UTC Linear Standard Transformers feature...

- True Hum Balancing Coil Structure... maximum neutralization of stray fields.
- Balanced Variable Impedance Line... permits highest fidelity on every tap of a universal unit... no line reflections or transverse couplings.
- Reversible Mounting... permits above chassis or subchassis wiring.
- Alloy Shields... maximum shielding from induction pickup.
- Multiple Coil, Semi-Toroidal Coil Structure... minimum distributed capacity and leakage reactance.
- Precision Winding... accuracy of winding .1%, perfect balance of inductance and capacity; exact impedance reflection.
- High Fidelity... UTC Linear Standard Transformers are the only audio units with a guaranteed uniform response of +/-0.5dB from 20-20,000 cycles.

**Typical Curve for LS Series**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>Primary Impedance</th>
<th>Secondary Impedance</th>
<th>Max. Level</th>
<th>Relative hum-pickup reduction</th>
<th>Max. unbalanced DC in primary</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-10</td>
<td>Low impedance mike, pick-up or multiple line to grid.</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>40,000 ohms in two sections</td>
<td>+13 DB</td>
<td>-74 DB</td>
<td>5 MA</td>
<td>$25.00</td>
</tr>
<tr>
<td>LS-10X</td>
<td>As above</td>
<td>8,000 to 15,000 ohms</td>
<td>50,000 ohms</td>
<td>+14 DB</td>
<td>-92 DB-Q</td>
<td>5 MA</td>
<td>$32.00</td>
</tr>
<tr>
<td>LS-21</td>
<td>Single plate to push pull grids</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>135,000 ohms; turn ratio 3:1 overall</td>
<td>+14 DB</td>
<td>-74 DB</td>
<td>0 MA</td>
<td>$24.00</td>
</tr>
<tr>
<td>LS-30</td>
<td>Mixing, low impedance mike, pickup, or multiple line to single line.</td>
<td>8,000 to 15,000 ohms</td>
<td>50, 115, 200, 250, 333, 500/600 ohms</td>
<td>+17 DB</td>
<td>-74 DB</td>
<td>5 MA</td>
<td>$25.00</td>
</tr>
<tr>
<td>LS-30X</td>
<td>As above</td>
<td>8,000 to 15,000 ohms</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>+15 DB</td>
<td>-92 DB-Q</td>
<td>3 MA</td>
<td>$32.00</td>
</tr>
<tr>
<td>LS-50</td>
<td>Single plate to multiple line</td>
<td>5,000 ohms plate to plate and 3,000 ohms plate to plate</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>+17 DB</td>
<td>-74 DB</td>
<td>0 MA</td>
<td>$24.00</td>
</tr>
<tr>
<td>LS-55</td>
<td>Push pull 2A3, 6ASG's, etc.</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>50, 115, 200, 250, 333, 500/600 ohms</td>
<td>10.7, 5, 2.5, 1.2</td>
<td>20 watts</td>
<td>30, 20, 15, 10, 7.5, 5, 2.5, 1.2</td>
<td>$24.00</td>
</tr>
<tr>
<td>LS-75</td>
<td>Same as above</td>
<td>50, 125, 200, 250, 333, 500/600 ohms</td>
<td>50, 115, 200, 250, 333, 500/600 ohms</td>
<td>10.7, 5, 2.5, 1.2</td>
<td>20 watts</td>
<td>30, 20, 15, 10, 7.5, 5, 2.5, 1.2</td>
<td>$20.00</td>
</tr>
</tbody>
</table>

The above listing includes only a few of the many units of the LS Series. For complete listing — write for catalogue.
That's the GL-8005, rating and cost-wise. Substantial plate input at a price that unzips timid wallets!

Your G-E tube distributor will be glad to tell you how small a sum (about as much as for one 600-w-input tube) buys two GL-8005's for push-pull operation... giving you:
1) A better-balanced circuit than with one tube for your final.
2) A circuit with which you can reduce second-harmonic radiation. This should be cut to a minimum in today's ham work.
3) Opportunity to purchase a "spare" for your shelf for half the investment otherwise tied up in an extra 500- or 600-watter.

As for power — a pair of GL-8005's has all you are apt to require, taking 600 w max input CW or 480 w phone (ICAS). Frequency at this power is up to 60 mc, or well beyond the 6-meter band. Drive needs are low.

Primarily useful as r-f amplifier or final, the GL-8005 also serves as a good Class B modulator. Two in this service will produce a healthy 300 w of audio output.

The tube has a 10-v heavy-duty filament. It's a husky, able to stand the gaff. It's a triode, so easy to apply and use. Investigate its good qualities, check the high value it offers... by visiting your nearby G-E tube distributor, or writing Electronics Department, General Electric Company, Schenectady 5, New York.

**GL-8005 TRIODE**

Typical operation, one tube (ICAS)

<table>
<thead>
<tr>
<th>Class C</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>telephony</td>
<td>telephony</td>
</tr>
</tbody>
</table>

- Plate voltage: 1,250 v, 1,500 v
- Current: 190 ma, 200 ma
- Driving power: 9 w, 7.5 w
- Power output: 170 w, 220 w

---

**Series 2 in a listing, by areas, of tube distributors who can supply you with Ham News, G. E.'s bi-monthly magazine:**

- **Albany, N. Y.:** Fort Orange Radio Dist. Co.
- **Amsterdam, N. Y.:** Adirondack Radio Supply
- **Binghamton, N. Y.:** Federal Radio Supply Co.
- **Bridgeport, N. J.:** Joe's Radio Shop
- **Brooklyn, N. Y.:** Electronic Equipment Co.
- **Buffalo, N. Y.:** Radio Equipment Corp.; Standard Electronics Dist. Co.
- **Camden, N. J.:** Radio Elec. Service Co.
- **Ithaca, N. Y.:** Staffman of Ithaca
- **Jamaica, N. Y.:** Peerless Radio Dist. Co.
- **Newark, N. J.:** Continental Sales Co.
- **Poughkeepsie, N. Y.:** Electra Supply Co.
- **Rochester, N. Y.:** Hunter Electronics
- **Syracuse, N. Y.:** Onondaga Supply Co.; Syracuse Radio Supply Co.
- **Trenton, N. J.:** Allen and Hurley
- **Utica, N. Y.:** Langdon and Hughes Elec. Co.; Onondaga Supply Co.; Veeth Elec. Co.
- **Watertown, N. Y.:** Onondaga Supply Co.

(List as of Dec. 24, 1948)
More contacts, more quickly, easily, with a ... COLINS PTO Exciter Unit

All these Collins exciters give you the flexibility of variable frequency, with the accuracy of calibration and remarkable stability inherent in the 70E-8A PTO around which they are engineered. The slide rule dials of both the 310B series and 310C series roughly indicate operating frequency, while their vernier dials read directly in kilocycles. See them at your Collins dealer’s. If you don’t know him write us for his name and address.

The 310B-1 is a versatile, self-powered unit with an input of 40 watts on all ham bands under 32 mc. It is bandswitching with the exception of the final amplifier, where plug-in coils are used. Output coupling is by means of a link in the plate tank coil. The tube complement consists of 1—6SJ7 PTO, 3—6AG7 multipliers, 1—2E26 r-f amplifier, 1—6SL7GT sidetone oscillator, 1—SR4GY H. V. rectifier, 1—SZ4 L. V. rectifier, 1—6H6 bias rectifier, 1—VR105 voltage regulator, 1—VR150 voltage regulator. Price, $190.00.

The 310B-3 has a series-parallel tunable matching antenna network, of the universal type, which will match balanced or unbalanced antenna systems over a wide range of impedances. Otherwise it is identical with the 310B-1. It makes a fine standby transmitter, is excellent for spot frequency network and, because of its low power requirements, for emergency work. Also, it is unexcelled for the beginner. Later, when more power is called for, he has only to add the final amplifier stage. Price, $215.00.

The 310C-1 exciter is a straightforward unit consisting of a 70E-8A and a multiplier, with an r-f output of approximately 80 volts rms across 40,000 ohms. Its output frequency range is from 3.2 mc to 4.0 mc. The output of the 310C-1 can be plugged into the crystal socket, or applied to the grid of an 807 buffer stage, providing crystal accuracy and stability with greater versatility than a large number of crystals would afford. Price, $85.00.

The 310C-2 is identical with the 310C-1, but with self-contained power supply. Price, $100.00.
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...for 10-inch or 12-inch tube *

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* Frame for mounting 12-inch tube approximately $8.50, including all necessary parts.

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4401 W. Fifth Ave., Chicago 24, Ill.

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| Colorado | W7CF | Clifford Cavanaugh | Route 1 | | |
| Utah | W7CP | | | | |
| Idaho | K7LZG | | | | |
| Montana | W7GZN | | | | |
| Oregon | W7JG | | | | |
| Washington | W7ACP | | | | |
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| San Francisco | K6XT | Samuel C. Van Lew | 275 Novato Ave. | Daly City |
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| | VE2ET | | | | |
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MINIATURE TUBES ... for lower minimum circuit capacitance, better high-frequency performance. The S-53 is the lowest priced set with all miniatures in RF and IF sections. A concrete example of Hallicrafters high engineering standards plus their endeavor to give you ever increased value.

BEFORE YOU BUY, see and try the S-53. Compare its features, learn the thrill of its superior performance. Lift its top and examine its compact, precision-engineered chassis. You'll agree, here is advanced Hallicrafters design!

RANGE 540 kc to 31 Mc plus 48 to 54.5 Mc in five bands. 6-Meter Band calibrated on bandspread scale. Other features include series-type noise limiter, phono input jack, built-in speaker. 7 tubes plus rectifier.
is a noncommercial association of radio amateurs, banded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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.

All general correspondence should be addressed to the Secretary at the administrative headquarters at West Hartford, Connecticut.

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Alternate: David H. Calk, W5BHO  
730 Junip St., Houston 17, Texas
The amateurs of the United States are about to regain some of their operating rights in the old 160-meter band!

As we write this, all details have been worked out and will come into force as soon as FCC can process the necessary orders. It is quite possible this will have been accomplished by the time these words appear in print.

What we will obtain, and the conditions under which we will be permitted to resume operation, are set forth in the latter part of the article on the Inter-American Regional Radio Conference on page 27 of this issue.

This plan reflects three and a half years of hard work and careful negotiation by your League on behalf of the amateur service, on the one hand, and the Federal Communications Commission, the Coast Guard, the Army, the Navy and other Government agencies on the other. Actually, it would perhaps be more accurate to say there is no “other hand” because one of the most heartening and significant features of this extensive study has been the unanimity of objective on the part of all concerned, a determined effort to see if somehow something couldn’t be worked out. Amateur radio owes these agencies and their representatives a real vote of thanks.

We think it is appropriate at this time to outline briefly the steps which have preceded this final development. As we imagine most amateurs know by this time, the basic complicating factor in the whole picture was the development, during the war, of a secret long-distance navigational system for airplanes and surface vessels known as loran. It was put into operation at that time in our 160-meter band for the simple reason it was the only place in the spectrum it could go without a lot of costly delay; that band is by no means the ideal place for it from an operational standpoint. Conceived for wartime military use it subsequently turned out to be so essential for long-distance overseas flying that its retention became a matter of peacetime as well as wartime necessity and it is today a growing service both for aviation and for shipping. We do not propose here to argue its merits or demerits or alternative means of accomplishing the same end, but will summarize these aspects by saying that extensive and costly attempts to develop a substitute system have so far failed to produce results, that technical difficulties inherent to the system and physical problems of installation have so far prevented shifting loran to more suitable frequencies (150–200 kc.), and that until one or the other of these alternatives is possible it is the policy of the United States government, reflecting the view both of Government and non-Government interests, that loran must be continued as an essential safety service.

This, then, was the situation that confronted the League when, in 1944, it participated in the famous September hearing before FCC to begin the job of drafting a postwar frequency spectrum. At this hearing the League’s position with respect to “160” was that amateurs should be restored the band, as set forth in the League’s presentation for that hearing and reported at the time in QST.1 However, when FCC issued its subsequent report on proposed allocations below 25 Mc., in May of 1945, it turned down this request and assigned 1800–2000 kc. to “navigation aids,” meaning loran.2 In its appearance a month later to comment on this proposal, the League, obliged to recognize the firm position of the United States in respect to loran, for the first time proposed the arrangement which is reflected in the development we chronicle this month; we pointed out that the characteristics of the system, as used in the United States, offer some hope of a sharing arrangement based on the fact that the loran system uses one frequency (1950 kc.) on one coast, and another frequency (1850 kc.) on the other coast. We suggested that it might well be practicable to permit amateurs on one coast to use the 100-kilocycle band not in use on that coast, and at that time we formally requested FCC to institute a study with the appropriate Government agencies to examine the feasibility of our suggested sharing arrangement.3

1 p. 20, November 1944
2 p. 15, July 1945
3 p. 25, August 1945
The Commission, cooperative as always, then set up a special engineering study on this question, as a result of this request of the League; this was conducted between the engineering division of the Commission and the U.S. Coast Guard radio engineering department, under whose supervision the loran system is operated. Unfortunately, as reported by the writer to the special meeting of the League's Board of Directors in March, 1947, the results of this study, while never published, indicated that it would be inadvisable at that time to inaugurate such a sharing arrangement on any simple basis. We were at that time rapidly approaching the opening of the Atlantic City conference, and further study of the knotty problem was impossible because of the necessity for everybody concerned devoting their energies to preparations for the world conference. Nevertheless, almost on the eve of the conference itself, the League was responsible for getting the basic U.S. allocation proposal changed, with respect to this band, so that instead of the proposal for 1800-2000 kc. being only for loran, it was for navigation aids, amateur, fixed and mobile services. Admittedly only a foot in the door at that time, it reflected our feeling that sharing could eventually be worked out and our determination to pursue the subject later. To that extent, our Government went along with us. As is now known, we were successful in having just exactly this assignment carried into the international table of allocations at Atlantic City. Following Atlantic City, we revived the subject in Washington circles and, beginning early in 1948, the studies were resumed. Complicated by technical difficulties, and a host of factors including considerations of national security, they went forward intensively through 1948 and have finally resulted in what you now see. We remark at this point, paraphrasing a famous statement, that never has so much hard work and negotiation been covered in so few words as in the previous sentence.

We want to conclude this report with some pretty plain talk. First of all, let there be no undue griping from amateur ranks over the conditions imposed upon us in this initial authorization. We know it’s going to be tough on some of the amateurs in the states bordering the Gulf of Mexico to have to forego night operation altogether and we imagine there are amateurs elsewhere who will not be entirely happy about the power restriction indicated for them. Let us realize, however, that there is nothing arbitrary about these decisions; they reflect only what is deemed essential at this time in the interests of safety and security. Second, it can and should be said right here that our future on these fre-

1 p. 45, April 1947
2 p. 42, November 1947

FIRST TRANSCON TT QSOS REALIZED!

As we go to press, confirmation has been received of successful amateur two-way teletype communication and message exchange between W1AW and W6PSW, Bakersfield, Calif. The stations effected partial contact on January 30th, repeated more successfully on the 31st, and on February 1st rag-chewed and exchanged congratulatory-message traffic solidly. Earlier, on January 23rd, William T. Knott, W2QGH, Larchmont, N. Y., had been able to make rough copy of W6PSW's test transmissions. Stations participating in this notable work used 11 meters and the a.f.s.k. teletype system described by John E. Williams, W2BFD, in October, 1948, QST. Left: Tom McMullen, W1QVF, whoopered W1AW TT installation during transcon; right: Johnny Agalosoff, W6PSW, scans 'print' from W1AW.

(Continued on page 122)
Parasitic-Array Patterns

Experimental Measurements on Parasitic Arrays

BY JOSEPH L. GILLSON, W3GAP

The work described here is an experimental determination of the radiation patterns of several horizontal parasitic arrays. Patterns are presented for a 3-element array adjusted both for maximum forward and minimum rear radiation at several heights, and for a 2-element array at a height of 5/4 wavelength with various lengths of the parasitic element between that of a too-short director and that of a too-long reflector.

Here’s an article that will interest every user and prospective user of a rotary beam. It shows, on a relative basis, where your power goes with respect to that all-important “angle of radiation.”

Fig. 1 — Physical arrangement of the test set-up for measuring antenna patterns. With this gear, field-strength measurements could be made in both the horizontal and vertical planes. The work described in the text was done with model antennas working in the 420-Mc. band.

The vertical patterns were determined as follows: A field-strength meter was moved up in small steps through a vertical arc of 90 degrees about a point on the ground below the test array, then the test array itself was rotated horizontally through 180 degrees, and finally, the field-strength meter was stepped down through the same 90-degree arc, thus completing a vertical semicircle in the antenna field. Readings were taken at each step.

The azimuthal patterns were determined by fixing the field-strength meter at some vertical angle and taking readings as the antenna was rotated horizontally. Thus the field-strength meter effectively moved through a complete circle in the antenna field.

The field-strength readings taken were plotted directly on polar-coordinate paper to give the radiation patterns in terms of relative field strength.

Fig. 2 — Field-strength meter circuit.

The radius of the field-strength meter arc was 15 feet, or about 6.5 wavelengths at the operating frequency of 427.95 Mc.

The most important of several theoretical limitations on the accuracy of the results is that a radiation pattern measured near an antenna differs from the true pattern (the pattern measured at a very great distance) as to the amplitudes and vertical angles of maxima and minima. It can be shown, however, that the greatest error in the results from this cause is less than 0.7 degree in the determination of the vertical angles of maxima and less than 8 per cent in the amplitudes of maxima.

Measuring Set-Up

The equipment used (Fig. 1) was located within, and on the roof of, a shed of wooden construction. A rectangular wooden frame 7.7 by 18.5 feet was mounted horizontally on the roof and covered with copper fly screening to form an artificial ground surface. A round wooden pole, projecting vertically through the ground screen, served as the antenna support and was rotated by means of a selsyn-driven gear train.

A light wooden boom, pivoted in a wooden frame, was mounted by the side of the ground screen with the pivots opposite the antenna sup-

* Mullin Lane, Wilmington 278, Del.

March 1949
port pole. The boom was 17.5 feet long and the pivots were located 2.5 feet from one end. By means of a cast-concrete counterweight and a system of block and tackle the boom could be elevated from 0 to 90 degrees. The angle of elevation was measured on a large angular scale mounted with its origin on the line of the boom pivots.

At the far end of the boom and at right angles to it, a cross member was attached horizontally. The field-strength meter was suspended from this member in a free-swinging pivoted frame so as to be directly in front of the antenna support and the same distance below the cross member as the ground screen was below the boom pivots, thus making the center of rotation of the field-strength meter a point on the ground screen directly below the test array. Because the boom was not perfectly rigid, it was necessary to counterweight the cross member to keep it horizontal.

The field-strength meter, the circuit of which is shown in Fig. 2, was read by means of a telescope located on the roof 13 feet from the antenna.

Fig. 3 — Field-strength pattern of a half-wave dipole in the vertical plane perpendicular to the wire. This is one of a series of such patterns taken at different heights to check the accuracy of the measuring system. The theoretical pattern is shown by the broken curve for comparison.

Fig. 4 — Vertical (A to E, inclusive) and azimuthal (F to J, inclusive) patterns of a 3-element array, adjusted for minimum rear radiation. Spacing between antenna and reflector was 0.15 and between antenna and director 0.1 wavelength. The small circles on the azimuthal patterns indicate the half-power points. Comparison of amplitude between patterns taken at different heights is not significant.
Fig. 5 — Same as Fig. 4 except that the array was adjusted for maximum forward radiation.

The linearity of the field-strength meter was checked by applying a 19V voltage at 60 cycles.
to the rectifier and microammeter and plotting variations in this applied voltage against the d.c. indicated by the meter. The relation was found to be linear down to about 1 microampere. While no calibration was carried out at the operating frequency, there is no reason to believe that linearity at 60 cycles should not indicate linearity at the higher frequency.

**Radiation Patterns**

A check on the validity of the results was obtained by measuring the vertical patterns at right angles to a standard dipole at heights of 0.5, 0.75, 1.0, 1.25 and 1.5 wavelengths and comparing these patterns with the theoretical patterns (as found, for example, in the *ARRL Antenna Book*). Very good agreement was found to exist. Only one of these experimental dipole patterns is given here (Fig. 3).

During initial tests of the apparatus some marked irregularities were found in some of the dipole patterns. It was suspected that the concrete-boom counterweight, then mounted directly on the short end of the boom, was acting as a reflector. It was therefore removed from the boom and suspended as shown in Fig. 1 below the level of the ground screen. This smoothed out the irregularities considerably, though not completely. Further investigation showed that the material of the boom itself was acting to some extent as a reflector. However, since the experimental-dipole patterns now agreed very well, in general, with the theoretical patterns, no further changes were made in the apparatus.

The vertical patterns were all taken at right angles to the elements of the arrays. The azimuthal patterns should have been plotted, of course, on the surfaces of cones of semivertex angle 90 minus the angle at which they were taken. Nevertheless, they do show the relative field strength in any direction at the indicated angle.

It should be noted that while the adjustment for minimum rear radiation could be made with considerable precision, the maximum forward radiation adjustment could not be made so accurately because the tuning was broader. Consequently, the maximum forward-gain patterns were measured with an array adjustment that was probably not exactly the same in each case. Comparison of the array vertical patterns (Figs. 4, 5, 6) with theoretical patterns of dipoles at corresponding heights gives little support to the widespread belief that a parasitic array has a
lower angle of radiation than a dipole. In the array patterns, the few maxima that occur at slightly different angles than corresponding maxima in the dipole patterns at the same height are, almost without a doubt, displaced by defects in the apparatus. Of course, since the array has a much larger proportion of its total radiation in its lowest forward maximum, it actually does radiate more power at lower angles than a dipole at the same height.

Sets of patterns like those given here for the 3-element array with spacing refl. = 0.15 λ ant. - 0.1 λ - dir. were also made for a 3-element array with spacing refl. = 0.15 λ - ant. - 0.2 λ - dir., and for the 2-element array with 0.1 λ spacing. So far as vertical angles of maxima were concerned, all six sets were the same. The wider-spaced 3-element array had a slightly better front-to-back ratio and slightly higher gain than the close-spaced, and the 2-element was poorer in both respects.

The vertical angles at which maxima occur in the patterns of the arrays mentioned here may be computed in the same manner as for the dipole. Assuming perfect ground,

\[ \theta_m = \sin^{-1} \left( \frac{\lambda}{2\pi h} \sin^{-1} 1 \right) \]

where

- \( \theta_m \) = angle at which field is maximum
- \( h \) = height in wavelengths

Azimuthal patterns were actually taken at approximately the maximum of each maximum in each vertical pattern. The width (angle between half-power points) of the lobes in any one pattern was practically constant, though there was found a considerable (as much as ten degrees) and erratic difference in the widths of the patterns of the same array at different heights, particularly in arrays adjusted for maximum forward radiation. This erratic variation was probably caused, at least in part, by the fact that array adjustments were not precisely the same in each case.

The only adjustment made during the determination of the 2-element array patterns of Fig. 6 was to change the length of the parasitic element.

It is seen that the total power in some of the patterns is very considerably greater than in others. The reason for this is not clear, and since no measurements were made of the power input to the antenna system or of the standing-wave

(Continued on page 104)
Just in case there are any old-line dyed-in-the-wool hams still around who don't know what single sideband, temperature inversion, phase modulation, and all those other two-dollar words mean, here is a rig for straight c.w., with no trick circuits, no frills and no gadgets but with plenty of what it takes — power.

It doesn't take an electrical engineer with a Master's Degree in radar to build it, or the President of the local bank to pay for it; and when you get through, you'll have a full gallon — really full. Sure, I know you can work the VKs with a 6L6 running; 15 watts, but can you do it for a hundred consecutive nights? Having now settled the QRP argument so handily, we proceed to the designing and construction of the rig.

Design

Most of the c.w. fraternity abandoned the crystal long ago, except for net operations, and the VFO exciter that takes its place usually has some kind of a tube line-up ending in an 807 delivering 8 to 10 watts. Before de Wah, from a 10-watt start, it took four yards of breadboard-layout amplifiers to get up to a kilowatt, and the power supplies for said layout were a wonder to behold. These days, with the new tetrodes, from 10 watts to a jugful is one easy step. The whole deal is only 42 inches high, and my 10-year-old junior operator can lift the power supply with two hands. The only thing that really needs to be worried about is the Theorem of Electric Chairs which states that 3000 volts at one ampere will kill you awful dead, awful fast.

The writer of this treatise admits to having had no personal contact with 3000 volts, but from results with 440 volts data have been obtained which have been extrapolated to 3000, indicating that definite allergies exist among human beings for voltages in the higher ranges. Translated into English, that means 5000-volt insulation — everywhere. From here on, push-back wire is out. Starting right now, every joint or connection is wrapped with rubber tape, then friction tape, then doped up with goo. A "ground" means an electrical ground, carried all the way back to the power company's generating plant at Niagara Falls.

Another corollary obtained from the Theorem of Electric Chairs indicates the necessity for designing the unit high — I for stout. Although it is not suggested that the power supply be tested by dropping on a cement sidewalk from a third-story window, the fact remains that the power supply described was dropped on a concrete floor and the only damage discovered was a chip in the concrete. Mechanical rigidity is essential when handling voltages in the 3000 bracket. Components must be mounted with large-size bolts — with lock washers — and wiring must be supported on stand-off insulators. Go down to the power company's substation or switching yard and you'll get the idea. For this phase of the operation, put the Handbook away for a while and start reading the National Electric Code.

Electrically, from the meter in the service porch to the antenna on the roof, the unit will run at less than 25 per cent over-all efficiency, so to run a full kilowatt you have to take some four kilowatts off the a.c. line. Now, four kilowatts looks like an electric stove, which means a 220-volt three-wire grounded-neutral circuit right into the power supply, with a breaker mounted on the wall high enough so the harmonics can't reach it while you are down at the sweatshop mooning over the DX you are going to work. An overload relay in the negative plate lead is good insurance; with pentodes at $37.50 per, you don't kick them around like you would a surplus 807.
For tubes in the final, a pair of 4-125As would do the trick, but for an additional ten bucks each you can get the 4-250As which will give you peace of mind worth far more than the extra money invested. Reserve capacity, or call it safety factor; anyhow, it's a grand and glorious feeling to be sitting behind a pair of 250As loafing along under a guaranteed full-kilowatt input.

The 250As take 500 volts on the screen at 140 ma, and you could do it with a dropping resistor. But a little quick mental figuring of $I = \frac{E}{R}$ over $R$ will show that it will be a man-sized resistor and will warm up the shack some. In cold climates this would be a distinct advantage; in Arizona, not so good. Besides, when you buy a power transformer you want the power from it to go into the tubes, and not into heating up the shack. Electric heaters for warming a room are available at most appliance stores; dropping resistors are not designed for this purpose. This means a separate power supply for the screen. Just to be consistent, it was designed according to the Theorem of Electric Chairs (junior size).

The grid circuit of the final is a bandswitching doodad that you get store-bought. You could use plug-in coils, but did you ever squeeze in back of the transmitter, fumble around under the final chassis taking out a coil (famous last words: "I hope I turned the power supply off"), then try to put in the new coil upside down? Those plug-in coils under a chassis look pretty in the photographs, but did you ever own one?

Separate transformers are used for the 250A filaments. Reason: no room for one big filament transformer. Also, wiring is simplified and mechanical balance is achieved.

The final chassis is sealed with a bottom cover and a blower installed to air-cool the tubes. At only a kilowatt input the tubes might not require air cooling, the purpose of the blower being to impress the visiting ignorant and uncouth amateur who calls CQ fifty times then signs once. The voltmeter on the power-supply panel is for a similar purpose: the occasional 'phone man who drops in for a chat is filled with awe and goes home resolved to be a better amateur and start learning the code.

The design of the transmitter control circuits will depend a lot on the individual requirements; however, most c.w. men want a relay in the final power supply that can be controlled from the operating position, either manually or by break-in relay. For this reason a two-pole relay is installed to break both hot legs of the 220-volt primary; the ground lead must be continuous. Two switches in series, the first connected to the rectifier filaments and the second to the power-transformer relay, will insure that filaments are turned on before plate voltage is put on the rectifier tubes.

A cabinet interlock switch should be provided to keep the company that has your life insurance happy. This switch costs less than a dollar and may save your friends the extra expense of sending flowers that you won't be able to smell if the switch is omitted. When its purpose is properly explained, kind and loving relatives will be glad to donate the cost of the interlock switch just to keep you around for a few more years.

Metering for the final is easy. A separate meter
for the plate circuit is provided in the negative lead so it can be wired in and taped up. A meter for the grid and screen circuits is switched across resistors in the grid and screen leads — the switch must have a 1000-volt breakdown capacity. The 4-250A screen current must be controlled and the grid current set at proper value, so don't try to get along without this double-purpose meter.

**Construction**

Most articles on construction of gear of this type say placement of parts is not critical, wiring is straightforward, and assembly is standard practice. Everything is just lovely and some night when you have an hour or two of spare time to kill you can go out in the shack and build yourself a kilowatt transmitter. Phooey! Building a kilowatt is a job with a lot of hard work in it and don't fool yourself before you start.

The first thing to do is to plan the project so you don't take your present rig off the air. If you do you'll be in a hurry to get the big rig on, and hurrying means botched up holes and haywire wiring. Take your time, do it right, and when you finish you'll have something you can be proud of.

It would be pretty nice to have a machine shop with a flock of drill presses, circle cutters, and the long list of tools given in the Handbook as needed in the amateur's workshop, but most c.w. men I know are interested in c.w. and not in machine shops and their tool list includes a pair of dime-store pliers, a pair of diagonal cutters that stopped cutting 7 years ago, a soldering iron won at the 1938 Hamfest, and an assortment of screwdrivers with broken points, missing handles and bent stems.

Therefore, the first item of expense to be charged to the kilowatt transmitter is a few tools. It can be done with a hand drill, but with ¼-inch chuck electric drills available for fifteen bucks, doing it with a hand drill is earning fifteen dollars the hard way. From a ¾-inch hole, a tapered reamer in Uncle Harry's brace will get up to any hole except the meter holes and the socket holes. A socket punch — the kind you twist the bolt with a wrench — is a necessity. The meter holes will have to be done at a machine shop, unless you have hours and hours of time to waste filing.

Most instructions on assembling units say that after the location of holes is marked on the chassis, the dimensions should be carefully checked before drilling. The writer has found this to be an unnecessary step. After carefully checking many hundreds of dimensional layouts before drilling, the writer finds that most of the holes don't fit anyway, and have to be reamed out a little. At first this is disconcerting and leads to high blood pressure, but after 25 years of radio the writer is able to mount a part requiring four bolts and find that three of the bolts would fit the holes and ream the fourth hole with aplomb. A Code Proficiency Certificate does not necessarily imply the ability to drill a hole exactly where it should be.

After all parts are mounted, the first wiring attempt should be made. About halfway through this it will be found that if the parts had been reversed and placed in another location the wiring would be much simpler, and more efficient electrically. Here is where the true c.w. man comes through with flying colors: tear out all the wiring, dismantle the components, throw the chassis away and start all over again. After all, your lost time doesn't cost you anything, and the chassis is only three bucks.

Back view of the Arizona Kilowatt. The bottom chassis contains the high-voltage supply and bias supply. The screen supply is mounted on a separate rack panel just above it. The kilowatt amplifier, with its sealed chassis and blower, is at the top.
The second wiring attempt will turn out better if you remember that wire has two fundamental characteristics: carrying capacity and insulation. Don't send a little boy to do a man's job; don't use No. 18 wire in a 110-volt circuit carrying 10 amperes. The safe carrying capacity of wires is given in the National Electric Code. It's the same story on insulation: a screen circuit carrying 500 volts should be insulated for 1000 volts.

Consider this: when you get through building your kilowatt, you will be so tired out you won't want to build anything else for five years --- and what's going to happen to that insulation five years from now?

So here you are: all put together and wired up; now boys, let's fire it up and work AC4YN.

But just a minute! This is the time to go fishing or deer hunting or take a week off. Just go away and forget it for a while. Then, when you come back, take the pair of 4-250As down to the bank Friday night and have them locked up until Monday morning. Spend the weekend checking all the circuits.

Adjustment

First, if you haven't a multimeter, go borrow one, preferably from a 'phone man. While you are visiting him, you can lift a small but important part from his modulator when he is not looking. This will not only inconvenience him in causing him to hunt for the reason his modulator won't work, but will also take one 'phone man off the air, thereby giving room for ten c.w. men. Having obtained the multimeter, first check every circuit for grounds. Tie one of the test prods to a waterpipe ground, and poke the other prod into everything that looks like metal, the chassis, transformer cases, panels, all exposed metal on the front of the panel, and the circuits that are supposed to be ground circuits. If any point tests resistance to ground of more than one ohm, get to work and make a real electrical ground. The purpose of this is just to arrange things so you will die of old age instead of in the prime of your life. Remember the previously-quoted Theorem of Electric Chairs.

Now, it is necessary to undo that beautiful job you did wiring up the 220 primary of the plate transformer. Disconnect the 220, and make a temporary connection that will put 110 volts across the 220-volt primary of the plate transformer. This reduces the voltage on the plates of the tubes to half value, a perfectly lovely way to start off with new tubes in a new rig.

Before putting the tubes in, check all voltage points and make sure they are at rated voltage. Get this: for once in your life you have a rig that is going to run at rated capacity, and if the book says 500 volts on the screen don't try to whoop 'er up to 600. Also, 5-volt filaments last longer when run at 5 volts than when you accidentally put 110 across them.

Put the tubes in, then with a silent prayer, turn on the filaments and bias, crank up the 10 watts excitation and start tuning. The 4-250As require no neutralization, and if you have followed the layout shown in the photographs, or any similar layout that will effectively shield the grid from the plate circuits, no neutralizing adjustments will be required.

If you have never fooled around with any high-power screen-grid tubes the most difficult part of the tuning is in learning that there are three circuits that have to be adjusted simultaneously. An increase in plate loading will cause a decrease in screen current, other things being equal, and an increase in grid current causes an increase in both screen and plate current. Your job is to set all three at the values given in the Handbook. Old-line c.w. men who have five children will find this simultaneous adjustment a restful relaxation after trying to get the five dear little kiddies to bed. Others, who are not so accustomed to complete insanity, may find a few hours of this type of adjustment leading them gradually into the frustration which precedes schizophrenia.

The usual practice in starting triodes is to load lightly the final and tune the tank condenser to minimum plate current. With the screen-grid tube a light loading of the tank circuit can give screen current dangerously high, and it becomes necessary to tune the amplifier fully loaded. The amplifier cannot be run at reduced power input by loosening the coupling in the final link. It will run correctly only at rated capacity; overloading results in too high a plate current, and underloading results in too high screen current.

Well, there you are; on the air with a full kilowatt.

Results

The articles in QST by amateurs describing gear they have built usually end up with a couple paragraphs of brag about how they never could work so-and-so before but since using the above described what's-it they have a shoe box full of cards from there. Well, the kilowatt rig described

(Continued on page 188)

March 1949
A Sensitive Crystal-Type Field-Strength Meter

Full-Wave Rectification for Improved Performance

BY RUFUS P. TURNER,* K6AI, EX-WIAY

Increased sensitivity can be obtained in the crystal-type field-strength meter by employing two crystals in a full-wave circuit and a microammeter instead of the more-common milliammeter. Thus observations can be made with this tubeless instrument at a greater distance from the station transmitting antenna than is possible with single-crystal field-strength meters.

The complete circuit schematic is given in Fig. 1. Each half of the center-tapped secondary, L2, is tuned separately by a section of the dual variable capacitor, C1. A closed-circuit headphone jack, J1, is provided for aural monitoring of a modulated signal, but headphones should be removed from the circuit when using the microammeter. Six plug-in coils are used to cover the range of 3.5 to 200 megacycles.

The device is built in a 3 X 4 X 5-inch steel box and is small enough to be held in one hand. The coil socket is mounted on a small piece of aluminum suspended from the top edge of the box on metal pillars at the corners. A clearance hole is cut for the coil so that it may be removed from the top. The tuning condenser is fastened to the front edge of the box. Since the writer did not intend to use the instrument for frequency measurement, the condenser was fitted with a plain knob, but a small dial such as the National type AM may be used if calibration is desired.

The double-diode crystal unit is a Sylvania type 1N35, but two individual 1N34s may be substituted if preferred. The crystals are wired in between the tuning condenser and the headphone jack in front of the coil opening as shown in the side-view photograph. The microammeter is a one-inch instrument with a 200-µa. scale. It is mounted on the front edge of the box above the tuning control. The antenna terminal is a small feed-through insulator at the rear of the box.

The coils are wound on Amphenol type 24-4P (Continued on page 104)

TABLE I

Dimensions for L2, Fig. 1

<table>
<thead>
<tr>
<th>Band</th>
<th>Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5-7 Mc.</td>
<td>36 turns No. 24 enam., close-wound.</td>
</tr>
<tr>
<td>7-14 Mc.</td>
<td>25 turns No. 22 enam., 1 inch long.</td>
</tr>
<tr>
<td>14-88 Mc.</td>
<td>20 turns No. 22 enam., 1 inch long.</td>
</tr>
<tr>
<td>28-64 Mc.</td>
<td>12 turns No. 22 enam., 1 inch long.</td>
</tr>
<tr>
<td>60-100 Mc.</td>
<td>5 turns No. 22 enam., 1 inch long.</td>
</tr>
<tr>
<td>100-200 Mc.</td>
<td>2½ turns No. 22 enam., 1 inch long.</td>
</tr>
</tbody>
</table>

*L1 in all cases is 1 turn No. 24 wound in space between halves of L4 (see text).
An Inexpensive Sideband Filter

Notes on the Filter-Type Single-Sideband Exciter

BY DAVID O. MANN, W3MBY

That complicated and mysterious filter required to knock out one sideband in a single-sideband transmitter has stopped a lot of hams who would like to try the system. To the eternal credit of the art, however, a few ingenious amateurs have refused to be stopped, and this article tells how one of them did the trick with materials that anyone can get. There is also additional material on aligning a filter-type single-sideband exciter, using your receiver for the job.

One of the articles that heralded the latest revival of interest in single sideband appeared in the January issue of QST for 1948, where the details of constructing an exciter were presented by Art Nichols, W9IKQ. Those of us interested enough to get beyond the first few paragraphs can recall the dismaying fact that arriving at the requirement of a 9- to 11.6-kc. bandpass filter, indicated by a suitably-labeled rectangle on the circuit diagram, Fig. 2, of the article. Aside from the filter characteristics given, and the suggestion that an excellent filter could be designed with the assistance of Terman’s Engineering Handbook, the problem was promptly dismissed as a tough one. Without a reasonable amount of laboratory equipment this problem can be too great to solve, even if the apparent complexity of the circuit diagram doesn’t sour one on the idea before that. Unfortunately, this single difficulty is probably responsible for the rather poor popularity among amateurs of this system of single-sideband generation, though, once constructed, an exciter of this type has some distinct advantages over other systems. As an example, once the filter is constructed, intelligent use of a standard communications receiver (something most amateurs have) is all the test equipment required to tune up the exciter. With the addition of a potentiometer, any desired amount of carrier can be inserted, and the resultant a.m. (A3 minus one sideband) signal used to establish contacts before switching to single sideband. Most of the necessary construction details, except the filter, were sufficiently covered in Art’s original article. Changes in the exciter that were found to be advantageous by both the writer and “Butch” Mason, W3MGG, during the construction of three units, are included in this description, together with a tune-up procedure. This article is primarily intended to describe a bandpass filter suitable for use in the circuit and within the reach of even the relatively inexperienced amateur.

The Filter

The filter details to be given are the outgrowth of difficulties in constructing the first exciter. The first filter design was successful, but a good filter wasn’t built until after about three tries at getting suitable iron for the inductances. For small values of inductance, iron cores with good properties at high audio frequencies are available; however, they are usually costly and in the form of toroids that are not easy to wind without special equipment. The toroid is generally considered the best physical configuration for high-Q inductances, but if a filter is to be built by amateurs with a minimum of investment and test equipment, a compromise has to be made between performance and ease of construction. To make this clear, the toroid cores for the inductances were cut from the core of a television horizontal-sweep transformer by boring and slicing a cylindrical section of it. This material is called “sponge iron” and was tried because it was designed for use at 15 kc. It made some pretty good coils, but such construction isn’t at all inviting and of course would be extremely difficult to describe to anyone else. One of the inductance values required in this first filter was 21 mh., much larger than the others for which the toroids were used. To make up this value using the toroid core would have required an enormous number of turns, and this started a search of all available coils having this larger inductance and a reasonable Q. An RCA standard television variable inductance, used in the horizontal-sweep circuit, was found to have a range of inductance between 5 and 21 mh., and a Q at 10 kc. of from 10 to 35. This served the purpose at the time, but it appeared to be such a handy component that various filter designs were computed, in an effort to find one in which it could be used throughout. Eventually a filter was built, tested, and even substituted for the first filter with acceptable results, but it was decided it could be better, and two more revisions resulted in the one described here. These little coils are called Horizontal Linearity Coils, RCA part No. 201R3, and they can be obtained for less...
than a dollar. They contain about 1300 turns of No. 33 enamel wire, and to use them for the lower values of inductance in the filter it is necessary that they be pruned, to permit keeping the slug well in the winding and thus maintain a higher $Q$.

Another variable in the filter design is the image impedance (an impedance similar to the surge impedance of a transmission line), and the value of 200 ohms was selected because audio line transformers for this impedance are very reasonable and, because of unity transformation ratio, they will pass 10 to 13 kc. This is important, because audio components for this frequency range are usually tagged "Hi Fi" and priced accordingly. Fortunately they are not required in this case. The transformers listed in the diagram are quite reasonable and have been very satisfactory.

**Construction of the Filter**

The photographs show three views of the filter in a standard 3 X 4 X 5-inch box, as one method of assembly. It is almost obvious that no attempt was made to give the job a commercial look, but it does indicate the relative size to be expected when completed. Fig. 1 is a complete diagram of the filter and, though it may look complicated, it really isn't any worse than some of the clipper filters in common use today. The frequency range is not an old stamping ground, but the same techniques are still good and the measuring methods used shouldn't scare anyone away from tackling the job. In addition to the filter schematic, Fig. 1 contains a table dividing the filter into seven elements and illustrating the recommended method of making up the odd values of capacitance from standard condenser units. The center column of this table gives detailed information for altering the standard coils so that the required inductance can be set with the slug. Reasonably uniform results can be expected of a standard procedure, since several of these coils were measured and the individual variation was quite small.

