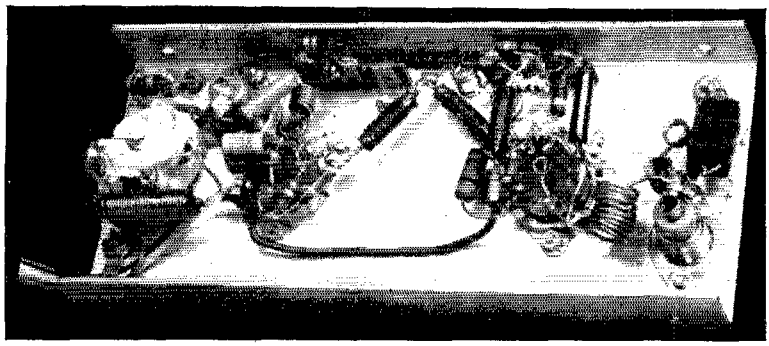
Magnetic coupling is satisfactory but is not easily handled with primitive measuring instruments. Capacitive coupling gives a lower gain-bandwidth factor than the other two and requires a very small coupling capacity that is difficult to measure. Inductive coupling is used in this equipment because it can be tuned up with only an accurately-calibrated grid-dip meter and a soldering iron. Calculations for the magnetic and inductive cases are, however, the same.

A summary of the equations needed or applicable for working out the component values are given in the Appendix, together with an actual example as used for the ten-meter converter built by the writer.

Since the voltage gain of bandpass circuits is not as great as for simple tuned circuits, precautions have been taken to get as good a noise figure as possible. Two 2C51 dual triodes were used. These are supposed to be about equivalent to a triode-connected 6AK5. As can be seen in the circuit diagram shown in Fig. 2, the first 2C51 is a cascode r.f. amplifier while the second provides a triode mixer and ten-meter crystal oscillator. Neutralization of the cascode amplifier is not necessary or gainful at this frequency.

After the calculation of the component values is complete (Appendix) we are ready to start construction of the converter. The writer's model was built on a piece of aluminum channel 6½ by 3 by ¾ inches — just the right size to fit into a small steel hinged case that happened to be available. It is held in place by four drive screws. One of the photographs shows the top view with the cover open. The antenna plugs into the receptacle at the right while the receptacle between the crystal and tube is the i.f. output. From this a short piece of coax goes to the broadcast receiver. The rotor projection of the crystal oscillator plate tuning capacitor can be seen just behind the crystal. It is adjusted by means of a screwdriver. The tube on the right is the r.f. amplifier and the mixer and crystal oscillator tube is at the left.

The other photograph shows the bottom of the chassis. The bottom of the coax input receptacle



The converter is built on a 6½ × 3 × ¾-inch aluminum channel. The input circuit is at the right, and the interstage coupling can be seen at the center, between the two tube sockets. The coils in each coupling circuit are mounted to minimize inductive coupling.

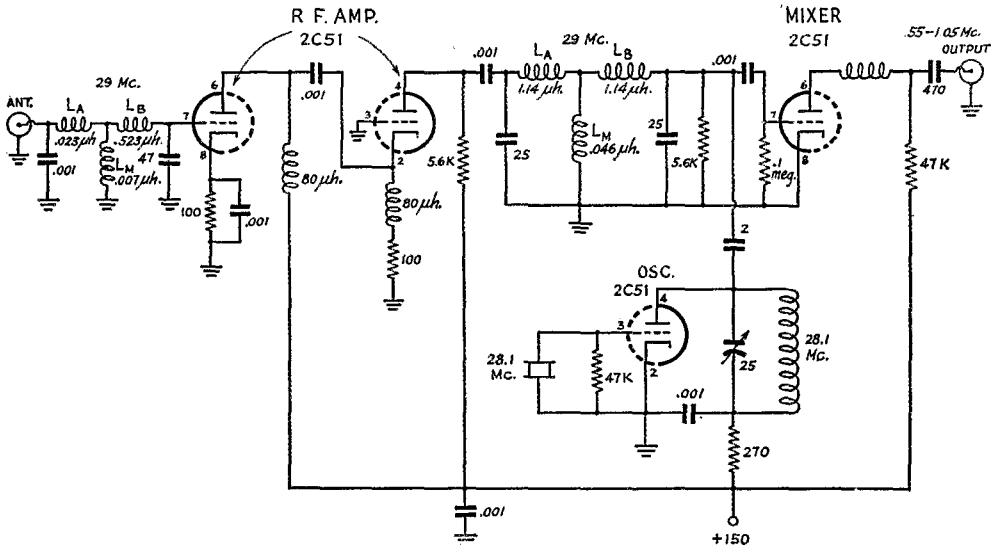


Fig. 2 — Wiring diagram of the bandpass crystal-controlled converter. The two 100-ohm cathode resistors in the r. f. stage should be changed to 220 ohms if a 6BQ7 is used.

can be seen in the lower right-hand corner. Above it is the .001-μf. of the antenna circuit, while grouped about the receptacle are L_A, L_M and L_B. The 47-μf. is a couple of small ceramic capacitors showing at the edge of the socket. The intercoupling between the coils should be minimized by proper positioning, and capacitor leads should be kept very short. The coils are self-supporting, wound of No. 18 poly-insulated wire. The two coils mounted vertically above the r.f. amplifier tube are the 80-μh. plate and cathode chokes shown in Fig. 2. These are wound with as many turns as possible of fine wire on iron core forms with built-in pigtails. These are really not critical and anything above 10 μh. would suffice.

L_A and L_B of the interstage coupling circuit are in the center of the chassis and L_M is mounted just above. L_M is self-supporting No. 18 as before, but L_A and L_B are wound on small bakelite forms ($\frac{3}{16}$-inch diameter) with built-in pigtails. The 25-μf. interstage tuning condensers are mounted at the edge of the sockets. A small inductance to reduce Miller effect in the plate circuit of the mixer tube can be seen just above this tube but its value is questionable. At the extreme left is shown the variable tuning capacitor and coil of the crystal-oscillator plate tank. This coil is wound on a bakelite form. Just above the capacitor is the crystal socket and beside it above the tube socket is the 2-μμf. injection-coupling capacitor. Three leads providing B+, B− and "A hot" are brought out through a hole in the side of the cover. Construction is very straightforward and no precautions were taken except to use short leads and to avoid magnetic coupling between the various coils as much as possible.

Adjusting the Circuits

The various interstage coils were wound and adjusted to the calculated values by measuring their inductances on a *Q*-meter. The mutual inductances were too small to measure and were estimated. Later checks of the bandwidth were made to see if they were satisfactory, and they could be altered if the bandwidth were incorrect. Actual data on the coils are not given as they must be wound to a given inductance value and the constructor may wish to vary the type of winding. If a *Q*-meter is not available, a grid-dip meter may be used to measure the inductance. Merely connect the coil to be measured across a small mica or ceramic capacitor of known value having, as nearly as possible, no leads at all. Measure the frequency of this tuned circuit with a grid-dip oscillator and calculate the inductance from the formula:

$$L = \frac{1}{(2\pi f)^2 C} = \frac{1}{\omega^2 C}$$

Now, with the coils in place, they are given a final adjustment and tuned to the proper frequency by means of the grid-dip oscillator by the following procedure. To adjust L_A of either circuit, unsolder one end of L_B, letting it hang free. Now adjust L_A by squeezing or stretching it, until the grid-dip oscillator coupled to it shows a dip at exactly the midband frequency (f_o = 29.15 Mc.). Now solder down the free end of L_B and unsolder one end of L_A without distorting the coil and let this end hang free or keep it disconnected by a small piece of paper. Now adjust L_B, by squeezing and stretching, until a grid-dip oscillator coupled to it dips at exactly the midband frequency (f_o = 29.15 Mc.). Now, carefully resolder the free end of coil L_A and the job is done.

The crystal oscillator uses the conventional tuned-plate circuit, tuned by the plate tuning capacitor. It should not be left tuned too close to peak output or it may not start itself readily when first turned on. The crystal used is an overtone low-drift type furnished by the Valpey

Crystal Corp. of Holliston, Mass. Its operation has been perfectly satisfactory and reliable over a period of nearly three years. Its frequency is 28,100 kc.

One of these converters has been in operation for nearly three years in the car installation of W1PIJ. It has performed very well and has equaled or outperformed any converter that has been checked against it. Sensitivity measurements made with a signal generator using a 70-ohm dummy antenna and 10-db. signal-to-noise ratio is better than 0.5 microvolts over the entire band. During a 10-meter WAS contest, the writer used this converter at home into an NC-173, with eight feet of wire draped over the radio room door for an antenna. Everything was copied that could be copied on the regular receiver and folded-dipole installation.

Calculations have been made for similar converters for 15- and 20-meter use. The values are tabulated below:

15 Meters:

Band limits are 21.0 to 21.45 Mc

f_o = 21.23 Mc.

B_{-3} = 0.75 Mc. (B_{-1} = 0.45, $B_{-3} = \sqrt{2} \times 0.45$ = 0.64 Mc.)

R_A = 70 ohms

Antenna Input	*Interstage*
G_A = 0.0143 mhos	$C_A = C_B$ = 25 $\mu\mu$f.
k = 0.0354	Q = 40
C_A = 2150 $\mu\mu$f. (use 0.002 μf.)	k = 0.025
Q_A = 20	$R_A = R_B$ = 12,000 ohms
G_{so} = 0.0004 mhos	$L_A = L_B$ = 2.14 μh.
C_B = 120 $\mu\mu$f.	M = 0.0535 μh.
L_A = 0.0262 μh.	$L_A - M$ = 2.09 μh.
L_B = 0.469 μh.	$L_B - M$ = 2.09 μh.
M = 0.004 μh.	
$L_A - M$ = 0.022 μh.	
$L_B - M$ = .465 μh.	

20 Meters:

Band limits are 14.0 to 14.35 Mc.

f_o = 14.18 Mc.

B_{-3} = 0.6 Mc. B_{-1} = 0.35, $B_{-3} = \sqrt{2} \times 0.35$ = 0.49 Mc. chose 0.6 Mc.

R_A = 70 ohms

Antenna Input	*Interstage*
G_A = 0.0143 mhos	$C_A = C_B$ = 25 $\mu\mu$f.
k = 0.0423	Q = 33.3
C_A = 2,680 $\mu\mu$f. (use 2700)	k = 0.031
Q_A = 16.4	$R_A = R_B$ = 15,000 ohms
G_{so} = 0.0004 mhos	$L_A = L_B$ = 5.02 μh.
C_B = 150 $\mu\mu$f.	M = 1.56 μh.
L_A = 0.047 μh.	$L_A - M$ = 4.86 μh.
L_B = 0.842 μh.	$L_B - M$ = 4.86 μh.
M = 0.0085 μh.	
$L_A - M$ = 0.0385 μh.	
$L_B - M$ = 0.834 μh.	

Appendix

The mathematical equations used in the calculations have been used for radar amplifiers and were taken from Vol. 18, "Vacuum Tube Amplifiers," by Valley and Wallman of the Radiation Laboratory Series, published by the McGraw-Hill Book Co., Inc. Discussion and formulas for the infinite-Q case used for the antenna input are to be found on page 687, Sec. 13-14. Those for the equal-Q case used for the interstage coupling are on page 211, Sec. 5.3. These formulas are used for providing design data for double-tuned circuits to pass the required bandwidth. The circuits are transitionally coupled to provide a flat nose with no dip at the center.

Most of us are quite familiar with the term "critical coupling" as applied to double-tuned circuits but may not be familiar with the term "transitional coupling." As applied to double-tuned circuits, "critical coupling" is that degree of coupling which produces the most stage gain without a double peak. "Transitional coupling" is that degree of coupling that produces the widest nose without a double peak. In the case of equal Q of the two tuned circuits (the condition usually encountered in communications receivers as, for example, in i.f. amplifier transformers) the two couplings are identical and the former term is usually used. In the case of unequal Q, however, "transitional coupling" is greater than "critical coupling," and in the case where all the loading is essentially due to only one of the tuned circuits, the so-called infinite-Q case,

$$\text{trans. coupling} = \sqrt{2} \text{ crit. coupling.}$$

Since we are primarily interested in maximum bandwidth rather than maximum gain, we will use transitional coupling in our design.

The bandwidth can be figured between the points that are down 3 db. (B_{-3}) or the points that are down 1 db. (B_{-1}) remembering that

$$B_{-1} = \frac{B_{-3}}{\sqrt{2}}$$

In the design of the ten-meter converter described it was decided to keep the circuits not more than 1 db. down over the 1.05-Mc. bandwidth to be used. Since the formulas

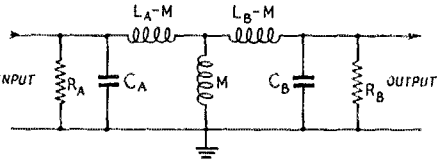


Fig. 3 — Basic circuit for inductively-coupling two tuned circuits.

used were set up for 3-db. bandwidth, the above equation was used to select a required bandwidth of 1.6 Mc.

For the equal-Q case (for interstage coupling):

Definition of terms (Fig. 3):

$R_A = R_B$ = resistive loading

$C_A = C_B$ = tuning capacitors (including tube capacity)

$L_A - M = L_B - M$ = tuning inductance minus common inductance

M = mutual inductance

$(L_A - M) + M = L_A$ = input tuned circuit inductance

$(L_B - M) + M = L_B$ = output tuned circuit inductance

$L_A = L_B$

k = coefficient of coupling

B_{-3} = 3-db. bandwidth (cycles)

f_o = center freq. = $\frac{f_{high} + f_{low}}{2}$ = average of band limits

Equations:

$$k = \frac{1}{Q} = \frac{B_{-3}}{\sqrt{2}\, f_o} \qquad C = C_A = C_B = \sqrt{C_A C_B}$$

$$R = R_A = R_B = \sqrt{R_A R_B}$$

$$B_{-3} = \frac{f_o \sqrt{2}}{Q} = \frac{\sqrt{2}}{2\pi RC}$$

$$\text{gain} = \frac{G_m R}{2}$$

For the infinite-Q case (for antenna input coupling):

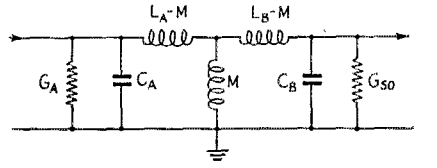


Fig. 4 — Basic circuit for inductively coupling two tuned circuits.

Definition of terms (Fig. 4): G_A is used instead of R_A as formulae were so written.

$G_A = \frac{1}{R_A}$ = input conductive load (due to antenna)

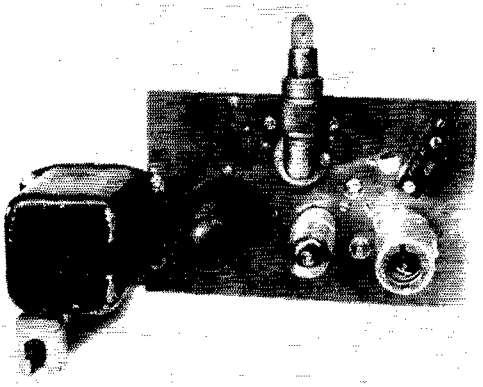
(*Continued on page 106*)

A Simple 144-Mc. Rig for C.D. Work

R.F. Section and Modulator Operate from a 100-Ma. Supply

BY ALBERT J. NEWLAND,* W2IHW

AFTER sitting in on several amateur and civil defense discussions it became apparent to the writer that there was widespread need for a small, efficient 2-meter transmitter. Such a rig that could be built from used or otherwise low-cost parts would make it possible for many communities with limited budgets to get started with radio equipment for c.d. purposes. It also appeared that there was considerable interest in this sort of thing on the part of young Novices.



Top view of the "breadboard" model of the 2-meter transmitter described by W2IHW. The shielded tube is the 12AT7. At the center is the 5763 doubler-final. The metal tube is a 6V6 modulator.

Some 12AU7-5763-6146 combinations that had been described for 144-Mc. use had turned out to be unsatisfactory in several respects, and even when made to operate properly they represented more current drain than is practical for the continuous duty frequently required of c.d. equipment. The string of 6J6s originally described in *QST*, and duplicated by several radio club groups in various forms, was doing a good job, but it used four tubes in the r.f. section, and required something lower than the conventional 300-volt plate supply for safe operation.

The circuit shown in Fig. 1, developed in various mechanical forms as seen in the photographs, has proven very satisfactory for the job at hand. The r.f. section requires only two inexpensive tubes, and it may be built complete with modulator by adding one more. The total current drain, with modulator, is well within the capabilities of the economical 300-volt 100-ma. vibrator supply. If more power is required than is available from the 5763 doubler, the latter will drive a 2E26 amplifier adequately.

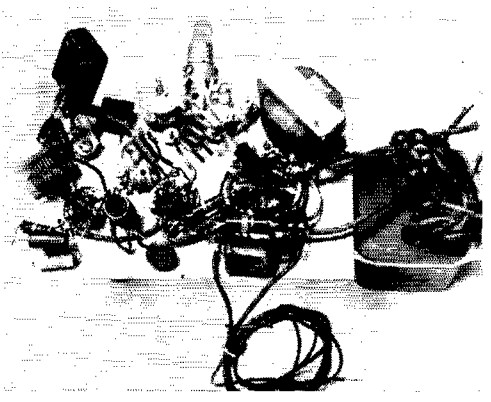
Examination of several rigs using similar circuitry that had not worked out well in the past indicated that they were low on drive to the 5763 stage, so that stage did not drive the following stage (6146 or 2E26) properly. Our effort was, therefore, directed toward boosting the drive to the 5763 and improving its over-all efficiency.

First, the various dual triodes were tested to see which would do the best job as a crystal oscillator-tripler. The 12AT7 seemed the most efficient of the lot. The 6J6 was also good, but it had the disadvantage of requiring a plate supply of less than 300 volts for safe operation. Next followed experimentation with values for the resistors, coupling capacitors and r.f. chokes. When the final model was evolved, the specifications were turned over to four other amateurs, who then built units of their own. Performance of the original was duplicated in each instance.

Construction Hints

As may be seen from the accompanying photographs, the mechanical form of the several units built varies widely. They have one thing in common, however — all were built largely of junk-box parts! Here are a few hints that are important if good performance is to be obtained.

The oscillator is the conventional overtone circuit that has been used many times in *QST*. Its operation is also covered in the ARRL *Handbook*. The inductances L_1 and L_2 are made from a single piece of B & W Miniductor, with no spacing between the two sections other than that resulting when the wire is cut to make the leads to the two



Bottom view of the experimental model. The crystal was connected temporarily as shown in order to isolate it from the tubes and thus determine whether there was any crystal heating.

sections. Start with 6 turns on L_2, peeling off a quarter turn at a time, if required, to reduce feedback. Four turns has been enough for every crystal we've tried in the experimental model to date.

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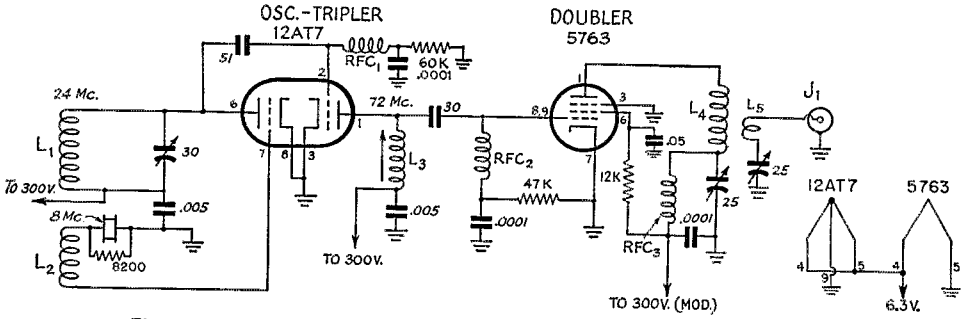


Fig. 1 — Schematic diagram and parts list for the W2IHW 2-meter transmitter.

L_1 — 12 turns B & W No. 3007 Miniductor.
L_2 — 6 turns same. L_1 and L_2 made from single piece; see text.
L_3 — 9 turns No. 16 enam. on ⅜-inch slug-tuned form; close-wound, brass slug.
L_4 — 4 turns B & W No. 3005, or No. 12 ⅝-inch diam., 1 inch long.
L_5 — 1 to 2 turns similar to L_4, as required to tune with series trimmer.
RFC_1 — 100 turns No. 37 enam., close-wound on 10-meg. 2-watt resistor (2.5 mh. also OK).
RFC_2 — 50 turns No. 33 enam. on 1-watt 10-meg.
RFC_3 — 32 turns No. 26 s.c.c. on ¼-inch diam. (Ohmite Z-144 also suitable).

The value of the grid resistor (across the crystal) will have a direct bearing on the plate current. With the 8200 ohms shown, the plate current is about 12 ma. If the chassis layout is reversed the pin numbers on the 12AT7 should be reversed also, to keep leads as short as possible.

The value of the coupling condenser between the oscillator plate and the tripler grid is important. Higher values prevent easy crystal starting and lower ones reduce coupling efficiency. The r.f. choke in the second grid is also important. Don't try to do without it as an economy measure, as it may result in a loss in drive to the following stage of as much as 20 per cent. A 2.5-mh. pi-wound choke may be substituted for the hand-made one specified. The by-pass at the cold end may be omitted if a 2.5-mh. choke is used.

The second plate coil, L_3, is resonated with a brass slug. The coil should be wound with its cold end nearest the chassis. Reversing it will drop the efficiency of the stage appreciably. The coupling capacitor value between this stage and the 5763 grid is also important, as is the inclusion of an r.f. choke in the grid lead. The plate current in the second stage will be about 12 ma., also.

The value of the grid resistor in the 5763 stage is at variance with the recommendations of the manufacturer, but the 47,000 ohms was found to give the best efficiency in the doubling application. Omission of the r.f. choke in series with this resistor was found to reduce the grid drive by more than 10 per cent.

The plate circuit of the 5763 is series tuned. The r.f. choke may be connected at the end of the coil, as shown. The r.f. voltage node on the coil can be found by touching a lead pencil along the winding until the point is found that has the least effect on the output. If the B-plus is fed in at this point a 470-ohm isolating resistor may be substituted for the r.f. choke, if desired.

A convenient dummy load for testing can be made by soldering a short length of stiff wire to the center connection of a No. 46 (blue bead) pilot lamp, and then soldering this wire into the inner conductor of a standard coaxial fitting so that the top edge of metal shell of the bulb is flush with the top of the fitting. The lamp will show at least full brilliance, or an output of about two watts.

Adjustment and Operation

Adjustment should start with the oscillator, checking for easy starting under load and freedom from self-oscillation, adjusting the inductance of L_2 to this end. Check the bias voltage developed across the second grid resistor to determine the efficiency of the oscillator. The original model will develop up to 150 volts at this point, though some detuning higher in frequency is required to guarantee easy oscillator starting. Check the oscillation to be sure that it is crystal-controlled, and on the third overtone, 24 Mc.

Next adjust the slug in the tripler plate circuit for maximum grid voltage across the 5763 grid resistor. As running the brass slug far into the coil (to reduce the inductance) lowers the Q of the coil appreciably, more output may be obtained if the turns spacing is adjusted so that the slug will be largely below the winding at resonance. Check the frequency to be sure that the stage is tripling.

(Continued on page 110)

Group of hams who have built rigs to W2IHW's specifications, for c.d. use. *Standing, l. to r.:* W2IHW, W2OMA, W2AXC, W2UYR. *Seated:* W2IOU, W2IND, W2KBH.

VR Break-In Keying

Using Voltage-Regulator Tubes for Keying

BY BYRON GOODMAN,* W1DX

• Here is a clickless and chirp-free break-in keying system that is the simplest and most widely applicable of any of the methods that have been proposed to date. It won't do much for a transmitter with insufficient oscillator isolation (what will?), but it's certainly worth a try in anything else.

SLIGHTLY less than six years ago, Mack Seybold, W2RYI, first pointed out that VR tubes can be used quite effectively as arcless switches for keying and other applications.[1, 2] Since then the principle has been used quite often, but an erroneous idea has developed along the way. It is the purpose of this article to explain away the misconception and also to describe a new break-in circuit that can be applied to any reasonably-good c.w. transmitter.

Although many pages have been written about the subject, some amateurs are still confused about key clicks and their causes. A prime misconception is that all key clicks are caused by the spark at the key or keying relay (or both) when the current is interrupted. It is quite true that any spark can cause clicks — it becomes a miniature *spark transmitter* (the thing hams and commercials used before vacuum tubes were available). The click you hear in a b.c. set when a light is switched on or off is an example, as is spark plug QRN from passing cars heard at ham-band frequencies. These clicks do not require associated radio gear for their generation, and they can be reduced or eliminated by an *r.f. filter* connected as close as possible to the point where the spark occurs. We will call them *r.f. clicks* — normally they can't be picked up more than a hundred feet or so from the source.

The more undesirable type of key click can be called an *envelope click*. It is caused by keying the rig on and off too abruptly, so that the r.f. envelope of the signal looks almost like a rectangle. This is the type of click that is very loud right on the signal proper and gradually falls off in intensity as you tune either side of the signal. In a bad case it may extend 50 or 100 kc. either side of the signal, or more if the signal is coming from a ham only a few blocks away. The envelope click is reduced or eliminated by proper *shaping of the envelope.*

Part of the confusion on r.f. clicks and envelope clicks arises from the fact that they coincide in time. However, it must always be remembered that they are two different breeds of cat. Obviously, you can't listen for envelope clicks in your own receiver until you have eliminated the r.f. clicks. Many amateurs eliminate the r.f. click by an r.f. filter at the key, no longer hear clicks in a neighbor's b.c. set, and assume they have eliminated all clicks (blaming the clicks they hear in their communications receiver on overload). Under these conditions, envelope clicks can (and often do) still exist.

But enough of this — let's get back to the VR tubes.

VR Tubes as Switches

A VR tube is a gas-filled tube primarily used as a voltage regulator. The VR-150, for example, has a practically constant voltage drop across it of 150 volts, regardless of the current through it. If, by some means, the voltage across the tube is reduced below 150 volts, the tube can no longer conduct. W2RYI used it in the circuit of Fig. 1 (and later modifications) to key a tube in the screen-grid circuit. In Fig. 1, the screen of the r.f. tube, V_1, gets its voltage from the + source, minus the drop through R_2 and the constant 150 volts of the VR tube. When the key is up, V_2 has no bias and tends to draw heavy current through R_2. If the voltage at the plate of V_2 is dropped below +150 volts, the VR tube no longer conducts because it doesn't have at least 150 volts across it, and the screen of V_1 is disconnected from the + source. With the key down, V_2 is biased to draw little or no current, the drop through R_2 is insufficient to bring the plate of V_2 below 150 volts, and the VR-150 conducts. R_1 is in the circuit only to furnish a d.c.

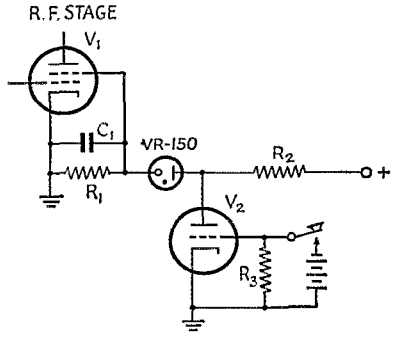


Fig. 1 — A VR-150 used as a keying switch. The key breaks the small current flowing through R_3, while the VR tube switches the screen-grid current to the r.f. stage.

* Assistant Technical Editor, *QST*.

[1] Seybold, "Clickless Keying Using VR Tubes," *CQ*, May, 1948.

[2] Seybold, "Electronic Keying Systems," *RCA Ham Tips*, Jan., 1950.

return for the screen of V_1 when the key is up, and C_1 is an r.f. by-pass condenser.

The advantages of the circuit should be apparent. If R_3 is large, the key makes and breaks current that is measured in fractions of a milliampere, so the necessary r.f. filter at the key has a very small job to do. The main job, that of breaking the screen current to V_1, is now done by the VR-150, and it is being broken without arcing or sparking.

And right here is where a misconception has developed. W2RYI mentioned that there is a finite ionization time of a VR tube, so that there is some lag. (Actually it is very slight, on the order of small fractions of a millisecond.) And years ago, the *envelope-shaping* networks for keying were called "lag filters" (a horribly inept expression). But the combination of the two has apparently given rise in some circles to the thought that keying through the VR tube like this results in some wonderfully benevolent envelope shaping and all of one's problems are solved! Actually, of course, there is considerable shaping of the voltage waveform applied to the screen, but it is caused by C_1 charging through R_2 and discharging through R_1 and the effective screen resistance. The VR tube is a nice (and to all intents and purposes) fast switch that doesn't give r.f. clicks when the current is turned on or off through it, but it isn't an envelope shaper.

As another application of the VR switch, W2RYI also describes making V_2 a clamp tube on an amplifier. This circuit has the advantage over the usual clamp tube that the screen voltage is reduced to zero with no excitation instead of the 10 to 30 volts often obtained.

Break-In Keying

Some c.w. die-hards (like the writer) are convinced that the oscillator of a c.w. transmitter cannot be keyed if one is to escape chirps and clicks (you can get rid of one but not both), and over a period of years they have concocted various circuits to key amplifiers and also work break-in. These circuits usually take the form of something that will turn the oscillator on just ahead of the amplifier and turn it off just after the amplifier is turned off, so that the oscillator in effect is running constantly so far as the transmitter output is concerned. The intervals when the key is up still permit hearing the other station. Examples of this have appeared in *QST* in the past.[3,4] The only justification for another circuit is that the one about to be described is the simplest to date and, as promised in the introduction, can be applied to any reasonably-good c.w. transmitter.

It might be wise to explain that "reasonably-good" before continuing. Obviously, keying a stage following the oscillator doesn't buy you anything in chirp-free operation if keying this stage reflects back on the oscillator and introduces a chirp. In some instances, keying the oscillator *and* amplifier is a better compromise, particularly in small two-stage transmitters (the ARC-5 transmitters are a good example of this). A basic requirement for a near-perfect c.w. transmitter is that keying the amplifier has *no* effect on the transmitter frequency. If you don't already have this condition met, this new keying system won't do as good a job as it is capable of.

Now let's take a look at grid-block keying, a system that can be applied to the output amplifier or driver stage of any transmitter. Shown in Fig. 2, it must be admitted that it is about as simple as they come. The one objection some folks have to it is that it requires a negative voltage source — if that is an insurmountable problem or drawback for you, we've just lost a customer. But if you can throw together a simple negative supply, here's how the thing works. The resistor R_1 is the normal grid leak for the tube — that's set by the tube characteristics and you don't change it. The negative voltage should be anything higher than about three times the operating bias, a requirement that becomes awkward to meet only with some of the largest tubes, since almost any small b.c. transformer will give about 400 volts out of a condenser-input filter when the current drain is negligible as it is in this case.

The operation is rather obvious, and the adjustment is simple. With the key up, the negative supply biases the tube beyond the point where any r.f. excitation has any effect, and hence the plate current is zero. If the tube is a tetrode, the screen voltage must be obtained from a "stiff" source to avoid "soaring." When the key is closed, the normal grid leak is returned to ground, and the tube can perform as it should under normal amplifier conditions. The *envelope shaping* is determined by the value of C_1, R_2 and, to some extent, the negative voltage. The value of C_1 is made just large enough to give as soft keying as desired on "make" (the larger the condenser, the softer the make), and then R_2 is increased until the "break" is soft enough. With values of R_1 that range from 10,000 to 50,000 ohms, C_1 will run from 0.01 to 0.1 μf. and R_2 will be 0.1 megohm or more. The key doesn't break much current, and its r.f. filtering is relatively simple.

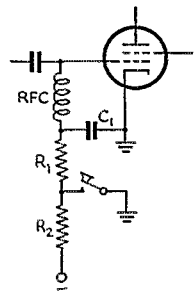


Fig. 2 — The basic grid-block keying circuit. The signal is shaped by the proper choice of C_1 and R_2 — R_1 is the normal grid leak.

The first requisite for the break-in circuit is a transmitter that can be keyed satisfactorily by grid-block keying in the output or driver stage. Assuming that you have one, to the point where you and your critics are happy, all that is re-

[3] Puckett, "'De Luxe' Keying Without Relays," *QST*, Sept., 1953.

[4] Goodman, "Chirp-Free Break-In Keying," *QST*, Oct., 1953.

quired is the additional 6J5 and VR-150 shown in Fig. 3 (the values shown are for keying a 6146 amplifier — they may vary slightly in your rig). The 6J5 is a cathode follower, and normally its

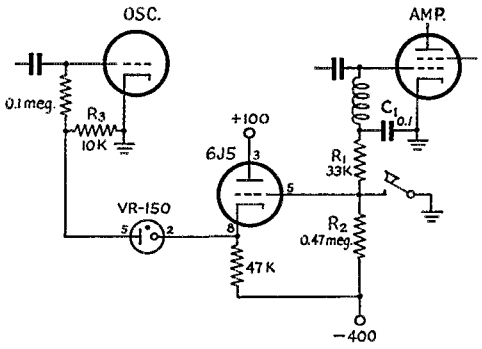


Fig. 3 — The break-in keying circuit uses grid-block keying of an amplifier stage combined with VR-tube switching of the oscillator. The oscillator turns on before and off after the amplifier. The 6J5 heater should be connected to its own transformer and not to the heater circuit of the transmitter.

cathode voltage would follow closely the voltage appearing at the junction of R_1 and R_2. With the key up, this voltage is −400 (or whatever the negative supply delivers). But the VR-150 is in series with 47,000 and 10,000 ohms, and a little calculation will show that about 4.4 ma. is passing through the 47,000-ohm resistor, putting the 6J5 cathode at +195 volts with respect to its grid. Hence, to all intents and purposes the 6J5 isn't in the picture right now. The oscillator is biased off by the 45 volts appearing across the 10,000-ohm resistor, R_3.

When the key is closed, the cathode of the 6J5 follows its grid and goes immediately to a few volts positive. On the way the voltage across the VR-150 becomes less than 150, the VR tube stops conducting, there is no fixed bias on the oscillator, and the oscillator turns on. But the amplifier tube doesn't start conducting until C_1 (which was charged to −400 volts) discharges down through R_1 until a bias value is reached that permits the amplifier to start operating. Thus the oscillator turns on first.

When the key is opened, the junction of R_1 and R_2 does not go immediately back to −400 volts. Assuming that the operating bias of the amplifier was −90, then C_1 is charged to this voltage. The instant the key is opened, the grid of the 6J5 jumps to a voltage determined by the voltage divider R_1R_2 connected between −90 and −400 volts (in this case about −110) and then increases toward its −400 idling value (at a rate determined by the value of C_1 and $R_1 + R_2$). The 6J5 cathode has to get to about −170 before the VR tube can even begin to ionize, and by then there is no appreciable amplifier output.

In operation, the rig (6AC7 VFO on 160-6AC7-6AG7-6146 output on 40 meters) sounds like excellent amplifier keying, with no trace of a chirp or click. However, there is no signal as soon as the key is lifted, and you can "hear between dots" even at the higher bug-key speeds. Listening to the oscillator on 160 you hear a clicky oscillator. There is a little back wave through the 6146, so on a 'scope it is easy to see the oscillator coming on before the amplifier and hanging on an instant after the amplifier is off.

The circuit came about as a result of the needling by Director Anderson, W4MWH, for break-in keying that didn't use relays. We couldn't tout him into an earlier circuit[4] that gave good keying but was complicated, and we must confess that his insistence (after all, he's a boss!) was all to the good. Andy tried out the circuit in his exciter even before it was tried at W1DX. His exciter is somewhat the same in that it uses a 6AC7 VFO and ends up in a 2E26, and his circuit constants are also similar to those in Fig. 3.

In cases where the operating bias and necessary cut-off voltage of the keyed stage is higher than in the 2E26-6146 range, it will be necessary to use two or more VR tubes in series and, in some cases, raise the negative source voltage. For any given set of conditions and transmitter, increasing the number of VR tubes will increase the "hold-in" time of the oscillator. There is no good reason to do this but it is pointed out in case you run into conditions where the oscillator doesn't hold in long enough and even the largest values of R_2 (Fig. 3) still give a click on "break."

It should be obvious that the same principle can be applied to a vacuum-tube keyer that is normally used in the cathode circuit of a driver or output stage. It is only necessary to add the cathode follower and VR tube to the grid circuit of the v.t. keyer.

OUR COVER

What with the annual ARRL DX Contest beginning this month, the subject of antennas and antenna farms is highly topical. *QST*'s cover presents a landlubber's view of the 110-foot mast supporting W1ATE's 10- and 40-meter rotaries at Rockville, Conn. The sociable climber is none other than Hq. staffer W1HDQ. Also see page 50.

QuistQuiz

Our friend A recently installed a 3-element rotary beam with Gamma match and coaxial-line feed. To get his beam tuned "on the nose" he used a variable condenser in the Gamma match, a Twin-lamp s.w.r. indicator, and a field-strength meter located a quarter mile from the antenna and 100 feet higher. With a helper at the field-strength meter and with a 144-Mc. talk-back circuit to the helper, he climbed the mast to adjust the antenna, with his transmitter running with just enough power to light the twin-lamp decently. To his disgust, he found that as he adjusted for a good s.w.r. as indicated by the twin-lamp, the reported field-strength reading went down! What should he do — adjust for maximum field strength or minimum s.w.r.?

(Please turn to page 52 for the answer)

A Beginner's Code-Practice Set

Low-Cost Audio Oscillator Construction

BY LEWIS G. McCOY,* W1ICP

ANY amateur operator's license requires a certain amount of proficiency in the International Morse code. You can learn to copy code by listening to code records, "tape" machines or, sooner or later, on a short-wave receiver to actual amateur and commercial signals. There are many amateur stations that send slow-speed code practice at regularly scheduled times. Some of these stations are listed at the end of this article.

Unfortunately, more than a receiver or records is needed to learn to *send* the code properly. This is where only a code-practice oscillator fills the bill. Long ago, electric buzzers were traditional as a means for learning the code. It is true that code-practice buzzers are still available, but if you don't live alone, the sound of an electric buzzer may soon grate on the nerves of the family or neighbors. However, with an audio oscillator and headphones, you can practice the code and keep peace at home.

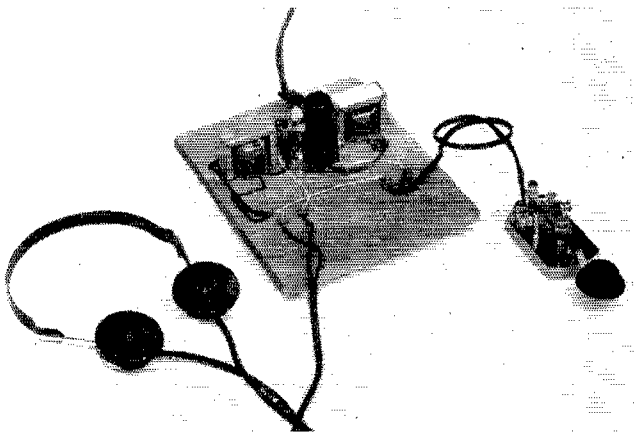
An audio oscillator is an electronic device that generates an audio tone. Together with a telegraph key for forming the code characters, and a pair of headphones for listening, it makes a code-practice set that is convenient to use. Code-practice oscillators have been described that use batteries for power, and others use rectified power from the a.c. lines. The oscillator to be described is powered from the a.c. lines, but it is unusual in that no plate power is required. Eliminating the plate power supply reduces the cost considerably, of course. In fact, a check in amateur parts catalogs showed that the unit described here could be built for less than $6.00 — a reduction in price over commercial code-practice oscillators by more than half! In addition, most of the components can find many applications in other pieces of amateur gear after you get your license (which is more than can be said for electric buzzers).

The Circuit

As can be seen from the wiring diagram, Fig. 1, the unit consists of a 6J5 oscillator, a 1-to-1 turns-ratio audio transformer to furnish the necessary feed-back for the tube to oscillate, a 0.1-μf. condenser, a 47,000-ohm resistor, and the 6.3-volt heater transformer. Different 6J5 tubes were tried in the circuit and they all worked equally well, but it is conceivable that a particular 6J5 would not work. In such a case, another 6J5 should be tried. Beam-power 6V6s, 6Y6s and 6L6s were tried, with the screen tied to the plate, but none of them oscillated. However, 6F6 pentodes were tried (with the plate and screen tied together) and they oscillated. The only type of audio transformer tried was the Stancor A-4711, but three different ones were used and they all worked equally well. It is important that high-impedance headphones be used as the circuit[1] did not work well with the low-impedance type.

Construction

For the newcomer to amateur radio, it should be pointed out that in addition to the parts shown in Fig. 1, an octal socket (Amphenol 77MIP8), a three-terminal tie point, about two feet of hook-up wire, a 115-volt line cord and plug,



The simple code-practice oscillator uses an inexpensive audio transformer (left), a 6J5, and a heater transformer (right). Throw in a 3-terminal tie point (rear), a resistor and condenser, and a few screws and nuts and you have it made.

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[1] The only other instance we can recall of an oscillator circuit that works with no apparent plate voltage is that of the Tri-Tet crystal oscillator, which will run merrily without plate voltage from an external source so long as the circuit is complete. The code-practice oscillator shows 0.2 volt between cathode and plate, derived from the initial velocity of the electrons. The failure of beam-power tubes to operate in the same manner presumably stems from the fact that the grids are aligned and the cathode-to-plate spacing is greater. — Ed.

and a chassis are needed to complete the oscillator. For simplicity, the chassis is a 7×7-inch piece of wood, ½ inch thick. By mounting the parts on wood, there is no need for metal-working tools. The only tools necessary are a soldering iron, pocket knife, screwdriver, a hand drill and ⅛-inch twist drill, and a pair of pliers.

The parts are held securely to the board by No. 6 machine screws and nuts. The transformers and the three-terminal tie point are held in place with ¾-inch screws. The tube socket screws are 1½ inches long, and the 'phone and key terminal screws are 1 inch long. Two extra nuts are needed for each of the tube socket screws. These are used to hold the socket about ½ inch above the board,

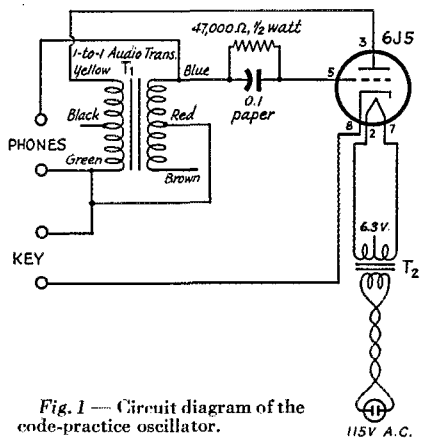


Fig. 1 — Circuit diagram of the code-practice oscillator.

T_1 — 1-to-1 push-pull interstage transformer (Stancor A-4711).

T_2 — 6.3-volt 1.2-amp. heater transformer (Stancor P-6134).

allowing plenty of room for soldering connections. After the parts are mounted, you are ready to wire the unit.

Wiring

First off, *don't* shorten any of the transformer leads. You may find that you want to use the transformers in another piece of gear at some later date, in which event the longer leads may be needed. The extra length can be coiled up.

The 6.3-volt leads of the heater transformer are connected to Pins 2 and 7 of the 6J5 socket. The 115-volt leads of the transformer and the power cord wires are connected at two tie points and soldered. Pieces of adhesive tape are put over each of these 115-volt terminal points to avoid accidental contact. If desired, a single-pole single-throw switch can be inserted in series with one of the 115-volt leads to switch the unit on and off. However, it was felt that it was just as easy to move the plug in and out of the wall socket and save the cost of a switch.

The resistor and condenser are connected between Pin 5 and the remaining tie point on the three-terminal block. The blue lead of the transformer, T_1, and a lead from the headphone terminal are also connected to the same tie point as the resistor and condenser. The yellow lead from

• Here is an a.c.-powered code-practice set that is hard to beat for simplicity and low cost. It can be assembled in an hour or so, leaving a maximum amount of time for the No. 1 job — practice!

T_1 is soldered to Pin 3, the 6J5 plate. The green and red leads from T_1 are connected to the remaining headphone terminal, together with a lead that runs to one of the key terminals. The other key terminal is connected to the 6J5 cathode, Pin 8. This completes the wiring of the unit.

High-impedance headphones are connected to the "Phones" terminals, and a telegraph key to the "Key" terminals. If you already own a communications receiver and don't want to disconnect the headphones from a plug each time you use the code-practice oscillator, use a headphone jack instead of the machine-screw "Phones" terminals.

Push the a.c. plug into a wall socket and allow a minute or so for the tube to warm up. When the key is closed (pressed) a high-pitched audio note should be heard in the headphones. If not, check the circuit carefully against Fig. 1.

As to learning to send the code properly, the subject is treated in detail in the ARRL booklet, *Learning the Radiotelegraph Code*, available at your local dealer.

Code-Practice Stations

In addition to the code practice stations listed below, the schedule for W1AW, Headquarters station of ARRL, is given in the "Operating News" section of this issue.

W1ACT, Fall River ARC, 57 Richmond St., Fall River Mass.; 3545 kc.; Mon., Wed., Thurs. and Fri., 1900 EST; 5-7 w.p.m.

W1SRB, Al Vesce, 84 N. Main St., Thompsonville, Conn.; 29.6 Mc.; Mon., Wed. and Fri., 1930 EST; beginners' speeds.

W2EZS, Paul Reynolds, 63 Oswego St., Baldwinsville, N. Y.; 3690 kc.; Mon., Wed. and Fri., 1630 EST; 5-13 w.p.m.

W2FSL, Adolph F. Elster, 53 Commercial Ave., Avenel, N. J.; 3675 kc.; Sat., Sun. and holidays, 0730 EST; beginners' speeds.

W2HEI, William Teso, Mountain Ave., Hillburn, N. Y.; 3950 kc.; Sat. and Sun., 1400 EST; 5-18 w.p.m.

W2NRM, Howard B. Jack, Brown's Trailer Court, R.F.D. 6, Lodi, N. J.; 1.88 and 29.118 Mc.; Mon. through Fri., 2100 EST, Sat., 0800 EST; 3-8-15 w.p.m.

W2WDT, Henry Bergmann, 1028 Jefferson Ave., Brooklyn 21, N. Y.; 29 Mc.; Wed., Thurs. and Fri., 2100 EST; 5-10-15 w.p.m.

W4RUR, Edward J. Blatt, 536 16th Ave. So., St. Petersburg, Fla.; 28.05 Mc.; Mon. and Wed., 1900 EST; 6-22 w.p.m.

W6JZ, Ray Cornell, 909 Curtis St., Albany 6, Calif.; 3590 kc.; Mon., Wed. and Fri., 1830 PST, 5-25 w.p.m., 1920 PST, 35-45 w.p.m.

W6QBN, Bob Conley, Route 1, Box 411, Escondido, Calif.; 3760 kc.; Sun. through Thurs., 1830 PST, 4-6-10 w.p.m.

K6USN, Cmdr. J. M. McCoy, 12th Naval District Reserve Electronics Stn., Bldg. 7, Treasure Island, San Francisco, Calif.; 3590 kc.; Tues. and Thurs., 1830 PST; 5-25 w.p.m.

(Continued on page 110)

Captain Tony Borgia, **DL4IE**, who along with **DL6WL** accounts for a large part of the DL s.s.b. activity, wonders out loud about the possibilities of a DX contest or perhaps a field day for the s.s.b. gang. Together with some of the other active European stations, he reasons that such an activity might get more of the s.s.b. DX stations together. This column would be available to publicize any suggestions as to the form of such an activity and to report the results. Right now we're wide open for ideas and arguments pro and con. The only similar activity we can recall is a "DXCC Round-up" some years ago, where the idea was for members of the DXCC to get on the air during a particular week end and see how many other DXCC members they could work. How do you feel about setting aside a week end (that doesn't conflict with any society's DX contest) for a s.s.b. contest? And what about scoring — do we follow the ARRL DX Contest pattern of W/VE working other countries, or do we count W and VE call areas as "countries" (along with the DX countries list) and make a combined Sweepstakes/DX contest out of it, with a multiplier based on countries? Should a country worked on two bands count as a multiplier of 1 or 2? If enough of you want a contest, on a purely informal basis, we will be glad to set it up. Your opinions will be appreciated.

Wyn McGee **VR2CG**, is using push-pull 805s in his linear at 150 watts peak, driven by a phasing exciter. ZL activity is high, he reports, but VK s.s.b. contacts are hard to come by. A new Signal Slicer patterned after the *G.E. Ham News* design is doing a nice job, Wyn reports, and he is trying to talk some of the ZLs into building them. VR2CG hears East Coast Ws on 75 s.s.b. quite often, when no a.m. signals are audible from that area, and he needs no further proof of the effectiveness of s.s.b.

Geoff of **G3FHL** reports building a six-crystal filter for his BC-342, and he likes the results a lot. He says the European preference seems to be filter selectivity for reception (as opposed to the phasing units so common in this country) and about an even split between filters and phasing in the exciters.

Forrest Balliet, **W6LWD**, and a lot of others are trying to scare up more s.s.b. activity on 40. He and cronies **W6CIN, W6IAL, W7JPN** and **W7LPE** have been meeting regularly Saturdays and Sundays, 9 A.M. and 2 P.M. PST, on 7298 kc. They can now be found there or on 7201 kc., and their promotion has resulted in a list of 26 regulars that include W2, W5, W6, W7, W8, W9 and KL7.

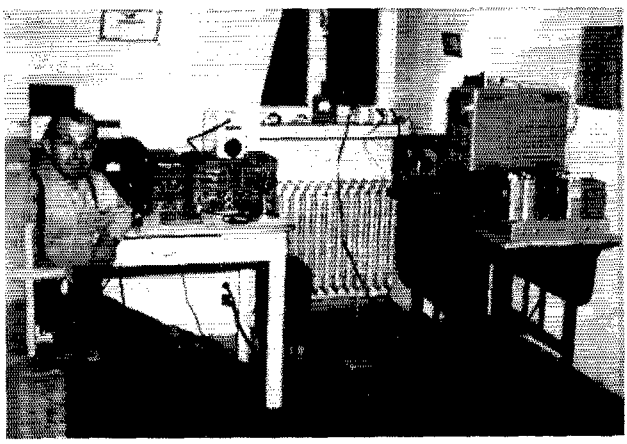
If you're a Johnny-come-lately to s.s.b., you may be interested in filling in on some of the s.s.b. literature. A *must* in every such shack is a group of s.s.b. articles that have appeared in *G.E. Ham News*, and we understand that they are again available by dropping a card to "Lighthouse Larry," Tube Department, Electronics Division, General Electric Co., Schenectady 5, N. Y. He will send you gratis the issues describing SSB Jr., the Signal Slicer, Lazy Linear, Power Peaker, etc.

Fine Tuning with a Clapp Oscillator

Most VFOs don't have a slow enough tuning rate for easy "zeroing in" on a s.s.b. net, and Charles Polsten, W2JYG, sends along a simple tip that may help you get around this. His series-tuned (Clapp) VFO uses 1000-$\mu\mu$f. silvered-micas in the divider and a 35-$\mu\mu$f. variable in parallel with 100 $\mu\mu$f. fixed for tuning. For fine tuning he shunted another 35-$\mu\mu$f. variable across the cathode-to-ground 1000-$\mu\mu$f. condenser, which gives a range of around 330 kc. with the regular tuning condenser and about 3 kc with the trimmer. Needless to say, setting to the correct frequency is no longer a breath-holding chore.

Modifications of "W9LIJ" Anti-Trip Voice Control

Laurence Smith, W7FOM, has been using the W9LIJ voice-control circuit (November, 1953, *QST*, page 43) and is pleased with its operation. He made some modifications and had some experiences that he passes along for others who might be interested in the circuit. In his words, "Any



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Captain Anthony Borgia, DL4IE, Heidelberg, is one of the more active European s.s.b. operators. Tony is shown here with the 10A exciter, 4E27 final that runs 300 watts peak input, and the AR-88 receiver plus Signal Slicer. Sterba and Vee beams are used on 20, and the Vee also handles the 80-meter activity.

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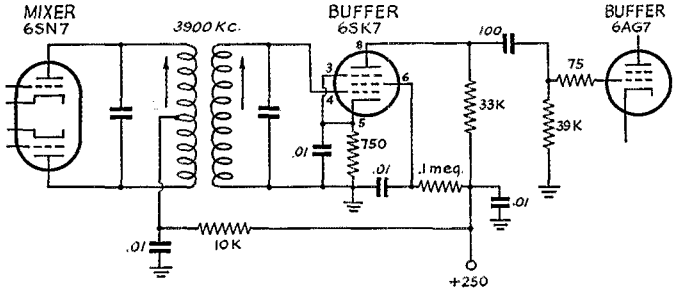


Fig. 1 — A resistance-coupled buffer stage, as used by W7FOM to drive (and help to stabilize) a 6AG7 Class A amplifier. A driver like this should not be used if the driven stage draws grid current.

sharp-cut-off pentode r.f. tube can be substituted for the 6AG5s used in the circuit. I ended up with one 6AK5 and a 9001 because that's what the junk box yielded. However, 6AK5s were tried in both sockets with good operation. Improved 'no-trip' action may be obtained by altering the value of the common cathode resistor and/or the plate resistor of the right-hand 6AG5. I used a 3000-ohm cathode resistor and 15,000 ohms in each plate circuit. This reduced the cut-off bias for the transmitter to about 30 volts (with a 120-volt negative supply) but was sufficient to bias off the 6SN7 mixer and 6AG7 output tube of the crystal-filter exciter.

"Receiver bias was about 45 volts, which worked on my BC-312 when applied to the a.v.c. bus. These three resistors should be changed to the values that give the required voltages for each individual set-up. If a germanium diode is used in series with the bias to the receiver a.v.c. bus, pick one with a very high back resistance. I had some trouble with a 1N34 diode in that the back resistance decreased after the receiver operated for a period of time. This upset the S-meter readings and reduced the a.v.c. action. One diode section of a 6AL5 was installed in place of the 1N34 and eliminated the trouble.

"I originally tried using half a 6J6 in place of the 6C4. However, the circuit tripped too easily from the loudspeaker. A triode-connected 6AQ5 (screen tied to plate) with a 10,000-ohm plate load resistor was substituted, and operation was much improved.

"If low-pitched sounds from the 'speaker have a tendency to trip the circuit, the coupling condenser to the input might be changed to a smaller value to reduce this effect. If it is sensitive to high-pitched sounds, a small by-pass condenser from plate to ground should help to minimize this trouble.

"I use one of the cheaper dynamic mikes with this circuit, about two feet from a loudspeaker that faces the operating position. Excellent no-trip action is obtained with a fair amount of 'speaker volume.

