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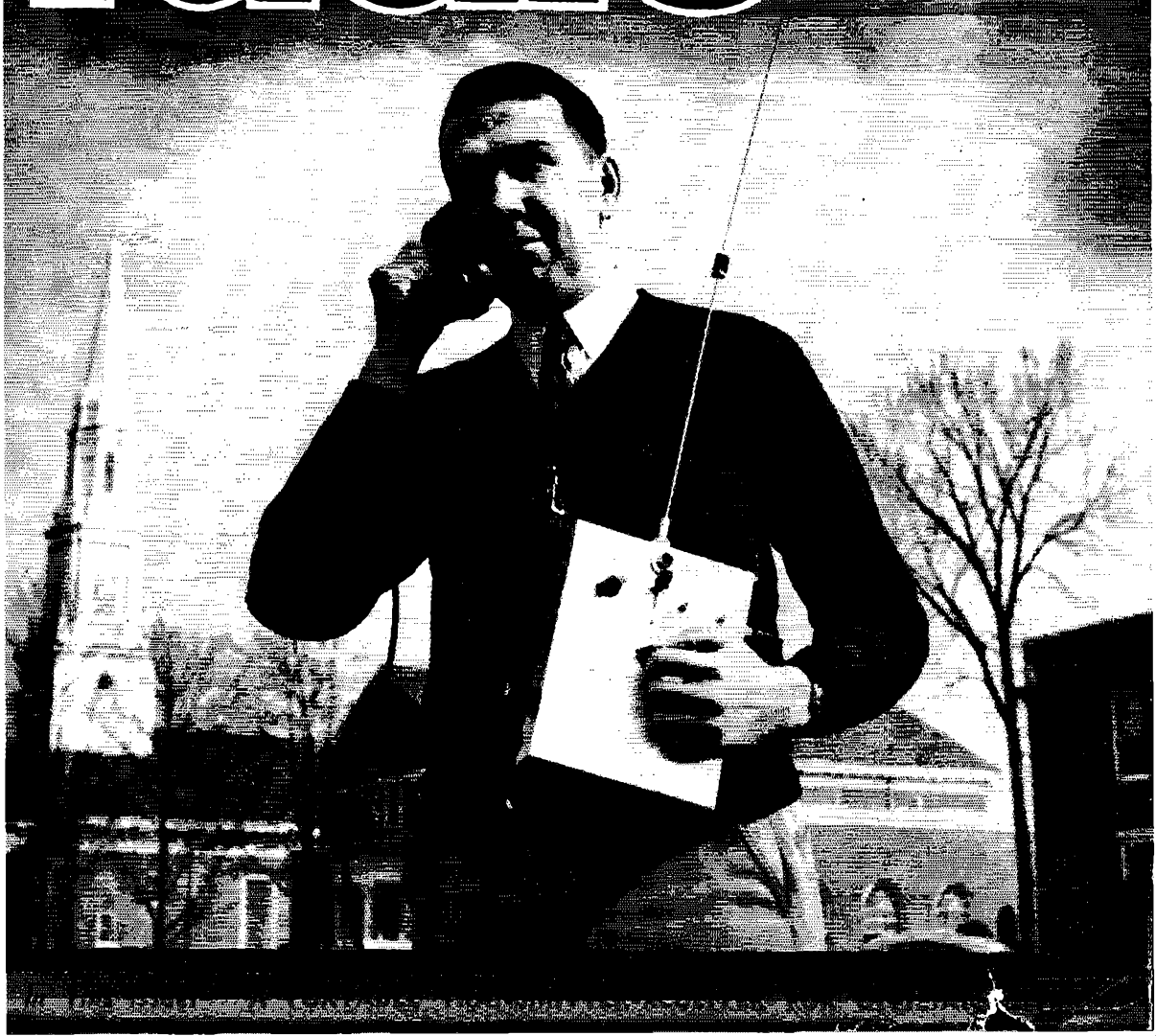