The condensers are small enough so that the lugs of the coils can be used for tie points. It is suggested that each element be made up as shown and all mounted, leaving pigtails long enough to permit tune-up and interconnection. Before interconnection, each element is then tuned to series resonance at the frequency shown in the right-hand column of Fig. 1, using a test set-up as shown in Fig. 2. Since the values of standard condensers vary, setting the inductances compensates for the error by making the elements have the same resonant frequencies they would have if all components had exact design values. This also helps to compensate for any fixed error in the calibration of the oscillator used to tune the elements. To guard against errors, it is suggested that the best available type of condensers be used, i.e., a mica condenser can usually be expected to be more closely watched than a tubular paper during manufacture, but the paper condensers should be satisfactory for the larger sizes. Referring to the photographs, the elements were mounted on the "U"-shaped bracket by forcing the heads of the coil forms through the proper-sized hole (approx. ½ inch). The elements were then tuned and, after bolting to the side of the box, the slug screw adjustments are protected from accidental change during wiring and final insertion in the box. The open face of the box can then be secured down on the chassis to enclose the filter and protect the components.

As a word of encouragement, there is no need...
mounted), it docs not appear the least brazen to request this favor of your parts supplier should
the instrument is used to tune all clements.

should be tried.

are rather common test equipment in the present­
day laboratory, and a reasonable will to get the

job done should be all that is necessary to get over this barrier.

The finished filter can be expected to have an insertion loss roughly as shown in Fig. 3 which, though not ideal, will be found satisfactory in producing easily-copied good-quality single­
sideband signals. During the development of the filter, an earlier design was substituted in the exciter for the regular filter and no noticeable difference reported by either new or well-es­
tablished contacts, even though this particular job had nearly 15 db. less attenuation between 7 and 9 kc. ! Apparently this indicates that a suppression of the undesired sideband of only 20 db. will permit easy copy, but it would hardly justify our claims to an unqualified 3-kc. band­
width. The filter given here does much better than this.

It should be emphasized that the filter is not symmetrical, and therefore care should be taken to see that the connections in the exciter are as indicated in Fig. 1. This means that the right end of the filter will be terminated in approximately 200 ohms as required (see Fig. 4).

The remainder of the transmitter is practically identical to that described by WSTQK, with only the following exceptions. In Fig. 4 of his article he uses a 50-µfd. trimmer from grid to
ground on the balanced modulator, but it was connected from plate to ground in our case. In the same diagram, the 6SK7 amplifier was re­
placed by a 6AB7. The only other difference is that the trap consisting of Lsoa and a 100-µfd.
trimmer, shown connected in series with the grid of the 6SG7 in Art's rig, was link-coupled to
Lso2, and Lso2 and its condenser were connected directly to the 6SG7 grid.

The transformers T402 and Tso1 are slightly different than those described in the WSTQK
unit, as can be seen in Fig. 5, although the general principle is of course the same.

When the filter and some of the other expensive or special components in this exciter are either
explained, or replaced by more reasonable parts, the complexity of the problem disappears and really, if you will compare the circuit with a complete diagram of your present a.m. trans­

Fig. 1 — Circuit diagram of the single-sideband filter. The Tso2 and Tso1 references are to the original WSTQK
nomenclature, which is carried throughout this article. C1-C7 — Small mica, molded-paper or paper cond­
ensers — not electrolytic — combined as below.

L4-L7 — RCA Horizontal Linearity Coils (RCA No.
201R3) modified as described below.

Element Make-up Tune to

\[ \begin{array}{|c|c|c|}
\hline
Element & Make-up & Tune to \\
\hline
C1 & 50000 pfd. paper & 11.5 kc. \\
\hline
L1 & 1.2 mh. & Tune with 0.1-µfd. condensers in series to 9.4 kc. \\
\hline
L2 & 10 mh. & 11.6 kc. \\
\hline
C2 & 0.01 µfd. paper or mica & 9.8 kc. \\
\hline
L3 & 10.0 mh. & 10.9 kc. \\
\hline
C3 & 1.1 µfd. (1 and 01 in parallel) & 9.6 kc. \\
\hline
L4 & 0.007 µfd. (Save wire for L5) & 13.5 kc. \\
\hline
\end{array} \]

for extreme accuracy in either the number of turns pruned from the coils or the calibration of the
audio oscillator used to line up the elements. The specified turns to be removed includes a
fair margin of safety, and if the combination doesn't tune to the given frequency the con­
denser value is probably too far off and another should be tried. As mentioned above, should the
marked frequencies on the oscillator be off, the eventual operation of the filter will not be im­
paired, provided the operation of the same instrument is used to tune all elements.

The matter of obtaining use of the necessary test equipment may seem troublesome, but since it is at worst a ten-minute job to complete the
tuning (assuming the elements are made up and mounted), it does not appear the least brazen to request this favor of your parts supplier should other sources fail. Audio oscillators and v.t.v.m.s are rather common test equipment in the present­
day laboratory, and a reasonable will to get the

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mitter, you may be rather surprised. The entire exciter can easily be built on an 18 × 18-inch chassis, and even though you don't complete the job in a week it will be well worth the education and operating enjoyment later on. A further consolation is that most of the adjustments to the circuits are made once initially and then need no further attention. You don’t adjust the i.f. amplifier in your receiver very often; at least you shouldn’t have to. The same idea applies here, too.

Alignment Procedure

A few modifications in Art's original circuit were found that make operation and tune-up much easier. The most significant of these is the carrier-reinsertion network shown on the output of T203 in Fig. 4. By varying RC, any desired amount of carrier can be by-passed around the balanced modulator to T401, and being able to do this offers two very important advantages. The first is that the carrier can be used to tune up the exciter and any following amplifiers. The second is that having the carrier-reinsertion control during operation permits adding enough carrier to permit the signal to be copied just like any conventional a.m. station, or it can be operated with a 20-db. suppressed carrier, or no carrier. Operating experience has revealed a great deal of controversy concerning the value of a 20-db. suppressed “pilot” carrier, in view of the usual blanket of other carriers, but at any rate this arrangement is versatile enough for most requirements. The feature of being able to set up a signal that can be copied in the normal manner will be found invaluable in establishing contacts.

Barring unusual difficulties, any receiver with an S-meter is the only essential to tuning up the whole circuit, but it should be appreciated that a receiver is a very sensitive instrument and that the r.f. gain should be kept as low as possible, to reduce the chance of false readings. A test probe will be found convenient and can be made by connecting the receiver antenna input lead to the test points through about a 50-µµfd. or smaller condenser to an alligator clip.

If you are fortunate enough to have good ears, you can probably hear the 10-kc. oscillator in the vicinity of T305, but if not you can test the oscillator later in another way. Connect the probe to either plate of the 550-kc. balanced modulator, and check for a signal from the 550-kc. oscillator, tuning T405 to obtain maximum output. A little exploring 10 kc. above or below this frequency may reveal two signals, which should be present if the 10-kc. oscillator is working. If present, tune to one of the sidebands and see if its intensity can be varied by the carrier-reinsertion control, RC. If so, all is fine so far, since the receiver is tuned to one of the sidebands produced by modulating the 550-kc. carrier with the 10-kc. oscillator signal. Let’s assume we want to tune to the upper sideband coming from this modulator, so set the receiver to about 560 kc. (the signal just above the 550-kc. oscillator that can be controlled by RC), shift the probe to the secondary of T102 and tune the trimmers for maximum signal. Vary RC again just to be sure you have the sideband and not the 550-kc. oscillator signal.

The proper frequency for the 10-kc. oscillator, with respect to the filter characteristic, can be set with this arrangement. Watching the S-meter, set RC for minimum indication. This now means that the only path for the 10-kc. oscillator signal is through the unbalance in the ring modulator, T202, and the filter. Run up the sensitivity of the receiver until a reading of about 85 is obtained; RH in the ring modulator can be varied to increase this reading if necessary. Start with maximum capacity in the 10-kc. oscillator tank circuit and increase the frequency (decrease capacity) until the receiver indicator shows a fairly rapid rise to a maximum. If no pronounced rise is noted (3-4 S units) by the time the 500-µµfd. compression condenser is all out, it may be necessary to reduce the fixed capacity in the tank from 0.002 to 0.0015 µfd. and try again. When the response levels off to a maximum, the oscillator is up in the passband of the filter and thus has been “located.” To get the oscillator on the proper part of the filter curve it is merely necessary to decrease the frequency (increase capacity) until the response drops two S units.

When RC is set for a minimum we don’t want any of the 10-kc. carrier sneaking through, and to prevent this the ring modulator has to be balanced. This isn’t at all tough, as even rough balance will produce a carrier attenuation of around 60 db. (10 S units). To do the balancing, set the receiver for a good indication, S5 or so, with the probe still connected to the secondary of T402. Check again to see that RC controls the

![Alignment Procedure Diagram](image-url)
Fig. 4 — Wiring diagram of the speech amplifier, oscillator and first balanced modulator, as used at W3MBY. Components not labeled are the same as in the W8TOQ unit (Fig. 2, page 20, QST, January, 1948).

CB — Balancing condenser, approximately 0.004 µfd. See text.

RB — 30-ohm wire-wound potentiometer, for balancing carrier.

R0 — 100-ohm wire-wound potentiometer, for carrier insertion.

T201 — Single-plate-to-200-ohm-balanced-line (SNC signal and that it is set for a minimum (center point ground). Take Cb, 0.004 µfd., and connect to the side of the primary of T202 that produces the smallest S-meter reading. If this reduces the signal so low that the receiver sensitivity will not bring it back on scale, leave further balancing until more of the circuit is tuned up and a higher level is obtained.

The rest of the tune-up is very conventional as will be seen presently. Turn up some carrier with RO until a good indication is obtained; then shift the probe to the secondary of T403 and tune both sides of T403 for maximum. Leave the trap, L403, until later. Turn on the plate switch and step the probe successively to the primary and secondary of T404 and T401 reducing the receiver, or setting of RO, as each circuit is peaked up. Check again to see that the signal is controlled by RO and also by the 10,000-ohm potentiometer in the cathode of the 6A87. Set the receiver to the 6-Mc. crystal frequency, connect the probe to the grid of the 6SL7 frequency doubler, and tune up the oscillator. Reconnect the probe to the secondary center-tap of T401, tune the receiver to twice crystal frequency, and then tune plate tank of the doubler. Set the receiver to the output frequency, 14.2–14.3 Mc., and move the probe along from L601 to L603 as these circuits are tuned, but omit the trap, L600. The acid test for “bugs” comes when the probe is connected to the output link of the 807 and the signal can be controlled by the carrier control, RC1 An 807 in a circuit like this usually demands a special “cooling-off” operation which is impossible to describe or predict. A thorough job of shielding the grid and plate circuits, including the lower section of the tube, is practically a “must,” but it can be made to function as an amplifier eventually.

The tuning of the carrier traps, L401 and L603, has been deferred purposely because they cannot be tuned properly until the receiver input is free of any appreciable pick-up radiated from the carrier oscillators. With the receiver connected directly to the output of the 807, radiated fields should be relatively small indeed, and if the output is controlled by the carrier injector RO, the whole job can be wrapped up promptly. The first time through the 550-ke. and 14-Mc. channels, the tuning was rather rough because of probe loading on the tuned circuits, radiation pick-up, body capacity, etc., so while the receiver is connected to the 807 output go back and touch up both channels, from the 550-ke. oscillator tank right up to the 807, again omitting the traps L401 and L603. Now with all this gain on the signal, when RC is turned to a minimum the carrier leakage at the ring modulator can easily be detected, so vary RB and see if a sharp null can be obtained. If the null is broad, it will be necessary to try a little different value of RC until the minimum attained by varying RB is sharp. When good balance is obtained, a hum will be audible in the receiver; i.e., the carrier is so weak that the heater-cathode leakages cause appreciable modulation. Ten kc. above or below the carrier frequency (which side depends whether a 14.7- or 13.7-Mc. carrier is used in the last balanced modulator) another fairly strong signal will be found which is not controlled by RC. This is an undesired output that comes from the 550-ke. oscillator and must be eliminated by balancing the 550-ke. modulator, in the same manner as the ring modulator, by means of the 5000-ohm potentiometer in the cathode circuit and the 50-µµfd. trimmer connected to one of the plates. If T403 happens to end up just so, a rather sharp
balance will be found initially, but a nearly perfect balance can be made by working between the condenser and the potentiometer, varying the condenser by small increments and carefully watching for a smaller minimum as the cathode balance control is moved through the minimum S-meter reading. When this has produced an absolute minimum, tune $L_{Q1}$ for a further minimum which should practically eliminate this signal. To set the high-frequency trap, $L_{Q2}$, simply tune the receiver to twice the high crystal signal. To set the high-frequency trap, $L_{Q2}$, simply tune the receiver to twice the high crystal signal. After doping the windings and transformer for $J_{402}$ and $J_{403}$, simply tune the receiver to twice the high crystal signal. The wire from the first coil was doubled and used for the wire would be used. After doping the windings and transformer for $J_{402}$ and $J_{403}$, simply tune the receiver to twice the high crystal signal.

The assembly was then replaced in the i.f. can.

That's it, though it might be advisable to bring in a little carrier again with $R_C$ and retouch the tuning of both channels to correct any interaction effect the traps may have had. Bringing up the carrier with $R_C$ should produce a lot of voltage at the 807 and practically nothing when it is turned down. To QSY it is not necessary to tune up the whole exciter. Only the circuits from the last balanced modulator need any retuning, and if the move is small (20 kc. or so) only the crystal or VFO need be touched. The two-stage speech amplifier is simple enough so that little trouble should be encountered. An r.f. filter has been added to the input circuit and some condensers inserted to make the response fall off above 4000 cycles. The 10-13 kc. bandpass filter will trim the radiated sideband down to an effective 300 to 3000 cycles, but the response of the speech amplifier to frequencies above 17,000 cycles must be well down to prevent their modulating any second harmonic of the 10-kc. oscillator and producing spurious sideband frequencies within the passband of the filter. The audio circuit has ample gain for a crystal-microphone input.

As Art Nichols stated in the previous article, the unit puts out about 10 watts peak, which is enough to drive an 813 or a pair of any medium-power high-$\mu$ triodes listed for Class B modulator service. Another 807 following the exciter, operating Class AB, with only 500 volts on the plate, 300 volts on the screen and 45 volts grid bias, will not require 10 watts drive, but will put out a 30-watt peak signal that either can be radiated or used to excite push-pull 250THs or a 450TH to 1-kw. peak input. Yes, you can get to high power almost as easy as with c.w., but the premium is about 10 per cent less efficiency than with Class C, and the amplifiers have to have real stability when operated Class B. However, there are also dividends; less harmonic generation and less driving power required — this not counting the 9-db. communications gain. The over-all result will be an net advantage eventually, because TVI will soon rank harmonic generation of paramount importance to amateurs. A properly-operated push-pull Class B amplifier generates a negligible amount of harmonics in the plate-load circuit. “An ounce of prevention is worth a pound of cure.”

**Conclusion**

After about four months on 20, Butch and I have found that going on single sideband compares closely with the thrills of first getting on the air. Occasionally it seems like some of the stations contacted for the first time even appreciate single sideband more than we do. No fooling — this system of transmission appears to live up to all the nearly unbelievable things claimed for it. In operation it looks as though the 9-db. figure obtained theoretically for a signal-to-noise ratio gain is overshadowed by the signal-to-QRM gain observed with single sideband. Stations equipped with panadapters have reported the signal completely covered and yet readable. Another station contacted frequently over a two-week period stated that he estimated difficulty in copying the signal began when the QRM had about a 30-db. advantage. This is significant if we will admit that it is QRM that is gradually strangling the maximum enjoyment of our low-frequency 'phone bands. Possibly this extra signal-to-QRM advantage is not accountable because of the difficulty in accurately appraising the “suppression effect,” previously mentioned by Villard, of a large carrier on the normal A3 signal. Suppression takes place countless times on the 'phone bands, as for example when your R5 QSO is abruptly terminated by an A9 transmission that “hits him” and “takes him out.” In most cases the usual A3 signal is completely smeared in the presence of a large interfering carrier because its

(Continued on page 104)
The Inter-American Regional Radio Conference

Conference to Open April 1st in Washington — Preparatory Work Largely Completed — IRAC-FCC Report Forecasts Action on League Request for Sharing Rights on "160"

Hold your hats, boys...

The long-awaited many-times-postponed inter-American regional radio conference of the nations of North, Central and South America, originally scheduled to be held in Bogota, Colombia, last year, has now been announced to begin its sessions on Friday, April 1, 1949, at Washington, D. C., with the expectation it will continue in session approximately six weeks.

The League will be in attendance throughout, to represent the amateur service, the ARRL Board having appropriated $5,000 for the purpose at its meeting last year.

To avoid misunderstandings, amateurs should have a clear idea of just what this conference can and cannot do affecting us. First and foremost, it cannot change the Atlantic City allocation table, which is the over-all governing table until the next world-wide conference. The exclusive bands we amateurs were assigned under Atlantic City are ours; the inter-American meeting can do nothing to take them away from us.

But while it is a fact most of our Atlantic City bands are "exclusive amateur" this statement is not true of all of them; since the very first days of international regulation, our bands below 4000 kc. have been indicated, under the international table, as available for assignment not only to amateurs but to some other services as well — usually the fixed and mobile services. (The same is true of assignments for the other services, where similar "sharing" among them is provided at the lower-frequency spectrum.) There is nothing new about this; it is simply a device to give the various regions of the world more flexibility in deciding just how they want to allocate services in the short-range bands where the effects are not world-wide and don't, therefore, require uniform allocation throughout the world. Regional radio conferences, of which the forthcoming inter-American in April is an example, then break down these shared bands definitely for their regions, following the world-wide conference (Atlantic City, in this case).

The League has always attended these regional conferences as they apply to this region, therefore, to ensure that any amateur shared bands (our 80-meter band is one, and the old 160-meter band is another) are fixed up to earmark them exclusively for the amateur service in this country and, so far as possible, throughout the entire region — the region, in this case, being the entire Western Hemisphere.

Preparatory work for this conference, with the exception of allocations studies, began last spring and was essentially completed by fall; the League's Acting Secretary Budlong, together with Assistant Secretary Huntoon on occasion, attended and participated in these meetings. Thus, except for more or less cursory review, most of the nonallocation phases of the preparatory work have been pretty well fixed up so far as the United States is concerned. On allocations, meetings will have begun several weeks before you read these pages, being scheduled to start February 14th, again with the League's Acting Secretary in constant attendance. These meetings will be of Government people and "industry" representatives and will have as their objective the determination of the United States' view on the various shared bands. Needless to say, the League's traditional view that any regional shared band involving amateurs should be allocated exclusively to amateurs, beginning with the United States and extending throughout all nations of the region if possible, will again be our position.

Will we succeed in this with our U. S. preparatory group? The chances are excellent that we will. For there will have come into existence a few days before the preparatory group meets an exceedingly important document in this connection: On February 11th the Interdepartment Radio Advisory Committee (a group of representatives of the military and other Government departments making use of radio — and on which body the League's present Acting Secretary served for nearly four years during his military service) and the Federal Communications Commission each submitted identical recommendations to the Department of State representing their conclusions on how the regional bands we are interested in should be handled at the inter-American conference, and it is almost certain these will have a powerful influence in determining the decisions of the preparatory group.

In this report, it is recommended for 3500-4000 kc. (assigned to amateur, fixed and mobile

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services under Atlantic City) that "The U.S. recommend that the exclusive amateur service allocation discussed at Rio be adopted." So much for that.

But now get this (quoted exactly as it appears in the report):

1800-2000 kc

(a) Amateur

(1) In Region 2, Atlantic City authorizes the amateur, fixed, mobile (except aeronautical mobile), and radio-navigation (Loran) services to employ whichever of the two bands, 1800-1900 kc or 1900-2000 kc, is not required for Loran in any particular area on condition that they do not cause harmful interference to Loran. Both of these bands are used by Loran in Region 2.

The United States has studied the problem of sharing among these authorized services and has reached the conclusion that it cannot be done in Region 2 without interference to the existing Loran system. However, it recognizes the desirability of taking a calculated risk and intends to permit amateur operation under the following conditions on a non-interference basis to Loran. The areas in which the amateur service will be permitted to operate and the power it may use are based upon the existing Loran system and the maximum permissible interfering signal to the Loran sky-wave signal at maximum service range. It should be noted, however, that the tolerable degree of interference can only be determined by actual operation. Furthermore, the Loran system may be expanded in specific areas. Either or both of these factors may operate to require revision of the following conditions.

Note (1) (a) The amateur service may use in any area whichever bands, 1800-1925 and 1875-1900 kc, or 1900-1925 and 1975-2000 kc, are not required for Loran in that area, in accordance with the following conditions. The use of these frequencies by the amateur service shall not be a bar to expansion of the radionavigation (Loran) service:

(i) The amateur service shall not cause harmful interference to the radionavigation (Loran) service;

(ii) Only classes A1 and A3 emission shall be employed;

(iii) Amateur operation shall be limited to:

Area

Power (watts)

Day

Night

Mississippi River to East

1800-1925 kc

500

200

Coast U.S. (except Florida and states bordering Gulf of Mexico)

1875-1900 kc

500

200

Mississippi River to West

1900-1925 kc

*500

*200

Coast U.S. (except states bordering Gulf of Mexico)

1975-2000 kc

*500

*200

*Except in State of Washington where daytime power limited to 200 watts and night time power to 50 watts.

Note (2) In any particular area the Loran system of radionavigation operates either on 1650 or 1950 kc, the band occupied being 1800-1930 or 1900-2030 kc.

What does this mean?

It means exactly what it says: That the three-year study between the ARRL (at whose formal request it was initiated in 1945), the Federal Communications Commission, the U.S. Coast Guard, the military and other Government agencies has finally resulted in a conclusion. The conclusion is that trial sharing between us amateurs and Loran on "160" is now contemplated by the United States, under the conditions indicated.

It means even more than is stated in the report: It means that the report reflects planning almost completed for changes in the amateur rules to make possible such operation domestically as soon as the details can be worked out and the necessary orders cleared. It means that actual operation on the terms and frequencies indicated above is imminent.

For further details on this long-awaited development, see the editorial in this issue. And keep an ear bent for W1AW official bulletins, which will carry news of actual authorization as soon as it is forthcoming.

— A. L. B.

BOOK REVIEW


As pointed out by Dr. Einstein in his foreword, anyone who has attempted to interpret the works of advanced scientists for the benefit of the average reader knows well the difficulties of such a project. Either the writer tends to cover the subject superficially, taking only the aspects which may be most readily made intelligible, or he does a thorough job and ends up with a work which is sufficiently technical to scare off many of his intended audience.

Lincoln Barnett has turned out an exceptionally well-done exception to this rule. His exposition on the Theory of Relativity and other works of Dr. Einstein and the profound thinkers who preceded him brings these concepts down to a level which is within the capabilities of the high-school physics student, yet he accomplishes it in a manner which meets with the hearty approval of Dr. Einstein himself. More important, to most of us, he has, in the process, given us a volume which will provide an evening of fascinating reading; a book we will want to keep within easy reach on our library shelves long after the first reading has been completed. — E. P. T.
Reception on 6 meters is better in the Boston area these days, as the result of the efforts of Jim Nye, W1EZV, in adapting the Wallman "Cascode" to 50-Mc. service. News of the improved performance obtained with Nye's preamplifier got around fast and more of these low-noise amplifiers appeared in short order. Since the construction of a cascode is simple, indeed, others who are interested in improving the signal-to-noise ratio of 50-Mc. receivers may wish to give it a whirl.

The cascode preamplifier was developed as the result of wartime research at the M.I.T. Radiation Laboratory, aimed at improving the noise figure of radar receivers. It was first used at 30 Mc., as a preamplifier preceding the string of pentode stages used in the broadband i.f. amplifier. If properly designed, a two-stage cascode amplifier gives approximately the same gain as a single pentode stage, but with appreciably lower overall noise.

Briefly, it consists of two triode r.f. stages, the first a grounded-cathode circuit with inductive neutralization, and the second a grounded-grid stage. The low noise results from the inherent characteristics of the triodes used, and the reduction of regenerative effects by the neutralization in the first stage. The original circuit and the 50-Mc. adaptation by W1EZV use a 6AK5 connected as a triode in the first stage and a 6J6, with its unused terminals strapped to the grid, in the second. Other combinations may be used, including various dual triodes, provided that they have separate cathode connections. Possibilities in this connection include the 12AT7, 7F8, 2051 and others.

The circuit and constants used by W1EZV are given in Fig. 1. Both input and output circuits are tuned, and the unit is made so that it may be used in conjunction with various receivers, with a low-impedance line connecting the preamplifier to the antenna terminals of the receiver or converter. An alternative arrangement is shown in the insert in Fig. 1. This is applicable if the antenna circuit of the receiver or converter has a pick-up coil, and if it is possible to mount the preamplifier directly adjacent to the antenna terminals of the receiver. The 6J6 plate voltage is run through the receiver antenna coil, which is made to take the place of \( L_a \).

Two models of the cascode were built and tested in the ARRL lab, and on various receivers at W1HDQ. The first used a 12AT7 dual triode with tuned circuits similar to those used by W1EZV. The second had self-resonant slug-tuned coils, and used the original 6AK5-6J6 line-up. Except for bandwidth, there was no great difference in the performance of the two, approximating that reported by W1EZV and others. The bandwidth can be altered by changing the value of \( R_a \), the usual value of which is around 3300 ohms. This results in a bandwidth of about 3 Mc., making it possible to use one middle setting for the active portion of the 50-Mc. band, with activity at present levels. Dispensing with the tuning condensers, \( C_1 \) and \( C_2 \), and making the inductance of the coils adjustable to resonance with the tube and circuit capacitances increases the bandwidth. Our slug-tuned model was flat over the entire band, and some more besides.

The neutralizing coil, \( L_N \), resonates at the operating frequency with the tube's grid-plate capacitance, but it is not critical. It is, in fact, possible to remove this coil without causing self-oscillation, but the noise figure is impaired somewhat. If it is wanted to adjust \( L_N \) on the nose it

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March 1949
Reducing Key Clicks
Some Notes on Improving Transmitter Keying

BY OWEN M. CARTER,* W9ADN

Fortunately for the art there are a few amateurs who realize that keying a transmitter properly consists of something more than connecting the key in some circuit that doesn't arc too much. In this article, one of them tells of a simple test procedure that will allow you to check your keying right in the shack, with a few added pointers on how to avoid clicks.

Satisfactory keying has probably caused the writer as much concern over the years as any other one problem that should have been relatively easy to solve. Despite the fact that delay circuits, tube keyers and continuous monitoring have been used, plus checks from amateur operators far and near, every once in a while some busy little bee at an FCC monitoring station has seen fit to send one of his cogent stingers in the mail.

Listening to the increasing number of stations with key clicks initiated a fresh study of the writer's gear. It is believed that the simple factors discussed here are well known to many radio men, but they have neglected to pass the information on to the rest of us. It is for the benefit of other poor souls who are struggling with key-click problems that this is being written.

It had been observed that when a low-power stage had been properly adjusted with delay circuits to give clickless keying, clicks reappeared when another stage was added between the keyed stage and the antenna.1 It had been possible to slow down the make and break times of the keyed stage so that one additional stage wasn't awfully bad for clicks. However, when other stages were added between the keyed stage and the antenna, the shaping of the keyed wave became such an interlocking set of adjustments that no straightforward set of rules could be established for getting both clickless operation and keying that sounded good. All sorts of things were tried: the various stages were neutralized and reneutralized, low-C tank circuits were replaced by high-C arrangements, and tubes were operated as frequency multipliers instead of straight-through amplifiers, to remove the likelihood of oscillation. Always the clicks remained.

* Box 433, Lockport, Ill.
1 Ballou, "Keying the Tetrode Amplifier," QST, December, 1947; Goodman, "Some Thoughts on Keying," QST, April, 1941.

Test Methods

During the course of the experiments, keying was checked by the following methods: (1) by ear with a radio receiver, (2) on an oscilloscope using r.f. from the transmitter, (3) by oscilloscope connected to the receiver output, b.f.o. on, and (4) by oscilloscope connected to the receiver output, b.f.o. off. These methods are mentioned because what appeared to be satisfactory by one method of testing was not always confirmed by others. For example, checking the shape of the r.f. envelope at radio frequency with the 'scope indicated that there were no transients, and yet a receiver tuned to the same frequency said "Clicks!" Likewise, the 'scope connected to the receiver with the b.f.o. on showed freedom from transients, but the clicks appeared when the b.f.o. was turned off. Method No. 4 was found to be the one to use for checking relative key-click intensity, while Method No. 1 is the one that finally determines how far one can go in softening the keying.

Probably the greatest single factor in the production of clicks in the stages following the correctly-adjusted keyed stage had been the fact that a surplus of excitation was available for each stage. To get the correct value of rectified grid current for each stage, the practice of W9ADN had been to increase the fixed bias until the grid current was normal. This, coupled with the fact that the stages were operating at low plate and screen voltages, meant that the tubes were operating at three to five times cut-off bias.

Finally, during the course of some tests, it was noticed on the 'scope that the keying transients dropped when the grid bias was decreased. Following this path, it was found that the tube, (Continued on page 108)
A High-Power VFO Unit
Forty Watts Output on 80, 40 and 20
BY C. W. SCHWENZFEIER,* W8MQR

After a few months of not-too-successful crystal-controlled DX hunting on the 14-Mc. band, it became apparent that no quantity of DX could be worked without a VFO. Accordingly a careful search was made for a simple VFO exciter. Although a great number of circuits were found, all of the units of sufficient power output to drive a 500-watt triode amplifier were many-stage affairs, generally including gang tuning and inefficient Class A isolation stages.

In view of the ready availability of high-gain well-shielded tetrodes, it did not seem that all of these complications should be a necessary part of an exciter unit designed for amateur service. On this basis, a fresh start was made, with a 2-stage exciter that would deliver approximately 40 watts usable r.f. output as the goal.

The 807 was decided upon for the output stage because of its low driving-power requirement. In order to avoid the need for gang tuning, it was decided that the oscillator tube should be one of high dissipation rating so that off-resonance in the plate circuit would not damage the tube. In order to avoid the need for Class A isolation stages, use of a screen-grid tube was indicated. Our old stand-by - the 6L6 — was chosen for this job.

One of the most important requirements to be met by the proposed exciter was simplicity of construction and therefore bandswitching was promptly discarded. Anyway, in most ham installations antenna and amplifier changeover and tuning take so much time that the additional required for changing plug-in coils is not significant.

The circuits selected are conventional and proven; a high-C Colpitts-type oscillator and a standard Class C doubler-amplifier as shown in Fig. 1. Although the 807 was its usual independent self, operating on frequencies of its own selection at first, a few minor changes converted it into a tame, effective amplifier.

For 3.5-Mc. output, the oscillator circuit is tuned to 1.75 Mc., while L2C3 and L3C14 are tuned to 3.5 Mc. At 7 Mc., the oscillator is tuned to 3.5 Mc., and L4C5 and L4C14 to 7 Mc. The arrangement is the same for 14-Mc. output except that the 807 is operated as a doubler with L3C14 tuned to 14 Mc.

The unit as a whole is no more difficult to build and adjust than an exciter of comparable output using a Pierce or Tri-tet crystal oscillator. There are, however, a few very important precautions that must be observed. The most important of these is that the fixed capacitors, C1, C3, C4 and C5, Fig. 1, must be high-quality

*403 Longbeach Parkway, Bay Village, Ohio.

The completed 70-watt VFO unit enclosed in an 8 X 10 X 8-inch Par-Metal cabinet. The dial is a National ACN.

March 1949
This view shows the arrangement of tubes and coils on the chassis. The VFO tuning condenser, C2, is behind the panel. The large resistor in the 807 plate lead is a parasitic suppressor. The two knobs are the tuning controls for the VFO and 807 plate circuits.

zero-temperature-coefficient condensers; otherwise the frequency stability will be very poor. Several types of mica capacitors and two types of ceramic capacitors were tried without success before Ceramicons, made by The Erie Resistor Co., of Erie, Pa., were selected. These condensers gave superior frequency stability.

As the Colpitts oscillator is quite sensitive to variations in either screen or plate voltage, a regulated source is essential if the oscillator is to be keyed. Use of a 25-watt variable-tap voltage-dropping resistor of 20,000 ohms to supply the VR tubes from the 700-volt plate supply for the 807, as shown in Fig. 2, was found to be a very simple and practical solution to this problem. To adjust this resistor to the proper value, the tap is first set at maximum resistance and is then moved in steps toward the other end until the VR tubes just ignite completely when the key is closed.

As might be expected, making the 807 operate only when driven by the oscillator and on no more than one frequency at a time proved to be the most difficult task encountered in constructing the first model. All of the recommended 807 taming procedures were tried without success and finally, in desperation, the heater return was made through the chassis and, most important,
To H.V. Supply

Fig. 2 — Voltage regulator for the oscillator screen and plate.

A 50-ohm 5-watt carbon resistor was connected in the plate lead. The resistor completely eliminated all tendency toward parasitic oscillation without noticeable effect on the output.

Two keying methods, cathode and screen-grid, were tried in the oscillator. Both worked well, but click suppression, as might be expected, was very difficult when cathode keying was used. No filter has been found to be necessary when keying the oscillator screen.

Because this exciter-transmitter is so simple to build, there is no need to comment on its actual construction, except for the 807 coils. In the first model all connections were taken from the plate coil in the conventional manner and a fixed lead was run from the coil socket to the 807 plate. This line proved to be troublesome and was eliminated by providing each coil with its own 50-ohm resistor and plate cap.

A further recommendation for this exciter is its relatively low cost. All tubes and parts, including the dial, were purchased new for less than $15.00.

Members of the Kingsport (Tenn.) Amateur Radio Club, prospective hams and XYLs happily engaged in the pleasant task of wrapping Christmas gifts for the orphans at Holston Methodist Home. L. to r., seated: Mrs. Bill Armstrong, XYL of W4GCS; W4JD; Forrest Pilgrim, W4JD; Mrs. Bob Delius; Mrs. Winston Jackson, XYL of W4JD; Mrs. Ward Lantis, XYL of W4LEB. Standing: Scott Delius (holding doll); Ed Shaulis, W4EUM; President Jim Litton, W4LNF, of the Kingsport Amateur Radio Club; Jim Welde, W4CUB; W4GCS; W4LEB; Dan Delius; and Mrs. Jim Litton. Other participating KARC members not present were Lee Dayy, W4FCU; Ralph Dousherby, W4MCZ, and Joe Selby, W4GL. The Kingsport club is a 100%-ARRL-member affiliate.

W6OHU notes that of the 288 postwar DXCC Certificate (e.w.) holders listed in December QST, 50, or 17.3%, are W6s. Furthermore, 28, or 10.8%, are located within a 20-mile radius of Los Angeles!!!
The ARRL Emergency Corps Is Ready!

October, 1948, Simulated Emergency Test Proves Efficiency of National Emergency Net, AEC Groups and Traffic Nets

BY ALBERT E. HAYES, JR.,* WIIIN

The following are the “scores” as reported by the ECs who captured the teams of AEC members:

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* National Emergency Coordinator, ARRL.

A view of three of the five operating positions at National Emergency Net station K3NRW with (l. to r.) W3CDQ, W3BWT and W4IA at the controls. Acting not only as a delivery point for reams of Red Cross traffic, but also as a key relay point for much of the traffic flowing to ARRL headquarters, the Washington gang proved they have what it takes when the going is rough. It was the operating staffs at the NEN stations who best realized how efficiently the emergency coordinators all over the country had laid their emergency plans. Without the best efforts of the ECs, their assistant ECs, and the many ARRL Emergency Corps members, installations such as this would be powerless to render public service in time of emergency.
Here is Francis D. Cook, W9GQS, at one of the two operating positions at National Emergency Net station W9DUA. Operated by members of the Amateur Radio Emergency Association of Evanston, Ill., W9DUA was kept on the air for the entire duration of the Simulated Emergency Test. Traffic addressed to both ARRL and National Red Cross headquarters flowed in a steady stream through W9DUA, proving to the operating crew that the ECs of the Midwest are ready, and that there is no substitute for advanced planning if traffic is to be handled in quantity in time of emergency.

New Orleans, La. ....... 52
Butte, Mont. .......... 51
Dubuque, Iowa. ....... 50
Pendleton, Ore. ....... 50
Hamilton, Ont. ....... 50
Nashville, Tenn. ..... 48
Muscatine, Iowa. ....... 48
San Diego, Cal. ....... 48
Sharon, Penna. ....... 45

This year the Red Cross traffic originating during the test was funneled, either directly, or through the National Emergency Net, into two stations whose calls became familiar to all who took part — K3NRW and W9DUA. Perhaps you have wondered just what these stations are that they should provide such excellent message services into National Red Cross headquarters in Washington, D.C. The accompanying pictures will give you an idea of the capabilities of these installations, both of which are provided with leased teletype facilities tied into the nationwide Red Cross telecommunications system of leased lines.

K3NRW, installed in downtown Washington by USNR, and manned during the Test, as it has been several times during emergency, by a group of Washington and near-by amateurs, is provided with five operating positions and a battery of transmitters that would warm the heart of any old timer.

W9DUA, Evanston, Ill., is controlled and operated by members of the Amateur Radio Emergency Association, and, provided with two operating positions, joins the amateur service and the Red Cross wire net when emergency calls. A similar installation, W6CXO, operated by the Naval Shipyard Radio Club of San Francisco, was not in service for the Test but is also on the ARC wire circuit, and is prepared to take its place with K3NRW and W9DUA when next disaster strikes.

We have shown what we can do when we want to, fellows. Let's show the public that we can surpass even the FB record we made in 1948 when the '49 Test rolls around in October. More AEC members, more emergency coordinators, and more and better emergency-powered equipment are the order of the year. QRV?
REGULATORY MATTERS

The 1948 proposals of the ARRL Board of Directors remain on file with FCC, overload of the staff and frequent absences of several Commissioners combining to make even slower the necessarily-complex routine of processing. In brief, the major ARRL recommendations are:

1) Expansion of the 75-meter Class A 'phone band to 3800-4000 kc.

2) No change on 40, 20 or 10 meters.

3) A 16-w.p.m. code test for future Class A license examinations.

4) One year "apprenticeship" for new amateurs before permitting them use of 'phone below 29.7 Mc.

5) An exclusive c.w. assignment 50-50.1 Mc.; A9 or "duplex" above 51 Mc.; and n.f.m. permitted above 50.1 Mc.

Late last year two additional sets of proposals were sent to FCC by minority groups unwilling to accept the Board's recommendations. As might be guessed, one group feels the ARRL stand is too restrictive to 'phone, while the second feels equally strongly that the ARRL position is too liberal toward 'phone. Without commenting at this time on the effects on the amateur body as a whole of minority groups separately approaching the Commission to further their desires, we

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On the occasion of his inauguration, President Harry S. Truman receives congratulatory messages which funneled into the Nation’s Capital via amateur radio in the ARRL Governors to President Relay, January 19th and 20th.

Members of the Washington Radio Club, the Potomac Valley Radio Club and other amateurs in the District of Columbia area manned about thirty stations in this history-making event. Radiograms were filed by the Governors of thirty-nine states and four possessions; receipt in Washington was prompt and 100 per cent delivery achieved. Section Communications Managers designated local amateurs to obtain and start the messages. For the most part relaying of GPR traffic was accomplished by organized amateur message-handling networks.

Amateurs representing the ARRL and the Washington-area radio clubs met with the President on January 26th and made official delivery of the numerous messages. L. to r.: Cedric Van Pelt, W4LRI; E. L. Battey, W4IA, director Roanoke Division; A. L. Budlong, WIBUD, acting secretary ARRL; Miss Elizabeth Zandonini, W3CDO, assistant director Atlantic Division; President Truman; Frances R. Darne, W3AKB, assistant SCM, Md.-Del.-D. C.; Col. E. S. Van Deusen (Rtd.), W3ECP, RM Md.-Del.-D. C.; Donald McClemon, W3EIS, president WRC; Malcolm Williams, W3ER, past president WRC; (in foreground) Gordon Walter, W3EYX. Mrs. Darne, W3AKB, acted as spokesman for the group.

QST is indebted to Eppa W. Darne, W3BWT, Md.-Del.-D. C. SCM, for providing a complete report covering the Washington end of the GPR, and to Thomas Kelley, W3KAM, who provided the photo. A complete report crediting all those known to have participated in the GPR will appear in the April issue.

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QST for
list the major provisions of the two sets of proposals:

The "phone" group asks:
1) Expansion of the 75-meter 'phone band to 3750-4000 kc.
2) Expansion of the 20-meter 'phone band to 14,200-14,400 kc. (14,200-14,350 after Atlantic City regulations come into effect.)
3) Defeat of the ARRL recommendation for 16-w.p.m. code test in the Class A exam.
4) Defeat of the ARRL recommendation that newcomers be denied 'phone below 29.7 Mc. their first year.

The "c.w." group proposes these:
1) No expansion of the 'phone assignments.
2) Allocation of small portions of the present 'phone bands exclusively to single sideband (25 kc. on 75 meters, 15 kc. on 20, and 25 kc. on 10).
3) A 20-w.p.m. code test for the Class A license exam, to be required also for renewals of Class A licenses.
4) A new short-term (six months to a year) license with relaxed code and technical requirements, nonrenewable, the holder restricted to c.w., crystal control, and certain portions of 80, 40 and 2 meters.

FCC NIPS BOOTELEGERS

A few fellows who recently thought they could get away with hamming without benefit of licenses found that FCC's monitoring system keeps a close finger on the pulse of radio operations — including ham radio.

In suburban Kansas City, Mo., one evening last December, FCC engineers paid three simultaneous "friendly" calls at the homes of three bootleggers who had set up their own communications system on ham bands and with self-assigned ham call signs. The three stations were closed down, with a stern warning to each of the operators; a fourth station which had been under suspicion disappeared during the Commission's monitoring activities. These bootleggers thought they could mislead any official checking-up activity by announcing false locations, but the monitoring division's network of intercept stations, equipped with d.f. gear and interconnected by teletype for simultaneous bearings, sealed their doom. Once the local area of operation was determined, mobile d.f. and monitoring units went into action — to trace source of signals right to the front door. In January the Commission closed down a similar set-up in and near Lincoln County, North Carolina. Tipped off by suspicious amateurs and with their assistance, FCC engineers investigated and tracked down the bootleggers again with d.f. procedures. The moral is twofold: If you're not a ham, don't kid yourself into thinking you can get away with some unlicensed operation, however harmless it seems to you; if you are a ham, help FCC to keep our bands clear of unlicensed operation by reporting to them any activity which on its face is not bona fide amateur.

YEAR-END LICENSE FIGURES

FCC has issued a tabulation of license authorizations outstanding as of the end of 1948, showing a total of 76,666 amateur radio operators and 77,338 amateur stations. For the first time, all amateur licenses are now on a five-year basis — and thus for the first time since the war it is possible to get a precise count of amateurs. Comparisons with the previous year cannot be accurate since the 1947 year-end figures were estimated and included an unknown amount of "deadwood" — all licenses issued since 1938 were automatically kept in the active file by the series of extension orders. Paper statistics, for what they are worth, show a decrease of 4334 operators and an increase of 2238 stations in the amateur service during the past year. Perhaps the most accurate comparison for purposes of determining overall recent growth is the 1948 year-end count of 76,666 ham operators and the 1940 midyear count of 56,235.