"The power supply for this circuit consists of a pair of small 6.3-volt heater transformers connected back-to-back (6.3-volt windings tied together). This furnishes heater power for the tubes, and −120 volts d.c. from the 120-volt winding of the second transformer through a selenium rectifier, small filter choke and two 40-μf. 150-volt condensers. The + side of the supply is grounded, of course, so the condensers and selenium rectifier are reversed from a normal power-supply circuit."

Resistance-Coupled Buffer for Stabilizing a 6AG7

W7FOM also sends along the circuit he uses in his crystal-filter rig to stabilize a 6AG7 buffer. His line-up following a 6SN7 mixer (where the s.s.b. signal is heterodyned to the operating frequency) is shown in Fig. 1, and it may help those who have had trouble "taming" a 6AG7 buffer. If desired, a 50,000-ohm variable control can be connected between the 750-ohm cathode resistor and ground to control excitation to the 6AG7.

—*B. G.*

Twentieth Annual ARRL DX Contest

'Phone: Feb. 12th–14th and Mar. 12th–14th;
C.W.: Feb. 26th–28th and Mar. 26th–28th

Are you all set for the 20th ARRL International DX Competition? Amateurs everywhere are invited to participate. Two week-end periods will be devoted to c.w. participation and two to 'phone. A special certificate award will be given to the highest-scoring c.w. and 'phone station in each country and in each continental U. S. A. and Canadian ARRL section. Operators outside the U. S. and Canada will attempt to exchange serial numbers with as many W (K) and VE/VO stations as possible.

Contest periods will be divided for c.w. and 'phone as follows: First 'phone period will begin on Feb. 12th at 7:00 P.M. EST and end on Feb. 14th at 7:00 P.M. EST. The second 'phone period will be scheduled during the same hours from Mar. 12th to 14th. The first c.w. period gets underway at 7:00 P.M. EST on Feb. 26th and ends at 7:00 P.M. Feb. 28th. The second c.w. period is scheduled for the same hours March 26th to 28th.

Though not necessary for entry, convenient contest report forms will be supplied by ARRL upon request. Please indicate whether you plan to enter the c.w. section, the 'phone section, or both, when requesting these forms.

ARRL has circulated preprints of the rules to I.A.R.U. Societies, to foreign QSL Bureaus, and to hundreds of active hams overseas, and it is expected that many scarce prefixes will be represented in the contest. Stand by for DX galore in February and March!

Post-Phasing Distortion

THE question of distortion in a linear amplifier, and its relation to spurious emissions in the unwanted sideband of a single-sideband transmitter, has been discussed both in print and over the air, but there is another source of "spurious" that seems to have had little attention. It is a phenomenon peculiar to phasing-type transmitters and results from harmonic distortion in the audio amplifiers following the audio phase-shift network, and from nonlinearity in the balanced modulator. In general, these amplitude distortion products are not in the proper

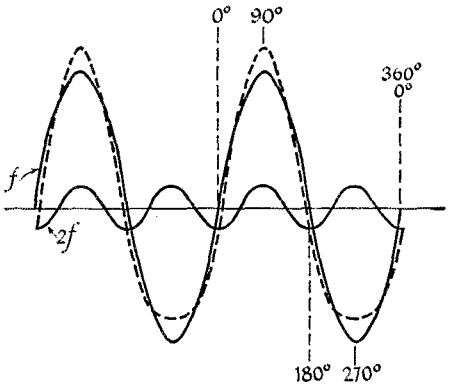


Fig. 1 — The common type of distortion in vacuum tubes can be resolved into a fundamental and second harmonic having the time relationships shown. The fundamental, *f*, is the amplified grid signal, and 2*f* is the generated harmonic.

phase to cancel out on the unwanted side of the suppressed carrier.

Fig. 1 is typical of second-harmonic distortion that occurs in vacuum-tube circuits. The dashed curve is the output waveshape and the solid curves show the fundamental and second-harmonic frequencies of which it is composed. Two different frequencies cannot be shown on a single vector diagram but their behavior can be depicted by a series of "snapshots" at consecutive time intervals. Fig. 2 shows such a series at 90-degree intervals over one cycle of the fundamental frequency. The second harmonic, having twice the frequency, changes phase twice as rapidly as the fundamental.

Now suppose we have two signals such as shown in Fig. 1, identical except for the fact that the fundamental component of one lags 90 degrees behind the fundamental component of the other. This situation can arise when pure fundamentals, 90 degrees apart out of an audio phase-shift network, are applied to the grids of separate amplifiers that distort each signal in exactly the same way. The vector diagrams of Fig. 2 apply to each individually, so when the 90-degree fundamental shift of one channel is taken into account and the two channels are viewed simultaneously, the behavior with time is as shown in Fig. 3. Each harmonic component retains its same relative phase with respect to its fundamental. These harmonic components, it will be observed, are 180 degrees apart, not 90 degrees. The diagrams illustrate the fact that in a circuit designed to preserve waveshape the phase shift is proportional to frequency; i.e., there is no phase distortion. Circuits following the audio phase-shift network, including audio amplifiers and the balanced modulator itself, are perforce designed to meet this condition in order to generate a clean single-sideband signal.

If the signals from the two channels in Fig. 3 are applied to balanced modulators in the usual way, there is no sideband cancellation at the harmonic frequency. Fig. 4 shows what happens. To avoid confusion in the drawings, the fundamental vectors have been advanced 30 degrees from the position at the left end in Fig. 3. Consequently, the harmonics advance 60 degrees in the same time interval. The audio relationships at this instant are shown at the top. When the

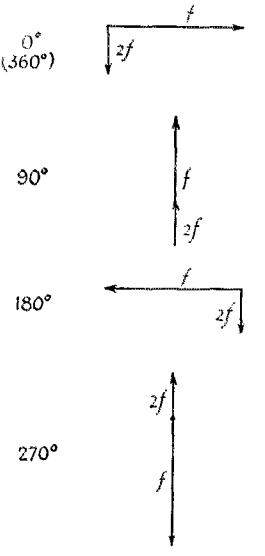


Fig. 2 — Relationship between the fundamental and harmonic vectors of the wave in Fig. 1, taken at 90-degree intervals of the fundamental frequency.

outputs of the two channels are applied separately to modulators with 90-degree r.f. phasing, the composite diagram is as shown in the middle drawing. The fundamentals, A_1 and B_1, have been omitted in this drawing since they are no longer needed and merely follow the usual pattern for single-sideband generation. The sec-

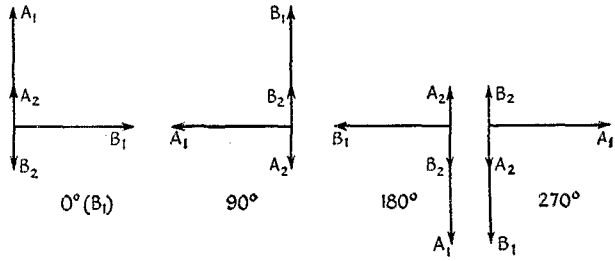


Fig. 3 — Phase relationships in two channels when the fundamental in one (A_1) leads the fundamental in the other (B_1) by 90 degrees. A_2 is the second harmonic associated with A_1, and B_2 the second harmonic associated with B_1.

ond harmonic, A_2, of the first audio channel, when applied to the first r.f. channel generates side frequencies A_{2U} and A_{2L}, upper and lower respectively, spaced twice the fundamental frequency from the carrier. Similarly for the harmonic B_2 generated in the second audio channel when applied to the second r.f. channel. When the carrierless r.f. components are combined in the balanced modulator the two lower side frequencies add together as shown at L in the lowest drawing, and the two upper side frequencies combine into U. These are identical with the upper and lower side frequencies produced by single-tone modulation in one balanced modulator — that is, double-sideband suppressed-carrier transmission.

All harmonics generated in the circuits under discussion will be shifted in phase in proportion to frequency. Thus, if the fundamentals in the two channels are 90 degrees apart the second harmonics will be 180 degrees apart, the third harmonics 270 degrees, and so on. It has been shown that the second harmonic is transmitted as a carrierless double-sideband signal; this is true of all even harmonics. The case of the third harmonic is interesting because a phase difference of 270 degrees between the two audio channels is equivalent to a 90-degree difference, but with the lead and lag reversed as compared with the fundamentals. Hence, identical third-harmonic distortions in the two channels will give single-sideband transmission again, but with the output in the *unwanted* sideband. On the other hand, the shift at the fifth harmonic is 450 degrees, which is identical with the 90-degree shift at the fundamental; hence, fifth-harmonic distortion gives rise to a spurious component in the desired sideband but not in the other. Odd harmonics give single side frequencies, alternating between the undesired and desired sidebands.

The behavior described above has been verified experimentally. It is not hard to observe if a really pure audio tone is available; however, distortion *ahead* of the audio phase-shift network is likely to confuse the issue, especially in the desired sideband. If a tone of 1000 cycles or higher is used a receiver with a sharp crystal filter will separate the components of the signal without difficulty, and at least a qualitative check is possible.

This discussion has been idealized to the extent that it has assumed identical distortions in each channel, exact 90-degree r.f. phasing, and complete carrier suppression. For even harmonics, departure from exact audio phase and amplitude balance will affect the amplitudes of the side frequencies to some extent; so will inaccurate r.f. phasing. If some carrier gets through, there will be phase modulation along with the amplitude modulation, and under special conditions pure phase modulation would be possible. Similar departures in the case of odd harmonics will cause components to appear in both sidebands (although generally of unequal amplitudes), and incomplete carrier suppression also will cause phase modulation along with amplitude.

At present, there are no data available to judge the position that distortion of this sort

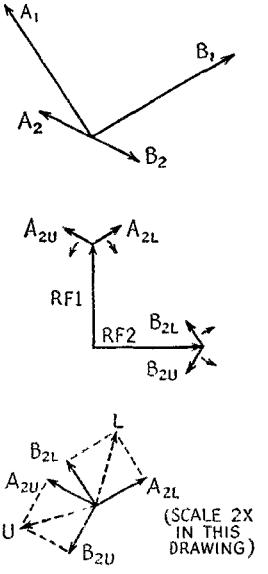


Fig. 4 — Sideband output when the harmonics (A_2 and B_2) in the upper drawing are applied to balanced modulators having 90-degree r.f. phasing. The r.f. carriers are shown for reference in the middle drawing. When carriers are eliminated the upper and lower side components, subscripts U and L respectively, combine as shown in the lower figure.

rates in the list of things that can cause "clutter" in the unwanted sideband. As a first approximation the spurious components can be taken to be of the same order as the original distortion although, as is evident from Fig. 4, they may be somewhat smaller. In a transmitter in which, in the absence of such distortion, the sideband suppression actually is close to the common target figure of 40 db., the distortion in the post-phasing audio amplifiers and in the balanced modulators would have to be kept to the order of 1 per cent to avoid degrading performance.

In practice, there is one saving feature that applies not only to this type of distortion but

(Continued on page 118)

A Vacuum-Tube Insulation-Resistance Tester

Checking Components for Leakage

BY OTTO KOSA,* W1IYB

• Here's a handy gadget to have around the shack to check those used condensers and other components. It's a lot easier (and sometimes less expensive) to spot defective parts *before* installation than after.

THE author does a lot of construction, mostly from parts obtained from (a) the junk box, (b) surplus, (c) the prewar rig. As a result, quite frequently capacitors and other components that checked OK with the v.o.m. broke down or started to leak when installed in equipment. An instrument was needed that would test the parts under voltage strain. After some consideration, the circuit shown in Fig. 1 was devised.

One of the easiest ways to describe the operation of this instrument is to have the reader consider the ordinary capacitively-coupled triode Class A amplifier. With a given vacuum-tube type and plate voltage, the cathode bias resistor determines the plate current that is drawn. When the grid coupling condenser becomes leaky, a positive voltage from the previous-stage plate circuit is impressed on the triode grid. This changes the operating point on its plate-current/grid-bias-voltage curve. As a result, plate current increases and distorted signals appear in the output. We have just given the coupling capacitor a rough insulation-resistance check by observing the distortion and the increase in plate current.

In order to protect our instrument when checking a shorted capacitor, or other component of low resistance, it was decided to apply a negative voltage to the grid through the component being tested. The cathode resistor is made variable so that the plate current can be adjusted to full-scale reading on the plate milliammeter, when nothing is being tested. This provides a starting point of infinite insulation resistance.

As the instrument was to be used in checking moderately-high insulation-resistance components, it was decided to use one-half megohm as our low-resistance starting point. Therefore, a ½-megohm resistor, R_9, is switched in series between the vacuum-tube grid potentiometer, R_7, and the negative testing voltage. The potentiometer is now adjusted so that the plate milliammeter reads approximately one-twentieth full scale. Our meter scale is now marked 0.5 megohm at this point. To fill in the calibration points between infinity and 0.5 megohm, we switch out the 0.5-megohm resistor and insert in its place other resistors of known value.

T_1 provides all necessary voltages. V_2 rectifies the testing voltage and C_1 filters. Pure d.c. is necessary here, since we are interested in measuring insulation resistance, not reactance.

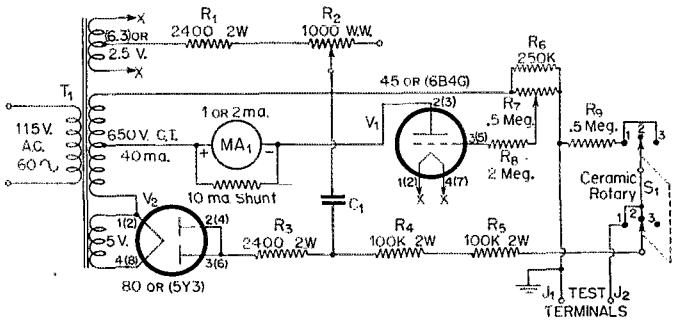


Fig. 1 — Circuit of the insulation-resistance tester. R_9 is made up of five 0.1-megohm 1-watt resistors in series. J_1 and J_2 are pin jacks. Pin numbers in parentheses refer to tube type in parentheses. C_1 is a 2-μf. 1000-volt unit.

R_4 and R_5 determine, to a considerable extent, the total current that will flow in the testing circuit when J_1 and J_2 are shorted together.

To check adequately capacitors and other components rated at 600 or 1000 w.v.d.c., the instrument must provide like voltage for insulation-resistance checking purposes. A happy compromise of 900 volts d.c. is provided when applied across a good low-leakage component. A 600-volt paper capacitor of reliable make will take this voltage.

V_1 is in a self-rectifying circuit, providing pulsating d.c., so we can read results on MA_1. This meter has a 1-ma. movement and shunting it with sufficient resistance for full-scale reading of 10 ma. sufficiently dampens it so it will no longer follow individual d.c. pulsations. V_1 is either a Type 45 or 6B4, depending upon the

(Continued on page 114)

* R.F.D., North Chichester, N. H.

Happenings of the Month

MARITIME MOBILE HEARING

In the ARRL filing on Docket 10501, in which FCC proposed world-wide maritime mobile privileges on the 21-Mc. band, the League countered with a suggestion that MM hams in the coastwise service be permitted operation on all amateur bands, and requested oral argument to elaborate on its request for dismissal of the FCC proposal. This the Commission has granted, with the argument to be heard before the Commissioners in Washington on January 25th.

DOCKET 10712 FILING

At the direction of the Executive Committee, ARRL comment has been filed as follows on the FCC proposal to make Novice and Technician licenses available by mail only, and to reduce to 50 miles the distance from a quarterly examining point determining whether personal appearance is required for other exams:

FEDERAL COMMUNICATIONS COMMISSION

In the Matter of

Amendment of Part 12, Rules Governing the Amateur Radio Service, concerning operator examinations } DOCKET 10712

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INC.

Pursuant to Paragraph 4 of the Notice of Proposed Rule Making in this matter, released October 6, 1953, the American Radio Relay League, Inc., files these comments on behalf of the approximately 40,000 licensed amateur members of the League.

These comments were formulated after and are based upon analysis and study by the ARRL Executive Committee.

General

In common with the Commission, the League is extremely proud of the standards which have been maintained over the years in the conduct of amateur examinations. It is against that background that the League's views on the present proposals have been formulated. At the same time, the League is aware of the budgetary problems facing the Commission and the need to pare expenses to meet the economy policy of the present administration.

As concerns giving Novice and Technician Class examinations by mail only

The League offers no objection to the proposal to give Novice and Technician Class amateur operator examinations by mail only. In the League's view, this action involves but little danger to the present high examination standards, because in one instance the license is limited to a one-year term, and in the second instance the license is sharply restricted as to operating frequencies.

Although not having detailed statistics, the League estimates that, with no more Advanced Class examinations being conducted and with comparatively little interest in the Amateur Extra Class, the examination load problems are limited to General Class or below. Hence, the examinations for Novice Class must comprise nearly half the total load on the Commission. It would therefore appear to the League that the current economy objective of the Commission might well be reached by enacting this proposal alone, without the need for additional measures.

As concerns the proposal to reduce the present 125-mile limit for mail examinations to 50 miles

As concerns the proposed reduction, from 125 to 50 miles, in the distance from Commission examining points beyond which resident applicants are eligible to take a Conditional Class amateur operator examination, the League appreciates the problem confronting the Commission but would regret any action which would tend to lower the high standards of amateur examination procedures and therefore requests the Commission, if it is found necessary to make some reduction, to give the most careful study before any action is taken so that any reduction will be held to a minimum.

The mail examination procedure is, of course, a necessary one in amateur radio. Without it, in remote sections of the country, distances over which an applicant would be required to travel to an examination point visited by an engineer might total many hundreds of miles. The present limit of 125 miles was set some years ago. In these days of faster transportation the limit is certainly no greater hardship on prospective amateurs. The locations of FCC district offices and quarterly examining points combine with the 125-mile radius to set off almost all of the area of the United States east of a line from North Dakota to Texas as within the distance where personal appearance is required; major population centers on the west coast are similarly covered. The effect, then, has been to make the amateur examination available by mail almost exclusively only in those areas of comparatively sparse population. This is as it should be.

The reduction of the limit from 125 to 50 miles would inevitably open additional sections of the more heavily populated eastern portion of the country to mail examinations. In general, the standards of mail examination procedures are good and abuses of the system are relatively minor. Nevertheless, the League is concerned over any possible adverse effect of opening considerable additional area to mail examinations for permanent licenses. This is particularly true now that there is no longer any requirement for a special license to operate in certain crowded voice bands. The comment of the League amounts to suggesting that of the two proposals in this docket, the second is certainly the less desirable; that at this point adoption only of the first proposal and a number of months' experience with its effects may well show it meeting the needs of the Commission in its current problem. It is the hope of the League, therefore, that the second step will not be taken unless careful study shows it to be a necessity, and even then the League suggests that the Commission may find it possible to make a reduction in distance limit not so drastic as that currently proposed.

AMERICAN RADIO RELAY LEAGUE, INC.

A. L. BUDLONG
General Manager

PAUL M. SEGAL
General Counsel

December 28, 1953.

Strays

H. C. (Casey) Jones, sr., of Harriman, Tennessee, could no longer stand being left out in the cold. The 63-year-young father of avid hams W4TUE, W4RET and W4UQN, Casey finally broke down and got his own ticket. He's now W4AQN.

—···—

W7SWW sends out interesting travel literature on Montana with each QSL. Dave states, "The cost of possibly making some new friends for your city and state is a three-cent stamp as compared with a two-cent stamp for just a QSL alone."

YL NEWS and VIEWS

BY ELEANOR WILSON,* W1QON

YL DXCC

Congratulations to our foremost DXing YL, W1MCW, Lou Littlefield. Up 12 from her score in the original roll of YL DXCC members published in this column last March, persistent Lou has broken the 200-mark with the grand total of 203 DX stations worked and confirmed. And, as all DXers know, they don't come easy in that stratosphere, either. Incidentally, all of Lou's contacts have been made on 'phone. W6UHA, Maxine Willis, is tailing Lou with a score of 183 — up *81* from last year. Maxine rolls them off on both 'phone and c.w. EA2CQ and LU4MG are up 25 and 3 respectively from last year. It is disappointing, though, not to see any new YL calls on the list this year — at least, to the best of our knowledge, we have not discovered any girls who joined the Club during the past twelve months. If we're wrong, we'd be happy to hear about it. Let's hope that the sunspots favor us and make the sport of DXing more enticing during 1954.

RADIOTELEPHONE

W1MCW..203	LU4MG....150	OE5YL....100
EA2CQ....176	W2PBI....113	

'PHONE AND C.W.

W6UHA...183	W2NFR...115	ZS6KK....109
W4ITR....123	W1FTJ....113	G3ACC....100
W6YZU....120	W8BFQ....110	

YL/OM Coast-to-Coast Roundtable

With YLCC and YL WAS as tantalizing bait in these days of increased YL activity, an OM suggested the formation of a regular YL get-together to make finding the gals a bit easier. As a result, the YL-OM Coast-to-Coast Roundtable was introduced Nov. 27, 1953. That night 25 OMs and 28 YLs from 20 states reported in for a good start.

The net is still in a formative stage and there may be some changes made; but, in the meantime, *all* interested YLs and OMs are invited to call in at the appointed time and frequency each Friday — 12:00 midnight EST using 75 'phone on 3900 kc. CU?

There aren't too many YLs in North Dakota (yet, that is) and WØKOY, Inga Hoffman, who submitted this photo, believes that most of them are shown here. The occasion for the gathering was the Jamestown, North Dakota, Hamfest. Left to right are WØs NVV, MAY, OLV, OAB, DPZ, KOY, HEZ, ORV, OQG, CVQ, NQJ, WNØKAD and WØBIC. WØMAY is really not one of the N.D. gang — Minnesota is her home.

Calling All YLs and OMs

YL-OM Contest time is a-comin' again. Plan your time *now* for March 6th–8th. Rules will be in the next issue of *QST*.

Keeping Up With the Girls

On November 22nd the Long Island *Sunday Press* carried a feature story with photographs on women amateur radio operators of Long Island. Those who appeared in various photographs were K2ESO, Lee; W2IGA, Ruth; W2JZX, Vi; W2MWY, Ann; W2SUR, Esther; and the XYL of W2UXY. The opening sentence in the article stated that "there are more lady hams per acre on Long Island than anywhere else in the country." . . . At the November

(*Continued on page 114*)

*YL Editor, *QST*. Please send all contributions to W1QON's home address: 318 Fisher St., Walpole, Mass.

Dell Daykin, VE3AJR, is equally as capable behind the rig as she is in front of it — those who know her will testify to that. When she isn't transmitting on 20, 40, 75 or 80 (70 per cent c.w. — 30 per cent 'phone), chances are she's busy building. She writes "I think I may say that building is my first love, because when I am busy on something I forget all about operating (forget to eat, too). Putting your theory to work — building, testing, experimenting, and especially trouble-shooting — is very fascinating to me. No matter what you learn, something unforseen is always arising that makes you realize you haven't even scratched the surface. Keeps a person from becoming too cocky, hi!"

Dell belongs to the TRN, the Ontario 'Phone and Civil Defense Nets and QNI. An A1-Op and ORS, she particularly likes to act as liaison between 'phone and c.w. nets and is doing what she can "to promote better understanding between 'phone and c.w. factions."

Both confirmed rag-chewers, Dell and her OM Loris, VE3DNV, are equipped to rag-chew simultaneously, with one shack upstairs at their Leamington, Ontario, QTH, and another downstairs — one rig on the low end of 40 and the other on the high end of 75.

Hints and Kinks For the Experimenter

SHOCK MOUNT FOR RELAYS

A SIMPLE and inexpensive method of reducing relay noise is shown in Fig. 1. The system shown has been used in the construction of a.c.-d.c. receivers (to mount variable capacitors) for years and, when used to support relays, reduces the sounding-board effect normally caused by the chassis or other mounting surface.

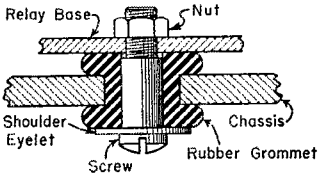


Fig. 1 — Drawing of the rubber-grommet shock mount used by W3WPN.

Fig. 1 is almost completely self-explanatory. However, one precaution should be observed. Make certain the shoulder eyelet is shorter than the grommet thickness so that the grommet will be under compression when the nut is tightened. Otherwise, the cushioning action of the mounting will be impaired. Naturally, this system may be used to shock-mount tube sockets and other components. — *Sol Davis, W3WPN*

THE GRID-DIP METER AS AN AID TO CRYSTAL GRINDING

RECENTLY, while grinding some war-surplus crystals into the 7-Mc. band, it became obvious that most of the elapsed time had been spent mounting and unmounting the crystals so that activity and frequency checks could be made. In an attempt to do away with as much of this extra work as possible, we devised a practical and time-saving method that involves the use of a grid-dip meter.

When using the grid-dip meter, it is first necessary to unmount the crystal from its holder and then insert it into the coil covering the frequency range under consideration. The grid-dip meter is then tuned for a dip at the crystal frequency and the amount of dip is noted as a criterion for checking crystal activity during the grinding process. The initial steps being concluded, brawn, elbow grease, grinding compound and the other necessary ingredients are brought into play for the actual grinding. Whenever enough grinding has been done to warrant a frequency and activity check it is only necessary to wipe off the crystal, then insert it into the grid-dip meter coil. Depending on which side the crystal frequency is approached from, the meter may either dip gradually or suddenly as the frequency is approached. Most crystals will exhibit a gradual dip from the high-frequency side of resonance. The frequency of maximum dip is the crystal frequency and the amount of dip as compared with the initial standard earlier established determines the relative activity of the crystal. In either case use standard crystal-grinding technique to approach the desired frequency or to improve crystal activity. Most grid-dip meters are not sufficiently well-calibrated for precision accuracy but once the desired frequency is approached more accurate measurements can be made by checking the meter against a communications receiver. In following this practice, the meter is again tuned for maximum dip, the calibrated receiver is tuned to zero beat with the meter and the frequency read directly from the receiver dial.

Conversely, the calibration of a grid-dip meter can be checked with crystals of known frequencies. It is only necessary to insert an unmounted crystal of known frequency within the inductive field of the appropriate coil. Maximum dip of the meter indicates resonance with the crystal. The ham who possesses a number of surplus crystals with odd frequencies which cannot normally be applied to amateur radio practices can make good use of these crystals by mounting them permanently, minus holders, in the appropriate grid-dip meter coils. Two crystals mounted within one coil, with frequencies near the lower and upper limits of the range under consideration, or in close proximity to the most used frequencies, afford a number of check points for determining meter accuracy. If, for instance, we are measuring the resonant frequency of a coil, unless the coil is kept a sufficient distance from the grid-dip meter, it may alter the meter calibration. In such a case, the accuracy of the instrument can rapidly be checked against the crystal and if the calibration has been altered, the amount of deviation can be determined from the crystal check and applied toward the actual measurements being made.

The quartz crystal being of a nonconducting substance will, of itself, have no effect on the calibration of a coil within which it is mounted. Care must be used in determining which is the crystal dip and which is the resonant circuit dip in cases where a circuit whose frequency approaches that of the crystal is being measured. In cases where the circuit under consideration is of the same frequency as the crystal, resonance will be indicated by a further dip of the meter.

Depending on the relative sensitivity of the grid-dip meter being used, the crystal can be placed on either the outside or the inside of the coil. Maximum meter reaction will be had by using the outside method of mounting, while the

(*Continued on page 122*)

Strays

W2PF, en route Chicago from New York by air, was caught reading *QST* by no-acquaintance plane captain W2SIM.

—...—

Amateur radio code and theory Tuesday night classes are taught at Chicago's Austin High School by W9VFZ. They convene from 6:45 to 9:45 P.M., two hours being devoted to code and one to theory. A new class gets under way the first week of this month.

—...—

What's-in-a-name department tidbit: Capt. *C. W. Hartley* was among the operators of MARS station AA2WAO in the Army Command Post Exercises held last November.

And a what's-in-a-call item from OM WØDAD: W*ØROB* is on the police force at Columbia, Mo.

—...—

George H. Floyd, W2RYT, was recently appointed manager of advertising and sales promotion of General Electric's communication equipment section. A well-known amateur, W2RYT previously acted as advertising and sales promotion liaison in the communications headquarters staff of G.E.

—...—

More on "two-letter" WAS achievements. Ex-W4KE (now DL4ZC) points out that he turned the trick within two years — from 1951 through 1952 — and also succeeded in accumulating all 48 QSLs. Incidentally, Col. Colvin has operated under an impressive list of call signs: W6TG, FA8JD, W6ANS, KL7KG, W6IPF, J2AHI, W6KFD, K2CC, JA2KG, W2USA, K4WAB, J2USA, W7YA, W6AHI, W7KG, JA2US, W4KE and now DL4ZC. That's getting around!

—...—

Beginning last month, the National Bureau of Standards began broadcasting short-term radio propagation forecasts for the North Pacific area from standard-frequency station WWVH, Hawaiian counterpart of the Bureau's Washington station, WWV. The forecasts apply to radio transmission in three service areas illustrated by the following typical paths: Alaska to Seattle or San Francisco; Alaska to the Aleutians and Tokyo; within Alaska.

This new service is similar to that NBS provides for communications paths across the North Atlantic (WWV). The North Pacific short-term forecasts are transmitted by WWVH in code twice each hour — 9 and 39 minutes past the hour — on standard frequencies of 5, 10 and 15 Mc. By contrast, the North Atlantic WWV forecasts are broadcast on those frequencies at 19½ and 49½ minutes past the hour. A given announcement is repeated every half hour until the next forecast is issued. Refer to page 466, 1953 ARRL *Handbook*, for detailed information on interpretation of forecast symbols used.

W1s LIG and RCS have run across enough local newspaper misprints to put the TV yogi antenna into a class with the geranium crystal.

—...—

Encountered by W9FJI in an AP dispatch date-lined Indianapolis: "The Bureau of Motor Vehicles is preparing special automobile licenses for ham radio operators, but the first batch had to be sent back. Somebody forgot to put 'Indiana' on them."

—...—

Just as World Radio Labs of Council Bluffs began to move into its new fireproof building, practically everything in the old quarters was destroyed by fire. However, Leo Meyerson, W9GFQ, says that, thanks to the co-operation of manufacturers, WRL's brand new inventory is larger than ever and it's "business as usual."

—...—

Dr. Raymond A. Heising (above) was presented with the Armstrong Medal, one of radio's most prized honors, at the 44th Annual Banquet of the Radio Club of America held in December. Beginning as early as 1914, Dr. Heising specialized in the development and construction of radio transmitters of increasing power. Now retired from the Bell Telephone Laboratories after 39 years of service, he was responsible for the design and construction of the first transmitter used in overseas telephone communication. The type of modulation circuit that now bears his name is still employed in amateur circles when simplicity and portability are paramount considerations.

—...—

Among a number of outstanding men recently granted the grade of Fellow in the Institute of Radio Engineers is James J. Lamb, well known to amateurs as former technical editor of *QST*, and now research director of Remington Rand. Although certainly not the first time an amateur has attained that grade of membership, it is probably the first instance where work in the amateur field was a major factor in the conferment. The citation reads: "For his technical contributions to amateur radio activities, and for direction of radio and electronic circuitry development."

How's DX?

CONDUCTED BY ROD NEWKIRK,* W1VMW

How:

With the 1954 ARRL DX Test getting under way this month we hasten to pass along information on a nifty gadget you may want to have available for the fray. W2HSZ took notes during a speech by the eminent Continental DX man Count U. R. Kuntries in order to garner these facts (with apologies to our DL friends and Sid Caesar). . . .

Der DX-Gedder Systemer

Vas ist der DX-Gedder Systemer? Der DX-Gedder Systemer is ein schemen vas ist controllen der snatchen auf gut DX. Ein operaten iss runnen der superinhalen; ein DX-Gedder Systemer iss controllen der operaten. Ist ein ingeniouser littler schemen vas ist gemaken der logbuk outgaben mit AC4s und VS5s. Der operaten is gesitten mit der hands gefolden. Ist das superinhalen kaput? Nein, das ist der DX-Gedder Systemer.

Vor exemplen, ein AC4 ist CQing mit un signallen drei db. unter S1. Der DX-Gedder is outgaben mit "*Achtung!*" Der operaten ist tooken ein looker mit der scopen. Das littler pipsers ist gejumpin ober der screener.

"Vas ist das?" der operaten ist inquiren.

"*Ist ein AC4, dumbkoffl!*" der DX-Gedder Systemer ist geroaren. "*Proceeden mit der callen mit der breakneck speeder!*"

Das operaten ist gepushen ein switchen . . . ein red bulben ist geblinken . . . der exmitter ist gesponden mit ein grosser klicken auf relayen . . . der beamer ist gespinnen. Der DX-Gedder Systemer is geroaren mit "*SCHWEIN! STARTEN DER KEYEN!!*"

Der operaten is gepullen ein switchen und das exmitter ist gemaken mit ein "BOOM!" Mit ein smilen on der face auf der operaten, he ist pressen ein buttonen und is gesitten mit der handsers gefolden. Das DX-Gedder Systemer ist nicht ein nincompooper!

Der AC4? Ach, der AC4 ist gelogged — *und how!*

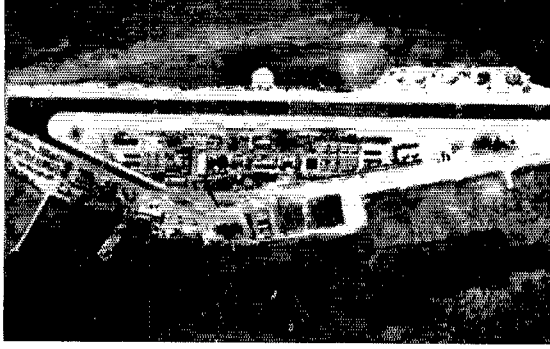
Well, even if you don't go for dialectal capers the foregoing should add considerably to your vocabulary for Scrabble.

What:

Twenty meters, still as ever the daytime and week-end DXers' paradise, remains most uncoöperative in hours of darkness. Good solid DX openings remain infrequent — keep your fingers crossed for productive ARRL DX Test week ends this month and next! W4ZAE reports **CRs** 6AN (14,040), 9AF (037), **ET2PA** (035), **FB8QQ** (020), **FF8AZ** (073), **LUs** 3ZO (042), 5ZO (051), **VP4LZ** (004), **ZE5JJ** (075) and **ZS3B** (030) on behalf of the Transcontinental DX Club. Mick, himself, accounted for **CR6AI** (047), **KH6ASU/KM6** (030) and **VP2MD** (040). VP2s, not long ago fairly plentiful, are currently quite recondite . . . . Norfolk Island's **VK9GM** (020) ran into W6NTR at 0515 GCT . . . . W1TVJ wrapped his long-wire around **OQ5VN** (010) and **TF3MB** (023) . . . . A Viking II and 3-element beam captured **CN8s** FL MB, a CR6, **CS3AC**, **CX5CU**, **EA0AB**, **EL1DFX**, **FP8AP**, **HC1JW**, **HH3DM**, **HR1AA**, **ST2AR**, **TF3WS**, **TG9RB**, **VQ4ERR**, **ZE3JP**, **ZS3AB**, **4X4FS**, **5A1TP** and **9S4AX** for W9PYV. Marty would swap some of this stuff for a solid VK QSO or two . . . . **VS9AS** (073) at 1600 EST looks plenty good in W1JLN's log . . . . W5VIR found time to knock off **SU1FX** and **VP8AT** while tuning up a new 8JK beam . . . . All-bandsman W2LYO hit 20 for **LZ1KDP** (010) and **VP6GT** (083) . . . . **CN2AO** (ex-EK1AO) and **VQ2DT** blasted their ways through W8YGR's power leak — Jack has only four more to go for DXCC . . . . W4TJI's long list of successes include **CE7AK** (021), **CX4CZ** (050), an HC1, **VPs** 6FI 8AN and a ZE5. A new Vee slanted Europewise brought him quickly past 76 countries worked . . . . W1PWK (ex-CN8EG) didn't take long to contact **CN8s** EP FK, **EA8BP**, **FQ8AF**, **HR1AT**, **PJ2CF**, **SP3AN**, **TI2TG**, **ZEs** 3JO 5JA, **ZS3BC**, **3V8AN**, **5Als** TJ and TM. CN8EP is the guy who inherited Steve's old Moroccan gear . . . . Thirty watts and a folded dipole 35 feet high netted **CP1BX**, **DU7SV**, **KR6GR**, **KX6BF**, **LUs** 3ZS 4ZS, **TI2AG** and **YV5AI** for KH6AHV. Bob also found the Guam gang, **KG6s** AAY FAA, W3WLP/**KG6** and W0OCA/**KG6** very raisable. He receives with an NC-57 . . . . A bent dipole in his attic serves W2YVQ well. SP3AM (010) was among the many comers-back . . . . "DX has been very poor here lately," opines KA8AB/W0QDC. Harry finds **JZ0KF** passing out Netherlands New Guinea contacts regularly on 14,081 kc. . . . . Don't pass up any FO8s as "just more Tahiti" after you've filled your quotas in the DX Test. The grapevine has **FO8AJ** readying for contest action on Clipperton, a multiband operation . . . . Thirteen-year-old VE1AEE used 20 14-Mc. watts to catch **KA2JF**, **YU2DU** and a ZS2.

Now turning to *forty*, W4TJI put his new quarter-wave vertical to work on **FA8DA** (7015), **FK8AB** (12), **HH2OT** (10), **KM6AA** (29), **VP6SS/P** (24) and **YV6AO** (80). Paul now has more VKs, ZLs and Europeans in the log than you can shake a pair of cans at . . . . Minnesota's W0GHX did well with **EA9AP**, **HH2OC**, **KV4AQ**, **TI2s** CR PZ, **VP7NM**, **YV5FH** and ZP1AC. Ray is another vertical enthusiast . . . . **MP4BBD** (25) got away from W6NTR around 1515 GCT recently . . . . Fun at W1PWK: **MF2AA**, **HR1AA**, **VP4LZ** and **YV5DE** . . . . **DU7SV** (40) came back to the 25-watter of W0AHX; W90IN got through to **LU1CB** with the same soup . . . . **SP3AN** and **YU1AD** answered W2PCI while KH6AHV was keeping busy with his 25-watter, **KB6AY**, **KC6AC**, **KG6FAA** and **JA1AA** . . . . **KL7PI** (18), **SP9KAD** (18), **YU3AJK** (18) and **4S7NG** (18) are pretty good DX for the Canal Zone and KZ5CI . . . . Via W4ZAE we hear the TCDXC put

*DX Editor, *QST*.



One of three currently active Johnston Island stations, KJ6AY uses an ART-13 transmitter, SP-600 and BC-348 receivers with a 343-foot long-wire on 15, 20 and 40 meters, 'phone and c.w. At right is an aerial shot of the island itself, a coral speck in the Pacific one mile long, 1000 feet wide and of 7-foot elevation.

the bite on C3FH (01), an EA9, KW6BB (10), OD5AD (02) and VP8AW (02) . . . . . W1APA's buddy, VK3MH, comes up with FK8AO, VR2AS and VS6CG.

Forty 'phone, normally not conducive to routine DX hunting because of raucous b.c. garbage, should get a workout in the DX Test this month and next. Meanwhile, W9LMC reports the availability of KH6s AWM (7208), IJ (210), TI2CHV (240) and VP1ZU (245) . . . . . W1APA picked off YV4AM (200) around 0530 EST.

Twenty 'phone appears to be fish-in-a-barrel stuff for W7AHX. Guys like CN8s EP EY GZ HA, CR6AI, DU9VL, EL6A, I1YAK/Trieste, KAØIJ, KS4AU, KW6BB, OD5s AB AD BA, OE13RB, OX3BD, SVØWG/Rhodes, VSs 2BS 2DY 2UW 6CG, VP3YG and YV1CA bring George up to 113 worked and 105 confirmed. W7AHX runs 200–500 watts to a VFO-HK54-250TH combo modulated by 838s, this pumping into a 3-element plumbers'-delight . . . . . VQs 4EI (14,145) and 5EK (145) settled well with WØVIP . . . . . W2HPV caught up with OQØDZ of Ruanda Urundi around 14,130 kc. . . . . W8CLR reports GD3ENK and ZB2A (305) as good voice possibilities . . . . . CN8FK, FM7WN, HC1LO and HR1FV wound up in the log of K5FBB . . . . . QSLs from FQ8AG, KP4UH and ZD2FFB carry W9MQK past the 100-mark — 102 confirmed, to be exact — and Ray worked A3er LZ1KPZ for a late new one . . . . . HR1s GM FM and KG4AL are recommended by W9LMC.

The old adage, "Never tune a DX band with your filaments switched off," especially applies to *fifteen meters*. If you make such a mistake and run into a hot opening the

Dick Dickenson, ZE3JP, has a firmly established reputation as an outstanding all-band DXer. ZE3JP nosed out FF8AG with the handsomest African c.w. score in the '53 ARRL DX Competition — 492 contacts for 67,896 points.

band probably will close before you get the rig fired up. Despite fifteen's mercurial behavior, W5VIR used 21-Mc. c.w. to bag a long roster of stuff, a list that features CP5EK, ET2US, KB6AY, KG4AN, KX6BF, LU3ZS of So. Shetlands, OA4C, VP8AJ, VQ4RF, YV5s BZ DE and FH. This makes 71 15-meter countries for Tex . . . . . Continuing on the c.w. subject, W7AHX cornered CR7AF, FU8AA, KG6ADY, KR6AA, OQ5CP, TI2TG, VQ2GW and ZE3JP.

Fifteen 'phone is worth a paragraph of its own. W6ZZ proves this by way of DU7SV, JA1CO, KA3MD, KJ6s AY BA, KL7ALJ, KR6LJ, KW6BB, KX6BB, TI2RC, VP6PV, VR2CG and ZS9G. Miles now has 60 21-Mc. countries, 52 on voice. Out after a 100-KH6 certificate, W6ZZ has 74 QSLs after having had 350 QSOs with 132 different Hawaiian stations. He also sports new "W6ZZ" license plates. Miles feels Ws should be reminded that the lower band edge for 15 'phone is 21,250 kc., *not* 21,200 (or 21,150) . . . . . W7AHX grabbed his mike in time for CE6AB, CN8MM, CR6BX, JA7RC, OA4s C ED, VK9YT, VPs 5SC 6FR 9BK, VQ2s DT GW HA, ZE2JK, ZP5AM and the aforementioned ZS9G . . . . . ZE3JP tells W1ZDP he's now up to 76 21-Mc. countries . . . . . W1PWK's first crack at fifteen brought CT3AB, SP3AN and ZE3JO, among others. He reports that W1MMY has 60 21-Mc. 'phone countries so far with 120 watts input . . . . . W1WPO recommends ZD1SW as a likely 15-meter voice customer.

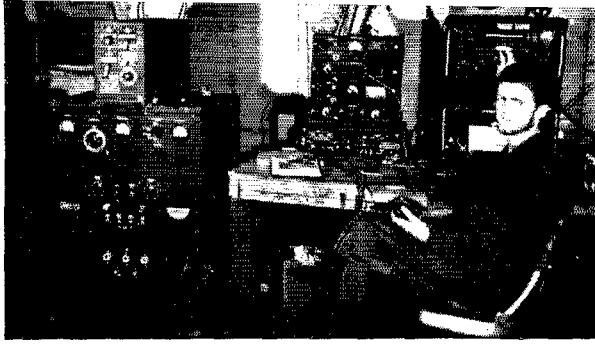
Eighty is really beginning to roll. W6ZAT reports that the JA boys are now on 3.5 Mc. in force — you'll find them between 3520 and 3524 kc. They expect to be allotted 3500 to 3525 kc. in the near future (3525 to 3575 for 'phone). W6ZAT QSOd JA1CR on 80 and says that ZK1BG (3505) raps through with a husky signal. VKs and ZLs are growing rather commonplace out around North Hollywood. Del should have his new kw. feeding the ground-plane by the time this print dries — watch out! . . . . . GD3UB and YV5DE are among W2LYO's list of successes on eighty . . . . . K6AHV chimes in with KL7TI and Novice WH6AVT, while W1TVJ adds YO7FX . . . . . W2IFP blasted through to folk like KV4AA, VP6EB, YV5FH and ZS2A . . . . . AP2K and HA7OL are two goodies squeaking through on 80; W3AXT appends HH3RC.

W4NQM's cohorts hold firm on *ten meters*, low MUFs notwithstanding. Sparkie used the mike to nab CE4BX, LUs 6AB 6DBM 8DDI and TI2TC . . . . . CE6AB, CT1CL and LU7DDC worked WØBJP . . . . . If you need a quick QSL from Mexico, W4NQM and W4WVM offer XE1s IQ and XI, both readily available on 28-Mc. 'phone.

Last, but far from least, comes *one-sixty*. W1BB gives us the lowdown on early sessions of the Transatlantic Tests. Conditions in late December were adjudged fairly good. CN2AO, EI9J, Gs 3PM 6ZB, GW3ZV, HB9CM and KV4AA were worked by W1BB, while W4KFC salted away a similar list: EI9J, Gs 3PU 6GM, GW3ZV, KV4AA and VP7NM . . . . . WØNWX made the long haul to KV4AA and VP7NM. Bob reports that terrific loran QRM out his way makes it just about impossible to tune the new British band segment (1825–1875 kc.) . . . . . GC3EML is another good catch reported available. Some of those active on our side of the puddle were W1s LYV TVD, W2s TRK WC, W3s PA RGQ, W9s MEM and PNE. W3PA made it across to GW3ZV, who had the mightiest European signal encountered so far this season . . . . . W3RGQ raised Gs 2HX 3PU 5JU 6BQ 6GM 8JR and KV4BB, the latter using both 'phone and c.w. Sheldon adds 160-meter men DL1IX, GM6IZ and LU4DM to the universal stalk list . . . . . This *QST* should reach you with the 1954 Transatlantic Tests in full swing. Check the December, 1953, issue, page 68, for February and March test dates.

Where:

NZART president ZL2GU informs us that ZL2LB, W. Fouhy, P.O. Box 489, Wellington, N. Z., handles QSL matters for *all* New Zealand call areas, one through four . . . . . W1PWK has it that QSLs for all DL4 stations can go via DL4OR . . . . . We learn that the Libyan



Through the years amateur radio has been one of the invaluable connecting links between remote outposts and populous civilization. This tradition holds true in the case of KF3AB on Fletcher's Ice Island in the far north. The operator above is Larry Oswald, W9UTZ. Large quantities of Fletcher Island traffic go via W9NZZ.

bureau address on page 66 of Dec., 1953, *QST* is no longer valid. Cards for 5A– stations, at least until further notice, should be sent direct.

C3BF, (QSL via W1WAY)
C9AA, Box 409, Shanghai, China
CN2BA, Ahmed, Ramenycajal 19, Tanger, Tangier Zone
CN8FW, (W5AGW) Box 164, McComb, Miss.
DM2ABL, Leipzigerstrasse 14, Dresden-N6, Germany
ET2NG, Lee Grant, P.O. Box 252, Asmara, Eritrea
ET2ZZ, Box 379, Asmara, Eritrea
FK8AB, J. Duplat, Pointe Chaleix, Noumea, New Caledonia
GC3HFN, Radio Society of Guernsey, 4 Commercial St., St. Peter Port, Guernsey, Channel Islands, U. K.
GD2AWT, (QSL to G2AWT)
JA8AQ, Sashiya Mitsumata, South 18, West 12, Sapporo City, Japan
KH6ASU/KM6, Box 19, U. S. Naval Stn., Navy 3080, FPO, San Francisco, Calif.
KX6BF, J. H. Canniff (W5RGA), Box 34, Navy 824, FPO, San Francisco, Calif.
KZ5CR, Norm, Fort Amador, Canal Zone
MB9CA, Franz Kardash, Unterbergen-Karnten, Austria
MP4BEN, Dukhar Airport, Qatar, Persian Gulf
T12JV, P.O. Box 1061, San Jose, Costa Rica
VP6AF, Art Farmer, Grandon, Deacons Rd., St. Michael, Barbados
VQ3EO, Box 13, Kikagati, Uganda
VQ4EJ, P.O. Box 777, Nairobi, Kenya
VQ5EK, W. K. Campling, P.O. Box 1, Kumpala, Uganda
VS4BA, Richard A. Haskins, Kiching Airport, Sarawak via Singapore, Malaya
ZS5OV, P.O. Box 627, Durban, Union of So. Africa
ex-5A1TJ, Don Rowley, Loyal, Wisconsin

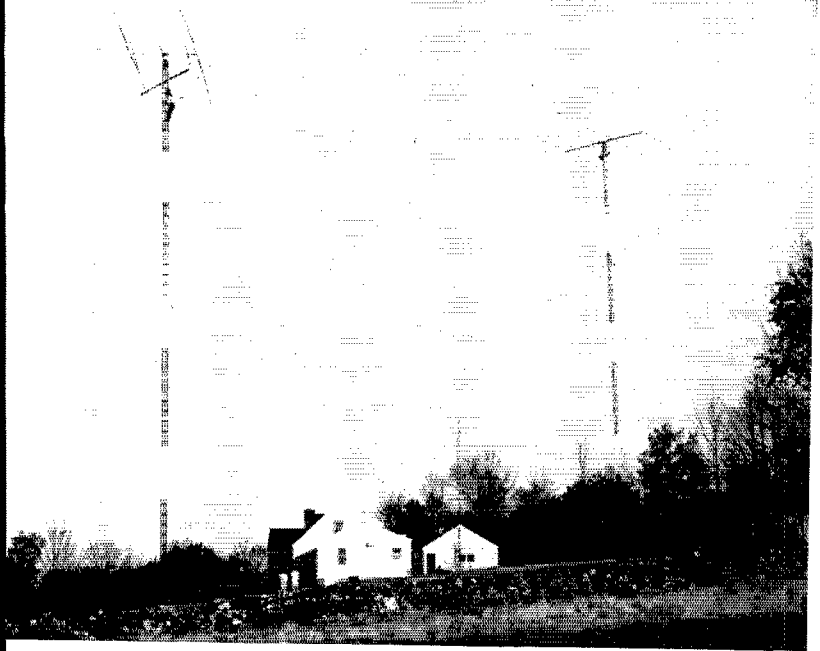
Samaritans W1s APA BIH PWK WPO WQC, W2MUM, W4ZAE, W6s GPB ZAT, WØVIP, KZ5CI, LeRoy Waite, *RSGB Bulletin* and the So. Calif. DX Club *Bulletin* helped furnish these addresses.

Tidbits:

Africa — VQ3RJB writes W1WQC regarding the scarcity of W1 QSOs in his Moshi log. "It's strange," he remarks, "because I get good reports from W3s and W4s." Latitudinal vicissitudes, no doubt. VQ3RJB hails from Fitchburg, Mass., and he'd like to keep in touch with the home-town area even though he must stay awake into the wee hours to do it . . . . ZD4BJ told W1BIH not to QSL until he settles upon a new QTH back in England . . . . An 85-foot-high skywire enabled CN8FL (W8EZF) to work ninety-four countries in less than eight months of activity. Narvel works 15, 20 and 40 meters almost daily, with 80-meter work imminent. CN8FL had difficulty obtaining QSL stock but his cards by now should be getting around copiously . . . . I5LV reports QSL-routing difficulties in a line to W5MPG. *He does QSL 100 per cent, however* . . . . Ex-CN8EG (W1PWK) fired up his Boston set-up preliminary to reassignment in, he hopes, W6-land. Steve finds Stateside conditions much better than some W/VEs paint them. "Made about 5100 QSOs from CN8EG. Sent a QSL card to every station worked and received about 60 per cent returns — not *too* bad." Steve finds that somebody pirated his call on 40 meters during July, August and September of 1952. The McCoy CN8EG didn't hit 7 Mc. until October of that year. In Morocco Steve worked 130 countries and confirmed 112; he contacted 46 (45 within three days!) of the United States but couldn't score with North Dakota and Montana. If your CN8EG QSL went astray drop a line to W1PWK with full QSO particulars and you'll get a reissue . . . . African nibbles courtesy West Gulf DX Club *DX Bulletin:* An FF8CG should shortly be on from the Ivory Coast. . . . FF8AZ represents the French Sudan with a fairly active 60-watter. . . . VQ4NZK looks forward to some VQ9 operation beginning this month and from other rare spots later (VQ3 VQ5 and VQ7) . . . . VP1RO (G2RO) tells W1ZDP all QSLs for his African activities were mailed as of December last.

Oceania — Sarawak's VS4BA writes: "I've just rigged up my station and shall be operating every Tuesday, Saturday and Sunday evening, normally between *1000* and *1400* GCT." Dick is strictly a c.w. man and likes 14,080 kc. with a 6V6 c.c.o. driving p.p. 6L6s into a simple folded dipole oriented broadside toward the United Kingdom. He receives with an AR-88. VS4BA QSLs are due from the printer and he should find himself extremely popular in such a hard-to-get country. As the ARRL Countries List (p. 61, January *QST*) indicates, the VS4 prefix is now usedly solely for Sarawak, with VS5 and ZC5 allocated for Brunei and British North Borneo, respectively . . . . The Maui Amateur

No DX contest would seem complete without the ether-busting signal of KH6MG. Leo's phenomenal performance in last year's ARRL DX test, top Oceanian and third-high overseas tally, weighed in at 339,552 points — 1574 contacts and a multiplier of 72. In this shot of the compact KH6MG shack, final amplifiers for 160, 80, 40 and 20 meters are out of view to the left. Watch for Leo's machine-like fist again in the 1954 fracas that begins this month.



Whether you are a W, a VE or rare DX you can't tune very far on the 'phone bands without running into the rock-crushing signals of W1ATE. Our cover shot this month is a close-up of the 10- and 40-meter rotary beams and 110-foot mast at left. *QST*'s v.h.f. editor, W1HDQ, is aloft near the 100-foot level. The two barely discernible figures in front of the house are those of W1ATE and W1DX, *QST* assistant technical editor. The other 110-foot mast at right supports 20- and 15-meter rotaries. A 75-meter folded dipole hangs between the tops of the towers and, although not clearly seen in this photograph, several lower-frequency fixed arrays are supported semi-vertically by both structures — 10 skywires in all. The "short" center mast is Chad's concession to TV. In the shack, W1ATE has three separate 250TH finals modulated by 250THs.

♦

Radio Club now issues a neat certificate to any station furnishing proof of contacts with fifteen Maui KH6s, QSOs dated after October 3, 1952. Contact KH6OL of MARC, P. O. Box 434, Puunene, Maui, Hawaii, for further details . – . – . – JZØKF gave Dutch New Guinea to many fellows while running 45 watts to a 6V6-807 crystal-controlled rig firing into a simple dipole (unfolded, that is). His QSLs should be getting around in volume ere long . – . – . – The Yap Amateur Radio Club (KC6YT) puts out an interesting bulletin through the efforts of KC6AA. Trust Territory stations now in regular operation include KC6s AA AG and SJ on 14-Mc. 'phone, with KC6AF holding forth on 40-meter c.w. They do things in a big way in the Territory — KC6AA uses a 12-wavelength antenna and KC6AF employs a 10,000-foot radiator of No. 20.