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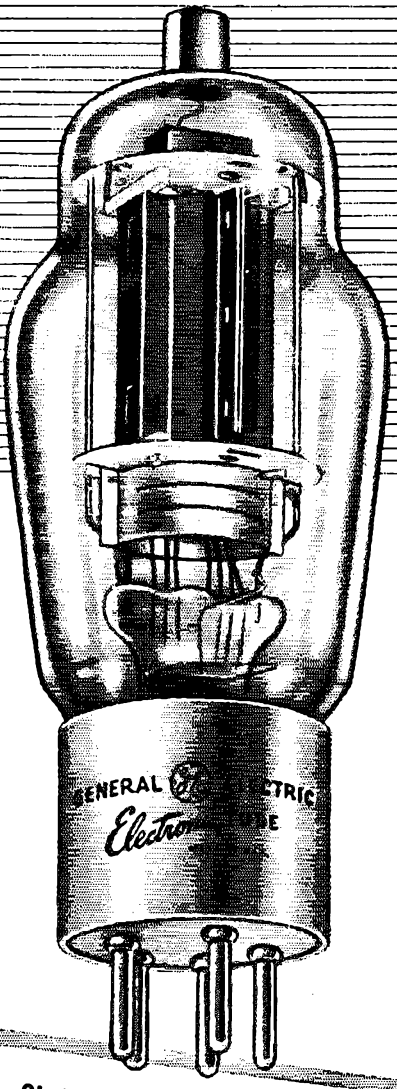

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Freq. at max ratings	60 mc	

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QST

MAY 1951

VOLUME XXXV • NUMBER 5

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

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38 La Salle Road
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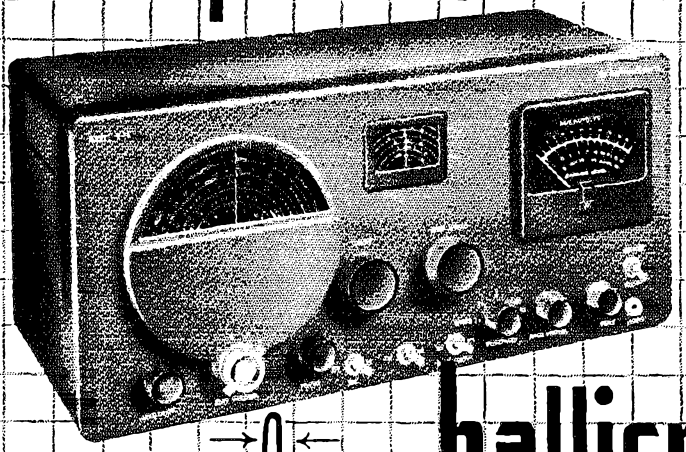

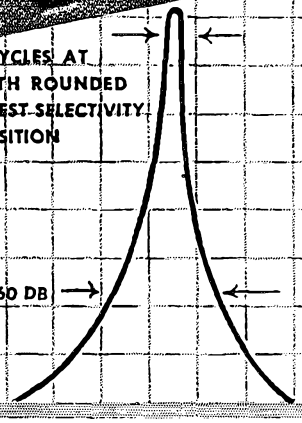

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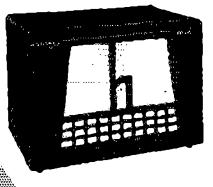

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports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

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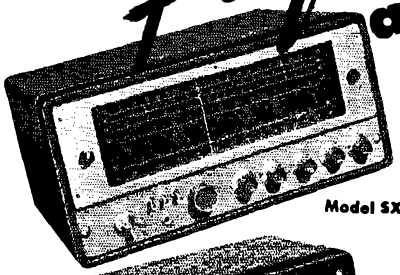

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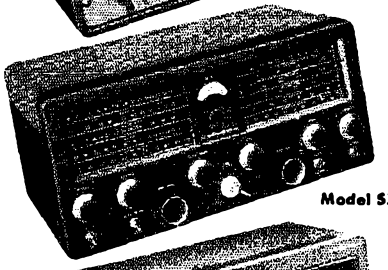

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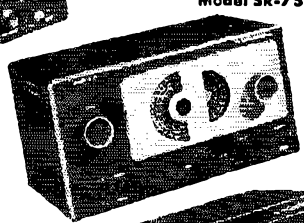

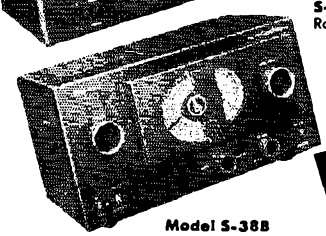

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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

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

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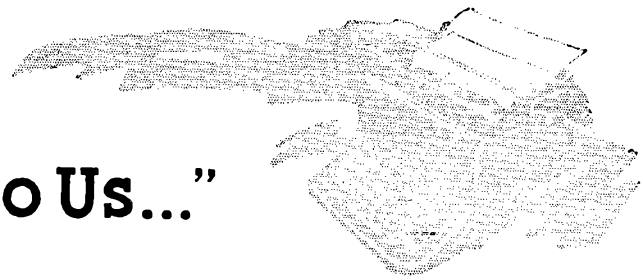


"It Seems to Us..."