STAFF NOTES

Hq.'s "Ten Year Club" met on February 11th, with President Bailey as a guest, to enroll two new members and to take note of two additional anniversary milestones. On that date Acting Secretary Arthur L. Budlong, W1BUD, completed 25 years with League Hq., and several days before Chief Accountant Alice V. Scanlan had marked her 20th anniversary with the staff. Appropriate initiations were administered Asst. Communications Manager Joseph A. Moskey, W1JQY, and Asst. Secretary John Huntoon, W1LVQ, who on December 6th and February 8th, respectively, completed ten years. The club now boasts a membership of 16 persons with ten or more years' service. In order:

Treasurer David H. Houghton .................. 27
Acting Secretary A. L. Budlong, W1BUD ...... 25
Communications Mgr. E. B. Handy, W1BDI.... 24
Production Supt. Ralph T. Beaudin, W1BAW .. 22
Circulation Supervisor Cecelia C. Hatch ... 21
Chief Accountant Alice V. Scanlan ........... 20
Technical Director George Grammer, W1DF .... 19
Technical Asst. C. Vernon Chambers, W1JEQ ... 19
Communications Asst. Lillian M. Salter .... 18
Asst. Technical Editor Byron Goodman, W1DX .. 13
Traffic Manager Harold K. Isham, W1MFA ... 12
Circulation Supervisor Marion E. Bayeer ... 11
Communications Asst. George Hart, W1NJM ... 10
Asst. Secretary John Huntoon, W1LVQ ....... 10

By the way, almost immediately after asking the question in our last issue, concerning departure of two staff members for points west, "What is it California winters have that Connecticut dittos don't?" newspaper accounts gave us adequate answer: snow, snow and more snow!

(Continued on page 52)
Electrical Shock—Pfttt—Obituary

BY RONNIE MARTIN,* WSZF

It happened suddenly. An electrical shock, then pfttt! and the Grim Reaper smiled as he looked at the prostrate form of another victim lying upon the floor of a home. This home was like any ordinary American home. It was a happy home with healthy and contented occupants. One of them was an amateur radio enthusiast. His equipment was well engineered and designed, well constructed and, above all, complied with all of the very necessary safety regulations. Yet, while working on one of his transmitters, one contact with a circuit carrying less than 500 volts caused his sudden death. Another life, a loved one, an amateur radio operator, was suddenly snatched away into another world... the Grim Reaper's world—DEATH!

As the Grim Reaper turned to seek another victim he looked back over his shoulder and said to himself, “Like these careless automobile drivers of today, you know, I believe this electricity stuff is really dangerous to mortal man. I'll have to look into its possibilities a little more!”

The above could very well be a scene in your home—your station. Take a minute and seriously consider what you have just read. If you are a sensible person you will really be concerned. If you are not, you might as well stop reading this and devote your time to something else. Let all of us who possess equipment operating from electrical-power sources realize the danger of death lurking within. Transmitters, receivers, frequency standards, monitors, and other pieces of equipment operating at voltages from 115 on up certainly are instruments of death. If you wish to live to enjoy the pleasures they can give you, you should read on.

I have just returned from attending funeral services held for one of my closest friends. He was an amateur like you. In everyday life he was an electrician. He knew the pitfalls and dangers of electricity and he knew how to handle it. Yet one move, one contact with the object of his vocation and—pfttt—his life was blotted out quickly and completely. While sitting in the little chapel listening to the services for my friend, I couldn't help thinking of the other 75,000 amateurs throughout the United States and elsewhere. I wished that you all might be sitting there with me. It may have made each of you realize the lethal effects of electrical shock. It may have brought it to you so forcibly that you would have vowed this very day to be careful, to take safety precautions and above all “Switch to Safety.” This procedure and this alone can prolong your life.

Let us look at the facts of electrical shock. The following data were compiled with the kind assistance of Dr. Pothoff of the National Safety Council, and the Pacific Telephone and Telegraph Company.

<table>
<thead>
<tr>
<th>Type of Resistance</th>
<th>Resistance Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry skin</td>
<td>100,000 to 600,000 ohms</td>
</tr>
<tr>
<td>Wet skin</td>
<td>1000 ohms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal Body</th>
<th>Resistance Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-to-foot</td>
<td>400 to 600 ohms</td>
</tr>
<tr>
<td>Ear-to-ear</td>
<td>approximately 100 ohms</td>
</tr>
</tbody>
</table>

For example, with 120 volts and a skin resistance plus internal resistance totaling 1200 ohms, the result would be a current of 100 milliamperes. That much current is definitely enough to cause death!

The following data make a very clear and self-explanatory summary of the effects of various currents through the human body:

### Safe Current Values

1 ma.: Causes no sensation—not felt.
1 to 8 ma.: Sensation of shock, but not painful; individual can release his contact at will, as muscular control is not lost.

### Unsafe Current Values

8 to 15 ma.: Painful shock; individual can let go at will. Control is not lost.
15 to 20 ma.: Painful shock; muscular control of adjacent muscles lost. Cannot let go.
20 to 75 ma.: Painful shock; severe muscular contractions with breathing extremely difficult.
100 to 200 ma.: Painful shock, causing ventricular fibrillation of the heart. This is “irregular twitching of the wall of the ventrical of the heart.” It is a fatal heart condition, for which there is no known remedy or resuscitation. It means DEATH!
200 ma. or over: Severe burns, severe muscular contractions, so severe that chest muscular reac-
tion clamps the heart and stops it for the duration of shock. This reaction prevents ventricular fibrillation. Artificial respiration should be administered immediately and in most cases the victim can be revived.

If skin contact in the circuit is maintained while the current flows through the skin, the actual skin resistance is gradually decreased.

Remember this! — current is the killing factor in electrical shock. The voltage is important only in that it determines how much current will flow through a given body resistance. A voltage of 110–120 is enough to cause a current many times greater than that necessary to be fatal. Currents of 100 to 200 ma. cause a fatal heart condition known as ventricular fibrillation. There is no known remedy to prevent death in this condition. Artificial respiration proves ineffective in reviving victims receiving this amount of shock. It is a generally accepted fact that fewer low-voltage shock victims can be revived than those receiving shocks of 1000 volts or more. So remember this when you work around your equipment! Low voltage as well as high voltage can be lethal! Be careful — be extremely cautious — when working with or around electricity.

Do you want to be the next victim of the Grim Reaper? Even should you escape his clutch, you may receive burns that may cause total or partial disability for life! It may mean amputation of a badly-burned finger, hand, arm, leg or foot!

Do "safety precautions" pay dividends? Attend funeral services held for a very dear friend killed by electric shock. Nothing will bring it home to you more quickly.

FEED-BACK

The wiring diagram of the "basic 'phone exciter" (Fig. 4, page 14, January, 1949; QST) had a drafting error that should be corrected if the unit is to perform properly. The diagram shows a lead from the junction of $R_{55}R_{57}$ to $C_{26}$ — this is incorrect and should be omitted.

W2KUJ points out that the double-sideband 'phone quality of the unit is impaired slightly by the connection of $C_{26}$ to $C_{49}$ as shown, and suggests that $C_{25}$ be connected to the junction of $C_{30}R_{37}$ (Pin 5 of the 6SJ7). When this is done, $C_{26}$ can be omitted. Under these conditions, the 6SJ7 carrier amplifier should not be removed during adjustment, since its input capacity replaces $C_{26}$.

It is also suggested by W2KUJ that unless $C_{19}$, $C_{34}$, $C_{39}$ and $R_{39}$, $R_{32}$, $R_{34}$ all have similar values, phase-shift differences may creep in because of the tolerances of the components. He suggests increasing the condensers to 0.5 µfd., and also connecting the "tops" of $R_{15}$ and $R_{38}$ together, to parallel $C_{14}$ and $C_{20}$ and eliminate possible phase differences at this point.

TWO-WAY communication across the Atlantic had indeed become commonplace by March of 1924. According to QST for that month, at least 13 European and 17 United States and Canadian amateur stations had made the grade. An especially bright star on the transatlantic-DX horizon was the arrival on the air of Italian amateurs, particularly iACD, who QSOed 1WX and 2AGB. All of this outstanding work was done in the vicinity of 110 meters.

Pay-off time has arrived for the winners of the past winter's Fourth ARRL Transatlantic Tests. In this final listening competition the codes of thirty-seven European amateur stations were copied by a total of one hundred American and Canadian amateurs. R. B. Bourne, IANA, Chatham, Mass., has been adjudged winner of the first-prize $1100 Grebe transmitter.

In the Far North, the MacMillan Arctic Expedition has experienced a most severe winter. However, despite violent fading conditions, ARRL Operator Don Mix has been able to maintain reliable communication with home, mainly through the cooperation of Jack Barnesley, e9BP, Prince Rupert, B. C., and Len H. Weeks, u9DKB, Minot, N. D.

Anticipating the usual mild weather of early spring, this issue gives full discussion to the subject of antennas. John L. Reinartz, 1QP, contributes "How Antennas Work," an outline of a series of interesting antenna experiments; Technical Editor Kruse tells how to build a good "antenna series condenser," and appraises the various types of antenna lead-in insulators.

The search for more efficient receiving methods continues and Stuart Ballantine's easy-to-understand article, "Radio-Frequency Amplification," rehashes the methods of designing, constructing and tuning these stages. To show the BCL that all interference isn't ham-made, Perry O. Briggs, 1BGF, describes his technique for successfully tracking down power-line interference.

Pictorial introductions to a number of renowned stations here and abroad are in order this month. Photos of two British Transatlanticians, Gerald Marcuse's g2NM and E. J. Simmonds' g2OD, provide an insight to British amateur gear. Representative American stations pictured are SBDA, Parkersburg, W. Va., licensed to Edward Garrison, 6LV, San Mateo, Calif., station of William Baker, and BZD-3VE, Pittsburgh, Pa., joint station of P. E. Wiggin and F. B. Westervelt.

Tube bargain: E. T. Cunningham, Inc., announces a new low price for C-301A and C-299 receiving tubes — only $5.00 each!

March 1949
A.R.R.L. COUNTRIES LIST

Official List for ARRL DX Contest and Postwar DXCC

**A.** Afghanistan ............... K8
**B.** Bahrain Islands ....... VR1
**C.** Bangladesh .................. VR6
**D.** Belgium .................. A2
**E.** China, People's Republic of .................. VR7
**F.** Greece ................... VR8
**G.** Cape Verde Islands ....... ZD4
**H.** Cyprus .................. ZD7
**I.** France .................. ZD8
**J.** Germany .................. ZD9
**K.** Korea, South .................. VR9

**L.** Libya .................. VR10
**M.** Malaysia .................. VR11
**N.** Marquesas Islands ....... VR12
**O.** Mauritius .................. VR13
**P.** Morocco .................. VR14
**Q.** New Zealand .................. VR15
**R.** Nepal .................. VR16
**S.** Northern Mariana Islands ... VR17
**T.** Turkey .................. VR18
**U.** Ukraine .................. VR19
**V.** Vietnam .................. VR20

**X.** Cuba .................. VR21
**Y.** Yemen .................. VR22
**Z.** Zanzibar .................. VR23

**C.** Austria .................. V89
**D.** Bangladesh .................. V89
**E.** Barbados .................. V90
**F.** Brazil .................. V91
**G.** Cameroon .................. V92
**H.** Canada .................. V93
**I.** Cape Verde Islands ....... V94
**J.** China, People's Republic of .................. V95
**K.** Colombia .................. V96
**L.** Costa Rica .................. V97
**M.** Côte d’Ivoire .................. V98
**N.** Denmark .................. V99
**O.** Dominican Republic ....... V100
**P.** Egypt .................. V101
**Q.** Ethiopia .................. V102
**R.** Falkland Islands ....... V103
**S.** Faroe Islands .................. V104
**T.** Fiji Islands .................. V105
**U.** Finland .................. V106
**V.** France .................. V107
**W.** French Guiana .................. V108
**X.** French Polynesia .................. V109
**Y.** Gabon .................. V110
**Z.** Georgia .................. V111

**A.** Albania .................. Z90
**B.** Argentina .................. Z91
**C.** Armenia .................. Z92
**D.** Austria .................. Z93
**E.** Australia .................. Z94
**F.** Belgium .................. Z95
**G.** Brazil .................. Z96
**H.** Bulgaria .................. Z97
**I.** Cambodia .................. Z98
**J.** Canada .................. Z99
**K.** Cameroon .................. Z100
**L.** Cape Verde Islands ....... Z101
**M.** Central African Republic ... Z102
**N.** Chad .................. Z103
**O.** China, People's Republic of .................. Z104
**P.** Comoros .................. Z105
**Q.** Congo, Democratic Republic ... Z106
**R.** Congo, Republic .................. Z107
**S.** Costa Rica .................. Z108
**T.** Côte d’Ivoire .................. Z109
**U.** Cuba .................. Z110
**V.** Curaçao .................. Z111
**W.** Cyprus .................. Z112
**X.** Czech Republic .................. Z113
**Y.** Denmark .................. Z114
**Z.** Djibouti .................. Z115

**A.** Algeria .................. A1
**B.** Andorra .................. A2
**C.** Angola .................. A3
**D.** Anguilla .................. A4
**E.** Antarctica .................. A5
**F.** Armenia .................. A6
**G.** Australia .................. A7
**H.** Austria .................. A8
**I.** Azerbaijan .................. A9
**J.** Bahamas .................. A10
**K.** Bahrain Islands ....... A11
**L.** Belgium .................. A12
**M.** Bermuda Islands ....... A13
**N.** Botswana .................. A14
**O.** Brazil .................. A15
**P.** Britain, Northern Ireland ... A16
**Q.** Burma .................. A17
**R.** Russia .................. A18
**S.** Sweden .................. A19
**T.** Switzerland .................. A20

**A.** Argentina .................. A21
**B.** Australia .................. A22
**C.** Bangladesh .................. A23
**D.** Belgium .................. A24
**E.** Brazil .................. A25
**F.** Britain, Northern Ireland ... A26
**G.** Burma .................. A27
**H.** Canada .................. A28
**I.** Chad .................. A29
**J.** China, People's Republic of .................. A30
**K.** Colombia .................. A31
**L.** Cuba .................. A32
**M.** Côte d’Ivoire .................. A33
**N.** Congo, Democratic Republic ... A34
**O.** Congo, Republic .................. A35
**P.** Curaçao .................. A36
**Q.** Cyprus .................. A37
**R.** Czech Republic .................. A38
**S.** Denmark .................. A39
**T.** Djibouti .................. A40

**A.** Argentina .................. A41
**B.** Australia .................. A42
**C.** Bangladesh .................. A43
**D.** Belgium .................. A44
**E.** Brazil .................. A45
**F.** Britain, Northern Ireland ... A46
**G.** Burma .................. A47
**H.** Canada .................. A48
**I.** Chad .................. A49
**J.** China, People's Republic of .................. A50
**K.** Colombia .................. A51
**L.** Cuba .................. A52
**M.** Côte d’Ivoire .................. A53
**N.** Congo, Democratic Republic ... A54
**O.** Congo, Republic .................. A55
**P.** Curaçao .................. A56
**Q.** Cyprus .................. A57
**R.** Czech Republic .................. A58
**S.** Denmark .................. A59

**A.** Afghanistan ............... A60
**B.** Albania .................. A61
**C.** Algeria .................. A62
**D.** Andorra .................. A63
**E.** Angola .................. A64
**F.** Antarctica .................. A65
**G.** Argentina .................. A66
**H.** Australia .................. A67
**I.** Austria .................. A68
**J.** Azerbaijan .................. A69
**K.** Bahamas .................. A70
**L.** Bahrain Islands ....... A71
**M.** Belgium .................. A72
**N.** Bermuda Islands ....... A73
**O.** Brazil .................. A74
**P.** Britain, Northern Ireland ... A75
**Q.** Burma .................. A76
**R.** Russia .................. A77
**S.** Sweden .................. A78
**T.** Switzerland .................. A79

**A.** Afghanistan ............... A80
**B.** Albania .................. A81
**C.** Algeria .................. A82
**D.** Andorra .................. A83
**E.** Angola .................. A84
**F.** Antarctica .................. A85
**G.** Argentina .................. A86
**H.** Australia .................. A87
**I.** Austria .................. A88
**J.** Azerbaijan .................. A89
**K.** Bahamas .................. A90
**L.** Bahrain Islands ....... A91
**M.** Belgium .................. A92
**N.** Bermuda Islands ....... A93
**O.** Brazil .................. A94
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**R.** Russia .................. A97
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**M.** Belgium .................. A112
**N.** Bermuda Islands ....... A113
**O.** Brazil .................. A114
**P.** Britain, Northern Ireland ... A115
**Q.** Burma .................. A116
**R.** Russia .................. A117
**S.** Sweden .................. A118
**T.** Switzerland .................. A119

**A.** Argentina .................. A120
**B.** Australia .................. A121
**C.** Bangladesh .................. A122
**D.** Belgium .................. A123
**E.** Brazil .................. A124
**F.** Britain, Northern Ireland ... A125
**G.** Burma .................. A126
**H.** Canada .................. A127
**I.** Chad .................. A128
**J.** China, People's Republic of .................. A129
**K.** Colombia .................. A130
**L.** Cuba .................. A131
**M.** Côte d’Ivoire .................. A132
**N.** Congo, Democratic Republic ... A133
**O.** Congo, Republic .................. A134
**P.** Curaçao .................. A135
**Q.** Cyprus .................. A136
**R.** Czech Republic .................. A137
**S.** Denmark .................. A138

**A.** Argentina .................. A139
**B.** Australia .................. A140
**C.** Bangladesh .................. A141
**D.** Belgium .................. A142
**E.** Brazil .................. A143
**F.** Britain, Northern Ireland ... A144
**G.** Burma .................. A145
**H.** Canada .................. A146
**I.** Chad .................. A147
**J.** China, People's Republic of .................. A148
**K.** Colombia .................. A149
**L.** Cuba .................. A150
**M.** Côte d’Ivoire .................. A151
**N.** Congo, Democratic Republic ... A152
**O.** Congo, Republic .................. A153
**P.** Curaçao .................. A154
**Q.** Cyprus .................. A155
**R.** Czech Republic .................. A156
**S.** Denmark .................. A157

Note: Prefixes in parentheses are used by occupation forces.
How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

On Facing Page —
UP-TO-DATE COUNTRIES LIST
• For the information of DX-Contesters and DXCC members and aspirants, this QST reproduces in full the official postwar ARRL Countries List, including all modifications and additions made to date.

How:
It's rather doubtful whether anyone has the time or inclination to peruse our monthly alphabetical stew this trip. Old twenty is really sagging in the center and the other h.f. bands sound somewhat singed on their lower edges after those first DX Contest week ends! Verily, this is that time of year when power companies all over the world are mightily mystified by the appearance of strange peaks on their consumer graphs. Let them ponder; we're having fun, anyway!

BG's recent editorial aptly covered the subject, so added superlatives become superfluous. Nevertheless, it is interesting to note that Jeeves, imperturbable as he usually is, was strongly impressed by the huge amount of Contest activity. He says, despite the fact that he had soldered them into their sockets, one slow swish of the receiver across 14 Mc. caused two r.f.-stage 24As to pop out onto the operating table waving little white flags.

Now that's pretty steep, we'll admit, but Jeeves is an amazing fellow. For instance, look what he's wrung out of the month's mail sack . . . .

What:
Either everybody has been standing in the ZC8PM queue around 3508 kc. or else it's a widespread case of resting up for the annual DX fray now in progress. At any rate, eighty reports are few this month. W6CFB wound up with CN8MI (3515), FAS9F, F3MS, Gs 2JT, 6RB, 8JR, KH86K, V02C and Zls 1AX, 1IB, 1MB, 2BD, 4AV, 4DU and 4JA . . . . At W9AND the good words are VP2LA (3577), FAS9G, HH2BL (3501), HH1ES (3501), VP9U (3525 t7), 651I and G6CJ; KL7s PB (3550), TM (3730), LP (3550) and KB (3517) have been heard . . . . The 50-watter at W2Y2G grabbed VOs 2BL, 2BV, 2R, 4AD, G4JZ, HB9GQ (3630), D5PF and ZC8PM . . . . W9BMV succeeded handsomely with CT3AB (3515),

KV4AA (3505), D4AAJ (3503), ZL4JA (3510); Gs 6GM and 8AX.

The afternoon-daylight DX on forty has been delighting the eastern half of the country lately. W9KFO's kw. amass this assortment: CN8s AN (7040), BC (7050), ER (7005), D4AAJ (7005), D5AA (7015), GD3UB (7010), Z6UNJ (7008), OH3NB (7015), S22AD (7070), ZB1Q (7015), P68L1 (7008), ZLs 1LZ (7070), 1GE (7020), IIE (7030), VK4EL (7005), HK3CT (7018), PY2ACT (7010), six Swedes and more besides!

. . . . ZC8PM (7055-7085) was tackled by W8YGR, who also collected F0BC (7026), I1MQ (7068) and Gs galore . . . . Being from Missouri didn't cause W9ETP to scoff at HP2X (7040), CM1AJ (7020), HC1JW (7010), ZS1M (7060), VKs 3XB (7080), 5JE (7030), ZL2MM (7010), PYs 6AK (7030), 7WS (7010) as well as the omnipresent ZC8PM . . . . At 14 years, W5ONL is breaking into the racket on such as ZLs 1GE, 2ACV (7004), KH6IF (7025) and NY4DD . . . . The ground-plane job still puts out for W9VDC: ZS1H (7001), PZ1WX (7010), F3KHZ (7010), ON4s JW (7010), QF (7010), LAs 8RB (7070) and 7Y (7070) . . . . W3JAK quotes a few dandies in HAIKX, UA1KAC, UQ2AB, ZCI1CL and LATN, while the school vacation resulted in ZS1GV, HB9EI, KG6DI, VK3AE, ZC8PM and KV4AA at W6TKV . . . . A Canadian report that escaped VE3QD has VE30Y chatting with HB9X (7090), SM2LS (7055) and G1QK/A (7025) . . . .

* DX Editor, QST. Please mail reports of DX activity to W9BRD's home QTH: 1817 Fargo Ave., Chicago 26, Ill.

March 1949

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by W2MVP and his BC459 are FA9RZ (7030), GI3CTU, SM5AFB, OK1ZW, YV1AI and GDSUB, with ZCSPM as WAC insurance. W3NNL is a real Forty-Forever fellow and recommends OK1EA, F8ABB, H9ZBL, ZS2G, L14IV, ON4DB, F8EU and SM5AN. A card from ZCSPM will net his 807 a hard-earned WAC. Back again, W4CFB swapped salutations with F8AJO, F8EO, W8SIR/KH6, ON4DO, OH7NF, OK1XA, OZ2RS, PY7s GD, CK, UR2KAEB, UA3ME and ZCSUNJ. Gossip running the rounds has YK1AB (7010) being snared by more fortunate individuals during the late evenings.

Glimpse on twenty haven't been too lean. In the really fancy class there's one VU7AF (14,305) who has been generously handing out the P.O., mail. When they were finally located all okay by miserable luck in the loss of 10 rare QSLs in the never have been too well represented on the air VP4TX (14,125), CT2AB (14,310), Q5SDE (14,375), VK6P (14,335), VP3MCB (14,250), VP4TX (14,308), ZD1P (14,311), ZL1CD (14,220), and W2HJY aircraft/mobile (14,270) who was over the North Atlantic in a DC-6. 200 watts gives W9RBI enough seek to snag FF8AA (14,305), E8BO (14,190), C3EA (14,315) and PJSKO (14,400) via the mike method.

Among the c.w. proponents, we have the cream of G6RH’s crop in VPSAJ (14,120), VP4TAR (14,125 t8), ZK2AA (14,123), ZD9AA (14,045 t7), VP2AA (14,100 t9), KW6RF (14,105), LU1ZA (14,052 t8), KP6AE (14,060), CZZAC (14,120) and ZD7AA (14,120 t8). KH6PM jumps up and down about the tardiness of QSLs and has a scrumptious variety of juice: C1MY (14,000), CE7AP (14,005), CS5AI (14,060), CK6AD (14,005), F4JHI (14,000), H94AD (14,040), H9PR1 (14,020), KK6BB (14,010), UAK5EA (14,065), VK6GW (14,002), VK9NR (14,140-00479), VP8A1 (14,070), VQ2PL (14,090), VR2BE (14,150 t8c), VR5PL (VFO), VU2CR (14,050), YS1AE (14,000), Z91AA (14,070), Z91AL (14,075) and CR7BB (14,100). A card from W7BE/KH16 agrees with KH6PM that Hawaiian conditions are inspiring. Bill’s 10-watt VFO unit has over 55 countries already pinned down.

Back to the Mainland now, W4IYT managed UG6AB (14,043), W7KPA/VP2 (Antiguas), TF3JS (14,105), ZD4AU (14,060), KK1GW (14,010) and VP8AK (14,045). A quarter-kw. and a ground plane scared up MI3ABB, ZCPM, TA3AA, UI8BKA, UL7BS, ZB2F, ZD4AM, V86AZ and MP4FAB for W8DEN, and W9MDG’s indoor wire reached VP8AD, 4X4AA, TA3FAS, ZS8A, ZS3G and ZD4JU for.

H9PR1 has furnished a new country to a multitude. Bob toys with all bands, 28 through 3.5 Mc., but prefers good old 20. There’s an 813 in the final at 100 watts input; a single-wire-fed 40-meter half-wave is usually employed on all frequencies with good results. The receiver shown is an Australian job but a 75-A has recently been added. H9PR1 is also famous for his lightning-fast 100% QSL policy.
ZD4AB ... XE1TE finally got his 48 WAS cards together and celebrated the event by contacts with QO5BQ, EL2A, ZK1AE, VR2AQ, PZ1M, CP5FB, CP1AP and 37 ZLsl. At last reports WlEKU had just about 100 countries on 10 'phone during 1948. Vern lists as most consistent DX signals from the different continents, D4AAZ, KG6A/WK9, CK4CS, CR9AG, with several tied for first place in Africa. KG6A/WK9 is back home but Vern has yet to hear a signal from that area to compare with him. Recent catches at WlEKU are VQ4RF, AG2AD, EK1CG, VQ4CUR, ZE2JK, VQ5PBD, VQ2JC, OE7FR, PZ1M, HK5MO, CT1FM, GC2RS, GD3AGC and LX1BT ... W9AND clung to c.w. and was rewarded with people such as YRSA (28,077), TF3SF (28,045), EA1W (28,032), OE1AD (28,010), SP8XA (28,010), HE1EL (28,004), IS1AFM (28,012) and CN8ER (29,080). Wes hears that SM5LK is due to visit personally with some of the 100 W6s he has worked. We hope he can stand the weather out there!

Where:

Somebody must have yanked out the cathode by-pass condenser in this stage. Looks like a bit of degeneration showed up this month. But then the period has probably been the lull before the annual Test storm. The Amateur Radio Club of India announces the existence of a new centralized bureau to handle QSLs for VU2, VU7, AC3 and AC4 areas. Address: P.O. Box No. 6666, Bombay 20, India.

Miscellany:

C5E/A/C3 Srg. Al Hattlested, AAG Nanking, APO 909, % PM, San Francisco, Calif.
CAR 4000780, A. C. Smith, Nicobar Det., via RAF, Changi, Singapore, Malaya
D4AFS (via W9CFT)
E89AO Apartado 22, Villa Cimarosa, Rio de Oro, West Africa
H2IA Ron Wilson, British Civil Air Mission, Taif, Saudi Arabia
H21AH (via H2IA)
KG6CR/KL7 Wm. D. Gilley, USN, Radio City NOB, Adak, Alaska
KX6BC Navy 824, FPO, San Francisco, Calif.
MD4BLC % Post Office, Hargeisa, British Somaliland
MD4BPC W. H. Caunter, SQM8, Royal Signals, % British Somaliland Signal Station, Hargeisa, British Somaliland
M13AB Box 437, Amatra, Eritrea
ex-OA4CS Wilson H. Moore, % Comm. Dept., Pan American World Airways, LaGuardia Field, New York City
OESYL (via RSSB)
VK9NR (via WIA)
V020Y Wm. Raymond, Gander, Newfoundland
VO4AF Stephenville Crossing, Newfoundland
VP2LA Frank Detrichet, APO 807, % PM, Miami, Florida
VP5AO C. Socrates, No. 6 Retirement Road, Cross Roads P. O., Jamacia, B. W. I.
VQ4SS P. O. Box 584, Nairobi, Kenya

March 1949

Three well-known Trieste amateurs are shown here in charge of the ARI display exhibited at the recent International Fair of Trieste. 11RC is the fellow attempting to unscramble fifty-seven zero-beat Ws while 11BCB and 11NU look on sympathetically. (Photo via W2NFQ)

VU4CN Sgt. Forsyth, Nicobar Det., via RAF, Changi, Singapore, Malaya
W902ZG/C1 Box 501, Teingtao, China
Y1IDD % U. S. Embassy, Santiago, Chile
VK1AB Box 35, Damascus, Syria
Y11RO 153rd AACs Sqdn., APO 3024, % PM, New Orleans, La.
ZC8UNJ (via W1NY1)
2D4IT (via GM3AFG)

Thanks go to WIs IIN, KMY; W2s CJX, LXJ; W3s DPA, OHC; W4s CYY, IUO; W50JH, W6TLL; W9s CFT, CIA; W5CFB; V5TPH, Skeyneire (Montreal Radio Club, VE2KG).

Tidbits:

We're pretty sure that nobody is going to shed tears over the welcomed report that the spoofing "AC3GG" had the boom lowered on him by the FCC. He succeeded in fooling very few of the gang, anyway . ... This OE5YL claims to be the only feminine operator in Austria. Jane's the name but we didn't get her 'phone number. [No use, boss - she's on c.w. - Jeeves] ... With W4CY also working stuff on the bands, squinch-owlish W4YYY struggles to keep from going batty. Still, JB volunteers some tasty morsels: Chaps who have given CR4HT up as a bad job might be able to get their cards from CT1HT; AR1OD and MD4BPC have pulled their big switches while G3SS has become VQ4SS ... ... U. S. citizenry in the Philippines were supposed to have been handed the big QRT in January. Just prior to this, they were using the prefix DU instead of KA. W5ALA and D4ALN add other changes: J, J9 and D4 become JA, KR and DL
respective ly .......... If you still need your V84JJ! pasteboard, try a line to G2FSR .......... That FY8 business is back again. A peep at W4QNT’s Dade Radio Club bulletin reveals that a legit French Guiana station may appear on 7 Mc. at any time now. And don’t be too skeptical if you should bump into characters claiming Kuwait or the Turks and Caicos Islands as their QTIs .......... W1KMY received F738B’s QTH by radio as “Box 15, St. Pierre Island.” Well, the odds are still 648 to 1 .......... “You fellows certainly hear me okay, judging by the numbers calling me,” reads a letter from VS9AL. Hmm, as a VE4 once put it, “All who are being called are not necessarily being heard, these days.” But Bert’s 807 really does step out .......... Ex-Y12DFD writes from Surrey to say that although he tried to make it 100% QSL from Bagdad, a request to G2PFD will take care of cards gone astray .......... W4BYF is handling HC1ES QSLs for 14th ARRL DX Contest contacts, having recently received the log .......... A sked with AC4YN should be offered as first prize to the high man in the next DXCC Round-up, states W2BXA. Maybe we should make that on 75 ‘phone, too. We’ve never heard Tibet on 80 — postwar, that is .......... Quoting W9LNI, the Roumanian bureau has a stack of cards on hand for YR5P who is unknown to them .......... W0PXU has it that LXS 1AS and 1RB are the only Luxembourgers using 20 c.w. Others heard via the same medium are most probably ungood. LXR1B, by the way, engineers at the famous Radio Luxembourg .......... Brothers who have cards awaited which are a few months overdue need not be faint of heart. W6DNF just received a QSL from SM6SB confirming a 7-Mc. QSO way back in 1930! .......... Your chances to hook Trieste will be much enhanced by the FTT DX Contest slated for the entire month of March on 7, 14 and 28 Mc.both ‘phone and c.w. 1IRC roes to have all licensed personnel in there pitching .......... W2SNN will do the honors for PK4DA as regards cards, upon receipt of the fellow’s logs .......... There’s always some sad news floating around and here’s the latest: Ex-SU1HF reports that the Egyptian bureau at Box 360, Cairo, is no more. Neither is amateur activity allowed at present. Tardy SU1HF cards may be obtained from Hal Frost, P. O. Box 3352, Corpus Christi, Texas .......... Add itinerants: The personnel turnover in Korea is terrific right now. H1LS AA, AB, AH, AL, AX and BM are QRT. Major Blencoe, HLI4A, who really helped keep the ham spirit sprightly over there, returns to the States to get W9F3M on the air .......... We’d like to list the call changes in Japan but are unable to do so for lack of space; there’s no set system as in the case of J8-to-HJI. We’ll have to leave it to W0TRD. We can say, however, that the FEARL Hq. station, J2USA, has returned to the air as JA2US, using a kilowatt input on all h.f. bands .......... W9s CIO and 1WT are pleased to have YU2VJ as a classmate at the Milwaukee School of Engineering .......... ZS6BT (ex-G6UDO) writes an interesting epistle to W1VG concerning circumstances surrounding ZD9A. For one thing, there has been no boat to Tristan in over a year, so Bert was licensed by radio! Also, you’re not necessarily going to receive your card tomorrow or the next day; the boat only hangs around the island for a few hours. Thus it will most likely be that cards delivered in 1949 will not be answered until 1950. So let’s stop this nonsense of working ZD9A once a week to see if he’s QSLd yet .......... “Another pet peeve of mine is the big boy who, after an initial contact, calls me every morning just to see if he’s still RST 589 . . . .” So speaks the ever-popular ZC8PM, plunking a bad nail right on the head, too. Pat has been expecting to pull that big switch at any time and he certainly made a lot of pals with those snappy Asian all-band QSOs! .......... We hate to say it, but C6SAB’s statistics declare that W9s are the most lax QSL-answerers in the States — a spindly 57.62% comeback. W2s run a close second for the booby prize and W6s top the standings with a nose-too-good 84%. Grand total W average: just over 66%. If it would do any good, we’d repeat that much-maligned proverb about our big glass house .......... W4CQL (AR1YL) has cards on hand for ARs 1AK, 2LD, 3AB, 8BK and 8FZ. Former operators of these stations can claim their stacks by writing Edsie Harmanson at 245-48 60th Ave., Douglaston, N. Y. .......... W5QOH/MM is Asia-bound on 28 Mc. and intends to have a look-see at the ham situation in such areas as F18, FNS, CRS, HS, et al .......... We learn from good authority that cards for OE hams are being either censored or confiscated. ARRL has the undercover QTH, and will be glad to QSP .......... While gathering data for his new pamphlet on the proper water cooling of 6L6s, Jervis ran across the ionosphere theory in the new 1949 Handbook. Now they tell us; after all those years of calling Asians with our beam pointed straight down .......... HAMFEST CALENDAR

NEW JERSEY — The Delaware Valley Radio Association will sponsor its Fifth Annual Old Timers’ Nite & Banquet on Saturday, April 9th. The affair will be held in the ballroom of the Hotel Stacy-Trent in downtown Trenton. A turkey dinner will be served promptly at 6:30 p.m. Guest speakers will be prominent old timers from all branches of radio, and there will be a “Grand OM” award to the old timer whose experiences date back the farthest. Another special attraction will be W2Z’s collection of old-time wireless gear. Reservations must be made before April 1st and are $5.00 per person; write Ed G. Frazer, W2ZI, General Chairman 1949 Old Timers’ Nite, 315 Beechwood Ave., Trenton, N. J. Latecomers may purchase tickets at the door at $6.00. As in the past, the party will be stop.
The "Capital X" Array for 28 Mc.

A High-Gain Bidirectional Array of Extreme Simplicity and Low Cost

BY R. R. CAMPBELL, W4DFR

The performance of the array about to be described has been such as to result in numerous inquiries as to its construction. It is simple and inexpensive in the extreme, yet it provides a gain equal to the usual 3-element array—in two directions. It is of particular interest to those who have neither the purse nor the mechanical facilities for rotary-antenna construction. The array is built entirely of 300-ohm Twin-Lead and small hemp rope, 150 feet of each being required. These items, and a couple of awning pulleys for convenience in raising and lowering it, comprise the bill of material; five bucks will handle the job easily. It is made and erected as one unit, the entire job requiring only a few hours' time.

Briefly, the array consists of four folded dipoles, suspended two-over-two, and fed in phase, as seen in Fig. 1. The two dipoles in each section are 20 feet apart, center-to-center, and the two pairs are stacked vertically, one set being 20 feet above the other. Feeders to each dipole are arranged in "X" fashion, and fed at the central point of the system. Directivity is broadside to the array.

No insulators were used, suspension of the dipoles being accomplished by sewing them to the hemp rope, as shown in Fig. 2. Small holes are punched in the Twin-Lead at intervals, and the "sewing" is done with waxed linen shoe thread. This seemingly fragile construction is of sufficient strength, because of the extremely light weight of the entire system. A 1 X 1-inch piece of Plexiglas was used at the junction of the phasing lines, but even this might be omitted.

Probably everyone has his own idea about the proper length for a folded dipole made of Twin-Lead, but in our case it was determined by experiment to be according to the formula:

\[
\text{Length (feet)} = \frac{449}{\text{Freq. (Mc.)}}
\]

The phasing sections are each one wavelength long, minus the propagation factor of the line. The lengths may be figured from the formula:

\[
\text{Length (feet)} = \frac{492 \times 0.82}{\text{Freq. (Mc.)}}
\]

For 29 Mc. this comes out to be approximately 15.5 feet for the dipoles and 28 feet for the phasing sections. Just to be sure, we checked the phasing section length by experiment, too. The 150-foot length of Twin-Lead was coupled to the transmitter and checked Lecher Wire fashion. The answer came out 82.9 per cent, so it appears safe to take the manufacturer's word for it!

Care should be taken to see that all four dipoles and the two phasing sections are exactly alike, to insure balanced current distribution and mechanical symmetry. The array can be assembled most readily by attaching the dipoles to the ropes before the feedlines are connected. Stretch a rope tight and sew on one dipole, then measure 20 feet from its center and make this the midpoint of the second dipole. Repeat this procedure for the lower half of the array. The 20-foot dimension is correct for a 29-Mc. array; it will vary slightly for other frequencies. If the two sections thus constructed can be suspended 20 feet apart in a horizontal plane it will facilitate the connection of the phasing sections, the next operation. At the exact center of the crossed phasing sections open up the sides and solder as shown in Fig. 1, connecting on the 300-ohm line which will go to the transmitter position.

(Continued on page 110)
Ham Radio Scores a Turkey Run

BY GAYE E. MILIUS, JR.,* W2N1F

HAMS and “mudders” — the latter the truly-descriptive nickname of amateur endurance motorcyclists — have much in common. Timing, distance, operating skill, stamina, routing, reliability — all are critical factors entering into the pursuit and enjoyment of both hobbies. It was only natural, therefore, that success was assured when the Yonkers (N. Y.) Motorcycle Club invited the Westchester (N. Y.) Amateur Radio Association to participate in the scoring and administration of the Northeastern States Championship Turkey Run.

Ninety-eight riders braved the hazards of the Yonkers run, which ran for 175 miles over — and through — all manner of terrain, including water holes, cowpaths, dense woods, gullies and precipices. Drivers negotiated the route without preview or rehearsal, and were timed and scored at twenty check points manned by YMC officials and WARA members, the latter using all forms of portable and mobile gear. Thanks to this communications set-up, YMC officials at the finish line had a clear picture at all times of the progress of the test, and the probable winner was known when the last rider had crossed the finish line, eliminating the three-day wait experienced in past years.

Over 2000 messages were speedily and accurately handled during the meet. Though most traffic related to scoring and timing, there were instances when routine was broken by the need for getting through reports of vehicle breakdowns and illness among supervising officials. On one occasion, a WARA operator was arrested for

Amateur radio ops and motorcyclists in action during the Northeastern Championship Turkey Run. Top: A Yonkers Motorcycle Club rider surmounts a water-hole obstacle. Top center: Phil Chubb, W2PHF, operating W2PEO’s rig at Check Point 10. Lower center: Dave Bulkley, W2OUJ, at finish line with Bill Tracey, YMC official, standing by. Lower left: Mike Hoyer, W2BWS, in business at Check Point 5 (messengers standing by). Lower right: Otis Trowbridge, W2NVB, and SCM Fred Skinner, W2EQD, receiving traffic at the finish line while a YMC scorer looks on. (Photos by Al Lane, W2PHO.)
speeding while on the way to his post. This news was, of course, relayed by ham radio to the W ARA net control and a relief provided.

Al Lane, W2PHO, YMC member and equally at ease be it kilocycles or motorcycles, acted as coordinator between the two clubs. The W ARA committee handling plans consisted of Bill Knott, W2QGH, J. C. Ward, W2ITX, Ken MacLea, W2RH, Eric Roberts, W2PEO, Larry Trigg, W2YBK, and SCM Fred Skinner, W2EQD. This group received, in strict confidence, a list of all check points on the proposed route. After weeks of investigation and radio testing, the communications plan shown in the diagram was evolved. Patterned along emergency-net lines, the gear employed included 30 portable or mobile transmitters, a similar number of receivers, and five 115-volt a.c. generators.

"Turkey Run?" Oh, a name stemming from the fact that the winning "mudder" takes home a Thanksgiving turkey as a prize. And how did the W ARA gang fare? Well, after all bruises and equipment breakdowns had been counted and things squared with the XYLs, the OMs sat down to a festive board with YMC members. The pièce de résistance? You guessed it — turkey!

Plan of smooth-working Westchester Amateur Radio Association communications net for scoring and coordinating the Yonkers Motorcycle Club endurance test. Over sixty W ARA amateurs participated in this unusual field test of emergency equipment, plans for which were carefully worked out in advance. Phone was used to advantage mainly on short-haul intercom circuits while c.w. routes carried a large volume of long-haul record traffic.

Our Cover

December QST, featuring Little Miss W3OVV as our cover girl, hadn't been out a week when the young menfolk of the land decided something should be done about regaining the youngest-ham title for themselves. In accepting the challenge, they found formidable contenders in the persons of nine-year-old Kent Lattig and his "older" brother, Lowell, age eleven, of Cropsey, Ill. The star second baseman and the ground-covering shortstop, respectively, of the Strawn (Ill.) Elementary School baseball team called on the FCC examiner in company with their mother, Orleta Lattig, W9KOD. The brother team handled the exam confidently and without assistance — they had won their 15-w.p.m. ARRL Code Proficiency Certificates months before. In short order FCC issued Kent W9FZE and Lowell W9FZJ; W9KOD received her Class A endorsement, too.