Europe — Words from the new staff at ZB2A in a letter to W8CLR: "We have been active only three weeks and have been in very great demand by Gs and Ws alike. We took two months to repair and rebuild the previous ZB2A rig and are now going strong. Operators here are G3GFM and myself, ex-DL2NH/G3DBT." The boys are awaiting a new call to supersede the ZB2A label, after which they'll stock up on QSLs and maintain a scrupulous confirmation policy. "You are likely to hear us on 'phone most evenings between 1700 and 1900 GMT, depending upon conditions." They run 150 watts with an 813 final and vertical dipole . – . – . – Here's another project for you sheepskin-chasers — the WASP (Worked All Sicilian Provinces) sponsored by a group headed by IT1TAI. Proof of contacts with stations in at least five of the nine Sicilian provinces, all QSOs dating after July 1, 1952, can be submitted to IT1TAI, P. O. Box 300, Palermo, Sicily. Check with IT1s TAI TCZ or ZGY for complete details . – . – . – From W2OLU we hear that GM2DBX has confirmed all North American call areas on 'phone . – . – . – LZ1KAB is the Bulgarian Central Club station and LZ1KDP represents the Bulgarian National Polytechnic Institute. The latter features a five-stage 40-watt rig working into a 40-meter windom radiator. Three newcomer LZ stations now available are LZ1s KJS KPZ and LZ2KPP. Nineteen-year-old DXer LZ1UA has been quite inactive because of heavy high school studies. This Bulgar briefing thanks to W2WZ and W6GPB.

Hereabouts — W1ATE, contest 'phone DXer par excellence, paid a recent visit to Bermuda and reports a lively welcome by a lively bunch of VP9s. Ex-TA3AA was down there, too. Chad had the rare pleasure of working his home station (W1IYI operating) from the hamshack of VP9BH . – . – . – As of elections last December 10th, W6s MHB LW and TI are president, vice-president and secretary-treasurer, respectively, of the Northern California DX Club . – . – . – W1RST reiterates a recommendation of long standing that rare DX stations take firm and authoritative control of the communications situation during pile-ups. They only court chaos when they heed stations heard calling within 20 or 30 kc. of their own frequencies . – . – . – When W2AIW recently worked the North Greenland British Expedition, G3AAT/OX, the latter reported a howling blizzard and a temperature of 37 degrees below zero. W2AIW, by the way, is another of the staunch prewar DX gang who has girded himself for the fray once more. After 76 countries worked in 1951 with a 6L6 doubler he has stepped things up to 400 watts and a rotary beam.

Almost three dozen W9 DXCC members were present at a Chicago get-together held last December 5th. Shown here are (standing, l. to r.) W9s FDX TKV PGW DHT ABB TMU FKC ABA YFV ESQ GRV ALI WFS GIL WKU FID KA NN; (seated) W9s IU UM VW UJ KXK HQF GZK and QIY. Also attending but not in this picture were W9s CIA FNR GDI JUV LI MXX TQL and UXO. (*Chicago Tribune photo*)

Correspondence From Members-

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

AMATEUR S. S. B.

130 Martense St.
Brooklyn 26, N. Y.

Editor, *QST:*

Recently I have been listening on the upper part of the 75-meter 'phone band to discussions between a.m. and s.s.b. stations concerning interference caused by s.s.b. stations. It reminded me of the old arguments in the early 1920s between spark and c.w. stations and in the '30s between the 'phone and c.w. operators.

Single-sideband transmission is not new in radiotelephone communications. It has been used for over 20 years for transatlantic commercial radiotelephone circuits. With the ever-increasing number of amateur 'phone stations, interest in s.s.b. for ham use has greatly increased. In fact, s.s.b. has made possible telephone-conference type operations, permitting several operators to talk to each other instead of one station monopolizing the frequency with long-winded monologue.

S.s.b. is another sign of progress in ham radio. Equipment developments by amateurs will make possible improved s.s.b. apparatus for military and civilian communication needs. Therefore, we should encourage such progress and not try to oppose it, as some hams do who have complained to the FCC and the ARRL about alleged QRM caused by s.s.b. stations. I hope *QST* will carry more technical and operating articles about s.s.b. and that equipment manufacturers will make available kits, parts and equipments for construction of s.s.b. transmitters and improved receivers.

Let's keep our s.s.b.-a.m. discussions within our ranks. The old saying "United we stand, divided we fall" is just as true today as in the past.

— *David Talley, W2PF*

UNCOÖPERATIVE HAMS

State College, Miss.

Editor, *QST:*

During the recent emergency operations in Vicksburg, Miss., the attitude of some W2s was really a disgrace to the amateur radio operators. (I do not have my license, but am planning to get it soon.) I now have a doubt in my mind as to whether it is worth while to mess with, if that is the attitude of those guys with the kilowatts in W2-land.

I heard one W2 say that he had been shoved around enough and he happened to land on top of the frequency that was handling the emergency traffic for this district and wouldn't move. He was having a rag-chew and some of the people in this district were really worried about the welfare of their relatives and family. To be a little more exact there were about 100 persons who were in college in this section who wanted to hear from their family for life or death messages.

Gentlemen, please coöperate with the emergency nets!

— *Bill Budington*

A SIMPLE PRESELECTOR

38 Cromwell St.
Kittery, Maine

Editor, *QST:*

Here at WN1YDX I thought I had done all the business that could be done with my S-40A receiver. My limit seemed to be the Mississippi River to the West and Georgia to the South. I could not hear anything beyond well enough for a QSO. One night I coupled the output of a little one-tube regenerative receiver that was tuned to 80 meters into the S-40A. The gain was out of this world. This was my introduction to a regenerative preselector! Upon referring to the *Handbook* and finding only a passing remark on these "useless" gadgets I was rather surprised. After taking out the bugs, namely getting smooth regeneration control, I gave it comparison tests with a 2-stage nonregenerative r.f. preselector and was more than pleased with the results. To any Novice that has an S-40A receiver I would suggest trying one of these little gadgets as a temporary expedient (until we can all have a 75A-3, hi!).

Since putting my little preselector into service I have my first California QSO. Without it, I could not read him!

— *Robert G. Dawson, WN1YDX*

[EDITOR'S NOTE: Other amateurs could do well to copy WN1YDX's technique for improving the performance of smaller receivers. During the 30s *QST* carried many articles on regenerative preselectors, but they lost favor because they call for two-handed tuning (the receiver and the preselector). A cute stunt was described on page 41 of the December, 1935, issue of *QST*, telling how a regenerative receiver need only be loosely coupled to the regular receiver's antenna lead to act as a preselector.]

LIGHTNING PROTECTION

712 Louisiana St.
Lawrence, Kansas

Editor, *QST:*

The writing of this letter was prompted by the appearance in *QST* for November 1953 of an article by W9YVZ describing a ten-meter vertical antenna. From my experience with a ten-meter vertical J-antenna I know that they are very successful. However, I was surprised by the lack of mention of some provision for grounding the antenna.

By virtue of its physical character a vertical antenna is very susceptible to being hit by lightning. This fact was vividly emphasized through an experience I had with my "J" several years ago. This antenna was arranged with a shorting bar and movable taps for the feeders, so it could be tuned. This allowed the lower end of the "J" to be permanently grounded.

One evening a violent thunderstorm struck our neighborhood. I had been using the "J" during the day and had left it connected to my equipment. Remembering this, I hurried upstairs, jerked the lead-in from the transmitter and prepared to ground it. At that moment, with a huge pff-t-t, lightning hit the antenna. In spite of the permanent ground, a spark jumped from the lead-in to me, about ¼ inch, and another larger one jumped to the ground terminal, about an inch. I fortunately had presence of mind enough to ground the lead-in for another bolt hit a moment later and was safely dissipated.

The moral of this tale is obvious. In fact I even ground my mobile whip to the car frame during thunderstorms.

— *Nelson Bigelow, jr., W1RVV*

SPARK DAYS

Bayard, N. M.

Editor, *QST:*

Navy b.c., 1,200,000 watts from Jim Creek Valley, Wash., brings to mind the first Marconi radio station atop Congress Hotel, Chicago. Spark gap some 18 inches wide. Brass balls as large as a large orange. A very impressive spark. Key some 12 inches long with large shield about 6-inch diameter.

I do not remember the year — radio seemed and was very slow and unreliable then. Landline bonus wires were running 60–75 messages an hour and faster. No QRM, QRN or skip. Those were the days!

— *L. A. Jessen, W5NKG*

(Continued on page 116)

He Makes What We Hams Use

WILLIAM J. HALLIGAN, W9AC
The Hallicrafters Co.

C. W. or 'phone, any band from 80 through 2 with special attention to 144 Mc. — Bill Halligan's interest in operating is still broad as well as deep. His first call, 1AEH, was issued in 1916, the same year that found him as a youngster starting to pound brass commercially. A 2½-year hitch as a Navy operator came next, followed by both ham and commercial activity while going to Tufts and West Point. There's evidence that the op at 1UL, Bill's first post-World War I call, was pretty hot, since he won a 1923 ARRL code contest, copying 40 w.p.m. with a stick. During the years in W9-land Bill has been on the air whenever time allowed, participating in the Sweepstakes and other contests, but mostly rag-chewing. Although W9WZE may be best known as the W end of schedules with certain expeditions, Bill's present call, W9AC, seems destined to identify a station that will always provide an interesting QSO for any of us. Bill has been active in many radio clubs in several cities, and perhaps his greatest interest was — and still is — in helping newcomers get started. More than one of today's radio engineers remember that when they were beginners it was the enthusiasm and the encouragement of Bill Halligan that kept them going.

Answer to QUIST QUIZ on page 35

He should do both, of course. What he forgot was that as he tuned the antenna and Gamma match, the loading at the transmitter was changing and consequently the transmitter was not maintaining constant power to the feed line. Unless this is done, there is no way to correlate Twin-lamp observations and remote field-strength indications. If a bridge-type s.w.r. meter were used, its swamping action on the transmitter would have eliminated the effect, and A could have taken simultaneous readings of field strength and s.w.r. and have them mean something.

Strays

W1LIG's reply to WN1ZHQ's recent poetic Stray scoring speed-demon QSOers:

Send at speed
That you can read.
Send too fast
And you're outclassed!

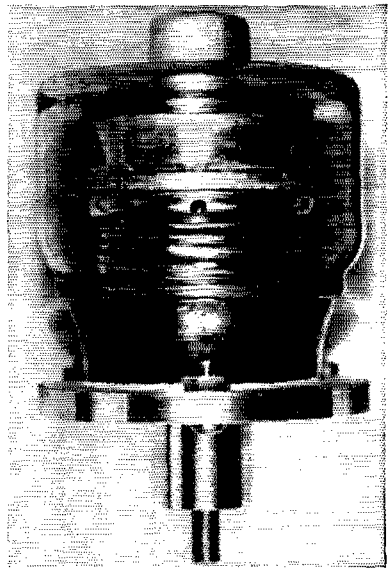
—···—

W7NPV found himself in an alphabetical rut one recent evening as he successively QSOd W7s RDM, RDN and RDO on 75-meter 'phone.

New Apparatus

The VAC-4-40 Vacuum Variable Condenser

Certainly one of the obstacles in the path of more compact high-powered transmitter designs is the tuning condenser, if one confines his thinking to the air-spaced variables, and ever since vacuum variable condensers were first introduced the high-power gang has drooled over them. The drooling, instead of more practical action, generally starts as soon as the aspirant receives a reply to his question of "How much money?"



While they still aren't giving away vacuum variable condensers, the new VAC-4-40 should bring a few more into use in the ham bands. It is making a definite bid for the amateur market, although its rating of 42 amperes at 10 kilovolts (at 22 Mc.) makes it highly useful in commercial applications as well. The capacity range is 4 to 40 $\mu\mu$f., with a logarithmic variation that makes tuning easier at the low-capacity end. The condenser is 5 inches long and 2⅝ inches in diameter, with a ¼-inch diameter tuning shaft. Manufactured by the Jennings Radio Mfg. Corp., San Jose, Calif., the amateur net price is $47.60.

The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* W1HDQ

How would you like to have a 50-foot parabolic reflector for use on 144 Mc., especially one that can be aimed at any angle, horizontal or vertical, or even servo-controlled to track the moon or other heavenly bodies automatically? You'd like it, you say?

Well, then, perhaps you'll be interested in the 2-meter project now getting under way at W2SC, Belmar, N. J. The big dish was being built for other purposes, but it would be available at odd hours and over week ends for ham use. This was too good an opportunity to let slip by, thought Col. Loren E. Gaither, W7CVD, director of the Evans Signal Laboratory, so he proposed amateur use of the antenna system by the Evans Signal Laboratory Radio Club.

A high-powered transmitter was built by members of the club for the spare-time project, and it is probable that the first 2-meter transmissions will already have been made by the time this appears in print. Provision was made for c.w., tone modulation or voice, and all three modes of operation will be tried. Moon-reflection tests will be conducted at propitious times, and the station will be operated on schedule in various directions. Random hamming will be carried on at other times. This will be a completely amateur operation, carried out by hams for amateur purposes, to satisfy ham curiosity about what might be accomplished with an antenna system more elaborate than any of us is likely ever to be able to build for himself. Its gain should be around 25 db., and the aiming facilities are nothing short of a ham's dream.

Insofar as possible, v.h.f. enthusiasts will be kept informed of the proposed schedule of W2SC. As we go to press, operation is due to start on or about January 15th. The frequency will be 144.70 Mc. Watch W1AW and other ARRL Bulletin Stations for further information. Any test transmissions will be coded in some way, to provide a positive check on reception reports. If you hear W2SC, be sure to copy the transmitted information carefully. Reception reports under any unusual conditions will be welcomed. They should be sent to Evans Signal Laboratory Radio Club, Belmar, N. J.

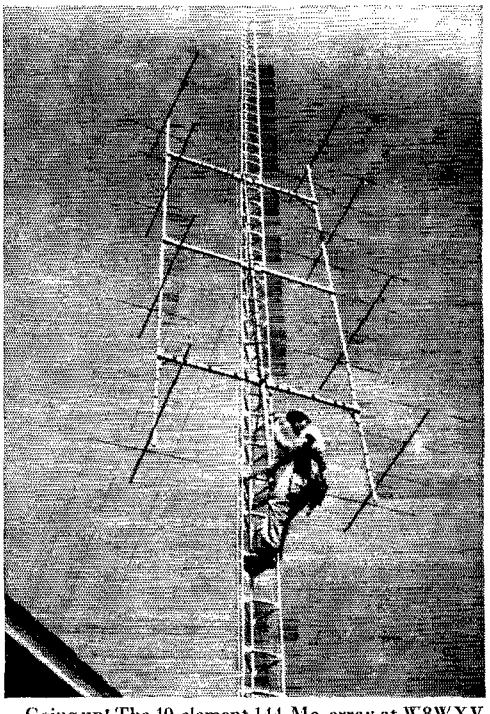
Here and There on the V.H.F. Bands

Spot-frequency organization can do a lot for local activity, if results in the Washington area are any indication. W3YHI, Andrews Air Force Base, says that the local gang have congregated on 145.315 Mc. The frequency was selected with a view to allowing participation by Novices, and also to keep the local rag-chewing out of the portion of the band most used for DX and high-powered operation. W4DWD offered 12 crystals for the new frequency, and all were spoken for immediately.

Now when one of the gang is working around the shack, he leaves his receiver on the local channel, and if he wants to chin a bit, a short call on the net frequency will raise at least one answer at almost any hour. The frequency is occupied steadily from 7 P.M. to midnight evenings. There has been plenty of crystal grinding and solder-plating to land exactly "on the nose," and the availability of contacts almost at will has brought back a number of calls that *had been missing locally for several months. Everyone likes* the idea, even the DX hot-shots who normally don't go in for local rag-chewing, and several stations in the Baltimore area have picked up the idea. Could be it would help in other localities.

Traffic-outlet nets on the v.h.f. bands can serve useful purposes in densely-populated areas where traffic handling is going strong on lower frequencies. W9PK, Downers Grove, Ill., reports that the Illinois 'phone and c.w. traffic nets have a traffic outlet net on 145.6 Mc. Operating nightly, this group is known as the Watchdog Net.

W8BFQ, West Richfield, Ohio, reports that there is more doing on 144 locally than in previous winters. Several of the gang are keeping skeds, and all swap information as to conditions and available activity in other areas. Margaret is now keeping a 2100 sked with her beam east, calling a long c.w. CQ nightly at that hour. Signals of a sort have been heard over the W8BFQ-W1HDQ 450-mile circuit almost



Going up! The 40-element 144-Mc. array at W8WXV, Shiloh, Ohio, shown in the early stages of its trip up the new 100-foot aluminum tower. The beam is made entirely of metal, and its center is now 110 feet above ground level.

* V.H.F. Editor, *QST*.

every night since this schedule was inaugurated. There's seldom a "communication" signal, but W8BFQ can be identified by the writer better than three nights out of four. Margaret works W9WOK, Bensenville, Ill., nightly at 2030. This is a 350-mile haul.

W8WXV, Shiloh, Ohio, finds it possible to work W9WOK, W2ORI, Lockport, N. Y., and W2UK, New Brunswick, N. J., on 144 Mc. regularly since he erected his 40-element array (see accompanying photo) 110 feet above the ground. The first two were worked before, but the new beam and an increase from 150 to 400 watts put Al in business with W2UK. The distances are about 320, 200 and 440 miles, respectively. As has been noted on other long paths, Al says the signal of W2UK shows little variation from night to night, bearing no relation to the conditions noted over shorter distances.

RECORDS

Two-Way Work

50 Mc.: CE1AH — J9AAO
10,500 Miles — October 17, 1947

144 Mc.: W6ZL — W5QNL
1400 Miles — June 10, 1951

220 Mc.: W5AXY, W5BDT — W5RCT
520 Miles — October 5, 1952

420 Mc.: W1RFU — W4TLM
410 Miles — July 26, 1953

1215 Mc.: G3QC/P — G8DD/P
100 Miles — July 26, 1953

2300 Mc.: W6IFE/6 — W6ET/6
150 Miles — October 5, 1947

3300 Mc.: W6IFE/6 — W6ET/6
150 Miles — October 5, 1947

5250 Mc.: W2LGF/2 — W7FQF/2
31 Miles — December 2, 1945

10,000 Mc.: W4HPJ/3 — W6IFE/3
7.65 Miles — July 11, 1947

21,000 Mc.: W1NVL/2 — W9SAD/2
800 Feet — May 18, 1946

What consistent effort with a big antenna and high power can accomplish over seemingly impossible paths is no better demonstrated than in the results being achieved on 144 Mc. by W7LEE, Parker, Ariz. From a valley location near the Colorado River, Bob puts a consistent signal over to many of the 2-meter gang around Los Angeles. W6MMU, Santa Monica, made his first contact with W7LEE in October, and has been hearing him regularly since. The distance is more than 240 miles, and W6MMU is only 120 feet above sea level. Anyone who feels that mountains are an insurmountable barrier to 144-Mc. DX should take a careful look at what lies along this path! W6NLZ, Los Angeles, works W7LEE each Saturday and Sunday at 0800 PST.

Near the middle of the Texas Panhandle, in Amarillo, W5SFW is not exactly overburdened with 2-meter activity, but he manages some good stuff now and then. Phil calls CQ with his beam southeast each morning at 0730, and on Nov. 14th was surprised to hear W5HHU, Dallas, come bounding back. Also worked were W5AJG, W5ABN, and W6AQS, who is in Palmer, a distance of more than 360 miles. Phil called W5MJD, also of Amarillo, who worked the same stations, plus W5IOW, in Ada, Okla., 280 miles to the east.

Interest and activity can be maintained on 50 Mc. by a few regular schedules, too. Wherever TV Channel 2 is in use, there is a tendency for hams to throw up their hands and abandon 6 to the TV set owners, but fellows are demonstrating that it is possible to work successfully on 50 Mc. where the Channel 2 signal is strong. There are times when TV use is low, too, when 6 can be used in any locality. A New York–New Jersey section of the Horse-traders is operating on and around 50.2 Mc. each Friday night at 2030, with W2MEU as control station. There are about six regular participants and others are invited.

Around Washington, the 50-Mc. fraternity get together each Sunday at 1015. W3OTC lists W4s UMF and HVV, W3s OJU PCB KMV and OTC as regulars in recent sessions. Little has been heard from the Wilmington and Philadelphia areas, and calls from up this way are encouraged.

There is 50-Mc. activity around Philadelphia every Sunday morning, however, according to reports from W3LFC. Walt says that W2s ADA BAY ORA ZUL, W3s CUB CGV GGR LFC MXW and RQT congregate on 6 between 0930 and noon, and again Monday evenings between 2030 and 2230. Interest in 220 is growing in this same region, and W3LFC says that W3s KBP UGA RBS SAN KPK SNV TXP UKG WKF NHI FFF QMQ CGV and JEW are on regularly. Much of the activity is with simple gear and vertical antennas, but several stations are going to crystal control and m.o.p.a. rigs for better stability.

Simple-gear operation on 220 Mc. is also reported from Valparaiso Technical Institute, where W9SRK says that W9s RFI SRK SRP SPC, W8MLJ, W8MLK, W4TYO and WØCNY are on the band. More stations are expected to join.

Interest in 420-Mc. work is fostered in Southern California by regular net operation. With W6NIT, Lynwood, as control station, each Thursday night at 2000 PST sees W6s ABN DKN NSW OCU DQJ ORV EWX QDP OJF ZW ZDO HZ KES and CHO regularly. Many others are heard from less consistently. W6s MVV IBS and BYE report in regularly from San Diego, more than 100 miles to the south. The net has been functioning since last summer.

Something new in club contests: The December issue of *Grid Leaks*, "published occasionally for the Amateur U.H.F. Club of Jamaica," (New York) reports that a feature of their January meeting will be a 420-Mc. antenna contest. A transmitter will be set up in a large room on 434 Mc. Sole criterion in judging will be the reading on a field-strength measuring set-up provided by the contest committee. The antenna can be any type, so long as it was built by the entrant. Only horizontal polarization and 52-ohm termination are specified.

Two other v.h.f. contests are reported this month from far-off lands. ZS1SW says that a yearly v.h.f. contest is scheduled for the Capetown area, with a trophy named in honor of ZS1T, long-time v.h.f. ringleader among the ZS1s, who recently joined the Silent Keys. And from CE1AJ comes news of a 50-Mc. contest that was held between Dec. 19th and 27th. This is the peak of the summer sporadic-*E* season in the Southern Hemisphere, and plenty of contacts were expected between Chile and Argentina. Ida was a little in doubt of her ability to participate, as a recent earthquake had shaken the 6-meter rig off its table. Larry and Ida were away at the time, but when they returned, they found the rig hanging from a couple of its power wires!

An upheaval approaching earthquake proportions has been stirred up in Wichita, Kansas, as the result of the appearance of a TV station on Channel 16. This is one of those troublesome channels where the first i.f. for double-conversion u.h.f. strips is in the 144-Mc. band. WØZJB has been having quite a time in attempting to keep 2-meter activity going in the face of this TVI problem. His experiences point the way for other hams to follow. If there is a u.h.f. station due in your community, better get some spade-work started before the storm breaks. Coöperative effort with local TV dealers, distributors and servicemen is the first step. Make sure that everyone concerned with the TV business understands the facts of life regarding these strips. (See November and December *QST* for details.)

If strips are sold, and interference develops, do everything possible to remain on friendly terms with the complainants. Get them to go back to their dealers, or to the manufacturers, and demand satisfaction. Copies of ARRL letters to FCC and to manufacturers are available as ammunition. Make sure that your rig causes no interference on u.h.f. receivers or converters that employ recommended circuitry. Then don't give in.

The double-conversion strip method of u.h.f. reception is wide open to all kinds of interference, and an innocent purchaser has every right to obtain satisfaction from the people who manufactured, distributed, sold or installed it. The ham's best approach is to remain calm and friendly, despite all provocations to the contrary, but firm in his right to the use of a band that is, with this one exception, one of our best frequencies for TVI-free communication.

New Amperex Twin Tetrodes

As a lower-powered companion to their 5894/9903, well established as almost standard equipment for 420-Mc. tripler and amplifier service, Amperex recently introduced a new u.h.f. dual tetrode, the 6252/9910. The 6252 bears about the same relationship to the 5894 that the 832 has to the 829. With lower input and output capacitances than any comparable twin tetrode, the 6252 is a natural for 420-Mc. use. In unmodulated service it will deliver up to nearly 50 watts output at 200 Mc., 25 watts at 400 Mc., and 20 watts at 600 Mc. In plate-screen modulated service the 6252 will provide 31 watts at 200 Mc. and 13 watts at 400 Mc., operating under CCS conditions. Physically, the tube is approximately the size of an 832, but with the mechanical and electrical features that have made the 5894 such a fine performer at 400 Mc. and higher.

Where price is a consideration, the tag on the 5894 and the 6252 may slow down some hams, but the fellows who have to watch their pennies closely will be interested in the Amperex 6360. This new type, also a twin tetrode, is of single-ended construction, and consequently it allows the use of mass-production techniques that make for lower cost. Roughly comparable to a pair of 5763s in a single envelope, the 6360 will be capable of up to 18 watts output at 200 Mc., with 350 volts on the plates. Maximum ratings apply up to 200 Mc., so the tube should operate, at reduced efficiency, in the 420-Mc. band. As it will be considerably more moderately priced than its famous brothers, the 6360 should be popular with Technicians and other newcomers to the 220- and 420-Mc. bands.

OES Notes

Perhaps the most noteworthy project ever carried out by a member of the OES family is the long-term 144-Mc. DX schedules W4HHK, Collierville, Tenn., is keeping with W2UK and other Northern New Jersey W2s, principally W2NLY and W2AZL. Results on this 940-mile path have been reported monthly in these pages since the first inkling that reception was possible over such a distance without the aid of unusual weather conditions of some sort.

In a detailed summary of two months of observation, W4HHK shows 103 separate schedules kept in October and November. A tape recorder was run on the W4HHK receiver to catch any snatches of signal for future study. On all these schedules, only 8 showed completely negative results, and on two of these the feed line was broken, a condition not detected until the following day.

A modified "R" scale is used to grade results. R1 is for scattered short bursts, pings or tweets, with only individual letters or parts thereof distinguishable. R2 covers reception of groups of letters sufficient to convey some information such as a complete signal report or a call; bursts of several seconds' duration. R3 is reserved for bursts of 15 seconds to 2 minutes of solid copy. These are rare. R4 and R5 — well, they're not worrying about defining these as yet, though all hands are hoping that the big rhombic array and kilowatt final now under construction at W4HHK will turn the trick.

The 2-month tabulation shows, in addition to 8 blanks, 39 R1 entries. 20 schedules are rated R1–2. Twenty-nine make R2, but only 2 were good enough to justify an R3 rating. The balance are ranked R2 to 3. The periods during which the best reception occurred coincided fairly well with predicted meteor shower dates, as taken from *Sky and Telescope* magazine. Morning schedules, usually between 0640 and 0700 CST, show more consistent results than others kept at 1600, 2030 and 2130 CST. The 2130 period is the best of the evening hours, to date. Evening checks with W1HDQ have been completely fruitless. Looks like a bigger antenna is in order at Canton!

W5SCX, Ardmore, Okla., says that the performance of the Gonset 6-over-6 array can be improved for low-edge work if the driven elements and directors are lengthened slightly. The array appears to be broad-banded slightly to work effectively over the entire band, and as much as 2 to 3 db. can be picked up by peaking the elements mentioned for maximum forward gain at the frequency most used. It might be a good idea to watch for changes in impedance when such modifications are made, we add parenthetically.

W9GFL, Green Bay, Wis., reports that although 2-meter conditions have not been good, there are several new stations on the band, largely the result of the formation of the NEW VHF Club. The local net frequency, 145.008 Mc., is now used by seven stations, with the channel occupied daily between 1215 and 1230, and 1815 and 1830 CST.

2-METER STANDINGS

	Call	States	Areas	Miles
W1HDQ		18	6	850
W1IZY		16	6	750
W1RFU		15	7	1150
W1MNF		14	5	600
W1BCN		14	5	580
W1DJK		13	5	520
W1CTW		12	4	500
W1KLC		12	4	500
WN1YQI		12	4	420
W1OPI		12	4	420
W1MMN		10	5	520
W2UK		23	7	1075
W2NLY		22	7	1050
W2ORI		21	8	1000
W2AZL		20	7	1050
W2QED		19	7	1020
W2PAU		16	6	740
W2AMJ		14	5	550
W2BLV		14	5	450
W2QNZ		14	5	400
W2UTH		13	7	880
W2SFK		13	6	—
W2AOC		13	5	400
W2DFV		13	5	350
W2CET		13	5	405
W2DPB		12	5	500
W2FHJ		12	5	—
W3QKI		22	8	820
W3RUE		20	7	760
W3NKM		19	7	660
W3KWL		16	7	720
W3LNA		16	7	720
W3FPH		16	7	—
W3GKP		15	6	800
W3IBH		13	5	570
W4HHK		23	7	850
W4AO		21	7	950
W4JFV		18	7	830
W4MKJ		16	7	665
W4OXC		14	7	500
W4JHC		14	5	720
W4IKZ		13	5	720
W4JFU		13	5	720
W4CLY		12	5	720
W4OLK		12	5	720
W4FJ		12	5	700
W4UMF		13	5	600
W4WCB		9	4	650
W4UDQ		8	4	850
W4TLA		7	4	350
W5RCI		20	7	925
W5JTI		14	5	670
W5QNL		10	5	1400
W5CVW		10	5	1180
W5AJG		10	4	1260
W5MWW		9	4	570
W5ML		9	3	700
W5ABN		9	3	780
W5ERD		8	3	570
W5VX		7	4	—
W5VY		7	3	1200
W5FEK		7	2	580
W5ONS		7	2	950
W5FBT		6	2	500
W5IRP		6	2	410
W5FSC		6	2	500
W5DFU		5	2	275
W6ZL		3	3	1400
W6PJA		3	3	1390
W6WSQ		3	3	1390
W6BAZ		3	2	320
KG6AAV/6		2	2	275
W6NLZ		2	2	237
W6GCG		2	2	210
W6QAC		2	2	200
W6EXH		2	2	193
W6ZEM/6		1	1	415
W7LEE		3	2	240
W7YZU		3	2	240
W7JU		2	2	140
W7JUO		2	2	140
W7RAP		2	1	165
W8BFQ		24	8	775
W8WJC		24	8	775
W8WXV		21	8	1200
W8WRN		20	8	670
W8DX		19	7	675
W8BAX		19	7	655
W8UKS		18	7	720
W8RMH		18	7	690
W8RWW		17	7	630
W8EP		17	7	—
W8WSE		16	7	830
W9EHX		23	7	725
W9FVJ		22	8	850
W9EQC		21	8	820
W9BPV		20	7	1000
W9UCH		20	7	750
W9LF		19	-	—
W9WOK		17	6	600
W9ZHL		17	6	—
W9MBI		16	7	660
W9KLR		16	7	—
W9BOV		15	6	—
W9LEE		14	6	780
W9DDG		14	6	700
W9FAN		13	-	680
W9UIA		12	7	540
W9GTA		11	5	540
W9JBF		10	5	760
W9DSP		10	4	700
WØEMS		24	8	1175
WØGUD		22	7	1065
WØIHD		19	7	725
WØONQ		17	6	1090
WØINI		14	6	830
WØZJB		12	7	1097
WØOAC		12	5	725
WØWGZ		11	5	760
WØJHS		9	3	—
WØHXY		9	3	—
VE3AIB		20	8	890
VE3DIR		17	7	790
VE3BQN		14	7	790
VE3BPB		12	6	715
VE3AQG		11	7	800
VE1QY		11	4	900
VE3DER		10	6	800
VE2AOK		7	3	440

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
R. L. WHITE, W1WPO, Asst. Comm. Mgr., C.W.
PHILLIP SIMMONS, W1ZDP, Communications Asst.

GEORGE HART, W1NJM, Natl. Emerg. Coördinator
ELLEN WHITE, W1YYM, Asst. Comm. Mgr., 'Phone
LILLIAN M. SALTER, WN1ZJE, Administrative Aide

One Minute per Hour on the Hour. A brief time for *regular* amateur listening on the National Calling and Emergency Frequencies, most specifically one minute per hour on the hour has been suggested. W7HDT favors this suggestion originating with WØIC and suggests that all net managers QNC their groups or otherwise "sell the idea" so it will be put into standard practice. If but partially observed, it would seem that this new device has potentialities to speed getting attention and communications help in emergencies.

Since *voluntary* instead of mandatory, response to this idea of pausing at a given time *at the beginning of each hour for one minute* should be maximum and should prove of great assistance. The National Calling and Emergency Frequencies should be monitored each hour *on the hour* for at least a minute. Amateurs needing help from nearby will naturally try first the local section frequencies of 'phone, c.w. and emergency nets. When failing to get a desired response on ones' own section net frequency, an operator should go at once to the nearest National Calling and Emergency channel. If amateurs will heed this suggestion *on the hour*, each hour will give optimum chance of getting any needed communication established or traffic moved along. It is suggested that all amateurs observe carefully the NC and EF channels presented in a box elsewhere in this *QST*.

Quotes Changed. Following the Paris ('49) Telegraph Conference the code equivalent for *quotes* become di-dah-di-di-dah. That was formerly the sign used to separate a whole number from a following fraction. Since no new symbol was specified, FCC advises that in separating a whole number and a fraction it is proper to use the hyphen, dah-di-di-di-di-dah.

Amateurs going up for examination for General Class privileges are not required to be familiar with these designations but should be able to use code equivalents for the question mark, period and slant bar. Novice code exams do not require knowledge of the code equivalents for punctuation but of course common punctuation should be learned since it will be used operationally almost at once.

A Substitute for Phonetic Alphabets. Some years ago ARRL OPS formulated the groundwork for the ARRL-recommended phonetic alphabet which is available on request from the League today. This was accomplished after study of as many as a dozen official alphabets used in wire and radio practice with the prestige of international and commercial usage and laboratory tests on intelligibility. *Midwest Clixs* and *Pacific Area News* have commented as follows on the subject, recognizing that without an FCC mandate no one list will be universally followed, especially now that the old military lists are being abandoned in favor of the I.C.A.O. one. "Few voice operators use our official phonetic list in its entirety, probably because of concern with various military lists. We don't blame anyone for being a trifle confused, nor adhering to the standard list, since this has been changed quite a few times. When the choice includes several words such as Able, Adam, Afirm, or Alfa for the letter 'A', it is no wonder that every operator is at a loss as to just what word to use.

"In a recent issue of *Midwest Clixs* someone came up with the idea of dropping all these different alphabets and concentrating on something that all operators know — namely 'Dit-Dah' for A, 'Dah-Di-Di-Dit' for B, etc. There are no changes in word substitution for *these!* All hands know them."

On Circuit Discipline; Use of Net Frequencies. Most amateurs want to know how to work smoothly in a net and there's a heavy request for copies of the new ARRL Net Directory at this season of the year. All who would like to know the functions of the NCS and the operating pointers that make the difference between mediocre and outstanding nets are invited to request our booklet *Operating an Amateur Radio Station.* Study of the material on Network Organization (pages 13 and 14) will be helpful. Follow these principles: (1) Report into your local 'phone or c.w. net promptly at the appointed hour or in any event *after* an NCS general call to the net. (2) Send traffic or exchange any remarks with others in a directed net *only* when invited to by the NCS. (3) Answer promptly when the NCS calls; do not leave the net without notifying him. (4) Know common Q and QN signals and keep a more extended list available for reference. (5) Save all conversation or personal remarks until the net is free (QNF).

The following suggestions are from the Ontario Section Net Bulletin. "The viewpoint expressed by VE3EAM that the NCS *alone* should run the show and all others coöperate by answering his calls and requests is very well taken. Nothing is more likely to disrupt a net and throw an NCS into confusion than various 'helpful' guys butting in. Regarding civil defense, I feel there should be a c.w. net tie-in to local c.d. nets even where they are 'phone. I [VE3ATR] use a 6-meter net

tie-in with the local c.d. activity. This serves several purposes. It gives good practice in handling traffic on 'phone, it provides defense-net awareness of the long-haul abilities of the c.w. connections, and it constitutes a 6-meter net necessary to flow of traffic in and out. We have been waiting for someone to climb our backs about too much discipline and too severe net procedure.

"In case you are thinking in this direction it must be noted that we are all creatures of habit. Slovenly habits in operating reflect most severely against us in time of emergency, just when speed, accuracy and a minimum of confusion are required most. If every time we operate in the net we act in well-disciplined fashion, keeping our rag-chewing until after net exchanges and reporting at exactly the proper time with traffic, the procedures that make for quick accurate service, this will pay dividends if or when any real honest-to-goodness crisis confronts us. It is also a good idea when closing down the rig to leave the receiver and transmitter set on the net frequency and listen whenever there is opportunity. This makes for convenient traffic clearance in a pinch; more important, it can be a means of getting some operators on the job in an emergency!"

Field Day Dates. This will confirm the dates of the '54 ARRL Field Day. It will be held the customary third week end in June, i.e. June 19th–20th. The staff committee reviewing suggestions as for all our major activities had sought to avoid Father's Day by making it a week earlier; however, this is a voluntary observance as is the FD activity, while the more numerous school graduations and studying for exams on earlier week ends are mostly mandatory obligations. The FD is probably the greatest or most universal collective activity amateurs have. On review of FD dates it must be realized that it is not possible to satisfy every local wish; the best we can do is follow the custom that has proved a happy date for most, which gets the FD in between school closings and the taking off for vacations that last week end of June. The first '54 Affiliated Club Bulletin will include in full the FD Rules (usual pattern); it's not too early to start right now on any new design for those 30-watt rigs, mobile installations for emergency work, civil defense needs, FD, and the vacation season!

The ARRL DX Competition. With the advent of February, DX Contest time is here again. Our lower-frequency bands no doubt will again produce some surprises, and 15 and 20 meters should be fine at hours when these are open DX-wise. Advance notices have been sent airmail to foreign societies and rare DX points. All amateurs everywhere are most cordially invited to get into the annual DX fray. Ask for our free log forms to report on, or if at some remote point just follow the report form given in the January *QST* announcement. *DX Test Dates:* 'Phone, Feb. 12th–14th, Mar. 12th–14th; C. W. Feb. 26th–28th, Mar. 26th–28th.

— *F. E. H.*

HIGH CLAIMED SCORES 1953 SWEEPSTAKES

Early returns on the 20th ARRL Sweepstakes, held the week ends of November 14th and 21st, indicate that the bands were swamped as contestants swapped SS exchanges, then carried on the quest for more contacts and new sections to add to their logs.

Apparently at least two all-time records for SS c.w. work will go by the board as W9IOP became the first to claim a score over 200,000 points, and both W4KFC and W9IOP surpassed the previous high of 1100 QSOs. The Midwest appears to have wrapped up national 'phone honors with SS regulars W9NDA and WØPRZ turning in the top two tallies.

The following listings show score, number of contacts and number of ARRL sections worked, but all figures are subject to further intensive checking. Final results will include a tabulation of all scores, plus pictures, statistics, calls of award winners and other SS information. Watch for them in an early issue of *QST*.

C.W.

W9IOP	206,408–1140–73	W3KDP	116,174– 657–71
W3CTJ*	184,690–1012–73	W5QNZ	116,130– 837–70
W7PGX	183,420–1036–72	W3VAN	116,010– 645–72
W3BES	181,496– 996–73	W5USN	114,888– 661–70
W4KFC	172,937–1189–73	W3FQB	112,815– 655–69
W4KVX	172,080– 956–72	W9NII	112,175– 641–70
W5LGG	167,170– 916–73	WØPHR	111,350– 655–68
W3DGM	164,188– 925–71	W4WKQ	110,486– 654–69
W3EIS	160,783– 881–73	W3EVW	109,683– 601–73
W3JTK	154,260– 857–72	WØYCR	109,113– 625–70
W8PBU	150,300– 835–72	W1BFT	108,000– 600–72
W5GEL	146,073–1009–73	W3GHM	107,625– 615–70
W9YFV	138,791– 761–73	W3LEZ	107,625– 615–70
W9RQM	138,095– 782–71	W3AEL	107,388– 605–71
W9ERU	135,360– 754–72	W4LVV	106,949– 659–67
W5KC	134,900– 762–71	W3JBC	106,750– 610–70
W5DWB	134,280– 746–72	W2SSC	106,433– 617–69
W5TFB	131,850– 735–72	W5RFF	106,433– 617–69
W5RID	130,743– 904–73	W3EQA	105,000– 600–70
W4BRB*	127,330– 750–68	W6EAE	103,838– 585–71
WØTKX	126,263– 722–70	W9PNE	103,673– 604–69
W6LXK	126,000– 700–72	W5BTS	102,151– 583–71
W8LQA	123,363– 706–71	K6BLL*	102,018– 566–73
W5MCT	123,300– 688–72	W1JYH	101,700– 565–72
W3JTC	118,625– 650–73	W8RSP	100,731– 576–71
W3LVF	117,713– 646–73	W4BZE	100,595– 651–62
W3ALB	117,165– 642–73	W4CYR	100,275– 573–70
W3OCU	116,795– 658–71	W1BIH	100,170– 559–72
W3GRF	116,438– 675–69	K6CEF	100,050– 580–69

'PHONE

W9NDA	117,603– 537–73	K2AAA	39,270– 238–55
WØPRZ	112,676– 523–73	W5TLY	38,790– 219–60
W4HQN	102,960– 520–66	W4VFL	38,219– 224–57
W5YGL	71,379– 380–66	W1BFT	37,665– 233–54
KH6AWM	70,819– 536–67	W7NPV	37,572– 203–62
W8AJW	70,686– 357–66	W2ICE	35,100– 270–65
W4KZF	69,564– 341–68	W4WOO	34,286– 204–57
W5SFW	68,544– 493–72	W4LIM	33,660– 225–51
W5UBN	66,402– 330–68	W6CBE	33,062– 271–61
W4ESK	65,520– 366–60	W3JNN	32,660– 232–71
W1JEL	62,304– 328–64	W1TRX	32,450– 278–59
WØBCF	58,362– 421–71	W7EYD	32,076– 200–54
W6SUP	57,800– 425–63	W6BXE	32,040– 267–60
W4SOV	57,456– 309–63	W3MDE	31,680– 192–55
W5TTG	57,102– 307–62	W2SZ	31,350– 287–55
WØREP	53,676– 284–63	W1VYI	30,702– 240–43
W3VKD	51,204– 380–68	W2JJI	30,378– 250–61
W4VUA	49,938– 289–58	K6BWD	30,000– 200–50
W3KDD	49,104– 374–66	W6IDY	29,952– 234–64
W8HQH	45,588– 262–58	W9ACQ	29,892– 284–53
W2SKE	45,356– 334–68	W7DMZ	29,640– 249–60
W9JVN	44,196– 256–58	W5GEM*	29,475– 200–50
W4TEW/4*	44,141– 291–51	KL7AON	28,740– 242–60
W8MLR*	42,978– 285–52	WØEHF	28,160– 224–64
W2JKH	42,570– 258–55	W9KDV	27,000– 250–54
W4HUW	42,284– 341–62	WØZKO	26,796– 160–56
W3MSK	42,281– 200–71	W5RSN	26,565– 247–55
W8VQD*	41,688– 290–72	W4FV	25,984– 232–56
WØOMG	41,538– 303–69	WØYMP	25,652– 177–49
W9YWL	40,869– 240–57	W4YTO	25,398– 167–51

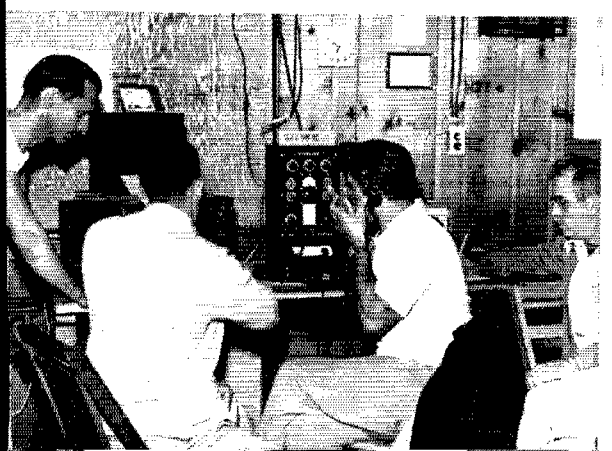
* Multiple-operator station.

We W amateurs often forget that our VE brothers north of the border have some different operating and licensing conditions than ours. Many of us, without thinking much about it, accept VE amateurs as being a part of the ARRL fraternity (which indeed they are) and therefore a oneness with us that amounts to a sameness. We seldom think of the fact that they pay for their licenses, they operate under a set of regulations different from, albeit similar to, ours, and they are not amateur radio stations but amateur experimental stations. There are differences as well as similarities in their civil defense set-up which we should also like to mention. Because Canada is our first line of defense to the north, Canadian civil defense is important and of interest to us. What, many U. S. amateurs would like to know, has Canada been doing about an amateur civil defense service similar to our RACES?

A recent trip through part of Canada indicates that the information we bring back from Ottawa may be of interest to Canadian as well as U. S. amateurs. Many VEs do not know of the existence of rules for VE amateur participation in civil defense communications. We suspect that a good many Canadian civil defense directors don't know about it, either.

In Canada, civil defense is administered by a division of the Department of National Health & Welfare. Its communications chief (Mr. D. S. Robertson) happens to be an official of the Department of Transport, whose Telecommunications Division is the Canadian counterpart of our FCC; but in his c.d. capacity he wears a different "hat" and works under Health and Welfare. In late 1951, Canada announced the earmarking of frequencies for use of amateurs in civil defense, following the U. S. lead and earmarking the same frequencies as our RACES. Later on, shortly after our RACES regulations were finalized, the Canadian Department of Health & Welfare, Civil Defense Division, Communications Section, published a small booklet outlining procedure to be used in the "Civil Defense Communications Service" and a "Guide for Establishment of a Civil Defense Radio Service." This manual bears the designation "C.D. Manual No. 17." We understand its distribution was limited, and gather that most VE amateurs do not know of its existence. Yet it goes into some detail concerning the procedures in setting up a radio service for civil defense in which VE amateurs can participate. Although the very title of the part having to do with a c.d. radio service seems to indicate its advisory nature, we have been assured that the publication is official, the frequencies mentioned are as firm as are our RACES frequencies, and the "Guide" is as official as our RACES regulations.

The "Guide" is very similar, in fact, to our RACES rules. Some parts of it are word for word. Civil defense amateur radio is thus under way in Canada. In British Columbia a highly-organized c.d.-amateur group exists. In Montreal the closest collaboration exists between local amateurs and civil defense officials. In Toronto an enthusiastic and well-prepared AREC group is ready and eager to take on some civil defense responsibilities. Nova Scotia amateurs are very active in civil defense activities. We continue to follow all such developments closely, for civil defense in Canada is *also* a contribution to the civil defense of the American continent.



W1WKM, the control station at the New Bedford, Mass., CD Control Center, handled a lot of traffic during a simulated A-bomb attack on Sept. 14th. Operators shown, left to right, are W1UID, W1WGN, W1WPL and W1BMQ. Mobiles who also assisted were W1s AVY, HPH, LAZ and UIE. W1CTZ participated on emergency power.

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On November 20th, southwestern Minnesota was visited by a severe sleet storm. At 0630 on the 20th, WØKFN had a call from the manager of the local telephone company who wanted to know if she could get a message into Minneapolis or St. Paul. Her first emergency CQ was answered by W9AAG in Illinois, who was asked to contact someone in the Twin Cities. WØAIY subsequently put in a long-distance call to the manager of the telephone company's St. Paul office informing them of the damage. At 0815 WØGVO of St. Paul contacted WØKFN and much traffic was handled. Later WØBWM of Minneapolis was on the air and helped with Minneapolis contacts. WØEUI helped out until 0900, then put his BC-654 on the air at his office. WØKYG, whose antenna was down, helped monitor 3820 kc. which was used to handle emergency traffic. The emergency started on Friday A.M., Nov. 20th, and ended Monday, the 23rd, with WØKFN handling all traffic that came and went out of Pipestone. Stations devoting their time handling traffic during this emergency were WØs AIY AYD BWM BWP CTW CXW ELC EQS EUI GVO GXG JDO JIE KFN KXZ KYG MXC NPR OPA PCU VQC; W5s AOH TTG; W7MAL; W9AAG.

— *WØMXC, SCM Minnesota*

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After the tornado which swept across Indiana and through the southern part of Tippecanoe County on April 9, 1953, the Tippecanoe Amateur Radio Association furnished 147.3-Mc. f.m. equipment and provided operators. The days on which the club provided emergency communication were April 15th, 16th, 17th and 18th. On April 15th there were a base station and four mobile units; on the 16th, 17th and 18th there were a base station and three mobile units. Stations participating were W9s ASX EBZ EDM EJV MOW NRK OLX REG RFH PZM QBH SAR UXP ZES and W2NDM.

— *W9PPG, Secy. TARA*

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On November 4th, W5RID of Austin, Texas, was somewhat startled to hear VP5BH, Grand Cayman Island in the British West Indies, calling "CQ help" on 40 meters. Answering the call, he was told that a British West Indian Airways plane had made a forced landing on Grand Cayman and wanted to get word to Miami Overseas Airways of the incident. W5RID called CAA at the Austin airport, who radioed to Miami. W5RID was the only contact with the accident, through VP5BH, who had the only means of communication on the island. The contact resulted in relief being dispatched to the disabled plane.

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A wave of prowlers and criminal assaults in Dallas, Texas, resulted in members of the Caravan Club being called into action on two occasions during late September to assist in manhunts. Control of the units was effected from a mobile unit located at the command post of the Dallas County Sheriff at the scene of the search. A total of about 15 mobile units took part in these activities. Amateur stations at the sheriff's office in downtown Dallas and near the scene of the search helped to maintain communications with the sheriff's headquarters and helped to keep the frequency clear.

During the nights of October 2nd, 3rd and 4th, the mobile units of members of the Caravan Club and of amateurs active in Dallas RACES were placed at the disposal of the police chief by W5VU, police communications officer. A Dallas policeman and a specific patrol area were assigned to each mobile unit. Dispatching of these units was handled under the direction of a police dispatcher by operators at

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W5TAG, located at Civil Defense Communications Headquarters. Approximately 50 mobile units, operating in shifts, were used in this activity. Outlying amateur stations helped to relay where necessary and helped to keep the frequency clear. A helicopter was placed at the Dallas Police Department, and communications to this unit also were handled through amateur radio.

A considerable amount of favorable publicity from newspapers and radio and television stations resulted from this activity. The acceptance by the Dallas authorities of assistance from the amateurs of the area marks a milestone in achievement and augurs well for the future.

— *W5CLP, Caravan Club Publicity Director*

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Fifteen SECs submitted monthly reports for October activities, representing 3861 AREC members. This is a gratifying increase, but we still have a long way to go to reach 100 per cent. Two new sections appear on our SEC report list — Sacramento Valley and San Joaquin Valley, both California sections.

A.R.R.L. ACTIVITIES CALENDAR

Feb. 6th: CP Qualifying Run — W6OWP
Feb. 9th: Frequency Measuring Test
Feb. 11th: CP Qualifying Run — W1AW
Feb. 12th-14th: DX Competition ('phone)
Feb. 26th-28th: DX Competition (c.w.)
Mar. 7th: CP Qualifying Run — W6OWP
Mar. 12th: CP Qualifying Run — W1AW
Mar. 12th-14th: DX Competition ('phone)
Mar. 26th-28th: DX Competition (c.w.)
Apr. 2nd: CP Qualifying Run — W6OWP
Apr. 10th-11th: CD QSO Party (c.w.)
Apr. 12th: CP Qualifying Run — W1AW
Apr. 17th-18th: CD QSO Party ('phone)
May 1st: CP Qualifying Run — W6OWP
May 11th: CP Qualifying Run — W1AW
June 5th-6th: V.H.F. QSO Party
June 6th: CP Qualifying Run — W6OWP
June 16th: CP Qualifying Run — W1AW
June 19th-20th: ARRL Field Day

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 on February 11th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters on 1885, 3555, 7125, 14,100, 21,020, 52,000 and 145,600 kc. The next qualifying run *from W6OWP only* will be transmitted on February 6th at 2100 PST on 3590 and 7138 kc.

Any person may 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 EST. References 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 is reversed during certain of the slow-speed transmissions. To get sending practice, hook up your own key and buzzer and attempt to send in step with W1AW.

Date Subject of Practice Text from December *QST*

Feb. 1st: *A De Luxe 5-Band Mobile Transmitter*, p. 17
Feb. 4th: *So-o-o Big!*, p. 26
Feb. 8th: *A Two-Control Multiband Transmitting Unit*, p. 28
Feb. 10th: *Filter Building Made Easy*, p. 32
Feb. 16th: *Remote Mobile-Antenna Resonating*, p. 34
Feb. 18th: *Transistor Circuitry*, p. 35
Feb. 23rd: *The Novice Round-up*, p. 44
Feb. 26th: *A 220-Mc. Station for the Beginner*, p. 39

W1AW OPERATING SCHEDULE

(All Times Given are Eastern Standard Time)

The W1AW fall-winter operating schedule remains in effect. Lithographed master schedules showing complete W1AW operation in EST, CST or PST are available without charge upon request.

Operating-Visiting hours:
Monday through Friday: 1500–0300 (following day).
Saturday: 1900–0230 (Sunday). Sunday: 1500–2230.

Exceptions: W1AW will be closed from 2230, Feb. 21st, to 1500, Feb. 23rd, in observance of Washington's birthday.

A lithographed local map showing how to get from main highways (or from Hq. office) to W1AW will be sent to amateurs advising their intention to visit the station.

General Operation: Refer to page 73, October *QST*, for a chart to determine times during which W1AW engages in general operation on various frequencies, 'phone and c.w. This schedule is still in effect and is not reproduced herewith for space considerations. Note that since the schedule is organized in EST, certain morning operating periods may fall in the evening of the previous day in western time zones. W1AW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies (kc.):
C.w.: 1885, 3555, 7125, 14,100, 21,020, 52,000, 145,600.
'Phone: 1885, 3950, 7255, 14,280, 21,350, 52,000, 145,600.
Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times:
Sunday through Friday: 2000 by c.w., 2100 by 'phone.
Monday through Saturday: 2330 by 'phone, 2400 by c.w.

Code Proficiency Program: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. *Exceptions:* On February 11th and March 12th W1AW will transmit ARRL Code Proficiency Qualifying Runs, and on February 9th there will be a Frequency Measuring Test instead of the regular code practice.