DISASTER COMMUNICATIONS — AND CIVIL DEFENSE

The Federal Communications Commission has been pouring out rule-making so rapidly the last few months that we'll wager its mimeographing department is almost as busy as ARRL's. A number of its actions have been either directly in our field or in immediately-related ones. Right now we'd like to discuss the relationship between the newly-established Disaster Communications Service rules and the segments of amateur bands earmarked for amateur use in civil defense, so that in this flurry of recent actions we won't lose perspective as to how one fits in with the other.

First of all let us make it clear that the Disaster Communications Service has been set up to perform one specific function, and that the amateur c.d. frequencies have been reserved to provide another and separate specific function. The function of our earmarked channels is, obviously, to provide amateur communications on behalf of civil defense agencies in the event of war. That of DCS is mainly to supply a common meeting ground for coördinating disaster work of various communications agencies in a community or larger area, in peace or war.

The DCS is set up to operate in 1750–1800 kc., under rules as printed in their entirety in April *QST*, beginning on page 38. It is by no means exclusively an amateur service. It does not replace any of the services which amateurs now perform. Its aim, primarily, is one of furnishing liaison channels between all the various services engaged in disaster planning and operation — amateur, police, utilities, military, etc. There is to be no wholesale licensing of amateurs, or of stations in any other service. Before any DCS license will be issued, applicants must show that their contemplated operation is as part of a locally- or regionally-coördinated plan. In fact, a copy of the plan must be on file with FCC.

So, as we see the new service, in a typical area it would consist of one (or two or three, for alternates) amateur station licensed to operate in 1750-1800 kc., and the same number of similarly-licensed stations from each other service working together as part of a plan. We'll still conduct our basic emergency planning and our networks and our drills on amateur frequencies. The only difference now is that, in the event of emergency (and of course in advance practice drills) our networks will be able to have a DCS-licensed liaison station, a sort of roving halfback, who can through the 1750–1800 kc. channels report, for example, what specific services amateurs are in process of performing, and in turn find out what non-amateur stations are doing. (Or the same exchange of information can be accomplished by cross-band work, DCS frequencies to amateur bands.) This will prevent duplication of effort and ensure that each emergency facility, amateur or otherwise, is used to best advantage. In practice, it may well mean that the disaster communications efforts of all groups are coördinated and directed by the community authorities through these liaison channels.

DCS is not primarily a defense or wartime measure; it is a permanent part of our nation's normal communications structure. As such a part, and a particularly useful one for the purpose, it can of course be integrated with other defense or wartime communications plans — and in fact FCC has indicated that its frequencies will remain available even in the event of war. In such event, amateur communications for civil defense conducted on the segments of our bands reserved for that purpose will still have, through representatives, liaison with other agencies similarly engaged.

In short, the Disaster Communications Service is a means of permitting the right hand to know what the left is doing.

ARE YOU LICENSED?

• When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

25 Years Ago this month

May 1926

. . . The Editor bemoans the current "lust for DX" which has "almost killed short-range, friendly, casual contacts."

. . . Amateur coöperation is solicited in maintaining communication with the Byrd Arctic Expedition.

. . . RCA has brought out three new tubes — the UX-200A high-sensitivity detector, the UX-171 audio amplifier, and the 874 regulator.

. . . With interest in crystal control growing, Stanley P. McMinn, 2WC, presents pointers on adjusting crystal-controlled transmitters.

. . . A. L. Budlong chronicles the achievements of amateurs in providing emergency communications for the Pennsylvania Railroad. And a Clyde Darr cover realistically portrays one of the "PRR" gang in action.

. . . The technique of rejuvenating low-emission transmitting tubes is detailed by Assistant Technical Editor John M. Clayton.

. . . The Wilkins Arctic Expedition has selected Howard F. Mason, 7BU, and Robert Waskey, 7UU, to serve as radio operators.

. . . A new dry-type rectifier, using magnesium and copper-compound discs, has been announced by the Elkon Manufacturing Co.

. . . The Army-Amateur Net control station, 2CXL/2XBB, is featured in the station descriptions section.

OUR COVER

NEC W1NJM operates W1HDQ's civil defense portable on the West Hartford green. A description of this rig starts on page 35.

A.R.R.L. ROCKY MOUNTAIN DIVISION CONVENTION

Estes Park, Colo., June 9th & 10th

The first Rocky Mountain Division Convention in five years will be held at Elkhorn Lodge, Estes Park, on June 9th and 10th. A full program is planned, and speakers will include Rocky Mountain Division Director Frank Matejka, WØDD, and ARRL Technical Director George Grammer, W1DF. At midnight there will be the traditional ceremony of the Royal Order of the Wouff Hong.