This month's cover shows W9FZE pounding brass on 40 while W9FZJ waits an opportunity to build his WAS total. In the short time the boys have been licensed Kent has an edge over Lowell — 22 states to 17. But to quote Lowell: "No wonder, a fella in the sixth grade has lots more homework than a fourth-grader."

The boys come from a most unusual radio family. Mom — "Letta" to the gang on 75 'phone — is WAS, RCC, holds a 25-w.p.m. Code Proficiency Certificate, and ably takes care of the needs of four other children younger than our new hams. And since we mustn't overlook Dad, he's Jim Lattig, W9QJR, ex-K6UQK, WAS, WAC, RCC, 25-w.p.m. CP, member of the Illinois Emergency Net, and superintendent of Strawn schools. In addition, competing for schedules and attention as favorite uncles, there are W9NRT and W6VAV!

Silent Keys

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

W1AWQ, Charles A. Garcelon, jr., North Lovell, Me.
W3EIN, Joseph E. Nelson, Nogal, N. M.
W6DSS, Stanley A. Tryee, Inglewood, Calif.
W6MSO, Frederick P. Stapp, Inglewood, Calif.
W7HKI, W7IHA, A. H. Gould, Portland, Ore.
W9NYL, Raymond N. Breecher, Waukesha, Wis.
W9YPZ, Henry J. Wood, St. Paul, Minn.
G3DIU, Richard Davies
G3PZ, Raymond R. Waite, Gloucester
OK1SM, Jaroslav Kucher, Prague

March 1949
On the Air with SINGLE SIDEBAND

Dowm New Mexico way W5NRP has done it with his single-sideband rig. The phasing job uses the networks described in GE Ham News into four 6K6s driving a pair of 4-125As at a kilowatt peak. Just to make it tough, Ray is on 28 Mc., where he says there is an amazing scarcity of b.f.o.s and knowledge of how to tune in the stuff. But he has managed to educate a few, by raising them on a.m. and switching to single sideband. The few include ZL2BE, ZL1TJ, JA2AB, G3AO, G2AKR, ZS5G and ZP5FA, which will give him the first single-sideband WAC, when he gets the cards!

In St. Louis, Mo., W6JSY is on 20 and 75 with a pair of 4-125As in the final running a kilowatt peak. The exciter ends up with four 807s, screen-modulated for single sideband, with provision for f.m., a.m., c.w. and single sideband. On a.m. the audio is used as a driver for a big modulator on the output amplifier. Using his old exciter and audio equipment, W6JSY spent less than $20 to make his station modern.

In Oklahoma City, W5HEV is on 75 with a rig patterned after Dawley’s in the July, 1948, QST, with plans for a push-pull 805 amplifier in the near future. John borrowed a 'scope for the original alignment, but finds he can check balance and phasing fairly well by just using his receiver. In common with many operators of single-sideband rigs, he proposes that the League inaugurate a “National B.F.O.-Rebuilding Week.”

Out West, W6CEM isn’t a newcomer to the stuff, since he has been on since last fall with the rig he described in CQ. That unit ended up with four 4-65As, and he has used it into the antenna or as a driver (with 400 volts on the plates) for a pair of 4-250As. Leigh’s best DX is only G, KH6 and KL7 since, as he puts it, he believes “more good can be done by working among our own heathen.” He would like to see all of the single-sideband boys get together in one spot for some extensive tests to see just what the stuff will do in intense interference conditions.

W3ASW and W2VVC have been doing just that, on 75 and on a small scale. In their latest tests, their (suppressed) carriers were spotted only 275 cycles apart, but W4OIL was able to copy either one simply by a small shift of the BC-221 he was using for carrier reinsertion. This was with both stations using the same sidebands — they have also demonstrated that by using opposite sidebands the receiving operator can select one or the other by judicious receiver tuning when both stations are on practically the same (suppressed) carrier frequency.

Another new one out West is W6NVH, who runs about 600 watts peak on 75. The exciter is patterned after the one at W6YX, where NVH was introduced to the stuff while active in the Stanford club. He hangs out around the high end of the band several nights a week.

W3MBY opened a filament in his big bottle, and had to resort to a 50-watt-peak 807 on 20. But at that he had a 3-hour solid contact on Thanksgiving afternoon, and that is a feat for any power on that band! (No, it wasn’t with someone two blocks away — it was with W5CDT.)

It might be well to take time out and do a little philosophizing on how far we have come in amateur single-sideband technique, and how things shape up for the future. It may help to end the minds of those fellows who want to try the stuff but can’t decide what kind of a rig to build.

It really boils down to only two things: filter or phasing, and high- or low-level generation. While there are strong supporters of both the filter and phasing methods, it is really only a matter of choice. The filter is not as expensive as you may have been led to believe at first, and QST has a couple of articles on the hook [one on page 21 of this issue — Ed.] describing how good filters can be made at home with parts you can buy fairly reasonably. The filter system requires a few more heterodyning jumps to get where you can shift frequency with the same relative ease as on a.m. or n.f.m., but this can be done with receiving tubes and components. You can’t get p.m. with a filter rig, and it takes a little doing to get the other sideband, but most of the fellows using filters now have provision for carrier reinsertion at the transmitter, so the original hurdle of establishing contact with fellows who don’t recognize single-sideband signals no longer exists. You can align a filter job with nothing more than an all-band receiver and a source of audio frequency, and that’s a big help to the fellow who is long on ambition but short on test equipment.

The phasing system gives you either sideband very handily, you can get p.m. or double-sideband at a flick of a switch, and you don’t have to start out on a low frequency so you heterodyne not more than once, if at all. It is a tough job to align the audio phase-shift network without a 'scope and a good audio oscillator, but such things can and have been borrowed. If the audio networks were available prealigned, you could do all of the adjusting with only a communications receiver.

As for high- vs. low-level generation, everything would seem to point to low-level generation aimed at ending up around 5 Mc. Then a 9-Mc. (Continued on page 112)
P LANS for the installation of radioteleprinters at Naval Reserve activities are being implemented. Equipment is under procurement, with shipment to start in the near future to those activities for which an initial evaluation set-up is planned. Six such initial points are planned, three on the East Coast and three on the West Coast. In addition, a number of equipments will be distributed for maintenance training.

The equipment which will be installed at the six evaluation points will consist of the following: a Model 15 teletype page printer; a Model 19, which is essentially a Model 15 with tape-cutting and transmitting facilities; a typing perforator, receive only, Model 14; and frequency-shift keyers and converters for adapting standard Navy receivers and transmitters to frequency-shift keying.

Training in the Naval Reserve as regards these automatic communication devices will be operational and rate training for communication personnel and technical training for maintenance personnel. The technical training will embrace all phases of automatic communication, landline as well as radio techniques. Operational training will cover the use of automatics from the relatively simple set-up such as will be found in smaller ships; that is, from reception of teletype “Fox” schedules and “press-to-type” automatics such as are used on v.h.f. and u.h.f. circuits to the relatively elaborate communication-center type of operation involving automatic tape relay and other techniques.

The equipment to be furnished the Naval Reserve will be the same as that now used in the Naval communication service and is the most modern to be found in either military or commercial establishments. It is the policy to replace this equipment with more modern equipment now under development as it becomes available. An example of what may be expected in the future is the new page printer which will probably be known commercially as teletype Model 28. This machine will be smaller, considerably lighter, practically noiseless and will operate at various speeds from 60 to 120 words per minute, in any position. In addition, it will have various automatic-switching features incorporated which will permit the unit to perform functions that now require additional equipment.

17 January 1949

From: Chief of Naval Operations

Subj: Press items or other public statements pertaining to the radio amateur

1. Certain press items in recent months, allegedly from Navy sources, which reflected criticism of the radio amateur, have been brought to the attention of the Chief of Naval Operations. The content of these items indicates a lack of appreciation and understanding of the importance which the Navy has consistently attached to U. S. radio amateurs and their national organization, the American Radio Relay League (ARRL). Such statements adversely affect the public relations of the Department of the Navy.

2. The Navy enjoys the best of relations with U. S. radio amateurs through the ARRL and is desirous of maintaining such relations. Both in peace and in war amateurs have repeatedly demonstrated their value and importance to the National Security. Accordingly, it is the policy of the Navy Department to support and encourage U. S. amateur radio activities.

A. W. RADFORD,
Vice Chief of Naval Operations

The above letter, which was addressed from Chief of Naval Operations to Naval commanders afloat and ashore, is of interest to all amateurs.

March 1949

Naval Reserve Multiple Address Letter 54-48 further explains this law. This is one of the most significant pieces of legislation affecting members of the reserve components of our armed forces.

Items for this page should be sent, via official channels, to Cmdr. F. G. Blasdel, USN, Rm. 3062, Arlington Annex, Navy Dept., Wash. 25, D. C.
W ell, was it a success, or wasn't it? From the standpoint of an observer on the East Coast, the Second Annual V.H.F. Sweepstakes was the biggest and best v.h.f. contest ever held. For the first few days after the contest the Headquarters mailbag was heavy with the fat reports of the W1s and W2s, many of whom reported more than 100 contacts. "Twice the bedlam of last year!" "New contacts to be made right through the contest period." "Much fun!" So the comments ran — the V.H.F. SS was great stuff, obviously. Activity was at a high level all along the Atlantic Seaboard, down to Washington, D. C., and Virginia. Ohio and Western Pennsylvania and Ontario sections turned in impressive totals, and several California sections had a lively time of it. Much of the rest of the country was rather quiet, however, or so it would appear, on the basis of early reports.

Conditions? For once we managed to pick a weekend for a v.h.f. contest when propagation was at least up to the season's average. The 50-Mc. band was open at least three times during the contest period, and tropospheric bending was quite pronounced from the beginning of the contest until around noon on Sunday, making it possible for the 2-meter gang to run up impressive section totals. Chances are, however, that January 15th and 16th would have passed as just an ordinary winter weekend, had it not been for the heavy and continuous activity engendered by the contest. Never was the importance of such activity in determining the possibilities of the v.h.f. bands better demonstrated. If as many stations were using the v.h.f. bands all the time, winter operation would be more productive of DX than most people suppose.

In a few minutes of listening just before the zero hour on Saturday, W1ATP, Holliston, Mass., was amazed to hear W4EID, Jacksonville, Fla., coming through on 6. Promptly at 2 P.M. he called, and Number 1 was exchanged each way for a flying start. This didn't last long, however, being the only sporadic-E contact thus far reported for that portion of the contest period. W1ATP went on to roll up 102 contacts in 8 sections on 50 and 144 Mc., for 1632 points, but W4EID could add only four more QSOs.

The highest score yet received was turned in by W2SAI, Riverton, N. J., who made 189 contacts in seven sections for 2646 points, more than 700 points above his nearest rival. His work was on 50 and 144 Mc. W2QNZ, Paterson, N. J., used 144 Mc. only, but spread his 106 contacts over nine sections, to total 1908 points. WSZFJ/2, Atlantic Highlands, N. J., worked 131 stations on 144 Mc., and W2ZBO, 126. W1GTV, Arlington, Mass., had 130 contacts on three bands, but his section total being lower prevented him from topping W1ATP for Eastern Massachusetts honors.

Not all the big scores were turned in by stations in a position to tap the reservoirs of activity in the Boston and New York areas. W8UKS, Burton, Ohio, piled up 66 contacts in Ohio, Western Pennsylvania, Michigan, Ontario, Western New York, West Virginia, Indiana and Maryland — a lot of territory to cover on 144 Mc. from North Central Ohio! W3RUE, Pittsburgh, reached seven sections, with 51 contacts on 144 Mc. for 714 points, and W5OY, Miamisburg, Ohio, made 46 contacts in seven sections.

As in the past v.h.f. contests, Hogback Mountain, Vermont, was the scene of valiant efforts. This time the hero was John Townsend, W1OIQ, who braved the wintry blasts and spent the entire contest period in a summer cabin near the summit. Hogback is the prize v.h.f. location of Vermont's Green Mountains, one of the few accessible spots in that state having a clear shot in the right directions to hit many of the populous areas of New England. W1OIQ/1 was prepared for operation on four bands, but contacts were made only on 50, 144 and 420 Mc. The 2-meter band opening Saturday night was the principal source of excitement, giving several New York and New Jersey stations their prized Vermont contacts. The score of W1OIQ/1: 46 contacts on 144 Mc., 18 on 50 Mc., one on 420 Mc., with a section multiplier of 9, for 1170 points.

One surprise was the number of stations worked on 50 Mc. in some sections. W1EKT worked 40 stations on 6, W1HIL 42, and W1LSN and W1ATP 43 each. There was no provision in the SS rules for participation by stations outside of ARRL field-organization sections, but that didn't stop XE1KE and XE1GE, Mexico City, from working W5s FFM, JLY, VV, ML, VY, ESZ, OLA, JTI, LKP and W4EQR — ten stations in five sections. This opening started at 5:35 P.M. CST on Saturday, and was still going.
March 1949

strong at 9 P.M. when XElKE left the air. Signals from Oklahoma, Texas and Louisiana were heard briefly in W1 and W2 just before noon on Sunday, but the Middle West got the better of this opening. The report of W5AJG lists W6YYS, W8LYV, W8UZ, W9AQG, W9GYX and W9JMS as worked during this period.

One hatch of reports from W2, although far from the top in total scoring, is of interest because the stations worked on 220 Mc. exclusively. W2UWK worked 6 stations in 3 sections for 36 points. W2FMI and W2POD were also in the 220-Mc.-only class.

Listed below are some of the higher scores from the more than 100 reports received in the first ten days after the contest. Though these scores are listed in numerical order, they were picked to show possible section winners and some of their closer rivals. They represent only a small part of the higher-bracket scores, of course, but they were chosen to show something of the activity around the country.

<table>
<thead>
<tr>
<th>Call</th>
<th>Section</th>
<th>Points</th>
<th>Multiplier</th>
<th>Score</th>
<th>Bands Used</th>
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<tr>
<td>W5AAI</td>
<td>E. N.J.</td>
<td>378</td>
<td>7</td>
<td>2666</td>
<td>50, 144</td>
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<td>W5QNX</td>
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<td>9</td>
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<td>1632</td>
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<td>7</td>
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<td>W1ATF</td>
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<td>1632</td>
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<td>W1CTW</td>
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<td>290</td>
<td>6</td>
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<td>744</td>
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<td>7</td>
<td>714</td>
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<td>6</td>
<td>618</td>
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<tr>
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<td>91</td>
<td>7</td>
<td>637</td>
<td>144</td>
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<tr>
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<td>6</td>
<td>656</td>
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<tr>
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<td>432</td>
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<tr>
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<tr>
<td>W3RUE</td>
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<tr>
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<tr>
<td>W5CHP</td>
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<td>W6VCQ</td>
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<tr>
<td>W4LVA</td>
<td>Virginia</td>
<td>74</td>
<td>3</td>
<td>222</td>
<td>50, 144</td>
</tr>
</tbody>
</table>

These are some of the leaders, but the picture may be changed materially, as each day's mail adds to the pile of reports. It is too early to be sure, at this writing, but it may well be that the Second V.H.F. Sweepstakes will turn out to be the biggest v.h.f. contest ever sponsored. Like any form of contest, it has some weaknesses, some inequities. We are evolving v.h.f. contest forms by experience. They will be changed when and if something better can be devised. If you have ideas along this line let us know. You may be sure that all suggestions will be given careful consideration. Next contest: June 4th and 5th — a hot spot in the v.h.f. propagation calendar. It should be good, and you should be in it!

January Highlights

The month provided numerous treats for those v.h.f. enthusiasts who were on hand to take advantage of them; in fact it would be hard to find a better example than January, 1949, as evidence to refute the widespread belief that the v.h.f. bands are interesting only during the summer months. The 50-Mc. band was open around the States, and down to Mexico City, several times, and at least twice to South America. On 144 Mc. the first authentic examples of two-way work by means of reflection from the auroral region were recorded.

HC2OT, Guayaquil, Ecuador, worked W5VY/5 on 50 Mc. at 10:32 a.m. on the 2nd. XElKE and XElGE worked several W5s on the 6th, in addition to the SS work on the 15th previously reported. The 6th and 7th were 50-Mc. aurora and F8 dates in the northern part of the country as well, skip contacts being reported all the way from W1 to W7. This coincidence of aurora reflection in the north and sporadic-E skip in the south was in evidence again on the 24th and 25th, two dates which will go down in v.h.f. history. On the 24th aurora effect was noted on 50 Mc. in the early evening hours, and around 9 p.m. EST there was a period when VE3, W4, 5, 8 and 9 were readble in the East on voice, though most stations were barely intelligible because of the aurora distortion. At this time several 2-meter operators noted aurora fuzz on signals, and turning their beams north and going on c.w. they proceeded to make 2-meter history.

W9PK, Downers Grove, Ill., worked W4RBK, Newport, Ky., and W8EP, Torra Alta, W. Va., on 50 Mc. aurora, and went over to 144 Mc. and found aurora signs there, too. Hastily connecting a key in the primary of his final plate transformer, Jack worked W4FBJ, Shepherdsville, Ky., W9EXH, McLean, Ill., and W9KYF, University City, Mo., and heard W9ASM, W9FVJ and W9FKI, all on 2-meter c.w., beams north. W3RUE, Pittsburgh, Pa., worked W1AEP on 50 Mc. and went to 144 Mc. immediately thereafter, calling CQ on c.w. for nearly an hour before he ran across W9PK, whom he called without result. Another CQ netted W9ASM, Indianapolis, at 10 to 10:15 p.m. W9EXH and W9FVJ were heard. The 50-Mc. gang were
making hay all that evening over at least half of the country.

The following night it was the same story, but more so! Beginning at 6:03 P.M. EST, HC2OT found the 50-Mc. band wide open to the States, and he worked W5NXM, Houston, La., W9QIN, Minneapolis, Minn., W7FGG, Tucson, Ariz., and W8s KSW, Brownsville, Texas, in a period of about one hour. He was heard for a few minutes at the first of this by W6NQD, Ashland, Ohio. At exactly the same time, 6 P.M., W3QKI, Erie, Pa., began hearing rough notes on the 2-meter band, with signals peaking from the north. In the ensuing

<table>
<thead>
<tr>
<th>2-Meter Standings</th>
<th>States</th>
<th>Call Areas</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>W8UKS</td>
<td>14</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>W8WJC</td>
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<tr>
<td>W8WXY</td>
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<td>W8CYE</td>
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<tr>
<td>W6NFM</td>
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<td>6</td>
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<td>W3KUX</td>
<td>13</td>
<td>5</td>
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<tr>
<td>W1BCN*</td>
<td>12</td>
<td>4 plus VE1</td>
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<tr>
<td>W1FVW*</td>
<td>12</td>
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<tr>
<td>W2NLY</td>
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<td>W4FBF</td>
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<td>4 plus VE3</td>
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<tr>
<td>W5DIV</td>
<td>6</td>
<td>4 plus VE3</td>
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<tr>
<td>W6WGZ</td>
<td>6</td>
<td>4</td>
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<td>W8BZ2</td>
<td>6</td>
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<td>W8BZ2</td>
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<td>W6GOK</td>
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<td>VES3AIB</td>
<td>5</td>
<td>4 plus VE3</td>
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<td>W4RKO</td>
<td>5</td>
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<td>W9OBW</td>
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<td>W6HXY</td>
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<td>W9NJS</td>
<td>4</td>
<td>2</td>
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<td>W9FPO</td>
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<td>W5LJY</td>
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* Winners 1948 Medallion award for most states worked during year on 144 Mc., 12 each.

Note to 2-meter operators: This month we add winning scores. Some of the leaders and their scores follow:

- W6WKO 100, and W6MJ and W6WWP 90 each.
- W6NMW coaxial tuner, went to the top scorers.

2-Meter Mileage Contest

Feeling that a contest for 2-meter men only is needed, the V.H.F. Institute of New York is sponsoring a mileage contest to be held the week end of April. The rules are simple: just report the stations worked on the lowest band, and two points per contact on 200 and 420 Mc. Two prizes, a 16-element W6IDF beam and a W6NMW coaxial tuner, went to the top scorers. Some of the leaders and their scores follow:

- W6WKO 860.
- W6NYC 850.
- W6ZRU 840.
- W6FOW 830.
- W6CRI 820.
- W6EKK 810.
- W6WKO 800.
- W6MJ and W6WWP 790 each.

2-Meter Standings

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Club-Sponsored 2-Meter Contests

If SS participation was somewhat lower than normal in the Los Angeles area it was probably because the gang were worn out after the V.H.F. QSO Party staged by the Two Meters and Down Radio Club (W6EMM) the previous week end. Activity on the v.h.f. bands had fallen off markedly, so the club sponsored the party to stir things up. The contest was open to all occupants of the 144-, 220- and 420-Mc. bands. One point was credited for each contact made on the lowest band, and two points per contact on 200 and 420 Mc. Two prizes, a 16-element W6IDF beam and a W6NMW coaxial tuner, went to the top scorers. Some of the leaders and their scores follow:


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stitute of New York, 47-01 Maspeth Ave.,
Maspeth, N. Y.

V.H.F. Net Activities

To promote year-round utilization of the v.h.f.
bands many groups are sponsoring nets on the
various bands. Some of these, with their operat­
ing schedules, are listed below. If you are part of
such a group, send us the information and we’ll
list it similarly, with the hope of attracting
greater participation. Give the frequency and
time of operation, the number of stations, an­
tenna polarization used, and other pertinent facts.

New England: 50 Mc. -- Horsetraders, Tues­
day, 7:30 P.M. New England Net, Tuesday, 8
P.M. New Hampshire Net, Wednesday, 9 P.M.
144 Mc. -- Monday Nighters, Monday 9 P.M. 220
Mc. -- Thursday, 9 P.M. 420 Mc. (Hartford area)
-- Wednesday, 8 P.M.

Hamptons-Newport News, Va. -- Emergency
net operating on 144.7 Mc. each Thursday night.
Stations include W4s AJA, JHC, IT, MXY, OLX,
ODG, KDV, NAQ, NRB and NNR.

Akron area: 50 Mc. -- Potlickers Net, Monday
and Friday at 8 P.M.

Chicago area: 50 Mc. -- Tuesday nights, 144
Mc. -- Wednesday nights.

Charleston, W. Va.: W8s BKI, LYG and YIF
desire 144-Mc. schedules within 50 to 60 miles.

Evansville, Ind.: 144 Mc. -- W9UNT, W9UIA
and W4LLR, Henderson, Ky., keep nightly
sked at 7 P.M. CST.

If the general use of horizontal polarization is
hindering you in local net operations, and a
nondirectional horizontal antenna is needed, try
the suggestion of W11JFF, Newport, R. I. Fred
uses a folded dipole made of Twin-Lead in the
usual way, except that it is fastened to a thin
stick and bent into a circle. This should give a
uniform signal in all directions, with a sacrifice
of about three db., as compared to a single hori­
zontal dipole in its favored direction. The three
db. can be regained by stacking a couple of these
a half wave apart vertically.

The local coverage possibilities of 50 Mc. are
emphasized in a letter from W8QYD, Dayton,
Ohio. "Hams in this vicinity are missing a good
deal. I can work W9ZHL, Terre Haute, Ind., any
night, though the distance is 170 miles. His an­
tenna is 100 feet in the air, but my set-up is noth­
ing out of the ordinary—100 watts to an 829B,
a homemade converter into an NC-SOX re­
ceiver, and a 4-element array 47 feet above
ground. How about telling the boys in Chicago,
St. Louis, South Bend, Elkhart, etc., to get on
when the band isn't open?"

Final Results

V.H.F. States-Worked Contest

We take pleasure in announcing the winners
of the bronze medallion awards for the most
states worked on each of the three v.h.f. bands
during 1948. The top scorer on 50 Mc. was J.
L. Peterson, W0KPQ, Robbinsdale, Minn., who
worked 42 of the 48 states during the year.
It is noteworthy that Pete's winning total was
racked up with 25 watts input. The 144-Mc.
section was headed by two Massachusetts Eels,
Edward Goodhue, jr., W1PIV, of East Freetown,
and Edward Gosselin, W1BCN, of Hyannis.
Both fellows worked every Atlantic Seaboard
state from Maine to Virginia, and VE1 besides,
on 144 Mc. in 1948. The top bracket on 220 Mc.
was a walkaway for Calvin F. Hadlock, W1CTW,
who worked Maine, New Hampshire, Vermont,
(Continued on page 112)
TWENTY-FIVE YEARS OF UNION

A little more than 25 years ago the first transatlantic QSOs occurred, soon to be duplicated by many eager experimenters. As a result, ham radio began to take on more of an international flavor, and the need arose for coordinating amateur activities throughout the world. The idea of an international union of amateur radio operators was the logical conclusion.

In Paris, France, on March 12, 1924, amateur representatives of nine different countries sat down together to discuss the possible formation of such a union. The countries represented were France, Great Britain, Belgium, Switzerland, Italy, Spain, Luxembourg, Canada and the United States of America. A letter from Denmark expressed regrets at not being able to have a representative in attendance, but asked that the Danish amateurs be counted in. At this meeting and at another meeting two days later, preliminary organization plans were completed. Hiram Percy Maxim was elected temporary president, Dr. Pierre Corret of France was elected temporary secretary, and the ARRL was invited to submit a recommendation for a constitution. Plans were made to hold a Congress to effect permanent organization, this Congress to be held during the Easter holidays of 1925, in Paris.

The I.A.R.U. congress of 1925 saw amateur radio representatives of 25 countries complete the final organization of the International Amateur Radio Union. Mr. Maxim was elected the first international president, Mr. Gerald Marcuse, g2NM, Great Britain, was the international vice-president, K. B. Warner was elected secretary-treasurer, and QST was named the official organ of the Union. The 25 nations represented were Argentina, Austria, Belgium, Brazil, Canada, Czechoslovakia, Denmark, France, Finland, Germany, Great Britain, Hungary, Indo-China, Italy, Japan, Luxembourg, Netherlands, Newfoundland, Poland, Russia, Spain, Sweden, Switzerland, Uruguay and the United States.

In its original form the I.A.R.U. membership was not made up of the national societies in each country, as is the case now. Instead, individuals joined I.A.R.U. by paying a small membership fee. In each country from which there were 25 or more individual members, a national section was formed, with the first such national sections being those of the United States, Canada, France and Great Britain.

Thus, 25 years ago, was conceived the International Amateur Radio Union, which, though it has changed slightly in structure, has continued to carry out the aims and purposes laid down at those first meetings: the promotion and coordination of two-way contact between the amateurs of the world; the effecting of cooperative agreements on amateur radio matters between the various national amateur societies; and liaison for representation of amateur radio interests at international telecommunication conferences.

CALL-SIGN PREFIX CHANGES

The following prefixes are currently effective in the areas indicated:

KZ5AA-KZ5WZ Canal Zone
KG6IA-KG6IZ Iwo Jima
KG6AA-KG6BZ Saipan
KG6TA-KG6TZ Tinian
KC6AA-KC6ZZ Caroline Is.
KX6AA-KX6ZZ Marshall Is.
JA2-JA7 Japan
HL1AA-HL1ZZ Korea
AG2 U. S. Trieste
MF2 British Trieste
DL2 British Zone of Germany
DL4 U. S. Zone of Germany
DL5 French Zone of Germany

GREAT BRITAIN

You'll be hearing quite a bit of DXing over the week end of March 5th and 6th, which will be the annual B.E.R.U. contest, sponsored by the Radio Society of Great Britain. This contest, extending from 0001 GCT, March 5th to 2359 GCT, March 6th, is open to all British subjects living within the British Empire and British-(Continued on page 118)
O Kay, fellows, now you can get all the latest G-2 on MARS as well as a bit of clear-channel code practice in plain text that just suits your needs, unless you happen to be a super-swift. Until requirements show a need otherwise the code speeds will be from 5 to 35 w.p.m., on 20, 40 and 80 meters.

Every Monday night at 0100 GCT on 6997.5

Tuesday night at 0100 GCT, on 14,405 kc., AF4AF will send as nearly 13-word-group-per-minute code as is manually possible, with the dum-dittys at 16 w.p.m. (That new Class A code requirement may show up sometime, OM.) After all information on MARS is transmitted, Federal Communications Commission regulations pertinent to amateur operation will be sent.

Wednesday night — same time, same station — there will be a repeat performance on 14,405 at 25 w.p.m. for a full hour. Thursday and Friday nights the schedule is the same as to frequency and time but the speed will be increased to 30 w.p.m. on Thursdays and 35 on Fridays.

The trusty wrist action at WAR is authored by M/Sgt. Paul E. Allyn, W4EEP, ex-W2QEM, chief op at K4USA, and Ron Griffin, W6COD, who beats a mean bug. The di-dabs at AF4AF are coauthored by S/Sgt. Ira W. Matteson, ex-5BKA-W7GUC (Matt is sweating out his W4 call right now), and S/Sgt. James M. Williams, W4OST. Before too long a Boehme keying unit will give their tired wrists a rest.

Transmissions are being arranged for the Central States by the Air Training Command at Barksdale Field, La., and 4th Army Head (Continued on page 180)

March 1949
GREATER SELECTIVITY WITH THE LAZY MAN’S Q5-ER

The advantages of low-frequency high-Q i.f. stages obtained from the now-famous Q5-er are many, but the selectivity is still not as great as it could be. A marked increase in selectivity was obtained by further increasing the separation between the i.f. coils in the BC-453 unit. This is done by removing the plug-in i.f. transformer, opening up the can, and removing the bottom coil and its form. Saw off the lower half-inch of the form, and reassemble, cementing the coil in place. Don’t try to slide the coil down on the form, because it is impossible to do so without wrecking things!

Selectivity is increased to the point where the h.f.o. in the first receiver is almost useless. The critical test, digging for DX on 40 meters, was passed with flying colors. I estimate the effective bandwidth to be about 500 cycles, which is sharp enough to keep almost anyone happy. I can’t recall having gotten more return for less effort, in a long time.

Maynard B. Chenoweth, W8CU8, ex-W20CC

IMPROVED OSCILLATOR-MIXER COUPLING

Anyone who has been aggravatated by that troublesome interaction between mixer and h.f.-oscillator circuits known as “pulling” will find the use of an untuned buffer stage interspersed between the oscillator and the mixer an effective means of reducing the trouble. This method is an improvement over the usual pentagrid-converter arrangement, in that while the former provides good isolation, it does so at the expense of lowered sensitivity, because the conversion transconductance of the tube is comparatively low.

In order to achieve freedom from pulling, and at the same time maintain mixer sensitivity, an untuned triode may be used as a buffer, as shown in Fig. 1. This takes advantage of the fact that although the control grid has a large influence on the plate circuit of a tube, the influence of the plate on the control grid is negligible. We have, then, a one-way affair that does not allow the mixer tuning to “back up” into the oscillator.

The grid of the triode is coupled to the tuned circuit of the oscillator, and the plate of the triode is, in turn, coupled to the tuned circuit of the mixer, the connection being made by a tap on the tuning coil of the mixer only a turn or two above ground. This permits the use of a high-sensitivity tube such as the 6AC7/1852 or 6SK7 as a mixer.

Fig. 1 — An untuned buffer stage used to provide maximum isolation of the h.f. oscillator and mixer circuits to reduce “pulling.”

| C1, C2, C3, C4 | 0.01-mfd. paper. |
| C5 | 220-mfd. mica. |
| C6, C7 | 0.005-mfd. paper. |
| R1, R2 | 0.1 megohm. |
| R4 | 2,200 ohms. |
| R3 | 0.47 megohm. |
| R5 | 22,000 ohms. |
| R6 | 47,000 ohms. |
| R7 | 10,000 ohms. |

It should be noted that poor interstage shielding or injudicious placement of parts will tend to undo the benefits of the isolating triode. Conversely, any measure designed to prevent the oscillator and mixer from coupling by means other than through the triode buffer stage will make the arrangement more successful.

Choice of a 6C4 miniature triode is favored because the tube is small, its power drain almost negligible, and it seems to give results equal to those obtained with pentodes, in spite of expectations to the contrary.

The results have been something more than encouraging. Over all amateur frequencies up to

(Continued on page 118)
Cornerstone From Members

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

MICHELSON'S INTERFEROMETER

P. O. Box 985, A. & M. Annex,
College Station, Texas

Editor, QST:
I don't suppose that it will make any difference in the course of world history, but the use of Michelson's Interferometer 1 to measure microwave frequencies is not unknown down in "these hyar parts."
When I was in high school down in Goose Creek, the professor of physics in our junior college and I did this experiment from a diagram found in a college physics book. Our equipment was almost identical with that described in your article, and Mr. Nelson allowed me to write up the experiment for the Texas Junior Academy of Science. This article can be found in an issue of Teretania, the official magazine of the organization.
We found that the complete pattern could be determined at the focal point by connecting the quarter-wave dipole to the intensity meter with a short length of coaxial cable. This makes the unit flexible and readings could be taken at many points in front of a large sheet of paper to determine the patterns that you illustrate in Fig. 1.

-- Don Hinton

QRM

2211 Bryan St., Commerce, Texas

Editor, QST:
I would like to thank all amateurs who operate on the frequencies of W1AW when code-practice transmissions are being sent. Keep it up, fellows, you're doing a swell job! Some of the boys with kilowatts are very courteous; they move up the band about 3 kc. This gives the listener the fun of trying to pick out the signal from their key clicks. There are times that these fellows make wartime "jamming" look like a peanut whistle.

-- William Potts

King, Ont., Canada

Editor, QST:
I am waiting on our trunk-line frequency while VE4AM relays a QTC to W6TIP. Conditions are bad tonight, and we require plenty of folks. So along comes some joker, swings his VFO down on us and without even thinking, or listening, starts a long CQ. Needless to say, VE4AM has to QRX. Why couldn't these fellows check the QST list of active nets, and avoid all this painful procedure. With a lot of messages and QRN, the difficulty is only increased by this thoughtlessness on the part of others.

-- T. H. Ussher, VE3AVE

TVI

15 East Van Ness Ave., Rutherford, N. J.

Editor, QST:
I read this letter by Robert James, Frederick, Md., in the Model Railroader for January, 1949: "My popularity has decreased in my neighborhood ever since the television sets have been installed. Some of the fellows have spent their time watching them instead of coming to call."
We have the same problem in your corner of the world. The radio and television repair shop next door reports excessive noise out of the television sets as well as poor visual reception.
"Of the several radio men I have consulted none has been able to offer a remedy. Can any readers help out?"
My first reaction was, "Ye gods! Is there anything that a fellow can do for relaxation beside collecting stamps or visiting the corner gin mill without becoming the target for the dirty looks and accusing remarks of TVlookers-on?" Then the recollection of having heard someone say, "The ultimate criterion of a good radio receiver is not necessarily what it can 'pick up,' but, rather, what it will reject." To which I say, "Amen!"

-- William H. Schmidt, WENFL

50 MC. AND UP

R.F.D. 3, Ashland, Ohio

Editor, QST:
Sometimes I think that the best efforts in "The World Above 50 Mc." may be wasted, as fellows not working on the v.h.f. bands may not read the column regularly. It seems to me that a little space in the regular editorial column might help to sell these fellows on greater use of the 50-Mc. band.
Here is an approach I have used on a few fellows, which seems to start them thinking. I point out that it is not sufficient for us to ride our hobby for our own pleasure entirely. We owe it to ourselves to put something into it, rather than merely take something out. I try to show them that operation on the v.h.f. bands helps to relieve the overcrowded condition on our lower frequencies, and at the same time helps to further interest in the higher ones. I try to point out that it is not a case of trying to find some v.h.f. activity, but rather of making it.

-- Tom Stone, WSMQD

301 Warren St., Needham, Mass.

Editor, QST:
Cal Hadlock's January QST article entitled "Making the Higher Frequencies Pay Off" was certainly timely, since those amateurs who are TV-conscious will find an important reason why high-band (174-216 Mc.) TV reception is very often marginal in acceptability.
Technical literature of recent vintage has dealt with this "aperture" concept probably with more emphasis placed on the microwave spectrum, but W1C7W's paper in the first semi-popular exposure encountered by the writer. His treatment of the subject was excellent in its essence and should be underlined as must reading for those v.h.f. enthusiasts interested in basic v.h.f. principles.

-- H. Sargent, W1OGA

"HANDLE" HABITS


Editor, QST:
The exchange of "handles" or names appears to have become an integral part of the standard exchange of data between hams in QSO. Our names are now included in the rubber-stamp routine, along with RST and QTH. I have no argument with the practice, although I do feel that the good old expression "OH" is fully as appropriate.
So firmly imbedded in the habits of present-day operators has this "handle" complex become, that when you fail to transmit your given name, your correspondent invariably comes back with, "Sorry, I missed your handle," or, "You forgot to give your handle." The fact is, he didn't miss.

(Continued on page 118)
Ice-Storm Emergency. Southern Missouri, Kansas and Oklahoma have just suffered one of the most severe icing conditions in recent years, leaving many cities without power or communications. With no little pride we report that amateur networks swung into action, assisted in train dispatching, re-establishment of power, and all of the important communication jobs incident to a protracted emergency which will require months for the complete restoration of pole lines and facilities. Many amateurs in the area carried on under tremendous odds, outside amateurs relayed to overcome “skip trouble,” intelligent amateurs not needed stood by, self-monitoring plans of some nets worked well and participating hams can boast that no requests for FCC-cleared frequencies were required. However, as the effects of the storm became widespread, an FCC order promulgating a declared emergency under FCC § 12.156 became effective for a two-day period, making it incumbent on all operators within 500 miles of the areas having communications difficulties to curtail all communication in the specified frequencies except emergency communications. ARRL-FCC designated stations named in the emergency order, including WlIAW, transmitted the order to amateurs and those assisted in the monitoring-policing responsibilities required by § 12.156(d). The National Emergency Coordinator is busy putting together the whole story (for next month) from the reports now coming from scores of points concerned with this emergency. Our congratulations to all who helped.

R.S.V.P. Every amateur is invited to be constantly ready for emergency operations. Preparedness and amateur community plans made in advance pay big dividends. Every community should have its ARRL emergency coordinator. By radio message or card to your SCM recommend a qualified amateur for EC, or ask his name should one have been appointed; ask for an Emergency Corps blank unless you have an AEC membership card signed by the local EC within the year. All amateurs, regardless of the organizations they belong to, should be supporting or full AEC members. There’s no cost to it. The only requirement is the willingness to serve. Get lined up today for information on emergency working. There is a place for every amateur in the ARRL Emergency Corps.

On Keeping Off Emergency Frequencies. “Must kick about the unholy QRM on ‘75’ while the Iowa ‘phone men were trying to handle emergency traffic. Overeagerness to help from all over the map was partly at fault. . . . Anyone with a think tank knows that the minimum stations needed to handle a job can turn in the best performance. Yet, on this band they will call in even if 500 miles away. I asked W5GIIF to monitor the band and try to keep the channel in emergency use clear. When those in an emergency net want help they will always ask. In the meantime make it strong in QST that standing by, to avoid jamming work in progress, and more listening and less transmitting are of top importance! What a shame that frequency was jammed.” — W4GIW

“With too many opening up to clear a band, QRM can be worse than ever. . . . Why not set up emergency channels on other amateur bands free of this interference?” — W4IA

Invitation — Official Observers Needed. Ever listen to the key thumps and poor notes that prevail at intervals in some of our precious h.f. bands and want to help do something about it? Have you ever noted bad splatter from some particular voice-operated station and wanted to help advise the operator about it even though unable to work on his frequency? All members are cordially invited to assist in keeping brother amateurs out of FCC difficulties and lending effort to keep our operating pleasurable in all bands. Care in observing is necessary as well as tact and discretion in mailing the cooperative-type notices designed to implement this ARRL program.

Perhaps you have thought that an expensive frequency standard was required to become an observer and do anything about these matters? That’s not so, and the chief requirement is that an observer-applicant have appropriate equipment to do a good honest job in the particular field of observing in which he plans to engage. Only the Class I (70 parts per million accuracy) and Class II (350 parts per million accuracy or better) observers are engaged in frequency measuring, as a rule, and while opportunities to get into this class through actual tests are presented in the form of Frequency Measuring Tests four times per year, the greater volume of observer activity is in the matter of sending the good word concerning poor notes, clicks, too-strong har-
monies and parasites, and modulation difficulties that are observed and studied with a view to keeping all of our stations and bands at top-notch performance — to make amateur radio a pleasure for all of us.

ARRL will be delighted to provide appropriate forms to every new observer appointed, as promptly as possible. Address your application to the SCM whose address is listed on page 6 of this issue of QST. Help us to help you on this important operating problem, please!

Give True Reports . . . Dishonest Ones Despised. The following is from W1—'s letter to an official observer: "Many thanks for your report. Very embarrassing to have the worst note you have heard since '46. Also interesting to compare your report with that from W5— who gave me T3 (a slight trace of ripple, not objectionable)! A source of troublesome r.f. feed-back to the VFO was found and treated and my sig is again T9. Thanks!" W2JUF writes in similar vein:

"Kindly forward W4--'s card. W5-- gave him 589x but it should have been T5. Keying was bad, too, and the signal very broad. The 'five' even said it was like a Naval station and that he himself would like to have such a signal. Pity poor 40 meters if they were all like that."

Be honest with all reports. Make your reports valued gang.

New Meanings for QNZ and QNA. ARRL netters utilize a list of special QN signals to facilitate clear and rapid communications in section-net and trunk-line operations. Such lists are available from ARRL on request and are ordinarily provided by the NCS to stations "joining up." Staff members responsible for review of suggestions relative to traffic and net betterment have recently noted W4NNJ's suggestion that the present meaning for QNZ is not being used; also that QNA is seldom required under present conditions. Effective on publication of this notice in QST, all netters will please note the adoption of revised special meanings, for amateur networks, as follows:

QNZ Zero beat your signal with net control station.
QNA Answer in prearranged order . . .

It strikes us that the above warrants a QNC over all ARRL nets to request netters to mark over their present lists to show these new meanings. The first signal should get fellows closely on net frequencies instead of spread over 5 to 10 kc., and a helpful QNL or QNH in individual cases will get all concerned on the ball. The second meaning above can be used for alphabetical order or any previously-decided net reporting order.

CD Staff and DXCC Note. Our heartiest good wishes go with Al Hill, W6JQB, ex-W1QMI. Now returned to California to be with his family, Al will pursue radio and control engineering with Northrup. Bets are being placed on how soon he will be on the air. John E. Cann, W3IEM, has accepted the vacated post as communications assistant. John was an AACS chief operator, and is ROWH, A-1, ORS and holder of a 35-w.p.m. Code Proficiency certificate. He is well known to hams for his work in AARS, TO, VN, SSN and his Md. Section net and also has 43 countries to his credit. Applications for DXCC are processed at John's desk. With those piling in right and left his present ambition is to get procedure on a current basis, since the change in personnel caused coverage of the desk to lapse for some two weeks. This is to report that the award machinery is rolling again and his listing of New Awards and Endorsements will first appear in next QST.