NEW CERTIFICATES AVAILABLE

Certificate collectors, take note! Here are four recently announced awards which maybe you haven't heard about.

The Hilo Amateur Radio Club of Hawaii announces the availability of its Hilo Amateur Radio Club certificate. Any amateur submitting proof of contact with 15 club members is eligible for the award. All contacts must be made after September 1, 1953, with 15 of the following HARC members: KH6s AE AFQ AFR AFS AKX AQE AQP AQU ARN ATQ ATT AU AUB AUC GP GW IN UO and WH6s ATY AUA AZL BAD BAI BAQ BAR BAW. Confirmations should be sent to the Hilo Amateur Radio Club, P. O. Box 1659, Hilo, Hawaii. If you're going to KH6-land, note that the club has an *Aloha* Committee that takes care of all visiting hams!

Any amateur who contacts ten Key West hams is eligible for the Conch Net Certificate. Applications should be sent to Key West Amateur Radio Club, Box 210, Key West, Fla. KWARC formerly issued *coconuts* for such work, but discontinued the practice when the cost of mailing became prohibitive.

The Greater New Orleans Amateur Radio Club takes pleasure in announcing the availability of an operating achievement award upon receipt of satisfactory evidence of two-way communication with 25 amateur stations in the Greater New Orleans area. Correspondence and applications for the WA "25" Award should be addressed to the Greater New Orleans Amateur Radio Club, P. O. Box 1057, New Orleans 4, Louisiana.

The York Amateur Radio Club is sponsoring the White Rose Award, available to any amateur who furnishes proof of contact with ten stations in the Greater York (Penna.) area. Cards or confirmations should be sent to Royal M. Gibson, W3LUD, 219 Wynwood Road, York, Penna.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for November traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W2BTB	57	3993	3681	92	7823
KG6FAA	486	3651	3363	288	7788
W3CUL	283	2334	1422	897	4936
WØHKE	216	1907	2065	158	4346
KA7LJ	426	1755	1685	138	4004
W6IAB	101	1609	1556	53	3319
KL7AIR	47	1416	1229	60	2752
W9JUJ	34	1177	1029	66	2306
W4USA	35	990	865	160	2050
W6KYV	127	961	253	708	2049
K4WAR	675	639	600	52	1966
W4YIP	26	781	642	116	1565
KA3AC	1155	194	159	29	1537
KA7RC	167	654	634	20	1475
W7BA	22	691	658	30	1401
W5MN	52	651	361	276	1340
W8ZGT	40	615	585	15	1255
WØBDR	18	526	515	7	1066
KH6FAA	154	475	358	57	1044
W9NZZ	266	385	5	377	1033
WØSCA	4	491	485	3	983
W7PGY	21	478	452	26	977
W4PJU	4	462	322	140	928
WØKHQ	10	452	445	4	911
K6FAL	433	211	179	25	848
KA2JF	454	189	181	15	839
WØCPI	6	416	380	36	838
KG6FAD	183	319	306	13	821
W3WIQ	12	364	348	18	742
KØFCR	121	301	285	16	723
KH6AJF	30	326	289	36	681
K6WAY	56	274	307	23	660
KØFAM	49	325	218	33	625
WØQXO	11	294	251	43	599
W8FYO	5	276	230	36	547
W9TT	26	242	253	4	525
W2ZOL	19	261	227	17	524
W9VBZ	60	231	110	120	521
W9SWM	86	215	206	6	513
W2RUF	30	255	187	40	512
Late Reports:					
KG6FAA (Oct.)	641	3133	2804	329	6907
W2BTB (Sept.)	19	2083	2056	39	4197
KL7AIR (Oct.)	101	1531	1423	76	3131
KA7RC (Oct.)	178	375	358	17	928
W2BTB (Oct.)	21	431	362	15	829
W4TAV (Oct.)	35	257	169	55	516

BPL for 100 or more *originations-plus-deliveries:*

KF3AB 121	W3QLZ.....108	K9FCA.....103
W1AW.....112	W3USA 106	W3CVE....100

The BPL is open to all operators who report to their SCM a message total of 500 or more, or 100 or more originations-plus-deliveries for any calendar month.

TRAFFIC TOPICS

On a few past occasions we've stuck our neck *way* out and discussed the ever-present 'phone/c.w. problem frankly and openly — and we seem, so far, to have gotten away with it. We suppose we'll continue to do so (i.e., stick the neck out) until someone takes a swipe at it.

We are concerned not with the 'phone man as such, or with the c.w. man as such, but with the attitudes, reactions and behavior of those amateurs who set out to render a public service, regardless of the modes of emission they customarily employ. A recent letter from VE3AJR says, in part, "Lately we seem to feel the beginning of a movement to bring c.w. and 'phone operators together." In Ontario, VE3ATR is running a *combined* 'phone and c.w. net on 3750 every Sunday. Some old-time c.w. traffic men are showing up in the 'phone bands, and lately we've heard some 'phone traffic-handlers (who we had suspected didn't even know the code) batting it out on c.w. We think and hope that the movement toward unity which these observations seem to indicate is more than just a beginning; rather, a trend which has developed spontaneously and which will continue inexorably to its ultimate culmination in close coördination between *all* traffic facilities.

Traditionally, traffic handling has been a c.w. function. Many of the old c.w. veterans cannot see how or why anyone could or would want to handle it by voice. But the fact is that there is an increasing tendency on the part of service-minded amateurs to handle traffic on 'phone — as witness the many active and successful 'phone traffic nets on the air today. To the hard-shelled c.w. traffic man we say "Let's face it," and to the newer 'phone traffic man we say "Welcome to the time-honored fraternity of traffic men." To both we say that the best way to handle traffic by more than one mode is to do it together, to suit each to its best purpose and to conduct liaison between c.w. nets, 'phone nets, RTTY nets, or any other kinds of nets that are handling traffic.

Since it is generally accepted that c.w. will carry farther for a given amount of power and through a given amount of QRM than will 'phone, it ought to follow that c.w. is better adapted to long-haul traffic nets, while 'phone is just as well adapted as c.w. for local purposes and usually has the added advantage of increased coverage at the local level. Logical conclusion: "Put long-haul nets on c.w., local nets on 'phone, and conduct liaison between them by stations capable of using both."

Of course this reasoning neglects one very important and practical consideration: that there are quite a few c.w. traffic men who, with low power, prefer operating in local nets, and also some 'phone traffic men who, with high power, can and do manage to clear quite a bit of long haul stuff. But ignoring this for the moment, how does the above strike you as a first attempt at sorting things out?

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The North Texas–Oklahoma Traffic Net reports 571 stations handling 188 messages in November. Five net-control stations reported.

TLJ is conducting liaison nightly with TLAP. Attendance has been 100% during November from trunk stations in Florida, Alabama, Tennessee and Indiana. Some round-about QNBs are often necessary when conditions are bad.

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National Traffic System. The response to the December *QST* appeal for TCC stations was gratifying, but there are still plenty of vacancies in all areas, either as regular, alternate, or part of a team covering each function. If you can wiggle a mean key, have a pretty potent signal, know something about traffic and would like to spend a couple of hours a week doing something useful along with some of the best amateur operators in the country, you're just the man (or gal) we're looking for. Drop us a line.

November reports:

Net	*Sessions*	*Traffic*	*High*	*Average*	*Most Consistent*
EAN	21	601	56	28.5	1RN, 8RN, TRN
CAN	21	582	55	27.7	9RN, TEN
PAN	21	767	113	36.5	All
1RN	20	146	33	7.3	EMN, WMN
4RN	42	418	61	10	E. Fla.
RN6	51	519	43	10	LSN
8RN	18	93	17	5.1	Mich, Ohio
9RN	30	1221	133	40.7	Ind.
TEN	42	1157	211	27.3	Ia., Nebr. S. Dak., Minn.
TRN	44	95	8	2.1	OSN
NYC-LI	21	109	30	5	
QKS (Kans.)	21	127	13	6	
QIN (Ind.)	48	607	68	12.6	
LSN (Los. A.)	25	73	12	2.9	
WVN (W. Va.)	21	92	13	4.4	
TLCN (Ia.)	21	292	29	13.9	
WSN (Wash.)	21	213	86	10.1	
Minn. Fone	52	145	72	2.8	
Minn. C.W.	26	118	10	4.5	
Total	566	7275	211	12.9	
Record	566	5428	211	12.9	

Despite the fact that we are missing four regional net reports this month, the totals for November break all previous November records. NTS fortunes continue to look up. Next month, we are going to replace the "High" (which

means high traffic total for any one session) column with a column headed "Rate." This will be determined by computing the rate of *traffic handled per minute* during that session in which the most amount of traffic was handled in any particular month. No need to change your reported figures; just include the duration (in minutes) of the session during *which you handled the most traffic that month.*

EAN certificates have been awarded to W3NOK and W4KX; 100% representation from 1RN, 8RN and TRN, but the competition is stiff. For missing only two sessions, 2RN takes bottom rating. Pretty much the same is the situation on CAN and PAN, both of which are having exceptionally good attendance, although a lot of traffic is by-passing CAN. 1RN moved its session to 1915 starting Dec. 1st. W4ANK has been reporting 4RN in the absence of W4AKC, but Joe is back now. RN6 reports "not much news except good news." 8RN says things are looking better this month. 9RN certificates have been issued to W6CIW/9, W4TYU and W4RYY/4. TRN has issued certificates to VE2DR and VE3AJR; reports much improvement in VE2 but VE1 still a problem.

On TCC, we have been joined by W1EMG, who takes on EAN-CAN bidirectional liaison on Friday, replacing W2ZVW who moves to a Wednesday EAN-PAN position. W4KRR and WØIC have teamed up for an effective EAN-PAN liaison on Tuesdays. WØRDN and W6LDR are holding successful CAN-PAN liaison on Monday. Other newcomers to the TCC roster are WØBDR, W7PKN and W6UTV. No longer on the roster at this writing are W6CMN, W6OFJ, W6YHM, W7EAU, W7NH and WØBVE. W9JUJ, CAN Manager, has consented to take on responsibility for TCC stations in the Central Area as Assistant TCC Manager. Now we need another one for the Eastern Area.

BRIEF

The portable generator of the Catalpa Amateur Radio Society of Birmingham, Michigan, normally emergency power source for the club's W8HLD, was put to novel use October 2nd when it powered an iron lung and kept a polio patient alive during transfer from one hospital to another.

FREQUENCY-MEASURING TEST, FEBRUARY 9TH

All amateurs are invited to try their hand at frequency measuring. W1AW will transmit signals for this purpose starting at 9:30 P.M. EST (6:30 P.M. PST) Tuesday, February 9th. The approximate frequencies used will be 3540, 7039 and 14,122 kc.

The signals will consist of dashes interspersed with station identification. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting several minutes after the start of the test. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the announced frequencies.

At 12:30 A.M. EST, February 10th (9:30 P.M. PST, February 9th), W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies used will be 3615, 7044 and 14,023 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II Official Observers. Present OOs not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see address, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. *All* observers must make use of the cooperative notices (mail forms provided by ARRL) reporting activity monthly through SCMs, to continue holding appointments.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of *top results.* No single (lucky?) reading can then make the top group to be reported in *QST.* Listing will be based on over-all *average* accuracy, as compared with readings made by a professional frequency-measuring lab.

At the Northeastern Univ. Open House last May, W1KBN, the club station, was open for public inspection, demonstrating equipment, explaining ham radio and plugging civil defense. Many messages were also handled, and W1KBN has been active in EMN and 1RN since. That's W1TTG at the operating position. Others participating were W1s RRP SMM TNA TUP UXE and WNF.

DX CENTURY CLUB AWARDS

HONOR ROLL

W8HGW....253	WØYXO.....246	G6ZO.....243
W1FH.....252	W6VFR.....246	W3GHD.....242
W3BES.....250	W6ENV.....245	W3JTC.....241
G2PL.....249	W2BXA.....244	W3KT.....241
	W6AM.....243	

RADIOTELEPHONE

PY2CK.....231	W1JCX.....209	SM5KP.....205
W1FH.....224	W1NWO.....209	W1MCW.....203
VQ4ERR....220	ZS6BW.....208	W2APU.....202
XE1AC.....215	W8HGW.....205	W9RBI.....200

From November 15, to December 15, 1953, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

OZ7PH.....167	PY5UG.....103	W2ADQ.....100
HB9MU.....125	W2WDP.....101	W2NIY.....100
VK5LC.....117	CO2OM.....101	G3CWZ.....100
W7ASG.....108	W1EIO.....100	ON4FP.....100
G3IDC.....104		VQ4BU.....100

RADIOTELEPHONE

I1CQD.....106	WØGKL.....104	VK5LC.....103
ZE2JK.....105	I1CTE.....103	LU8FAO....100

ENDORSEMENTS

G4CP.....232	W9ABA.....170	W6RRG.....132
W6TT.....230	ZS6A.....170	EA3CY.....130
KV4AA.....221	G3HLS.....165	FF8AG.....126
W8BKP.....210	G6LX.....161	VE1EK.....122
W9IU.....203	SM6HU.....160	VE3ADM....121
W5JUF.....202	ON8MM....152	KP4JE.....115
W5MPG.....202	W2PJM.....150	W3ZQ.....114
G8KP.....201	W5FXN.....150	WØCAW.....111
W4KFC.....200	OH2QQ.....143	WØVIP.....111
W6IBD.....200	IS1FIC.....140	WØDIB.....110
W6MHB.....190	SM6ACO....134	DL3RF.....110
W8JBI.....190		G3APN.....110

RADIOTELEPHONE

W5JUF.....173	ON8MM....143	W3DKT.....130
G3HLS.....160	F9RM.....140	ON4YI.....130
	G6LX.....140	

ELECTION NOTICE

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

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

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

Each candidate for Section Communications Manager must 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, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individual signers uncertain or ignorant of their 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.....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for 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 all 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. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
Yukon *	Feb. 15, 1954	W. R. Williamson	Mar. 17, 1949
West Indies	Feb. 15, 1954	William Werner	Aug. 15, 1952
Maritime *	Feb. 15, 1954	Arthur M. Crowell	Oct. 16, 1952
Utah	Feb. 15, 1954	Floyd L. Hinshaw	Feb. 18, 1954
Connecticut	Feb. 15, 1954	Roger C. Amundsen	Apr. 15, 1954
Arizona	Feb. 15, 1954	Albert Steinbrecher	Apr. 15, 1954
Tennessee	Feb. 15, 1954	Mark M. Bowelle	Apr. 15, 1954
Alberta *	Feb. 15, 1954	Sydney T. Jones	May 1, 1954
North Dakota	Feb. 15, 1954	Everett E. Hill	Resigned
East Bay	Feb. 15, 1954	Ray H. Cornell	Resigned
Louisiana	Mar. 15, 1954	Robert E. Barr	May 31, 1954
Nevada	Apr. 15, 1954	Ray T. Warner	June 15, 1954
Eastern Massachusetts	Apr. 15, 1954	Frank L. Baker, jr.	June 15, 1954
Ontario *	Apr. 15, 1954	G. Eric Farquhar	June 15, 1954
Idaho	Apr. 15, 1954	Alan K. Ross	June 17, 1954
Northern New Jersey	May 14, 1954	Lloyd H. Manamon	July 26, 1954

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian Director Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid, petitions must be filed with him on or before closing dates.

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.

San Diego	Don Stansifer, W6LRU	Oct. 15, 1953
Illinois	George T. Schreiber, W9YIX	Dec. 15, 1953
Alaska	Dave A. Fulton, KL7AGU	Jan. 15, 1954
Oklahoma	Dr. Will G. Crandall, W5RST	Feb. 15, 1954

In the North Carolina Section of the Roanoke Division, Mr. J. C. Geaslen, W4DLX, and Mr. Charles D. Chandler, W4BO, were nominated. Mr. Geaslen received 152 votes and Mr. Chandler received 85 votes. Mr. Geaslen's term of office began December 1, 1953.

In the Ohio Section of the Great Lakes Division, Mr. John E. Siringer, W8AJW, and Mr. Howard M. Robison, W8HOX, were nominated. Mr. Siringer received 620 votes and Mr. Robison received 278 votes. Mr. Siringer's term of office began December 14, 1953.

In the Alabama Section of the Southeastern Division, Mr. Joe A. Shannon, W4MI, and Mr. Laurence B. Peirce, W4KIX, were nominated. Mr. Shannon received 96 votes and Mr. Peirce received 67 votes. Mr. Shannon's term of office began December 14, 1953.

CODE AND THEORY INSTRUCTION

Attention of ARRL-affiliated club secretaries is invited to a planned *QST* listing of clubs giving instruction in radio code and theory. It is desired to compile an up-to-date list of affiliated clubs conducting such programs for all local operators and beginners (members and non-members). If your club has code and/or theory lessons under way, please advise us so that we may pass the word to those interested. Be sure to indicate the meeting place, nights and times, as well as the date instruction will conclude. If future classes are planned, please so indicate.

RTTY NOTES

The RTTY Society of Southern California has announced results of the First RTTY Sweepstakes, held October 31 through November 1, 1953. Top scores were made by W3PYW, W9TCJ, W1BGW and W6AEE, with an additional 25 stations taking part.

The Society also invites interested amateurs to participate in its Anniversary RTTY Contest from 6:00 P.M. EST, Feb. 19th, to 3:01 A.M. EST, Feb. 21st. Contest exchanges should follow the form shown on page 47 of November *QST*. Mail logs by Feb. 27th to RTTY Society of Southern California, 3769 East Green Street, Pasadena 10, Calif.

BRIEF

VE3CAN tells us about VE3FU's recent case of BCI. Reporting into the Ontario 'Phone Net, VE3FU often comments "No traffic here, old man." One night a neighbor could hold his peace no longer. He called up VE3FU to say, "What is the matter with you, anyway? You keep saying 'no traffic here' and yet I look out on the street and see *loads* of traffic going by."

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C. W.	*'PHONE*
3550 kc.	3875 kc.
14,050 kc.	14,225 kc.
7100 kc.	7250 kc.
21,050 kc.	21,400 kc.
28,100 kc.	29,640 kc.

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be *vacated immediately* to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: *c.w.* — 3535, 7050, 14,060; *'phone* — 3815, 14,160, 28,250 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCY

3620 kc.

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, W. H. Wiand, W3BIP — SEC: IGW. RM: AXA. PAM: PYF. E. Pa. Nets: 3610, 3850 kc. The Abington Township ARA, requesting modification of its club station license from RQY to PSH as a memorial to Henry M. Martin, who was president of the club, was granted modification by the FCC Nov. 13th. Future plans of the club will include transmitting Official Bulletins and code practice. The Philadelphia Wireless Assn. now meets at Germantown Hall, Germantown Ave. and Haines St. Newly-elected officers are JWC, pres.; HHK, vice-pres.; NHX, treas.; RNF, rec. secy.; WNR, corr. secy.; MWC, mem. dir. The Phil-Mont MRC reports the complete success of its first annual banquet with 57 members and guests attending. The Hazleton ARC started code and theory classes with 50 interested persons registered to date. FPC reports a new HRO-60 now in use while QXT has a new HQ-140X. EU says, "Let's plan on a hamfest this year." A very excellent idea and because reports are light this month, yours truly will use the remainder of this column to suggest a plan for a coöperative sponsored hamfest. Here's the brainstorm: A meeting could be called, inviting one or two representatives of each ARRL affiliated club within the section, to discuss over-all plans and lay the groundwork necessary. These representatives would report back to their respective clubs and each club would work as a committee, responsible for one phase of the hamfest. Further details are unnecessary at this time. Think about it, talk it over at your next club meeting, and let's hear your comments. AXA published a fine net bulletin reporting progress for the first three months of the fall season. All net members are to be commended on their untiring efforts in combating the long-skip again plaguing us. Net Control Stations for Monday through Friday are: QLZ, AXA, ELI, PDJ, BFF. Traffic: (Nov.) W3CUL 4936, BFF 339, QLZ 126, AD 90, GES 82, NOK 79, PYF 70, BIP 69, KAG 66, AEQ 65, PDJ 34, DUI 32, SHP 22, VN 22, TEJ 20, AXA 18, PVY 15, RSC 11, UOE 9, FPC 2, VDE 2. (Oct.) W3AXA 42, RSC 31, QOL 22.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Arthur W. Plummer, W3EQK — SEC: PRL. In view of the fact that February will mark my first full year as SCM I wish to report on all of the members of this section who hold CD appointments. ECs for Delaware and D.C., respectively, and also Asst. SECs: DB and PWB. ECs for the following Maryland Counties: AFM, Baltimore; BM, Worcester; BSV, Wicomico; GGR, Cecil; HL, Somerset; KTR, Montgomery; LDD, Harford; OYX, Washington; SLG, Anne Arundel; and WN, Frederick. We need 13 more ECs to take care of all counties. Send in recommendations to PRL or myself for ECs for the counties which have none. Also the Counties of Sussex, Kent, and New Castle in the State of Delaware are lacking in ECs. OBS appointees: AFR, BM, CDQ, CVE, EQK, FU, HKS, JE, NNX, QZC, RMD, ROU, and WSE. OESs: FU and KMA. OPSs: BM, EQK, JE, JZY, MAX, OQF, NNX, PKC and WV. ORSs: AEL, AKB, BM, BWT, CDQ, CIQ, COK, CVE, ECP, EEB, EIS, FPQ, FWP, GA, GRF, HC, IL, IYE, JE, JHW, JZY, LSX, LVJ MCG, MCD, NOE, NPQ, ONB, PKC, PRT, PTZ, PZW QQS, QZC, RNY, ROU, WSE, and WV. OOs: Class III and IV: AYS, BM, CVE, DVO, FQB, HVS, ILD, JTK, KET, LUL, MFJ, OSF, QZC, and VQZ. OOs Class I and II: EQK, LUL, and USW. PAMs: EQK and DQZ. RMs: AKB, BWT, CDQ, ECP, JE, MCG, and ONB. One of the requirements for holding appointment is regular monthly reports to the SCM of station activities. The SCM regrets to announce that beginning with the year 1954 appointees who fail to comply with the reporting requirement for three consecutive months will have their appointments cancelled. The SEC and the SCM visited the Mountain Amateur Radio Club at Cumberland, Md., the Fri. and Sat. after Thanksgiving. PMQ is Club president. CVE says ASHC has started a drive to get messages for overseas QSP via CVE and TCRN. K4AF and K4USA will QSP APO, N. Y., and K7FBL and W6KYV will QSP via APO, S.F. 4PL-ØKA and 6KYV, with one year's operation, qualified for TCRN certificates. CDQ met ZL2RC and his XYL on their recent visit to D.C. PXM is at Lackland AFB, San Antonio, Tex. The Washington, D.C. TVI Committee had a big turnout for the auction night at American Legion Hall, Greenbelt, Md. The WRC voted to change meeting nights to the 1st and 3rd Fri. of each month. CDQ showed color slides of her European trip at the Oct. 24th meeting of the WRC. MCG will operate K5WSP while in New Mexico. ESARC, now affiliated with ARRL, held its Nov. 27th meeting at Midway Restaurant, Denton, Md. BSV will be on the air soon with new antennas from new location. SBR had beam trouble during the recent storms. FEG and LUV are burning the roads and the air with their new mobiles. PVO has a new Viking. MCG helped MFJ raise a new 40-foot tower before leaving for the Land of Enchantment. John Dixon, Bendix engineer, gave an interesting talk and demonstration of the manufacture of quartz crystals at the CARC Nov. 23rd. NPQ skeds 1AFB every night. 1BUC is in a Washington Hospital but is coming along OK now. WAF now is General Class. WV skeds his jr. operator, PZW, at 5RVI weekly. There is a good bit of activity in Frederick County on 2 meters. JZY, in Washington County, reports working VE1QZ, Dartmouth, Nova Scotia, on 2 meters with only 15 watts input. JE was made an honorary member of the Camp Gordon Radio Club while in Georgia visiting his jr. operator. MKM spoke at the Dec. 7th meeting of BARC. On Nov. 20th ZL2RC spoke on hams in ZL-Land and showed 35-mm. color slides and 16-mm. movies of ham activities. Traffic: (Nov.) W3USA 418, CVE 361, COK 96, CQS 46, JE 36, NPQ 17, WV 11, MCG 10, JZY 9, HKS 6, OYX 3, QCB 3. (Oct.) W3COK 98, MCG 55, JE 40, NOE 4.

SOUTHERN NEW JERSEY — SCM, Herbert C. Brooks, K2BG — SEC: UCV. PAM: ZI. ZVW, in addition to his many traffic net activities, now is operating 75- and 80-meter mobile. EWN is receiving 420-Mc. TV signals from GZ. Sam also is building a 420-Mc. final which he hopes to have perking soon. BAY has a new beam on 2 meters which is working out FB for Ed. ZI can be heard around 3505 kc. putting a potent signal on the air with that new rig. QOK now is CCO and is on 20 meters. ZQ, on 75-meter 'phone, is being heard in far-off places. K2DZL now is the proud owner of a bandswitching rig on 80 through 10 meters. RLY has been heard modulating that QRP rig on 75-meter 'phone. ASQ recently returned from a swell vacation in Florida. Let's all be prepared by knowing the emergency nets and their frequencies that are operating in our areas so that we can better serve our local community if needed. Traffic: W2RG 150, ZVW 54, K2BG 42, W2ZI 7, HAZ 4.

WESTERN NEW YORK — SCM, Edward G. Graf, W2SJV — Asst. SCM, Jeanne Walker, 2BTB. SEC: UTH/FRL. RM: RUF. PAM: GSS. The NYS meets on 3615 kc. at 7 P.M., 3980 kc. at 6 P.M.; NYSS on 3595 kc. at 8 P.M.; NYS C.D. on 3509.5 and 3993 kc. at 9 A.M. Sun. Two brothers of BUI recently received tickets, K2GCR and a W1 in New Hampshire. EMW has 185 countries confirmed out of 198 worked. ABT/8 sends 73 to NYS and TCPN from new QTH in Ohio. K2ACA is very active in traffic, e.d., and AREC, using TR-75 with AM40 modulator, Meissner 150B, S40-B, and 129-X. VDF had a meeting with Asst. EC K2CKM with LAZ present. K2BKM and his son, KN2EBB, have a contest to see who can get the most QSOs. RX addressed the KBT on Micro Waves and Klystrons. On another evening KBT took a trip through a New York telephone station. K2AHH transmits Official Bulletins on 160 meters at 8 P.M. Mon., Wed., and Fri. QNA returned from Florida and immediately was sent to Northern Alberta, Canada, by his firm. K2DYB reports the Northeast Traffic Net operates on 3746 kc. each afternoon at 3:45 P.M. and invites all to QNI to give better daytime traffic coverage. NAT is using a Heathkit transmitter on 80-meter c.w. RUF requests that if the regularly-assigned NCS of your net does not show up, New Managers would appreciate anyone on the frequency taking over just as you would in an emergency. DVE is back on the air after being confined to the hospital. UTH has TV camera and transmitter per November *QST*. YZD has resigned as prexy of RAWNY. The Oswego County 2-meter net is all vertically polarized. A wonderful time was had by the ladies who attended the LA RARA dinner held at the Cresent Beach Hotel. The Finger Lakes Net has an average attendance of 17 stations. The RARA DX Assn. got the low-down on DX antennas, "How to Make Em" by FBA; DX QSLs, "How to Land 'Em" by SAW, and DX operating, "How to Hook 'Em" by ICE. NYS Radio Officer BGO held a meeting in Olean with Area 10A Radio Officers. Present were OZR, ROL,

PBC, SBK, SB, VEP, FWQ, DUC, TPN, SRB, PTC, OKY, LYF, KN2AZU, and BWL. An unauthorized station uses a DX call to raise a station and then signs BMK's call. The FCC has been notified. Traffic: (Nov.) W2BTB 7823, ZOL 524, RUF 512, BNC 122, OE 67, JMT 52, KEL 49, ZRC 43, IPC 40, WER 38, EMW 36, K2ACA 32, W2DSS 31, SJV 27, K2BZC 27, W2COU 24, HKA 19, K2DG 12, W2OZR 12, K2BUI 10, W2FGL 9, DVE 7, ZHU 5, K2CUQ 3, W2RQF 2. (Oct.) W2BTB 829, ZOL 297, K2DYB 13, W2QHH 8, K2AHH 2. (Sept.) W2BTB 4197, ZOL 213.

WESTERN PENNSYLVANIA — SCM, R. M. Heck, W3NCD — SEC: CA. RMs: NUG, GEG, UHN. PAMs: AER, LXE. W. Pa. traffic net meets on 3585 kc. at 7:00 P.M. From the *Washington County Amateur Radio Club Bulletin*, courtesy IDO: The Washington County Net meets every Sun. at 2000 EST on 3700 kc. The club has made application for ARRL membership. NRE is reported on 75-meter 'phone. WN3VNO is on 3730 kc. looking for QSOs. The Club meets in the West Penn. Building. The Bucktail Amateur Radio Club of Emporium reports that its club transmitter has been ordered, the antennas are up, and the application for a club license has been sent in. WNs VEE and WII are active on 80 meters. KUN made WAC in 3½ hours during the recent contest, and is handling traffic and participating in contests. RVS is in c.d. work. IIX is working in contests on 80-meter c.w. and 40-meter 'phone. His XYL, TYC, has completed a Heathkit transmitter and worked 24 states with it on 40- and 80-meter c.w. She is active in the YLRL 'phone nets. The Radio Association of Erie is doing a good job in c.d. Participating in the c.d. drill at Northeast were NXK, MED, STK, PSI, and QPP. The Old Timers Night sponsored by the club was well attended, with Wendell King (1916) as the oldest licensee and QN (1919) next. The Club purchased a truck to tow its communications trailer and plans to install emergency generators in it. An emergency communications demonstration for the Harborcreek PTA proved the amateurs' ability to get through despite trouble. The rig set up refused to put a signal into Erie and a mobile at the scene wouldn't work but traffic went through by relay from a mobile on the way to the meeting. Area amateurs are saddened by news of the death of KQB, who was active in the RAE Club. UVD says the Greensburg High School Amateur Radio Club has the call WZG, with TFI in charge. The Steel City Amateur Radio Club reports fine work in emergency communications during a brush fire, handling traffic for the fire companies and county and township officials until the fire was brought under control. Traffic: W3WIQ 742, QPQ 356, UHN 41, KUN 24, NCD 19, AER 10, SIJ 9, LXE 5.

CENTRAL DIVISION

ILLINOIS — SCM, George T. Schreiber, W9YIX — Section Nets: IEN ('phone) 3940 kc.; ILN (c.w.) 3515 kc. SEC: HOA. Asst. SEC: HPG. PAM: UQT. RM: BUK. Midwestern hams are trying for the certificate awarded by LARK for ten contacts with members of the YLs' group. There are about twenty of the certificates out. CHB, who so long sparked daytime activity on 10 meters, has switched to 40-meter 'phone but he visits 10 once in a while. HZG recently put in two weeks active duty as a major in the signal office at Fifth Army. CEE got 2nd-class commercial radiotelephone and radiotelegraph tickets. The Watch Dog Net (2 meters) is doing a fine job providing outlets for ILN and IEN. The Net is seeking listing with other ARRL traffic groups. VER, sister of LGR, is a new c.w. net member. NIU renewed his ORS appointment right on time. Why not send in your certificates for endorsement? AND enjoyed a Mexican holiday. HUX has replaced his 40-meter doublet that was taken down by high winds. HPJ makes his living at two radio jobs and then hams mobile in his spare time. SKR has an indoor antenna "8 feet off the sidewalk but works 20 and sometimes 40." MRK has three receivers and two transmitters in his car. Being a TV newsreel cameraman he monitors Chicago police calls, a private radio system and, of course, 10 meters. He talks back on two channels, HPG, Asst. EC, monitors 29,640 kc. nightly from his home. He's mobile on 147.5 Mc. The downstate gang is beating the gong for new legislation reviving the ham license bill. The Chicago group should get together with them. KJ has had little time for hamming. UZ says dust is gathering on his bug because of his activity on 40-meter 'phone. BUK has his 813 going at last. LRV switches from landline Morse to radio without skipping a dot. DO and RLX enjoy traffic-handling on ILN, FRP on IEN. An OT certificate was received by 6CIW/9, who obtained that call 25 years ago while at the University of California. He carries the call with him wherever he goes as a Naval commander. TXC works as a civilian radio operator for the Fifth Army and after hours hams for recreation. No violations were found in many hours of OO work by WAX. Perhaps we are all getting better. NN sponsored a meeting of the Midwestern DX Century Club in Chicago. There were 20 certificate-holders present. OR put in his operating time at DUA, the Red Cross, in Evanston. If you chaps would like to see more Illinois news in this column, send your activity on a post card before the 5th of the month. We will try to give you a mention. Thanks. Traffic: K6FCA 307, W9CSW 280, OKQ 150, YIX 120, W6CIW/9 62, W9CEE 60, VIT 60, BUK 36, SME 34, FRP 31, LMC 25, USI 12.

INDIANA — SCM, George H. Graue, W9BKJ — The LO family for the state remains the same. DGA is a recent addition to the family as Assistant Director. IFN, 3910 kc., now meets daily except Sat. at 0009. UCT is Net Mgr. and NCS. Evening Net sessions are the same as before. The FWRC mobile group furnished communication for the Armistice Day Parade. LZI attended the RACES meet at Chicago Nov. 23rd. This tri-state meeting was called by F.C.C., Chicago office. TARS, the Evansville club had a booth at the hobby show. FJI is TVling his rig. DGA arranged for a showing of the ARRL film on TVI. NTR has a 1200-ft. sky wire. BBW and BNL are new Novices in Evansville. DRJ reports the 160-meter net is now in full swing. VNE graduated from the Novice Class. New WNs in South Bend are ASB, WAU, YXX, and YVR. GUX has an 813 final. MIF has a Collins PTO 70-E-8. DWF is consultant on 160-meter mobile antennas. PQA has a new Viking. ZQP is a new WN in Fort Wayne. HLY has gone 3.9-Mc. mobile. KXB will be heard from a new QTH. RWN increased power to 750 watts with 813 in the final. BAV is a new Novice at Gary. CWB has established a trading post for used ham gear. RWN is collecting old tubes for club display. CAEN established a local c.d. demonstration on 160 meters with 25 stations participating. C.d. officials as well as police, fire, etc., witnessed the demonstration. NTA reports the IFN total traffic for November is 141. DUY has left b.c. station WGL and is part owner and manager of WATG, Ashland, Ohio. PHP is chief engineer at WGL now. QYQ made 105 contacts on 'phone in the SS Contest. DKR is rebuilding the modulator. IFX is back from the Navy; his new rig will be s.s.b. The DARA code class passed 12 in the test. ARH has a new antenna. NZZ Arctic QTC continues very good. TT, JUJ, NZZ, and SWM made BPL this month. Traffic: W9JUJ 2306, NZZ 1033, TT 525, SWM 513, YWE 402, JBQ 179, UQP 176, ERB 102, TG 90, FCN 81, NTA 80, FYM 78, QYQ 62, VNV 48, CMT 34, DOK 17, NTR 9, YVS 6, GUX 5, HLY 4, BDP 3, DGA 3, VNE 2.

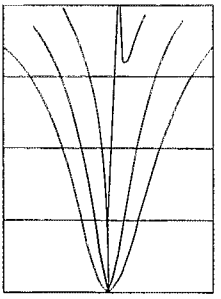
WISCONSIN — SCM, Reno W. Goetsch, W9RQM — SEC: OVO, PAM: ESJ. RMs: MQV, UNJ. Nets: WIN 3625 kc. 6:45 P.M. daily; BEN 3950 kc. 6 P.M. daily. State mobile and c.d. frequency: 29,620 kc. Net certificates (BEN) have been issued to LSK, LVB, and PD. VBZ was active in the SS, CD Party, and W/VE Contest. SAA is using a new antenna with quarter-wave counterpoise. UNJ received 35-w.p.m. Code Proficiency certificate. QCH has been active on WIN. PIE is experimenting with antennas. A v.h.f. net is being organized in the southern part of the section. UNJ worked EA1AB with QRP. VKR blew out his modulation transformer. NJB has 813 final with provision for driving 304TL kw. final. NLE now has p.p. 715B final with 811A modulator for a half gallon. OMM and SZR are proud owners of new Viking II transmitters. TPY is putting up antennas at new QTH. GTJ is rebuilding modulator and soon will be on with full kw. JHI is keeping us informed on activities in the Beaver Dam Area. WN9BJC is new at Black River Falls. GIL, FDX, and KXK attended the DXCC meeting for W9 members at Chicago Dec. 5th. FDX changed QTHs and had to take down all antennas, and now has only 20 watts and 40-meter antenna. OOF has a new 75-meter loading coil designed by THH. The MAREC provided communication at a recent demonstration by the USNR of Jet Precision Formation Flying with MER, RXS, RZV, and SKF participating. JLR is active on 7 Mc. The State Office of Civil Defense has issued to all ECs a copy of the Procedure and Training Manual for stations in RACES. New appointments: VBZ as ORS, RTP and LSK as OBS, BCC and AXS as EC. New officers of the N.E.W. V.H.F. Club are TKZ, pres.; YNX, vice-pres.; ZIX, secy.; and ZJA, sgt. at arms. TKS is completing 2-meter converter. GFL observed his 25th anniversary as a ham and MMO baked a cake to mark the event. VGL completed 2-meter converter a la *Handbook*. IMQ will be on 2 meters as soon as he gets up a tower for his 32-element beam. LEE says his new crystal diode noise generator works FB. Congrats to OVO and XYL on the arrival of a new jr. operator, a YL. Traffic: W9VBZ 521, SAA 228, MQV 220, ESJ 207, LSK 144, CXY 128, UNJ 121, RTP 74, GMY 58, IQW 24, KWJ 16, VKR 15, NAJ 11, RQM 10, WWJ 6.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, J. W. Sikorski, WØRRN — Asst. SCMs: Earl Shirley, ØYQR; Martha Shirley, ØZWL. SEC: GCP. RM: OLB. PAMs: NJQ, UVL. GCP, PHR, RRN, OOL, OOZ, SMV, LWW, and 7MCX/Ø attended a meeting of the Prairie Dog ARC, Vermillion, discussing AREC and RACES. GCP has signed up three ECs — EXX, Hutchinson County; NJQ, Brookings County; and BNA, Redfield and Spink County. SMV has a new HQ-129X, a birthday and Christmas present. It's a new YL jr. operator for KYZ. The Prairie Dog ARC and Sioux Falls ARC held successful auctions during the month. The BHA Net is shifting from 3885 to 3735 kc. to accommodate Novices and c.w. operation. The QTH of Bob Mitchell, formerly of KØFCR, is 485th Comm. Sqdn., APO 241, c/o Postmaster, New York, N. Y. KØFCR is getting a new operating position, including RTTY. QPC was put off the air by a hit-and-run driver who tore down one of his antenna masts. QEK's final now has a pair of 4E27s,

(*Continued on page 66*)

{Number two hundred thirty-eight of a series}



THE ADDITION of the crystal filter to the amateur communication receiver many years ago represented one of the major advantages in receiver design. After many years of use it still appears as the best method of dealing with phone interference. True, our crystal filters have been improved over the years and now receive better backing from the IF selectivity, in addition to becoming more flexible. However, the principle is still the same. In the hands of an experienced operator it is often possible to accomplish much more with a crystal filter than with receivers of the selectable-sideband type when copying AM signals through heavy interference.

In spite of the many years that the crystal filter has been incorporated in the more expensive receivers, it is a well known fact that but a small percentage of operators can really get the most out of this device. Therefore, many are looking for new and better methods of obtaining increased selectivity when they have terrific selectivity in the "palms of their hands."

Two conditions must be satisfied to get maximum performance. The crystal filter and IF alignment must be correct so that maximum response through the crystal filter coincides with the center of the IF channel, and the operator must be thoroughly familiar with the filter operation.

For CW use, it is important that the beat oscillator be set 500 to 1000 cycles higher or lower than the crystal frequency. This can be set in advance by tuning a steady signal to produce maximum S meter reading with the crystal filter set for the sharp position and with the phasing control at center, switching to CW operation and setting the CW oscillator for the desired beat note with the RF gain retarded as necessary. It is important that the receiver tuning is not moved during this adjustment. When signals are tuned in they will now have a marked peak at the crystal frequency and the phasing control can now be used for rejection of interference. Since operation may require phasing close to the crystal peak for rejection of signals in close, slight retuning of the receiver tuning dial may be necessary to keep the signal on the crystal peak. Actually, if the signal is on the crystal peak it cannot be phased out with the phasing control. It may appear to do this only because the notch can be brought in close to the crystal frequency.

Phone operation requires no preliminary set-up procedure but does require some familiarity with the objective if maximum results are to be obtained. The objective is to insure that the carrier of the desired signal is the strongest signal reaching the second detector in the receiver (as evidenced by being the signal that controls the reading of the meter), and to aid in rejecting heterodyne interference. If an undesired signal carrier stronger than the desired carrier reaches the detector, the desired sidebands get detected against the undesired carrier producing monkey chatter. Enough selectivity must be used to have the S meter actuated by the desired signal. Slight tuning of the dial will indicate on the S meter just how high above the QRM level the desired signal really is. The phasing notch can be used to reject the undesired carrier where only one interfering signal is present. When the interference is extremely heavy, it is desirable to adjust the phasing control for maximum readability, checking tuning and selectivity to make the desired carrier strongest at the detector. It is good practice to operate with the crystal filter in the circuit at all times in crowded bands to eliminate any fumbling when a strong signal appears. As the interference becomes worse, the filter can be adjusted for greater selectivity.

Selectivity obtained early in the receiver is much more valuable than that obtained later on, due to the absence of overload and cross modulation. Audio Filters for CW use, while extremely helpful, do suffer from two major disadvantages. First, the receiver must pass to the audio desired and undesired signals without overload for signal selection at this point; and second, unless the IF system is already sharp enough to prevent it, each signal received will deliver the correct audio frequency at two points. Thus, the interference possibility is double that obtained with crystal filter or IF selectivity.

By now, the question must have been asked, "Is it worth all this effort?" A quick check on 20 or 75 will indicate that many think so. Perhaps some of the above techniques accounted for someone else's reading a station when you lost contact — try this on either the NC-183D or the HRO-60. ED HARRINGTON, W1JEL

and works 160 meters exclusively. OJQ, QEK, WNØPTN, DSE, QPC, QAP, and 3NMO/Ø are building 2-meter gear. Traffic: KØFCR 723, WØOLB 177, OJQ 120, NEO 55, QPC 48, PHR 38, SMV 21, ZWL 17, DSE 9.

MINNESOTA — SCM, Charles M. Bove, WØMXC — Asst. SCM: Vince Smythe, ØGGQ. SEC: ZDU. RMs: OMC and DQL. PAMs: JIE and UCV. KJZ is secretary of the St. Paul Radio Club, Inc. DL4AY, now back in the States, has reënlisted in the Army and is located at Offutt Air Base in Nebraska. Art is operating the base station, KØAIR. He is having trouble getting his old call, DSF, back and has temporarily been assigned the call RHL. He plans on having a pair of 4-250s of his own on the air soon. PSD is EC for Grant County. IXR was confined in the hospital for a couple of weeks. FTY, HFY, KJZ, DQL, and TKX visited OMC at Hutchinson. OMC is doing a swell job with the MDN and would like to see more of you check into the MSN and the MJN. The Minneapolis Radio Club has purchased a Televar transmitter for emergency use. The St. Paul Mobile Corps control station, REA, soon will be tied in with RACES. According to CQY, REA will be operating on 3725 kc. with a local net. All hearing them are asked to report in. RQJ is back on the air. HFY is going on 75-meter 'phone. Let's all join the Emergency Corps. Write your SEC, Bob Coons, WØZDU, 15 South 5th Street, c/o Northern States Power, Minneapolis, Minn. The Minn. State Noon 'Phone Net elected UCV as Net Control and HUX, HMV, KFN, and KLG as Alternates. The evening 'phone net elected JIE as Net Control with AGD, NPP, and SYN as alternates. Traffic: WØKFN 151, UCV 115, DQL 112, KJZ 76, SWB 68, KLG 54, BWM 52, TKX 51, MXC 38, HUX 37, JDO 36, K6EA 31, WØBZG 29, IRJ 26, KNR 26, HMV 24, DYD 20, GTX 20, BUO 18, AGD 17, GGQ 16, OPA 15, TJA 15, IKJ 14, EMH 12, ECR 8, HAH 7, FFU 6, LUX 6, YUN 6, FUX 5, HBE 5, FIT 4, JNC 3, KXZ 3, LIG 2.

DELTA DIVISION

ARKANSAS — SCM, Fred Ward, W5LUX — Reports this month were pretty slim, so this column will be likewise. CAJ is a new call at Danville. MSH has been appointed manager of the Fifth Regional Net, and he needs operators to represent Arkansas. He says there's plenty of traffic for Arkansas but few stations to take it. OEF also needs help with the Ozark Net, so you traffic handlers have work waiting for you. The Little Rock Central High School Amateur Radio Club now has ten members. The Club's station call is KFS and the rig is on 80, 40, and 20 meters with an 807 final. VYP is president of the club. Traffic: W5MSH 159.

LOUISIANA — SCM, Robert E. Barr, W5GHF — TRQ is meeting the Crawfish Net Sun. mornings again and reports progress in clearing up his TVI. The newest club in the State is the Istrouma Radio Club in Baton Rouge, with 15 charter members. The Baton Rouge Club and the Istrouma Club are meeting jointly in planning for emergency set-ups. DHE recently was reappointed as EC for Baton Rouge. The Greater New Orleans Club reports that the recent Delta Division Convention in New Orleans was successful financially as well as in all other ways. ZNI now is corresponding secretary of the G.N.O. Radio Club. Louisiana hams were quite busy helping the Mississippi boys after the Vicksburg tornado, and also were QRL with smaller twisters the same night at several points in Louisiana. IUG, the SEC, is inquiring if you are interested in taking part in the state emergency corps. On Nov. 15th ACE, Shreveport, worked 9VUC, ex-5ACE, now at Indianapolis, Md., who sent him one of his old QSLs! Traffic: W5NG 363, TRQ 4.

TENNESSEE — SCM, Mark M. Bowelle, W4CXY/WLG — SEC: NJE. RM: SCF. PAM: QT. The section 'phone net is on 3980 kc., the c.w. net on 3635 kc. At this writing we do not have a report on the tornado emergency work of December 5–6 and cannot say to what extent the gang helped in the Vicksburg disaster, but we will wager that they were in there when and if needed. AGC sent an alert on the c.w. net some hours before the tornado hit Mississippi and most of the c.w. net was QRX until after midnight, when it was obvious that the danger had passed for Tennessee. The gang turned out in great numbers for the SS Contest and some mighty nice scores were recorded. The Memphis Club has elected new officers, with YMB the president, and continues very active with its emergency work. HHK is running some very extensive 2-meter tests with W2UK. Traffic: W4YIP 1565, OGG 260, OEX 196, SCF 90, TYU 90, UWA 61, PFP 39, WGJ 29, IIB 28, SUH 19, ZJY 18, DTI 11, WQW 9, PVD 8, RHO 8, RMJ 6, RET 5, HIH 4.

GREAT LAKES DIVISION

KENTUCKY—SCM, Ivan C. Kelly, W4TUT — New AREC member in northern Kentucky, WN4AVM, is awaiting General Class license. SXP is new Asst. SCM for Kentucky. The Owensboro Radio Club has requested affiliation with ARRL. YYI is its prexy. Membership now is at 33. JHU is assembling a Viking II. WXL has 100 watts to a BC-457. ZLK is a new ORS and has 20 w.p.m. CP endorse-

(Continued on page 68)

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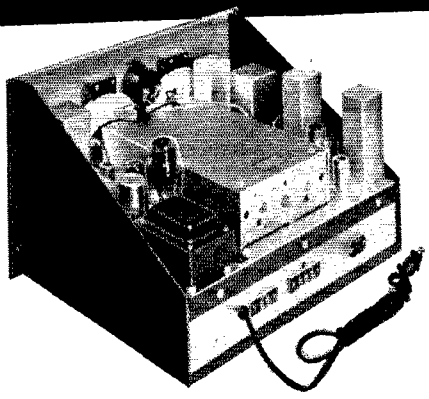

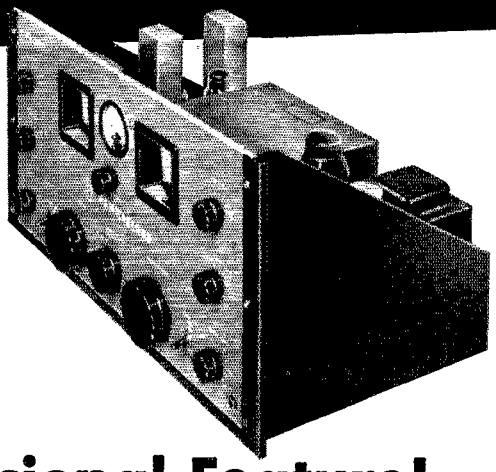

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The Hammarlund rack-mounting assembly is a heavy #16 gauge, steel frame designed for placement around an HQ-140-X chassis to make possible its rigid mounting in a standard 19-inch rack.

As a result of this assembly, new versatility is given to the well-known HQ-140-X communications receiver, making it even more adaptable for use in both amateur and commercial installations where it is desirable to mount it in a standard rack with other equipment. This rack-mounting assembly is available either for addition to an HQ-140-X receiver chassis taken out of its cabinet, or may be provided already mounted on a new HQ-140-X without cabinet.

The assembly includes a front-panel border trim to cover the standard cabinet mounting holes and the rack-mounting screws. It is finished in dark grey Hammertone to match the light gray front panel of the HQ-140-X.

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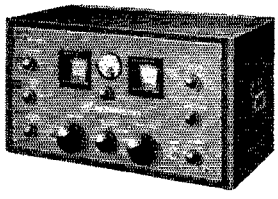

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ment. JUI now is able to frequency check 1 part per million. L. G. McCoy, IICP, of ARRL, gave Kentucky hams the "mcoy" on TVI. PXX is giving up his RM appointment because of lack of time. RHZ is the new RM. KMX, MOP, CNE, KKG, and BZS worked on a 4-hop microwave football telecast job. BAZ is starting a slow-speed code class. WNH has emergency power. BRY now is an AREC member. QJU is setting up new mobile antennas. KZF's cold in his nose held back his SS score. URF soon will be operating from W8-Land. WHC missed BPL for the first time this year, reason — on a paratroop assignment. ANQ/4 worked 73 sections in the SS. KVX, EPA, JBQ, FU, UTO, OMW, and KZF were plenty active in the SS. WN4CSW is a new AREC member and is mobile on 2 meters. Traffic: (Nov.) K4WBG 222, W4BAZ 171, SBI 60, ZLK 58, SMU 36, WXL 25, WNH 14, QJU 13, TFK 10, JUI 4, BRY 2, KZF 1, SZL 1. (Oct.) W4TAV 516.

MICHIGAN — SCM, Fabian T. McAllister, W8HKT — Asst. SCMs: Joseph Beljan, 8SCW; Robert Cooper, 8AQA; Mickey Wills, 8CPB. SEC: GJH. In spite of the fact that the bands have been blacking out on us in early evening hours the gang has turned in a nice bunch of traffic reports for the month. That's the way we like to see it; keep it up! Attendance on the section nets is very encouraging, too. SCW needs a couple of more good operators to take TCC skeds for EAN. Please contact Joe if you can help out on this. Club activity has perked up, too, with new projects in the offing. The Genesee County boys are getting hot after low-powered 160-meter rigs, with RTN spark-plugging the project. It is a fine deal for local work, and is splendid for e.d. purposes, too. The Grand Rapids and Lansing Clubs completed their annual exchange meetings; the Lansing crowd met with Grand Rapids in November and the GR boys journeyed to Lansing in December. The Huron Valley Club, operating KGG, finished fifth in its class during Field Day. Congratulations, boys! NEJ reports thirty-five hams logged in at the Game Refuge during the summer. A W9 "came to dinner" and stayed six days! OAF is back on the nets again, until the next windstorm "lowers the boom" on his antenna. Good antennas don't stretch, Ken. FGB was heard in Dodge City, Kans., with his ten-watt 160-meter mobile during late afternoon. Can anyone top that for 160-meter mobile? SWF is having trouble with WXYZ QRMing the 75-meter 'phone band in his locality. Anyone got any ideas on this? IEA reports, "Got my feet wet in my first SS Contest — had loads of fun." UKV finally got his antenna up. Sounds better over here, Dale. QIX also considerably improved since he souped up the rig to 150 watts to an 812A. NUL keeps a rig warmed up all day at his service shop. He monitors 3930/3920 mornings and 3663 kc. afternoons. It is a good chance to clear traffic during off hours. Traffic: (Nov.) W8ZGT 1255, FLM 223, NUL 222, ILP 90, ELW 87, RTN 84, URM 77, SCW 71, NOH 62, ZLK 62, QIX 54, FX 50, IV 45, JYJ 39, SPF 32, UKV 32, SWG 28, TQP 26, HKT 17, SYQ 16, NEJ 15, CPB 10, YKC 10, FGB 9, HSG 9, AHV 8, EGI 8, WVL 8, GTM 5, MAI 4, YMO 4, SJF 3, MGQ 2. (Oct.) W8FSZ 20, FGB 15, IYO 3, OAF 3.