Registration fee for the convention is $7.50, dinner and banquet included. Rooms are available at the Lodge (capacity of 150 persons, 2 to a room; $4.50 with bath, $2.50 without; both prices include Sunday breakfast) and in town. The capacity of the dining hall where the convention banquet will be held is 300 and so to avoid disappointment it would be well to check with the convention chairman beforehand, or to register at once and receive confirmation. All convention correspondence should be addressed to F. K. Matejka, WØDD, Estes Park, Colo.

HAMFEST CALENDAR

ALABAMA — Sunday, May 20th, at Mobile — Tri-state Hamfest arranged by the amateur radio clubs of Pensacola, Fla., Mobile, Keesler, Miss., and the Gulf Coast. No registration fee required — picnic will be Dutch treat. The day's entertainment includes swimming, contests, rag chewing, etc.

GEORGIA — Sunday, June 10th, at Robinson's Tropical Gardens — annual Hamfest of the Atlanta Radio Club. Program will start at 10 A.M., rain or shine. Adult tickets $2.50, children $1.75. Reservations should be made through Secy. Lee Connell, W4NQO, 624 Page Ave. NE, Atlanta.

ILLINOIS — Sunday, June 3rd, at Camp Ki-Shau-Wau — annual Hamfest of The Starved Rock Radio Club. A good time is assured all who attend. Tickets purchased in advance, $1.00; at the gate, $1.50. See June Ham-Ads or write W9MKS, Box 22A, Utica, Illinois, for details.

NORTH & SOUTH CAROLINA — Sunday, May 6th, at W4BPD's antenna farm, Orangeburg, S. C. — another popular picnic-style Hamfest. All Carolina hams are invited. Bring the XYL and kiddies and have a good time!

TEXAS — Saturday and Sunday, May 26th and 27th, at Kerrville — sixth annual Convention of the South Texas Emergency Net (STEN). Keynote of the program will be civilian defense. Speakers representing all branches of communications will be presented.

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. Its operation is made possible by volunteer managers in each W, K and VE call area. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

W and VE stations should not send cards for other W and VE stations through the QSL Bureau; they cannot be accepted. Likewise, cards for foreign stations should be sent only through the foreign bureaus. For a list of these overseas QSL bureaus, see page 48, December, 1950, *QST*.

W1, K1 — J. R. Baker, jr., W1JOJ, Box 232, Ipswich, Mass.
W2, K2 — H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia 5, Penna.
W4, K4 — William M. Rowe, jr., W4JDR, 2430 Connally Drive, East Point, Ga.
W5, K5 — L. W. May, jr., W5AJG, 9428 Hobart St., Dallas 18, Texas
W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.
W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.
W8, K8 — Walter Musgrave, W8NGW, 1294 East 188th, Cleveland 10, Ohio
W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wisc.
WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 329 15th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 1785 Emerson St., Victoria, B. C.
VE8 — Roy Walton, VE8CZ, Box 534, Whitehorse, Y. T.
KP4 — E. W. Mayer, KP4KD, Box 1061, San Juan, P. R.
KZ5 — C.Z.A.R.A., Box 407, Balboa, Canal Zone
KH6 — Andy H. Fuchikami, KH6BA, 2543 Namauu Dr., Honolulu, T. H.
KL7 — Box 73, Douglas, Alaska

D.S.R.C. Radiotelephony

Increased Sideband Output and Higher Efficiency in 'Phone Transmission

BY GEORGE GRAMMER,* W1DF

The type of 'phone transmission described in this article offers a very marked increase in sideband power output over amplitude modulation of the well-known type. Power consumption is substantially reduced, very little audio power is required, and the signal creates less heterodyne interference. Transmissions are readily receivable on conventional receivers, using conventional tuning methods.

The modulation circuits are simple and no more difficult to adjust than in ordinary grid modulation. Straightforward design methods, based on sound principles of modulation, are available.

DOUBLE-SIDEBAND reduced-carrier (d.s.r.c.) radiotelephony offers a number of advantages over conventional amplitude modulation: considerably higher efficiency, where efficiency is defined as the ratio of sideband (useful) power output to total power input; high output with comparatively little audio power; and a considerable reduction in heterodyne interference. These advantages can be obtained with simple circuits that are straightforward in design and adjustment, and the signal can be received by ordinary methods.