DITS and DAHS. "Your ham days begin the moment you pass the code examination for your operator license. It is one of those events in a fellow's life that he rarely forgets. It's a milestone in his amateur career, marked 13 w.p.m., and like all other milestones should be marked along a highway of progress. In a few days after receiving his ticket the average newcomer is deep in construction projects which rapidly increase his knowledge of radio theory to the point where he would think nothing of having to go back and take the theoretical portion of the ham exams. How about equal progress in code proficiency? Can you still take 13 w.p.m.? . . . or 15? Or have you slipped a bit in the long hours with the soldering iron? Why not find out on January 13th at the next ARRL Code Proficiency Run. Newcomers ought to make at least the 15-w.p.m. certificate. It's fun from there on to copy the practice runs once or twice a week, take the qualifying run once a month and receive concrete evidence of your progress in the form of endorsement stickers for 20 and 25 w.p.m. as your speed comes up. Consult QST 'Operating News' for details. Don't let that 13-w.p.m. milestone turn into a tombstone for your code speed!" The above from KZ5AW was from the Canal Zone Amateur Radio Association bulletin, Jan., 1949. This is just a reminder that the Code Proficiency Program is not just for the fellow who is getting started.

—F.E.H.
WITH THE A.E.C.

W8VVL, call of the late Judge J. D. M. Outcalt, has been assigned to the station of the Queen City Emergency Net. The late Judge’s widow has presented his entire station to the group, and, installed in the Red Cross headquarters in Cincinnati, W8VVL will be the focal point for the emergency activities of the QCEN and Greater Cincinnati Amateur Radio Association.

The Oregon Emergency Net is now in full operation, with its c.w. wing on 3000 kc. and a phone section on 3865 kc. This is no casual group, but a gang that drills nightly. The amateurs of Oregon are ready . . . are you?

Colby A. Foss, W4ISR, of Clewiston, Fla., has been cited for exceptional service in connection with his operations during the recent Florida hurricane emergency. Marooned in his station, with the water level above that of his floor, Foss stuck to his post for two-and-one-half days, handling weather reports and Red Cross and Coast Guard traffic on a continuous basis.

The Illinois AEC fellows have designated 29,640 kc. as the emergency calling frequency for their 28-Mc. mobile units. The Illinois State Police are making arrangements to monitor this channel in addition to the normal police channels. Any ham in Illinois who finds himself in an emergency situation should be able to obtain help in short order with this set-up. Sounds like a good idea to us. How about sending information about your local emergency channels to the NEC so that we can present a list in QST?

The new BPL award mentioned in January QST looks like a “natural” for the AEC crowd. We all handle lots of traffic during drills of our traffic and emergency nets. How about really working at it, and getting the message total about 500 this month so that those letters “BPL” can sit next to the “AEC” after our calls? Of course, a message total of 500 might be called “the hard way” — 100 deliveries-plus-extra-delivery-credits will bring the coveted pasteboard just as quickly.

AMATEURS FILL GAP LEFT BY NEBRASKA BLIZZARD

Nebraska hams responded to the call of duty when the first blizzard of the winter swung across the state to wipe out communications in many sections.

W6HYR of Lincoln, member of both phone and c.w. state nets, was one of the first to step into the breach when he attempted to contact McCook via the state ‘phone net, with emergency traffic for the Burlington Railroad waiting for clearance west. McCook was not contacted but W9OWP of Brush, Colo., answered and said he could handle anything for McCook as he still had one central train-control wire functioning. As the ‘phone net was crowded at the time, W8HYR and W9OWP dropped down to 3745 kc. and handled further traffic there.

On Thursday evening, during scheduled operation of the c.w. net, a weak signal calling QRRR was heard on the frequency and was copied by W8HYR. The signal turned out to be that of W6UDH of Palisade, Nebraska, seeking communications for his town. Communications were swiftly revived for that small western Nebraska community as ham radio replaced the missing wire circuits.

Early Friday morning W9BDQ of Broken Bow called W9RJK, seeking information for the manager of the Rural Electrification Administration in regard to the position of line breaks between Elm Creek and Ansley and giving instructions on methods of switching circuits in the district to resume service wherever possible. The same information was requested through W9MLB of Kearney and W9LOO at Grand Island. The information was furnished by the Platte Valley hydro plant.

W9THH, one of the reliables of the c.w. net, swung into action early in the disaster to furnish connections to other points for his city of Bloomfield, which was completely isolated when the blizzard left from three to five feet of snow and occasional drifts to twenty feet covering the highways. Action taken by W9THH opened communications to Norfolk, via Lincoln, and succeeded in furnishing needed directions to operators of highway equipment in their efforts to open the
highway and reach stranded tourists.

Omaha was well represented during the entire stretch of sleepless days and nights in pounding out traffic for Western Union. The Omaha hams made use of both 'phone and c.w. stations to furnish a needed link. The voices of W6EUT, W6GTC, W6QYM and W6NZ were kept busy on 'phone while W6KJP, W6FQB and W6GMZ were the brass pounders on the c.w. net frequency.

W6PAM, NCS of the c.w. net, was kept on the jump the entire period. Although his community was not too-seriously affected, he was hard-pushed at times, especially during the long hours of the nights, to keep the many stations tied in on the circuit. Through his efforts traffic from neighboring states was kept functioning smoothly and no serious snarls were permitted to "snaggle" the lines of communications.

The 'phone net was kept operating in good style by W0JED of Wayne, Nebraska, who was pinch hitting as control station. W0JED was on from Friday morning to Monday night.

Being short a few trains following the "big blow," representatives of the C. B. & Q. railroad showed up at the shack of W6QNP in Culbertson seeking an outlet to company offices. Information regarding a passenger train tied up in a ten-foot

omission traffic for Western Union. The Omaha hams were kept advised of weather conditions in Lincoln and Omaha. Work trains and line repair men were requested via the same route. Company officials were kept advised of weather conditions with the able assistance of W0NME.

Deserving credit must be given to the hams in the surrounding states of Colorado, Kansas and Iowa for their work in the handling of emergency traffic. It is impossible to list in detail all the work done during the storm but credit must be given to the following stations: WS6 AMY, AZH, BDE, BDO, BJX, COU, CUL, DHO, DMY, DQW, EKF, ERW, ESX, EUT, FAM, FEE, FMW, FQB, FQF, FHG, GMZ, GTC, 100, IRZ, IXL, JCB, JED, JLD, KON, KQX, KJP, LEF, LJO, LRF, MGV, MJY, MLB, NCV, NME, NVE, NZ, OKI, OVS, OWP, OZC, PDI, QFY, QNP, ROK, SAI, UDH, UFL, UPZ, UHT, VMP, WML, YAD, YMU, ZNI, W6VR1/0 and W71RX.

--- W. T. Gemmer, W6RQK
C. E. Longstreth, W6SAI

### NATIONAL EMERGENCY FREQUENCIES

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.W.</td>
<td>7100 kc. (day)</td>
</tr>
<tr>
<td>'Phone</td>
<td>3875 kc.</td>
</tr>
</tbody>
</table>

During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for the handling of third-party personal-inquiry traffic.

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**CODE-PROFICIENCY AWARDS**

The next qualifying run from W1AW/W0TQD will be made on March 16th at 2200 EST. Identical texts will be sent simultaneously by automatic transmitter.

Frequencies of transmission from W1AW will be 3555, 7215, 14,100, 28,000, 52,000 and 146,000 kc., from W0TQD 3594 kc.

The next qualifying run from W60WP only will be transmitted on March 5th at 1900 PST on 3590 and 7248 kc. For additional dates, see the ARRL Activities Calendar elsewhere in these pages. These W60WP-only runs will have different text from the runs sent by W1AW and W0TQD, but copy will be handled in exactly the same way as the transmission from W1AW and W0TQD.

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 five speeds transmitted, 15 through 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening, Monday through Friday, at 2200 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. To get

### BRIEFS

All present or former radio officers of the Merchant Marine are invited to join the activities of the Radio Officers Net on 7280 kc., P.M. Wednesday. The net call is "CQ RON."

The Golden Empire Radio Club, Chico, Calif., presented a 15-minute discussion of amateur radio as a hobby, with emphasis on emergency work, public service and other phases, in a broadcast over KI6SL. The occasion was in connection with National Radio Week. The club met at W6RAQ's and the broadcast was in the form of an actual three-way QSO between W6TID, W6LTE and W6GUV. In reporting the success of this feature, W6CKV remarks that other clubs should try to get more such programs before the public. Any club group that can get time over a local station may contact ARRL headquarters for background material and suggestions.

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March 1949
AMATEURS ASSIST EVACUEES

Amateur radio is often called upon to render communications assistance when the wires are down, but the recent work of members of the Far East Amateur Radio League, in conjunction with amateurs in China, is outstanding in the magnitude of the work load on a few stations. J2USA, Tokyo, J2HYS, Yokohama, C1AF, Shanghai, and C1RO and C1VF, Nanking, found themselves sages during the six-week period ending January 1949. J2USA, Tokyo, J2HYS, Yokohama, C1AF, Shanghai, and C1RO and C1VF, Nanking, found themselves deluged with an avalanche of third-party welfare communications assistance when the wires are down, but the recent work of members of the Far East Amateur Radio League, in conjunction with amateurs in China as the civil war in that country reached a critical stage during the Christmas season. The five stations mentioned above, with the assistance of J2NZI and J2GIL, handled nearly 2000 messages during the six-week period ending January 1, 1949. J2AHI and J2AIH carried the lion's share of the operating burden at J2USA.

BRIEFS

In answer to a CQ on 14-Mc., c.w. W4IYT received two replies, one from G3AWK, the other from VE3AWK, both on the same frequency.

Add “Father and Son” schedules: KP4KD, father, keeps in regular touch by amateur radio with his son, W4OLC, Miami, Florida.

The South Shore Amateur Radio Club offers a certificate to any amateur who contacts ten of its members. Phone or c.w. may be used and crossband contacts are allowed. Applications should be accompanied by a QSO list and sent to P. O. Box 8, Quincy, Mass.

TRAFFIC TOPICS

The changes in the special QN signals for net use should find widespread application among traffic nets. QNA, which now means “Answer in prearranged order,” can be used by any net which has a specified order of reporting. In effect, the meaning is broadened so that it can apply to any order that is prearranged, instead of only to alphabetical order, which had little meaning in nets containing stations from various call areas. QNZ, which previously meant “The following new stations are now in the net,” was receiving very little use, and has been changed to mean “Zero beat your signal with the NCS.” Used in conjunction with QNH and QNL, it should be helpful to net control stations in getting member stations lined up on a common frequency. W4NNJ is responsible for suggesting the latter change. All stations who have copies of the QN signals are requested to make these changes on their lists. The net signals QNE, QNJ, QNM, QNQ, QNU and QNW all have useful meanings in any net, but are little used. Let’s put them to work.

Don’t let low code speed keep you out of traffic work. There are several slow-speed traffic nets now functioning in several areas, and amateurs in those areas who wish to get into traffic work are invited to QNI. In Kentucky we have “KYW” meeting on 3600 kc. every Monday and Thursday at 2000 CST, using speeds of 10 or 15 w.p.m., “or slower if necessary” (courtesy of Blue Grass Ether Clippings). From W4KGI comes information that a new slow-speed net is being formed in South Georgia, with six towns already represented. The meeting place has been organized and other slow-speed nets include Slow-Speed Trunk Line (3545 kc., 1900 EST Monday through Friday) and Connecticut Emergency Net (3640 kc., 1900 EST Saturday and Sunday). Progressive sections nationwide are coming to the realization that there is a real healthy interest in traffic handling among amateurs who lack the ability or the desire to work at speeds above 20 w.p.m. What a net lacks in speed it can more than make up for in efficiency. Please send us further reports on organization of slow-speed traffic nets.

Have you got your BPL certificate? Your SCM will issue you one each month your traffic count totals 500 or more, or 100 or more deliveries-plus-extra-delivery-credits. We trafficers for years have awaited this kind of recognition for our efforts. Now let’s get busy and acquire at
least one of these certificates to post above our ORS certificates to show that we have more than justified our appointments.

Add to 'teen-age nets: W1RDB reports a 'teen-age net operating on 3700 kc. at 1600 EST every Monday and Friday. Interested amateurs should contact him for details.

Twenty-three of the nation’s top traffic-handlers appear on the roster of TLAP. For speedy East-West traffic service, TLAP is hard to beat. Stations with traffic to put on TLAP should report into Jersey Net which meets on 3630 kc. at 2100 EST each week day.

**SUPPLEMENT TO DIRECTORY OF ACTIVE NETS**

This listing is to be added to the directory as published in November, 1948, QST, page 72, and the supplement in January, 1949, QST, page 68. An asterisk (*) indicates a change from the November listing; a double asterisk (**) indicates a change from the January listing.

<table>
<thead>
<tr>
<th>Net Name</th>
<th>Freq.</th>
<th>Time &amp; Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona Slow-Speed Net*</td>
<td>3757</td>
<td>7:00 P.M. MST, Mon.-Fri.</td>
</tr>
<tr>
<td>Colorado Utility Net</td>
<td>3540</td>
<td>7:00 P.M. MST, Mon.-Fri.</td>
</tr>
<tr>
<td>Eastern Shuttle Net**</td>
<td>7210</td>
<td>7:00 P.M. EST, Mon., Wed., Fri.</td>
</tr>
<tr>
<td>Illinois Slow-Speed Net</td>
<td>3765</td>
<td>8:00 P.M. CST, Mon., Tue., Wed.</td>
</tr>
<tr>
<td>Kansas 'Phone Net*</td>
<td>3290</td>
<td>6:45 P.M. CST, Tue., Thurs.</td>
</tr>
<tr>
<td>Knights of the Kilocycles</td>
<td></td>
<td>7:30 A.M. EST, Sunday</td>
</tr>
<tr>
<td>KYW/KYE (W &amp; E Ky. Slow-Speed)</td>
<td>3600</td>
<td>8:00 P.M. CST, Mon.-Fri.</td>
</tr>
<tr>
<td>Minn. Noontime Net**</td>
<td>3560</td>
<td>12:05 P.M. CST, Mon.-Sat.</td>
</tr>
<tr>
<td>Minn. 'Phone Net**</td>
<td>3590</td>
<td>6:15 P.M. CST, Mon.-Sat.</td>
</tr>
<tr>
<td>Montana State Net</td>
<td>3520</td>
<td>8:30 P.M. CST, Sun., Tue., Thurs.</td>
</tr>
<tr>
<td>North Dakota 75 'Phone Net</td>
<td>3560</td>
<td>3:30 P.M. CST, Sun.</td>
</tr>
<tr>
<td>North Texas E.O. Net</td>
<td>3590</td>
<td>8:00 A.M. CST, Sun.</td>
</tr>
<tr>
<td>Northeast Texas E.O. Net</td>
<td></td>
<td>8:00 A.M. CST, Sun.</td>
</tr>
<tr>
<td>Northern New Jersey Net*</td>
<td>7260</td>
<td>7:00 P.M. EST, Mon.-Sat.</td>
</tr>
<tr>
<td>Northwest Texas E.O. Net</td>
<td>3640</td>
<td>8:00 A.M. CST, Sun.</td>
</tr>
<tr>
<td>Oklahoma Traffic Net</td>
<td>3682</td>
<td>8:00 P.M. CST, Mon.-Fri.</td>
</tr>
<tr>
<td>Oregon Emergency Net (OLD)*</td>
<td>3600/3685</td>
<td>7-9 P.M. PST, Daily</td>
</tr>
<tr>
<td>QMW (Midwest Net)</td>
<td>3615</td>
<td>7:30 P.M. CST, Mon.-Fri.</td>
</tr>
<tr>
<td>Quebec Emergency Net (QEN)</td>
<td>3570</td>
<td>10:30 A.M. EST, Sun.</td>
</tr>
<tr>
<td>Quebec Traffic Net (QFN)</td>
<td>3525</td>
<td>7:00 P.M. EST, Mon.-Fri.</td>
</tr>
<tr>
<td>South Georgia Slow-Speed 'Teen-Age Net</td>
<td>3582</td>
<td>9:00 P.M. EST, Wed.</td>
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<tr>
<td>Tennessee C.W. Net*</td>
<td>3577</td>
<td>7:30 P.M. CST, Mon.-Fri.</td>
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<td>Virginia 'Phone Net</td>
<td>3580</td>
<td>7:30 P.M. EST, Mon.-Fri.</td>
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<tr>
<td>Western Mass. Net</td>
<td>3570</td>
<td>7:00 P.M. EST, Mon., Wed., Fri.</td>
</tr>
<tr>
<td>Wisconsin Slow-Speed Net*</td>
<td>3725</td>
<td>6:00 P.M. CST, Mon.-Fri.</td>
</tr>
</tbody>
</table>

We present WIJE, Hal Larson of Worcester, Mass., one of the more-active traffic men in New England. Hal is the organizer and manager of Swing-Shift Net (7280 kc.), is ORS and OBS, holds 35-w.p.m. Code-Proficiency certificate, is a member of the RCC and OTC, and is active on Western Mass. Traffic Net and Traffic Outlet. The rig at left consists of a VFO hand-switching exciter, two identical 75-watt finals and antenna tuners. Frequency-measuring gear is at the right, and to the left of the receiver are antenna selectors and break-in relays.

**BRASS POUNDERS LEAGUE**

Winners of BPL certificates for December traffic:

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<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Del.</th>
<th>Rel.</th>
<th>Credit</th>
<th>Total</th>
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<td>W7CCY</td>
<td>3866</td>
<td>1752</td>
<td>17</td>
<td>1873</td>
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<tr>
<td>W7IOQ</td>
<td>1010</td>
<td>1030</td>
<td>0</td>
<td>1215</td>
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<tr>
<td>W5CE</td>
<td>8625</td>
<td>1085</td>
<td>28</td>
<td>1124</td>
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<tr>
<td>W6HMM</td>
<td>118</td>
<td>1014</td>
<td>6</td>
<td>1049</td>
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<tr>
<td>W2RUF</td>
<td>2470</td>
<td>890</td>
<td>36</td>
<td>1020</td>
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<tr>
<td>W6FDR</td>
<td>2223</td>
<td>306</td>
<td>220</td>
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<td>W7PRU</td>
<td>353</td>
<td>704</td>
<td>4</td>
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<tr>
<td>W5GZU</td>
<td>48</td>
<td>724</td>
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<td>W6RED</td>
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<td>694</td>
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<td>W7EWC</td>
<td>712</td>
<td>634</td>
<td>10</td>
<td>663</td>
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<tr>
<td>W5LSS</td>
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<td>W4PL</td>
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<td>589</td>
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<td>303</td>
<td>198</td>
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<td>512</td>
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<td>W4TSD</td>
<td>54</td>
<td>22</td>
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<td>W6TQD*</td>
<td>25</td>
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<tr>
<td>K9GDI</td>
<td>235</td>
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<td>306</td>
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The following made the BPL for deliveries:

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<tr>
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<td>W1NJM</td>
<td>137</td>
<td>VESAPS</td>
<td>106</td>
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<tr>
<td>W6DEB</td>
<td>191</td>
<td>W7JU</td>
<td>125</td>
<td>VESATR</td>
<td>103</td>
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<td>W8Y2Z</td>
<td>141</td>
<td>W1BIH</td>
<td>121</td>
<td>W6NH</td>
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<tr>
<td>WSTBN</td>
<td>117</td>
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</tr>
</tbody>
</table>

A message total of 500 or more or 100 "deliveries plus extra delivery credits" will put you in line for a place in the BPL. The Brass Pounders League listing is open to all operators who qualify for this monthly "honor roll."

* November Traffic
IS THIS YOUR CLUB?

By Ol' Joe

[Here's a picture of Ol' Joe's radio club. Read it carefully, and see how your club compares. — Ed.]

Our club meeting starts at 8:00 P.M. (it says in the rules), but it's usually 8:15 P.M., or 8:25 P.M., before a quorum stragglers in. Some of the members are on hand at 6:45 P.M., however, sitting around in an informal bull session.

To start with, we have an ideal set-up for a meeting place, good officers, and there isn't any reason why we shouldn't have good meetings, but we don't.

Our club roster shows 36 members, but we frequently fail to get a quorum, or 12 members. Our meetings are held at regular intervals, and all members are aware of this. When asked why they don't attend, it's usually, "You don't do anything but sit around and chew the rag." Of course, the logical answer to this is, "What would you like to see in our meetings?" The reply is always, "Well—I-, and that ends the subject. They always squawk, but never turn a hand to help.

The president, shortly after election, instituted code and theory classes, both of which petered out in short order because of lack of interest, although some members had howled for the classes. Also along an educational line, we attempted having a technical talk every other meeting, but some of the big-mouths in the club finally overruled those as "uninteresting (to them, anyway) and too frequent." Mindful of this, the president asked the program committee to arrange such talks on a monthly basis, with ARRL movies in between. That plan soon fizzled out, too, because no member was willing to lead discussions on various technical subjects after the first three or four.

The club attempted having a weekly door-prize drawing through donations from members, but it got to the point where certain members were donating all the prizes, while the others sat back and tried to win, without ever donating a thing.

Our club dues have been paid with the same spirit. Most of the members paid in full, but there are a number who paid only part of their dues and, despite any number of suggestions and hints from the treasurer, still attend regularly, expecting full membership. Under the club rules they can be refused a vote on any subject, but until now, the president has not invoked the rule.

Generally speaking, a majority of our members are doing just that—generally speaking. Regardless of who is recognized by the president, and has the floor, a half dozen members are chewing the fat among themselves around the room, paying no attention to the subject at hand. Good manners? They never heard of them!

In short, our club has deteriorated to about this: Approximately seven members take care of all activities, with a dozen or more barnacles hanging around the edges. Our meetings are called to order, occasionally some old business is discussed, possibly an item or two of new business, a motion is made for adjournment, and carried, and that's that. One or two members (who constructed it with parts donated by the half dozen or so good members) drift in to the club's 100-watt transmitter, pound out a couple of QSOs, and we go home.

The solution? Who knows? Our club has been in existence 22 years, with some of the original members still attending. While the field is almost unlimited, very few new members have been added in the past three years, and no member goes out of his way to hunt up new candidates. There is some talk of the "solid" members withdrawing and forming a new club with strict membership requirements, to weed out the deadwood.

Ol' Joe hopes this doesn't describe your club, too. Generally, entries in the CD contest are of a constructive nature. Maybe there are other clubs with similar problems who will read this and see the light and correct their situation. If so, this article has served a constructive purpose.

[Editor's Note: ARRL will be glad to furnish to any club material on organizing a radio club and maintaining interest in club activities. Training Aids, including movies, film strips, slides, tape-operated keying equipment and other material useful in club work are also available to ARRL-affiliated groups. Club secretaries are invited to write the Communications Department for further information.]

BRIEFS

A network for blind amateurs, the White Cane Net, has been organized by WSUDA and W1JQD. The schedule of operations calls for a session each Saturday at 7:00 A.M EST on 7265 kc, with W1JQD acting as NCS. Amateurs interested in joining are invited to get in touch with Dorothy A. Willett, WSUDA, 3513 Fleming Road, Flint, Michigan.
WIAW OPERATING SCHEDULE
(All times given are Eastern Standard Time)

Operating-Visiting Hours:
Monday through Friday: 1100-0600 (next day).
Saturday: 1100-0230 (Sunday).
Sunday: 1600-2200

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

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

Frequencies:
- C.W. : 1555, 7215, 14,100, 28,060, 52,000, 146,000 kc.
- Phone: 3950, 14,280, 29,000, 52,000, 146,000 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the WIAW signal, not for exact calibration purposes.

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

General Operation: Use the chart below for determining times during which WIAW engages in general operation on various frequencies, phone and c.w. Note that since the schedule is organized in EST, certain morning operation periods may fall in the evening of the previous day in western time zones. Mimeographed master schedules showing complete WIAW operation in EST, CST, MST or PST will be made available to any amateur upon request.

WIAW is not open on national holidays. On Saturdays and Sundays during which official ARRL activities are being conducted, WIAW will forego general-contact schedules in favor of participation in the activity concerned (see Activities Calendar).

Code-Proficiency Program: Practice transmissions at 15, 20, 25, 30 and 35 w.p.m. are made on Tuesdays and Thursdays on the above-listed frequencies, starting at 2200, and on Monday, Wednesday and Friday at 9, 12, 18, 25 and 35 w.p.m. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run is scheduled for Thursday, March 16th.

The station staff:
- T. F. McMullen, W1QVF, "fm"
- Richard N. Eidel, W1RUP, "re"
- R. E. Morrison, W3LRK, "Jr"

AMATEUR RADIO AIDS RESCUE MISSION

With the lives of nine airmen downed on a Greenland ice cap depending on the speed of its operations, the Air Rescue Service of the U. S. Army maintained essential voice communication between Washington, D. C., and a Labrador outpost by means of amateur radio in December.

Through K4USA, an amateur station installed at the Pentagon in connection with the activation of the Military Amateur Radio System, officers of the Air Rescue Service were in day-by-day contact with VO6AN at Goose Bay, Labrador, where rescue efforts were being directed. They exchanged information and advice, evaluated the problem in terms of daily weather conditions, and dispatched special equipment flown from widely-separated areas to assist in the rescue.

Rescue officers in Washington stressed the value of the conversational exchange in reaching quick decisions. K4USA was able to contact VO6AN within an hour after a request was made by the Air Rescue Service.

WIAW GENERAL-CONTACT SCHEDULE

W1AW conducts general operation, open for contact with any amateur station, welcoming calls in accordance with the following time-frequency chart.

<table>
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<th>EST</th>
<th>Sunday</th>
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* Starting time is approximate. General-contact period on stated frequency immediately following transmission of Official Bulletin which begins on the hour.

** Operation will be on one of frequencies stated, depending on propagation conditions, expediency and general activity.
GSP is about to successfully complete a code class with twenty members. UNT received his Class A ticket. A five­way QSO was made for 5-Mc. phone was reported between BGP, SWP, BAY, and GBI, who were in the same section. 11000m. The SJA takes traffic honors this month and also handled "GPO" for the winter months. BNP-2 has new antennas for 3.5-Mc. band. RDK reports 118 counties to him. RWH fired up his new 500-watt final, BAY has new rotator for his 50-Mc. beam. WFTJ took his class A exam. URS, our faithful reporter for the Ocean City area, is having plenty of interference trouble and offers the following about his local friends: KUM is supplying me with a new three-element beam with t.v. on top. K5AZ is working plenty of DX with twelve watts and a beam. Traffic: (November) W3NUG 54, (December) W3GEG 210, WPX 181, W2BGI 141, W10Q 103, W0D 98, QYH 87, 07 65, UYT 29, USO 8, BO 8, VYH 3.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, 3K, at 28, has been moved to New Jersey. SCM has been using his new PX-10 on 3.5-Mc. He reports good DX with his new rig. SCM, G. W. (Bill) Willen, SCM, will be found on page 6.

PA, and soon will be looking for the gang from New York. SCM has new YLQ who is working in to NYS regularly. QY has replaced the 813s with a pair of T240s with hopes of reducing harmonics. WUB is operating new hand-ended thing rig with a 610 and a BC-610 on which he made his DX contact. WUB is on 7 Mc. with 20 watts. Tex handles traffic with 5BYG and 5BUZ. SSS gave his last address to please contact him. UYG has weekly schedules with AMX and 3720 kc. at 7 or 8 P.M. for QSOs between BGP, WUB and C. R. (TWO) on f.m. telemetry systems for guided missiles. The Mountain Club of Pennsylvania has a club publication, The ATA News, and from it we learn that a swell Christmas party was held. With the help of the Detroit Amateur Radio Assn. and the Carnegie Tech. Radio Club, the ATA and the Poolecat Net were responsible for the first known inter-city rifle match handled by amateur radio. Let's give a big hand to CEC for the work. YLQ now is chasing DX. He is handling a good volume of traffic. VVC is having good DX on 3.5 Mc. SBG gets out well on 144 Mc. CVO has some nice DX on 3.5 Mc. E6T is just a hop and a jump over. BGP handled arrangements for the Freedom Club Christmas affair which was held in Delanco. The ITTA reports that the station has new antennas for 3.5-Mc. band. RDK reports 118 counties to him. RWH fired up his new 500-watt final, BAY has new rotator for his 50-Mc. beam. WFTJ took his class A exam. URS, our faithful reporter for the Ocean City area, is having plenty of interference trouble and offers the following about his local friends: KUM is supplying me with a new three-element beam with t.v. on top. K5AZ is working plenty of DX with twelve watts and a beam. Traffic: (November) W3NUG 54, (December) W3GEG 210, WPX 181, W2BGI 141, W10Q 103, W0D 98, QYH 87, 07 65, UYT 29, USO 8, BO 8, VYH 3.

NEW JERSEY — SCM, Jerry Mathis, 3K, at 28, has been moved to New Jersey. SCM has been using his new PX-10 on 3.5-Mc. He reports good DX with his new rig. SCM, G. W. (Bill) Willen, SCM, will be found on page 6.

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NEW YORK — SCM, Martin A. Clark, W2QT, 30, has been promoted to SCM. SCM has new YLQ who is working in to NYS regularly. QY has replaced the 813s with a pair of T240s with hopes of reducing harmonics. WUB is operating new hand-ended thing rig with a 610 and a BC-610 on which he made his DX contact. WUB is on 7 Mc. with 20 watts. Tex handles traffic with 5BYG and 5BUZ. SSS gave his last address to please contact him. UYG has weekly schedules with AMX and 3720 kc. at 7 or 8 P.M. for QSOs between BGP, WUB and C. R. (TWO) on f.m. telemetry systems for guided missiles. The Mountain Club of Pennsylvania has a club publication, The ATA News, and from it we learn that a swell Christmas party was held. With the help of the Detroit Amateur Radio Assn. and the Carnegie Tech. Radio Club, the ATA and the Poolecat Net were responsible for the first known inter-city rifle match handled by amateur radio. Let's give a big hand to CEC for the work. YLQ now is chasing DX. He is handling a good volume of traffic. VVC is having good DX on 3.5 Mc. SBG gets out well on 144 Mc. CVO has some nice DX on 3.5 Mc. E6T is just a hop and a jump over. BGP handled arrangements for the Freedom Club Christmas affair which was held in Delanco. The ITTA reports that the station has new antennas for 3.5-Mc. band. RDK reports 118 counties to him. RWH fired up his new 500-watt final, BAY has new rotator for his 50-Mc. beam. WFTJ took his class A exam. URS, our faithful reporter for the Ocean City area, is having plenty of interference trouble and offers the following about his local friends: KUM is supplying me with a new three-element beam with t.v. on top. K5AZ is working plenty of DX with twelve watts and a beam. Traffic: (November) W3NUG 54, (December) W3GEG 210, WPX 181, W2BGI 141, W10Q 103, W0D 98, QYH 87, 07 65, UYT 29, USO 8, BO 8, VYH 3.
Whenever a major rearrangement of the shack has been contemplated, with a new operating table or desk to be installed, or maybe a super-duper custom-built console, the problem has always arisen as to where to locate the microphone jack, transmitter control switches and divers other gimmicks needed for accessible, convenient operation of the rig. The receiving end offered no problem because the essential operating controls were already at the operator's finger tips on the front panel of the receiver.

On the other hand, the transmitter might be almost anywhere and it was usually necessary to run some sort of cable to it from a control panel at the operator's position. On occasion, the control panel would be recessed into the top of the operating table; at other times, it would be screwed to the side of the table or to some other point that seemed convenient.

Experience with various lash-ups of this sort has led to the conclusion that the best place for the transmitter controls would be right at the receiver where an operator could, with a minimum of lost motion, switch the receiver off and the transmitter on or vice versa. Naturally, we don't want to drill a lot of holes in our receiver panels to take these controls, for more reasons than one: First, it would probably pretty well ruin any resale value it might have. Second, it solves only half the problem because the wires still have to be taken out the back. Third, these wires running through the receiver could conceivably upset the alignment or otherwise impair performance. Fourth, it's too messy anyhow! Thus, the tilt base.

Why not mount the receiver two or three inches above the table top on a sort of sub-chassis, the front of which would serve as a panel for the microphone jack, keying jack, transmitter switches and other controls essential to the operation of the station? The wires from these controls could be run under the receiver, out the back, and cabled neatly on to their destination; then we would no longer have leads from the mike and/or key draped all over the operating table. If, in the process of making this base, it is dressed up to match the receiver and tilted back a little so the operator's hand falls into a more natural tuning position and the outside dial scales become easier to read — why, so much the better!

Actually, mounting your later model National receiver on a tilt base of the type designed for it results in a more massive appearing and impressive set-up, as well as operating convenience second to none.

Robert J. Murray, W1FSN
CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — Your section now has 28 counties with active ECs. Contact QLZ, W9KQL, for your EC. UUU, W9RIM, has EC duties. BRX has 55-ft. tower completed and is preparing rotator. NN has 1/4-ke. rig perking at last. OBB is working SWL and DX with a new 28-Mc. beam. TSW is building a 3.85- and 28-Mc. mobile from his Crosley. DE! has new screen modulation. 7MOA now is living in Kankakee. The Illinois Valley Radio Assn. of La Salle and the Wheaton Community Amateurs are providing DXL with an 829B rig for 28-Mc. phone. BPL reports FSN and FVQ are working well with 28-Mc. nets. A new 28-Mc. antenna was completed for the clubhouse. HUE got his three-element 14-Mc. beam. HUV is working with "ETA," a 7-Mc. teen radio shack. DE! got curious about the inside of his mike and now has a new one! LKK is a new man on 3.85-Mc. phone. QIE became the proud father of a son on Christmas Day. We welcome KAY to Chicago, E1VI, and Premax beam and is remodeling shack. The Illinois Council of Amateur Radio Clubs elected UU, prez.; E1VI, vice-pres.; and MRT, secy. and treas. Contact KAY if you have any questions or problems. The new EC for Green Maple, OBE, is working 28-Mc. phone. "Hardluck Francis" is DEL Be got a new electric clock adorns the shack of CIB whose president is DTE. TSF's kw. on 28 Mc, feeds a "dream" beam on a 70-ft. tower. RHJ threatens to go on 3.6 Mc. for DXL. A new CW station on 28 Mc is CRO linked a Colombian ham and his vacationing wife via 28 Mc. A new electric clock adorns the shack of CHH as a result of his top score in the recent Frequency Measuring Test. Our new Director, GPP, is busy getting things lined up. HEE completed new kw. final. RLB and LED are building new electronics. A new 430-Mc. rig is being considered by the club. FCF is active on the C.W. Net. All appointees are reminded to watch the expiration dates on their certificates. Traffic: W9RFK 232, E1IV 214, DND 48, IQW 40, BWG 21, DJV 30, RQM 21, TOA 6, LVR 5, SYT 5, YCV 5, AFT 4, BUZ 4, DKH 3.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Bonsetti, W9GZD — New calls in Grand Forks are OGD and YUL. KAI is on a new 804-Mc. phone from Grand Forks. 7MOA is back on the air. DE! got a new 55-ft. tower completed and is remodeling shack. DEL has a new wire recorder. DEL is on his way to Texas to visit his ailing father. DEL's son has a new trans. and new 28-Mc. beam. EEK is working on a new 28-Mc. beam. EBX has four-element 28-Mc. beam. DOQ reports FSN and FVQ are new calls at Wausau. SYZ has antenna troubles. DXL snagged ZS2G on 54-ft. poles. NDA is busy DXing on 14 Mc. EBX has re­ worked his station, and new 28-Mc. beam. REJ has a new 28-Mc. beam. FLQ is very active with traffic schedules. The Illinois Valley Radio Assn. of La Salle and the Wheaton Community Amateurs are providing DXL with an 829B rig for 28-Mc. phone. A new net has been organized on 3.560 kc: Mon., Wed., and Fri. at 7:30 p.m. LMB, at Bridgewater, is on all bands. BRD reports FSN and FVQ are new calls at Wausau. NYS is back on 7-Mc. c.w. with a local 28 Mc. net being organized for emergency work. "Hardluck Francis" is DEL Be got a new electric clock adorns the shack of CIB whose president is DTE. TSF's kw. on 28 Mc, feeds a "dream" beam on a 70-ft. tower. RHJ threatens to go on 3.6 Mc. for DXL. A new CW station on 28 Mc is CRO linked a Colombian ham and his vacationing wife via 28 Mc. A new electric clock adorns the shack of CHH as a result of his top score in the recent Frequency Measuring Test. Our new Director, GPP, is busy getting things lined up. HEE completed new kw. final. RLB and LED are building new electronics. A new 430-Mc. rig is being considered by the club. FCF is active on the C.W. Net. All appointees are reminded to watch the expiration dates on their certificates. Traffic: W9RFK 232, E1IV 214, DND 48, IQW 40, BWG 21, DJV 30, RQM 21, TOA 6, LVR 5, SYT 5, YCV 5, AFT 4, BUZ 4, DKH 3.

WISCONSIN — SCM, Walter G. Haaschamp, W9CBW — EX-9AMK is now is ANQ in Chester, HAM of St. Paul, IMW of La Crosse, W9, and DWA of Minneapolis are all new in Wisconsin. TPN got his three-element 14-Mc. beam going. A new net has been organized on 3.560 kc: Mon., Wed., and Fri. at 7:30 p.m. LMB, at Bridgewater, is on all bands. BRD reports FSN and FVQ are new calls at Wausau. NYS is back on 7-Mc. c.w. with a local 28 Mc. net being organized for emergency work. "Hardluck Francis" is DEL Be got a new electric clock adorns the shack of CIB whose president is DTE. TSF's kw. on 28 Mc, feeds a "dream" beam on a 70-ft. tower. RHJ threatens to go on 3.6 Mc. for DXL. A new CW station on 28 Mc is CRO linked a Colombian ham and his vacationing wife via 28 Mc. A new electric clock adorns the shack of CHH as a result of his top score in the recent Frequency Measuring Test. Our new Director, GPP, is busy getting things lined up. HEE completed new kw. final. RLB and LED are building new electronics. A new 430-Mc. rig is being considered by the club. FCF is active on the C.W. Net. All appointees are reminded to watch the expiration dates on their certificates. Traffic: W9RFK 232, E1IV 214, DND 48, IQW 40, BWG 21, DJV 30, RQM 21, TOA 6, LVR 5, SYT 5, YCV 5, AFT 4, BUZ 4, DKH 3.
EVERY ORDER IS RUSH AT PR!

Jobbers and quantity buyers of crystals are enthusiastic about prompt PR delivery. By most standards our regular service will meet or beat so-called “Rush” orders. Actually EVERY order is “Rush” at PR. We know your problems. We know you want your crystal supplies as quickly as possible... and we are in business to meet your needs... not weeks from now... but NOW!

10 METERS, Type Z-5, $5.00 • 20 METERS, Type Z-3, $3.75 • 40 & 80 METERS, Type Z-2, $2.75

PRECISION CRYSTALS
USE “PR” and KNOW where You Are!

PETERSEN RADIO COMPANY, INC., 2800 W. BROADWAY, COUNCIL BLUFFS, IOWA
Subject them to the toughest service, and JOHNSON's new Type L Variables "come up"—smiling—continue to maintain capacities and deliver peak performance!

Thanks go to JOHNSON'S use of perfected ceramic soldering which by eliminating the need for eyelets, nuts and screws, also eliminates possibility of stator wobble & fluctuations in capacities.

There is nothing to work loose! Available for all types of communications equipment having tuned circuits operating as high as several hundred mc., JOHNSON'S new Type L Variables come in .030" and .080" airspacing.

**SINGLE TYPE** — Available in six models: 2.8 to 11 mmf; 3.5 to 27 mmf; 4.6 to 51 mmf; 5.7 to 75 mmf; 6.8 to 99 mmf; 11.6 to 202 mmf.

**DIFFERENTIAL TYPE** — Available in three models: 2.8 to 10.5 mmf; 3.5 to 27 mmf; 4.6 to 51 mmf.

**BUTTERFLY TYPE** — Available in three models: 2.8 to 10.5 mmf; 4.3 to 26 mmf; 6.5 to 51 mmf.

Other capacities and spacings available on special order.

Write today for your copy of the new JOHNSON Type L Variable Catalog.
Like other leading amateurs Ed Hays\(^{+}\), W6SA and Dave Evans\(^{+}\), W6SZY are long time users of Eimac tubes. Ed and Dave have several important things in common. They share the same shack, antenna arrays, and in the final stage of their respective rigs are Eimac 4-250A tetrodes. These Eimac tetrodes were chosen because of their high power-gain, input-output circuit isolation, and ease of drive.

Whatever your power aspirations, for CW or phone, there is an Eimac tube to do the job . . . and do it better. Write direct for complete descriptive data.

*13th International ARRL DX Competition W6SZY 1st in Section CW
13th International ARRL DX Competition W6SA 1st in Section Phone
14th International ARRL DX Competition W6SZY 1st in Section CW
14th International ARRL DX Competition W6SA 1st in Section Phone*
EVERYTHING YOU WANT IN "STABILIZED" CRYSTALS

High quality—quick delivery—modest cost! All three are yours when you use James Knights Co. "Stabilized" crystals.

Whether you wish standard crystals, or crystals built to your exact specifications, The James Knights Co. is equipped to supply you promptly. A special production system is maintained to effect greater savings for you on short run jobs. The James Knights Co. fabricates a complete line of "Stabilized" crystals to meet every need—precision made by the most modern methods and equipment.

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New James Knights Co. Catalog On Request

A COMMUNICATIONS COMPANY needed precision low frequency crystals to synchronize their facsimile system. The James Knights Co. made the crystals, installed them in ovens, and delivered them promptly.