OHIO — SCM, John E. Siringer, W8AJW — Asst. SCMs: C. D. Hall, 8PUN ('phone); J. C. Erickson, 8DAE (c.w.); and W. B. Davis, 8JNF (adm.). SEC: UPB. PAM: PUN. RMs: DAE and PMJ. FYO received the only BPL card this month. New appointees are HQH, KXN, and WAB as ECs; DPW and LVF as OESs; and ILC as ORS. Your SCM wishes to thank those who made possible his reëlection. The total vote of 898 indicates a growing interest in League activities in this section. Congratulations to the Ohio Valley Amateur Radio Assn., Cleveland Brasspounders, and Westpark Radiops for topping their divisions in the '53 Field Day. Others who placed among the top ten in various divisions included the Tusco Radio Club, Queen City Emergency Net, Findlay Radio Club, and Westpark Radiops. We are sorry to report that WV, IUS, and ERI (ex-IPU) have joined Silent Keys. LJS, former QSL Mgr., has set up his own business in Fern Park, Fla. DG has bandswitch p.p. 813s from 75 and 160. IFX has his 304TL rig working in good order. YGR, "Lady Killer Lyon," has worked YLs in 35 states on c.w. All Geauga County amateurs are urged to join the new area club. Contact NAK in Newbury. 2ABT has moved from Buffalo to Cuyahoga Falls. According to SG, Mgr. of 8RN, the Ohio boys predominate on the net. Newly-elected SVARC (Fremont) officers are YFJ, pres.; and MVE, secy. The new secretary reports the HRN is attempting to build an 803 rig. YFJ has a new 2nd harmonic (boy), WN8MVE worked KZ5AF on 80 meters, and KVW is the newest member. The CACARC is planning a Novice/Regular Contest for amateurs of the Cleveland Area; AEU is manager. The FHARA (Hamilton) bulletin advises that DCE is on 2 meters; MDY, OFK, and MDZ seems sure bets to get their General Class tickets; and OFL passed his Tech. Class exam. HHF, secretary of the Toledo Club, states that the club awarded certificates to the winners of the recent hidden transmitter hunt. The team of VSB and JOR won on 160 meters while Fran Higgins, an SWL, won on 10! AJH, Cuyahoga County EC, reports seven municipalities had special transmitters on the air and more than fifty mobiles were active in the e.d. test of Dec. 6th. *Carascope*, of Columbus, announces the new CARA officers are YFW, pres.; WXY, vice-pres.; GIE, secy.; and APF, CPA, and DWP, directors. Other Columbus notes: ZCK worked WAC on 40 meters in a little over an hour and MSA received his General Class license. The OVARC *Ether Wares* is pounding at the lads to get in their scores. The Cincy *Mike and Key* has a nice outline of e.d. radio communications written by LKA. Dayton's *RF Carrier* informs us that KTM was the principle speaker at the Nov. 20th meeting and the Club had a Christmas Dinner at Menker's Party Hut on Dec. 19th. *Ham Flashes*, which covers Eastern Ohio, reports IRF has received his General Class license; ex-KCA now is K6CWX; Warren Radio Club officers are HOY, pres.; KPC, vice-pres.; with KCE and LCD in charge of activities; and Mahoning County e.d. drills are held Mon. at 7:00 P.M. on 29.5 Mc. with FRT as NCS. According to Springfield's *Q5* VF has installed a 45-foot pole; YAC has moved into OKB's neighborhood and RWZ has gone to push/pull 4-250As. *Shack Gossip*, out of Toledo, states that JOR is up to 600 watts, VSB's code class is up to 10 w.p.m., and OQR is on 160-meter mobile. Traffic: (Nov.) W8FYO 547, JAR 362, UPB 273, YCP 160, OUK 140, DAE 138, HNP 102, GDB 99, CTZ 80, SRF 55, DG 48, IFX 48, RO 43, BN 41, PMJ 41, NYY 31, AMH 28, LMB 28, AJW 27, IJH 27, AJH 24, HUX 21, AL 19, KIH 15, ZAU 15, KXG 14, EKA 12, YGR 11, UZJ 8, EQN 7, RN 7, BLS 6, CNI 6, QIE 6, RZ 6, DZO 5, HFE 5, WRL 5, AQ 4, BZD 4, ET 4, AYR 2, CSN 2, NQQ 2. (Oct.) W8BN 62.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Stephen J. Neason, W2ILI — SEC: RTE. RMs: TYC, KBT. PAMs: IJG, JQI. The AARA and the SARA held a joint meeting recently. Attendance was high and a very FB talk was given by A. L. Budlong, 1BUD, of ARRL. JFB is working out FB on 145 Mc. from Catskill. GDD helped organize a code class for AREC-e.d. in Portchester. K2BAR gave an excellent demonstration on selective i.f. amplifiers at the RVWARS recently. Also on the agenda was a talk by SEC RTE on AREC-e.d. and v.h.f. antennas by LDS. President VDX presided. Other officials present were FQL and ILI. LEL, our very active EC in Ulster, is organizing a radio club in Kingston. Don would be happy to hear from all who are interested. Congrats to SJV, who was reëlected SCM of Western New York. The SLRC is meeting twice per month in an effort to handle all the business and planning that is underway. OGP missed two meetings this fall, also two deer. New cars are breaking up the 29-Mc. mobile activity; SVS, OGP and YVP are ex-mobile. OKI has a 67-foot vertical for 7 Mc. John was active in the SS and still is working short skip on 21 Mc. LRW has a 522 and a double yagi working on 144 Mc. QCB has moved to Troy. WZQ is the chief operator at K2NAG. Ralph also is active on 3.8 Mc. with a new mobile rig. WSS has an FB time in the SS. Pete is very active on NYSS. K2BDJ has a new matchbox and it works FB. MRQ is mobile on 3.8 and 29 Mc. with a Lettine 240 and a tri-band converter. ANB has limited his activity to mobile and spends some time on 144 Mc. for AREC-e.d. work. K2EOQ is a new ham in Pok and is very active on the traffic nets. RTE has raised his new 32-element 144-Mc. beam from 10 to 50 feet. Traffic: (Nov.) K2NAG 105, BSD 78, W2LRW 66, GDD 53, ILI 46, EFU 45, MRQ 45, TYC 42, EQD 32, SZ 25, WSS 21, W2APH 18, K2BE 18, EOQ 18, W2KBT 12, K2BDJ 6. (Oct.) K2BE 18.

NEW YORK CITY AND LONG ISLAND — SCM, Carleton L. Coleman, W2YBT — Asst. SCM: Harry Dannals, 2TUK. SEC: ZAI. PAM: JZX. RM: VNJ. At the Mid-Island Radio Club annual election meeting the following new officers were elected: SMQ, pres.; DYP, vice-pres. (reëlected); STG, secy.; AZT, treas.; WVU, sgt. at arms; KTF and OME, trustees. TUK is /4 in Alabama during January and February. VNJ reports that the NLI c.w. net, on 3630 kc. at 7:30 P.M. Mon. through Fri., has improved in traffic and attendance but needs outlets in Suffolk. EC, after 30 years of c.w. operation, has turned to 75-meter 'phone. IIG received his OO appointment and is active in TAN. UCB, retiring president of MIRC, is moving to Minneapolis and will be a WØ. STG is very active on 2 meters with his 522. CXG is in training at a Texas Air Force Base. NTB has a new 40-meter vertical. PC is doing FB work on 'phone patch from the boys overseas. GPQ is a new 75-meter net members. VKF, Staten Island EC, reports a membership increase and flood relief work by ZNK and VKF. GGD and DJP direct the S.I. 10- and 2-meter nets on Thursdays. GXC increased power from 30 to 100 watts. GP, building a new final, reports 19,200 SS points. OPY had 31,625. KJG reports the new 20-meter antenna is doing FB DX. NJL is active in MARS and 2RN. KGN reports a score of almost 50,000 in the SS and that Brooklyn has 12 RACES stations. K2s CRH and DDU are doing FB work for the AREC. The Kings Radio Club's new president is K2BNW. The New York Radio Club held a "party night" in December and a frequency standard was given as a special prize. CMM recently gave a talk on receiver-servicing at NYRC. KGN received his WAS certificate and a CP sticker for 30 w.p.m. from Headquarters. DXN is busy with E.E. studies. KAY transferred to Landstuhl, near Heidelberg. K2AVB is working on a new 420-Mc. rig. CLG visited VE3EU and NM. OMG is active in NLI and 2RN. SNA now is on 7 Mc. IN is getting an s.s.b.

(Continued on page 70)

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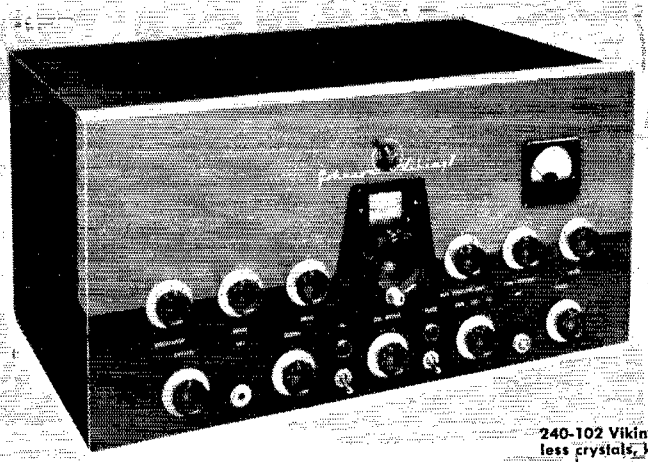

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exciter and expects more activity on 144 Mc. with the new net operating Tues., Thurs., and Sun. IAG reports there are 18 active mobiles in Queens on 10 meters. FKR has been appointed NCS for 10-meter AREC in Queens and MES/mobile is Asst. NCS. FI reports that 25 RACES operator licenses have been issued and plans for speeding the processing are in progress. During the Nov. 7th storm four members operated at Nassau County Control with 5 fixed and 23 mobiles taking part in the emergency. OG reports 20 stations were activated during the same period and mobiles toured all danger spots. JZX reports the 3943-kc. net is slow but traffic is picking up on 146.25 Mc. KEB had a good traffic total because of operation in the 2RN and "Holiday" Net. KFV reported traffic and work in both the 75- and 2-meter nets. OME received appointment as EC for AREC 2 in Nassau. KNA reports there are 140 AREC members in Suffolk. The Amateur Radio Society of Queens meets at the QTH of K2EOW, secy.-treas. The Society's president is FJF. At the December meeting FPS gave a lecture on a.m. and f.m. IVU reports traffic slow with only 10 watts and crystals. Wonder what he would do with a gallon and VFO. Traffic: W2JOA 296, IVU 246, NJL 246, JZX 184, VNJ 184, KEB 158, EC 147, GP 91, KFV 91, OMG 71, IVS 70, KJG 64, GXC 42, TUK 32, CLG 19, IIG 8, IAG 7, PF 6, IN 4, NTB 2.

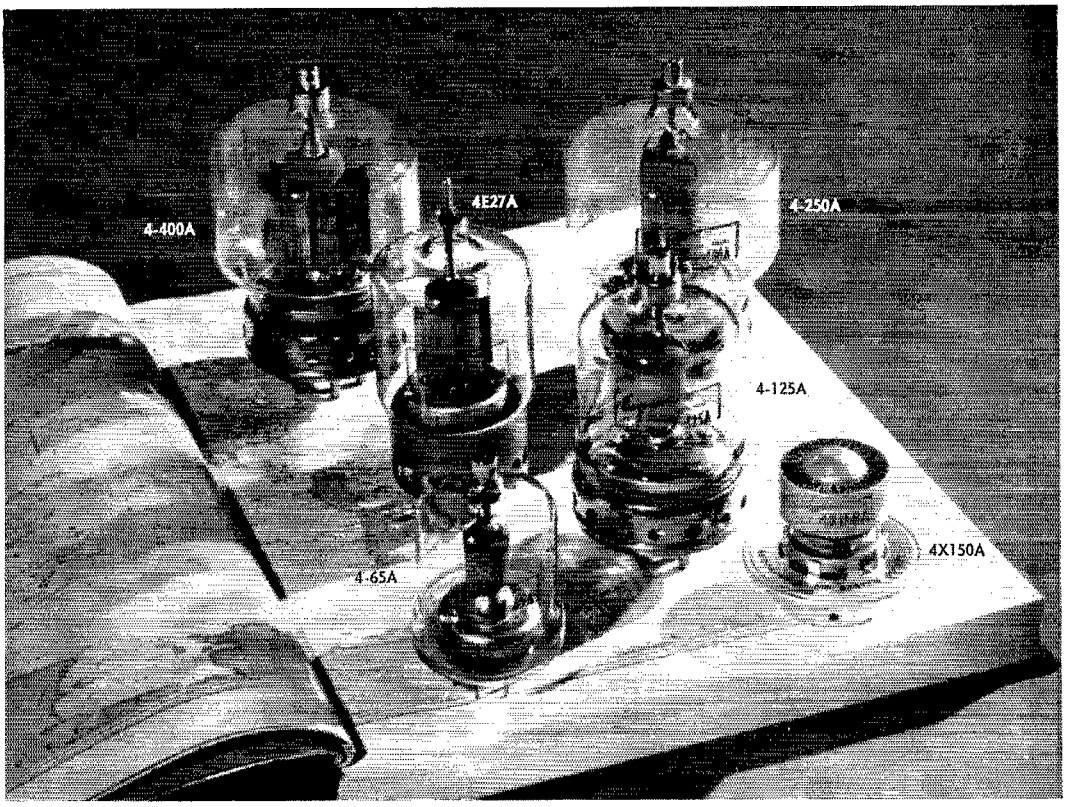
NORTHERN NEW JERSEY — SCM, Lloyd H. Manamon, W2VQR — SEC: NKD, PAM: CCS. RMs: NKD, CGG, WCL. VAV's new QTH is Kirkwood, Mo., and the new call is ØRFV. The Passaic Valley RC meets in the Paterson City Hall Annex on the 2nd and 4th Tue. of each month. New officers elected at the last meeting are K2CMB, pres.; W2FPM, vice-pres.; NPT, corr. secy.; KN2DFB, rec. secy.; and KN2CYZ, treas. SHC is forming a new club in the Pompton Lakes Area. Any and all who are interested should contact SHC as to meeting dates, etc. The address is 151 Whitney Ave., Pompton Lakes. NIY has received DXCC certificate. K2CZY passed his General Class exam and dropped the "N." KN2DPO is active on 3.7 Mc. in Bogota. VYB is home on military leave. The RVRC club house has been refurbished inside and out, but it isn't nearly large enough to hold all the hams who visit. However, all are welcome. NQA, in the process of moving to the new QTH, discovered things in the junk-box he never knew existed, including a collection of 201As. KN2CAR is making plans to photograph all RVRC members in an effort to raise funds for additional club gear. HJD heads up RVRC code classes for Novices. CUI is reported on the mend after a prolonged illness. K2BCK is back on the air after the summer layoff and reports a score of 22,050 in the SS. A letter has been received from TWN, in Nome, Alaska. He has 600 watts on 20-meter 'phone and c.w. and is looking for contacts in Northern New Jersey. The present call is W2TWN/KL7. Keep a watch out for Bob, fellows, he will appreciate it. BVS has a new 175-watt rig on the air. He reports that during the past year 30 call books were gathered by him and mailed to foreign hams. YVQ is back on the air after a brief layoff. He s busy building 220-Mc. gear. This will be his first crack at 'phone work after many years as a c.w. man. CFB is busy licking the TVI problem. OUS, one of our old-old-timers, was the first in the State to receive a RACES suballocated license. K2DHE spent the Christmas holiday in Cleveland at the old home QTH. K2EBL is about ready for 420 Mc. with 200 watts. K2DHE is a new OO. Being an s.s.b. man he will concentrate on s.s.b. observations. K2DQO has a new layout at his new station. Besides rebuilding the shack he has added a new 75A-3 receiver. Traffic: K2BWP 100, W2EAS 98, DXD 96, ZDH 19, FPM 13, HIA 6, CJX 4, COT 2.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, WØPP — QVA reports that NAY, NWF, and ZAM have all rejoined TLCN for the new season. New members of TLCN are LJW and KØFCR at the Rapid City AFB in South Dakota. BDR now keeps TCC skeds between CAN and PAN on Thursday nights with 6EDF. The USNR Training Center in Burlington has been assigned the new amateur call, KØNBW, and expects to have a rig on the ham bands soon. A new Novice at Mt. Pleasant is WNØQQA. GQI, of Burlington, was married on Dec. 1st and has moved to Milwaukee. WNØPPQ hopes to get his General Class license soon and is getting in there for emergencies by filing application for AREC. Good going, OM. YTA says winter weather is hard on the mobile battery. ERP reports his first contact on the new 20-meter beam was with a ZL for one solid hour. OZO is about ready to hit the nets with his new 813s. PEZ is a new ham in Waterloo. Russ and Doc still are on top making BPL. Traffic: (Nov.) WØBDR 1066, SCA 983, CZ 225, OZO 125, QVA 87, YTA 81, PZO 67, BBZ 45, ERP 44, BLH 42, GSH 38, GXH 33, NYX 4. (Oct.) WØPZO 67.

KANSAS — SCM, Earl N. Johnston, WØICV — SEC: PAH. RM: KXL. PAM: FNS. New officers of the Field McKindley High School Radio Club of Coffeyville are WNØROV, pres.; ROP, vice-pres.; RPC, secy. New calls received by club members are WNØRPJ, RPG, ROX, ROP, RPP, ROU, RPC, RPO, RPF, ROO, RPL, RON, ROM, RPB, RPH, and RPM. The school club station operates all bands with a Viking I and an HRO. MIR is attending col-

(*Continued on page 72*)



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4-125A	144mc	3.3w	2.5w	380w	500w
4-250A	50mc	3.2w	2.6w	675w	1000w
4-400A	50mc	3.5w	6.1w	825w	1000w
4X150A	420mc	2.0w	1.2w	200w	250w
4E27A	144mc	2.0w	1.6w	380w	500w
		Suppressor Grid Modulated			
4E27A	144mc	1.2w		180w	

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lege in Oklahoma. MIO and MIR are at Coffeyville, and MIP, FTB, FTC, FTY, FTZ, and HYW at K.U. FUF and FWS are in the Marine Corps. Members of the KVRC of Topeka, headed by BD, set up NBM's station at St. Vincent Orphanage for the kids to talk to Santa Claus's mobile (JLY with KXB at the mike) while driving through Topeka. The club raised $100 to furnish many of the presents the kids asked for. IMH installed a composite 8-tube transmitter-receiver in his AerCoupe and worked Topeka stations solid on 3920 kc. with 1-watt input en route to Manhattan and back Dec. 6th. EOT, a new ORS, has a perfect record QNI into Kansas QKS C.W. Net. He holds skeds with a portable 10-watter while at Manhattan. GCH has worked 39 states with his 10-watter that works 80, 40, and 20 meters. He also holds RCC and 20-w.p.m. Code Proficiency certificates. Traffic: WØBLI 271, NIY 205, OHJ 186, YOS 44, FEO 36, DEL 31, HS 30, BET 28, QQQ 27, EOT 21, ICV 14, FDJ 12, VBQ 12, YFE 12, FSE 11, FHC 10, LIX 9, GCH 5, KSY 5, CET 4.

MISSOURI — SCM, Clarence L. Arundale, WØGBJ — SEC: VRF. PAM AZL and BVL. RMs: OUD and QXO. The Missouri traffic nets have experienced considerable difficulty in net operations as a result of skip and unfavorable conditions. BVL reports the EBN had a record traffic month with a total of 902 messages handled. GAR has added a new schedule. JEJ's traffic inactivity is caused mainly by his duties as Director of Communications for the Missouri wing of the CAP. PWO has advanced from Novice to General Class and has an 807 final on the air. MEN has arranged for MFB, BUL, and ZBR to act as NC during the temporary absence of AZL. Each will choose an alternate for his night to act in the absence from the net. IYJ moved from Topeka to Excelsior Springs, Mo. Ex-ØTLY is operating KA9CJ in Japan. ARH expects to have to TVI-proof his rig. OUD has moved her rig again. BZK is waiting for final confirmations for his WAS. BPL certificates go to CPI and QXO. MAF has a Collins 75A-2 and a 32V-2 on the air. New appointments: OPS to OMG, OBS to QWB, and ORS to EBE. ITQ, Net Manager of TEN, visited GBJ on a recent trip through Missouri. HUI is rebuilding his big rig. All stations handling any traffic are urged to report it to the SCM. Traffic: WØCPI 838, QXO 599, GAR 201, BVL 171, GBJ 106, CKQ 90, IJS 81, HUI 39, OUD 28, BZK 23, QWB 13, KIK 10, BUL 9, QMF 7, CXE 6, WAP 4, EBE 3, WIS 2.

NEBRASKA — SCM, Floyd B. Campbell, WØCBH — Asst. SCM/RM/NCS: Tom Boydston, ØVYX. SEC: JDJ. AIN finally is building a mobile rig. MYH, CJV, and HLN are located at Imperial. QXR, at Omaha, now is v.h.f. editor for *Ham Hum*. Send your reports of activities to Herb, QAL is located at Omaha. LFU has dropped the "N" from his call. KGA has 40 watts to a Globe Scout on 75, 40, and 20 meters. UTE is operating K5FFA on 40-meter 'phone from Alexandria, La. RDN sure would like more stations to report in to the c.w. net on 3520 kc. at 7 P.M. daily except Sat. and Sun., when the net meets at 6:45 P.M. RJA is getting more b.c. engineers at Alliance. GAS now is on the air with a Globe Champ, 140 watts. OFZ is our traffic-handler from Valentine. YQN, Scottsbluff, is back in action. CKZ has his Viking II in operation on 40-meter 'phone and has a new wire up for 75 meters. RIG has a pair of 24Gs and is using an S-20R receiver. FQB checks in to TLCN and TEN regularly. KDW is a member of the Nebraska c.w. and Nebraska 75 'phone nets. EUT has been reporting lately and checks in on the Nebraska C.W. and 'Phone Nets. All League appointees, please have your appointments renewed. Requests for AREC blanks are welcome from this office. Traffic: WØRDN 455, FQB 165, ZJF 81, EUT 52, KDW 38, KØWBF 33, WØYYX 31, EGQ 22, LRK 21, HTA 19, CBH 17, MAO 17, NAA 16, FSE 14, IBA 12, DJU 8, HXH 7, DDP 4, ERW 4, KLB 4, MJK 4, NGZ 4, QOU 4, BOQ 3, HQN 2, LGN 2, RAM 2, ORW 1.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Roger C. Amundsen, W1HYF — SEC: LKF. PAM: FOB. RM: KYQ. CN-3640, CPN-3880, CEN-29,580 kc. By the time this appears in *QST* I hope there are at least three petitions in for the election of my successor. I am sure that it is high time that our section has an election and may the best man win. Your March report will be the last from here so watch for a QNC on the nets about April 1st announcing your new SCM so that you can send April reports to him. OND is building a new home. WPR gets up early Mondays to NCS from AW in the A.M. CN. SJ had trouble when the antenna broke, URC and FRL are new OES. ODW now is OO. JW is a new EC. UNG renewed ORS appointment. WPO and YYM are sporting new 7-Mc. ground plane. RAN operated in the SS from YK. OPZ worked IIYJ mobile. I had a FB time at the Stratford Club meeting at the Singer Mfg. Co. plant in Bridgeport on Dec. 2nd. RON arranged the tour. YU renewed OBS appointment. The Shelton gang is conducting code classes with AKG, BFS, VGP, VQH, CSX, FWX, and VKU. NFG's new shack sounds FB. APA still is putting up antennas. New Novices in Stratford are ZNU, ZNA, and ZMF. YON now is General Class. An FB bulletin was received from W. Mass. For the 1953 Connecticut QSO Party, held in October as sponsored by the Connecticut

(*Continued on page 74*)

MALLORY HAM BULLETIN

MALLORY 6-Volt Battery Charger Keeps Mobile Unit on the Go

Those of us who have tried mobile operation are fully aware of the very difficult problem of how to keep the car battery charged adequately for starting purposes, and still provide plenty of juice for a reasonable amount of time on the air.

Recently, one of our good amateur friends, who is a red-hot mobile fan, told us of a method he used for keeping his battery at top performance and still add no extra equipment to his automobile. His system sounded so practical, that we'd like to pass it along.

Here is what he did. First, he visited his Mallory distributor and bought a small, inexpensive Mallory 6-volt Battery Charger (the 6SAC6 or 12SAC5 for 12-volt systems) together with a special automobile Cigarette Lighter Plug (Mallory R675) to be used for inserting the Charger output into the electrical circuit of his car. The Lighter Plug was attached to the Battery Charger and the whole business was then mounted conveniently in his garage.

After an evening of mobile operation, he simply inserted the Plug into the cigarette lighter socket, turned on the 117 VAC line, and the next morning, presto, his battery was ready for heavy starting action.

With this very convenient arrangement, this ham was able to operate his mobile rig the year 'round, with little fear of even tough wintertime starting.

Incidentally, if your car is not equipped with a cigarette lighter, don't let that handicap you, simply ask your distributor for a Mallory Dashboard Receptacle (R652) which may be clamped to the dashboard without drilling a single hole. Used in conjunction with a Cord Assembly (R670) this arrangement will provide all the convenience afforded by the lighter plug method of installation.

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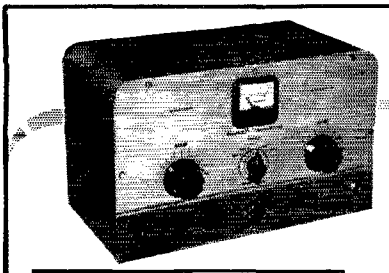
Wireless Association, VMW received 29 logs from entries in 18 town areas. Seventy town areas and 203 stations were listed therein. Highest scores: ZDP 5452, RY 3705, ODW 3200, WPO 2982, GVK 2139, and RFJ 1512; (Novice) WN1YNC 228, WN1YON 228 (a tie), and WN1YQQ 180. The CWA thanks all Connecticut amateurs who pitched in to make last October 24th-25th a most entertaining week end. Traffic: (Nov.) W1SJO 298, AW 213, KYQ 167, EFW 147, LIG 70, BDI 64, OPZ 58, YBH 54, CUH 53, RRE 51, HYF 45, WPR 43, UNG 31, BVB 30, KUO 29, FTM 28, RFJ 20, QJM 18, VOV 18, YYM 18, KV 11, EOB 8, NEK 6, SJ 5, VOS 4, RAN 1. (Oct.) W1SJO 347, KV 22, APA 11, BFS 8.

MAINE — SCM, Bernard Seamon, W1AFT — SEC: BYK. RM: OHT. PAM: BTY. The Sea Gull Net meets on 3960 kc. Mon. through Fri. at 5:30 P.M. The Pine Tree Net meets on 3596 kc. at 7 P.M. Mon. through Fri. It is with deepest regret that we record the passing of PWA. Ev was a fine man and an amateur of the highest caliber. TFY, now living in Chicago, recently was presented with twin girls. SFZ is at Great Lakes Naval Training Center. WN1YDX asks, "How do you get a Delaware Novice QSO?" The Eastern Maine Amateur Radio Club of Bangor has obtained the call QAR and has established a 250-watt station on 10 meters in memory of Ken Sumner. This station is to be used for emergency communications and public service activities. NXX now is head TV technician for G.E. distributors in Portland. DEG and FV are among the hams working at CSH-TV. TV at last has arrived in Maine and there is much work being done by the gang, both in reception and transmission. LHA is taking a cruise in southern waters aboard the Maine Maritime Academy's Training Ship. Carl will be operating a 150-watter on 75, 40, and 20 meters in addition to his duties as radio officer. You will note that we have a new Route Manager, OHT. Good luck, Andy, and the gang on the Pine Tree Net, and a deep bow to Wells Beach and John, LKP, our ex-RM. Well done, OM. Traffic: W1LKP 100, BX 44, VYA 33, BEU 21, RSC 15, TWR 14, AFT 10, UZR 3, WN1YDX 2.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — New appointments: DOF as OPS, CUC as OES, RQZ and VTT as OOs, VTT and JOJ as OBS, OUL as EC. Appointments endorsed: BL as SEC; EK Newton, CQN Norwood, MEG Framingham, MF Salem, KWD Weymouth, MD Hingham, MAN Marblehead as ECs; GDY, GOU, MEG, and QHC as OBS; GOU as OPS; MEG, NBS, and QMJ as ORS. On 10 meters: SCR, VRK, NSR, RK, RHN, RES, CF, JOM, VTH, LJH, ALK, VKL, GX, AAH, WSS, UVO, WTF, OGK, BIA, TRN, 6DGD/1, and YYZ. Mobile on 10 meters: UYK, WIY, YOR, and UCP. On 2 meters: UAR, OPI, UUQ, VKE, JXZ, SFV, WSS, YYJ, and WN1YZC. The Bedford Radio Club now is affiliated with ARRL. YFR has a Viking II and SX-24. WN1ZHW has a Lettine 240 transmitter and SW-54 on 40 meters. BGW is working RTTY on 3620 kc. WPW is active in MARS and is going on 220 Mc. LLY, Arlington EC, has appointed as Asst. ECs, LXR for 10 meters and GEO for the C.D. Net. AKY was the auctioneer at the South Shore Club's auction. Region 5 Radio Committee held a meeting in Cambridge with RM, DFS, KTG, NJN, BL, ALP, IPA, TQP, and 8ZYX present. Ed Tilton spoke at the Framingham Radio Club. The Quannapowitt Radio Assn. held an auction. Our sympathy to BJB on the death of his wife. DJ/OIR still is active on 6 meters, the New England Net on Mon. at 8 P.M., and the Horse Trader's Tue. at 7:30 P.M. MX put a vertical antenna up with a balloon on 80 meters and worked ZLs. New officers are 4YHD, pres.; YFM, vice-pres.; Ralph Gage, secy.; and 2WHB, treas. UXL has mobile rig TBS-50C for c.d. TQS, Provincetown EC, has been offered the Truro MARS station emergency facilities. CDJ has a Collins KW-1 at his QTH. DOF, Revere EC, has a TBS-50C and receiver set up at fire headquarters for c.d. work on 6 meters. GDY made the DX Century Club with 103 confirmed using an indoor folded dipole. The Malden Amateur Radio Club held an auction. The Old Colony Radio Club had a talk by Mr. Terrel of Workshop Associates, and one by RCA on bandpass transmitter exciter. HPH has a 32V-3. WGN, ONK, AVY, and AZY are on 15 meters. WKM has antenna 400 feet long. Standing by to help out Winthrop during its storm were AGB, SBT, BL, FBI, MAR, RM, DFS, TWG, KLC, KWD, JSM, YHN, and BB. New officers of the South Eastern Mass. Amateur Radio Assn. of New Bedford are KHV, pres.; YIY, vice-pres.; UID, secy.-treas. 5HNW and 4VXD are living in Hingham. The South Shore Club had an FCC night with George Doorakian and Mr. Hallenstein, IVI. The Winthrop c.d. drill had SBT, BDU, CMW, DJ, OIR, MQB, UOC, VIS, and BB on 2 meters. SBT, DJ, OIR, and BB were on 6 meters. The Town of Braintree was the scene of a simulated emergency test held in Sector 5 with the following towns: Quincy, Milton, Hingham, Dedham, Westwood, Weymouth, Norwood, Canton, and Randolph. Mobiles and fixed stations on were TYN, OSX, EKG, WFQ, GOU, IS, ALP, AUU, FWS, VPR, QVN, SII, DW, VAN, QKY, K2ADA/1, QPH, and SSA. The Boston Mobile Club is going to handle messages for the Boston Area. UE, RM for the Eastern Mass. Net on 3660 kc. at 7 P.M. Mon. through Fri., reports that the following are the NCSs: EMG, Mon.; NUP, Tues.; UE, Wed.; EPE, Thurs.; TY, Fri. We regret

(*Continued on page 76*)



Heathkit AMATEUR TRANSMITTER KIT

Range	80-40-20-15-11-10 meters
6AG7	Oscillator - Multiplier
6L6	Amplifier - Doubler
5U4G	Rectifier
105-125 volts AC 50/60 cycles 100 watts	
Size — 8½" high x 13½" wide x 7" deep	

MODEL AT-1

$29.50

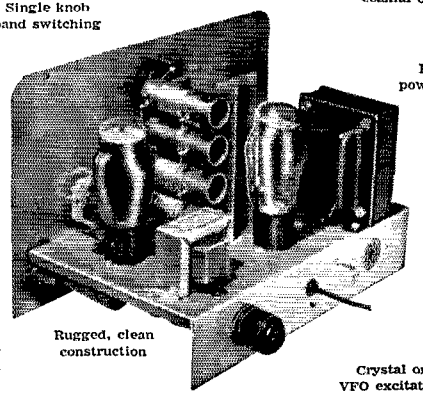
SHIPPING WT. 16 LBS.

Here is the latest Heathkit addition to the Ham Radio field, the AT-1 Transmitter Kit incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, standby switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation-up to 35 watts input. Built-in power supply provides 425V @ 100MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis and detailed construction manual. (Crystal not supplied.)

Pre-wound coils — metered operation

52 ohm coaxial output

Single knob band switching



Built-in power supply

Rugged, clean construction

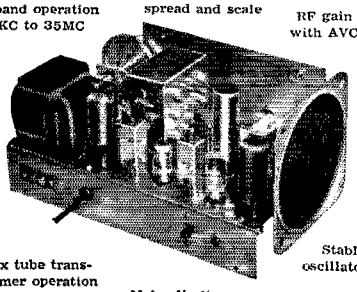
Crystal or VFO excitation

New HEATHKIT COMMUNICATIONS RECEIVER KIT

Four band operation 535KC to 35MC

Electrical band spread and scale

RF gain control with AVC or MVC



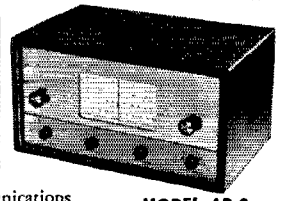
Six tube transformer operation

Noise limiter — standby switch

Stable BFO oscillator circuit

5½" PM speaker — headphone jack

Range	535KC to 35MC
12BE6	Mixer oscillator
12BA6	IF amplifier
12AV6	Detector - AVC - Audio
12BA6	BFO oscillator
12A6	Beam power output
5Y3GT	Rectifier
105-125 volts AC 50/60 cycles 45 watts	



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MODEL AR-2

$25.50

SHIP. WT. 12 LBS.

CABINET

Proxylin impregnated fabric covered plywood cabinet. Ship. wt. 5 lbs. No. 91-10. **$4.50**

THE IMPROVED Heathkit GRID DIP METER KIT

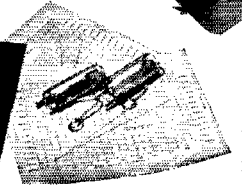
- ***Pre-wound coil kit***
- **Range — 2MC to 250MC**
- **Meter sensitivity control**
- ***Compact one hand operation***
- **Headphone monitoring jack**
- **Transformer operated**

The invaluable instrument for all Hams. Numerous applications such as pre-tuning, neutralization, locating parasitics, correcting TVI, etc. Receiver applications include measuring C, L, and Q of components, determining RF circuit resonant frequencies, etc. Thumbwheel drive for convenient one hand operation. All plug-in coils are wound and calibrated (rack included). Headphone panel jack further extends usefulness to operation as an oscillating detector.

MODEL GD-1A

$19.50

SHIP. WT. 4 LBS.



Two additional plug-in coils are available and provide continuous extension of low frequency coverage down to 355KC. Dial correlation curves included. Shipping Wt. 1 lb. Kit 341. **$3.00**

HEATH COMPANY

BENTON HARBOR 9, MICHIGAN

to report the death of HSB, formerly of Norwood. Traffic: (Nov.) W1EMG 218, LM 94, TY 91, AVY 64, UXL 25, BY 17, UTH 17, UE 8, NUP 7, TQS 7, WU 7, HWE 6, BB 5, CTR 5, DOF 5, EPE 5, VVA 3, AYG 2. (Oct.) W1MIX 134, QON 6.

WESTERN MASSACHUSETTS — SCM, Roger E. Corey, W1JYH — SEC: KUE. RM: BVR. PAM: RDR. WMN meets at 7 P.M. Mon. through Fri. on 3560 kc. Phone traffickers were represented this month by UKR, TAY, SPF, and AGM, with UKR being top gal in the section again. WMN now is running two sessions nightly, the first at 7 P.M. and the second at 8 P.M. TVJ has a new Viking VFO and is becoming DX-conscious on 40 and 20 meters. JRA finished a 500-watt final and put it on the air before the fall vacation. BDV attended c.d. meeting for ECs in C.D. Region 3. He represents Northbridge in the Region C.D. Net. AGM gave the local c.d. officials a demonstration of amateur facilities. LPF has a new rig using a 6146 on 10 meters and also checks into the Region 3 Net. He also is active on 6 meters and 80- and 40-meter c.w. FRA is on the air again from Clinton. TAY checks into the TCPN. NEEN, and NE 'Phone Net. SPF reports 39 AREC members active in Worcester c.d. nets. KUE has a new 2-meter rig using an 832 long-lines final. WM was well represented in the SS with TVJ, BKG, WCG, LIB, RAN, JYH, WEF, TTL, WFL, SRM, MVF, QWJ, WDW, RRX, KFV, MNG, NY, HRV, CJK, PHU, UKR, and OBQ among the participants. JYH built an electronic key and after a week's practice succeeded only in ruining his fist on the old bug. Ex-SCM EOB visited JYH and says he now is active on EAN from his new Connecticut QTH and also makes the CD Parties and the SS. VNH is v.h.f. activities chairman for the HCRC. KFV has a new HQ-140. WDW has built a VFO and is on 20 meters with a vertical. AZW, JAH, LLN, and NAX renewed their appointments. How about yours? Traffic: W1UKR 167, TVJ 54, BVR 37, MNG 34, TAY 34, JRA 28, HRC 26, SRM 20, JYH 15, SPF 10, WDW 9, RRX 5, AGM 2, OBQ 1.

NEW HAMPSHIRE — SCM, Carroll A. Currier, W1GMH — SEC: BXU. RM: CRW. PAM: UNV. At this time I want to thank CRW, Clif Wilkinson, for his fine coöperation in keeping New Hampshire on the map by writing the monthly reports for the last three months while I was in the hospital. Also, many thanks to all who sent me cards and letters to let me know you were pulling for me. It sure helped, and thanks a million. WBM has a 50-foot tower for his 6- and 10-meter antennas. He also has a new mobile rig on 10 meters. POK had an FB visit with BNC at Bangor, Me. QJX hears often from QJY, who now is located in California. When asked to send in your certificates for endorsement, it would be greatly appreciated if you would attend to it at once so that I can keep all appointments up to date. Don't forget, I have to report to Headquarters. Did you see how close QHS came on the last frequency check? 2.1 parts per million. Start the New Year right by sending in some new items and make our column interesting. Traffic: (Nov.) W1CRW 153, CDX 39, POK 26, TBS 26, FZ 10, SAL 9, QJX 4. (Oct.) W1SAL 44, WBM 17.

RHODE ISLAND — SCM, Merrill D. Randall, W1JBB — SEC: MIJ. RM: BTV. RIN meets Mon. through Fri. at 7 P.M. on 3540 kc. The R. I. c.d. net meets every Sun. at 10 A.M. on 3993 kc. The R. I. 'phone net meets every Sun. at 11 A.M. on 1890 kc. Speaking of the 'phone net — YAO, QCF, MSD, TRX, ULH, ZJQ, BGA, HLY, and ULS all met WKI at his QTH on Dec. 4th for a net meeting. WKI's XYL served a swell meal. That a great time was had was proven by the fact that the Sunday A.M. air meeting was full of thanks to WKI and his XYL. We could use a few out-of-state members on this net! With BBN at the helm, the Portsmouth c.d. and RACES plans are forging right ahead. TGD finally has gotten his 300 watts on the air. The code classes being held by BTV are becoming very popular — Nick is just the lad to teach code. No PRA's *Zero Beat* was received this month so I can't steal any of their news — Hi! JFF is mending slowly but still is wearing the cast. The NCRC wants to welcome all transient amateurs, particularly Navy, to the use of the facilities of the club at Seaman's Institute, Market Street, Newport. Traffic: W1VXC 64, BTV 49, BBN 47, TGD 10, AIT 8, O1K 4, TRX 4.

VERMONT — SCM, Robert L. Scott, W1RNA — SEC: NLO. PAM: RPR. RM: OAK. VTPN: 3860 kc. Sun. only 0930. VTN: 3520 kc. Mon. through Fri., 1900. GMN: 3860 kc. Mon. through Fri., 1200-1300. Final S.E.T. reports from Chittenden and Rutland Counties show very fine work, especially by the Chittenden gang. Active were emergency-powered W1KOO/1, NCS, with VEB and NLO as operators, BRO, mobiles TBG, TLI, QQN, SEL, VSA, BRG, and PIV, an out-of-state participant, and fixed stations TEW, NLO, VEB, TZM, OKH, BRO, WTO, WPK, AXN, and VDX. The test began at 0830 and was completed at 1130 hours. Rutland had AVP, TAN, UCC, WOA, YYU, UET, VTP, SET, GAZ, and SCE/mobile. The Vt. C.D. Net operates on 3993 and 3501.5 kc. at 0900 Sun. instead of 1900 Mon. Someone with a large supply of QSLs is wanted to move into Grand Isle! Traffic: W1RNA 266, OAK 131, AVP 32, PZX 32, IT 27, TEW 25, VZE 16, KJG 15, VVP 14, BJP 10, ELJ 1.

(Continued on page 78)

IF YOU WERE TO DESIGN THAT "DREAM" MOBILE RECEIVER

wouldn't you . . . .

first of all, consider your own operating convenience and . . . the SAFETY of yourself and your passengers, by arranging all normally-used tuning controls on a remote basis where they could be reached conveniently without taking your eyes off the road ahead? Wouldn't the same considerations that apply to the use of your rear view mirror apply equally to the positioning of any "S" meter that might be used?

wouldn't you . . . want to incorporate the type of circuitry that would put your mobile receiver on a par with your home station communications receiver?

wouldn't you surely include "Squelch" to eliminate between-carrier noise and background? A really effective noise clipper? A BFO for CW, SSB or merely to spot weak phone carriers?

wouldn't you certainly employ dual conversion . . . one high frequency input I.F. to eliminate image, followed by a real low frequency I.F. with multiple tuned circuits to restrict the pass-band...to provide effective adjacent channel rejection?

wouldn't you want the I.F. portion to be small in size but to include a self-contained power supply with provision for both 6 and 12 volt inputs? And a built-in loud-speaker? And all units joined by patch plugs and cables so that they could be easily removed for installation in a different car? Naturally, provisions for an external "S" meter?

if you would . . . .

. . . you and Gonset's engineers are seeing eye to eye because every one of these features—and more—are inherent in the Gonset Super-Six, Super-ceiver mobile combination.

SUPER-SIX
6 band converter

SUPER-CEIVER **Net 119.50** **Net . . 52.50**

includes tubes and crystal. Does not include Super-Six converter or "S" meter.

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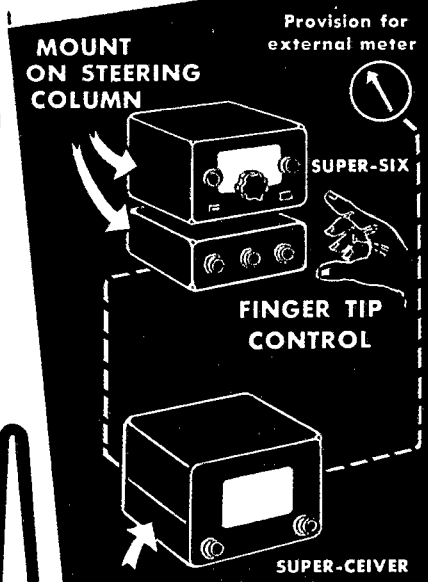

SUPER MOBILE COMBO

SUPER-SIX...
SIX BAND CONVERTER

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NORTHWESTERN DIVISION

ALASKA — SCM, Glen Jefferson, KL7NT — KL7TI has been appointed C.D. Radio Officer for RACES in the Territory. The RACES plan for Alaska has been approved. PDG is doing well on "V" beams pointed 85 and 137 degrees true, from Kotzebue. PDG says that as far as he knows he is the only *active* amateur in Alaska north of the Arctic Circle. There is no information to the contrary. The Sourdough Net continues to function in fine shape with KL7AIR as NCS. PQ and BK now have their KTVA-TV station on the air in Anchorage on Channel 11. Traffic: (Nov.) KL7AIR 2752. (Oct.) KL7AIR 3131.

IDAHO — SCM, Alan K. Ross, W7IWU — Orofino: RFM and OXL are the only active hams in the county. Lewiston: IDZ is taking hold of the EC work with his gang. QVZ was transferred from Grangeville to Lewiston. RSZ, from Craigmont, was in Lewiston, and reports a new HT-9 working FB on 20 meters. IFG has a new second harmonic, a boy. OWA is a new OPS. Albeni Falls Dam: NLJ, Bonner County EC, reports leg injuries and a broken finger trying to mount a left-handed pony from the right side. UVL and UVM are new hams in Priest River. RJK is TV repairman in Priest River. GZZ is getting back on the air. MER and his XYL, SDD, are going to WØ-Land for the winter. 1995 kc. proves the best night-time frequency during the winter and is used by the North Idaho gang. Grangeville: RSP and RKY are the only active hams in town, with RSP having emergency power on the farm. Caldwell: EYR reports 2-meter activity. SAC will leave for the Navy in June. Traffic: W7IPE 21, NVO 6.

MONTANA — SCM, Edward G. Brown, W7KGJ — SFK, Acting Net Control of North Montana 160-meter net and also president of North Montana Radio Club, checks into the Inland Empire Net. TKB reports conditions poor at his QTH but he had some fun in the SS Contest and equalled last year's SS work. Dan did work KZ5, KP4, KH6, KL7, and VE8 stations in the last contest. SSW will have his Lettine 200 on 20 meters. Dave has received his RCC certificate. FUB is using break-in with crystal-controlled transmitter running about 70 watts and hopes to have VFO this winter. QGJ constructed 6Y6 modulator for his ARC-5 75-meter rig and an all-electronic filter for his receiver. RDM is building an addition to his house. Mobile operation was curtailed by dynamotor trouble. SMY bought a 30-acre track, is building a new house, and will be off the air until construction is completed. LBK installed a 300- to 3000-cycle filter for the receiver and finds it effective. Earl finally has worked all states after waiting a year to get a card from Oklahoma. KUH was in Billings visiting the old gang. Traffic: W7MIM 106, SFK 53, TKB 34, TGU 14, OPM 12, LBK 8.

OREGON — SCM, John M. Carroll, W7BUS — Recent comment gathered from listening indicates that s.s.b. is drawing the largest amount of interest, both from those who build and those who buy equipment. Among those indicating interest are KL, TVW, and LVN. Appreciation is given to 6NYS for his assistance in relaying during the poor conditions the OEN operated under during November. OSN still is showing signs of increase in traffic and check-ins. KAB, PKN, PHJ, PRA, USO, NTH, MAO, SBX, TH, OE, and AJN have fine records for traffic-handling and attendance. TML, UAB, and UHK are new stations in the OSN. QPS is active in the Mission Trail Net as well as OSN. PRA is putting in a single-party landline to aid in more rapid delivery of messages. KTL is building a new shack. Traffic: W7APF 161, QPS 82, AJN 42, TH 29, PRA 26, HDN 23, PDR 23, UAB 7, EDU 4.

WASHINGTON — SCM, Laurence M. Sebring, W7CZY — SEC: QZF. RMs: FIX, OE. PAMs: EHH, PGY. New officers of the Radio Club of Tacoma are AZI, pres.; RXS, vice-pres.; OVW, secy.; and George Bielski, treas. NIL and KKN were elected to the Board of Directors. SMB has a pair of 811s on 80 and 75 meters. HMQ has a new Lysco 600 and broke it in during the SS Contest. NZM and OEB are mobile. NDO moved to Burien. HMQ, SMB, EHJ, OIH, NZM, and OEB were mobiles during the c.d. drill. LEC has 20 watts on 80 meters and reports no TVI so far. OE is new manager of WSN and new RM. OP mobiled to North Carolina. Charter members of the Apple City Radio Club of Wenatchee are ETO, pres.; PNN, secy.-treas.; EVB, HQO, SXN, OVE, SIL, JEJ, and ZV. The Club is affiliated with ARRL. CWN is mobile on 75 meters. HRC is on the air with teletype. BA has a son in Hilo and a daughter in Honolulu, so amateur radio really pays off. Traffic: W7BA 1401, PGY 977, OE 291, KT 287, FRU 256, CZX 142, QYN 137, CMH 120, UMK 74, RXH 73, TH 71, APS 66, EHH 65, BG 59, FIX 40, QOU 38, BLX 34, RTQ 32, AIB 30, AMC 18, SKT 17, ZU 10, FWD 9, LVB 9, ETO 5, BMK 4, CWN 2, GAT 1.

PACIFIC DIVISION

HAWAII — SCM, James E. Keefer, KH6KS — November 21st was the date of a recent T.H. civil defense drill in which KH6s from all of the Islands played on extremely effective part. A need for mainland outlets was brought out in the non-delivery of several messages for Washington, D. C. Advance notice is given of a 1954 hamfest to be held

(*Continued on page 80*)

on Kauai Aug. 14/15. This project is being conducted by KH6IJ and indications are that it will be an interesting outing. BPLs reporting for this month are KA7RC, KG6FAA, KG6FAD, KA3AC, KH6FAA, KA7LJ, and KH6AJF. Late October reports were turned in by KG6FAA and KA7RC. Single sideband is making its appearance in the Territory. KH6AOR, KH6ZP, KH6AXS, and KH6AJW all have multiphase exciters. They are active on 75-meter 'phone and will be heard from more often in the future. Traffic: (Nov.) KG6FAA 7788, KA7LJ 4004, KA3AC 1537, KA7RC 1475, KH6FAA 1014, KA2JF 839, KG6FAD 821, KH6AJF 681. (Oct.) KG6FAA 6907, KA7RC 928.

NEVADA — SCM, Ray T. Warner, W7JU — SEC: HJ. ECs: KOA, LGS, NWU, OXX, TJY, VO, and ZT. OPS: JUO, ORS: MVP. Known active Nevadans during the SS Contest were NOW, JUO, and JU. MRN has returned to Las Vegas. RSY is active on 75 meters and still worrying about bigger and better antennas. IWPO is looking for a WN QSO with Nevada. Novices contact him through ARRL Headquarters. 2QHH, who does things the hard way, is still looking for a 160-meter c.w. QSO with Nevada. Any helpers? OBW has returned from a jaunt to the South Pacific and is due for another in the near future. MVP is active on 80 meters. The certificate for working 25 Nevada stations still is being offered by the Southern Nevada Amateur Radio Club. Contact BJY regarding same. No news may be good news — but not in this column. Appointees are reminded that an activity report to your SCM is expected monthly.

SANTA CLARA VALLEY — SCM, Roy I. Couzin, W6LZL — Club election results are coming in now and the new officers for the coming year of the SCCARA are RNG, pres.; NOG, vice-pres.; MXB, secy.; and APV, treas. New board members are WGO, NX, and HC. UTV reports that he is keeping busy on the nets and entered the recent SS Contest. FON is keeping busy on MTN. AIT is busy on BAN. BBD went on a trip to W7- and VE7-Land. YHM reports a new exciter is almost in business. HC, our new Vice-Director, is very busy on the nets and preparing to dig in with JZ, our new Director, to see what we hams are griping about and try to do something about it. You fellows get behind these fellows if you want to see some real action. MMG spoke at a meeting of the NPEC and told of the benefits of having an ARRL appointment and also of the certificates and awards that go with membership. The Mountain View Radio Club had an interesting speaker and a white elephant sale. The Oakland Radio Club was host to the CCRC recently. AEV reports that the San Mateo County C.D. and Disaster Emergency Corp had their final reorganizational meeting and things went off pretty smoothly. We hope that this will set things up in a satisfactory plan pleasing all concerned. The PAARA had a very interesting meeting this month; the club was invited to visit Mackay Radio, KFS, so after a short meeting they went on their interesting tour. Traffic: W6YHM 142, HC 133, FON 73, UTV 34, AIT 10,*K6BBD 6.

EAST BAY — Ray H. Cornell, W6JZ — Asst. SCMs: Guy Black, 6RLB; Harry T. Cameron, 6RVC. SEC: WGM. RMs 1PW, JOH, PAM; LTI. ECs: AKB, CAN, CX, DNX, FLT, NNS, QDE, TCU. Since Ray already is busy at the task of being Pacific Division Director, this column is being written by RLB. We are happy to share the benefits of Ray's strong and effective leadership with the rest of the Division. Congratulations on your election, Ray. The Central California Radio Council is making progress on the publication of a monthly radio amateurs' calendar, to be distributed free to the members of all CCRC-affiliated clubs. It will list all club meetings, contests, c.d. and AREC drills, hamfests, hidden transmitter hunts, and FMTs. If your club is not a member of the CCRC, why not suggest that it join. Write RLB for details. Southern Alameda C.D. has been holding a series of specially-arranged drills with the regional station at Vollmer Peak. The Region 3 Office of Civil Defense will be happy to do the same for any other area. The 50.56-Mc. region-to-area net has been rather inactive lately but it's still there, and every area should be able to operate on 6 meters, reports RLB, Radio Chief for Region 3 OCD. The East Bay Radio Club had a dinner party at El Nido Rancho in Lafayette, and at its meeting elected VSV, pres.; MXQ, vice-pres.; CA, secy.; YSX, treas. The EBRC has been holding 2-meter hidden transmitter hunts at 8 P.M. the 1st and 3rd Fri. Participants in the last one were VSV, JHV, RLB, WZR, K6BAO, JGF and OHQ. IPW is interested in 160-meter DX. K6WAY has a new BC-610; K6BDF has a new rig with the band-box from April '52 *QST* and a 6146 final; YDI has been making receivers to be sent to Belgian Congo; the Mt. Diablo Club's TVI committee reports five new cases all cured by installation of high-pass filters. ELW enjoys TVI committee work. LW has 180 countries confirmed. This is the time of year when new club officers are getting their feet wet, so maybe it's appropriate to quote BFZ's proclamation to the SARO: "What place do you want in the machinery of running the SARO? No company would be able to last long if the number of free passengers were too large. Are you a deadhead or are you contributing toward your fare on the good ship SARO? It's up to you whether we end up on the 'mud flats' or continue to sail forth and add new honors to

(*Continued on page 84*)

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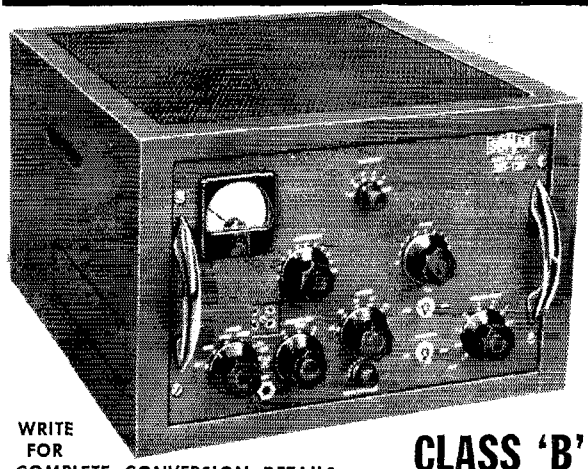

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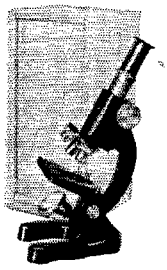

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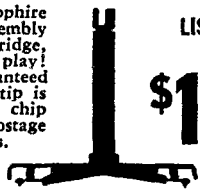

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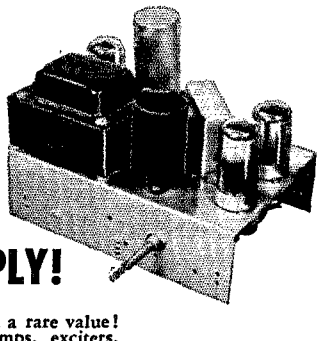

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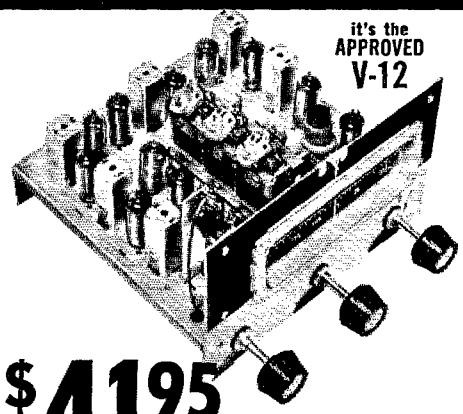
R-905	6BG6G	5.25	2.02
R-906	6BQ6G	3.80	1.46
R-907	6CB6	2.10	.82
R-908	6J6	2.50	.98
R-910	6SN7GT	2.35	.90
R-911	6V6GT	2.00	.76
R-912	6W4GT	1.90	.72
R-913	12AT7	2.90	1.15
R-914	12AU7	2.40	.94



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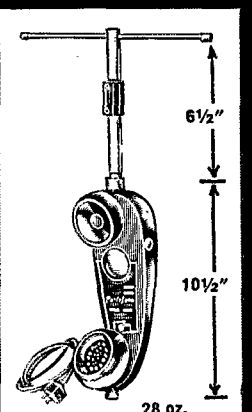

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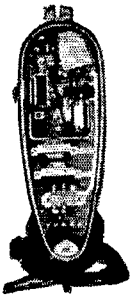

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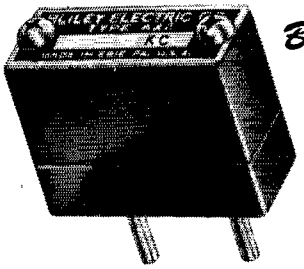
(*Continued from page 80*)

our already enviable record." Traffic: (Nov.) K6FAL 848, WAY 660, W6IPW 373, K6BDF 107, W6JZ 98, AKB 93, YDI 3. (Oct.) K6FAL 1426, W6AKB 70.