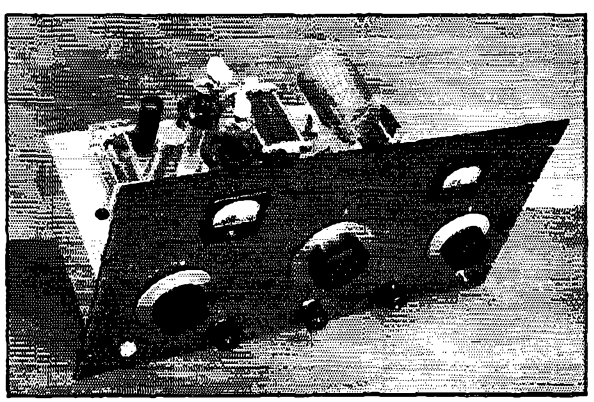
Straight amplitude modulation (A3) is rather inefficient. For example, plate modulation of a Class C amplifier operating with 100 watts input requires 50 watts of audio power (on a sine-wave basis), which is generated by a modulator that is only about 50 per cent efficient. The total power input is around 200 watts, at full modulation. Under ordinary conditions the carrier output will be 75 watts and the sideband power 37.5 watts, so the over-all efficiency is in the neighborhood of 20 per cent. Grid modulation runs about the same efficiency because, although the modulated-amplifier efficiency is lower, very little power is taken by the modulator.

The Rôle of the Carrier

The reason why the efficiency is low in ordinary A3 transmission is that two thirds of the power output goes into the carrier. But it is the sidebands, not the carrier, that do the talking at the receiving end. The principal function of the carrier is to give the receiver's detector something to work on, and so make it possible for anyone capable of turning a knob to tune in the signal and get intelligible speech from the loudspeaker. That is all right for broadcasting, but in amateur radio where operators presumably have some technical skill it has its ridiculous side. Why throw away two thirds of the output of a transmitter just so the fellow at the receiving end can tune his receiver like a BCL would?

It is well known, of course, that a carrier does not have to be transmitted at all. The fellows on single sideband are operating that way right along. In fact, single-sideband suppressed-carrier transmission is the ultimate, but there is no denying that it requires a bit more than average knowledge and skill to construct and operate such a transmitter. Some skill also is required to receive it satisfactorily. Despite the difficulties, it is gratifying that a steadily increasing number of the fraternity are going on single sideband. But in the meantime, d.s.r.c. transmission offers an intermediate step — one that any amateur with average "know-how" can take.

* Technical Editor, *QST*.



The experimental d.s.r.c. transmitter on which the principles described in this article were tested.

In reduced-carrier transmission, the tube power capacity no longer required for generating a full carrier is available to be used to generate sideband power, thus increasing the over-all efficiency and raising the effectiveness of the signal. From another viewpoint, a d.s.r.c. signal is one that has more than 100 per cent modulation, but with this important characteristic — there is none of the splatter that accompanies overmodulation of a straight A3 signal.

Principles

The principles on which d.s.r.c. transmission are based have been in use for some time, but at what might be called extremes of the scale. On the one hand, O. G. Villard, jr., W6QYT, has described a system operating chiefly as plate-modulated A3, with a limited amount of reduced-carrier type operation to prevent overmodulation splatter on voice peaks.[1] On the other, the single-sideband enthusiasts have eliminated the carrier entirely, along with one sideband. The middle ground has not been explored heretofore.

When a d.s.r.c. signal is received on a "straight" receiver there is some distortion, depending on how far the carrier has been reduced below the value that would normally accompany the same sideband power. The thing that makes it interesting as a method of communication is that we have found experimentally that quite a bit of the carrier can be eliminated before *intelligibility* suffers badly. Furthermore, most communications receivers have a built-in means for eliminating the distortion entirely. Hence, when just enough carrier is transmitted to preserve intelligibility it is possible to carry on communication by perfectly normal reception methods; and the receiving operator can, if he wants, easily restore the original quality of the modulation. In practice, the carrier can be reduced far enough so that the major part of the power gain obtainable with completely carrierless transmission can be realized.

To go over the principles briefly, let us first take the case of a carrier and a pair of side frequencies (single-tone modulation) shown along a frequency scale as in Fig. 1A.[2] At 100 per cent modulation each side frequency has exactly half the amplitude of the carrier, giving the modulation envelope shown at B. Although the drawing does not show it, a definite phase relationship must exist between the carrier and the two side frequencies if the envelope shown is to be produced; three separate frequencies of the same amplitudes but not having the proper phase relationships will not give the pattern shown at B. However, in other respects, the three frequencies can be considered as three independent signals.