MICHIGAN—SCM, Joseph R. Beljani, WBCW—SEC; GJH, RMs: GSJ, NOH, PBV, and UKV. Amateur radio was the connecting link in a novel pistol match held Dec. 16th between Southeastern Michigan sharpshooters and the best in the Pittsburgh area. The Michigan team fired in Detroit while the Pittsburgh team fired at Pittsburgh. Throughout the match contestants accuracy transmitted both ways so that all team members knew exactly how they compared with their competitors in the other city. Congratulations for a job well down by the Detroit end, and to SNIK, at Pittsburgh. ZKZ has been appointed OBS. Section Net Certificates have been issued to UCR and BXX. The Detroit Amateur Radio Society selected SCW, pres.; BXX, vice-pres.; FX, financial secy.; and URM, recording secy. The Lake Superior Radio Club has applied for a license with the ARRL. The Adrian Amateur Radio Club's E0 program is progressing nicely. PZO is now Class A. EPN is building a quad antenna. YDE is building a quad with director and reflector. GN is building a new handswitching exciter. Ex-CNQ now signs 4CNQ from Montgomery, Ala. QG5 is rebuilding for 800 watt d.c. output by 4-12,5. ZGR is b.f.m. with an Ht-18. BXK moved to Battle Creek, t YGE is California-bound. ND has a new Bud VFO. DAW is back on the air with a BC-610 plus a Collins 29V-1. WPK is on request 28 Mc. Converted SCR-522. Congrat to DCN on the jr. operator's arrival. SBI is enjoying fine results with his mobile rig. CJ is enjoying the area. AMH now has a new HRO-5. DIZ proudly twits dials on his new 75A-1. BYV and YMO now have Collins 310-0-1a. RX is being made in an old test cabinet. MDH has a new ASCR-33. QLZ has a new ASCR-1. TBP is QRL converting an ART-13 and is planning a little "phone operation. BYB and VDF have ASCR-2s. RX is being built. QK is just getting into QSL. NOH is now settled in his new apartment and is back on QMN taking charge of the 6 p.m. Net, TNO is busy, and plans to expand his station. TBP has a new Mixer-Tube. CHO is proud of his Collins 32V-1. AIA has a signal Shifter pushing a S13. CCC has a new four-element 28-Mc. beam antenna. They are interested in a Contest 4-10-15 conjunctions. QKJ is working now that he has his new car. TRN is high traffic man for the month and makes BPL on deliveries. Traffic: WSTRN 406, WJQ 405, JQW 314, UKV 114, RJL 107, WXX 87, HNR 55, OJS 54, AQA 36, UES 28, ZKZ 26, DPE 25, BYV 20, JUC 20, VMM 15, ACW 13, FX 11, BXX 10, NOH 9, EBC 9, YCF 9, DFE 7, ABE 7, HUE 7, BUM 6, and more.

OHIO—SCM, Dr. Harold E. Stricker, W8WZ—SEC; UBP, RBC, RN, FAM; PGM. Congratulations to DAE, RN, and WRN for sending in reports every month during 1948. Quite a few others missed only one or two months. So let's see how many will hit 100 per cent this year. We are very happy that the South East Amateur Radio Club of Cleveland, Ohio, has applied for affiliation with ARRL. The Adrian Amateur Radio Club's E0 program is progressing nicely. PZO is now Class A. EPN is building a quad antenna. YDE is planning a quad with director and reflector. GN is building a new handswitching exciter. Ex-CNQ now signs 4CNQ from Montgomery, Ala. QG5 is rebuilding for 800 watt d.c. output by 4-12,5. ZGR is b.f.m. with an Ht-18. BXK moved to Battle Creek, YGE is California-bound. ND has a new Bud VFO. DAW is back on the air with a BC-610 plus a Collins 29V-1. WPK is on request 28 Mc. Converted SCR-522. Congrat to DCN on the jr. operator's arrival. SBI is enjoying fine results with his mobile rig. CJ is enjoying the area. AMH now has a new HRO-5. DIZ proudly twits dials on his new 75A-1. BYV and YMO now have Collins 310-0-1a. RX is being made in an old test cabinet. MDH has a new ASCR-33. QLZ has a new ASCR-1. TBP is QRL converting an ART-13 and is planning a little "phone operation. BYB and VDF have ASCR-2s. RX is being built. QK is just getting into QSL. NOH is now settled in his new apartment and is back on QMN taking charge of the 6 p.m. Net, TNO is busy, and plans to expand his station. TBP has a new Mixer-Tube. CHO is proud of his Collins 32V-1. AIA has a signal Shifter pushing a S13. CCC has a new four-element 28-Mc. beam antenna. They are interested in a Contest 4-10-15 conjunctions. QKJ is working now that he has his new car. TRN is high traffic man for the month and makes BPL on deliveries. Traffic: WSTRN 406, WJQ 405, JQW 314, UKV 114, RJL 107, WXX 87, HNR 55, OJS 54, AQA 36, UES 28, ZKZ 26, DPE 25, BYV 20, JUC 20, VMM 15, ACW 13, FX 11, BXX 10, NOH 9, EBC 9, YCF 9, DFE 7, ABE 7, HUE 7, BUM 6, and more.

New James Knights Co. Catalog On Request

A COMMUNICATIONS COMPANY needed precision low frequency crystals to synchronize their facsimile system. The James Knights Co. made the crystals, installed them in ovens, and delivered them promptly.
TWO new Hypex* Projectors—designed for 360-degree sound dispersal—are now available. With sound distributed horizontally in all directions, these new models are intended for installations where coverage of relatively large areas and suspension from the ceiling are desired. Like all Hypex Projectors, these radial units incorporate the famous Hypex formula which results in improved acoustic performance.

By the addition of the two radials to the four previously announced Hypex units illustrated below, the Hypex line now includes a model for every “sound” need, indoors or outdoors.
The two conductors are in opposite walls of a polyethylene tube—surface moisture, snow or ice are held outside the dielectric field resulting in extremely low losses—dielectric between conductors is largely air.

Nominal Characteristics of 14-076 Twin-Lead

<table>
<thead>
<tr>
<th>Size</th>
<th>300 mc-6.1</th>
<th>70 Mc-2.1</th>
<th>60 mc-1.6</th>
<th>30 mc-1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Size</td>
<td>7/16&quot;</td>
<td></td>
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</tr>
</tbody>
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Tubular construction permits great strength with lightweight. Conductors are 7 strands No. 28 copper wire adequate to handle a kilowatt of power with low losses and ideal for FM or TV equipment.

Designed as an outside transmission line, Amphenol's 14-076 also proves to be a superior lead-in for either FM or TV. This new weatherproof tubular line is a Type TWIN-LEAD for best performance.

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has "V" beam under construction. Old SQA is now AL. YFJ has new Boomerang. CBI has moved the rig to his old revamped station area. LBR has new 14-Mc., two-element rotary beam and new VFO. JFC finally got his 28-Mc. beam up in the air, and in two weeks worked eight new countries on 29-Mc. phone. BAF and 20XK have 99 and 97 countries respectively on "phone. Visitors this month were UPB, TKS, PNY, YBF, WZK, and WYH. Thanks to all of you for your support.

Weatherproof 300 OHM Tubular TRANSMITTING TWIN-LEAD or TV LEAD-IN

ZKJ is doing an FB job and with mobile unit QW provided a link to the AEC group and with mobile unit QW provided a link to the R.A.F. This month was a quiet one for SQA. Old SQA is now AL. YFJ has new Boomerang. CBI has moved the rig to his old revamped station area. LBR has new 14-Mc., two-element rotary beam and new VFO. JFC finally got his 28-Mc. beam up in the air, and in two weeks worked eight new countries on 29-Mc. phone. BAF and 20XK have 99 and 97 countries respectively on "phone. Visitors this month were UPB, TKS, PNY, YBF, WZK, and WYH. Thanks to all of you for your support.

EASTERN NEW YORK—SCM, Fred Skinner, W2EQD—Very little news was received this month. About how some mail, gang? The slow speed section of NYS Net is a small place for most traffic-handling. GL in Tarrytown-sended QSL to NCS for the regular section of NYS Net, QDM is back from California where he was 6E1Z. TYQ averaged over four hours for the air for the year. Can't believe that? IXX's QSL appointment was endorsed for another year. He is trying to make infra-red wavelengths practical for the amateur bands. The last New York bulletin appeared in VHF Engineering News.

The PATENT PENDING Twin-Lead is a new lead-in for either FM or TV. The Twin-Lead is a weatherproof, tubular line for best performance. Specify this new weatherproof line for best performance.

14-076 Twin-Lead

- Nominal Impedance: 300 ohms
- Velocity of Propagation: 79%
- Attenuation db/100 feet:
  - 30 mc: -0.5
  - 60 mc: -1.0
  - 100 mc: -2.1
  - 200 mc: -3.3
  - 400 mc: -6.1

Tubular construction permits great strength with lightweight. Conductors are 7 strands No. 28 copper wire adequate to handle a kilowatt of power with low losses and ideal for FM or TV equipment.

Designed as an outside transmission line, Amphenol's 14-076 also proves to be a superior lead-in for either FM or TV. This new weatherproof tubular line is a Type TWIN-LEAD for best performance.

Actual Size: 7/16"
SWITCHING TRANSFORMER HIGH-VOLTAGE TAPS

Because of the high-voltage insulation of the Ohmite T-503 Switch, this unit may be used to switch the high-voltage taps on power transformers. CAUTION! In this application, we recommend that the shafts of the switches be connected to ground for protection of the operator. The switch should be moved only when the power to the transformer has been disconnected.

HOW TO CONTROL TUBE FILAMENT VOLTAGE

Have you ever measured the filament voltage of your final amplifier tubes? Tube manufacturers state that a filament voltage above the specified voltage reduces the life of a tube. Ohmite rheostats provide the ideal control for filaments. We recommend that the rheostat control the primary of the filament transformer to avoid upsetting any balanced secondary circuits.

The resistance and power rating of the rheostat may be calculated as follows: Suppose that the transformer is designed to furnish a secondary voltage of 7.5 volts at 10 amperes when the primary is connected to a 115-volt line. The actual line voltage, however, may prove to be 120 volts. What, then, are the specifications for a primary rheostat of correct operation?

The calculations are made as follows:

- Voltage drop in rheostat = Line voltage minus primary voltage
- Approx. primary current (assuming 100% eff.) = Sec. volts × Sec. current / Primary voltage

Using Ohm’s Law, we find that to produce 5 volts drop at 0.653 amperes requires 7.65 ohms.

Now, turning to the Ohmite catalog, we note that a stock rheostat of 8 ohms and 1.77 amperes is made. This rheostat would be suitable, but to obtain a little greater control, the 10-ohm, 25-watt rheostat (No. 0145), rated at 1.58 amperes maximum, would be the best choice. Ohmite rheostats are available at most radio parts distributors. Note that if your filament voltage is low, a rheostat will not raise it for you. Other means must be used to increase filament voltage, such as using an auto-transformer or variable output transformer.

While on the subject of filaments ... remember that Ohmite makes filament center tapped resistors for all common filament voltages. These resistors can be obtained at most radio parts distributors.

Write for Bulletin 137 "Ohmite Ham Hints"

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RHEOSTATS • RESISTORS • TAP SWITCHES
MATCHING EASE AND RADIATION EFFICIENCY NEVER SURPASSED

Amateurs seeking peak efficiency will be taking a long step toward their goal by using the amazingly efficient JOHNSON "Q" antenna.

This system almost invariably results in a substantial increase in radiated power. JOHNSON "Q"s' are available for 2, 6, 10, 20 and 40 meters. The 2Q and 6Q use aluminum tubing for the radiating portion as well as for the matching section.

A special application of the "Q" system, applications include half-wave doublet, either horizontal or vertical, harmonic or "longwave" radiator reflector, radiator director, "W" beam, JOHNSON "Q" beam and others. "Q" beam consists of two half-wave "Q" antennas spaced 1.8 wave.

In ordering the beam, specify two "Q" antennas for the lower frequency of the two bands desired. For example, if you want a "Q" beam to operate on 10 and 20 meters order two JOHNSON "Q"s' for 20 meters.

Antennas include all necessary aluminum tubing, suspension assemblies, spacing bars, hardware and detailed instructions.

Advantages of "Q" System
1. Much greater radiation than obtained with ordinary non-matched power.
3. Permits use of open wire line resulting in lowest possible transmission line losses.
4. No standing waves, practically zero line radiation.
5. No critical feed line lengths.
6. Permanent low-loss construction. Insulation will not weather or deteriorate.
7. Easily installed and adjusted—complete data supplied.
8. May be used with any antenna having a radiation resistance of 37 to 122 ohms and transmission line of 400 to 600 ohms impedance.

Order from your dealer or write for brochure entitled "The JOHNSON "Q" In Popular Antenna Applications."
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- You listen to the CENTURY... and you're amazed! You never expect such voice quality, such performance, for so little cost. And when you go "on the air" with this miracle mike, you know you are clearly reproducing your exact voice... putting your own personality on the carrier. • Available in high level crystal, carbon, dynamic types, with or without switch. Has advanced E-V features. List prices start as low as $8.25 for the Carbon, $10.00 for the Crystal and $16.50 for the Dynamic.

Special Model 916 Combination Century Crystal Mike and matching Desk Stand (shown at right) lists at only $12.50.

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Fits in the hand easily, comfortably

DESK MOUNT
Mounts on Model 415 Reclining Desk Stand

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Electro-Voice

E-V Pat. Pend.
Licensed under Brush Patents
The first plated amateur crystals.

Types AX2 and AX3

Drift less than .0002%/°C.

Precision calibrated.

Peak performance.

For the best results

813s to the tune of 1 kw. A 3.85-Mc. converter has been constructed for the mobile unit. Appointments are O27, and CKS as O26 and IAC as OBS. QNX added a beam rotator to his gear. Traffic: W1JQG 192, JSR 135, QXO 135, YSM 61, CKE 59, JOE 40, OUD 41, K1Q 38, HH 36, QON 34, WAP 26, ICD 3, IAC 3, OWL 2, NPB 2.

NEBRASKA — SCM, William T. Gemmer, W9RKQ— During the recent severe storms Nebraska c.w. and 'phone nets were in operation. Cooperation between both nets was excellent and much traffic was speedily transmitted to its destination. JED is new OBS appointee. HSO is exhibiting a new ORS Certificate. DMY has rebuilt to his rig.

Types AX2 and AX3

Drift less than .0002%/°C.

Precision calibrated.

Peak performance.

Use the right combination

C00-2A

Packaged crystal control for 2-6-10-11 meters.

Efficient VHF performance with proven design.

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Crystal controlled oscillators

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- **PS-30** — 30,000 VDC; 1 Ma.; 
  dimen. 7\" x 7\" x 7\"
- **PS-10** — 10,000 VDC; 2 Ma.; 
  dimen. 3\(\frac{3}{4}\)\" x 4\(\frac{3}{4}\)\" x 8\"
- **PS-5** — 5000 VDC; 5 Ma.; 
  dimen. 3\(\frac{3}{4}\)\" x 4\(\frac{3}{4}\)\" x 6\"
- **PS-2** — 2400 VDC; 5 Ma.; 
  dimen. 3\(\frac{3}{4}\)\" x 3\(\frac{3}{4}\)\" x 5\(\frac{3}{4}\)"
- **PS-1** — High Voltage — Capacitor load; 
  dimen. 3\(\frac{3}{4}\)\" x 3\(\frac{3}{4}\)\" x 5\(\frac{3}{4}\)"

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The “Monoplex” is far superior to other crystal microphones. It employs the same type of acoustic phase-shifting network used in the Shure ‘Unidyne’ Broadcast Dynamic Microphones, and TV as ORS: LQQ and OM as OQ. LMJ as OBS. AKY’s brother in Sweden has a new call, SMAPP, and is on 7 Mc. Ed says he has worked 49 SMs. WR gave a talk on transmitter troubles at the South Shore Amateur Radio Club and DDO also gave a talk, on January 28. TAY and JEL spoke on n.f.m. techniques at the Eastern Mass. ARA. Meetings are held the 3rd Wed. at the Cambridge YMCA in Central Square. The 3rd Radio Club, meeting at BVL’s, RCQ/2 has moved to Lockport, N. Y. The Brockton Amateur Radio Club had a film on Westinghouse r.f. heating. COU has first平衡 Pearl II Club certificate, all on n.f.m. PZG has moved to New York City. 3NYN and his XYL were in Medford for Christmas. NF is moving into new home again. MCR had seven on his Dorchester Emergency Net the last Sunday of the month. He has a schedule on 7 Mc with 256T, Syracuser, N. Y., formerly MCT. OBZ has been appointed senior emergency radio operator at the local Naval Reserve Armory, Mantonuk Road, Brockton. The South Shore Amateur Radio Club is giving certificates to all those who work ten or more members of the Club (W.S.R.). This site Dec. 1st at 6 a.m. Send your logs to PXH. AWA has an emergency set-up with two portable a.e. generators and plenty of gear for 144, 28, and 3.5 Mc. ORS has enough cards for UXCC and GER, but needs Alabama for WAS, QOI, QFO, and CTR are playing chess on 144 Mc. KLC and KLO are on 144 Mc. HDJ has quad detections. The West, Mass. Em. Emerge to get one working. was sick lady in South America through a ham in Miami and others on 28 Mc. QJF, in Maiden, is on 144 Mc. HIJ and LUV send in the news of the formation of a new radio club in the Quannapowitt Radio Assn. Officers are: (IAG, pres.; DF5, vice-pres.; LLV, secy.; IN, treas. Meetings will be held at the Greenwood House House the 2nd Fri. of each month. All hams are welcome. HH, will be on 220 Mc. AGX is on 6 bands from 220 to 3.5 Mc. The Hi-Q Radio Club now holds meetings the 2nd Fri. meeting. The Club has a net each night at 29 Mc at 7:45 P.M. HH, ALB, and KAE have new VFO’s using Clapp Oscillator, HY has a l.v. receiver, CMM is on 144 Mc. CHB and RN is on 28 Mc. NVB worked two Jins and Kwajalein on 28 Mc. OMM worked a 28 Mc. V.V. QFO has a new VFO, and has Class A license and is on ESN. LAU says that PZG will be on 3.5 and 144 Mc. LAMU will have 274-N RX for 3.5 Mc. ORS is going to build a new rig with a pair of 304THS. A lot of the boys have worked ZC2PM (W2AL5). DMS has p.p. 807a VFO and crystal on 7 and 28 Mc. MDU is building QJQ portable transmitter. CW is going to build a new meter from Santa. QNJ has 7-Mc. WAC. Traffic: (Nov.) WJLDP 13, HS 11, MQJ 4. (Dec.) WJUB 23, JCK 168, TY 104, EMG 100, AQQ 40, DNQ 11, OXY 8, QJB 14, PU 14, MDU 11, HDU 10, OMJ 8, JYU 6, WOQ 4.

WESTERN MASSACHUSETTS—SCM, Prentiss M. Bailey, WAZW—RM: BVR, SEC; UD, PAM: NY. Many thanks for the fine job during the recent near-flood disaster. The West, Mass. Em. Emerge to get one working was opened by BVR at 3 P.M. Dec. 31st and it continued to function until midnight. The ‘phone net and local emergency nets were called into action and performed with precision. BS and GZ leads the traffic with a very fine total. NES is NCS of SNM on Wednesdays. AMI can QSP to New Hampshire and also a very busy net on 144 Mc. BWB is busy on 28 Mc. NVB worked two Jins and Kwajalein on 28 Mc. ORS worked a 28 Mc. V.V. QFO has a new VFO, and has Class A license and is on ESN. LAU says that PZG will be on 3.5 and 144 Mc. LAMU will have 274-N RX for 3.5 Mc. ORS is going to build a new rig with a pair of 304THS. A lot of the boys have worked ZC2PM (W2AL5). DMS has p.p. 807a VFO and crystal on 7 and 28 Mc. MDU is building QJQ portable transmitter. CW is going to build a new meter from Santa. QNJ has 7-Mc. WAC. Traffic: (Nov.) WJLDP 13, HS 11, MQJ 4. (Dec.) WJUB 23, JCK 168, TY 104, EMG 100, AQQ 40, DNQ 11, OXY 8, QJB 14, PU 14, MDU 11, HDU 10, OMJ 8, JYU 6, WOQ 4.

NEW HAMPSHIRE—SCM, Gilman K. Crowell, W1AOQ—QKQ graduated from Massachusetts Radio School and is awaiting a license. SMM is rebuilding and will be ready for the DX Contest. GTY, LSN, and IF will be found nightly on 28-Mc. ‘Phone, EWF has a new Collins 310-B with a 4-269A. In the final, the KSO has a new rig on 28 Mc. QIZ is employed at WKNE. BWR is active from Saddleback Mountain. GMF is letting hunting interfere with his radio, GMY is active on the New
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Coarse, dark coating—designed to the known scientific principle that a rough, dark surface dissipates more heat, more rapidly, than a smooth, shiny surface.

Low-temperature processing—prevents injury to the element and loss of temper in brackets and terminals.

Handles full rated power—in all standard ranges; no derating necessary at high ranges.

Special corrosion-resisting cement—pioneered by IRC, is free of salts and chemically active ingredients which attack resistance wire.

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When you need power resistors for your rig, be sure to order IRC PWW's...the same precision-made resistors specified by radio and electronic engineers. International Resistance Co., 401 N. Broad Street, Philadelphia 8, Pa. In Canada: International Resistance Company, Ltd., Toronto, Licensee.

Hampshire Net, CRW is now manager of NYT. NAI is now 9CEF. QCY and PRT were home from college over the holidays. OMY has a portable rig on 28 Mc. QEB's new QTH is Nagasaki, N. QH, CXZ, and APK have departed our ranks in favor of t.v. QCZ and QHI are now attending radio school. NMB is now secretary of the Natasha Mike and Key Club. REZ is a new ham in Concord. New officers of the Concord Braeponders are: JNC, president; JH, vice-president. PFU, secy-treas. FN gave the local boys a deer supper which was enjoyed by all. Congratulation to AVL on a new tr. operator. Traffic: WICRW 579, QVY 32, BWR 86, MMM 33, FPU 24, EFW 23, GMM 20, ANS 14, AAQ 4.

RIDGE ISLAND—SCM, Roy B. Fuller, W7CHJ—The previously reported Newport Emergency Net has added another feature, code practice after the sign-off by ROF. For those interested, the frequency is 28,685 kc. on Thursdays at about 9:30 P.M. The holidays apparently affected activities for reports were few and far between this month. NAAHO held a Christmas party for its members, XYLs, and friends with an exchange of presents, dancing, and a buffet lunch. The evening, The Rhode Island Net (3540 kc.) is sorely in need of contacts with all parts of the State. RM BTV is bearing the brunt of incoming traffic with few outbound messages on the telephone. New hams are cordially invited to get into this interesting phase of amateur radio. Net activity will improve your operating ability. For further information contact the RM BTV or your SCM.

VERMONT—SCM, Burlis W. Dean, WINLO—CUN is building a sixteen-element beam for 144 Mc. MEF is converting BC-783 for 420 Mc. BLC has new final with p.p. 526a. W7HAZ and TJ visited NLO recently. FN and TF visited Atlantic City on Sunday. W7CD is the lucky one to get a deer this last fall. AAK, AHN, BYC, EIL, EMQ, BWF, GNF, GTY, HEV, JNC, RPK, and SP gathered at FN's home Dec. 13th to swap tall tales and partake of a venison dinner cooked by FN's better half, Edith. Members of the BARC have been doing some interior decorating on the club headquarters. They constructed an operating table, installed three-element plume's better for 28-Mc. phone and have applied to FCC for a club station call. W7CD has quit WVM and has moved to W7WY. VMV is experimenting with two tr. 70-Mc. phone and has moved to W7M. Traffic: (Nov.) W1PSD 120, RZV 24, (Nov) W1PSD 67, BIP 27, IP 19, RLN 17, AVP 15, AFA 14, QVS 4.

NORTHWESTERN DIVISION

IDAHO—SCM, Alan K. Ross, W7TIU—Reports were rather slim this month. Montana: More activity in November. W7PA visited me at WU and we had a FB talk. They are on 7 Mc. A nice letter was received from MAB, assistant chemical professor at the University. He has been more than ready to lend a helping hand. Especially did the new-comers find this true as he was never too busy to give an hand. Besides the fun rated power-in 75A-1 receiver is getting a good workout on the FARM Net. Fellows, we must have more AEC members in Idaho. I ask the amateur in the more remote areas to write me for a copy of the ARL's Emergency Communications Manual and Idaho's plan. We MUST obligate ourselves to emergency preparedness. The Boy Scout's motto, "Be Prepared," might well be our own, too. Let's hit this thing hard and possess a rig capable of operating away from commercial power. Traffic: W7DMZ 72, EMT 24, MTN 18, MAS 5, W7JU 3.

MONTANA—SCM, Fred Tintlinger, W7EGN—The Livingston gang is preparing emergency gear for portability and mobile use on all bands from 3.85 to 28 Mc. KVU has worked 42 countries since the war on 3.5 Mc. The Southern Montana Amateur Radio Assn. of Billings sponsored an "XYL" Party with an evening of entertainment followed by a buffet lunch. More than 50 guests attended and Mrs. Leslie Creutzer and Lloyd Hagaman won prizes in a "get acquainted" contest. HU is temporarily with the GAA at Lewistown. EYX has broken years of silence by appearing on 3520 kc., the Montana State Net, are: 7FL, 7JC, and ex-Montana hams, 6EBG, ex-7AOD, 6SYX, ex-7EGM, and 7BVE. Ex-Montana hams that have dropped in on 3.85, are: 7AU, 7FL, 7JC, 7H, 7K, 7R, 7W, 7YI, 6ES, 6EL, 6FR, 6LF, 6LF, 6NJ, 6VD, 6Z, and 75Q. HBM has new FB c.w. break-in system. KL7KB, ex-7KHH. The Butte Amateur Radio Club held a "Aquainted" contest, HU LTJ, EMQ, EWF, GNF, G'LY, HEV, JNC, RPK, and Les Blewett. 4JDL, ex-7BVE. Ex-Montana hams that have dropped in on 3.5-Mc. c.w. HBM has new FB c.w. break-in system. KL7KB, ex-7KHH. The Butte Amateur Radio Club held a Christmas party for its members, XYLs, and friends with an exchange of presents, dancing, and a buffet lunch. The evening, The Montana Amateur Radio Assn. of Billings sponsored an operating table, installed three-element plume's better for 28-Mc. phone and have applied to FCC for a club station call. W7CD has quit WVM and has moved to W7WY. VMV is experimenting with two tr. 70-Mc. phone and has moved to W7M. Traffic: (Nov.) W1PSD 120, RZV 24, (Nov) W1PSD 67, BIP 27, IP 19, RLN 17, AVP 15, AFA 14, QVS 4.

OREGON—SCM, Raleigh A. Munkers, W7HAZ—The entire Northwest mourns the death of Jay Gould, W7KIU/W7JA. Since suffering a stroke some time ago, Jay probably has been the most active amateur in the Northwest on 3.85 and 14 Mc. Consistently active on the Idaho Net and on 14 Mc. Jay was always more than ready to give a helping hand. Especially did the new-comers find this true as he was never too busy to give a boost to the younger hams. The report from RGH, at Redmond, was the only report... (Continued on page 84)
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received this month so I'm going to leave it up to you fellows and what wish to do about this column. I plan to keep doing this column once a month (by the sixth, please). Traffic: W2HYD 8,

WASHINGTON — SCM Clifford Cavanaugh, WA7CF — RM: C7Z, SEC: GP, PAM: C7K, DGN says antennas and mixing Christmas cheer for the boys doesn't work at the same time. EAU lost another antenna mast in the big wind. That makes three mast parts. 2Y, an old-timer, is getting back in harness again on 7 Mc. Both ZU and APS are out for the No. 1 BPT Certificate.

He reports 2H0Q from New York dropped in New Year's Day to pick up a QSL card that Larry had forgotten to mail, and, as Larry was a big man he didn't bother the L. He sent his A2A away so he has no more worries except as to how to get news for his bulletin from WBNET members. 10Q sends in a very FB report. Most of his schedules are around ease and he does a lot of folks a lot of good. RAO is out hunting for paper for VUON Bulletins. LEC has finally gotten that roaming 500 watt FMX Phase Modulator into a car to work the Valley radio and it looks like a real power plant for the emergency "that couldn't happen here," KHL has been plagued with late shift work at the Post Off­

ice. RVQ is having trouble keeping the phone out of the land line. We hear that DDR, at Colfax, broadcasts CQ all over town via the Congregational Church chimes system. HGC is building new CWN antenna using 407 to use on WSN, MYO and MVR are now hams at Bel­

luminum, KCM sends in a nice traffic report and says her OM, EEC, is building VDQ an excellent job of handling OM lots of competition in the traffic-handling department. ETO says his signal is frozen up and that is the reason for the slughed schedule. EWD is doing a fine job with his appointment. MCM and LVB are doing a good job of handling traffic between the two nets. We hear that

EC7 is getting his chickens all ready for a return to the air soon — hold onto your chains, gang. Traffic: W7CZY 1875, IOQ 125, EWC 650, E15 283, KCU 251, MCM 128, LEC 91, FI5 85, EWD 63, AMZ 49. ETO 41, KWR 23, LVB 23, ACF 17, EUA 17, EVW 14, DGN 11, OWN 1, HGO 1.

PACIFIC DIVISION

SANTA CLARA VALLEY — SCM, Roy E. Pinkham,

W6GEP— Asst. SCM, Geoffrey Almy, TBK, RM: CH3,

EC3, TPZ, ZPZ, LSC has been in the hospital for the past month. Jack had an operation on his back. He is up and around and on the 28-Mc. band now. ZU is using HT­

810 YTO and it looks like he has that gadget working right. The 114-Mc. Net of San Mateo County is going full blast now with about fifty stations planned in near future. VHE is hard drinking for paper for his bulletin from WSNET members. IOQ sends in a very FB report. Mostof his schedules are overseas and he does a lot of folks a lot of good. RAO is out hunting for paper for VUON Bulletins. LEC has finally gotten that roaming 500 watt FMX Phase Modulator into a car to work the Valley radio and it looks like a real power plant for the emergency "that couldn't happen here," KHL has been plagued with late shift work at the Post Off­

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Terminal group TR-20A consists of: 1. Bell model 2122 high fidelity radio-phonograph amplifier. 10 watts output, 15 watts peak, with bass and treble controls set for flat response, frequency range is 30 to 15,000 cps ± 1 db. Hum level is -65 db, below rated output. 2. Howard model 482 FM tuner, compact in attractive mahogany cabinet. Covers 88-108 Mc, FM band smoothly, with excellent sensitivity and stability. 3. V-M model 400-C dual-speed changer, 78-33 1/3 r.p.m. Plays 10 and 12 inch discs intermixed, record changer and motor shuts off automatically after last record is played. Single tone arm adjustable for both type records. Up to 4 hours on LP, Dual needle reversible cartridge also adjusts for proper needle pressure. 4. General Electric model 1201-D heavy duty high fidelity FM speaker, frequency response is 45 to 11,000 cps, handles 25 watts. 5. Terminal's own 12" bass reflex cabinet. Supplied unfinished, wood smoothly sanded, ready for finishing. Power amplifier complete with balanced driving network. Use in stereo, or for FM reproduction. When installed and interconnected, this radio-phonograph equipment surpasses the quality of instruments selling for three times our price!

NEW UNIVERSITY COAXIAL TWEETER ADAPTER #4407
A new convenience for extending range of any 12" PM speaker to 15,000 cps. Supplied with mounting ring and hardware. Net 14.70

NEW CINAXIAL SPEAKERS BY CINAUDOGRAPH
Frequency response 50 to 15,000 cps, 8 ohm input. Supplied complete with balanced bridging network. Use in a manner as a standard speaker, but enjoy the wide range performance of a dual speaker system.
CIN-12A 12" 10 w., 3" tweeter. 16.17
CIN-15B 15" 15 w., 2" tweeter. 27.93
CIN-15C 15" 18 w., 5" tweeter. 36.75

This equipment should be heard to be appreciated. On demonstration in our newly enlarged Sound Department.

NEW LP (LONG PLAYING) PHONO EQUIPMENT

ASTATIC 510-2M-33
Equipped with variable reluctance pickup for LP records. Response to 12,000 cps, with minimum distortion. Net 5.50

ASTATIC EA-2 EQUALIZER-PREAMPLIFIER
2-stage deluxe preamplifier for reluctance phono cartridges. Non-ferrous transformer, self-tuning with overlapping bands. Frequency response is 15,000 ± 1 db. Satisfies all requirements for standard and LP recordings. Net 23.22

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SMOOTH DUAL SPEED
Model GM—Quiet and smooth rim-drive, ideal for LP and standard records. 9" turntable. Net 6.75
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CLARKSTAN 201—Wide-range pickup cartridge with .001" replaceable needle for LP records. Net 15.00
Clarkston replacement needles (specify LP or standard). 2.40
PICKERING D-1405 — Wide-range magnetic cartridge for LP records. Equipped with diamond styli, outlives sapphires by 10 times. Net 34.00

Sound Values!
AT TERMINAL

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first report your SCM has made on its seventh term of office. In order for me to carry on the office of SCM as it should be I need the support of all you good fellows. The activity reports you ORS, OPS, and other points are needed. Traffic: W4AN4 283, HMG 32, M3J 37.

VIRGINIA — SCM: Victor C. Clark, W4KFC — Starting Jan. 16th, VN became a two-session affair on an experimental basis. The first session operates from 6:30 to 7:00 p.m., under the general guidance of KH7 LAP. The second session begins at 7:00 p.m. and lasts until all traffic has been cleared, and continues under the management of RM Li. Frequencies: Monday: 6090 kHz, VZ9 — 3980 kHz. FVCR held a banquet on Jan. 11th in Falls Church. Guests included MR. first president of Falls Church Club; OJL, Arlington Club President; and 2OP, of QG. Our deepest sympathy to J1, whose mother passed away in December. JAG is on 164 Mc, with a five-element beam and SCR-522. UV reports a new BOK of OGW, VY5A, and DXCU members, VE WAC'd on 7 Mc using 100 watts. LPP's 807 has chucked up 45 countries so far on 14 Mc; he also landed a VK9 of the PZT, 7U0 phone. KAO, our PAM, contacted the office of Governor Tuck to obtain a message for delivery to President Truman in the Governor-President Relay. CJD is building new emergency-powered rig. CQW is rebuilding to higher power. KMS reports ONV is getting started on 28-Mc. phone with a Collins receiver, n.f.m. KOD is building a modulator for use on VFN. HF earned his PB traffic total through visits to VN, National Trunk Line, and Paladin Net. IUU has been planning on VE's electric, KYW, WVN, Indiana Net, TLAP, NIN, Rebel Net, and MG-Del. DC Net. IWO's main power supply went kaput! From the PA of W6-217 UJH, JXH hard at work. HK worked Cape Cod on 144 Mc. using horizontal polarisation, MXZ schedules New Jersey on 144 Mc. MT has a new rig, a 144-Mc converter. Traffic: (Continued on page 94)

(Continued from page 93)

The conversion kit for the BC-454 is now available from THOMAS, 2-3201 Transformer, 6X5GT, etc. and mounts on dynamotor mounting base.

BC-458 TRANSMITTER

Only $5.95

The BC-458 covers 5.3 to 7 Mc and is easily changed to cover 40 meters. Makes an excellent 40 meter transmitter. Power supply suggestions, circuit diagram finished with each transmitter. Shipping Weight - 11 lb.

Brand New, Aluminum finish only. $6.95

BC-457 $4 to 5.3 Mc., Brand New. Used. $4.95

Makes an excellent 40 meter fixed or mobile rig.

Conversion kit with unbalanced calibrated scale furnished with each transmitter. Shipping Weight - 11 lb.

$6.95

PT-229 2-section Xmitter Rack, Used, with plugs, as illustrated above.

$9.95

BC-454 - 3 to 6 Mc. Receiver

Used, with Dynamotor, Shipping weight 11 lb. $5.95

A compactly built and extremely sensitive 6-tube superhet, ideal for Mobile, Fixed or Portable use. Requires only the addition of a power supply gain, control, and BFO switch.

Conversion Kit for BC-454 and BC-455 Receivers. Stock No. CK-4X, Spec wt. 4 lb. Only $6.95

Contains AC Power Supply parts, gain control, control, BFO switch, tuning knob and splices, and instructions. Power supply uses all standard parts (Thorndarson T-22001 Transformer, 6X5GT, etc.) and mounts on dynamotor mounting base.

Other SCR-274N Components

BC-456 Modulator with plugs & dynamotor, Used $2.95

BC-456 Modulator lens plugs, New 2.95

BC-450* 3-section Receiver Control Box, Used. $9.98

BC-451* Transmitter Control Box, Used. $9.98

PT-229 2-section Receiver Rack, Used. $3.98

B-752A Brass Spine for tuning receivers. $0.98

MC-212A Flexible Tuning Shafts, 220' long. $3.49

MC-215B Flexible Tuning Shafts, 100' long. $1.49

C-922A 6 to 9.1 Mc, RC Coli Set #6234. $9.98

A-909A 1415 KC First Filt., #7277. $7.98

A-909B 1415 KC Second Filt. #7277. $1.98

C-925A 2820 KC First Filt., #7277. $19.98

B-909A 30 ma. 3 y, Filter Choice #3534. $19.98

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ROCKY MOUNTAIN DIVISION

COLORADO — SCM: M. W. Mitchell, WSQZ — RM: CIC. There were all kinds of emergencies the past month! First the big blizzard of Kansas, Nebraska, and Eastern Colorado. Then on Dec. 29th there was another blizzard over most of the same area. Those who took part in the Dec. 29th races were the following Colorado hams: UID, MOM, GDC, OWP, and IQZ. On January 3rd, 4th, and 5th another blizzard stranded many people in cars and trains with 30-40, drifts in some localities. The snow affected this time Wyoming, Western Nebraska, Northwestern Colorado, and Western South Dakota. Colorado hams in the Governor Grids Net for emergency traffic were the following: IDA, PKN, GDC, FPG, CUG, AMI, OWP, KVD, and IQZ. LY2 is NCS for Interstate Utility Net. He also schedules New Mexico NTS, TLD, and NMN. PVRC had a banquet on Jan. 11th in Falls Church, Guests included MR, first president of Falls Church Club; OJL, Arlington Club President; and 2OP, of QG. Our deepest sympathy to J1, whose mother passed away in December. JAG is on 144 Mc, with a five-element beam and SCR-522. UV reports a new BOK of OGW, VY5A, and DXCU members, VE WAC'd on 7 Mc using 100 watts. LPP's 807 has chucked up 45 countries so far on 14 Mc; he also landed a VK9 of the PZT, 7U0 phone. KAO, our PAM, contacted the office of Governor Tuck to obtain a message for delivery to President Truman in the Governor-President Relay. CJD is building new emergency-powered rig. CQW is rebuilding to higher power. KMS reports ONV is getting started on 28-Mc. phone with a Collins receiver, n.f.m. KOD is building a modulator for use on VFN. HF earned his PB traffic total through visits to VN, National Trunk Line, and Paladin Net. IUU has been planning on VE's electric, KYW, WVN, Indiana Net, TLAP, NIN, Rebel Net, and MG-Del. DC Net. IWO's main power supply went kaput! From the PA of W6-217 UJH, JXH hard at work. HK worked Cape Cod on 144 Mc. using horizontal polarisation, MXZ schedules New Jersey on 144 Mc. MT has a new rig, a 144-Mc converter. Traffic: (Continued on page 94)

(Continued from page 93)
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Oil-filled condenser, single mounting hole, negative can, with nut... 59c

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1000 KC crystal, in FT-243 holder, ground to exact frequency to duplicate performance of original crystal in BC-221 Frequency Meter.

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SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW—JYB has a new Taylor super modulated kw, rig on the air. JYB and JYK visited Editors & Engineers and GGT, who heads Armed Forces Radio Services, California. The Tri-State Club of Dothan puts out a good bi-monthly bulletin. Write for it. Ex-AHQ is now 3AHH, KYD, airs OHS on 3.85 Mc. tri-weekly. IRE continues as NOS of AENB on 3715 kc. nightly at 7. BFM submits his first report and expects to participate in AEN. He works all bands. IRE continues as the Old Reliable on AENB and Rebel Nata. MXU has changed QTH and will be on 3.5 Mc. and in AENB again soon. MGD is now in Japan. Formerly of Craig Field, he leaves YET the only ham on the base. NSV, also formerly of Craig Field, has departed for D4 Land. GYD is revolving his plate transformer to get out of the low power class. BCU addressed the Alabama Chapter of the American Chemical Society on "Ham Radio as a Hobby." The Anniston Club is already formulating plans for the Annual Field Day. Other clubs are invited to participate in these plans. All the fellows at the University are back on the air after the holidays. NUB is the call of Mrs. Anna Loyd Hand of Bay Minette. Traffic: W4AX12, GJW 8, IMR 6, CYL 1.

EASTERN FLORIDA — SCM, John W. Hollister, Jr., WD4FQ, DQW, the SEC, and SCM suggest that now is the time to clean up the portable and mobile gear and start planning on local field days with a view toward overhauling the Emergency Corps. Area plenities like that held at Orlando and a Field Day like that held by the Dade Club are needed stimulants. An inter-area GB contest can be held. Club officers, Net Controllers, and others, send your ideas to the SCM for a section bulletin. Brooksville: MNT now is on 3910-kc. Emergency Net in action. Caladesi Islands: BCD and WPJ, SECs, radio water. AYX pleads for more interest on 144 Mc. AYP is active again on 3.85 and 28 Mc. ATX is on 144 Mc. at 3 p.m. and 7 p.m. daily. Coral Gables: IYJ has 120 up on DX with 95 omw. Andy clears traffic with 1NUP each Tuesday and is on 14 and 25 Mc. Lake City: IQV has p.p. 35Ts and 811 modulators, but has been working 14 Mc. with a 4-watt VFO. Jacksonville: EIH knows how to get plenty of stuff on 28 Mc. with low power and folded dipole. Lake Placid: BYR reports radiodiscography of NMJ in Washington, NMJ in Avon Park, and AMW on 28 Mc., and says a "Cow Country" emergency net is underway. Tampa: The Tampa Club knows how to get State Fair traffic out efficiently. TAMU and TAMU reports NTB is on 7 Mc. Orlando: DPM and SU have been doing some serious work on 420 Mc. They are happy about the DSC and in AENB again soon. MGD is now in Japan. Formerly of Craig Field, he leaves YET the only ham on the base. NSV, also formerly of Craig Field, has departed for D4 Land. GYD is revolving his plate transformer to get out of the low power class. BCU addressed the Alabama Chapter of the American Chemical Society on "Ham Radio as a Hobby." The Anniston Club is already formulating plans for the Annual Field Day. Other clubs are invited to participate in these plans. All the fellows at the University are back on the air after the holidays. NUB is the call of Mrs. Anna Loyd Hand of Bay Minette. Traffic: W4AX12, GJW 8, IMR 6, CYL 1.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DAO — NOS visited friends in Texas, BEK built a new beam. CNK, EQR, and NDB are now OSA. AM5 made a trip to Kona, Hawaii. DXQ worked a few, but no fun-poking. BCD, WPJ, and all surplus gear and bought a Globe Trotter. NFM moved to W2J Land, HJA bought a mobile transmitter, UC works for JNP, and SU has moved away from Pensacola and is on 144 Mc. Traffic: NVO, W4AX13, MNT 104, IQY 53, ATX 38, DES 84, MKP 27, PEI 20, IYJ 13, KJ 6.