SAN FRANCISCO — SCM, Walter A. Buckley, W6GGC — The SFRC now has a swap column listing in its monthly paper. The November meeting was auction night. HAMS held a meeting via 2 meters en route to visit MCRC and is planning visits to other radio clubs in towns nearby as the trip to MCRC was such a huge success. John Reinartz spoke on "Tuna Can RF Voltmeter" to the MARC members and their guests, the HAMS. Had a wonderful time at the SCRA Christmas Party given in honor of the XYLs and YLs. The TRC still is working on the mobile trailer rig. More manpower still is needed. How about it fellows? The SFNYC now has daily schedules during the lunch hour. Everyone is requested to listen in. FST is on 75 and 2 meters. 11:25 to 12:25 P.M. DZN wants to put teletype in the station. The fellows are building 420- and 220-Mc. equipment. The Mobileers held its breakfast the 3rd Sun. of December at Fisherman's Wharf, San Francisco. The 29ers held its second hidden transmitter hunt with much success. There is lots of activity on 10 meters in this area since the boys got so active. The Humboldt Amateur Radio Club's new officers are PLY, pres.; CNG, vice-pres.; K6ARJ, secy.; Ben Casey, treas.; JSY, act. mgr. BME, of Eureka, has changed his call to 7UMP in Oregon. K6BBS, W6TVT, W6QLX, and K6CXB, ex-ØIJB, are all new calls in the Eureka Area. LXQ and LRJ joined the gang at Eureka at its last meeting. BYS will be mobile only until further notice. The hamroom was needed for a bedroom because of the return of the YL and harmonic. LOZ won the 4-125 that John Reinartz brought to the MARC Club meeting. PHT almost tripled her traffic for November. QMO was the first San Francisco YL to check in on the YLRL Net. She now is chief cook for the SFRC. PHS is building a new 300-watt rig for QMO (his XYL) to work on 80, 40, and 20 meters. LV now has a new 20-meter beam. LAS is back in San Francisco after several months in Fresno. URA slipped up on renewing his license so will not be heard on the air until the renewal arrives. ATO was one of the first local boys down at the motor vehicle department to put in for his ham plate MXV still is convalescing from an operation on his foot. CTH forgot that Margaret's (the XYL) name was also on the license so he had to make a second trip to the vehicle department. GGC did a poor installation job of the 2-meter rig antenna on the roof and a strong storm blew it down. The Vaaro mobile antenna now is working. Thanks to AHH for finding what was wrong with it. The CCRC is starting a monthly activity paper. OO GQA still is handing out citations for second harmonics and outside-of-band violators. There were 18 in November and only 3 were Novices. JOX has a new Elmac and soon will be mobile. EJY is off the air mobile because of a car accident. NAC's operating time is limited as he has 14 Boy Scouts to take care of. Traffic: W6SWP 299, PHT 117, GGC 51, GCV 27, OPL 7.

SACRAMENTO VALLEY — SCM, Harold L. Lucero, W6JDN — Asst. SCMs: Ronald G. Martin, 6ZF; William van de Kamp, 6CKV. SEC: AVZ. OBSs: AKF, OMR. OPSs: IEO, OMR, BTY. ORSs: IEO, FYK, REB, OMR, PIV. SBH, SYY, TMP, TYC, BIL, and ZQD were active in the SS. KN6BHH is consistently active on the Novice band. The Tehama County Club celebrated its first birthday with the club rolls nearly doubled through the Novice recruitment conducted by FXO. SBH conducts code practice during regular meetings. GUV and QIV are rebuilding. HBM is working 2 meters. HNL has good luck with 6146s. IZC and BWC are working 160-meter mobile. JRY is building three-element 20-meter beam. KRX is active again after an illness. KTR is active again after moving to the new QTH. KUI works 2 meters occasionally. KYO is working 75-meter mobile. LYQ is working 160 meters. QJD is struggling with the mobile rig. RHC recently passed away. TSR works 160 meters once in a while. BMU recently graduated from the Novice class. KN6BYS rebuilt the rig to more power. K6NAK is active in traffic-handling. UIE has moved to Baton Rouge, La. ATQ conducted a very successful auction at the club Nov. 16th. UFR was heard on three spots at the same time on 3.5-Mc. c.w. KN6AWH is rebuilding with 829B final. KTF and ATQ report activity on 10-meter mobile. ELO, ETT, CSY, and TDB regularly hold ragchews on 10-meter 'phone net. PTX is experimenting with key click filters. Our SEC, AVZ, temporarily moved the QTH to Tungsten, Nev., and is experimenting with antennas. OPY is interested in organizing a net for Sacramento Valley section members only with liaison stations between this net and all other available 'phone and c.w. nets. If interested, contact your SCM. REF held the MTN c.w. net open and cleared for any traffic that was coming south from the Oregon flood area. K6FAV is the NCS for the Region Four Civil Defense. K6FR stood by faithfully on O6N and MTN c.w. AYU is mobile with new Elmac. PZG has gone to W7-Land. K6DBT is the first graduate of the McClellan Amateur Radio Society school. ASI's beautiful kw. runs feeders from transmitter right along the TV feed line and has no TVI. MUA has a new Globe King. DDC and CFU are active on 40-meter 'phone. 7BV from Kelso, Wash., visited DDC and met the gang at

(*Continued on page 86*)



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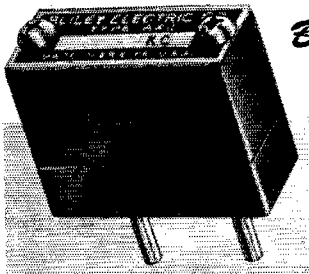

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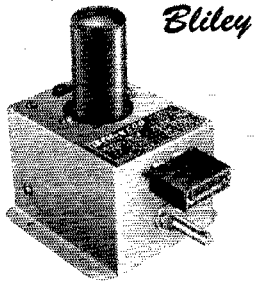

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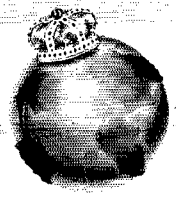

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Bliley CRYSTALS

UNION STATION BLDG., ERIE, PENNSYLVANIA

Dunsmuir. ILY is rebuilding the rig and coming up with an FB signal using amplitude modulation. HPL is working 40 and 75 meters. ASM is heard on 40 meters. IEO now is ORS, OPS, Asst. EC, and OBS and is working on OEN, MTN, RN6, the HOBO Net and in MARS. JDN and IEO are soliciting overseas points traffic from the Dunsmuir Area to its boys serving in the armed services in the U. S. as well as to overseas. FKI has formed a radio club at the high school with the call K6CDQ. OMR is doing a little 40-meter DX. HRF is planning to go mobile 100 per cent. NQA is active on 40- and 75-meter 'phone and is putting up a 400-foot long wire antenna. IRA is building a new receiver, SDP built one of LNN's modulators and checked in on the Tall Pine Net. Traffic: W6IEO 90, JDN 58, REF 47, TYC 11.

SAN JOAQUIN VALLEY — SCM, Edward L. Bewley, W6GIW — SEC: KRO. RM: EXH. Through the efforts of LRQ, members of the Bakersfield Club have joined the Bakersfield Police Communications Reserve and are receiving training from the Bakersfield Police Dept. OPU who has been sharing his call with Mickey Mouse, has Mickey's picture on his new QSL card, thanks to Walt Disney Studios. UJ has 170 confirmed countries. KIQ has a new 75A-3. BUT has been working KA-Land regularly with his BC-610. Hoppy also uses a Gonset Communicator on 2 meters via cigar-lighter plug. KUK has an Elmac receiver and TBS-50 awaiting installation in the new Mercury. EBL is new Asst. EC in Sonora. FEA and WJF still are using the clothesline antenna but manage to be very active on American Legion and YLRL Nets. Stockton C.D. Headquarters is on 75 and 2 meters with the call YVE. VPV has the new shack about finished. LRS is back on 2 meters from the new QTH. QUE is the happy owner of a new Viking. EXH can be found on 75 and 40 meters. NYT is another happy Viking owner. ERE has been building the 220-Mc. station exactly as described in recent issues of *QST*. Cliff demonstrated the receiver at a recent TARC meeting, using a transmitter built by the high school radio class under the direction of DIY. GYN demonstrated his 50- to 220-Mc. receiver consisting of a TV inductotuner followed by a superregen. detector. Thanks for the fine reports, gang. Traffic: W6WJF 30, FEA 26, TXM 13, EBL 12, GIW 12, OPU 11.

ROANOKE DIVISION

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — FM uses a battery-type BC to provide double conversion to BC-454 in his emergency rig; he pushed his big rig to a kw. in the SS Contest. TTG is working on his mobile rig and needs good vibrator power supply circuit. DX still is working on his amateur TV transmitter. YOA has eliminated his TVI. HMG and VJI report that the Palmetto Radio Club in Columbia had a spectacular demonstration of capital city mobile rigs proving their readiness for emergency use. ZRH, Charleston Club president, provided a demonstration of Charleston mobile rigs to the Hibernian Society. PDM is back on 75 meters after a long absence. CHD is a regular member of 4RN. The following mobiles reported into the South Carolina Mobile Roundup at 2:30 P.M. Sun. during November on 3930 kc.: ABW, ANK, AUI, BIZ, BMR, CAL, CEL, DX, DXW, FBE, HMG LTF, NJG, NQP, NTD, NWB, NZK, OLZ, OOC, OSC, PLX, STH, SZG, TPE, TWW, ULH, UPK, VFV, VUK, and ZVY. ANK took part in the MARS CP contest using 10 watts emergency power. TWW is installing his mobile rig in a new car. SGZ has a new professional-looking homemade grid-dipper. AMS has new Viking transmitter. UUB is building a 75-meter vertical. CPZ has a new QTH. OSN has a new 75-meter mobile rig. HME is on 75 meters from the Naval Reserve Building in Spartanburg. NTO is building a crystal converter. Traffic: W4ANK 228, FFH 72, YOS 4 FM 1.

WEST VIRGINIA — SCM, Albert H. Hix, W8PQQ — ISB and MBA are new ORS. LBT is new OO. FGL is new PAM. OIC is new OES. IAJ has new 167-BY rig using a pair of 813s. The Huntington Club had a successful turnout at its special TVI meeting conducted by the ARRL demonstration unit. We are sorry to learn that WN8OLS, of Weston, passed away recently. NLT, of Charleston, is back on the air after ten years' absence and is doing quite well with his Viking rig and downspout vertical. A very interesting talk was given by IWB on radar principles at the last Tri-City Club meeting. 4ZMZ is located in Charleston and recently signed up in the AREC. VCT is on 75-meter 'phone now. BOK is new OPS and OBS. HZH also is new OBS. CLX is getting ready to put up new three-element 15 and 20 dual beam. IRN will be on high-power 'phone soon. AUJ and ETF are going strong as NCSs of the 'phone and c.w. nets. QHG is Assistant EC for Kanawha County. EDJ traded in 75A-1 and 32V-2 for a new 75A-3 and 32V-3. EOJ put up Collins type 75-meter antenna which works very well. ZJS is getting interested in single sideband. The MARA is conducting a code and theory class with 16 non-hams in attendance. LU4AAR desires a 10-meter contact with this State. Any interested persons, please write him. Traffic: W8AUJ 150, HZA 53, ETF 38, GEP 38, DFC 21, MBA 17, ISB 8, PQQ 2.

(*Continued on page 88*)

THE INSIDE STORY

. . . . . VISUAL PROOF OF MORROW *Quality* RECEIVER ENGINEERING

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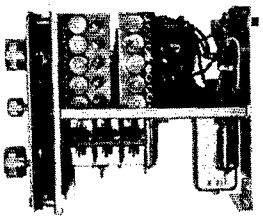
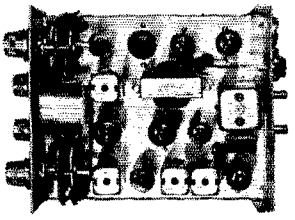
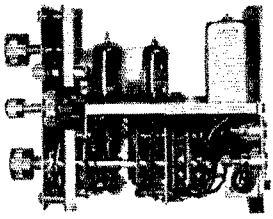
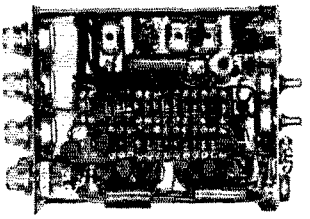


TOP VIEW





BOTTOM VIEW



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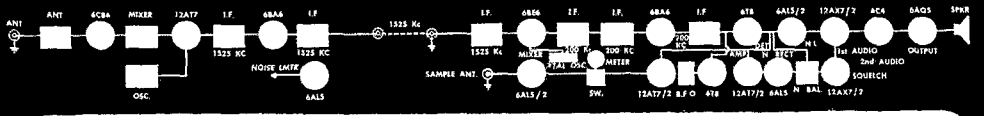

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ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Karl Brueggeman, WØCDX — SEC: AEE. The Denver Radio Club has set up a "Friendship Award" certificate. By making 25 personal contacts and getting the person visited to sign your log, the certificate will be awarded. YCD has a new Viking II. KHQ is back on the BPL list after taking a much-needed vacation. EKQ reports traffic is picking up. HKE has a "worked all members" certificate from the Salt Creek Radio Club, Roselle, Ill. A big wind blew down IA's antenna mast and TV antenna. Gene also has completed two c.d. handy-talkies and vibrator power supplies. BON, LO, ERR, and CDX recently were on station KFEL describing the Denver c.d. set-up and the mobile participation in the Armistice Day parade. LO is the new EC for Denver. LZY has scheduled his Official Bulletins at 12 noon Mon., Tue., and Wed. of each week. Congratulations to the Sky Hi Radio Club, Alamosa, on its affiliation with ARRL. IC has appointed the following as Assistant Directors: OWP, Northwest; ZJO, West; ANX, Colorado Springs; NIT, Pueblo; PGX, Arkansas Valley; WLN, Denver. The Colorado Slow-Speed Net is back in operation again with KHQ as NCS. Net meeting time is Mon., Wed., and Fri. at 1730 MST on 3545 kc. Orval asks that all members use straight keys. Traffic: WØHKE 4346, KHQ 911, KØFAM 625, WØEKQ 46, IA 12.

UTAH — SCM, Floyd L. Hinshaw, W7UTM — During November the Salt Lake City auxiliary police and civil defense group, working under the Salt Lake City Police Department, finalized their operating procedures. Any interested amateur may secure information direct from JPN in Salt Lake City. RCP/7 is attending Utah State College in Logan and has QHQ as his roommate. The USAC Club conducted a successful transmitter hunt and meeting. WN7UJO is active in Cedar City and hopes to drop the "N" soon. Look for an FB ragchew when you work TMK on 75, 40, or 20 meters. UTM missed both week ends of the SS because of the extra work. Traffic: W7UTM 30, RCP/7 7.

WYOMING — SCM, Wallace J. Ritter, W7PXX — The Pony Express Net on Sunday mornings is going well with over 35 check-ins regularly. The Casper Club now is an ARRL affiliate. Congrats and welcome, gang, let's have some reports on traffic and happenings now. TGZ is having extended receiver trouble. NHC is away at college. HNI has a new Collins receiver and will be back on 75 meters soon. HLA is sporting a new 200-watt rig. MWS still is the master antenna experimenter and is having trouble keeping 'em up. HRM is resting up after a good score in the SS. KUB is mobile on 10, 20, and 75 meters looking for contacts. EUZ is concentrating on low-power portable and mobile transmitter. TRD is finally on 40 meters. TMZ is putting in a good signal with 240 watts on 75 meters. HDS has been appointed Radio Officer for RACES. PKX is QRL but will get the news and traffic reports out if received from all hands. Traffic: W7PKX 112, PJT 35, DXV 13, KFV 12, PAV 9, KUB 8, HDS 7.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Joe A. Shannon, W4MI — RM: KIX. PAM: FGT. Your new SCM solicits station activities reports and news of club activities. Clubs are asked to place the SCM on their mailing lists. Gadsden and Tuscaloosa now have functioning clubs. The Birmingham Club staged a very convincing emergency demonstration for the Red Cross in November using both mobiles and fixed stations. AENP had to change its meeting time from 6:30 to 5:30 P.M. because of skip but still meets daily on 3955 kc. AENB meets at 7 P.M. daily on 3575 kc. YZT has dropped the "N" from her call. CMK and ZSH are new Novices in Sheffield — a YL-OM team! UHA made BPL rockbound with 25 watts input. SUF and PHR are building single sideband rigs. EJZ has a pair of 6146s on c.w. and is building modulator. AWJ is new in Jackson. ELX, VON, and WYN have cleared TVI with new antennas. The Tuscaloosa and Birmingham Clubs held Christmas parties Dec. 16th and 17th, respectively. Traffic: (Nov.) W4KIX 138, RLG 53, EJZ 12. (Oct.) W4UHA 212.

EASTERN FLORIDA — SCM, John W. Hollister, jr., W4FWZ — November brought to a close until next year the Novice Hurricane Net, with congrats to IYT, YJE, and WUS for a job well done. Help is wanted from 7-Mc. c.w. operators. IYT and TAS want more operators for the Gator Net. DVR. NCS for the Palmetto Net on 3675 kc. has a beautiful plan arranged for handling Tampa Fair traffic. The Tampa Club station, DUG, will originate traffic. PJU was the only one to make the BPL in November. New ECs: MLS, TWR, OTV, WUH, UMJ, and UHC. LFL is new OO, Class III. Brookesville: TWR is building a clickless VFO and reports fun on hidden transmitter hunts with the Tampa Mobile Club. Clearwater: AYX reports the Club is holding enjoyable hidden transmitter hunts monthly. Ft. Lauderdale: YOX built an Eldico modulator and is having fun as OBS. Ye SCM visited the Broward Club. New Club officers are JZB, FNR, JVF, ZQQ, and ZT. Jacksonville: JARS officers are DSC, UHE, WEO, and UHY. The ARRL TVI touring unit went over big. Key West: TSM is the new club president. Look for ZUS on 14,278 kc. also mobile. 5NLB is 75-meter mobile. Miami:

(Continued on page 90)

Come Again

Radio-Electronic Men!

Just as you have been coming since 1945 to the IRE National Convention and Radio Engineering Show — coming by the thousands, 35,642 in '53 — so come again to see and hear all that is new in the engineering advances of your industry.

▲ Fifty-four in '54! — 243 scientific and engineering papers will be presented, skillfully grouped by related interests into 54 technical sessions. More than half these sessions are organized by IRE Professional Groups, thus making the IRE National a federation of 21 conferences in one. The whole provides a practical summary of radio-electronic progress.

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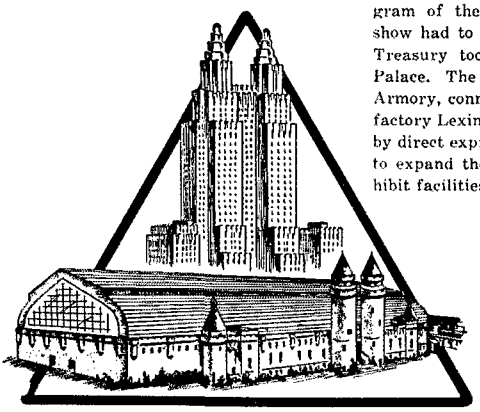
▲ Kingsbridge is the solution! Only the combined facilities of the Waldorf-Astoria Hotel, plus the three great halls in the Kingsbridge Armory, seating 906, 720, and 500 respectively, are able to keep pace with the increased technical papers program of the IRE Convention. The show had to move because the U. S. Treasury took over Grand Central Palace. The immense Kingsbridge Armory, connected to the very satisfactory Lexington Avenue Hotel area by direct express subway, serves well to expand the already outgrown exhibit facilities of the Palace and provide space for 200 new firms to exhibit, as well as seat greater audiences at the high-interest sessions. In addition to the subways, free busses leave the Waldorf every ten minutes in which you may travel in the congenial company of fellow engineers, direct to Kingsbridge.



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▲ Admission by registration only! Registration serves for the four day period. It is $1. for IRE members, $3. for non-members, covering sessions and exhibits. Social events priced separately.

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The Flamingo Net hidden transmitter hunts go over big. The Net will work 29 Mc. as well as the usual 29,044 kc. Broward also is on 29 Mc. MVR reports 13 new AREC members. It's a boy for DTJ and WYR! NQN is on 14-Mc. s.s.b. IEH is on 75-meter s.s.b. with 800-watt peak. IEH says you s.s.b. stations should remember to keep the sideband you are using *in* the band. St. Petersburg: New hams are BIL, AUA, CZZ, YZV, UUN, WPF, and WN4BAV, to mention a few, as reported by EYI. Tampa: SQA and SKN moved in from Dade County. 2JWJ/4 is ex-CN8EH. While he worked from Morocco with 1 watt he runs an 813 here. Congrats to ZD and DQA. GOR leaves us with, "Well done, Ernie." Traffic: (Nov.) W4PJU 928, LDM/KZT 331, DVR 220, PZT 191, DRD 174, BMY 119, ZIR 92, WS 79, KJ 66, TJU 59, IYT 30, FWZ 23, LLO 21, FKR 20, TYE 20, VIE 17, IM 10, AYD 8, TAS 7, TWR 6, YJE 6, ZUS 3. (Oct.) W4TJU 37.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS/RE — Acting SEC: NN. PLE/KL7 is looking for the gang. VFJ is hard at work getting the Pensacola High School Radio Club in shape with 25 members. AYS is likewise at Blount Jr. High School. WN4BGG is trying for WAS. YFF is heard burning up 14 Mc. 1REV/4 has an FB 75A-3. UCY received an HRO-60 for Christmas. CCY bought NJB's big rig. PQW is QRL mobile. PTK keeps the mobile hot. DAO is a grandpa again. UUF is trying 144 Mc. MS now has iconoscope and ham TV work goes ahead. GRO is heard on 75 meters. JM has a new car. NN is working 75-meter DX mornings. SWF is awaiting beam material. VEY finally has his receiver working. KWM had VFO trouble. ØKVX and NJH are wheels in the MARS station. WKQ has the big rig on 20, 40, and 80 meters. UNV is working on crystal calibrator. UNE is working 15 meters with vertical antenna. MFY is putting a noise limiter in the mobile rig. ZWG is on with Sonar transmitter. RKH is busy QSLing. UGQ has a new NC-183D. VBJ is building up an 813 final. VAQ is in the market for a receiver.

GEORGIA — SCM, James P. Born, jr., W4ZD — SEC: NS. PAM: LXE. RM: MTS. Nets: GCEN, 3995 kc. at 1900 EST on Tue. and Thurs., 0830 EST on Sun.; ATLCW, 7150 kc. at 2100 EST Sun. State mobile and c.d. frequencies: 3995 and 29,600 kc. The new officers of the Confederate Signal Corp of Atlanta for the year 1954 are as follows: FOE, pres.; E. B. Ezelle, vice-pres.; WN4YEK, secy.; GLX, treas.; ORI, act. mgr. EJC will continue as editor of the *Bugle*, a monthly paper published by the Confederate Signal Corps. The new officers of the Atlanta Radio Club for the year 1954 are as follows: IPL, reëlected pres.; MV, vice-pres.; ZDL, secy.; NWK, treas.; KFL, act. mgr. and editor of *The Atlanta Ham*. LNG has enlisted in the Army. VKK has a new harmonic — a boy. IMQ has returned home from the hospital and is working his Viking overtime while recuperating. The Kennehoochee Amateur Club has a new meeting place at Dobbins Air Force Base. The old-timers in this section have formed The Ole Timers Wireless Club. IO is president and KL is secretary-treasurer. The Club will hold two meetings a year, in December and in April. Any old-timers with twenty-five or more years interested in joining should contact KL, Joe Fleming, at 1243 West Ridge Road, S.W., Atlanta, Ga. HT has a new jr. operator. KWC has returned to the merchant marines. Traffic: W4USA 2050, K4WAR 1966, WBP 448, W4OCG 171, ZD 125, FOE 104, KGP 40, MTS 25. YMV 22, MA 16, IMQ 14.

WEST INDIES — SCM, William Werner, KP4DJ — SEC: HZ. The new Humacao District EC is QR. CB, RC, PQ, RK, GN, HM, CH, DV, IO, HV, BV, CX, and PZ renewed AREC membership. We regret to report the passing of KP4OO. TP/mobile is using an Elmac contacting G, F8, DL4, and HB9 stations on 20-meter 'phone. TP's XYL passed Technician and Novice Class exams. KD received QSLs from CEØAA and VQ7UU. UA, a new station on 3925 kc., reports from Sabana Grande using 32V-3 and HQ-129 receiver and emergency power. MO, assisted by ES, OS, CU, and DJ, handled urgent traffic on 3925 kc. with KG4AN re a boy's brain-tumor operation. LQ moved to Ciales. TZ is on c.w. with 6L6 oscillator. WE has a new Viking II and Matchbox. ES added H.W. VFO to TBS-50. W2WAT/MM stopped in several ports of Puerto Rico. The new AREC 10-meter Net schedule is 9 P.M. AST Mon. on 28,600 kc. KV4AQ is active on 20-meter c.w. TO has applied for OO appointment. PW, our c.d. liaison, is drawing up plans for amateur participation in RACES. W1TLJ now is portable KP4 at Sabana Seca. DJ regulated the oscillator voltage in the Super Pro with OA2. New stations heard on the 3925-kc. net are YF, YG, YI, UA, UB, RO, and VC. RD is assembling Eldico TR-1. Traffic: KP4RC 13, DJ 8, CY 2.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Howard C. Bellman, W6YVJ — Asst. SCM, William G. Coe, 6KWQ. SEC: QJW. RMs: BHG and GJP. PZN says that it looks like a hard winter for Bishop including bad 75-meter 'phone conditions. Our list of OESs now includes BMM, now moved to Manhattan Beach, CFL of Los Angeles, EGW of Temple City, NIE of Lomita, ZDO of Canoga Park. YSK, Class I OO, keeps his receiver filaments on 24 hours. MYG is looking for members in the Teen-Agers Net. HIF is a new ORS. NHP and HOW

(Continued on page 98)

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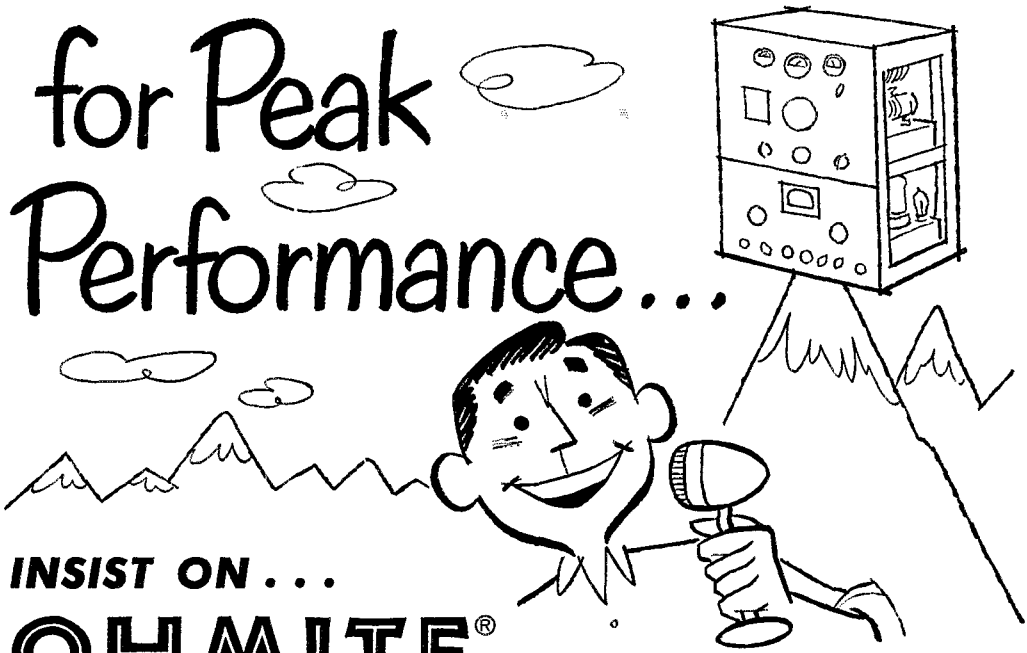

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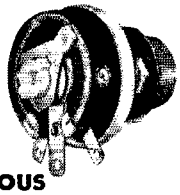

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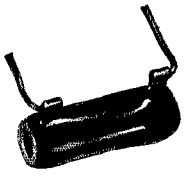

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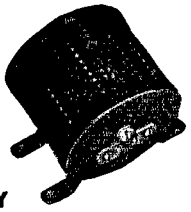

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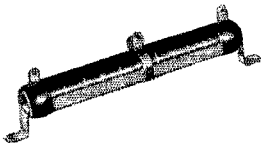

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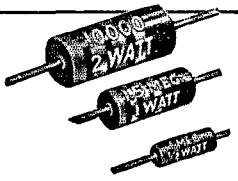

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(Suburb of Chicago)

are new ECs for Lennox Disaster C.D. Net and San Fernando (West Val) respectively. HOW is replacing GIO after a "fine tour of duty," according to the SEC. A 15-meter rotary is almost ready at Upland ARC. K6CUX. JQB reports a new VFO. According to QJW, RW has bagged TI9, UQL is new Deputy Chief RO for operations of Los Angeles County, new officers of the 50 Club are KOS, pres.; VC, treas.; GTE, secy.; WNF, sgt. at arms.; EH, dir. Whittier has the OK from the F.C.C. on city RACES plan. The DX Club heard QJW talk on antennas. EGW reports that TDM and NLZ, operating ZYT, are both aero-mobile over Arizona using Gonset Communicators. TDM also having a twin-6 Gonset beam. BHG became the first Long Beach applicant for call letter license plates. Hank also reports MBW is a new LSN member and USY is trying. BMM tells of 3 cm. demonstration at the Inglewood Club. Congratulations are in order to the Associated Radio Amateurs of Long Beach for its neat and highly informative *Ham Oscillator*. Also received and enjoyed here was the Lockheed ARC *News Notes*, five pages of live and up-to-date articles of varied interest. GJP brags of a kw. on 80 meters. Ex-9YTV now is K6CDW and is looking for a club. The gang from the Mt. Pacifico Radio Club, NJU, BFD, TJL, TJI, and MYG, had to return empty-handed, QSO style, from a trek to Mt. Pinos because of snow. AM was invited to speak at the Guatemala Radio Club while he was down there. NJU beat me to it. That is, he worked and received a QSL from ZS-Land. CUF is a DL4 in Munich. While in QSO with a state-side ham on 75-meter 'phone, LGP didn't know the conversation was being monitored by an SWL in New Zealand. A letter from the land of the ki-wi made Ed mighty happy and proud. He was using an 813, though. While we are back-slapping, let's all take notice of the recent election as Director of a really active ham, JZ, from whom many of us have received code practice. Ray is a real traffic man and should be able to look out for our interests when the Board convenes. Traffic: (Nov.) W6KYV 2049, HLZ 424, FMG 198, BHG 168, CMN 139, ISQ 97, JQB 51, MBA 46, USY 36, GJP 30, K6BVH 23, W6PZN 15, AM 8, HIF 6, OKD 4, YVJ 4, K6CUX 1. (Oct.) W6FAIG 204, ISQ 26, PZN 6.

ARIZONA — SCM, Albert Steinbrecher, W7LVR — Asst. SCMs: Kenneth P. Cole, 7QZH; Dr. John A. Stewart, 7SX. SEC: OIF. RM: QFQ. PAM: KOY. Arizona 'Phone Net: Tue. and Thurs. 7 P.M. 3865 kc. Arizona C.W. Net: Nightly 8 P.M. 3515 kc. Arizona Novice Net: Tue. and Thurs. 6 P.M. 3704 kc. IRX transmits Official Bulletins Tue. and Thurs. 6:45 P.M. 3865 kc. During November an outstanding event was held in Ajo. Congratulations go to the gang there for putting on one of the best hamfests ever held in Arizona. There were 115 present, representing 46 calls and 25 mobiles. A new use for ham radio was effected by members of the Phoenix AARC, who participated as "Safety Factors" for Jalopy Racing, and were stationed as portable mobiles around the track to report accidents, etc., to a Net Control Station. The following took part: IRX, KOY, LND, MAE, MDM, PUP, QZH, and ROZ (who was in Phoenix visiting). New calls: JMT, UJX, USM, and UXJ. New Novice: UXD. KWB and NAP are on teletype. PSH has a new Viking II with VFO and a new NC-183. NUL and OQS are building a 2-meter transceiver. LOC has a new GP antenna. SUI will be in charge of the Arizona Novice Net (ANN). The MARS Net now is changed to Mon. (c.w.) and Thurs. ('phone) at 10 P.M. on 4025 kc. Traffic: W7KOY 104, QFQ 78, LAD 64, LVR 10, PSH 6.

SAN DIEGO — SCM, Don Stansifer, W6LRU — Asst. SCMs: Thomas H. Wells, 6EWU; Shelley E. Trotter, 6BAM; Richard E. Huddleston, 6DLN. SEC: VFT. Asst. SECs: FOP, WYA. ECs: KUU, FJH, SK, QJH, HRI, DEY. PAM: JPM. Our thanks to FJH, who did such a fine job as SCM the past year. He is the new EC for Escondido. KL7MF, ex-W6MI, now with the FCC in Alaska, was a recent visitor, having personal QSOs with old friends in San Diego. CGQ made photo QSLs for TI9UXX for his Cocos operation. San Diego State College has a new Viking II. KSE has a new daughter. CXN is working DX on 40 meters. KYG is adding model airplanes as a hobby as he can't find new countries to work. The AREC Sunday Net on 3825 kc. at 0900 has 65 active members in the county area. The Rinky Dinks, ZBR, FBD, FHP, HOZ, and BTN, had a recent field day over a week end. ERZ has a special XE license with the call XE2XE to operate mobile on 75-meter 'phone while on a vacation to Mexico City. CLH, Big Bear, DLI, Mill Creek, and EWU, Pacific Beach, again are furnishing snow-ski news for a nightly TV weather report. New officers of the Coronado Club are 3KYF/6 (ex-JA2KW), pres.; PYD, vice-pres.; KSI, secy.-treas.; K6AQO (ex-VP9AL), corr. secy. The Coronado Club made 46,725 points on c.w. during the Sweepstakes. CAE took time out from rebuilding to place 12th in frequency measurements. POZ was a recent San Diego visitor while vacationing. 9IVH, in the Navy, visited San Diego Area hams. Ray, IAB, was cited for his operation of amateur radio station at Camp Pendleton during the Tehachapi earthquake. Traffic: W6IAB, 3319, FCT 3, LRU 2.

SANTA BARBARA — SCM, Vincent J. Haggerty, W6IOX — K6NBI again led the section in traffic. K6AUZ received ORS appointment and ran up a good score in the SS Contest. New officers of the Ventura County Amateur Radio Club are PYM pres.; QIW vice-pres.; KCD, secy.;

(Continued on page 94)

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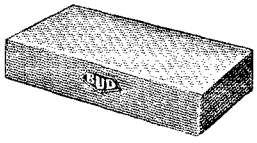

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AC-411	7″	15″	3″	16	2.04
AC-423	7″	17″	3″	16	1.83
AC-424	8″	12″	3″	16	1.71
AC-425	8″	17″	2″	16	1.89
AC-412	8″	17″	3″	16	2.22
AC-413	10″	12″	3″	16	1.89
AC-414	10″	14″	3″	16	2.40
AC-415	10″	17″	2″	16	2.28
AC-416	10″	17″	3″	16	2.58
AC-426	11″	17″	2″	14	2.37
AC-417	11″	17″	3″	14	3.00
AC-418	12″	17″	3″	14	3.18
AC-419	13″	17″	2″	14	2.82
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and K6AUZ, treas. BJB has joined the Air Force. JHV mobile is reported to be doing quite well on 2 meters up San Luis Obispo way. Reports were light this month. How about some reports from the Santa Maria and Santa Barbara Areas? A card at the month's end noting your activities is invited. Traffic: K6NBI 105, W6FYW 6, K6AUZ 4.

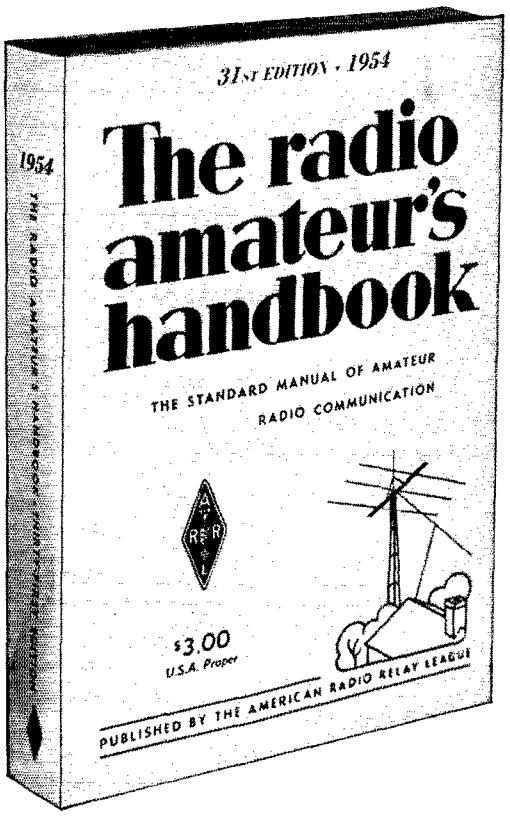
WEST GULF DIVISION

NORTHERN TEXAS — SCM, T. Bruce Craig, W5JQD — SEC: RRM. PAM: IWQ. RMs: PCN and QHI. MBP reports that the 160-meter Blue Ridge Net has greatly increased activity. LGY reports a trip to California, also a 2-watt rig. WN5AXL is a new Dallas ham. CTM, ATG, GZU, and VYY were Commerce visitors. ATG is remodeling his home rig. AWT, Weatherford, reports a busy time. VIM reports the "portable pedestrian" on 2 meters runs ¼ watt to 958. The Central Texas Amateur Radio Club officers are NSM, pres.; RDG, vice-pres.; TVA, secy.; NCD, treas. ER has a new Viking II. ATW reports considerable 2-meter activity. BVG had a vacation in Alabama. The Waco XYL Club met at KKD's on Nov. 12th. TJE reports on OBS activity and suggests that more hams use modulation monitors to add much-needed space on the bands. RRM reports many certificates are coming in for renewal, but suggests that all ECs look at their expiration dates and also that when you get a letter suggesting you send yours in, you do it right away. The Amarillo Club had supper with the SCM and a party on Nov. 15th, then met CA, West Gulf Division Director, while he was changing planes, to discuss some of the division's problems. RRM reports that c.w. nets need outlets in Dallas and Amarillo. A new c.w. emergency net is being formed. AFJ is new ANCS of NTEN. Traffic: (Nov.) W5UVC 176, PAK 161, UFP 62, CF 37, PCN 31, JQD 18, RRM 16, RDG 13, TYX 6, AWT 3, MBP 3, SFA 3, LGY 1. (Sept.) W5ASA 55.

OKLAHOMA — SCM, Jesse M. Langford, W5GVV — Asst. SCM: Ray A. Thacker, 5TFP. SEC: CKQ. RM: MQI. PAMs: SVR and ROZ. The dinner sponsored by the CAA Radio Club at Oklahoma City was well attended and a very good program was provided. Enid has three new hams all in one family, WN5CCJ, WN5CCK, and WN5CBY. WAH is in the Air Force at San Antonio. RST went to Colorado for Christmas. The Enid Amateur Radio Club held its annual Christmas Dinner Dec. 27th. Ada is organizing a radio club and now has nine hams in the county. IOW would like anyone interested in helping to organize a 2-meter net in Oklahoma to contact him, the purpose to extend 2-meter operation and to handle traffic. 4RDM/5, at Ft. Sill, reports into all the major traffic nets. VHP now has an HQ-140X. BDX is building new lattice crystal signal slicer. SNL and SMM are on the bands again. PZ is using center-loaded vertical ground plane for 75 meters. YQO is using off-center-fed dipole for 80 meters. The Tulsa County Emergency Net invites all stations to check into the net on 3860 kc. Sun. at 1330 CST. Station activities reports are desired from all Oklahoma stations regardless of band worked or the amount of traffic handled, as this is the only way we can report the section's activity. Traffic: (Nov.) W5MQI 138, YQO 54, GVS 52, ADC 48, PML 45, KY 35, RST 28, FEC 27, GVV 27, MFX 22, EHC 17, TFP 14, SWJ 12, PNG 10, WSQ 10, PZ 9, VAX 8, VEP 8, WQ 6. (Oct.) W4RCM/5 27, W5PZ 4. (Sept.) W5PZ 4.

SOUTHERN TEXAS — SCM, Dr. Charles Fermaglich, W5FJF — The SARC still is very active and Mary certainly makes a fine editor. The Ladies' auxiliary meets regularly and has nice programs. At the last SARC hidden transmitter hunt the transmitter, hidden by LVE, was found by FZA, LFG, and HHO. EYV is having lots of luck on 15 meters. ABQ has been laid up because of an auto accident. MIF set up his own rig by ABQ's bedside to help him pass the time while recovering. MWN works his son on sked. VWF is building a new 500-watt rig with 813 final. WYW is one of the latest 75-meter mobiles. URU is going strong on 40 meters. 8KDD passed Extra Class exam and has been working as an operator aboard ship. The Texas State Guard Amateur Radio Club, TLE, holds a hidden transmitter hunt once each week. FJF is working on a new kw. rig. FEK is going strong on 2 meters. LSE is going s.s.b. KFY is constructing a crystal-checking oscillator. ETA is NCS of Dragnet, the local 75-meter mobile net, which meets weekdays from 7:15 to 8:30. AIR and YES are Alt. NCS. There are more than 60 mobiles who check in regularly. Frequency is 3855 kc. with 3835 kc. as alternate frequency. The Kerrville ARC is going strong and preparing for an FB convention. The Club holds monthly transmitter hunts. RSA was first and TTW was second in the latest one. Club officers are TSG, pres.; OSP, vice-pres.; BEO, secy.-treas. FNH is general chairman of the coming Convention. Your SCM attended the Temple ARC's annual Christmas Party and get-together. LM worked me and talked me into town on my mobile. PNP and DXD met me, mobile, at the edge of town and guided me to LM's home. Lots of large clubs can take a lesson from these boys who have the real spirit of friendship. JIB was chairman and everything was FB. VFG is president of the club. FJF wants to visit all clubs in 1954, so please drop me a line with club meeting information, time and place of any proposed gatherings

(*Continued on page 96*)



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NEW MEXICO — SCM, G. Merton Sayre, W5ZU — SEC: MYL PAM: BIW. RM: NKG. The NMEP Net meets at 1730 Sun. and 1800 MST Tue. and Thurs. on 3838 kc. The NM C.W. Net meets nightly at 1900 MST on 3633 kc.; the NM Breakfast Club daily from 0700 to 0830 on 3838 kc. The Amateur Radio Caravan Club of New Mexico may be heard work days 0700 0800 on 3993 kc. New owners of the Sandia Base ARC are ZFS, pres.; UOZ, vice-pres.; RLT, secy.; 7MKH/5, treas. The Walker AFB ARC recently was reorganized to permit civilian membership. New officers are WIY, pres.; Sgt. Davis, vice-pres.; SUN, secy.-treas. Sgt. Sparks, GGO, has moved to Gila Bend, Ariz.; VHW to Midland, Tex. RDP is back from Korea and has moved to Georgia. The Albuquerque V.H.F. meets at 1930 Fri. on 144.138 Mc. FPB has a new MM GP-4 drooping ground plane for the local 2-meter net and reports most beam contacts are reflections off the Sandia Mountains. RFF made 618 contacts in 70 sections in the SS. BAG, KDX, NEH, RFJ, RFK, UQA, WVA, ZU, 1YHP, 4VFA, and their families had an FB picnic at White Sands National Monument Dec. 6th. Traffic: K5NRX 129, W5NKG 66, NUN 42, ZU 32, WPA 23, JZT 22, CEE 17, K5WSP 17, FAB 15, W5GEM 11, ZSL 11, BIW 10, RFF 10, YFN 8, YWG 8, UTS 6, RFK 5, MOX 4, FVY 3, HJF 3, WVA 3, WBC 2.

CANADIAN DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — The Giant Civil Defense Convoy recently visited Halifax and with the local civil defense people staged a huge two-day display at the Halifax Armouries. With the coöperation of the communications committee HARC members manned an amateur radio booth fully equipped with complete all-band ham station using the call of the Club, FO/1. Operation and installation, sparked by LZ, OM, RR, FQ, and others. Best DX through the unusually high noise level was GM8MN. DQ and PT used their mobiles to good purpose, the former having the c.d. director speak to the people while cruising the "target area." In addition the c.d. director for Halifax paid tribute to the local amateurs for their fine coöperation in these displays and exercises. Our Province of N.S. is the first in Canada to be issued licenses under the D.O.T. for c.d. communications. Keep an ear out for CJW201. VE1DQ/1 also will be used for some projected tests in the near future. Power of 200 to 300 watts on the 3.7 to 3.9-Mc. 'phone band is available and a rather good doublet antenna has been erected for test purposes. We are interested in all Maritime Division reports on tests of CJW201 and VE1DQ/1. Some testing also will be done on the c.d. channel of 3990- to 4000-kc. 'phone. Traffic: VE1FQ 248, AAW 190, VO6U 114, VE1ZM 41, BL 13, HC 10, ABZ 7.

ONTARIO — SCM, G. Eric Farquhar, VE3IA — AVS reports conditions on all bands are very grim. This seems quite general. OM. VZ changed location and now is operating from Islington. Welcome to the Sky Wide Radio Club, located in Mimico. This column would welcome some news of your proceedings. With deep regret we report the passing away of Art Schiper, DIB. Art, a polio victim, was a very likeable fellow and surely will be missed by the Forest Hill gang. DN specializes in giving Novices their first VE contact on 80 meters. A nice gesture, Dave. IL, NG, and AIB gave a demonstration of mobile operation to a very interested group at North York on behalf of civil defense. Feb. 5th is the date of the dinner-dance, an affair which is held annually by the Norton Radio Club in Toronto. NG has the particulars. Traffic: VE3BUR 195, ATR 189, NG 133, IA 88, AJR 77, NO 55, KM 51, DU 30, AOE 18, AUU 11, DPG 7, VZ 3.

QUEBEC — SCM, Gordon A. Lynn, VE2GL — KJ, who resumed hamming in 1951 after a rest of 28 years, has had 1109 contacts on 75 and 40 meters with 19 set operating on 12-volt storage batteries. NI, who was rebuilding, got back on for the SS Contest. ADK has a new rig with 813 final with pi-nets in both grid and plate and with gang-tuned exciter with VFO, BK finds building walkie-talkies taking all his available time. ABR has changed QTH from LaSarre to Granby, where he runs 300 watts to p.p. 812s. AAN, of La Sarre, now is on with a single 813. BG reports 15-meter contacts very good when the band is open, usually between 2 and 5 P.M. EST, but he works mostly on 75 meters. EC, ZL, AEM, and APP maintain twice-daily skeds at 9 A.M. and 1 P.M. on 75 meters. ANB, ASK, and NW, of Upper St. Maurice Valley, are on 80 meters every week end ready for traffic. APE is active on 75-meter 'phone each week end also. CA reports a heavy file of traffic from many Eskimos who are ill in the hospital in Quebec City to their families in the Arctic. One batch of 68 messages was cleared to VE8RT and VE8YT, who took them in turns. PQN is trying 3670 kc. on an experimental basis because of QRM on 3570 kc. brought on by long-skip conditions. LO, LM, RE, ATQ, GK, and CP report in regularly, with DR as manager. VE2AHE spent 4 days with HI6EC, just returning with VE2RP from extensive travels. PYIADA (Pres., LABRE) has just sent the ALL BRAZIL (WAB) AWARD to VE2AHE; their first to an English language country, and

(*Continued on page 98*)

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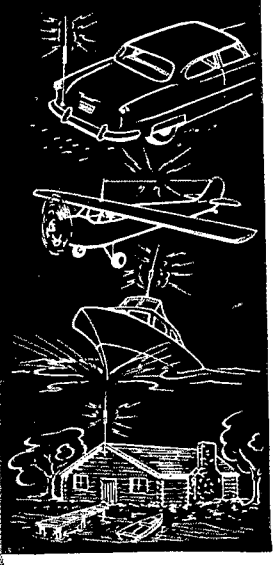

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ALBERTA — SCM, Sydney T. Jones, VE6MJ — HM is building a new type of VFO. LQ is finishing up a grid-dip meter. New officers of the NARC are as follows: NX, pres.; DO, vice-pres.; HM, secy.; ZA, treas. HY was a recent visitor to Edmonton. PP had a blown filter in the big rig but still worked MJ and EH with flea power. We are sorry to report that at this writing LZ is in the hospital in Calgary. We hope that by the time this is in print AL will be feeling much better. GK made a trip to U.S.A. HM reports some nice DX, having worked CR9AH on the Island of Macao. KZ has worked some nice contacts on 21 Mc. TK reports the Calgary gang is hot on the trail, going whole hog for 2-meter operation. We are sorry to report that KN is on the sick list. All the gang wish him a speedy recovery. WB was QRL helping in the search for a lost aircraft. WC reports conditions very poor for traffic-handling during November. MJ is QRL on the busy end of a paint brush. Traffic: VE6HM 54, WC 19, MJ 7, KZ 6, NX 1.

BRITISH COLUMBIA — SCM, Peter McIntyre, VE7JT — Thanks to our unnamed Chillibush correspondent for the news. Congrats to the new Vice-Director for Canada, AC, who recently celebrated his silver anniversary, and to his XYL our best wishes for the next 25. Glad to have QC back on the air after a long stay in the hospital and hope it's his last sojourn there. Congrats to RN on another daughter. Chillibush has enough hams to form a club but seems to lack the go to do it. Occasionally heard are BC and QU, while "The Noise of the Fraser Valley," AA, and AFA and RS keep the town on the radio map. NH's landlord takes a dim view of radio poles so he is dormant. RS says the background noise from the jr. operator is inaudible on c.w., so he is staying on c.w. AC says all his spare time is going into rebuilding the big rig. The TVI committee is in operation and helping the boys out of their difficulties. We hear that ex-5GA is going to settle in Sydney and wonder if he will put out the same signal as from Regina Beach. DH, of Nanaimo, was appointed SEC for British Columbia upon the resignation of PO. As conditions were bad and as I was away part of November I haven't had a chance to gather in much news but the ice has been broken by one correspondent, so more of you start writing to keep us posted. Traffic: VE7DH 32, FS 4, AC 3.

MANITOBA — SCM, Leonard E. Cuff, VE4LC — At the Annual General Meeting of the Amateur Radio League of Manitoba held in November the following officers were elected for 1954: CE, hon. pres.; SR, pres.; JY, vice-pres.; DP, secy.; LC, treas. We wish to offer our sincerest congratulations to CE on his promotion to the position of Chief Constable of the City of Winnipeg. AZ is a member of the Tenth Regional Net; he has just given his rig a thorough overhauling. HL has taken over the position of RM for another term and is busy getting set up in his new QTH at Portage. GE, assisted by her OM IF, is PAM and is turning in a very fine job. JM is rebuilding but should be on again by the time that you read this. QV is active again on 20 meters after a long layoff. RO is finding it more and more difficult to work any new countries; he seems to be getting near the bottom of the barrel. PA visited the SCM recently and informed us that his firm has transferred him to The Pas. RW now is a member of Canada's famous Royal Canadian Mounted Police and is stationed at Regina in VE5-Land. Traffic: VE4AZ 24.

SASKATCHEWAN — SCM, Harold R. Horn, VE5HR — FLASH: Start now and get prepared for the 1954 Annual Hamfest. The Moose Jaw Club is sponsoring the event this year and it will be held May 24th. Be sure and plan to attend; you are assured of a good time. PJ reports IC, at Tisdale, is back on the air; LD has boosted his power to 100 watts; and GT is putting out an FB signal with his new rig of p.p. 813s. BG is heard on 40-meter c.w. PI is on 80-meter c.w. with an FB note. SR passed his exam and will be heard on soon. LY is experimenting with a T2FD and getting good results. RQ is heard on occasionally, when time permits. HR made WAC on A3 this summer running his countries worked up to 65 by doing so. JO is on with a pair of 814s at 90 watts and, along with FY, is heard on 21 Mc. doing well. EQ has rebuilt and now uses a pair of 807s. YF and FY attended the Prince Albert Club annual banquet and reported a good attendance and a good time. AQ and CD have moved to Alberta to become VE6s. HJ is a new ham at Melfort who received his ticket in the morning and was on the air going strong in the afternoon. DB has moved to Saskatoon. Traffic: VE5HR 27 PJ 4, LU 2.