It is not hard to imagine the amplitudes of the two side frequencies being increased indefinitely while the carrier amplitude stays fixed. Nothing in Fig. 1A would prevent it. And there is no reason why the proper phase relationships cannot be maintained, since the amplitude of any of the

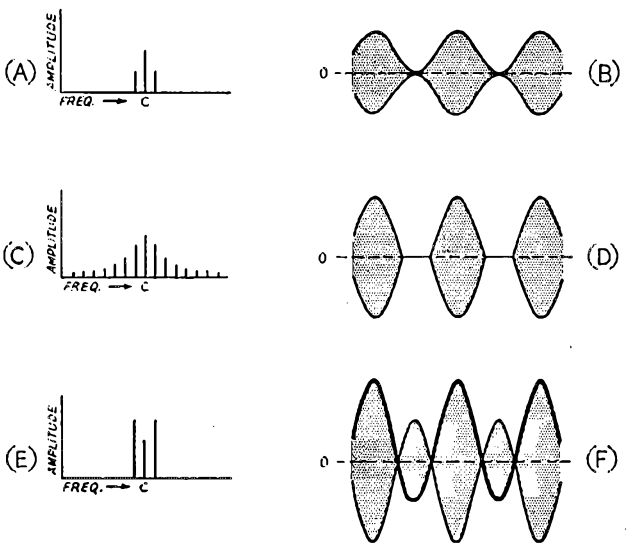


Fig. 1 — Frequency spectra and wave-envelope patterns of conventional A3, 100 per cent modulated (A–B), overmodulated A3 (C–D), and d.s.r.c. with a modulation factor of 3 (E–F). In the frequency diagrams the carrier is indicated by *C* in each case.

three frequencies considered individually does not affect its phase. However, in straight amplitude modulation the side frequencies cannot be increased above one-half carrier amplitude because the methods used do not permit modulating more than 100 per cent downward. When the output reaches zero on the downswing it simply stays there for as long as the modulating signal cuts it off. This gives rise to the type of pattern shown at D. It is the same pattern that would be produced by a complex modulating signal of the same waveshape,[3] and is accompanied by additional sidebands as indicated (but not to scale) at C. There must be just enough such additional side frequencies, of just exactly the right amplitudes and phases, to add up (with the carrier) to zero output during the entire time that the output is cut off by the modulating signal.

This limitation is not in the modulated wave itself, but only in the method used to produce it. To have distortionless — and splatterless — downward modulation of more than 100 per cent it is necessary to continue the modulation "below zero" during the time when the output would

[1] Villard, "Overmodulation Splatter Suppression," *QST*, June, 1947.

[2] Technical Topics, "How To Visualize a 'Phone Signal," *QST*, July, 1950.

[3] Technical Topics, "Some Facts of Modulation," *QST*, March, 1951.

be cut off in straight amplitude modulation. "Below zero" does not mean less than zero output. It simply means the same thing that it does in any a.c. wave — that is, the phase is reversed when the wave crosses the reference or zero axis. Actually, the farther one swings below zero the greater the output becomes, and in just the same ratio that it increases on an upswing.

There is no limit to the percentage of modulation that can be used when the phase is reversed and the carrier is properly modulated during the periods that would represent overmodulation in the case of pure amplitude modulation. Such an "overmodulated" signal occupies no more spectrum space than a conventional a.m. signal modulated 100 per cent or less. A signal of this sort has the carrier-and-side-frequency relationship shown at E in Fig. 1. The modulation envelope appears at F where, as shown by the heavy outline, the modulation follows a sine wave and hence is without distortion. The pattern shown is the way a d.s.r.c. signal looks on an oscilloscope which, because it does not show phase, merely shows the amplitude of the r.f. voltage or current from instant to instant. The pattern does not bear much resemblance to the "normal" modulation pattern at B, but *it is the only type of pattern that can represent an undistorted signal with more than the customary sideband amplitude.*[4]

Circuits

Circuits that can generate a d.s.r.c. signal all make use of the balanced-modulator principle so familiar to single-sideband operators, but there are many possible variations. A balanced modulator alone will eliminate the carrier more or less completely, so in order to transmit a carrier it is necessary to introduce a means for deliberately unbalancing the modulator to the desired extent. The circuit shown in Fig. 2 will serve to illustrate the method. By-pass condensers and other accessories normally required have been omitted in Fig. 2, for the sake of getting down to essentials.