GEORGIA — SCM, Clay Griffin, W4DXI — The following stations reported their number of contacts in the Georgia QSP Party held Dec. 12th: DXI 13, GTX 11, GSP 11, AAY (Continued on page 50)
ALLIED'S Terrific "Buy" in an All-Band All-Purpose Auxiliary Transmitter

HALLICRAFTERS HT-17

WITH COILS FOR ALL BANDS

ONLY $39.50

You can stop looking for that auxiliary transmitter you've always wanted for emergency use—for your annual Field Day week-end tests—for Net tie-in—for vacation use! Here's the ideal CW job at a whopping saving of over $30! Originally priced at $71.50—now yours at ALLIED for only $39.50 while they last. Now—have what you want without construction, labor or worries. The HT-17 has conservative 10 watts output on 80, 40, 20, 15 and 10 meters. Uses 6V6GT crystal oscillator driving an 807 final; matching network for any antenna or for driving high-power amplifier. Controls: Plate Tuning, Antenna Loading, Standby, Meter Switch, Power on-off. Rear terminals for antenna, ground, key, external modulator. Satin-black metal cabinet, 12 3/4 x 6 7/8 x 7 3/4". For 105-125 v., 50-60 c. A.C. Complete with tubes and coils for all bands. Less crystal. Shpg. wt., 25 lbs. Quantity Limited—Order Now!

$97-580. F.o.b. Chicago, ONLY ................... $39.50

Beginners—Get on the Air for Less Than $100!

Yes—you can get a complete station at ALLIED for less than $100! Includes: HT-17 Transmitter complete with coils for all bands; Hallicrafters S-38 Receiver; a quality handkey; headset; Billey 40 meter crystal; antenna wire and insulators; ARRL station logbook; Amateur Radio Callbook—everything you need to get on the air—at amazingly low cost!

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Will willing to go overseas for 1 year. Must stand thorough character investigation. Navy veterans ETM 1/c or higher. Army veterans TECH/SGT or higher. Base pay, bonus, living allowance, vacation arranged for applicants. Men qualified in radar, communications or sonar give in complete history.

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R.F. Section a complete 150 watt XMTX—Provisions for ECO—Automatic Bias on Final & Buffer—Voltage regulated Oscillator and Buffer—Class B Speech modulator—150 Watt input from 10 thru the 80 meter band—complete with tubes and meters including 1 set of coils—Specially crate for safe shipment.

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Look for the Arizons gang on 3515-ko, fast c.w., 2757-ko, slow c.w., and 2865-ko; "phone. Traffic: W7RNJ 123, MW2 68, JFY 57, LPY 44.

SAN DIEGO — SCM, Irvin L. Eng, W6GC — SCM, Gordon W. Brown, 6AGP, and Shelley E. Trotter, 6BAM, RM; BGF, SEC; DUP. BGF comes through with the highest score for the section. New meeting time for the Southern Border Net is 8 p.m. PST on 3550 ko. This frequency will be monitored from 7 until 10 p.m. for traffic. LDJ checks on this Net, also on 7 Mc. in Santa Ana, depending upon his whereabouts! FMZ had a real workout with Christmas traffic but forgot to send in the score. PC is sending 4LHY 4PD and OKE 4PD. OKE and PC will monitor 28 Mc. New officers for the Orange County Club are: CGP, pres.; UDV, vice-pres.; FCT, secy.; BAM, asst. mgr. Current rumor is that IQM and OAMB, both old-time members, may send in scores for W6 again. MI sends in a nice traffic score and reports he is working all bands from 3.5 to 28 Mc. BAM is working DX where he's not on 3.5 Mc. and is sending reports on 7 Mc. to W6. RMG and WMG are back on the new call of the new station at the Scribata Institute of Oceanography at La Jolla. New officers of the Palomar Radio Club are: VTS, pres.; VIQ, vice-pres.; BLV, secy.; and DWE, treasurer. The Halle Radio Club is planning a hamfest to be held in April. W6LD has a new transceiver. Traffic: W6GCP 204, K6MN 88, W6TVS 28, BAM 24, MI 24, WNN 17.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, Joe G. Buch, W6CUO — BKH has resumed activity in Abilene and is working NTX, "phone and c.w., plus Naval Reserve net. We welcome new members, PGO and his XYL, W5CDU. Dale works 3.56 and 14 Mc. and the XYL takes care of 28-Mc. phone and 7-Mc. c.w. BTO works 7160 ko. mostly. DSY, RFP, and MSH, of La Mesa, joined in on 3.56-Mc. phone. BFA is the new NWT Assistant NOS. AAO is doing a commendable job as SEC and NWT NOS. OUS has sent in his application for a 3.5-Mc. phone. Of course, he is still Operator of AAO and local. DJW received his Class A ticket and joined the NWT Net. OEE is working fixed portable from A. A. M. College. IHZ and JGJ report in from VFRY is still on 3.5, sending for the Southern Border Net is 8 p.m. PST on 3550 ko. This frequency will be monitored from 7 until 10 p.m. for traffic. LDJ checks on this Net, also on 7 Mc. in Santa Ana, depending upon his whereabouts! FMZ had a real workout with Christmas traffic but forgot to send in the score. PC is sending 4LHY 4PD and OKE 4PD. OKE and PC will monitor 28 Mc. New officers for the Orange County Club are: CGP, pres.; UDV, vice-pres.; FCT, secy.; BAM, asst. mgr. Current rumor is that IQM and OAMB, both old-time members, may send in scores for W6 again. MI sends in a nice traffic score and reports he is working all bands from 3.5 to 28 Mc. BAM is working DX where he's not on 3.5 Mc. and is sending reports on 7 Mc. to W6. RMG and WMG are back on the new call of the new station at the Scribata Institute of Oceanography at La Jolla. New officers of the Palomar Radio Club are: VTS, pres.; VIQ, vice-pres.; BLV, secy.; and DWE, treasurer. The Halle Radio Club is planning a hamfest to be held in April. W6LD has a new transceiver. Traffic: W6GCP 204, K6MN 88, W6TVS 28, BAM 24, MI 24, WNN 17.

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Compact mobile xmittr for "dashboard" mounting. Measures only 5½” x 4½” x 6½”, weighs only 6 lbs. Designed to operate at 30 wts. Input. Uses 6V6 Tritet xtal osc. quadrupling from 7 to 28 mc driving 2E26 Class C mod. amp. High level Class B modulator capable 17 watts audio. Built-in coax antenna relay; p.t.t. switch. All controls front panel including illuminated meter, xtal jack, etc. Plate requirements: 300-400 volts at 140-180 ma. Shpg. Wt. 6 lbs. Less tubes
$79.95; including complete set tubes........................ $87.50

Collins 75-A
$375.00
80, 40, 20, 15, 11 and 10 meter ham receiver. Automatic noise limiter, high sensitivity, double conversion. With speaker in matched cabinet. Shpg. Wt. 93 lbs.

COLLINS 32V-1
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FS-135C Frequency Standard
Makes your receiver an accurate frequency standard with marker signals every 100kc. Includes low drift 100kc crystal, 6AU6G tube, complete instructions. Brand New. Only a few left.............................................. $64.95
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Hams, record your Q.S.O.'s on tape. Use the tape recorder that's proven dependable in innumerable installations, and cuts tape costs by doubling your playing time on standard reels of tape.

Separate inputs to record from your receiver or microphone. Outputs for booster amplifier and external speaker. Built-in phone facilities. Easy to operate with professional results assured. Send today for technical literature and professional factory prices.

Basic Mechanical chassis also separately available.

AMPLIFIER CORP. OF AMERICA
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New York 13, N. Y.

100
Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stocks of all Collins amateur equipment for immediate delivery. Also complete stocks of all other amateur receivers, transmitters, and parts. I promise you that you can find nowhere else lower prices, more complete stocks, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

A FEW ITEMS I STOCK ARE:

| National NC-33 | $ 57.50 |
| National NC-57 | 89.50 |
| National NC-173 | 189.50 |
| National NC-183 | 268.00 |
| National HRO-7 | 292.50 |
| National HRO-7C | 372.45 |
| National HFS | 142.00 |
| Hallicrafters S-38 | 49.95 |
| Hallicrafters S-53 | 89.50 |
| Hallicrafters S-40A | 99.50 |
| Hallicrafters SX-43 | 189.50 |
| Hallicrafters SX-42 | 275.00 |
| Hallicrafters SX-62 | 269.50 |
| Hallicrafters HT-18 | 110.00 |
| Hallicrafters HT-19 | 399.50 |
| RME HF-10-20 | 77.00 |
| RME VHF-182A | 85.60 |
| RME DB22A | 71.00 |
| Hammarlund HQ-129X | 177.30 |
| Signal Shifter EX kit | 49.75 |
| Telvar T60-2 | 150.00 |
| Harvey-Wells TBS-50 | 99.50 |
| Harvey-Wells TBS-50A | 121.25 |
| Hunter 20A Cyclomaster | 169.50 |
| Sibrico MT-15X | 79.95 |
| Hallicrafters & National TV sets |

Some prices higher on west coast

FOR EXAMPLE:

- Collins 75A-1 receiver $ 375.00
- Collins 32V-1 475.00
- Collins 30K-1 1450.00
- Collins 70E-8 40.00
- Collins 310C-1 85.00
- Collins 310C-2 100.00
- Collins 310B-1 190.00
- Collins 310B-3 215.00

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Shipments 4 hours after receipt of order. Send $5.00 with order and shipment will be made at once C.O.D.

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You can't beat Bob Henry for trade-ins. Write, wire or phone today about your equipment and Bob Henry will make you a better offer than you can get anywhere else.

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Because Bob Henry finances the terms himself you get a better break. Save time and money, deal with Bob Henry on his personal, profitable time payment plan.
New PIONEER CHASSIS PUNCH
(Pat. Pending)

CUTS ANY SIZE LARGER SQUARE OR ANGULAR HOLE

For Transformers, I.F.'s, Plugs.
Binding Post Snips, Sockets, Etc.

Banished forever is hand hack sawing or filing of holes for hard to
need.

For larger square or angular holes, PIONEER Chassis Punch will do the work.

SIMPLE HAND WRENCH SCREW ACTION

BUY IT AT YOUR FAVORITE DISTRIBUTOR

PORT ARTHUR BROACH COMPANY
LOS ANGELES 15, CALIF.

“KEYED” ROUND

"KEYED" CHASSIS PUNCH
FOR KEYED 1 1/4" SOCKETS
Screw Action—Self Aligning
AT YOUR FAVORITE DISTRIBUTOR
PORT ARTHUR BROACH CO.
Los Angeles 15 California

$3.50

Net

New 1/4" SQUARE ROUNDS

1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4" 1/8" 1/4"

$2.95 $3.50 $1.95 $2.15 $2.30 $2.65

PORT ARTHUR COLLEGE
PORT ARTHUR, TEXAS

Approved for G. I. training

controlled carrier 'phone on 3.85 Mc. and is pleased with
the results. KS continues to work DX on 14-Mc. c.w.

WW has changed QTH to St. Johns, TF finds his four-tele
14-Mc. beam too sharp to work anything except
those beamsed directly on a traffic. (Nov.) VE2KG S. (Des.)
VE2RB 176, GM 146, XR 101, EC 96, XB 85, LO 85, XO
85, AE9H 11, VA 8.

VANALTA DIVISION

ALBERTA—SCM, Sydney T. Jones, VE8MJ—QS
has increased power to 200 watts using P40. YD is
active on 3.8-Mc. ‘phone using S11. VX now is on 14-Mc.

‘phone. KC puts out a good signal on 3549 ko. LQ, HM,
PA, and OQ keep communications open during a recent
storm. Nice going, gang, the AEC really works. QF
is a new call at Medicine Hat. MJ announces the arrival of a
new Jr. transmitter. TE, JQ, and ED are doing good work in
AEC organization. Contact your EC for membership.

PORT ARTHUR COLLEGE
studenta accepted monthly. If interested In radio training
necessary to pass F.C. C.C. examinations for first-class tele-
phone and second-class telegraph licenses, write for details

The annual joint meeting of the American Section, International Scientific Radio Union, and
the Institute of Radio Engineers will be held in
Washington on Monday, Tuesday and Wednesday,
May 2nd, 3rd and 4th. The first two days
will, as usual, be devoted to the presentation of
papers bearing on the more fundamental scientific
and research aspects of radio and electronics. May
4th will be reserved for meetings of the National
Commissions on Radio Standards and Methods of
Measurement, Terrestrial Radio Noise, Radio
Waves and Circuits, and Electronics. A
booklet listing the program of titles and abstracts
will be available for distribution before the meeting.
Correspondence should be addressed to Dr.
Newbern Smith, Secretary, U.S.A. National
Committee, URSI, National Bureau of Stand-
ards, Washington 25, D.C.

PORT ARTHUR COLLEGE

PORT ARTHUR

102
THE MOBILE SEASON IS HERE!

Now that the low frequency bands have been opened for portable mobile operation, you’ll want to get your equipment shape for plenty of top-notch activity. And Newark is a good place to get every type of gear. Take your pick from your local stock in the country. . . . Get Immediate Delivery at Lowest Prices!

Premax Antenna Equip’t

Fig. A. Type R Universal Antenna Mount—Used in most police installations. Bronze, cast ball universal joint bolts to car panel thru heavy plastic disc, waterproof gasket and steel back plate. Adjusts to any angle. Stainless steel universal locking clamp takes any ¼" whip. May be used with spring adapter below, Shpg. Wgt. 4 lbs. No. 23422 Each $7.35

Fig. B. Type K Bumper Mount. Securely locks ¼" whip in place. 10 degree adjustment in hgt. Ceramic cones. All hardware incl. No. 23420, Wgt. 4 lbs. Each $4.20

Fig. C. Type SA Spring Adapter Mount for protecting whip when passing under obstruction. Fits between mounts above and base dia. 1½", 43¼" H. Shpg. Wgt. 2 lbs. No. 23424 Each $7.06

Fig. D. “Whip” Rods. Widely accepted by police and commercial users. Practical and rugged. Stainless steel rods with ¼" base to fit above mount ideal for 10 meters. Ideal for mount for police and commercial users. Practical and rugged. Stainless steel rods with ¼" base to fit above mount ideal for 10 meters. Ideal for mount for 23421, Type AS-290, $3.38

No. 5-467 .................. $1.49

NEWARK ELECTRIC CO., INC.

TWO NEW PORTABLE MOBILE RIGS

LYSCO MOBILE XMITTER

A very desirable new rig. Only 4 x 5 x 5½" high. Power output 6 watts. Requires 6.3 V A.C./D.C. 110 Mc. Provision for metering PA stage. Uses 3-6AG7’s for grid, one, mod., and final amp. Built-in antenna changeover relay—antenna termination for 50 ohm coax line. Requires T-172 nulke or equal. Model 129 covers 27-29.7 Mc and Model 175 covers 3750-4000 Kc, with 7 or 9 Mc xtal. Complete, less tubes and accessories. No. A17100, Model 129 $23.95

No. A17101, Model 175 $29.95

No. 5-467 .................. $1.49

NEW GON-SET 3-30 CONVERTER

Continuous coverage from 8-80 Mc in 8 bands. High sensitivity and stability. Four tubes. Current drain is only 10 Ma. Connects easily to your rig. Use as receiver or transmitter. Or 3½ x 5½ x 5½". Complete with tubes. Wgt. 6 lbs. No. A3064 Each $39.95

SEND FOR YOUR FREE COPY OF THE 1949 NEWARK CATALOG

3 GREAT STORES! Uptown at 115 West 45th Street and Downtown at 212 Fulton Street in NEW YORK 323 West Madison Street in the heart of CHICAGO

MAIL ORDER DIVISIONS: 242 West 55th St., N.Y. 19 and 323 West Madison Street, Chicago 6, Illinois

BY-LINES... by Bob Gundersen

W2JO

Using tetrotode and pentode as class C amplifiers presents a problem of high screen current when the tank is tuned to resonance with no load. Should a separate supply for the screen dropping resistor be used? We think a screen dropping resistor, so to say, is a current limiting device. Is it not better to have the screen voltage vary with load changes in plate current than to have a fixed supply which will try to keep the screen to burn out if the plate supply falls? Where a single mode modulator and transformer secondary is used, it seems better to apply the optimum voltage to plate and screen, using the same dropping resistor. With this resistor, the screen bypass condenser will be more effective, since the screen supply impedance is high in contrast to the low impedance offered by the associated screen bypass condenser.

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High Voltage, High Current Plate Transformer

Swell for a medium power phone or CW Xmr. Delivers 1345 volts A.C., each side of CT at 600 ma. Heavy construction designed for continuous operation from 105 to 125 V A.C. Heavy duty terminals, inverted type mgr. Size: 9½" x 9½" L x 3½" H. Shpg. Wgt. 65 lbs. A rare Valued Act Now! S-877 Special $14.95

Multi-Filament Transformer

An ideal filament supply for most medium power transmitters. Used with Plate Xformer No. S-877 (above) provides basis of swell power supply. Tapped primary 105/125 VAC, 6 separate secondary windings, all CT as follows: Three at 6.4V at 8 Amps. Two at 2.6V at 2.5Amps., One at 2.6V at 10 Amps. Will easily handle a pair of 866 Rect. in addition to all tubes in audio and RF sections of your rig. Uses 1314 type super heater. Complete with units. Wgt. 8 lbs. No. S-890 Special $5.95

NEWARK OIL FILLED TRANSMITTING CONDENSERS

These new Newark Oil Condensers are just the thing for the power supply in your rig. Conservatively rated. Rectangular can—Glass insulators. Brand New—Not War Surplus.

No. Can. Mfg. WYDC Size Price

S-858 2 3000 1¾ x 8¾ x 7½ $1.50

S-859 2 3000 1¾ x 8¾ x 7½ 2.75

S-860 4 2500 1¾ x 8¾ x 1½ 3.75

Enclose 20% Deposit with C.O.D. Orders

.include postage

All Prices F.O.B.

New York or Chicago
CUT HOLES $\frac{1}{2}''$ to $3\frac{1}{2}''$ IN RADIO CHASSIS

WITH A GREENLEE RADIO CHASSIS PUNCH

Save hours of work...eliminate tedious reaming and filing. Just turn GREENLEE punch with an ordinary wrench for accurate, smooth holes...in a hurry. There's a GREENLEE for each of these sizes: $\frac{1}{2}''$, $\frac{1}{4}''$, $\frac{3}{8}''$, $1''$, $1\frac{1}{4}''$, $1\frac{1}{2}''$; $1\frac{3}{4}''$; $2\frac{1}{4}''$...also GREENLEE Knockout Punches and Cutters for conduit and meter holes up to $3\frac{1}{2}''$. Write for facts. Greenlee Tool Co., 1863 Columbia Avenue, Rockford, Illinois.

Parasitic-Array Patterns

(Continued from page 18)

ratio, not even a partial explanation can be given. However, whether the amplitudes of the various patterns are in exactly the proper proportion to one another or not, the series does show how the shape of the pattern changes with the length of the parasitic element. Note that the parasitic-element lengths given do not have general significance because of the relatively large diameter-to-length ratio of the elements, and the varying magnitude of end effects with frequency. The physical length of a half-wave of the tubing used for elements was found to be only 89 per cent of an electrical half-wave at the frequency used.

The writer wishes to express his deep appreciation to Dr. Vincent E. Parker and Mr. Bruce C. Lutz of the Physics Department of the University of Delaware for their support and guidance in the conduct of these experiments.

Field-Strength Meter

(Continued from page 80)

four-pin $1\frac{1}{4}''$-inch forms. Winding $L_2$ is divided into two equal halves spaced slightly on the form to leave room for the single-turn pick-up coil, $L_1$. The accompanying table gives dimensions for $L_2$ for various frequency ranges.

In this view one of the sides of the box has been removed to show internal placement of the few simple components of the field-strength meter.

When using the field-strength meter, a vertical length of stiff wire, such as busbar, attached to the antenna input terminal will suffice as a pick-up antenna on all frequencies. The meter may be calibrated in frequency from a signal generator.

Sideband Filter

(Continued from page 86)

double sidebands work against each other unless this carrier has exactly the correct frequency and phase. With a single-sideband signal this isn't the case. Suppression can be used to advantage at the receiver by making the b.f.o. the largest $A\Phi$ signal at the second detector and arranging the tuning such that it is within about 40...
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In STOCK...

A complete line of Collins transmitters and receivers is always on display in our spacious new showrooms. We invite your inspection of this famous equipment...just more proof that Electronic Wholesalers has all the greatest names in radio.

Ready For Delivery!

- 30K-1 500 WATT TRANSMITTER
- 32V-1 150 WATT TRANSMITTER
- 70E-8A VFO
- 75 A-1 RECEIVER
- 310-B EXCITER UNITS

Large Stocks of United Transformer Corp. TRANSFORMERS

Transformer components always on hand. Everything for Ham, Power, and Hi-Fidelity uses. Over 200 types to choose from.

McMurdo Silver Absorption Wavemeter

Model 903 $3.30 EACH

Indispensable around the "Ham" shack. Checks operation of oscillator, amplifier and doubler stages. Seven calibrated frequency ranges.

Plug-in Inductors for each of 7 ranges...75c EACH

- Products of all National Manufacturers in stock—25% deposit on C.O.D. orders, F.O.B. Washington, D.C.

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ENJOY MAXIMUM LIGHT VISIBILITY!
Johson 147-1217
1 inch - Lucite Cap


Johson 147-1141
11/16 inch Lucite Cap

Especially suitable for NE-51 neon glow lamp. Soldered terminals. Fits 11/16" hole. Bulb also mounted far forward for maximum visibility. Choice of red, amber, opal or clear. Johson carries in stock a complete line of standard pilot light assemblies to meet every ordinary need. Special assemblies, to meet your most exacting requirements, can be furnished in production quantities on special order. Your inquiries are invited.

THE KEY TO PERFECT CW

MON-KEY

Electronic Monitor and Key

Flawless CW — smooth, rhythmic as a tape — can be quickly achieved by anyone who uses the new MON-KEY.

FEATURES

- Automatic dots and dashes
- Dashes equal to three dots in duration
- Speed approx. 8 to 45 words per minute
- No weights to adjust
- Monitor with volume control
- Operation 115 V AC or DC

ONLY $29.95
Amateur Net

If your dealer can’t supply you, send check for $29.95 direct to us. Immediate shipment on Money Back Guarantee.

ELECTRIC EYE EQUIPMENT CO.
6 West Fairchild Street, Danville, Ill.


Using the “Cascode”

(Continued from page 109)

may be made slug-tuned also, and adjusted to the proper value by feeding a signal into the stage with no heater voltage applied, and then adjusting for minimum signal. Radio service men whose experience dates back to the days of triode r.f. stages in broadcast receivers will recall this technique! The plate coil, L2, is also self-resonant, but is extremely uncritical.

Results

If your location is quiet, and your receiver is completely stable, with or without an antenna connected, the cascode will make a considerable improvement in your reception. It contributes very little noise, by itself, and the gain will be 15 db. or more. If your receiver is low on gain it will be particularly helpful. If you already have quite good performance, or if your location is one where external noise is already a limiting factor, you will not gain much from the addition of a cascode. If the noise that bothers you comes in on the antenna all the r.f. gain in the world won’t help you. And if your receiver is already on the verge of oscillation in the r.f. stage, addition of the cascode will only make matters worse. Regeneration is great stuff for high S-meter readings, but bad medicine for signal-to-noise ratio.

The original discussion of the cascode by its designers states that it has been used effectively on frequencies as high as 180 Mc., so it should be of interest to 2-meter workers who are striving for improved receiver performance. — E. P. T.
### TRANSFORMERS

**POWER P-3165—Prl. 117 V. Secs.: 350-350 V. rms. @ 200 ma. DC. 6.3 V. @ 5 amp. 3 V. @ 2 amp., 5 V. @ 5 amp.**

- **Price:** $9.00
- **Dimensions:** 6½“xW. 4½”x Priced Right

**Type**
- **Sec. Rms.**
  - **Volts:** 600 V.
  - **Price:** $6.85
- **Vac.**
  - **Rms.:** 500-500
  - **Price:** $13.55

**P-3159—Prl. 117 V. Secs.: 360-360 V. rms. @ 250 ma. DC., 6.3 V. @ 6 amp., 7 V. @ 2 amp., 8 V. @ 5 amp.**

- **Price:** $10.15
- **Dimensions:** 7⅞“xW. 4¼”x

**Type**
- **Vac.**
  - **Rms.:** 500-500
  - **Price:** $19.15

**P-3171—Prl. 117 V. Secs.: 2500 V. rms. @ 2 amp. 5 V. @ 2 amp.**

- **Price:** $57.00
- **Dimensions:** 7⅝“xW. 5¾”x

**Type**
- **Sec. Rms.**
  - **Volts:** 117 V.
  - **Price:** $10.15

**VERTICAL BLOCKING OSC, A-3000—Turns ratio pri. to sec. 1:4.2, shielded type A.**

- **Price:** $1.18
- **Price for 2:** $2.35

**A-3002—Turns ratio pri. to sec. 2:1, shielded type A.**

- **Price:** $8.25
- **Price for 2:** $16.50

**INPUT 220-250 FORMERS**

- **Type 20:** 115 V. input, 0-135 V. output 0-2 3 5.0 400 watts, P-62 .... $4.80
- **Type 116:** mounted; 115 V. input, 0-135 V. output 0-2 3 5.0 400 watts, P-62 .... $4.80

**ISOLATION TRANSFORMERS**

- **All 117 Volts to 117 Volts 60 Cy.**
  - **Price:** $9.30
- **P-96, 40 watts .. $3.60 P-98, 100 watts $19.00**
- **P-97, 80 watts ... $10.10 P-99, 250 watts $17.70**

### FILTER CHOKES C-2991—2 henries @ 250 ma.

- **Price:** $1.92
- **Price for 2:** $3.84

**C-2992—2 henries @ 200 ma. DC. 50 ohms.**

- **Price:** $1.62
- **Price for 2:** $3.24

### RAYTHEON VOLTAGE STABILIZERS

**Positive Stabilization ±1%**

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Stability</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-130 volts, 60 cycles single phase</td>
<td>115 Volts stabilized ±1%</td>
<td>115 Volts</td>
<td>$15.00</td>
</tr>
<tr>
<td>15 ma. DC</td>
<td>6.3 V.</td>
<td>15 ma.</td>
<td>$17.00</td>
</tr>
<tr>
<td>5 ma. DC</td>
<td>5.0 V.</td>
<td>5 ma.</td>
<td>$17.00</td>
</tr>
<tr>
<td>10 ma. DC</td>
<td>4.5 V.</td>
<td>10 ma.</td>
<td>$17.00</td>
</tr>
<tr>
<td>15 ma. DC</td>
<td>4.0 V.</td>
<td>15 ma.</td>
<td>$17.00</td>
</tr>
<tr>
<td>20 ma. DC</td>
<td>3.5 V.</td>
<td>20 ma.</td>
<td>$17.00</td>
</tr>
</tbody>
</table>

**Output Net Price**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cap. wtg.</th>
<th>Watts</th>
<th>lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VR-6110</td>
<td>15</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>VR-6110</td>
<td>30</td>
<td>$27.00</td>
<td></td>
</tr>
<tr>
<td>VR-6110</td>
<td>50</td>
<td>$37.00</td>
<td></td>
</tr>
<tr>
<td>VR-6111</td>
<td>120</td>
<td>$31.00</td>
<td></td>
</tr>
<tr>
<td>VR-6112</td>
<td>250</td>
<td>$48.00</td>
<td></td>
</tr>
<tr>
<td>VR-6115</td>
<td>500</td>
<td>$75.00</td>
<td></td>
</tr>
</tbody>
</table>

### STEP DOWN TRANSFORMERS

**Input 220-250 Volts 60 cy.**

<table>
<thead>
<tr>
<th>Output</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-125 V. input 60 cy.</td>
<td>$18.00</td>
</tr>
<tr>
<td>150</td>
<td>$20.00</td>
</tr>
<tr>
<td>200</td>
<td>$27.50</td>
</tr>
</tbody>
</table>

### TRANSFORMER VARIABLES

**Type**
- **20: 115 V. input, O-135 V. output @ 3.0 amps. 0.4 KVA.**
  - **Price:** $12.50
- **Type 116: mounted, 115 V. input, 0-135 V. output @ 1.0 KVA.**
  - **Price:** $23.00
- **Type 116U: unmounted, 115 V. input, O-135 V. output @ 1.0 KVA.**
  - **Price:** $19.00
- **Type 1226: 115 V. input, O-135 V. output @ 1.0 KVA.**
  - **Price:** $17.00
- **Type 1226: 230 V. input, tapped at 125 V. O-270 V. output @ 2.4 KVA.**
  - **Price:** $46.00
- **Type 115A: 115 V. input, O-135 V. output @ 450 amps. 6.1 KVA.**
  - **Price:** $118.00

### QUALITY-PRICE DEPENDABILITY

**OIL FILLED CONDENSERS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Volts</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Mfd</td>
<td>600 V.</td>
<td>$6.49</td>
</tr>
<tr>
<td>7 Mfd</td>
<td>750 V.</td>
<td>$8.59</td>
</tr>
<tr>
<td>2 x 0.1 Mfd</td>
<td>7000 V.</td>
<td>$2.00</td>
</tr>
<tr>
<td>8 Mfd</td>
<td>600 V.</td>
<td>$5.98</td>
</tr>
<tr>
<td>8 Mfd</td>
<td>690 V.</td>
<td>$5.85</td>
</tr>
<tr>
<td>05 Mfd</td>
<td>2500 V.</td>
<td>$5.95</td>
</tr>
</tbody>
</table>

### PLATE TRANSFORMERS

**For Small Transmitters, DC Voltage Ratings are Approx. Values. Mercury Vapor Rectifier Tubes Pri. is for 115 V. 60 cy.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sec. Rms.</th>
<th>DC Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Volts</td>
<td>Volts</td>
</tr>
<tr>
<td>P-97</td>
<td>600-600</td>
<td>300-300</td>
</tr>
<tr>
<td>P-58</td>
<td>1080-1080</td>
<td>1000*</td>
</tr>
<tr>
<td>P-59</td>
<td>200-500</td>
<td>400-150</td>
</tr>
<tr>
<td>P-47</td>
<td>1450-1450</td>
<td>1000</td>
</tr>
</tbody>
</table>

### ISOMETRIC TRANSFORMERS

**Model 129-10 Meter Model 175-75 Meter**

<table>
<thead>
<tr>
<th>Type</th>
<th>Price Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>$23.95</td>
</tr>
</tbody>
</table>

### CHOKES

**SMOOTHING SWINGING**

<table>
<thead>
<tr>
<th>Type</th>
<th>Hy</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-80</td>
<td>750</td>
<td>$8.60</td>
</tr>
<tr>
<td>C-81</td>
<td>10</td>
<td>3-14</td>
</tr>
<tr>
<td>C-82</td>
<td>10</td>
<td>3-14</td>
</tr>
<tr>
<td>C-83</td>
<td>10</td>
<td>3-14</td>
</tr>
</tbody>
</table>

### STANDAD STEEL CHASSIS

<table>
<thead>
<tr>
<th>Type</th>
<th>Black Crackle</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 14 x 3</td>
<td>$1.00</td>
<td></td>
</tr>
<tr>
<td>10 x 14 x 3</td>
<td>$1.44</td>
<td></td>
</tr>
<tr>
<td>17 x 14 x 3</td>
<td>$1.44</td>
<td></td>
</tr>
</tbody>
</table>

### GREENLEE PUNCHES

<table>
<thead>
<tr>
<th>Type</th>
<th>Cut to 16”' thick metal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/16”</td>
<td>$1.94</td>
</tr>
<tr>
<td>1/2”</td>
<td>$1.94</td>
</tr>
<tr>
<td>1/4”</td>
<td>$2.12</td>
</tr>
<tr>
<td>3/16”</td>
<td>$2.25</td>
</tr>
</tbody>
</table>

### ALUMINUM CHASSIS—Heavy Duty

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 x 7 x 2</td>
<td>$9.48</td>
</tr>
<tr>
<td>7 x 9 x 2</td>
<td>$10.76</td>
</tr>
<tr>
<td>10 x 10 x 3</td>
<td>$1.06</td>
</tr>
<tr>
<td>10 x 11 x 3</td>
<td>$1.76</td>
</tr>
<tr>
<td>13 x 13 x 2</td>
<td>$1.15</td>
</tr>
<tr>
<td>15 x 15 x 2</td>
<td>$1.28</td>
</tr>
</tbody>
</table>

### BIAS TRANSFORMER TYPE K5877

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 V.</td>
<td>$1.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Mfd</td>
<td>@ 500 Ma.</td>
</tr>
<tr>
<td>12 V.</td>
<td>8 Mfd</td>
</tr>
</tbody>
</table>

If not rated 25% with order, balance C.O.D. All prices F.O.B. our warehouse New York. No order under $2.00. We ship to any part of the globe.

### LEEDS RADIO CO.

75 Vesey Street
Cortlandt 7-2612
Dept. QS 3
New York City 7

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107
Extra high efficiency in antenna switching makes ADVANCE small Coaxial Relays ideal for mobile and other low power transmitters. Designed for 50 ohm RG cable, these ADVANCE Relays maintain a VSWR ranging from 1.04 : 1.00 at 80 mc, to 1.40 : 1.00 at 300 mc, with max. rating of 250 watts. A variety of terminal positions are available.

Write for descriptive folder on all ADVANCE Radio Relays

ADVANCE ELECTRIC & RELAY CO.
1260 WEST SECOND STREET - LOS ANGELES 26, CALIFORNIA

Available Now

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Weight</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>3E5</td>
<td>3 ELEMENT 6 METER</td>
<td>18 lbs</td>
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<tr>
<td>4E5</td>
<td>4 ELEMENT 6 METER</td>
<td>21 lbs</td>
<td>$27.35</td>
</tr>
<tr>
<td>3E5 FR</td>
<td>3 ELEMENT 6 METER</td>
<td>16 lbs</td>
<td>$27.60</td>
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<tr>
<td>4E5 FR</td>
<td>4 ELEMENT 6 METER</td>
<td>16 lbs</td>
<td>$27.60</td>
</tr>
<tr>
<td>3E10</td>
<td>3 ELEMENT 10 METER</td>
<td>22 lbs</td>
<td>$34.40</td>
</tr>
<tr>
<td>4E10</td>
<td>4 ELEMENT 10 METER</td>
<td>26 lbs</td>
<td>$35.95</td>
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<tr>
<td>3E10 FR</td>
<td>3 ELEMENT 10 METER</td>
<td>17 lbs</td>
<td>$28.60</td>
</tr>
<tr>
<td>4E10 FR</td>
<td>4 ELEMENT 10 METER</td>
<td>20 lbs</td>
<td>$24.95</td>
</tr>
<tr>
<td>3E20T</td>
<td>2 ELEMENT 10 METER</td>
<td>22 lbs</td>
<td>$37.00</td>
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<tr>
<td>4E20T</td>
<td>2 ELEMENT 20 METER</td>
<td>28 lbs</td>
<td>$64.95</td>
</tr>
<tr>
<td>3E20T</td>
<td>3 ELEMENT 20 METER</td>
<td>28 lbs</td>
<td>$64.95</td>
</tr>
<tr>
<td>4E10-20T</td>
<td>2 ELEMENT 10 and 2 ELEMENT 20 METER Stacked with 2 T Matches</td>
<td>42 lbs</td>
<td>$74.95</td>
</tr>
<tr>
<td>6E10-20T</td>
<td>3 ELEMENT 10 and 2 ELEMENT 20 METER Stacked with 2 T Matches</td>
<td>48 lbs</td>
<td>$98.95</td>
</tr>
<tr>
<td>6E10S</td>
<td>2 ELEMENT 10 METER</td>
<td>42 lbs</td>
<td>$69.95</td>
</tr>
<tr>
<td>3E10-2E20T</td>
<td>3 ELEMENT 10 &amp; 2 ELEMENT 20 METER Stacked with 2 T Matches</td>
<td>45 lbs</td>
<td>$84.90</td>
</tr>
<tr>
<td></td>
<td>Folded dipole for 6 and 10 meter beams</td>
<td></td>
<td>$6.00 Extra</td>
</tr>
<tr>
<td></td>
<td>T Match for 6, 10, and 20 meter beams</td>
<td></td>
<td>$5.00 Extra</td>
</tr>
</tbody>
</table>

---

Reducing Key Clicks

(Continued from page 30)

which had a calculated cut-off bias of 27 volts (at the low plate voltage being used) actually had a bias of 150 volts. When this bias was reduced to around 60 or 70 volts, roughly twice cut-off bias, the extreme transients disappeared from the 'scope and the clicks disappeared in the receiver.

Pursuing this still further, the effect of dividing the bias between fixed and grid-leak sources was investigated. It had been the practice to use a self-regulated bias supply to maintain bias voltages "constant" with varying grid current. Key-click measurements were made with various values of fixed and resistance bias, with fixed bias values of from half to five times cut-off. Those showed that the clicks were about equal up to about 1 1/2 times cut-off and increased above that. It was further found that resistance bias added to any fixed bias did not increase the amount of click, up to as far as 10 times cut-off, the limit of the tests.

A further comparison was made between the amount of clicks that would be introduced by having a frequency doubler follow a keyed stage and having an amplifier follow a keyed stage. It was found that clicks were the same for either the doubler or amplifier when the fixed bias did not exceed 1 1/2 times cut-off and the additional bias was obtained from resistance bias. It was thus established that, for minimum clicks, the fixed bias should not be more than 1 1/2 times cut-off, with any additional bias (for purposes of efficiency in amplifying or frequency multiplying) to be obtained from resistance bias.

Following this rule, it is now possible to do all of the initial work of adjusting the keying circuit for clickless keying without going on the air, with the assurance that when subsequent stages are added there will be no clicks contributed by these stages (provided, of course, that there are no parasitic oscillations in these doublers and amplifiers). The keyed circuit should be adjusted so that the keying sounds very "soft" without "ringing," and it will then be satisfactory at any speed that can be copied aurally.

Checking the Keying

Owners of 'scopes will find the task of adjusting the keyed stage for clickless keying much easier than those who must do so by ear. These guides may be followed by 'scope users:

1) With plate and screen voltages removed from all following stages, connect the 'scope to the headphone output of the receiver (b.f.o. on) and check the envelope shape. This is done by making dots with the bug key and synchronizing the 'scope sweep until the pattern stands still.

2) Adjust the keying-circuit time constants so that there are no parts of the 'scope pattern that are absolutely vertical. The sides should be sloping and the corners rounded. Whenever the sides have too little slope or the corners become sharp, the clicks are increased.

3) When the above adjustments have been (Continued on page 110)
SPERRY AMPLIFIER
Brand new servo amplifier containing two beam power output tubes (1632) similar to 25L6, two twin triodes (1633 and 1634) similar to 6S27, two mica condensers, dozens of color coded half watt resistors, two dual and four section bathtub condensers, three transformers, two water switches, one volume control, four octal sockets. Easily convertible. $3.95

RADAR RECEIVER BC1068A
Guaranteed excellent condition. It is a "Hot" receiver for the "Ham" and short wave experimenter covering the 174 to 210 MC Television band. Has individually slug tuned antenna R.F., Detector and oscillator circuits resulting in maximum sensitivity; contains 2 R.F. and S.I.F. stages detector and video amplifier. Complete with 110 volt A.C. power supply and 14 tubes. $39.50

SCR-195 WALKIE-TALKIES
SCR-195 Walkie-Talkies, brand new, weight 27½ pounds, including knapsack. Range up to 65.8 MC. $9.95 each

CRYSTALS!
All crystals have Army MC harmonic ratings but Sun enforces directions for deriving the correct fundamental frequency below.

CRYSTALS WITH A MILLION USES

<table>
<thead>
<tr>
<th>Frequency Standards (ke)</th>
<th>98.356 kc</th>
<th>567.78 kc</th>
<th>527.77 kc</th>
<th>514.45 kc</th>
<th>503.55 kc</th>
<th>531.94 kc</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Crystal Controlled Signal Generators</td>
<td>$99c each</td>
<td>$99c each</td>
<td>$99c each</td>
<td>$99c each</td>
<td>$99c each</td>
<td>$99c each</td>
</tr>
</tbody>
</table>

I.F. Frequency Standards

<table>
<thead>
<tr>
<th>For Ham and General Use</th>
<th>$3.89 each</th>
<th>99c each</th>
<th>69c each</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractions Omitted</td>
<td>577ke</td>
<td>377ke</td>
<td>374ke</td>
</tr>
<tr>
<td>Assorted Miscellaneous Crystals</td>
<td>374ke</td>
<td>371ke</td>
<td>368ke</td>
</tr>
<tr>
<td>Fractions Omitted</td>
<td>370ke</td>
<td>368ke</td>
<td>365ke</td>
</tr>
<tr>
<td>Crystals from BC 6 10</td>
<td>364ke</td>
<td>362ke</td>
<td>360ke</td>
</tr>
<tr>
<td>2-6 MC PB RECEIVER</td>
<td>$9.95 each</td>
<td>$9.95 each</td>
<td>$9.95 each</td>
</tr>
</tbody>
</table>

ATTENTION! CLOSEOUT SPECIALS

| KIT 1 | Astmd Mica Condensers—Unmarked. 100 for ... | $1.50 each |
| KIT 2 | Astmd Resistors V/W—1 W. 100 for ... | $1.00 each |
| KIT 3 | Astmd Condensers—Tubular Bypass. 25 for ... | $1.00 each |
| KIT 4 | Astmd Condensers—Electrolytic. 25 for ... | $2.00 each |
| KIT 5 | Astmd Potentiometers—with or without switch. | $3.00 each |
| KIT 6 | Astmd Ballast Tubes—Line Bypass. | $3.00 each |
| KIT 7 | Octal Sockets—Waffa. 25 for ... | $1.00 each |
| KIT 8 | Octal Sockets—Plastic with Flange. 20 for ... | $1.00 each |
| SPECIAL! All 8 Kits for $8.00 |

MAGNETIC HEADPHONES
Brand new SC 4000 ohm Magnetic phones with 8" cord and standard phone plug. Headphones are adjustable to size. A $1.45 value ... $2.49

SUN RADIO
938 S STREET, N. W. WASH. 4, D. C.
completed, check with the b.f.o. off. If the job has been done correctly, keying peaks that extend to dizzy heights will not be seen. This check should be made with the receiver audio gain control open enough to give good S9 signals when the b.f.o. is on, and the a.v.c. should be off.

When the keying of the controlled stage is satisfactory, as indicated by the above tests, the plate and screen voltages can be applied to the subsequent stages. If the fixed bias on any of these stages does not exceed 1 1/2 times cut-off (any additional bias can be provided by grid resistors), the resultant signal on the air should be clean and something to be proud of (if these amplifiers have no parasitics or serious regeneration).

As an alternative to the use of the scope, the operator can listen closely in the headphones to slow dashes, noting carefully the clicks on "make" and "break" with the b.f.o. on and off. The problem here is to judge correctly the degree of click, however, and that is why the scope is so useful.

The keyed stage used in all of the tests was an RK20A pentode amplifier, using a tube keyer on the suppressor grid. The tube keyer allows a wide range of keying rise and decay times by adjusting only resistors and condensers, as opposed to the necessity for correct iron-core chokes in direct cathode and plate-supply keying. Grid-blocking keying of any low-drive stage is also a simple type to adjust.