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"LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

Harmonic Antennas

(Continued from page 14)

again out of range. Carrying out the calculations, we obtain the following results:

a bandwidth of 118 kc. centered at 3.41 Mc.,
a bandwidth of 148 kc. centered at 7.08 Mc.,
a bandwidth of 165 kc. centered at 14.29 Mc., and
a bandwidth of 239 kc. centered at 28.75 Mc.

Except for slight improvement in the lower two bands, these bandwidths are not significantly different from those calculated for a wire 25 feet high.

Feeders

A brief discussion of feeders is in order, principally because they introduce another difficulty in this type antenna system. In a center-fed doublet, the feeder system is relatively free of induced antenna currents if it is perpendicular to the antenna for a reasonable distance away. However, in an off-center fed system this is not the case. While a certain angular orientation of the transmission line with respect to the antenna may balance out antenna currents at a particular harmonic, this condition will not prevail at other harmonics since the radiation patterns (and induction field patterns) are different. A pair of r.f. ammeters in the line will demonstrate this.

A coaxial pair — i.e., two 75-ohm lines side by side to give 150 ohms — might appear to be a solution to this problem, but in this case the coupling effects due to the induced currents in the outer surface of the coax shield will produce completely unpredictable distortions in impedance and pattern characteristics, and furthermore, these distortions will also differ on various harmonics.

Conclusion

There is an infinite number of combinations of antenna height and length that can be investigated, but we can certainly conclude from the cases considered that, as stated in the beginning of the article, flat-line multiband operation may be possible, but it is certainly not very practical. No doubt many amateurs have tried off-center balanced-line-fed multiband antennas and "they work!" The real criterion is, of course, the radiation efficiency and radiation pattern. Actually, any piece of wire attached to the output of a transmitter will radiate some energy, and the currently popular pi-section output is capable of compensating considerable reactance. The old single-wire feed system (Windom) used to do about the same job.[8]

[8] Windom, "Notes on Ethereal Adornments," *QST*, Sept., 1929.

Strays

Some of the fellows who have the newer U. S. "K" calls are beginning to find out how lucky they are. The old rare-DX technique of "CQ NO W" doesn't bother them at all.

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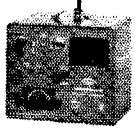


An improved model of *the popular Communicator, 2-meter station. Cabinet modified to include ventilating screens. Ideal for CD work because of squelch and automatic speaker muting when phones are plugged in. Has receiver dial light, on/off switch and built-in speaker, noise limiter and 19" whip. Takes crystal or carbon mike. Crystal control.*

Complete with tubes (less crystal and mike)..... **$229.50**

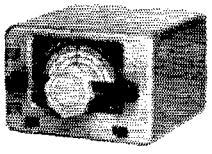
New Mobile Receiver GONSET SUPER-CEIVER

Uses any converter as a tuning head. Employs crystal-controlled first IF and dual conversion to 265 kc. Adjustable-pitch BFO; AF, RF and AVC controls; built-in noise clipper and squelch; built-in PM speaker. *Furnished with convertible (dual) 6-12 volt pack and tubes.*

less converter **$119.50**

GONSET "SUPER 6"

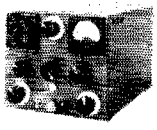
Six Band Amateur Converter



A compact converter covering 10, 11, 15, 20, 40, and 75 meter phone bands. Also *covers 6 mc. (49 meter) and 15 mc. (19 meter)* short wave broadcast bands. Uses 6CB6 low noise rf stage, with panel controlled antenna trimmer, 6AT6 triode mixer, 6C4 modified Clapp oscillator, and 6BH6 IF stage.

Complete with Tubes..... **$52.50**

JOHNSON VIKING Mobile Transmitter Kit



A low cost, efficient *rig in kit form, ready for quick and easy assembly. 30 watts input at 300 volts... up to 60 watts, at 600 volts.* 100% modulated...three stages, 807 output...75, 20, and 10 meters with provision for additional band . . . crystal control. Other features include: bandswitching, gang-tuning, RF fixed bias supply, and metered stages..... **$99.50**

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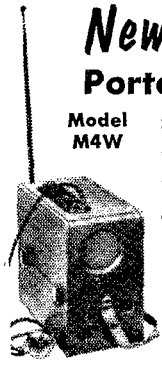

A compact, four channel, 2-way radio telephone. Self powered. *Will operate for approximately 20 hours without recharging. Self-contained batteries can be charged from standard household current or from storage battery. Operates on any channel* from 2 to 3mc covering telephone, Coast Guard, and two ship-to-ship bands. *Has 5 to 50 mile transmitter range.* Delivers approximately 3 watts to built-in antenna. Built-in speaker, plus closed circuit jack for use with external trumpet speaker as efficient P.A. system. No written test or technical knowledge required for license. Weighs less than 20 pounds and can be carried like an overnight bag.

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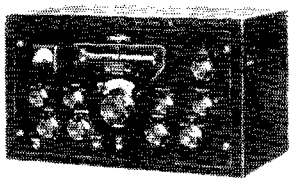
Add Federal Tax..... 6.62

Battery Charger..... **19.95**

The COLLINS 75A-3 Receiver



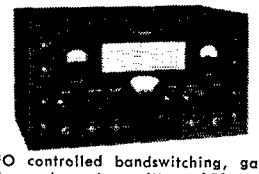
With Mechanical Filter

The familiar Model 75A-2, redesigned and modified to provide for the use of mechanical filters. Supplied with one 3 KC filter, and facilities for one additional. A 2-position front panel switch permits selection of filter desired.

Complete (less speaker)..... **$530.00**

Speaker **20.00**

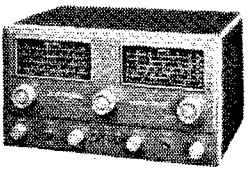
COLLINS 32V-3 Transmitter



A VFO controlled bandswitching, gang-tuned amateur transmitter. 150 watts *input on CW and 120 watts on phone.* Covers 80, 40, 20, 15, 11 and 10 meter *bands.*

Dimensions: 21⅛" wide, 12-7/16" high, 13⅞" deep.

Complete with tubes..... **$775.00**



NATIONAL NC-88

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The advanced NC-88 circuit uses 8 high-gain miniature tubes plus rectifier, covers 540kc to 40mc with calibrated bandspread for amateur bands. Built-in speaker; two IF stages; 2 audio stages with phono input *and tone control; antenna trimmer; separate high frequency oscillator; sensitivity control; series valve noise limiter;* delayed AVC; headphone jack . . . and other features that add valuable performance characteristics to this popular model.

NC-88 *complete with tubes*.... **$119.95**

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Checking R.F. Chokes

(*Continued from page 15*)

checked on a calibrated receiver. A perfect choke has no reactance, one way or another; it will not add to, nor decrease the g.d.o. frequency. Such is seldom, if ever, the case, for the perfect r.f. choke has yet to be developed. In practice, however, varying degrees of desirability may be assigned to several chokes undergoing test. The r.f. choke that least shifts the g.d.o. frequency, as determined by the communications receiver, is assumed to be least imperfect and, hence, the most desirable for use at that particular frequency. Chokes planned for multiband usage should be checked at all frequencies involved before being considered satisfactory. Subsequent experience in building exciter and transmitter units has proven the worth of this technique. How the several chokes tested stack up is shown in the accompanying table.

Results of Test on R.F. Chokes

	Frequency Shift in Kc.		
Choke	*80*	*40*	*20*
National R-300 (2.5 mh.)	−15	−140	−180
Millen 34105 (1 mh.)	+20	−120	−230
National R-100 (2.5 mh.)	−20	−150	−180
National R-300 (1 mh.)	+30	−120	−245
From BC-375 Unit No. 7	−50	−550	−500
From BC-375 Unit No. 5	−100	−580	−600
From BC-375 Unit No. 9	+130	−350	−650
Ohmite Z-7 (7-Mc. choke)	+900	+600	+30

'Phone Selectivity

(*Continued from page 23*)

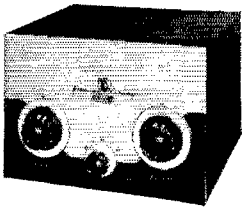
until both have cooled. *Every effort must be made to avoid straining the crystal wires;* once they come loose from the crystal you are, for all practical purposes, through with that crystal. Next, select a solid hand rest, and with the tweezers hold the crystal carefully but firmly; apply the soldering iron to the opposite junction and lift away the crystal with its two wires.

For grinding, the crystal is held by its edges between the thumb and index fingers and stroked back and forth with fairly strong pressure on a carborundum No. 106 razor hone, or something similar. A combination of figure-8 and back-and-forth strokes can be used. The edges should be checked frequently for squareness under a high-power magnifying glass, and the squareness of the sides checked by silhouetting the crystal against the sky. As the crystal approaches the desired frequency it should be checked for Q by the method already described. Low Q is due to lack of squareness and/or grinding the edges unequally. The necessity for resoldering the crystal to the holder wires each time frequency and Q are checked is an unavoidable evil. The crystal is remounted by a reverse of the taking-out process. After mounting, it should be rinsed in alcohol and dried thoroughly.

"Don't bother him, Junior. He's all tied up in a deal with Walter Ashe."

HAM GEAR

JOHNSON MATCH BOX— Bandswitching antenna coupling system. Model 250-23 Net $49.85



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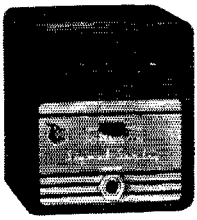
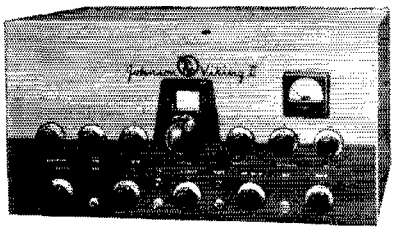


JOHNSON VIKING II TRANSMITTER KIT. Net $279.50

JOHNSON VIKING II WIRED AND TESTED. Net $337.00



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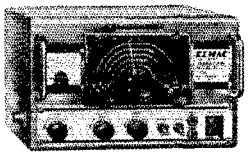

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Model S-40B	119.95	Model NC-88	119.95
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220 Mc.

(Continued from page 18)

suggested, the various currents will, of course, be lower.

With all stages working, check back over the adjustments, peaking those previous to the final amplifier for maximum grid current in the final stage. If the stage is completely neutralized, maximum output, minimum plate current in the final stage, and maximum grid current in the final will all appear at one setting of C_7. This is probably the most sensitive indication of correct neutralization. Another check is to remove the crystal or otherwise disable the oscillator for a *brief* test period. There should be no final grid current when this is done. If any appears the final stage is not neutralized, or some of the other stages may be oscillating. Final grid current, under load, should be 6 to 8 ma.

In operating the transmitter with an antenna attached, the coupling between L_7 and L_6 should be adjusted for maximum antenna power. This is best checked with a field-strength indicator, such as the one described in December *QST*. Modulation may be checked by listening to the signal with no antenna connected to the receiver. With the lamp load coupled to the final stage, there should be a brightening of the lamp as the operator speaks into the microphone.

The shape of the final plate circuit can be adjusted to vary its inductance. If the plate condenser tunes near maximum capacitance, the inductance is too low, and it can be increased by spreading the sides of the U-shaped "coil" farther apart. Narrowing the U reduces the inductance, so that more capacitance will be needed to tune it to resonance.

Amplitude Limiting

(Continued from page 26)

the additional effort spent in determining the correct negative-temperature-coefficient capacitor is of value. The compensation required varies with every individual case, and must be determined experimentally for optimum results. Temperature tests made on the compensated inductor resulted in temperature-frequency coefficients of less than 2 cycles/10^6/°C. over a 60° C. temperature range. The frequency stability of the complete oscillator circuit is poorer by a factor of about five.

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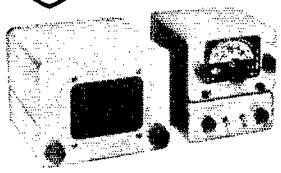

Includes crystal controlled, fixed-tuned superhet receiver and a separate control box, designed for use with "Super 6" or any good quality converter. Voltage regulated BFO with adjustable pitch control permits CW or SSB reception. Noise clipper, squelch circuit, PM speaker, and filtered vibrator-power supply built-in. RF and AF gain controls. 4 double-tuned IF transformers. With tubes, 1430 kc crystal and 4 ft. cables with connectors. Specify 6 or 12V.....**$119.50**

Gonset "Super 6" Converter — Covers 10-11-15-20-40-75 meters, plus 49 and 19 meter SW bands. With tubes **$52.50**

GONSET NOISE CLIPPER

Minimizes interference from ignition noises, certain power leaks, electric razors, etc. Excellent for mobile or fixed station communications and short wave broadcast receivers. 2x4x2½". With instructions and cable — ready to attach.....**$9.25**

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Coils only.....Ea. **$4.00**
Set of 3 coils, mount & shorting bar for 10 meters .....Only **$22.50**

GONSET COMMUNICATOR II

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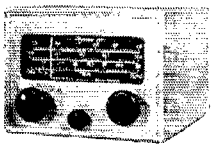
Compact, 2-meter station with built-in speaker, noise limiter and 19" whip. Output 5 to 7 watts. Uses 8 mc crystals. Tuning eye metering on all stages. Cascode RF stage and 3 IF stages. Dial light switch. Takes crystal or carbon mike. Operates on both 110VAC and 6VDC. 10¼x9¼x7". Wt. 20 lbs. Less mike and crystal **$229.50**

Communicator I. As above, less squelch, phone jack and light switch **$209.50**



MORROW CONVERTER

Covers 10-15-20-40-75-80 meters. Temperature compensated Clapp oscillator. 3 gang tuning and separate coils for each band. ½ microvolt sensitivity. Built-in noise limiter. Antenna trimmer on front panel. Requires 6V. at 1.2 amps; 250 VDC at 20-25 ma. With tubes. 5BR (for use with FTR) **$67.95**

FTR Receiver. Crystal controlled, fixed-tuned superhet with adjustable squelch, audio amplifier, power supply **$128.40**

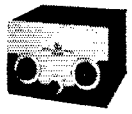
SHERRICK CONVERTER-ETTES CONVERTER-PRESELECTOR

For any one band: 10-15-20-40 or 75 meters. Uses broadcast receiver to tune band. No operating adjustments necessary after installation. Increases sensitivity and improves image rejection as a preselector. Requires 6V. at 0.75 amp; 150 to 250V at 15 to 25 ma. 4x2⅛x1⅝". With tubes, wired and tested. Specify brand. **Model CVT.** **$17.50**

JOHNSON SIGNAL SENTRY

For monitoring CW or phone without regard to operating frequency. Energized by xmtr RF. Receiver audio muted for break-in operation. Can be used as code practice oscillator with slight modification. Requires 1— 12AX7, 1— 12AU7 (not supplied). Completely assembled. With instructions. **$14.70**

JOHNSON MATCH BOX



Antenna coupling system. Matches practically any line and can be used with any xmtr up to 250 watts. Loads antennas (unbalanced or single wire) of 25 to 3000 ohms. Instant bandswitching for 80, 40, 20, 15, 11 and 10 meters. Front panel tuning and loading. Self-contained antenna changeover relay. Impedance 52 ohms from 3.5 to 30 mc range.....**$49.85**

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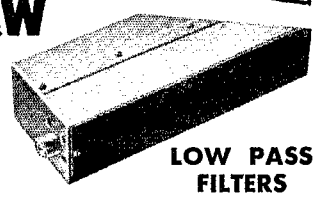

Squelch harmonic radiation! No tuning or adjustments necessary. Insertion loss less than .25 db through entire pass band to 30 mc. Attenuation at least 85 db throughout TV band, 100 db on TV channel 2. Handles more than 1 KW of RF power. Includes 4 "K" sections, 2 "H" derived end sections. All copper construction and high grade electrical Teflon insulation. 10¾x3x2". Choice of 52 or 75 ohms **$14.85**

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An effective noise silencer that does not distort audio signal. Includes variable squelching arrangement to eliminate background noise during standby receiving periods. Makes it easier to detect a carrier under heavy noise conditions. On-off switch not required. Requires 6V. at 6 amps; 150 to 250V. at 2 ma. Tubes: 6AL5, 12AX7. 2¾x2¼x1⅝". With tubes.
Model TNS-1 .....**$12.50**

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Bandpass Circuit Design

(Continued from page 30)

C_A = input capacity
C_B = output capacity (including tube cap.)
G_{s0} = fictitious output load due to input load; i.e., loading that is seen looking back into unit due to transformed R_A
Q_A = loaded Q of L_A due to R_A

Rest of terms same as for equal-Q case except that $L_A - M$ is not equal to $L_B - M$.

Equations:

$$Q_A = \frac{2\pi f_o C_A}{G_A} \qquad k = \frac{M}{\sqrt{L_A L_B}}$$

$$k^2 Q_A^2 = \tfrac{1}{2}$$

$$B_{-3} = kf_o = \frac{G_A}{2\pi C_A \sqrt{2}} = \frac{\sqrt{2}G_{s0}}{2\pi C_B}$$

$$G_{s0} = \frac{k^2 Q_A^2 C_B G_A}{C_A} = \frac{C_B}{2C_A} G_A$$

We are now ready to design the couplings for the ten-meter converter to be used as an example.

Since the interstage coupling is the easier, we will calculate this one first. The equivalent diagram is shown in Fig. 5:

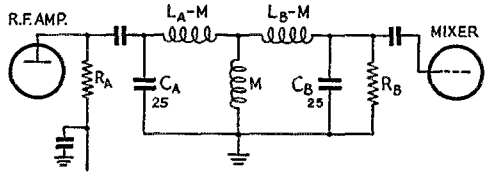


Fig. 5 — Equivalent diagram of the interstage coupling.

A value of $C_A = C_B$ must be selected. This should be low to give high gain but must include tube and wiring capacity:

Suppose: $C_A = C_B = 25$ $\mu\mu$f.

$$f_o = \frac{f_{high} + f_{low}}{2} = \frac{29.7 + 28.65}{2} = 29.15 \text{ Mc. approx.}$$

$$B_{-3} = \sqrt{2}B_{-1} = \sqrt{2}\,(f_{high} - f_{low}) = 1.41 \times 1.05 \text{ Mc.}$$

Allowing leeway, $B_{-3} = 1.6$ Mc.

$$B_{-3} = \frac{f_o\sqrt{2}}{Q}, \text{ and}$$

$$Q = \frac{\sqrt{2}f_o}{B_{-3}} = \frac{1.41 \times 29.15 \times 10^6}{1.6 \times 10^6} = 25.6$$

$$k = \frac{1}{Q} = \frac{1}{25.6} = 0.039$$

$$B_{-3} = \frac{2}{2\pi RC}, \text{ and}$$

$$R = \frac{\sqrt{2}}{2\pi B_{-3} C} = \frac{1.41}{6.3 \times 1.6 \times 10^6 \times 25 \times 10^{-12}} = 5500 \text{ ohms}$$

$$L_A = \frac{1}{\omega^2 C}, \text{ where } \omega = 2\pi f$$

$$L_A = \frac{1}{6.3 \times 29.15 \times 6.3 \times 29.15 \times 10^{12} \times 25 \times 10^{-12}} = 1.18 \ \mu\text{h.}$$

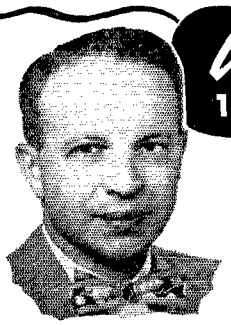
$M = k\sqrt{L_A L_B} = kL = 0.039 \times 1.18 = 0.046$ μh.
$L_A - M = L_B - M = 1.18 - 0.046 = 1.14$ μh. approx.
$R_A = R_B = 5500$ ohms. $L_A - M = L_B - M = 1.14$ μh.
$M = 0.046$ μh.

We are now ready to calculate the components of the antenna input coupling, using the equation of the infinite-Q case (Fig. 6). The capacity of C_B includes tube capacity, of course. To obtain a good noise figure from our r.f. amplifier, we wish to have a voltage (or impedance) step-up from the antenna to the grid of the r.f. amplifier tube. This

(Continued on page 108)

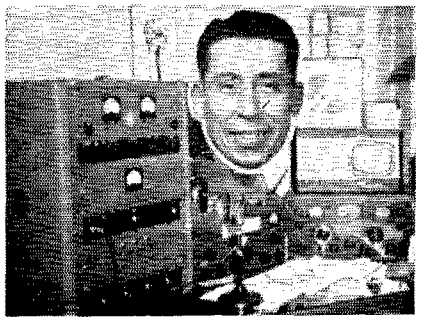
Use WRL's EASY PAY PLAN

10% Cash Down • 18 Months to Pay



Leo I. Meyerson, WØGFQ
C.U. on 10-20-40 & 75 Meters

Now it is easier than ever to buy from WRL. Pay as little as 10% down and the balance in 18 months. No red tape — we handle our own financing. We will give you a generous trade-in allowance on your present equipment. We have over 600 reconditioned used items — with new factory guarantee. Send for free list. You will profit most when you deal with WRL — THE WORLD'S MOST PERSONALIZED RADIO SUPPLY HOUSE and "LARGEST DISTRIBUTOR OF AMATEUR RADIO TRANSMITTING EQUIPMENT."



Clyde M. Fuller, W8MRV Praises GLOBE KING Xmtr.

Dear Leo:

Regarding your 400 series transmitter, your slogan, "More Watts Per Dollar," is the understatement of the year.

Top quality of parts plus high efficiency is the difference between being lost in the QRM and riding the crest. Take note of the proximity of the TV receiver to the transmitter.

Yours for more value per ham dollar.

Clyde M. Fuller, W8MRV
16603 Stout, Detroit 19, Mich.

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GLOBE KING XMTR

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KIT FORM **$89.95**

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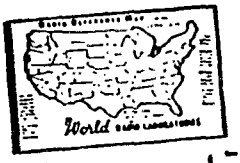

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Address_____

City_____ State_____

step-up can be anything within the limits of the components. A value for output resistance, the resistance that the grid sees, is known to be optimum at about 2500 ohms

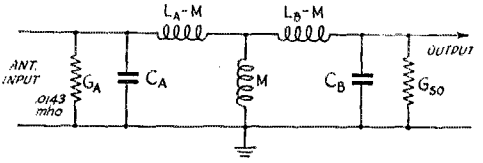

Fig. 6 — Equivalent diagram of the input coupling.

or so for best noise figure at 30 Mc. for a 6AK5 triode-connected as a cascode amplifier input tube. This value has been used.

$R_{out} = \frac{1}{G_{s0}} = 2500$ ohms (by choice).

As mentioned in the discussion of antennas, 70 ohms is a good figure to use for an average value of impedance for a 10-meter whip.

$R_A = 70$ ohms $\quad G_A = \frac{1}{R_A} = \frac{1}{70} = 0.0143$ mhos

$k = \frac{B_{-3}}{f_0} = \frac{1.6 \times 10^6}{29.15 \times 10^6} = 0.055$

$B_{-3} = \frac{G_A}{2\pi C_A \sqrt{2}}$, and

$C_A = \frac{G_A}{2\pi B_{-3}\sqrt{2}} = \frac{0.0143 \times 10^{12}}{6.3 \times 1.6 \times 10^6 \times 1.414} = 1000\ \mu\mu f$

$k^2 Q_A^2 = \frac{1}{2}$, and $Q_A = \frac{1}{\sqrt{2k}} = \frac{1}{0.055 \times 1.414} = 13$

Having selected 2500 ohms for $R_{out} = \frac{1}{G_{s0}}$,

$G_{s0} = \frac{1}{2500} = 0.0004$ mhos

$G_{s0} = \frac{C_B}{2C_A} G_A$ (Note that the impedance transformation is proportional to C_B and C_A only.)

$C_B = \frac{G_{s0} \times 2C_A}{G_A} = \frac{0.0004 \times 2 \times 1000}{0.0143} = 56\ \mu\mu f.$

Calculating the coils:

$L_A = \frac{1}{\omega 2 C_A} = \frac{1}{6.3 \times 29.15 \times 6.3 \times 29.15 \times 10^{12} \times 1000 \times 10^{-12}} = 0.03\ \mu h.$

$L_B = \frac{1}{\omega 2 C_B} = \frac{1}{6.3 \times 29.15 \times 6.3 \times 29.15 \times 10^{12} \times 1000 \times 10^{12}} = .53\ \mu h.$

$k = \frac{M}{\sqrt{L_A L_B}}$, and

$M = 0.055 \sqrt{0.03 \times 0.53} = 0.055 \sqrt{0.016} = 0.055 \times 0.1267 = 0.007\ \mu h.$

$C_A = 1000\ \mu\mu f.$ $L_A - M = 0.023\ \mu h.$ $M = 0.007\ \mu h.$
$L_B - M = 0.523\ \mu h.$
$C_B = 56\ \mu\mu f.$ (including 10 $\mu\mu f.$ for tube and wiring.)

Strays

The passing of Marnol A. Webb, WØCCL, as reported in this month's Silent Keys, came about as the result of his encountering a 69,000-volt overhead power line while engaged in efforts to attach a 20-foot pipe section, for use as an antenna support, to a tree at the front of his home. All amateurs should be cognizant of such dangers — beware and stay clear of overhead high-voltage hazards.

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70° COSINE DEFLECTION YOKE

Exact replacement for RCA *74952*

Most popular replacement yoke. Newest Cosine type. Used in RCA, Emerson, Motorola, Capehart and other sets with direct drive system. Exact replacement for RCA 74952, Stancor DY-10, Merit MD-30, Chicago JY4, Ram Y70F30/S. With leads and plug.

TS-20.....NET 2.95

PICTURE TUBE TEST POINT ADAPTER

Ideal for taking measurements of voltage, resistance and video from the base of the picture tube. Just insert between CR tube base and socket. All connections readily accessible. Saves time and increases servicing efficiency.

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Accommodates 2 high impedance inputs. Separate gain controls for mixing. Connected directly to equipment. No external cables. Minimum lead-length inside shielded housing minimizing "stray-pickups". Ideal for use with tape, wire, or disc recorders, amplifiers, musical instruments, etc. Size: 2-1/16" x 1-13/16" x 1-1/16".

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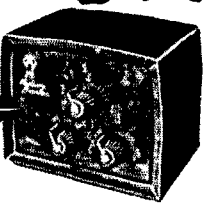

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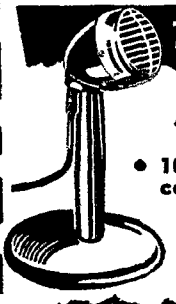

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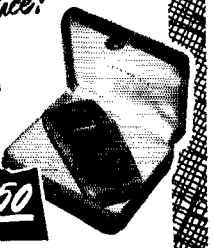

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Here is a real buy on 1,200 feet of plastic base recording tape, including 7" reel. Highest quality, optimum performance for thousands of playings. Frequency response 15 to 8,000 cycles. At this price you can't lose.

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Most popular sizes for radio and TV. Famous brand. All fresh, new stock. Input voltage 130 volts. You can't go wrong at these prices.

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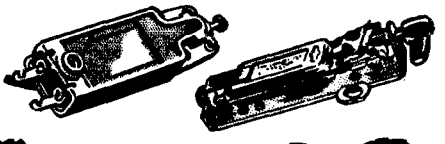
RE-12, 65 MA., ea. 59c	57c ea.
RE-14, 75 MA., ea. 62c	59c ea.
RE-10, 100 MA., ea. 77c	72c ea.
RE-11, 250 MA., ea. 1.25	1.19 ea.
RE-13, 400 MA., ea. 1.59	1.52 ea.

PHONO CARTRIDGES



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3.5 VOLT OUTPUT exact duplicate for direct replacement of all standard cartridges such as L70, L82, L92, W60B, N10, and many others. Reg. list price $5.50.

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144-Mc. Rig

(*Continued from page 32*)

be largely below the winding at resonance. Check the frequency to be sure that the stage is tripling. The voltage across the grid resistor should be about 85 to 95 volts.

Next, apply plate and screen voltage to the 5763, and resonate the plate circuit with a lamp load connected. Final plate and screen current should be about 36 ma. Depending on the tube life you want to get from the 5763, the value of the grid resistor may be varied for greater output. Lowering the resistor value will allow the tube to draw more plate current, and develop more output. The stage should not be operated with less than about 43 volts developed bias.

The transmitter was operated continuously for four hours daily over a period of ten days, with the values given on the schematic diagram. At the end of this time there was no discernible change in any of the tube characteristics, and the output was identical to that originally obtained. It is felt that such a set-up is ideal for low-powered c.d. or other mobile applications, as the total drain, including a 6V6 or 6AQ5 modulator, is less than 100 ma. The rig works fine with a PE-101C power unit, currently selling for $4.95 or less.

In addition to those shown in the photograph, a total of seven of these units has been built and all are giving satisfactory service.

Code-Practice Set

(*Continued from page 37*)

K7FAG, Russel R. Henderson, Capt. USAF, MARS Base Dir., Davis-Monthan AFB, Tucson, Ariz.; 29.6 Mc.; Thurs. 1830 MST, 3–24 w.p.m.

W7FWD, O. U. Tatro, 513 N. Central, Olympia, Wash.; 3646 kc.; Mon. through Fri., 1700 PST, 4–25 w.p.m.

W8JJE, Calumet High Radio Club, Calumet, Michigan; 28.3 Mc.; Mon., 1930 EST; 5–10–15 w.p.m.

W8MAI, Blossomland Amateur Radio Assn., RFD 1, Box 147F, St. Joseph, Mich.; 1890 kc.; Mon. through Fri., 2000 EST; 5–20 w.p.m.

W9ODD, Radio Amateurs of Marquette Univ., Marquette Univ., 615 N. 15th St., Milwaukee 3, Wis.; 29.224 Mc.; Mon., Wed. and Fri., 1930 CST; beginners' speeds.

W9UIN, Joseph H. Kadlec, 1148 Ashland Ave., Evanston, Ill.; 7240 kc.; Sat. and Sun., 0800 CST; 5–7½ w.p.m.

WØBOL, R. A. Prehm, 1130 Delaware Ave., St. Paul 7, Minn.; 29.2 Mc.; Tues. and Wed., 1900 CST; letters to 6 w.p.m., practice from 8–15 w.p.m.

WØEGQ, Bob McMullin, Route 1, Lehigh, Nebr.; 3690 kc.; Mon. through Fri., 1700 CST; 5–13 w.p.m. with text from *The Braille Technical Press*.

WØLQC, F. Bion McCurry, 1234 Stanford, Springfield, Missouri; 29.18 Mc.; Tues., 2130 CST; beginners' speeds.

WØQDF, W. H. DuBord, 10247 Midland, Overland, Mo.; 29.6 Mc.; Mon. and Wed., 2000 CST; Mon. 5–13 w.p.m., Wed. beginners' speeds.

HAMFEST CALENDAR

WASHINGTON — The Clark County Amateur Radio Club will hold their second annual hamfest in Vancouver on March 6th. Headquarters will be the Minnehaha Grange Hall, where a varied program is planned, plus a dinner and dancing. Registration $2.50 sold in advance only; no tickets at door. Write Oscar MacCoumber, W7SAP, 1310 East 10th St., Vancouver.

LOOK STEINBERGS LOOK

MOBILE SINGLE SIDEBAND
OR FIXED STATION . . .
AND LOOK AT THE PRICES!

From the laboratory of Electronic Engineering Co., builders of the famous SS-75, comes the newest in fine, low-cost single sideband equipment, small enough for mobile operation, but powerful enough to drive a high-power final. Refer to description on page 58, December, 1953 QST.

ELENCO X-4 SSB EXCITER

Only 6" x 6" x 6", small enough for mobile operation. 10 watts peak output, enough to drive most finals to 1 KW input. Uses SAME TYPE CRYSTAL FILTER USED IN SS-75. Output frequency 3.6 to 4.0 MC when used with suitable VFO or crystal. Provision for VFO or crystal operation. Audio gain sufficient for crystal or dynamic microphone. 4-tubes: 6SA7 crystal oscillator and audio mixer, 6SQ7 speech amplifier, 6SA7 second mixer and VFO, 6F6 4 MC power output. Power required: 6.3V @ 1.6A., 200–300V @ 80 Ma. D.C. 45V bias.

Wired, Tested, Aligned $69.50. Kit Form **$49.50**

ELENCO X-4 VFO

Only 4" x 4" x 2". The VFO is a modified Clapp circuit utilizing the 6SA7 second mixer in the X-4 Exciter to furnish oscillator voltage. No tube in VFO unit, adding greatly to stability. Provision for upper or lower sideband selection. Silver mica padders and ceramic oscillator coil form used for maximum stability. Provides coverage for 75, 40, 20 meters when used with X-4 mixer. 4" tuning dial covers 3.6 to 4 MC in 50 KC steps. Requires no power, plugs into crystal socket on back of X-4. 18" twin coax cable and plug furnished.

Wired and Tested . . . **$24.50**

ELENCO X-4 VOICE CONTROL

Designed to permit voice controlled operation of the X-4 Exciter and associated receiver for fixed or mobile use. Uses 6SN7 dual triode, one section used as voltage amplifier, second section used as a negative pulse gating tube which controls the voice operated relay. Built in 4" x 4" x 2" cabinet. Power required: 6.3V 6A., 200–300V, 10 Ma., D.C. Furnished with power plug and socket, less connecting cable.

Wired and Tested . . . **$19.95**

ELENCO X-4 MIXER

Designed to use with the X-4 Exciter to convert the 4 MC SSB signal to 40 or 20 meter output. Uses a 6L6 as a combined crystal oscillator and mixer stage with output up to 10 watts on 40 or 20 meters. Built in 4" x 4" x 2" cabinet. Power required: 6.3V @ .9A, 200–300V, 60 Ma., D.C. Furnished with one coil and one crystal (specify 40 or 20 meters). Coil and crystal for the alternate band, add $5.70.

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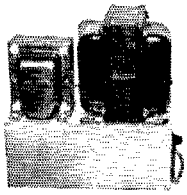

ELENCO X-4 POWER SUPPLY

The X-4 AC operated power supply, mounted on 7" x 7" x 2"chassis, furnishes 300 volts, 150 Ma., D.C., plus 6.3 volts AC., more than ample to operate the X-4 Exciter, complete with Mixer, VFO, and Voice Control unit. It also supplies 45 volts negative, for bias and muting purposes. A 4-pole, 3-position switch is provided and wired into the circuit. This switch serves as a manual control switch for the X-4 Exciter and the receiver in use. One set of contacts is terminated on one of the power sockets, to be used for controlling the high voltage primary relay for the high power final, if one is used. The fourth set of contacts is not wired and can be used for any switching purpose. 80 Mfd filter and 10 Henry choke provide for hum-free operation. Three power output sockets, with plugs, are provided to permit individual plug-in connections for each unit.

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Send 20% deposit with COD orders. Please include *sufficient postage* or *instruct* us to ship by Express Collect. Overpayment will be refunded by check.

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73, Jule Burnett, W8WHE

Tech Topics

(Continued from page 41)

also to all the other aberrations that may result in the appearance of energy in the wrong sideband. As W2ZE has pointed out to the writer, a single-tone test represents the most severe condition. With a complex signal such as speech, the energy is spread over many components and no one distortion product is likely to approach the amplitude that it would attain with a pure-tone signal. Hence the average sideband suppression under actual communicating conditions will be better than a single-tone test would indicate. It is fortunate that this is so, because there are many points in the system where sideband suppression can suffer, even with careful design and adjustment.

— *G. G.*

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. Its operation is made possible by volunteer managers in each W, K, and VE call area. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. For a list of overseas bureaus see p 66, Dec., 1953, *QST*.

W1, K1 — J. R. Baker, jr., W1JOJ, Box 232, Ipswich, Mass.
W2, K2 — H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia 5, Penna.
W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Oren B. Gambill, W5WI, 2514 N. Garrison, Tulsa 6, Okla.
W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.
W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.
W8, K8 — Walter E. Musgrave, W8NGW, 1294 E. 188th St., Cleveland 10, Ohio.
W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wis.
WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 329 15th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 2316 Trent St., Victoria, B. C.
VE8 — W. L. Geary, VE8AW, Box 534, Whitehorse, Y. T.
VO — Ernest Ash, VO1A, P.O. Box 8, St. John's, Newfoundland.
KP4 — E. W. Mayer, KP4KD, Box 1061, San Juan, P. R.
KH6 — Andy H. Fuchikami, KH6BA, 2543 Namanu Dr., Honolulu, T. H.
KL7 — Box 73, Douglas, Alaska.
KZ5 — Gilbert C. Foster, KZ5GF, Box 407, Balboa, Canal Zone.

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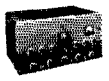
JOHNSON VIKING II



$279.50

(In Stock)

Kit, complete with tubes—less crystal, key and mike.

Wired and Tested, $334.50

Collins 32V-3 Transmitter

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VFO Controlled, Bandswitching, Gangtuned. Covers 80, 40, 20, 15, 11 and 10 meters; 150 watts CW; 120 watts phone; entire RF section enclosed in metal shield. (In Stock)

COLLINS 75A-3 RECEIVER With Mechanical Filter and Speaker **$550**

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SONAR SRT 120 TRANSMITTERS

All bands 120 w. CW, 100 w. phone

Switches to all six bands. TVI suppressed, with 10 tubes.

SRT 120 Kit $159.50
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Including Power Supply in Deluxe Case

VFO 120 ..... $19.95
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Send for Complete List

Meissner 150B Transmitter	$195.00
Sonar MB611	47.50
Sonar FM Exciter With 10 and 20-Meter Coils	75.00
Millen Exciter Unit	20.00
Hallicrafter SX43	145.00
Hallicrafter SX24	75.00
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Hallicrafter S38B	35.00
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National NC46 With Speaker	65.00
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National SW54	40.00
Eldico TR75 TV	50.00
Eldico MB40 Modulator	45.00
Hammarlund HQ 129X With Speaker Like New	175.00
Gonset 3-30 Converter Like New	39.75
Meissner 2CW Transmitter Wired	15.00
Harvey Wells APS50 Power Supply	25.00
Harvey Wells TB550	75.00
National NC125 With Speaker Like New	125.00
Police Alarm FM Receiver 30-50 Mc. (AC-DC)	45.00

Hammarlund HQ 140X

Tunes 54-31 mc. in six bands; *calibrated band spread; 9 tubes in* RF and AF; full wave rectifier and voltage regulator; calibrated S meter; crystal filter; antenna compensation; AVC; new series-type noise limiter; furnished in two-tone gray. $264.50

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Trans-Citer

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GONSET COMMUNICATOR

2-Meter

Transmitter Receiver

Model 3026	Model 3025
$209.50	$229.50

Operates from either 115-Volt AC or 6-Volt DC source.

MOBILE SPECIAL!

Single button carbon hand mike. Complete with cord and plug. Finest made. While they last, Post Paid $3.75

Dozen $36.00

ELMAC

A54 Transmitter $119.00
A54-H Transmitter 129.00

Demonstrators Guaranteed Like New

SPECIALS CLEARANCE

STANDOFF INSULATORS, low loss steatite, nickel plated base and top.
½" x 1⅜" — 13c ea.; 10 for $1.00
½" x 2⅞" — 17c ea.; 10 for $1.45
¾" x 4⅞" — 43c ea.; 10 for $3.20
¾" x 6¾" — 59c ea.; 10 for $4.75

FEED THRU INSULATOR, ceramic.
For 1" hole, 41c ea.—10 for $3.25
For 1½" hole, 45c ea.—10 for 3.50

INSULATOR, cone type
1¼" high, 18c ea. — 10 for $1.50
3" high, 43c ea. — 10 for 3.25

TUBES — standard brands
6AK5 ..... 69c ea. — 6 for $2.50
6C4 ..... 39c ea. — 6 for 2.00

MINIATURE VARIABLE CONDENSERS *Screw driver adjustment.*
25 mmfd....25c ea.—5 for $1.00
140 mmfd....75c ea.—4 for 2.50

SOCKET, 7 pin min., mica filled, shield base .....10 for $1.00

SWITCH, phenolic sec., 2 d., 3 p., 3 pos., NS....29c ea. — 4 for $1.00

ANTENNA ROTATOR SPECIAL

Will Handle 200 Lbs.

Uses 4 cond. control cable

While They Last At

$29.95

With up to 100 ft. cable

MASTER MOBILE HY Q COILS

For 20, 40, 75 meters

$6.95 ea.

ON-AIR LIGHTS

Uses 6 volt bulb

$1.95 ea.

Extra Special DYNAMOTOR GN45B

6V in, 400 V 160 MA out. Complete with conversion diagram and brushes. Will go Parcel Post. $24.95

Fort Orange RADIO DISTRIBUTING COMPANY

904 BROADWAY, ALBANY, N. Y.

TELEPHONE ALBANY 5-1594

Insulation-Resistance Tester

(*Continued from page 42*)

transformer available. Either tube will give the same megohm graduations on MA_1.

R_1 and R_2 could be one wire-wound potentiometer, but some vernier action would be lost. R_6 gives R_7 long life by by-passing part of the testing current. R_8 was included to filter out any power or radio-frequency fields present in some locations.

R_9 performs two functions, and separate resistors could be used. As "low-end set," R_9 could well be replaced with a number of resistors depending upon the number of different ranges the designer wishes to incorporate. As shown, R_9 also discharges the capacitor being tested when the function switch is set on "safe" (position 3). Discharging through R_9 eliminates sparking that might deteriorate the function-switch contacts.

Setting Up the Instrument

In adjusting the tester for use, first place S_1 in Position 3 (safe), adjust R_2 (infinity-set) so V_1 draws exactly full-scale reading on MA_1. Then switch S_1 to Position 1 (low-end set), and adjust R_7 so the meter needle rests on 0.5 megohm. Next, place S_1 in Position 3, readjust R_2, if necessary, and then connect object to be tested across J_1 and J_2. Now, place S_1 in Position 2 (test) and read the insulation resistance on MA_1. Lastly, switch S_1 to Position 3, and allow sufficient time for the capacitor just tested to discharge before handling.

With a Triplett model 630-A meter, the approximate calibration is as follows: 10 ma. — infinity; 9.7 ma. — 50 meg.; 9.2 ma. — 20 meg.; 8.4 ma. — 10 meg.; 7.1 ma. — 5 meg.; 2.4 ma. — 2 meg.; 0.5 ma. — 0.5 meg.

YL News & Views

(*Continued from page 44*)

meeting of the N.Y.C. YLRL, plans were discussed for a proposed group trip to ARRL Headquarters in the spring. . . . W2UXM, Sally, was chairman of a rummage sale conducted by the L. I. unit of the YLRL for the purpose of raising funds for the *Braille Technical Press;* and W2JZX, Vi, was chairman of a successful award drawing project for the *Press.* . . . Old friends will be glad to know that W1NHN, Norma, of Needham, Mass., is active again after a four-year absence from the bands. . . . VE3DEA, Denny, was pleased to work KS4AU on Swan Island with 35 watts on 40 'phone. . . . W5TXK conducts an amateur radio club at the junior high school in Jackson, Miss., where she teaches. When Margaret was studying for her Master's degree at the U. of Alabama last summer, she carried her rig with her and had a daily 5:00 A.M. QSO with her OM, W5SRU. . . . W5BDB (ex-W9SPN) is happy to report that she has put her rig back on the air at her new QTH. Rose's OM is not a ham, but he is proud of her. . . . The Sept.–Oct. '53 issue of the So. African Women's Radio Club *YL Beam* reports a total membership of 84 members in the club, "40 of whom are transmitting members (hams)." . . . W2JZX, Vi, has been appointed ARRL 'Phone Activities Manager of the N.Y.C.–L.I. Section. She is also net manager of the N.Y.C.–L.I. Traffic Net. . . . YLRL 4th D.C. W4JCR writes "Enthusiastic Kay, WN4BLR, built her own transmitter from a 1947 ARRL *Handbook* and now plans to tear it down and build a 60-watter. She uses a BC-348 receiver and averages approximately 3 hours a day on the air." . . . When hurricane "Florence" threatened

(*Continued on page 116*)

Floridians, W4TTM, Alice, and her OM, W4PTK, set up an emergency power unit and stood by for immediate operation. . . . A quick peer inside their receiver revealed to W3RXV, Peg, and her OM, W3RXW, why they hadn't been able to turn the tuning knob. Little four-footed, long-tailed creatures thought the area under the dial cable in an SX-43 just the place for hiding a man-sized handful of small Hershey chocolate bars. During their nocturnal visits the inquisitive rodents had also partaken of condenser wax and the choke-coil covering in the transmitter. The Ferbers suffered a slight pause in operating time! . . . You'll probably deduce that the commercial-type gear apparent in the photograph of Dell, VE3AJR, on page 44 doesn't seem to fit with her description as an avid constructor. The fact of the matter is that the operating position shown is that of a station set up at the September, 1953, Buffalo convention. The picture was taken by W2DXZ.

—•••—

Here's Lucille Hinkle, W6JMS, YLRL Chairman of the Sixth District, enjoying a bit of two-meter operation with her "green-eyed monster" in the Sierra Nevadas. When Lucille and her OM, W6JDU, take one of their frequent mountain camping trips, their Gonset Communicator and home-built collapsible beam go with them — and they've made some fine 144-Mc. contacts from the higher altitudes, too. At home in Fresno, they have a Viking, HT-18 and HRO, and work 40 and 75. Lucille reports favorably on the YLRL members in her district — "They are very active and they support club meetings and hamfests very enthusiastically."

Correspondence

(Continued from page 51)

QRM & DX

154 Kingsacre Road
Glasgow S4, Scotland

Editor, *QST:*

I read with interest the letter from W2IHI in your November issue re "What'll It Be?" I could not agree more with Fred Myers in what he has written about high power. We in GM are permitted to use 150 watts. Several of my friends have made DXCC, not with high power, but good operating skill and the use of 807s or 829s in the final. This is the real essence of DX awards. . . .

The guy I like is the little man who fought for his DXCC with 50 or 150 watts. The certificate to him is priceless, but to the "lid" it is more or less junk like the rest of his certificates!!

Good luck with your 50 watts, Fred — plenty of stations in GM looking for weak signals through QRM!

— *David Ross Macadie, GM6MD*

59 Stanton Lane
Grosse Pte., Mich.

Editor, *QST:*

I wish to file a complaint with a few others on how some hams come on the frequency when I'm trying frantically to contact a DL4 or a JA1 on twenty (both of great importance

(Continued on page 118)

to me) and make a beautiful pile-up. I know that some of them don't have good receivers, but there couldn't be *that* many. It seems some of them *try* to mess it up. I don't see why they can't listen before they transmit.

— *John Davidson, W8MNZ* (*age 12*)

INSURANCE

555 South State
Salt Lake City, Utah

Editor, *QST:*

Just a note that the local office of the Maryland Casualty Co. (auto insurance) has put an endorsement on my policy at no extra cost covering, ". . . a radio receiver and radio transmitter, together with generating equipment necessary for the operation thereof."

— *Arthur Weart, W7NVY*

QRM REDUCTION

798 Sherburne Ave.
St. Paul, Minn.

Editor, *QST:*

I think I might have a solution to a lot of the QRM caused on ham bands. Many QSOs are lost because someone starts to test his rig just when you're in the middle of a QSO. I don't think they do it on purpose. I've lost quite a few QSOs because of QRM, but about three-quarters of these were due to someone testing his rig.

Since 80, 40 and 20 c.w. are the most crowded bands, why not take about 3 kc. out of each band and set it aside for testing transmitters only? Here we could check our s.w.r., power output, tune up the rig and what-have-you, without interfering with anyone. I don't think we would miss 3 kc. If every ham would do this, and I don't see why not, a lot more enjoyable contacts would be made with less hard feelings. Here is a possible set of frequencies: 3600–3605 kc., 7100–7105 kc., 14,000–14,005 kc. How about it?

— *Jim Scheuneman, WØGSV*

RECIPROCITY

124 Erie St., S.
Leamington, Ont.

Editor, *QST:*

We have heard a great deal of discussion of late regarding QSL cards. The problem seems to be the great number of QSL cards sent out and the few received in return. From personal experience, I find the complaint quite justified.

A partial solution has been found at this station which we offer for consideration. It seems to us that the station making the initial request for a card should show his good faith by sending his out first. When we request a card, we should be the ones to take the risk of not getting a reply. Conversely, when asked for a card, we promise to answer promptly upon receipt of the other station's card, and, of course, never fail to keep that promise.

This system is working very well for us and perhaps would work for others.

— *Olive Dell Daykin, VE3AJR*

"WOT SA OM?"

RFD 3, River Rd.
Luverne, Minn.

Editor, *QST:*

"Greetings OM — tnx fer call — gld to meet up wid u." Why all this lingo? Why not "55" (nice for a "bug") or select a number that has had some significance such as the age of the OM or his third wife. I'm sure whatever *QST* would suggest would be acceptable. What would we do without "73" or "88"?

— *Orlie S. Davis, WØOAF*

R. D. 1
Monaca, Penna.

Editor, *QST:*

After looking through a dictionary of Q signals I became curious as to signals like QRN and QRM pertaining to static and competitive interference. In the summertime, especially out of town, there are always a lot of flies to be found in the ham shack or anyway in mine. So why not some kind of Q signal meaning, "Are you bothered by flies and other insects?"

— *Larry Moorhead, W3VEX*

RESULTS — 1953 VE/W CONTEST

Final results of the 1953 VE/W Contest, held September 26th and 27th, have been announced by the Montreal Amateur Radio Club. In each case the first-listed station in the tabulation below has been declared a section winner and is receiving a special certificate award from MARC. Top U. S. A. score was that of W9GWK with 14,784 points and VE5QZ's tally of 28,440 points was high for Canada.

Listed below are the scores of all participants submitting entries. The figures following each call indicate final score, number of contacts and number of sections worked.

Maritime

VE1ZZ	11,895–161–39
VE1CU	3174– 46–23
VE1OM	1458– 27–18
VE1DB	1364– 30–16
VO6U	986– 30–17
VO6N	572– 22–13

Quebec

VE2ATD	6426– 79–28
W2SVF/VE2	4757– 66–24
VE2AIE	3024– 54–28
VE2CP	2040– 34–20
VE2AGG	810– 27–15

Ontario

VE3BBR	20,124–162–43
VE3CBR	16,777–154–37
VE3BXF	14,980–214–35
VE3DRD	9120–100–32
VE3DFM	6072– 69–22
VE3DBM	5544– 79–24
VE3YV	3100– 50–31
VE3DNE	1989– 39–17
VE3DPG	1690– 34–13
VE3DU	392– 23–13

Manitoba

VE4MX	8040–106–40

Saskatchewan

VE5QZ	28,440–200–48
VE5RU	8892– 80–38
VE5DZ	392– 14–14

Alberta

VE6VK	7178– 98–37
VE6GJ	627– 19–11
VE6ZR	486– 14–12

British Columbia

VE7QC	784– 25–16
VE7RU	200– 10–10
VE7ADE	165– 11– 5

Yukon

VE8SD	1224– 36–17

E. Pennsylvania

W3VZI	128– 4– 1

S. New Jersey

W2GND	9240– 55– 7
W2CAG	6384– 38– 7
W2CVW	144– 3– 2
W2ZQ (W2NDO)	3120– 65– 3

W. Pennsylvania

W3LXE	3808– 34– 7

Illinois

W9PNE	12,384– 65– 8
W9NPC	4536– 27– 7
W9HVP	4032– 32– 8
W9WIO	2016– 18– 7
W9OIN	1056– 11– 3
W9VBV	864– 9– 4

Indiana

W9POB	1248– 18– 6

Wisconsin

W9GWK	14,784– 77– 8
W9VKR	3808– 34– 7
W9RKP	3360– 20– 7
W9VBZ	1728– 18– 6

Louisiana

W5TFD	7616– 34– 8

Tennessee

W4VNE	5376– 21– 8
W4TIE	768– 12– 4

Ohio

W8AJW	12,288– 64– 8
W8YGR	3840– 20– 8
W8DAE	912– 19– 3
W8FU	128– 2– 2

E. New York

W2IFP	672– 14– 3
W2RHQ	384– 8– 3

N. Y. C.–L. I.

W2WC	7872– 41– 6
K2CHQ	1224– 17– 3

N. New Jersey

W2EQS	11,616– 62– 8
W2LYO	7224– 43– 7
K2AFQ	2256– 23– 3
W2NIY	720– 15– 3

Kansas

WØFRL	3600– 25– 6
WØMLG	840– 7– 5
WØGAX	25– 1– 1

Missouri

WØCVZ	6336– 33– 8
W9GBJ	1568– 14– 7
WØIEU	720– 6– 5

Connecticut

W1ODW	9600– 50– 8
W1UHP	5688– 40– 6
W1VG	3968– 31– 3
W1NLH	192– 4– 8

Oregon

W7UCQ	2496– 26– 4

Washington

W7CMH	1120– 10– 7

Santa Clara Valley

K6BBD	192– 3– 2

San Francisco

W6BIP	2432– 19– 8

Sacramento Valley

K6OKD	2088– 15– 6

North Carolina

W4BDU	2800– 25– 7

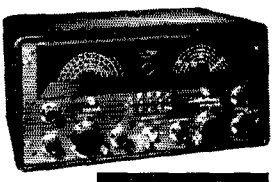
Virginia

W4WRM	3840– 20– 6
W4KFC	3248– 29– 7
W4YVO	1296– 17– 4
W4WBC	528– 6– 4

(*Continued on page 122*)

YOU CAN BET ON BOB HENRY FOR THE BEST— HE HAS IT!

31 REASONS WHY SX88 IS HAM NEWS AT BOB HENRY'S:



1. Heavy gauge steel welded chassis for mechanical stability.
2. Full precision gear drive for main and band spread tuning.
3. Six position Band Width Control (selectivity) from 250 cycles to 10 kc.
4. 10 watt inverse feed back and push-pull audio output.
5. Exhalted B.F.O. for tops in single side band reception.
6. Buffer amplifier in B.F.O. circuit.
7. Antenna trimmer.
8. Amplified and delayed A.V.C.
9. Built-in 100 kc calibration crystal.
10. Second conversion oscillators crystal controlled.
11. Inertia tuning (fly wheels both dials).
12. Full frequency coverage from 535 kc to 33 mc.
13. Calibrated electrical band spread 160, 80, 40, 20, 15, 11, and 10 meters.
14. Logging scales on each tuning shaft.
15. Dial locks on each tuning shaft.
16. Tuning dial indicators resettable from front panel for maximum calibration accuracy.
17. Auxiliary A.C. socket on rear of chassis.
18. Illuminated band-in-use indicator.
19. Illuminated S meter.
20. Dual S meter calibration S units and microvolts.
21. Auxiliary power socket plus .6 amps at 6.3 volts and 10 ma at 150 volts for accessories.
22. Standard 8¾" by 19" panel for rack mounting if desired.
23. 50 kc i.f. output jack via cathode follower for teletype converter, etc.
24. Five position response control (tone control).
25. Two r.f. stages (Bands II to VI).
26. 17 tubes plus voltage regulator, ballast tube and rectifier.
27. Automatic noise limiter circuit.
28. Phono Jack.
29. Audio output transformer for 3.2, 8, 500/600 ohm loads.
30. Fuse for overload protection.
31. Auxiliary sensitivity control permits monitoring of local transmissions in standby position.