This circuit uses two tetrodes connected with their grids in push-pull and plates in parallel for r.f. (The same result will be secured if the grids are in parallel and the plates in push-pull.) The modulating signal is applied in push-pull to the screens through the dual-secondary transformer, T. One secondary, S_1, is returned to a negative d.c. voltage while the other, S_2, is returned to an equal positive voltage. If we assume that we have "ideal" tubes for the purpose, no plate current will flow if the screen voltage is zero or negative with respect to the cathode. Consequently, in the absence of an audio signal no plate current will flow in B, but A will take plate current determined by the d.c. screen voltage. Hence, Tube A is delivering r.f. power to the output circuit and B is idle. The steady power delivered by A is the carrier, and its amplitude can be adjusted, completely independently of the modulation, by adjusting the d.c. screen voltage.

When a modulating signal is applied one screen will be swung positive while the other is swung negative, since the screens are in push-pull. If A's screen is swinging positive the output will increase (upward modulation) just as in ordinary screen modulation. At the same instant, B's screen will be swinging more negative with respect to cathode and the tube produces no output. When the a.f. polarity reverses, the output from A will decrease linearly until the instantaneous modulating voltage (negative at A's screen) overcomes the d.c. screen voltage, at which time A's output is cut off. It continues to stay cut off as long as the audio voltage is more negative than the d.c. screen voltage is positive. However, at the instant the resultant voltage at A's screen goes negative, the voltage at B's screen goes positive and B consequently begins to take plate current and deliver power to the load. This power will vary in the

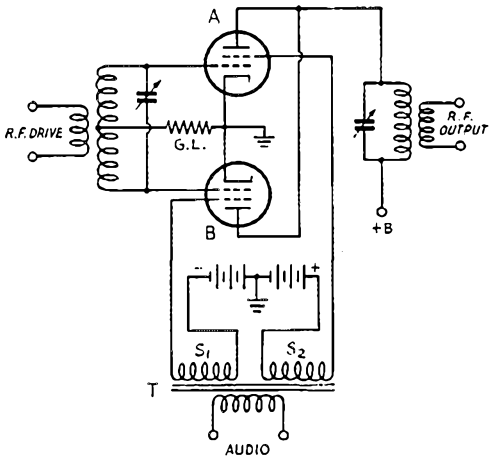


Fig. 2 — Illustrative circuit for generating a d.s.r.c. signal. This is a form of balanced modulator, with screen modulation.

usual fashion as the modulating voltage varies from instant to instant. But because the r.f. phase at B's control grid is opposite to that at A's control grid, the phase of the r.f. current delivered by B to the load is reversed as compared with that delivered by A. This meets the condition required for setting up a signal such as is shown in Fig. 1F.

Essentially, Tube A is overmodulated in the well-known way. B "takes up the slack" and supplies the requisite type of output during the time when A is cut off.

Note that the two tubes never work simultaneously. If both draw plate current at the same time their outputs are in opposition in the tank circuit and the total output is less than it should be for maintaining a linear modulation characteristic. The screen of Tube B must be biased negatively so that it does not begin to work until the

[4] The discussion throughout is based on sinusoidal modulation. There is no limit to the amount of *upward* modulation that can be used in straight A3, so far as the modulating mechanism is concerned, but the upward modulation can exceed the downward modulation only when the modulating signal itself is unsymmetrical. Under any other condition distortion is set up in the modulator and spurious side frequencies are generated. See Reference 3.

instant that A stops working. With similar tubes, this requires that the d.c. voltages be equal but opposite in polarity.

System Performance

It is convenient to determine the operating conditions in d.s.r.c. transmission in terms of the modulation factor (m), which is the same thing as percentage of modulation except that it is not expressed as a percentage. A modulation factor of 0.5 corresponds to 50 per cent modulation, a factor of 2 corresponds to 200 per cent modulation, and so on. Sideband power varies as the square of the modulation factor, without restriction in d.s.r.c., but with the restriction in ordinary amplitude modulation that the factor must not exceed 1.

Although it is possible to use plate modulation to obtain a d.s.r.c. signal, there does not seem to

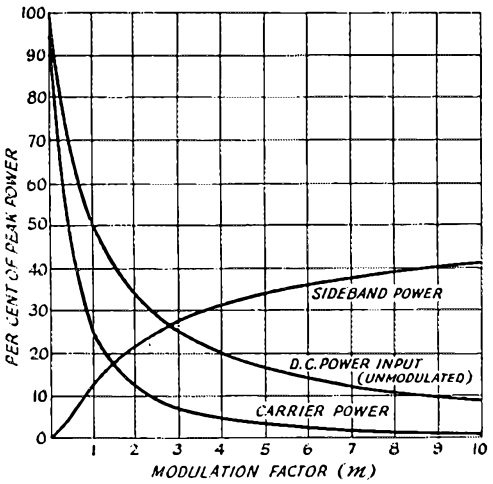


Fig. 3 — Relationship between sideband power, d.c. power input without modulation, carrier power output and peak power, as a function of the modulation factor. These curves, as well as those in subsequent figures, represent continuous values averaged over one cycle of sine-wave modulation.