"Capital X" Array

(Continued from page 45)

Now you are ready to erect the array in its permanent position. A space about 40 feet square is required, though the greater the clearance in all directions the better, of course. The bottom dipoles should be a minimum of a half-wave (about 16 feet) above ground for best results.

The idea in back of this arrangement is, of course, the old familiar "X-H" array, with the difference that, the phasing is done with relatively-flat lines. The dipoles are fed at their centers, and all, in turn, are fed from a common central point, insuring uniform current distribution. The 20-foot separation of the dipoles, a mechanical accident resulting from the length of the phasing sections, spreads the dipoles out over a larger area than they occupy in the conventional "H" configuration. This tends to improve the performance of the system, as the optimum spacing for four dipoles is something more than the commonly-used half-wave arrangement. Remember the positioning of the dipoles in the bedspring arrays used for early warning-radar service?

Because of the distribution of the power four ways it will be found that the amount of r.f. in any one of the dipoles is relatively low. Do not expect that this array will show the fire one becomes accustomed to in working with parasitic systems. The same is true of the phasing sections; it may be that, with moderate amounts of power, a neon bulb or fluorescent light will light on the main transmission line but not on the phasing sections.
Performance and Convenience in Amateur Communications

THE TURNER
MODEL 20X Crystal Hand Microphone • $12.85 List

Exceptionally high output level and smooth response to speech pickups make the Turner Model 20X an ideal unit for amateur communications. It features a high quality moisture sealed crystal. Range: 50-7000 c.p.s. Level: 54 db below 1 volt/dyne/sq. cm. Conveniently designed case is natural to hold, has hook ring for hanging and weighs only 8 ounces. Finished in rich baked brown enamel. Also available with slide lock switch at extra cost.

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Microphones BY TURNER


INSIDE THE FAMOUS hallicrafters HT-19 YOU’LL FIND B & W INDUCTORS

“hallicrafters” and “B & W” need no introduction to their many friends in the amateur radio fraternity. However, in any piece of equipment, it is the quality of workmanship and parts selected that determine its performance on the job.

That’s why we’re particularly proud to tell you that when you look inside the latest transmitter released by hallicrafters, the new HT-19, you’ll find B & W INDUCTORS on the job!

Final stage of hallicrafters HT-19

BARKER & WILLIAMSON, Inc. 237 FAIRFIELD AVE., UPPER DARBY, PA.
Radio, CORNISH engineers have kept abreast of electronic developments... so as to serve YOU better. The theoretical gain of this array is about 7 db., and it shows at least that much in actual practice. The cost and difficulty of erection of the two systems provides an even more favorable comparison.

Single Sideband
(Continued from page 48)
VFO allows you to be on either 20 or 75 simply by using the sum or difference beat. With all of the dirty work accomplished in the low-level (receiving tubes and components) exciters, the high-power problems become only those normally associated with high-power linear amplifiers, and they aren't tough at all. It doesn't matter much whether you use a filter or the phasing method to get the single-sideband signal at 5 Mc. — that's a choice you have to make just like you have to decide for yourself what big tubes and condensers and transformers to use. Either system will give you 30 db. or more attenuation of the undesired sideband if you build it right, and either system can be bad if you don't know what you're doing, just like an a.m. or n.f.m. 'phone can be.

So, to anyone who wants to try the stuff but hasn't yet made up his mind how to go about it, we suggest that you review all of the articles that have been written. Pick out the system you understand better or the one you think you can build and align easier, and then build it with all receiving tubes and components to come out at around 5.2 Mc. From there on all you will need is a 9-Mc. VFO, a 6SA7 mixer and some linear amplifiers to build up the level.

There isn't much need to discuss amateur single-sideband receiving techniques. Just ask anyone who is using a phasing or filter selectable-sideband adapter, or even a Q5-er — and then see if he would enjoy operating without it! — B. G.

SO Mc.
(Continued from page 63)
Massachusetts, and Rhode Island on 220 Mc. He missed two-way with Connecticut because of your conductor's inability to hear him on two occasions when W1HDQ was being heard at W1CTW. Yet, on another occasion, a crossband contact 220-144 Mc. was made the other way around. If the 235-Mc. contacts made with New York and New Jersey, prior to the change to the new band, are added, W1CTW has a total of 7½ states worked on 1¼ meters!

Shall We Decide the Polarization Question?
It has been suggested in several quarters that the question of horizontal or vertical polarization for 144-Mc. work be decided on the outcome of a vote of active 2-meter operators. Good idea — but will it take? Our experiences with polls are very disappointing, to say the least. Unless you send every individual a stamped self-addressed reply card, on which he merely marks an X to indicate his preference, it is impossible to get anything like a majority opinion. And if we did
(Continued on page 114)
GIGANTIC REPEAT SALE!

of Used, Reconditioned, "Good-as-new" COMMUNICATION EQUIPMENT

By popular demand Walter Ashe repeats his dramatic midwinter clearance of first quality Communication Equipment at terrific mark-downs! Rigid inspection, expert repair, tube check and alignment, insures A-1 operating condition. Quantities listed are available at date this publication goes to press. Every item represents a value you'll find it hard to resist. So hurry! Avoid disappointment. Order today by phone, wire or letter (or mail handy coupon), indicating 1st, 2nd or 3rd choice!

All Prices F. O. B. St. Louis.

Time Payments available on new equipment purchases

Filter Condenser Bargain
Last chance on these Aerovox Mfd. X 2500 VDC transmitting filter condensers. A real value at only

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3 lbs.

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Bill DuBord, W0QDF, Mgr., Amateur Div.
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2nd choice: 
3rd choice: (show make, model of new equipment desired)

□ Rush bigger-than-ever "surprise" trade-in allowance on my (describe used equipment)

for

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Here's the HRO in its newest, finest form, setting a new high receiver performance.

The seven new features are:
1. New crystal filter, selectivity from 200 to 6,000 cps.
4. New auto. noise limiter, clips negative as well as positive peaks without distortion.
5. Accessory socket provides additional 6.3 v. AC, 150 v. DC, reg.
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Type A-10 - For Panel Mounting

$2.95 POSTPAID

A large sturdy cast aluminum plate with satin-finished letters and border against a black baked enamel background. Red, green, blue and gray -- 50¢ extra. Size 2-3/4" x 8½" with 1½ letters.

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Type S

$24.00 Postpaid in U. S. A.


Adjustable speed control, maintains constant speed at any setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50¢ per roll.

**GARDINER & COMPANY**

**NEW JERSEY**

---

**The World Above 420 Mc.**

As a result of more than a year of work on 420 Mc. W4ZU and W4DPM of Orlando, Fla., have drawn some conclusions which may be of assistance to others of the 420-Mc. gang who are getting started the hard way. W4ZU had trouble getting his acorn superregen (November, 1947, QST) to operate satisfactorily until he made some modifications. R.f. chokes were added to the heater leads, at the socket, and the tap on the hairpin loop in the plate-grid circuit was brought off at right angles, instead of down between the sides of the loop.

After having indifferent results with 6J6s he is now using a pair of 316As with a half-wave line. Instead of being mounted at one end, as shown in
ANTENNA COUPLER
Will greatly reduce harmonic radiation and transfer efficiency of unwanted (and coaxial cable, ribbon twist, etc.) and balanced line. Has oscillator capacity to tune out resistance of line. Perfectly couples balanced line to transmission current such as the 627V-1, etc.
Handles up to 500 Watts output, 6,000 Volts peak envelope, with adjustable gain control for each in line. Adjustable gain control, dual output, contact to emitter leads, and carbon microphone. Dual output coils with plug-in taps. Complete with lead wires, coax connectors, instructions, etc. for any one band. (Specify Coil. All S. $24.75)

NEW JOHNSON INDUCTORS
Greater tank efficiency, less harmonic radiation, and reduced cost. Use with Johnson Inductors. These are the JOHNSON 150°/0 Type RC5 for low voltage, high current. MA or Type LCS for low voltage, high current. (Just about what you would pay for the parts alone!)

STEEL FOR SHIELDING
Put your rig in a modern enclosed rack cabinet - keep the spurious radiations - and the fingers out. No phone calls. Cabinet or separate - metal, aluminum.

COLLINS TRANSMITTERS
Perhaps the answer is the compact, well shielded, commercial built, transmitter such as the 150 watt 32V-1.

HAYV ANTENNA PROBLEMS?
Install a broad band Amphenol Twin Folded Dipole! No leadin problems - perfect match! High fee, birds, etc. doesn't bother it! Handle 1 KW of RF. Commercially built, transmitter such as the 150 watt 32V-1.

AC LINE WAVE TRAPS
FOR RECEIVER - BC, TV or FM
New Bud Wave Trap plugs between receiver and AC line traps out your RF. Simple - no need to tamper with receiver! Compact - 4" x 2" x 2".

FOR TRANSMITTER
OHMITE POWER LINE CHOKES prevent RF from getting into the power lines.

OPEN NEW YORK - UNTIL NIGHTS 9:00
RADIO CORPORATION
12 WEST BROADWAY, NEW YORK 7, N. Y.
BARGAIN SPECIAL

2500 Volt - 300 Ma
POWER SUPPLY
FILTER KIT

Consists of TWO - 2 Mfd.
2500 volt DC oil filled con­
sdensers size 1 ¾ x 3 ¾ x 5 ¼" high overall and ONE 4.2 Hy
filter choke (78 ohms, 2500V.
breakdown) in fully enclosed
metal case 4 ¼" H X 3 ½" dial, with 4" square base.

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Buy Now from this ad. Remit with order ADD for
Postage. Kit Weighs 11 lbs.

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thing in Radio and Electronics
—Many Outstanding Bargain
Values.
Write if you have not re­
ceived them. They will come
to you FREE.

WANTED...
Western Electric Vacuum tubes, types 101F,
102F, 272A, 274A, or B, 310A, or B, 311A,
313C, 323A, 328A, 348A, 349A, 352A
373A, 374A, 393A, 394A, 121A, Ballast Lamps,

Box 132 - QST

BARGAIN SPECIAL

January, 1949, QST, the tubes are at opposite
ends. This way one tube has to be in an inverted
position, but the doorknob doesn’t seem to mind
working upside down. Quarter-inch welding rod
is used for the lines, and for the filament terminals
as well.

Various antenna systems and methods have
been tried, and they find little to choose from be­
tween Twin-Lead and coaxial lines. Using a 16­
element array W4DPM was able to produce
standing waves on his feedline by reflections from
near-by objects. This worked so pronouncedly,
in fact, that he flashed a 316-A over by aiming
his antenna at a flat metal plate across the room!

One of their first major obstacles, that of meas­
uring frequency accurately, was overcome by us­ing
a 955 detector in the circuit shown on page 114.
This is sufficiently sensitive so that it may be
used across the room from a low-powered oscil­
lator, eliminating the need for coupling Lecher
wires directly to the oscillator, with resultant
possible detuning effects.

The doorknob oscillator described by the
writer last month in QST has been tried out by
quite a number of the 420-Mc. fraternity.
W3NWJ duplicated it, but with 316-As in place
of the 703-As used at WIHDQ. He says that the
lines had to be shortened a bit to get the larger
tubes to work in the band.

W2QNZ reports that there is some 420-Mc.
activity in northern New Jersey, with some of
the gang using 832 triplers and crystal control.
K2AH, West Orange, has a converter feeding into
a BC-348, which he says works fine on stable
signals. W2BAV, Rye, N. Y., is reported to be
on 420 with 100 watts and a 32-element array.
W2JND, Syosset, L. I., is on 430 Mc. He says
that he’s been heard as far away as W2UCD,
Belmar, N. J., and has worked W2FQW on sev­
eral occasions.

On the subject of polarization, W2VSA votes
for vertical, on the grounds that it
is simpler for
the fellow who must use a nondirectional antenna.
From our experience to date, however, anyone
who uses a nondirectional antenna on 420 is
doomed to failure, except on pure line-of-sight
hope; that is, if the nondirectional antenna is a
dipole. Stackedturnstile arrays for 420 Mc.
should be within the capabilities of almost every­
one, so we would rule out that consideration in
discussions of polarization on 420 Mc. It has
been suggested that horizontal be made the
standard for 420-Mc. work, simply on a toss-up
choice. Why change?

Out in Los Angeles, W6NLZ has transmitters
working on 420, 1200, 2100 and 3300 Mc., leaving
only 3 bands to go for complete coverage of the
u.h.f.-s.h.f. amateur assignments.

Your conductor is working out on 420 Mc.
every Wednesday night at 8 P.M., operating the rig
continuously for 15 minutes, retransmitting the
8 P.M. WIAW bulletins, or otherwise modulating
the January QST doorknob rig. A 16-element
horizontal array is aimed at the Hartford area,
but the direction will be changed for others on

(Continued on page 118)
Now... ALL these popular Astatic microphones are available in models with CERAMIC ELEMENTS

Microphone
Quality performance in a handsome yet inexpensive instrument. Opaque gray and chrome, complete with cable connector, detachable handle and interlocking base.

Velvet Voice
CRYSTAL, DYNAMIC OR CERAMIC MICROPHONE
- Sparkling beauty in gold-finished case and handle, with dark brown, detachable base for convertibility to desk stand, floor stand, hand use.

T-3 Crystal
OR CERAMIC MICROPHONE
- An all-time Astatic favorite, still as modern in design as ever. A sparkling beauty in bright chrome, with tilting head. Available with Type $ On-Off Switch.

D-104 Crystal
OR CERAMIC MICROPHONE
- First practical crystal microphone developed, with few changes still the top favorite of amateurs.

Wanted
... TRC1 equipment, T14 transmitters, R19 receivers, AM 8 amplifiers, PP13 power units.

Box 141 QST

RADIO and TELEVISION
Thorough Training in All Technical Phases
APPROVED FOR VETERANS
WEAKLY RATES
RCA GRADUATES ARE IN DEMAND
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 WEST 4th ST., NEW YORK 14, N. Y.

ENGINEER FACULTY — Excellent Laboratory and Technical Facilities. Limited Classes—Unlimited Opportunities. DAY—EVENING CLASSES. CRL is Sponsored and under Technical Supervision of CRYSTAL RESEARCH LABORATORIES, INC. Licensed by Connecticut State Board of Education. Approved for Veterans. Write today for Catalog and copy of Telecaster.

SCHOOL OF ELECTRONICS, INC.
29 ALLYN STREET • HARTFORD, CONNECTICUT

EVERYTHING AT YOUR FINGERTIPS with SUBRACO MT-15 X
GO "DASHBOARD" MOBILE-

ONLY 79.95
LESS TUBES

WRITE FOR CATALOG Q-39

SUBURBAN RADIO COMPANY
158 CENTRAL AVE. • ROCHELLE PARK • NEW JERSEY
MM-2 MODULATION MONITOR

ADD SIGHT TO YOUR SOUND...
with this basic oscilloscope featuring calibrated modulation percentage scale, linear 60 cy sweep with return trace blanking, trace intensifier window, complete controls, reversible panel, rack mounting provisions and many other outstanding features. See the MM-2 at your dealer or write Dept. J-9.

LAMBDA ELECTRONICS CORP.
BOX No. 55
CORONA, N.Y.

WANTED

More receivers in trade on new receivers and other equipment. The demand for our good reconditioned receivers at bargain prices is big. We need more trade-ins. Tell us what you want and how much you want for your receiver. Or ask how much we will allow. We bid high. Receivers shipped on ten day trial. Easy terms financed by us. Write.

HENRY RADIO
BUTLER, MISSOURI

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY
4799 SHERIDAN ROAD, CHICAGO 48, ILLINOIS

request. Crossband schedules will be arranged with interested parties who may not be able to work two-way on 420. So far the only contact has been with W1HDF at Elmwood, 12 miles distant, over high intervening hills.

I.A.R.U. News
(Continued from page 54)
mandated territories and to British occupational forces operating properly-authorized stations, who are fully paid-up members of either the R.S.G.B. or one of the British Empire societies.

CHILE

Back in 1938 Chile was without a national amateur society, although there was a group known as the “Radio Club Friends of the Air.” A national assembly of Chilean hams that year organized the society known as the Radio Club of Chile. In 1943 they received full government recognition and in 1947 the Radio Club of Chile became a member of I.A.R.U. Thus, they have just recently celebrated their tenth anniversary.

Their bulletin is growing, and now presents a good bit of technical information in excellent detail, even though the publication is in mimeograph form. The most recent copy received at I.A.R.U. headquarters, for example, contains a discussion of the “Transistor” and complete data on the design and construction of a rotary beam.

Hinks & Kinks
(Continued from page 56)

30 Mc., sharp tuning peaks in the mixer stage are regained without disturbing the oscillator frequency, and the receiver can be peaked for maximum sensitivity with decidedly less need for readjustment. In addition, the buffer presents a constant load to the oscillator, eliminating the trouble encountered in some receivers of oscillator failure in certain parts of the tuning range. No longer are dead spots encountered as the receiver is tuned through its range.

No doubt there is room for more experimentation on this subject, and it is hoped that others will be stimulated to make similar investigations along this line. — Clyde P. Brockett

Correspondence
(Continued from page 57)

it, because you didn't transmit it; and you didn't forget, because you didn't intend to give it. But since it is routine to send RST, QTH, and name, he actually thinks that he failed to copy correctly or that you forgot to transmit your name.

Now, from my standpoint, the term "OM" is every bit as personal and endearing as "Joe," "Pete," "Dick" or "Harry." When I call a ham "OM," it includes all the intimate feeling and consideration one ham can have for another. It is traditional in amateur radio to call each other "OM." It is one of those niceties peculiar to our group. It is a composite "handle" but, more important, includes the basic spirit of ham radio. It's an all-inclusive greeting to a fellow human who has common interests with you in the best hobby on earth. I'm proud to be called "OM." How about you?

— Everett L. Bailey, W4JA
Simpson 240 Hammeter

The first self contained pocket portable built expressly to check high voltage and all component parts of transmitters and receivers.

75, 200, 500, 3000 . . . D.C. Milliamperes: 0-15, 150, 750 . . . Ohms:
0-3000 (center scale 30) -0-300,000 (center scale 3000) . . . Accurate?
D.C. 5% - A.C. 5%. Amateur’s Net Price . . . . . . . . . . $24.60

SIMPSON ELECTRIC COMPANY
5200-5218 W. Kinzie St., Chicago 44, Illinois
In Canada: Bach-Simpson, Ltd., London, Ontario

Al Knodell
W9TLO

HAVE YOU YOUR COPY OF THE 1949 HANDBOOK?

Price $2.00
United States, Its Possessions and Canada $2.50 Elsewhere

AMERICAN RADIO RELAY LEAGUE
West Hartford - Connecticut, U.S.A.

CUSTOM BUILDERS
EQUIP YOUR RADIO CONSOLE WITH THIS QUALITY CHASSIS

NEW

ESPEY DELUXE TUNER
POWER SUPPLY
RADIO AMPLIFIER

514 Amplifier
513 Tuner

This New Custom Built AM-FM Quality Chassis gives you exquisite sound performance at an increased saving to you and your customer.

- The 513 DeLuxe Tuner is easy to install in any console cabinet, old or new and embodies the latest engineering refinements for highest quality at a price that defies competition.
- The Espey S13 Tuner employs 10 tubes plus tuning indicator in a super heterodyne circuit and features a drift compensated circuit for high frequency stability, tuned RF on AM and FM plus phono input provision, and separate AM and FM antennas.
- Model 514 DeLuxe Power Supply-Audio Amplifier is designed specifically to work in conjunction with Model 513 Tuner, and is also used wherever a high quality audio amplifier is required.
- With an output of 25 watts, Model S14 features a parallel push pull output circuit, self balanced phase inverter system, extended range high fidelity response, and inverse feedback circuit.

Makers of fine radios since 1928. Write Dept. KDI or your free catalog.

ESPEY MANUFACTURING COMPANY, INC.
528 EAST 72nd STREET, NEW YORK 21, N. Y.
Learning Telegraphy & Wireless is EASY

Keying fundamentals, codes — learn it all quickly, easily with Signal's new booklet, "Radio Keying and Telegraphy for Beginners". Performance-proven practice keys and two-way learner sets are also available. Mail 15c (stamps or coin) today for your instruction manual and equipment catalog.

ELECTRIC MANUFACTURING CO.
DEPT D-2, MENOMINEE, MICHIGAN

W8GFK
ALUMINUM CALL PLATES
and polished 1¼" letters. Plate size 2" by 6½". 3 styles: P for panel mounting, L for car license and D for desk use. $1.78 each postpaid.
P & H SALES CO.
619 Jasper St.
Kalamazoo, 31, Michigan

Courses to cover U.S.A. Radio
Amateur Examinations

Write for FREE BOOKLET giving details of CORRESPONDENCE COURSES by E.M.I. Institutes — the College backed by the Organisation which designed and developed the British Television System. Courses are supervised by full-time tutors, many of whom hold British Amateur Licences, who also teach in the day and evening attendance courses held at the Institute.

★ Many testimonials from successful candidates.

Principal — PROFESSOR H. F. TREWMAN,

E.M.I. INSTITUTES LTD.
Dept. 86, 43 Grove Park Road, London, W.4, ENGLAND

M.A.R.S.
(Continued from page 55)

quarters at San Antonio, Texas. Headquarters
4th Air Force, Hamilton Field, Calif., and 6th
Army Headquarters, San Francisco, Calif., are
arranging schedules for the Pacific Coast MARS
broadcasts.

Constructive criticism of these broadcasts is
invited by the Chiefs, MARS, and direct cor­
respondence concerning the above by military
personnel of any command is authorized. For
Chief, MARS, USAF, the address is 4-C-1067
Pentagon, and for Chief, MARS, Army, 3-B-337
Pentagon Building, Washington 25, D. C.

The VAR broadcasts originate in the Pentagon
with the option to use transmitters and accom­
panying rhombics at Ft. Myer or Battery Cove
up to the operator. The keying is over a v.h.f.
link with landlines as a stand-by.

For AF4AF, the transmission takes place from
701 Columbia Pike (on the Pentagon grounds)
using a Collins 30K-1 or Millen 90810 with 500
watts input. The sky wires on 40 and 80 are Zepps
and the 20-meter transmission is via a 3-element
close-spaced beam oriented at 270 degrees.

Happenings
(Continued from page 57)

Heard W1RNT on 80 or 40 c.w. recently?
She's the only YL ham at Hq., Eleanor Lyder,
steno in the Advertising Dept. Eleanor applied
for a job with us in November, 1947, completely
unaware of what this "radio league" thing was.
But the bug bit deeply and soon she was boning
up for her license exam, which she passed last
July. Right now she's showing her bosses, W1GS
and W1VG, a thing or two about operating. She
intends to get into traffic work, which she thinks
is one of the best ways an amateur can perform
in the public interest.

A.F.C.A. ANNUAL MEETING

The third annual meeting of the Armed Forces
Communications Association will be held in
Washington, D. C., March 28th and 29th, featur­
ing the Navy's communications and photographic
activities. Navy leaders and other distinguished
Government figures will be the principal speakers
at the banquet, following the first-day business
meeting. The second day and perhaps part of a
third will be devoted entirely to exhibits and
demonstrations planned and directed by the
Navy at its stations and aboard ships in the
Washington area.

Strays

For the amateur and SWL who like to listen
occasionally outside the amateur bands, the
World-Radio Handbook for Listeners is an excel­
lington international radio guide, with its listings of
practically all of the broadcast stations of the
world studded with interesting program and
technical notes. U. S. representative is Ben E.
Wilbur, 32 Whittlesey Ave., East Orange, N. J.
"The 10-Meter Beam arrived in fine shape. It has been up in the air for about four weeks and it works out fine — doing all and more than you said it would do. Two weeks ago we had a very bad wind storm that blew for eight hours with winds of more than 80 m.p.h. and gusts of more than 105 m.p.h. Trees and houses came down, but my Workshop Beam stayed up during it all without the slightest bit of damage."— A. C. Emmett, Jr. KL7SS, Yakutat, Alaska

"I have had one of your 10-Meter Beams since the fall of last year. It has gone through four hurricanes without mishap since original installation."— E. A. Baker W4MGW, Fort Lauderdale, Fla.

The WORKSHOP ASSOCIATES, INC.
Specialists in High-Frequency Antennas
63 NEEDHAM STREET, NEWTON HIGHLANDS 61, MASSACHUSETTS

Workshop Antennas and Equipment

<table>
<thead>
<tr>
<th>Antenna Type</th>
<th>Model</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>2-Meter Beam</td>
<td>#14AB</td>
<td>$21.50</td>
</tr>
<tr>
<td>6-Meter Beam</td>
<td>#52AB</td>
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<tr>
<td>10-Meter Dipole</td>
<td>#29AD</td>
<td>$8.00</td>
</tr>
<tr>
<td>10-Meter 3-Element Beam</td>
<td>#29B</td>
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<td>20-Meter 3-Element Beam</td>
<td>#14</td>
<td>$120.00</td>
</tr>
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<td>Antenna Mast Kit</td>
<td>#AM</td>
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</tr>
<tr>
<td>Model #AM1</td>
<td></td>
<td>$1.30</td>
</tr>
<tr>
<td>Rotating Accessory Kit</td>
<td>#AM2</td>
<td>$5.00</td>
</tr>
<tr>
<td>Workshop Rotator</td>
<td></td>
<td>$157.50</td>
</tr>
</tbody>
</table>

Available at better dealers

RADIO COURSES

- RADIO OPERATING
- RADIO SERVICING
- CODE
- PA TELEVISION

REFRIGERATION SERVICING
Personal Counselling Services for Veterans
Write for Catalog and Picture Brochure
Y. M. C. A. TRADE & TECHNICAL SCHOOLS
225 W. 66th St. (West of B'way) New York City

COMMERCIAL RADIO INSTITUTE

A RADIO TRAINING CENTER FOR 28 YEARS

Literature upon request, Veteran training
Dept. B., 38 West Biddle Street, Baltimore 1, Maryland

"It's KENYON Transformers For My Rig Because They Always Put Out!"

Hams everywhere specify KENYON "T" Line Transformers! Manufactured under rigid standards, all KENYON transformers are constructed of the finest grades of material plus the skill and long experience of a highly trained competent operating staff.

All KENYON transformers are checked progressively in the course of manufacture and are laboratory-tested upon completion to insure satisfaction. Yes, KENYON "T" Line Transformers meet the most exacting requirements of critical purchasers. For skillful engineering, progressive design and sound construction — Specify KENYON for top performance in your rig!

KENYON TRANSFORMER CO., Inc.
840 BARRY STREET
NEW YORK, U. S. A.
Enjoy noise-free reception — eliminate B.C.I. — by NFM transmissions! Low-cost National NFM adaptors are now available at your National dealer's.

FOR NATIONAL RECEIVERS:
NFM-07 for HRO-7 .......... $16.95
NFM-83 for NC-183 ........ $16.95
NFM-73 for NC-173 ........ $17.95

IF YOU BUILD YOUR OWN:
SA: 4842 discriminator-transformer .. $4.50

Hold your National receivers at the right angle — dress up your shack, too! Punched holes for accessory switches or jacks. See them at your nearest National dealer's.

It Seems to Us
(Continued from page 10)

it seems to us that the availability of only 50 kilocycles in any given part of the country indicates the need for some intelligent application within amateur ranks. These frequencies should be used only by the fellows who simply can't put ten meters or six meters or two meters to use to accomplish the same result, or in some cases, perhaps, by the amateurs now on ten who are plagued with unusually severe TVI problems.

Fourth, do not overlook the fact that at the time this is being written, the arrangement is not in effect but is only proposed. Do not "jump the gun" in getting on these frequencies but wait until you have conclusive evidence that it is permissible. WIAW will carry the facts in its official bulletins and information will be sent to all affiliated clubs, etc., when the authorization is granted.

— A. L. B.

An Arizona Kilowatt
(Continued from page 19)

herein won't give you a shoe box full of cards from choice DX, not all by itself, it won't. It takes operating skill, patience and know-how; and most of all you have to hear 'em before you can work 'em. The above-described rig won't do any of those things for you. But if you have all those things, and a full-grown 100-per-cent guaranteed cool-running legal-maximum-input one-kilowatt transmitter, what do you think you could do with it?

Yes, sir, you're right. You sure can!

Strays

Allen B. Du Mont Laboratories, Inc., has announced an informative 64-page publication, "The Cathode-Ray Tube and Typical Applications," which is available to instructors and those professionally engaged in the electronics field. Written in nontechnical language and profusely illustrated, the book's five chapters are devoted to c.r.t. history and development, construction, test-equipment applications, TV applications and radar uses. Copies are available without charge from the Technical Publications Office, Allen B. Du Mont Laboratories, Inc., 1000 Main Ave., Clifton, N. J.
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in that field of their art.

(2) No display of any character will be accepted. nor can any individual, firm or corporation be listed. All or part capital letters be used which would tend to make one advertisement look like another.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraphs (1) and (2).

(4) Remittance in full must accompany copy. No cash or check discount or agency commission will be allowed.

(5) Closing date for Ham-Ad is the 25th of the second month preceding the month of publication in manner and is placed and signed by a member of the American Radio Relay League, Inc., or by a member of the American Radio Relay League, Inc. and includes commercial and all advertising by him for the grade advertised. Having made no investigation of the advertisers in the classified column, the rate is 30¢ per word, except as noted in paragraphs (1) and (2).

(6) No display of any character will be accepted. nor can any individual, firm or corporation be listed. All or part capital letters be used which would tend to make one advertisement look like another.

(7) Because error is more easily avoided, it is requested that you use more than 100 words in any one issue or not more than one ad in one issue.

(8) No rate reductions will be allowed.

(9) Remittance in full must accompany copy. No cash or check discount or agency commission will be allowed.

(10) Closing date for Ham-Ad is the 25th of the second month preceding the month of publication in manner and is placed and signed by a member of the American Radio Relay League, Inc., or by a member of the American Radio Relay League, Inc. and includes commercial and all advertising by him for the grade advertised. Having made no investigation of the advertisers in the classified column, the rate is 30¢ per word, except as noted in paragraphs (1) and (2).

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(23) No rate reductions will be allowed.

(24) Remittance in full must accompany copy. No cash or check discount or agency commission will be allowed.

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(34) Remittance in full must accompany copy. No cash or check discount or agency commission will be allowed.

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(36) No display of any character will be accepted. nor can any individual, firm or corporation be listed. All or part capital letters be used which would tend to make one advertisement look like another.

(37) Because error is more easily avoided, it is requested that you use more than 100 words in any one issue or not more than one ad in one issue.

(38) No rate reductions will be allowed.
SELL complete Kw station including new NC-240D with BC453 Q5er, $195.00. Never used, D104 mike and stand, $12.00. Two 401A outputs, paperless wattmeters, 150 watts CW output, 300 volts P.F., $495.00. 1780 v. 60 30 Ma., $22.00. BC221 VFO exactly as in March '47 QST--$15.00. Complete radio, $125.00. (Ask about our high grade modular unit transmitters) KW RCA surplus modulation, 500 ohm input and HD filament) extra pair 90's new $30.00, Used FC453's, tubes, $3.50 each, 1000 v. supply plus 1172Hs only, $40.00. Final amplifier 40TUH, input 500 v., $25.00. Used 6k6's, used 8k6's, $2.50 each. B&W HD swg. link and 20 meter coil; Sunanamo 12000 v. b.c., $25.00, check with W2KQI, W1AC, $10.00; PP motor and 2 small alvyn motors plus four 1/4 x 1/4 x 2 in. $15.00. Details by mail, all guaranteed. Take all or $500 and get many extras. Don Sauer, WHEK, McCook, Nebraska.

CASH for good receiver and commercial transmitters. Sell good 400 watt All-Transmitter. $100.00. EICO, $150.00. LAR-1000 400 watt p.f. $195.00, Good kilowatt phone final, power supply, 810's, 5 HDV1's, 5000 amp supply, 8100 watt output, 10000 volts, D.C., 70; 6 foot sectional cabinet, new panels, two chassis, $35.00. Good HQ-120X, with speaker, $100. Bargain box, hundreds of new transistors, other components, many variables, coils, condensers, six Triplett meters, modulated signal generator, 807-A, 807-A, 6L6's, 708-A's, 706-A's, 6n6's, 6h6's, 6h7's, 6a6's, 6v6's, 6h7's, 5814's, 6h6's, etc., $300.00. Write for details. Harold Ramos, W8TGU, 3802 East 46th St., Columbus, Ohio.

Selling exclusive plate transformer, 100-watt all-band transmitter. Butterly tank condenser, Q5er, 908's, 928's; Miscellaneous parts. W8FSS, Box 184, Tylerstown, Md.

Wanted: Where can I get a used 811-A amplifier, $40.00, HT-19 transmitter, $250.00; SP-400X receiver, $370.00. This equipment is practically new. W2IOJ, Cleveland, Ohio.

FIRST! Brand new, latest printed circuits nationally distr. ad. $455 complete, 7-day money back trial. Used 2 PC working condition. Complete with few minor repairs. $495.00. Parise, 19 South 4th, Minneapolis, Minn.

TRANSAITLANTIC link-up Britain's radio monthly, "Practical Wireless.., keeps you informed on British-European radio..." Case and 2 years back issues. Write QST, $5.00 each. LATEST Meissner signal shifter all bands with FM added. Same price. 300 miles missing. Fine run. Best cash offer, W2QYD, 450 watt CW and CW generator, 250 watts phone, 1000 watts output. QST, $5.00 each, 25 cents each. W2QYD, 450 watt CW and CW generator, 250 watts phone, 1000 watts output.


FOR SALE: Hallicrafters SX-25 complete with speaker, excellent condition. 24 Hour service on RSLS, SWLS. W1HIJ, Box 32, Manchester, N. H.

FOR Sale: Hallicrafters S-40A for sale. 10 months old and in fine condition. $65.00. W6FS, 401 West Evelyn St., Lewistown, Montana.

FOR Sale: Hammarlund HQ-129X, month old, used but in good condition. $140.00. AJ Williams, WHHYA, 314 Victory Heights, Spokane, Wash.

FOR Sale: Sold, complete good used condition, less dynamotor and ground-component condenser. Best offer. W6RWS, 26 East Seley Lane, Redwood City, Calif.


Four hour service on QSLs, WLSL, W1BHJ, Box 32, Manchester, N. H.

FOR Sale: Hallicrafters SX-25 complete with excellent, speaker condition, complete plus a few extra parts. $125.00. W2GWE, 720 Modick Ave., New York, N. Y.

FOR Sale: Sold, complete good used condition, less dynamotor and ground-component condenser. Best offer. W6RWS, 26 East Seley Lane, Redwood City, Calif.

Selling out ham equipment: Two 1 kW 'phone transmitters, complete with tubes; four smaller transmitters, 200 to 500 watts; 500 watt speech amplifier, and modulator unit; 750-watt AC generator; spare plate and modulation transformers. All must go. Bargain prices. W8YAM, Westwood Ave., Evanston, Ill.

WESTINGHOUSE 18A mobile receiver, 18B receiver, dynamotor, $22.00 plus postage. C. Sleetier, 11 Saratoga Drive, Schenectady, N. Y.

HARMMLUND HQ-129X, month old, used but a few hours, excellent condition. $150.00. W2HTA, 17 Poplar Street, Ridgefield Park, N. J.

Selling out ham equipment: Two 1 kW 'phone transmitters, complete with tubes; four smaller transmitters, 200 to 500 watts; 500 watt speech amplifier, and modulator unit; 750-watt AC generator; spare plate and modulation transformers. All must go. Bargain prices. W8YAM, Westwood Ave., Evanston, Ill.

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SALE: Five Super-Pro receivers: $125.00 and up. RCA Marine $20.00. Prop-Pitch rotator, $15.00; Rotator motors, $5.00. Riders $100.00. W2YHO, 71 Crosshill St., Staten Island, N. Y.

Sacrifice: $630.00. F. o. b. Manhattan, Kansas.

SELL: Collins 75A-1, $300; Collins 310B-1 exciter, $150; F. o. b. Springfield, Mo. W2YJF, 743 S. Highland Ave., Oak Park, Ill.

Trade Collins 75A receiver for best deal on Leica or Contax outfit, or best cash offer, or jeep. W4AIS.

TRADE: Webster 80 wire recorder, in perfect condition. A sacrifice at $175.00, W2YOJ, Vic Crawford, 34-09 83rd St., Jackson Heights, L. I., N. Y. or phone Newtown 9-2304.

WEBSTER 80 wire recorder, in perfect condition. A sacrifice at $175.00, W2YOJ, Vic Crawford, 34-09 83rd St., Jackson Heights, L. I., N. Y. or phone Newtown 9-2304.

Augsburg camera, F4.5 lens, 1/250 sec shutter comp. with carrying case and sun shade in perfect condition. $30.00. Trade or sell.

Want offer around $200.00. Jack Kaiser, 817 Forest Ave., Los Angeles, Calif.

WANTED: For sale, Hickok Model 195 oscilloscope. Used 2 hrs. $200.00 or best offer SWGBO, 2117 Ginter Street, Richmond, Va.

 pals.

WANTED: Use equipment clean. Recorders, wire, tape, perforator. W2YOJ, Vic Crawford, 34-09 83rd St., Jackson Heights, L. I., N. Y.

WANTED: FOR SALE: Hickok Model 195 oscilloscope. Used 24 hours. Guaranteed new $125.00 or best offer. WTYID, P. O. Box 475, McCammon, Idaho.

WANTED: For sale: no time to operate. Collins 12Y1, $400.00. Collins 175-8A receiver, $100.00. Also, VHF152-A for $65.00. Dr. M. L. Rodman, WREN, Fargo, North Dakota.

WANTED: NC-240CS complete, excellent condition. $175.00. W. Gago, WFDU, 743 S. Highland Ave., Oak Park, Ill.

SELLING out: Send for complete list. 8W8DR, 202 E. Philadelphia, Flat 3, Miami.


WANTED: Five ten-meter beam antennas, 15 feet, 60 feet, 100 feet, 150 feet, 200 feet, all complete. $250.00. W4FZN, Fairhope, Ala.

WANTED: Webster 80 wire recorder, in perfect condition. A sacrifice at $175.00, W2YOJ, Vic Crawford, 34-09 83rd St., Jackson Heights, L. I., N. Y. or phone Newtown 9-2304.

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The No. 90921 'SCOPE AMPLIFIER-SWEEP UNIT

The No. 90921 comprises horizontal and vertical amplifiers, a hard tube saw tooth sweep generator and power supply mounted on a standard 5 3/4" rack panel for use with the 2, 3, or 5 inch Millen basic 'scopes.

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MAIN OFFICE AND FACTORY
MALDEN
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Unfortunately, it only takes one case of BCI for the neighborhood Ham to become the scapegoat for every complaint of electrical disturbance in his neighbor’s radio set.

It seems to be human nature, as soon as the sky-wire goes up with its distinctive zepp feeders, or the beam is seen with its multiple elements, to blame the amateur for every neighborhood electrical nuisance, whether it be the air compressor at the corner filling station, the diathermy machine at the hospital down the street, or the oil burner next door.

This is a sad state of affairs, as most of us have found through bitter experience. It not only subtracts considerably from the enjoyment of our hobby, but also, it may result in strained relations with the non-technical BC set owner who lives next door or across the street.

Generally, under such circumstances, the burden of proof lies entirely with the amateur. It is usually up to him to initiate action for elimination of the interference, or he must be prepared to suffer the indignities of blame for its generation regardless of its true origination.

As an aid to the ham who is confronted with a problem involving a neighborhood electrical nuisance, Mallory has available for the asking an informative technical booklet entitled "Practical Radio Noise Suppression", which takes up in detail the generation, transmission and suppression of electrical noises resulting from the operation of motors, electric signs, fluorescent lights, oil burners and appliances. This booklet is a worthwhile addition to the amateur's library and may be had by addressing a card to P. R. Mallory & Co., Inc., Box 1558, Indianapolis 6, Ind.

Your copy of "Practical Radio Noise Suppression" is another example of the thoroughness with which the Mallory Engineering Staff operates ... not only as a technical information bureau, but also as a designer of Precision Radio and Electronic Parts.

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"I now hold ticket P-10-3787, and holding the license has helped me to obtain the type of job I've always dreamed of having. Yes, thanks to CIRE, I am now working for CAA as a Radio Maintenance Technician, at a far better salary than I've ever had before. I am deeply grateful." Student No. 3310N12

"I was issued License P-2-11188 on November 4. The next day I was signed on board a tanker as Radio Operator-Purser. Besides radio operating, I handle the payrolls, etc., which is all overtime and brings my monthly pay up to between $500 and $650." Student No. 2355N12

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1. Calibrated amateur bandspread for 6, 10-11, 20, 40 and 80 meter bands. Gear drive tuning dials.
2. Two RF stages on all bands! Image rejection 40 db at 28 mc!
3. New "double-diode" noise limiter, effective on both phone and CW!
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5. S-meter with adjustable sensitivity for both phone and CW!
6. Temperature compensation and voltage regulator provide outstanding stability!
7. High-fidelity push-pull audio output! Ideal for phonograph attachment. Tone control.
8. Accessory socket for NFM adaptor!

- RANGE: 0.54 to 31 mc. plus 48-56 mc.
- TUBE COMPLEMENT: 14 plus rectifier and voltage regulator.
- AUDIO OUTPUT: 8-watts undistorted

The brilliant new National NC-183 incorporates the latest in circuit design. Check its outstanding performance features. Note the rugged, heavy-duty quality of the National-designed, National-built components at your dealer's today. When you see inside, you'll decide on the National NC-183.

$268 (less speaker), Also available in rack model at same price. (Prices slightly higher west of Rockies)
NFM-83 adaptor makes the NC-183 a top-notch NFM receiver. Instant selection of AM or NFM from front panel.

$16.95
## RCA RECEIVING TUBE CW Ratings

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<td>375</td>
<td>250</td>
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<td>300</td>
<td>-125</td>
<td>100</td>
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<td>21</td>
<td>3.5</td>
<td>28</td>
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<tr>
<td>RCA-6N7</td>
<td>350</td>
<td>-100</td>
<td>30 (per plate)</td>
<td>5 (per plate)</td>
<td>5</td>
<td>5</td>
<td>5.5 (per plate)</td>
<td></td>
<td>14.5 (total)</td>
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<td>35</td>
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<td>-100</td>
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<td>2</td>
<td>11</td>
<td>30</td>
<td>9</td>
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**Note 1:** 100,000 ohms maximum grid resistor  
**Note 2:** Based on 70% plate efficiency  
**Note 3:** Maximum frequency for full power output and input  
**Note 4:** For pentodes, this is the grid-screen amplification factor

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Use **RCA Receiving Tubes** in your new transmitter

The high-frequency cw ratings for the seven popular RCA receiving types given above, mean that you can now obtain plenty of r-f power inexpensively.

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**RADIO CORPORATION of AMERICA**  
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