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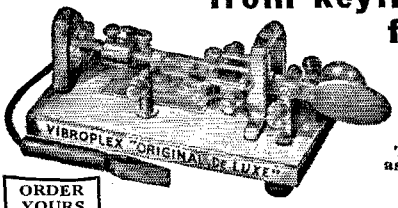

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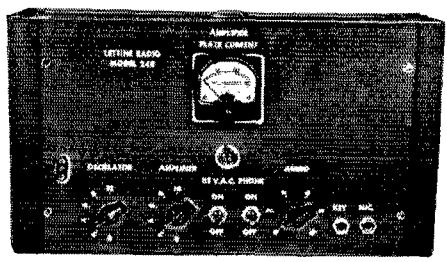

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This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation. Air wound plug-in coils used for greater efficiency — never obsolete — an outstanding buy, direct from our factory, ready to operate.

The 240 is a 40 to 50 watt Phone-CW rig for 160 to 10 meters, complete with: (8 x 14 x 8) cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tubes: 6V6 osc., 807 final, 6SJ7 crystal mike amp., 6N7 phase inverter, 2 6L6's mod., 5U4G rect. Weight 30 lbs. TVI instructions included. 90-day guarantee. Price $79.95.

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80, 20, 10 meter coils $2.91 per set. 160 meter coils $3.60.
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West Virginia

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Utah

W7QDJ	2184-	13-	7

Alabama

VE3OJ/W4	2360-	30-	5
W4WOG	1848-	17-	7

E. Florida

W4LVV	11,136-	45-	8

Georgia

W4ZSC	1860-	17-	5
W5TOU (W4AQL)	800-	10-	5

Los Angeles

WØHAW/W6	144-	3-	2

Arizona

W7RZQ	3360-	20-	7
W7KUZ	2184-	14-	7
W7ANE	864-	9-	3

San Diego

W6KJR	880-	11-	5

Santa Barbara

W6MUW	1680-	12-	5

S. Texas

W5VNW	2184-	26-	7
W5AQE	1872-	16-	7

New Mexico

W5VRP	5952-	62-	8

Hints & Kinks

(*Continued from page 46*)

inside method is more suited for a permanent job. The crystal, minus holder, is attached to the coil with a small amount of Duco or similar cement. The crystal frequency as noted from the holder is marked on the grid-dip meter coil. It may be advisable to adjust the crystal into a position giving the amount of dip desired prior to applying the cement. — *Alvar J. Kujampaa, W1KJO*

PREVENTING R.F. LEAKS WITH ALUMINUM FOIL

ORDINARY aluminum foil — the kind that the XYL uses around the kitchen — can be used to seal up cracks or holes that must be covered in the interest of good shielding. Merely cut the foil into ½-inch strips of proper length and seal it over the openings with 1-inch masking tape. It works! — *George E. Forant, W1FON*

RIFLE CLEANING BRUSH AS A SOLDERING AID

DO not overlook the use of a metal bristle rifle or pistol cleaning brush whenever a hard-to-reach section of a chassis, shielded enclosure, etc., must be brightened up for soldering. The brush will be more convenient to manipulate if it is fitted with a length of cleaning rod and a small wooden handle. — *M/Sgt. R. J. Detmer, W5WXK*

HANDY STORAGE BINS

THE meter and test departments of electric utilities, in their replacement programs of electric watt-hour meters, receive shipments of new meters in flat, sturdy, four-compartment corrugated boxes. Overall, each is about 13 by 17 inches and from 5 to 7 inches deep. Because some of these boxes are reused for local shipment of meters within the utility's district, each cover is usually cut along three edges only, the fourth forming a sort of a hinge and making a very handy and practical arrangement.

I find these boxes, each with four compartments, very useful in the storing of small radio parts. Because they are uniform in size, sev-

(*Continued on page 124*)

eral readily and safely may be piled vertically, thus providing considerable storage in a small space.

It shouldn't be too much of a trick to secure a few of these boxes directly from the meter and test department of your local utility. Incidentally, don't talk to your meter reader about getting these; he is not apt to know anything about them.

— *Jerome Blaisdell, W2IEP*

MAKING LARGE ROUND CHASSIS HOLES WITHOUT A PUNCH

THERE is no need of holding up work on an aluminum chassis just because punches for cutting large holes are not immediately available. Fig. 2 illustrates a set of four operations used here at W6GJZ whenever a large hole for a meter,

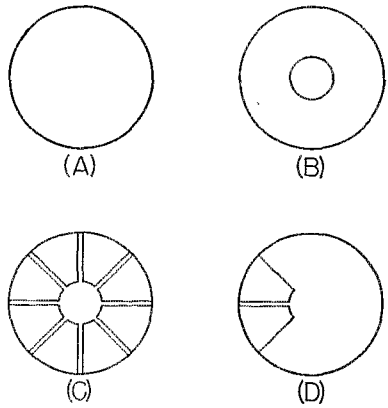


Fig. 2 — Method of making large chassis holes recommended by W6GJZ. Operations (a) through (d) are listed in the text under the same headings.

tube socket, etc., is required. The steps involved in employing the system are as follows:

a) Use a pair of small sharp-pointed tinsmith's calipers to scribe the chassis as shown in Fig. 2. Make several *round trips* so as to score the metal deeply.

b) Drill a hole at the center of the circle. The hole must be large enough to accept a hack-saw blade A pistol-grip saw is recommended for the operation ahead.

c) Make radial cuts — the more the better — from the center hole to the scored line marking the perimeter.

d) Bend each individual tab back and forth until it breaks free. After all of the tabs are removed, finish the job with a half-round file.

An alternative, if a pair of tinsmith's calipers is not available, would be to use an ordinary pencil caliper or a circular template for marking the hole. The saw cuts could then be made to the pencil line and the tabs removed with a small sharp chisel. The metal should be placed on a solid surface as the tabs are removed and the cuts should be made well inside the pencil line. This method worked out satisfactorily on 18-gauge aluminum and required about ten minutes' work per hole. — *Dr. Russell R. Crane, W6GJZ*

M.A.R.S.

MARS CPX Results

Ninety-six MARS stations, manned by 122 operators, submitted logs in the Army Command Post Exercise conducted 290001Z to 292400Z, November, 1953.

A study of the logs and analysis of comments from participating stations indicates that this type of activity is popular with all MARS members. Many wrote to say that because of Thanksgiving and previous commitments they were unable to be on the air for the contest. MARS Headquarters staff plans to promote similar contests in the future.

Approximately 60 per cent of the total operation was by A3 emission, 40 per cent by A1. A list of participating stations and scores, based on one point for each message sent, one point for each message received and double credit for emergency power, follows:

SINGLE-OPERATOR STATIONS

AA4WAR	J. Rodgers	308	A5ZU	G. M. Sayre	34
AA5WAO	J. D. Daly	288	A2SQI	W. C. Bolvig	32
A5JPC	N. Wehrli	174	A5WPV	E. E. Marriott	32
A8AJA	G. F. Schwab	159	A4IMQ	J. Schliestett	30
A5SFW	P. Patterson	148	A4TXO	A. B. Hall	30
AA4WDO	3rd Armd. Cav. Regt.	122	AA5FOM	E. Mildebroth	30
A4SMU	P. Ciangetti	114	A9GVT	M. L. Peters	30
A4SOI	C. P. Green	111	A9WQA	T. S. Wonnell	30
A5GER	V. B. Morrison	110	A3EGN	O. L. Shorter	29
A2HX	A. G. Wentzel	102	A6WX	D. P. Baker	29
A7ZT	G. B. Criteser	102	A1SJO	C. A. Polo	28
A2UAP	J. W. Brimmer	94	A2QND	D. Henderson	28
AA2CWZ	T. W. MacClure	92	A5ATS	H. W. Dow	28
A2LST	D. H. Ferrari	90	A5RFK	D. Dyvad	28
A5PNG	R. G. Patterson	79	A6DPK	J. Barton	26
A5ARK	S. C. Baker	78	A9QYQ	F. M. Carroll	26
A4ANK	T. H. Wood	72	A2JBN	A. H. Kuhn	25
A4HSK	J. C. Harden	72	A4YNG	H. Scofield	24
A5YAJ	Peggy Wehrli	64	A6EXB	W. Cleaves	24
A3GUS	F. P. Burkhart	62	A6GSR	F. K. Inami	24
A5VTK	P. A. Terrell	62	A6SWP	P. H. Ryan	24
A2TDU	J. H. Woodward	60	A9FRP	C. E. Duke	22
A8LVK	L. L. Taylor	60	A2PF	D. Talley	20
A2ZI	E. G. Raser	58	A6DDE	E. Wilcos	18
A2PYC	W. L. Philbin	58	A3MSU	Ethel Smith	16
A5MOX	R. H. Self	58	A5FMF	O. G. Mahaffey	16
A5TKV	N. C. Lafleur	58	A5RVI	L. C. Young	16
A5TV	A. E. Crockett	55	A6ZVO	R. C. Schneider	16
AØGYZ	J. Brawley	54	A7EVW	A. E. Paul	16
A6BHG	H. Garman	54	A2ZAL	D. J. Umholtz	14
A6BGE	R. C. Stoner	51	A3SMF	E. D. Crossley	14
A5RTS	C. B. Self	48	AA3WAZ	W. J. Prentice	14
AAØWBJ	J. H. Alford	48	A9ERB	L. W. Hatten	14
A5JOG	F. R. Carlisle	44	A5BZG	W. C. Sharbrough	12
A2ASG	A. M. Mkitarian	42	A1AUU	E. A. Miller	10
A4RNQ	J. S. Hatcher	40	A5ZM	H. Davis	10
A5YZB	G. H. Jorgenson	40	A9TEK	G. E. Fenimore	8
A2PXU	H. J. Thyhsen	38	A6EWV	D. M. Cleaves	4
A6PAM	N. Trede	36	AA2DG	S. J. Bentler	2
A8DHL	H. P. Williams	36	A1KDI	M. Kelly	1
A1EG	D. Meirowitz	34	A1GVS	J. Middlebrook	—
A5FIW	N. D. Voss	34			

TWO-OPERATOR STATIONS

AA4WBN	Cpl. T. H. Jackson, PFC J. C. Hester	360
AA4WBF	M/Sgt. G. M. Johnson, M/Sgt. E. Levine	156
AA5WBN	L. Vasaleck, A. Kaizer	132
A5USA	(Sam and Jim)	116
AA6WAH	M/Sgt. G. C. Odlum, SFC R. E. Jamison	28

THREE-OPERATOR STATIONS

A4ZVQ	J. Cuddihy, W. Eller, J. Dicks	190
A2USA	Broocks, Williamson, Post	114
AA6WAE	D. Jones, W. Meussig, N. Trede	15

FOUR-OPERATOR STATIONS

AA2WAO	Sgt. C. Cox, Cpl. W. J. Milton, Sgt. H. Lee, Sgt. J. W. O'Leary	282

Continued on page 128)

A4USA SFC G. Yarte, Sgt. J. C. Carlson, Capt. W. H. Robson, Capt. C. W. Hartley 192

FIVE-OPERATOR STATIONS

AA4WCE Mower, Allen, Hord, Wilson, Wright 189

SIX-OPERATOR STATIONS

A6USA R. Nurss, H. Ayers, L. Kidd, W. Miller, W. Hickman, J. Boyce 170

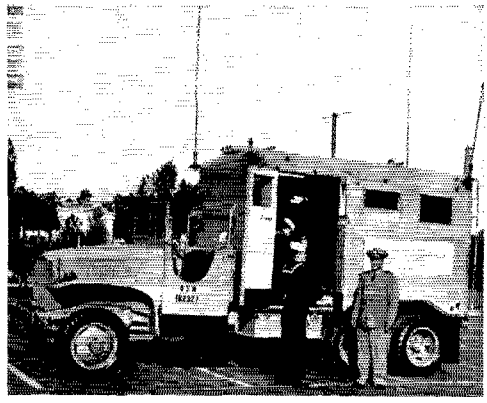
U. S. N. R.

ARRL Southwestern Division Convention

The Naval Reserve was well represented during the ARRL Southwestern Division Convention held at the Ambassador Hotel, Los Angeles, Calif., on October 9–11, 1953. Cmdr. B. A. Wambsganss, Assistant District Reserve Electronics Program Officer, represented the Commandant, Eleventh Naval District. Cmdr. Wambsganss spoke on the relationship between the amateur and the Navy. He also discussed the benefits available to the amateur participating in the Naval Reserve electronics program. The Naval and Marine Corps Reserve Training Center, Los Angeles, furnished an operative SCR-299 communications van. The Naval Radio Station at Long Beach furnished an operative radioteletype van.

Novice Classes

The Beaumont Amateur Radio Club conducts weekly classes in basic radio theory and code in preparation for the FCC Novice Class amateur license. These classes are held each Wednesday at 7:30 P.M. local time at the Naval and Marine Corps Reserve Training Center, Beaumont, Texas. W. E. Hughes, RMC, USNR (W5PYU), stationkeeper at the training center, instructs the group. Officers of the club are W5s AMO, KWA, RYV and VEI.



Mobile communication van of the Eleventh Naval District Reserve Electronics Program Office operating as K6NCB/6 with Cmdr. J. C. Picken, jr., USNR, K6DY, District Reserve Electronics Program Officer, and operating personnel.

February 1929

. . . Ross A. Hull, *QST* Associate Technical Editor, delves deeply into matters concerning "The Requirements of Transmitter Keying," reviewing principles and methods.

. . . *QST* Technical Editor Harold P. Westman furnishes specifications on a new screen-grid tube for the high-powered amateur transmitter, the UV-861.

. . . Clark C. Rodimon, W1SZ, of *QST*'s editorial staff, uses his 500-watt crystal-controlled transmitter as a guinea pig to observe "The UV-861 in Action."

. . . Mr. Westman also writes on "A Multi-Range Voltmeter," a rugged and practical test instrument with six ranges from 1.5 to 1500 volts.

. . . "A '1929' Receiver," detailed by Paul S. Hendricks, features a four-tube circuit with an r.f. stage, grid-leak detector and two stages of audio.

. . . D. R. Clemons undertakes a mathematical and graphical treatment of "The Design of Inductance Coils" in an article of considerable value to experimenters.

. . . A flashlight lamp, two r.f. chokes, a small battery and a ten-ohm rheostat make up "A Cheap Radio-Frequency Meter" for George W. Woster, W9FKH.

. . . Communications Manager F. E. Handy alerts amateurs for the third Governors-to-President Relay, an operating event scheduled for early March.

. . . "IARU News" includes an interesting description of ham station XEB4WK aboard the Belgian four-masted sailing training ship *L'Avenir.*

FEED-BACK

In the circuit diagram of the five-tube receiver, page 46, December *QST*, a 0.1-megohm resistor connected between Pins 1 and 3 of the b.f.o. tube was omitted.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

ex-1BJF, John E. Roach, Franklin, N. H.
W1HSB, Werner E. Carlson, Riverside, R. I.
W1MUB, William F. Lynch, Lawrence, Mass.
W1PWA, Everett M. Fairbrother, Dover-Foxcroft, Me.
ex-1XU, Thomas S. L. Kletchka, Lanesboro, Mass.
K2BKW, Robert W. Conlon, Brooklyn, N. Y.
W2CZG, Krine Laffler, Passaic, N. J.
W3SLO, Louis W. Krivda, Belle Vernon, Penna.
W4KG, Joseph W. Manuel, Nokesville, Va.
W5HD, Leslie W. Kruger, Fort Worth, Texas
W5JHO, Dr. William C. McClure, Oklahoma City, Okla.
W6ZFY, Richard H. Feige, San Diego, Calif.
WN7TLR, Lee Frank, Airway Heights, Wash.
W8ERI, Walter L. Widlar, jr., Parma, Ohio
W8WV, Capt. Hoyt S. Scott, USN, Cleveland, Ohio
W9DAO-W9NQS, Kenneth D. Turner, Kirkland, Ill.
ex-W9GLY, Wesley J. Lott, Vallejo, Calif.
WØCCL, Marnol A. Webb, Wichita, Kansas
WØGPC, Kenneth C. Horne, Steelville, Mo.
KP4OO, Francisco Collado, Santurce, P. R.
VE3DIB, Arthur S. Schipper, Toronto, Ont.
ZS1T, Charles Rieder, Capetown, S. Afr.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League take the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested signature and address be printed plainly.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

MOTOROLA used communication equipment bought and sold. W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

SUBSCRIPTIONS. Radio publications. Latest Call Books, $3.50. Mrs. Earl Mead, Huntley, Montana.

QSL's-SWL's Meade WØKXL, 1507 Central Avenue, Kansas City, Kans.

WANTED: Cash or trade, fixed frequency receivers 28–42 Mc. W9YIV, Troy, Ill.

QSLS, SWLS. High quality. Reasonable prices. Free samples. Write to Bob Teachout, W1FSV, Box Q124, Rutland, Vermont.

WANTED: All types of aircraft radios, receivers and transmitters. Absolutely top prices. Dames, W2KUW, 308 Hickory St., Arlington, N. J.

QSLS-SWLS, 100, $2.85 up. Samples 10¢. Griffeth, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSL samples. Dime, refunded. Roy Gale, W1BD, Waterford, Conn.

QSLS-SWLS, as low as $1.50 per color. Samples dime. Stronberg, P.O. Box 151, Highland Station, Springfield, Mass.

QSLS "Brownie," W3CJI, 3110 Lehigh, Allentown, Penna. Samples 10¢; with catalogue, 25¢.

QSL's, SWL's. Fair prices for excellent quality cards. Eleven styles for you to choose from. Samples, 10¢. Almar Printing Service, 602 Barker Bldg., Omaha, Nebraska.

QSLS. Custom-made or stock! State which. Samples, 10¢. C. Fritz, 1213 Briargate, Joliet, Illinois.

ATTENTION Bargain hunters! Dozens of real trade-in values including Collins, Vikings, Nationals, Hallicrafters, Elmac, Gonset, RME, Morrow, Harvey-Wells. Write for free bargain bulletin. Complete stocks, all leading brands. We trade and sell on time. Burghardt Radio Supply, Watertown, South Dakota.

DELUXE QSLS. Petty, W2HAZ, 17 Southard, Trenton, N. J. Samples 10¢.

QSLS-SWLS, samples, 10¢. Malgo Press, 1937 Glendale Avenue, Toledo 14, Ohio.

DON'T Fail! Check yourself with a time-tested Surecheck Test. Novice, $1.50; General, $1.75; Amateur Extra, $2. Amateur Radio Supply, 1013 Seventh Avenue, Worthington, Minn.

QSLS. Something new, something different, samples free. CPS, Bladensburg, Md.

CALL Letters: 25 cents a set. Dress up your rig, car, etc. For samples, write to Robert Connick, Nickcon, P.O. Box 272, Cincinnati 1, Ohio.

WANTED: Bargains in transmitters, receivers, laboratory and test equipment, power supplies, miscellaneous gear and parts. What have you? Please state price desired. Harold Schonwald, W5ZZ, 718 N. Broadway, Oklahoma City, Okla.

QSLS. Taprint, 205 South, Union, Miss.

FREE List! New and reconditioned receivers, transmitters, etc. A hundred big bargains every month. Highest trade-in allowance. Fast four-hour shipping service. Special Novice department. Write us today. Dossett, W9BHV, 855 Burlington, Frankfort, Indiana.

SWAP only. Any 15 copies of *QST* 1917 to 1921 for March and May 1916 issues. Have 100 copies *QST* 1933 to 1946 at 25¢ each. Jablonsky, WØMCX, 1022 N. Rock Hill Road, Rock Hill 19, Mo.

MICHIGAN Hams! Amateur supplies. Store hours 0800 to 1800 Monday through Saturday. Purchase Radio Supply, 605 Church St., Ann Arbor, Michigan. Phones 8696 and 8262. Roy J. Purchase, W8RP-Leroy Reichenberger, W8LJD-Edmund E. Gunther, Jr., W8HMW.

RK-4D32 tube, brand new, $19.50 postpaid. W5AXI.

QSLS? QSLS? State-maps? Rainbow-maps? Cartoons? Flags? Eagles? QSL samples 25¢ (Refunded). One-day service! Sakkers, W8DED, Holland, Michigan.

QSLS! We've printed a million for hams all over the world. QSLs. Samples 10¢, refunded. VYS Print, 1704 Hale, Ft. Wayne, Ind.

VAN SICKLE has Eldico, Sonar, National, Hallicrafters, Hammarlund, Elmac, Gonset and Johnson-Viking in stock at lowest prices. "Gene," W9KJF, Van Sickle Radio Supply, 1320 Calhoun, Ft. Wayne 2, Ind.

WANTED: BC-348 receiver and parts. Write to James S. Spivey Co., 1406 "G" St., N.W. Washington 5, D. C.

POSTCARD brings you free information on our new Amateur Desk Signs and money-saving club purchase plan. Hawkins Distributing Co., Paquatuck Terr., East Moriches, N. Y.

WANTED: AN/ART-13 transmitter and/or parts. Robert Wegelin, 410 Cedar Street, NW, Washington, D. C.

QSLS-SWLS. Bartinoski, W1VHD, Box 617, Houlton, Maine.

QSLS. High quality, samples 10¢. Dortch, W4DDF, Jocelyn Hollow Rd., Nashville, Tenn.

TRADE: KW power supply with Thordarson T21P77, two section filter, 2500 VDC @ 400 mils. KW RF ampli. with 4-250A. Wanted: large calibre hunting rifle in excellent condition, other hunting and camping equipment. Write to F. R. Tesche, W5UZI, 2313B 48th St., Los Alamos, New Mexico.

QSLS. Samples free. Albertson, W4HUD, Box 322, High Point, N. C.

TVI Monitor, compact 7" set $35. Larger screen, $40. Want Eldico or Multiphase SSB Exciter. W4API, 1420 South Randolph, Arlington, Virginia.

CODE slow? Try new method. Free particulars. Donald H. Rogers, 41 Fourth Street, Fanwood, N. J.

CALL signs, aluminum, reflecting type, car, rig, home. Regular 2" x 5", $1.50; Jumbo 3½" x 12", $2. Satisfaction guaranteed. Overnight service. J. Q. Whitley, W2LPG, 133 Airsdale Ave., Long Branch, N. J.

NEED: NC-348 and BC-342 radio receivers. C. Hoffman, 1406 G St., N.W., Washington, D. C.

ANTENNAS. Specializing exclusively in amateur antennas. Greene dipoles and 20-meter Panther beams. Send for flier. Antenna, Inc. Wakefield, R. I.

ELECTRONIC Technicians. For permanent positions with Sandia Corporation. Armed Forces acquired radar or electronic experience desirable; trade school certificate with minimum five years experience. Versatility, capability and willingness to work most essential. Sandia Corporation, a subsidiary of the Western Electric Company, operates the Laboratory under contract with the Atomic Energy Commission in Albuquerque, New Mexico. Excellent working conditions and liberal employee benefits, including paid vacations, sickness benefits, group life insurance and a contributory retirement plan. No housing shortage in the Albuquerque area. For further information write to Section (2), General Employment Division, Sandia Corporation, Sandia Base, Albuquerque, New Mexico.

PASS amateur theory exams. Check yourself with sample FCC-type questions & Novice & General class examinations. All for only 50¢. Ameco, 1203 Bryant Ave., New York 59, N. Y.

VHF 152 $40; BC 453, $18; Millen exciter, four sets of coils, $25; Meissner Deluxe Signal Shifter, five sets of coils, $35. All units complete with tubes. Wayland M. Groves, W5NW, Box 586, Odessa, Texas.

QSLS! SWLS! See the latest, most striking designs. Free Samples. This ad worth $1 with order. Acme Printers, 707 W. 8th, Los Angeles 17, Calif.

VERY sweet baby mobile antenna satisfies XYL mobile antenna problem. Beautifully chromed only 4 feet high. High Q weatherproof plug-in loading coils. Changes bands instantly. Top section resonates antenna to operating frequency. Becomes regular car whip when coil is removed. Perfect for Gonset, Elmac, Viking, etc. bandswitching transmitters. Tiny but effective on all bands. Replaces regular cowl or fender broadcast whip. Easily installed in a few minutes. Coils available 75 through 10 meters. With mounting hardware and one coil, $12.95 each. Specify band. Other coils, $2.75 each. W6VS, Bill Davis, 225 Cambridge Ave., Berkeley 8, Calif.

SELL: Late Model S-40B used 5 hours $90.00. Meissner EX Signal Shifter perfect $50.00. Heathkit AT-1 xmitter $25.00. New pair 809s $4.00 new pair 100ths $10.00; Superior Model 670-A VTVM never used $25.00. Rugel WØPRM, 304 North Park Blvd., Independence, Kansas.

WANTED urgently, instruction book for KP 81, will pay for use. Earle Cantor, W2LHQ.

FREE Bargain list. Mark, 1888 Randell Avenue, Bronx 72, N. Y.

QSLS, world's finest, 100 Super-gloss, one color, $1.95 up. Samples 10¢. QSL Press, Box 71, Passaic, N. J.

WANTED — TCS-12 to 15 AC Power Supply type 20309. State condition and price. W9FCL, Wesley Kidd, Glen Ellyn, Illinois.

HALLICRAFTERS S-53A R cvr. Excellent. Almost new. $55.00 express collect. Dean Hayes, WN9BAH, 826 N. Ridgeland, Oak Park, Ill.

SELL: Hammarlund Pro 400X complete as new. R. Long, 933 E. Broadway, S. Boston, Mass.

SX-71 like new, $150; BC-696A perfect, $25; TBY transmitter receiver, 28–80 Mcs, $20; Wilcox CW3 receiver, $20; ABK-4 receiver, perfect, easily converted 144, 220 or 420 Mcs, $15; BC-654A receiver, 3800–5800 Kcs, minus case, $10; PE-101C dynamotor, brand new, $3.50. Want ART-13 transmitter and parts. W1KJO, 29 Pine Street, Bedford, Mass.

FOR Sale 1 used Pentron tape recorder, 7½ fps, $65.00, 20 rolls 1200 feet recording tape, new, $2.00 each, 11 24G's surplus tubes $0.85 each, new, in original packing. W4KSZ, 1209 Owsley Avenue, Columbus, Georgia.

WANTED — Synchros, Pay $25.00 for 1F or 1G; $20.00 for size 5DG differential generators, 2J5FB1 or 5CT control transformers. Other types will advise. Need Amplidyne Motor Generators Input 115/230V, 1 ph., 60~; Output 250 VDC at .6A or larger. Subject to inspection. Electro, 50 Eastern Ave., Boston 13.

TOP cash for your HQ129X. Electronic Labs, 2444 "D", Lincoln, Nebr.

WANTED: IRE and QST, 1925 *through* 1933; BSTJ up through 1940, *April* 1948, *April* 1951; RCA Review June 1947. George Maki, W6BE, 1417 Pacific, Santa Barbara, Calif.

FOR Sale Signal Corps Code Training Set AN/GSC-T1, 1 to ten students at one time. Complete with speaker and light blinker. New, est. Gov't. cost $175.00, sacrifice $49.95. Write, Dr. Sydensticker, # 4851-7th Ave., Sacramento, Calif. W6-MOH.

TELETYPE: sell #12 printer including table, cover, keyboard, syncmotor 60N, $100.00, also #21A tape printer and four #12 printers less keyboards. W6DOU, 1558 "B" Street, Hayward, Calif.

POWER Mobile Boys Leece-Neville Generator, almost new, little used, in excellent condition; large 80 ampere output with two voltage regulators one completely altered at factory, complete with rectifier, belt and instruction. First $90.00 takes it f.o.b. Atlantic City, New Jersey 2407 Boardwalk W2FLD Iry Fishelberg.

1000 K.C. crystals in holders $2 postpaid, 500 k.c. crystals in holders $1 postpaid, 450 k.c. to 470 k.c. (N.B.F.M.) discriminator transformers (air-tuned secondary) $1 postpaid. All items guaranteed. Mail order *only*. KRK Radio Products, 4303 N. Avers Ave., Chicago 18, Ill.

NEW crystals for all commercial services at economical prices; also regrinding or replacement crystals for broadcast, Link, Motorola, G. E. and other such types. Over 18 years of satisfaction and fast service. Eidson Electronic Company, phone 3-3901, Temple, Texas.

QSLS. Quality with economy. Samples 10¢. Stinnette, W4AYV, P. O. Box 155, Umatilla, Fla.

SELL 32V2, 75A2, bound volumes QST 1921–1951. Best cash carry offer. Please write W2AEB.

COLLINS 32V3 excellent condition. Best offer above $600.00. W5KYO, 1002 Garver, Norman, Oklahoma.

QSLS! "America's First Choice!" Samples 10¢. Tooker Press, Lakehurst, New Jersey.

WANTED: HQ-129X, SX-71, NC-173 etc. used communications receivers, ART-13, ARC-3, TCS. Farr Electronics, Box 273, Lexington 73, Mass.

10, 15 & 20 Meter Beams, Aluminum Tubing etc. Perforated aluminum sheet for shielding. Radcliff's, 1720 No. Countyline St., Fostoria, Ohio.

DX LOG of awards, the information you have been looking for. Contains the official rules for more than 30 awards with check lists to record your progress. DXCC covers nine pages alone. Only one non-DX award, WAS, which has space for five bands. Contains also postal data, countries cross-index, list of banned countries and other valuable information. The prepaid price to any country is only one dollar, U. S. funds. By air mail to U. S. and possessions $1.25. Send check or cash now to: E. C. Frierson, W4RKJ, Hobby Publishing Co. Easley, S. C.

FOR sale or Trade: Mimeograph, Grebe CR-13, antique Blickendorfer typewriter, R9er with 7 coil sets, Sonar XE-10, Underwood typewriters, Handsets. WANT: Elmac, Harvey Wells or S4OA, or? Gerald Samkofsky, 527 Bedford Avenue, Brooklyn, N. Y.

QSLS 125 $2.00. Garra, Lehighton, Pa.

WANTED PE 103 Brushes any Ant. Write W8IXU, 5638 Abbottsford, Cincinnati 13, Ohio.

SALE — Collins perfect 32V2, with 35C2 low pass filter, set B & W baluns mounted, extra 4D22. $495.00 Complete. W3ETA — Harold Fox, 7610 N. Front Street, Cheltenham, Pa.

NOVICE station 50 watts transmitter receiver $85. 20 watt 10Mtr mobile transmitter with power supply $40. Elmac A54H VFO mobile transmitter (new in carton) cost $153, sell $120. W2AEV, 14 Carol Rd., Bethpage, L. I., New York.

ANNOUNCING New Hayes Antenna System for 20 meters. Small, compact, rigid construction, low cost. Information on request. Arrow Industries, 143 N. Main St., Oakland, Iowa.

BALUN coils, type B&W #3975, mounted on 7x9x2 chassis and wired for use to match 75 ohms unbalanced to 300 ohms balanced lines, $12.95; mail orders please include $1.00 for packing and postage costs. Evans Radio, P. O. Box 312, Concord, N. H.

JUST out! 1954 Edition World Radio Handbook — only complete survey international broadcasting. $1.50. DX'ers — Ham's interpreter, words and phrases in seven languages — $1.00. World Radio, 47 Mounthaven Drive, Livingston, N. J.

WANTED — Collins 75A2. Give price, age and condition. Harold Weeks, WØERI, 5112 Nall Ave., Mission, Kans.

TRADE: Precision Series ES-500A Scope with Series SP-5 Probe Set, never used, plus cash for 75A2 Revr. or will consider 75A1. W6QAP, 1119 N. La Cienega Blvd., Los Angeles 46, Calif.

SELL — 200 watt Cw. Pair 807's. Coils 40–20. Two power supplies 600–1000 volts. Sonar low pass filter ant. tuner & R.F. meter. Completely shielded in table rack. Also Vx-101-jr 80–40–20 vfo, 807 output. Both for best offer over $125. Local buyer only. — EV-8-2248. Al Ekblad, W2KIR, 8 Lombardy St., Brooklyn 22, N. Y.

SWAP or sell. New Master 75 meter antenna. Precision geiger counter 2-BC645, 2-EE8 phones, used Columbia cylinder graphophone, 100 records. Want 35 m.m. camera, slide projector, sweep generator, AM/FM tuner with RF stage, mobile converter, 10/20 preselector, Hi-Fi equipment, SP 400X. Jack Watt, W8HYQ, Ontonagon, Mich.

S-38 Receiver for sale. Excellent condition. $30 FOB. Fred Richman, W3VXQ, 4639 Walnut Street, Philadelphia, Penna.

FOR sale — Plate Voltage transformer, 2400 each side of center for 1 KW rig. Mfg. by G.E. Co. $15.00. Plate Voltage Transformer Westinghouse, 6000 to 120 V. $8.00. New Antenna Coupler Mfg. for Signal Corps 1 KW rig. Cost $200.00. Sell $15.00. Field Fone set complete $10.00 — Motor Generator Set, Robbins & Myers 500 V.D.C. 200 Watts. New condition $25.00 — 15 New B & W Plug-in Coils for final of BC-610-E Transmitter. $15.00 all bands. — 2 Tuning Units for B C-610-E 20 & 40 Meters $4.00 — Weston D. C. Voltmeter 0 to 1000 Volts with Resistor $15.00 — Jewell A. C. Voltmeter 0 to 15 Volts for panel $5.00 — Old Wireless Age, Marconigraph and QST Magazines beginning with 1913. Earl H. Brockway, 714 Clifford St., Flint, Michigan. W8AGG.

SELL: NC-125 with speaker, $125.00. Best offer takes Heath Oscilliscope and 6V Battery Eliminator. K2EQD, Box 547, Perth Amboy, N. J.

SELL QSTs complete file 1944 through 1953, March, November issues missing from 1939 file, few earlier scattered issues $25 prepaid. W5LV, 1916 Fern, New Orleans, Louisiana.

SELL Meissner EX Shifter, factory wired, 40–80 meter coils, never used, $59 or best offer. W2NQR, 61 Henry St., Merrick, L. I., N. Y.

SALE: Super Pro SP400-SX Speaker, like new, $195.00. C. H. Fitch, 3512 Farragut Ave., Kensington, Maryland. W3ENS.

WANTED: Eldico AM40 modulator in good condition. Euel H. Shelley, Nichols, S. C.

TRADE 5 hp outboard motor for mobile gear. W5ASO, Box 601, Mountain Home, Ark.

BARGAINS: extra special: Motorola P-69 series Mobile Receiver $19.50; Gonset 10–11 converter $19.95; DM-36-10 meter converter $19.50; VHF-152 $49.00; HF 10–20 $49.50; S-40A $75.00; RME-45 $99.00; RME 2–11 $99.50; HRO-senior $99.00; SX-43 $119.00; S-76 $149.00; SX-71 $169.00; SX-42 $189.00; HRO-50 $275.00; 75A1 $275.00; MB611 Mobile Transmitters $14.95; 90800 exciter $22.50; HT-17 $32.50; BX Shifter $69.00; Globe Scout $69.50; Globe Trotter $69.00; TBS-50D $99.00; HT-9 $199.00; Supreme AF100 or Temco 75GA $225.00; Globe King $295.00. We need used receivers: We give highest allowances for S-20R; S-40A; B; NC-57; NC-100; NC-125; SX-24; SX-25; HQ-129X; and similar receiver. Free trial, Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Laboratories, Council Bluffs, Iowa.

XTALS SSB. Surplus FT-241-A all frequencies for any published SSB circuit. Matched sets excellent for average ham work, $1 per xtal. Special for serious SSB workers: Weaver-Brown (Aug '51 QST) lattice set 8 selected crystals custom-worked to guaranteed 10 cycles or better accuracy, $20 the set. 5 cycles or closer, $50 the set. Inquiries invited. All xtals postpaid. Calif. buyers add tax. Orco Products, Box 51, Downey, Calif.

MUST sell — following radio gear of the late WØGPC, Steelville, Missouri. This gear is very clean. 1 Viking II and Viking VFO, used but few hours, $300.00. 1 PE103 Pioneer Dynamotor (brand new). 1 Par-Metal Enclosed cabinet type ER-225. 1 Eclipse metal Cabinet with hinge top — 18x14x10. 1 Triplet 0-150 vac. 1 Triplet 0–200 dc mil. 1 Triplet 0–500 dc mil. 1 Triplet 0–500 dc mil. 1 BC-459A. 1 T-19 ARC-5. 1 pr 250A Eimac. 1 250th Eimac. Mrs. Dora Horne, Steelville, Missouri.

FOR sale Millen 90080 exciter with all coils and tubes $25. Code machine $10. Write Box 206, Roxbury, New York.

IF I wanted to buy a new transmitter I'd see Uncle Dave, W2APF at Fort Orange Radio Distributing Company in Albany, N. Y.

QSLS. Something different! Send $3.00 for 100 and be surprised. 24-hour service. Satisfaction guaranteed or send 10¢ for samples. Constantine, Bladensburg, Maryland.

SX-43 with spkr $100.00; Eldico Ant. Coupler $20.00; Eldico Lo-pass $7.50; 300 ohm 10M Lo-pass $3.00; Shure '51 $18.00; Astatic DK-1 $7.50; Sweep Tube Rig QST Apr. '53 $17.00; PP807 rig with pwr. supply QST Oct. '50 $35.00; Master bumper mount $4.00; Bliley CCO-2A $5.00; Tube Tester $10.00. Free parts with every purchase. W8FIL, 11833 Wisconsin, Detroit, Mich.

SURPLUS specials! RG-8/U Cable 100 ft. $5.95, 250 ft. $13.25, 500 ft. $25.00. Coaxial Connectors — PL-259 5 for $2.25, SO-239 5 for $2.00. New tubes — 807 — $1.65, 811A — $4.25, 812A — $3.50, 813 — $10.50, 866A — $1.48, 304TH — $8.75, 872A — $3.95, 24G — $1.85. Postage extra. Request free bulletin and visit our new store for thousands of bargains. Want to buy or swap: Selsyns, Synchros, Servo Motors, Amplidynes, RTA-1B Aircraft Radio. Lectronic Research, 719 Arch St., Philadelphia 6, Pa.

SELL or trade: Boehme automatic perforated tape keyer for Morse code, 7-B transmitter for teletype, 21A midget tape printer, #12 page printer with keyboard, 32V-3, Hallicrafters S-25, HRO50-1, APA-10, APR-5A, frequency meter, SCR-694-C. Want BC-610 & parts, Panadaptor, #15 Printer, ART-13, BC-348 or similar receiver, BC-221 or LM, technical manuals, SIG-5 catalogs. Tom Howard, W-1-AFN, 46 Mt. Vernon St., Boston 8, Mass. Richmond 2-0916.

SX-71 Hallicrafter, speaker, headphones. New, perfect condition. Selling reasonably. Blackweider, 131 Riverside Drive, N. Y. EN 2-6024.

NC-125, PM speaker, like new $130.00; RME "Fifty" receiver, matching speaker, just factory serviced, $135.00; Command transmitters, receivers; 75 watt CWxmitter 20–40–80 complete $45.00; Select-O-Ject $15.00; Millen R-9er, 10–20 coils $10.00; Complete new six volt Windcharger unit $20.00; Bud WM-78 frequency meter $5.00; Varitran V-0 $5.00; power supply 700 volts 200 milliamps $20.00; crystals 6, 10, novice 15 meters; VHF variable condensers; panel meters; quantities transmitting tubes; miscellaneous gear; all guaranteed. FOB Indianapolis, see previous Ham-Ad QST January 1953. Too busy to use this equipment. Howard O. Severeid, W9DPL, 2431 East Riverside Drive, Indianapolis 23, Ind., telephone Winthrop 2184.

HALLICRAFTERS 5–10 receiver with Gonset noise clipper and external S meter in good condition. Best offer. Also UTC special Series S59 filament transformer, 5 volts at 10 amps, $4.00. W8KJ.

REAL bargains: New and reconditioned Collins, Hallicrafters, National, Hammarlund, Johnson, Elmac, Gonset, Babcock, Morrow, RME, Millen, Lysco, others. Reconditioned S38 $29.00, S72 $59.00, S40A $69.00, S40B $79.00, SX43 $99.00, S76 $129.00, SX71 $169.00, SX42 $179.00, SX62 $179.00, NC57 $69.00, NC125 $129.00, NC173 $149.00, NC183 $199.00, NC183D $299.00. DB22A $49.00, HF-10-20 $49.00, VHF152A $49.00, HRO7, HRO50T1, HRO60, HQ129X, 75A1, 75A2, 32V1, 32V2, HT9, Viking I, many others. Shipped on trial. Terms financed by us. Write for free list. Henry Radio, Butler, Mo.

TRADE: 4-250A new tube guarantee for Millen R9ER or National Selecto-Ject. What am I offered for pair? W1JDE, Greene, 199 Jackson St., Newton Center, Mass.

FOR sale: PE-103 $22.00, home-made speech amplifier $4.00. Harrison antenna tuner (with all coils) $10.00, twelve inch speaker $3.00, Weston photocell-relay $5.00 (list $60), Master Mobile multiband antenna $4.00. George Kravitz, W2OTR, 7919 20th Avenue, Brooklyn 14, N. Y.

SELL: BC-348-R, 110 VAC, Good Condition — $65. Fred Wimberly, W4UVM. 506 Carrison St., Camden, S. C.

WANTED: pwr supply 650–750 VDC. Prefer with regulated 255 VDC and 12VAC. D. W. McKay, Box 668, London, Ont.

SELL: National NC125 Receiver. Brand new, used less than 8 hours. Purchased at old price $149.50, will sell for same. No spkr. W1ITB Win Brown, 103A Highland St., Bangor, Maine.

FOR sale Thordarson 6000, 4800 at 300. Code practice oscillator. Gardiner sender. Regenerative receiver. Heathkit transmitter, Hallicrafters S-20R. Write only. John Bradley, 41 Cedar, Montclair, N. J.

FOR sale: Complete Mobile Rig Elmac A 54H — M 450 Volt 375 MA Dynamotor Gonset Triband and Noise Limiter, Dow Coax Relay Sure Reluct. Mike. Very Reasonably priced. Lawrence H. Lapinske, P. O. Box 179, Wausau, Wisconsin.

SALE: 15 watt 80-meter transmitter. Guaranteed, $25.00. David H. Knight, Route 1, Cookeville, Tenn.

SELL: 32V-1 transmitter $325.00. W4GKI, Mr 1 Austin Drive, Columbus, Ga.

WANTED: BC-779, in good condition. M. R. Riggins, Box 147, Macomb, Ill.

SELL: Multiphase 10A SSB exciter factory-built in excellent condition with 80, 20, and 10 meter coils, $100. RME converter 152A brand new, $60. Elincor 10 meter beam model 400 EA brand new never assembled, $20. James Hartshorne, 502 Veterans Place, Ithaca, New York.

ELMAC A-54 with 40 meters excellent condition $110; Bandbox kit $25; BC610 coils; 2 meter ARC-5. W5NXE, 2255 46th Los Alamos, New Mexico.

TELETYPE — Model 12 with Sync motor, table, keyboard receiving & transmitting distributor and terminal unit. $165.00. Less terminal unit $125.00. F.O.B. W6BWQ, 1630 Kenilworth Ave., San Marino, California.

LETTINE transmitter, xtal, coils for 3 bands, ex cond $65.00, NC 57 like new $70.00, 40 & 80M xtals $1.00 each, SX25 very gud condx $85.00. Send for list. L. Blum, 2661 Dibblee Ave., Columbus 4, Ohio.

SALE — 75 watt de-TVI-ed xmitter and S38C receiver: both 3 mos. old. Bargain at $100.00. Want V.F.O. WN4AXQ, Tazewell, Tenn.

FOR sale — Harvey Wells TBS 50 D Bandmaster deluxe, never used $100.00 — Gonset model 3008 2 meter converter, excellent condition $20.00 — Dynamotor PE 103 power supply, unaltered, excellent $20. WØKHR George Payne, 1314 So. 31 St., Omaha, Nebraska.

FOR sale: 1200 volt 350 ma. power supply, used 4-250A. WØGHX.

FOR sale: Viking I Transmitter with T.V.I. Kit installed. Best offer over $190. Robt. Watts, WØIBW, Box 355, Hubbard, Iowa.

SELL: 75-watt 80 cw xmitter in metal cabinet (illustrated 1952 ARRL Handbook), $55.00. WØKCJ, Veutter, 1312 Fillmore, Alexandria, Minn.

WANTED: Bargain in National HFS or 1–10 receiver. What have you? J. Y. Wilfong, W4EMV, Route 1, Box 260, Newton, N. C.

DUMONT Power Supply 400VDC/200MA & 5V/3A 3% Regulated; 12 6VCT/6A complete $18.98. 2500 VDC/200MA Kit. Power & Filament transformers & (4) 866A Bridge Rectifiers, $23.00. We buy & sell & swap as well. "TAB", 111 Liberty Street, N. Y. C.

COLLINS 32V1 absolute perfect condition and excellent performer with carbon mike and spare 4D32, best offer over $350. Bernard McConnell, 551 W. 174 St., NYC 33.

FOR sale: Collins 75A3, Xtal Calib. $440. HRO7, 4 coils, power supply, speaker, $160, or best offer. Bill Speck, 108 Washington, Marietta, Ga.

FOR sale: Commercial-looking mobile xmitter, coils for 75 and 10; Mallory 400 volt power pack, complete, ant. change relay, $75.00. Write for details. Richard Laplander, W8ZDQ, Box 88, Dollar Bay, Mich.

FOR sale: Late model Johnson Viking I, deTVI'd, tubes, low pass filter, many extras; new Hallicrafters SX-71 and speaker; new Meissner signal shifter. All of this equipment is in excellent operating condx and will be sold to the highest bidder. F.o.b. Chappell. Write Larry Pyle, WØAGE, Chappell, Nebraska.

SELL: HT-9 xmitter 150W Coils 10, 20, 40, 80, 160. Good working order. $150.00. Dalton J. Atherton, P. O. Box 85, Fullerton, California.

COLLINS 32V-1 completely detvied, filter and mike, top condition. Best offer in New York area. Richter, 86-11 Sancho Street, Hollis 23, N. Y. Tel. Spruce 6-0477.

FOR sale: NC57, Selectoject, Meissner Deluxe Signal Shifter, Workshop rotator, Simpson 260 VOM, RCA 151-2 Oscilloscope. W8VJD, 203 W. Kaye Av., Marquette, Mich.

SELL — QST in binders, 1933–1952 inclusive, $100.00. W. K. Lindeman, 211 Union St., Michigan City, Ind. W9LNH.

SELL Meissner 150-B with Signal Shifter complete, no reasonable offer refused, F.o.b. South Bend, Indiana. Robert G. Kasa, W9OGZ, 821–24th Street, South Bend, Indiana.

HARVEY-WELLS Deluxe, Reconditioned in Harvey-Wells Factory, used little since, with matching homebuilt power supply. Worth $170. Best offer over $100 takes it. Fred Snively, W3WWM, 1204 Oak Hill Ave., Hagerstown, Md.

TRADE: National 1–10 rcvr. w/coils & power supply for factory built equipment of equal value. Need G.D. Meter, VOM, SWR bridge, Freq. meter. Roger Mayhew, Rfd, N. Conway, N. H.

FOR sale: SCR522 xmitter $35, 300v. @ 200 mil. & −150v. Bias for 522 $15, extra power supply 300v. @ 200 mils. $10. All for $50. Hallicrafters S38C new gray model $40. Renkowitz, K2DUW, 3020 Yates Av., Bronx, N. Y.

FOR sale: 250-watt NBFM-cw trans. rack panel mounted in 36" metal cabinet. H. V. supply on separate chassis. Sonar XE10, T/19-ARC-5 VFO, SX24 with speaker. Reasonable. W2DVH, 60–71 70 St., Maspeth 78, L. I., N. Y. Tel. Hickory 6-6373.

WANTED — Collins 310B1 or 70E-8A. Have Robot II with Schneider F1.9 lens. Millen Grid-Dip Meter; Hy-Lite 10 meter beam. John Geczi, W8OOP, 12901 Forest Ave., Cleveland 20, Ohio.

MORROW 3-band converter 10–20–75 meters. Two months old, guaranteed perfect. $40 prepaid. Money order to Robert Lorenz, 2695 Lorian Lane, Salem, Ore.

FOR sale: S40B receiver with tuning eye and misc. $65. Bernhard Weinberg, Whitewater, Wis.

RL 8 FILTERS, two for $2.50 prepaid. BC 348 shock mounts $2.00. Heavy duty 110V AC selsyn motors $4.00 ea. SCR 522 transmitter with tubes $20.00. BC 443 radio compass receiver $7.50. BC 1004 Super Pro receiver with cabinet and heavy duty power supply .54 mc through 20 mc. $125.00. Carter dynamotor 6V in 500V at 200 ma out and vibrator supply 300V DC at 100 ma with filters and start relay $30.00. BC 610 modulation transformer and high voltage power supply, 2600V DC at 500 ma. 420 mc APS-13 with both RF heads $5.00. Wanted: Good AM FM tuner and amplifier. M. D. Haines, W5QCB, 1316 S. W. Military Drive, San Antonio 4, Texas.

Index of Advertisers

Allied Radio Corporation 136
American Electronics Co. 129
American Phenolic Corporation 80
American Radio Relay League, Inc. 95, 100, 115, 117, 133
Arrow Electronics, Inc. 94
Ashe Radio Co., Walter 103

Barker & Williamson, Inc. 117, 120, 127
Belden Manufacturing Co. 79
Bliley Electric Co. 85
Bud Radio, Inc. 93

Candler System Co. 115
Cannon Electric Co. 104
Capitol Radio Engineering Inst. 133
Central Electronics, Inc. 123
C & G Radio Supply Co. 116
Chicago Standard Transformer Corp. 74
Collins Radio Company 2
Concord Radio 92
Crawford Radio, The 119

Dale Electronic Distributors 88
Dow-Key Co., Inc. 126

Eitel-McCullough, Inc. 71, 108
Electro Sales Co., Inc. 125
Electro-Voice, Inc. ..... Cov. II
Engineering Associates 123
Equipment Crafters, Inc. 110
Evans Radio 121

Fort Orange Radio Distrib. Co., Inc. 113

Gardiner & Co. 126
General Electric Co. 1
Gonset Co., The 77
Gotham Hobby Corporation 78

Hallicrafters Co. 4, 5
Distributors:
- Allied Radio Corporation 116
- Almo Radio Co. 114
- Evans Radio 126
- Edwards Co., W. H. 124
- General Radio Supply 129
- Hall, Inc., R. C. & L. F. 112
- Harvey Radio Co. 110
- Henry Radio Stores 121
- Hudson Radio & Telev. Corp. 118
- Sterling Radio Products 122

Hammarlund Manufacturing Co., Inc. 66, 67
Harrison Radio Corporation 105
Harvey Radio Co. 101
Harvey-Wells Electronics, Inc. 70
Heath Co., The 75, 119
Henry Radio Stores 99
Hudson Radio & Telev. Corp. 86
Hughes Research & Dev. Labs. 123
Hy-Lite Antennae, Inc. 119

Instructograph Co. 130
Institute of Radio Engineers 89

Johnson Co., E. F. 69, 119

Knights Co., The James 135
K-W Engineering Co. 120

Lafayette Radio 109
Lampkin Laboratories, Inc. 130
Lettine Radio Mfg. Co. 121

Mallory & Co., P. R. 73
Mass. Radio & Teleg. School 127
Master Mechanic Mfg. Co. 108
Master Mobile Mounts, Inc. 102
Millen Mfg. Co., Inc. The Jas. 134
Morrow Radio Mfg. Co. 87
Motorola C & E, Inc. 112
Multi-Products Co. 97

National Co., Inc. ..... Cov. III, 65

Ohmite Manufacturing Co. 91

Palco Engineering, Inc. 129
Petersen Radio Co. 7
Pioneer Tool Co. 118
Port Arthur College 123
Precision Apparatus Co., Inc. 72

Radio Corporation of America ..... Cov. IV
Radio Shack Corporation, The 82, 83
Raytheon Manufacturing Co. 76
RCA Institutes, Inc. 125
Regency (Div. of I.D.E.A., Inc.) 115
Rider Publisher, Inc., John F. 128

Selectronics, Inc. 129
Shure Brothers 98
Sonar Radio Corporation 81
Steinberg's, Inc. 111
Stromberg-Carlson Co. 124
Sun Parts Distributors, Ltd. 125
S & W Electronics 127

Terminal Radio Corporation 90
Trans World Airlines 128
Triad Transformer Mfg. Co. 84
Turner Company, The 125

United Catalog Publishers, Inc. 128

Valparaiso Technical Institute 115
Vesto Company, Inc. 122
Vibroplex Co., The 121

Webster Manufacturing Co. 96
Wilmington Elec. Specialty Co., Inc. 127
Wind Turbine Co. 114
World Radio Laboratories, Inc. 107

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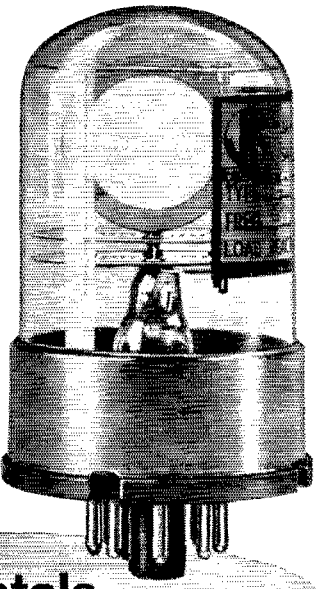

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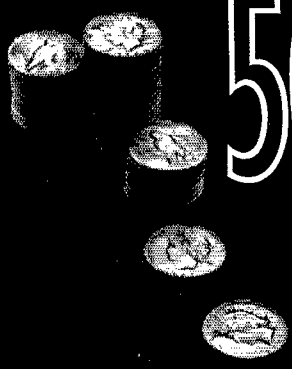

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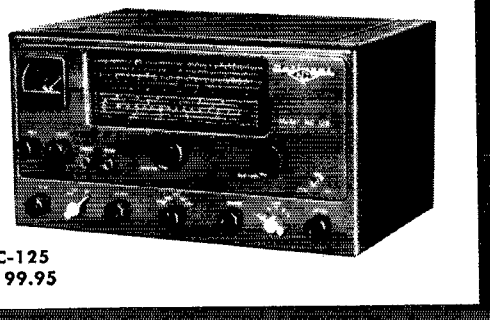

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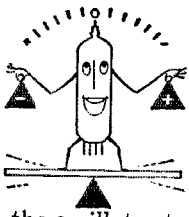

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