be much point in doing it since the sideband power can be generated more economically with some form of grid modulation. The following discussion is therefore based on grid modulation, and assumes a sine-wave modulating signal and a perfectly linear modulated stage. Analysis of the operation of such an idealized system gives the performance curves shown in Figs. 3 to 8. The quantities used as a reference are defined as follows:

Peak power: Power at the modulation up-peak, either input or output. Curves of average d.c. power input are referred to the peak d.c. input, and curves of average power output are referred to the peak output. The relationship between peak input and peak output will depend upon the plate efficiency obtained at the modulation peak.

Peak plate current: Instantaneous d.c.

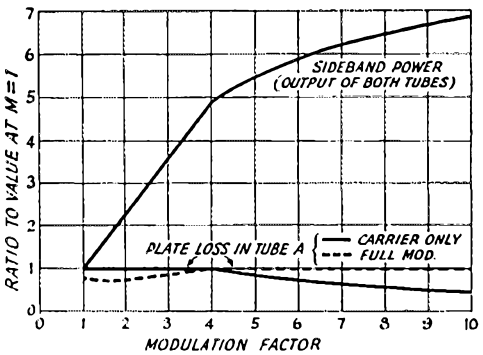


Fig. 4 — Relative sideband power as a function of modulation factor, for constant plate loss in Tube A. Below a modulation factor of 4 the plate loss is larger with no modulation; above $m=4$ the plate loss without modulation is less than with full modulation.

plate current at the modulation up-peak.

These peak values are always associated with the "carrier" tube — Tube A in Fig. 2 — and are the basis for the design of a d.s.r.c. transmitter. The "negative peak" tube (Tube B) is adjusted for exactly the same operating characteristic as Tube A, but is never swung over the same range (that is, does not reach the same instantaneous peak values) except when the carrier is eliminated completely.

Fig. 3 shows the relationship between peak power values, sideband power output, carrier power output, and unmodulated d.c. input to the modulated amplifier. A modulation factor of 1 represents recognizable conditions to those familiar with the principles of grid modulation; as the curves show, the average d.c. input at this modulation factor is equal to half the peak d.c. input; the carrier power output is equal to one-fourth the peak output; and the sideband power output is one-half the carrier output, or 12.5 per cent of the peak output. The curves show what happens as the modulation factor is increased while maintaining the same values of peak power, and thus give a measure of the improvement obtained by shifting the power output from carrier to sidebands. The maximum sideband output is naturally obtained when the modulation factor is infinite — i.e., the carrier is eliminated — and at that point is equal to half the peak power output. This is four times as much sideband power as can be obtained with 100

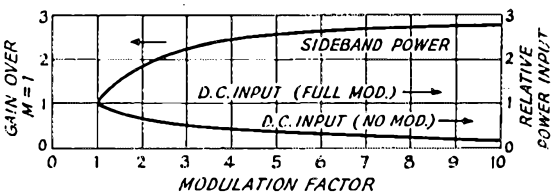


Fig. 5 — Sideband power as a function of modulation factor when the d.c. plate input is held constant. This curve applies when the available plate power, rather than the tube plate dissipation, is the limiting factor. The unmodulated-carrier d.c. input is less than the input with full modulation, as shown by the lower two curves. Arrows point to the appropriate scale.

per cent modulation, for the same peak power output in both cases.

Fig. 3 is not representative of what actually can be done with d.s.r.c., because in practice the peak power values would not be held constant with different modulation factors. As the modulation factor is made larger it becomes possible to use larger peak values while maintaining the same plate dissipation in the carrier tube, and this provides a further increase in sideband output. Fig. 4 shows the improvement over 100 per cent modulation when the plate loss in Tube A is held at a fixed value — that is, when full advantage is taken of the tube capabilities. (It is not necessary to consider Tube B, because it is never worked to the same extent as Tube A.) Up to a modulation factor of 4 the sideband output increases linearly; in this region the permissible power input is dictated by the unmodulated carrier level. Above a factor of 4 the input with full modulation determines the permissible plate loss.

The region around $m=4$ in Fig. 4 is of particular interest because it represents the knee of the improvement curve. At this point the sideband power is five times as great as could be obtained with straight A3 transmission (grid-modulated) with the same tube, and it is also a region in which distortion in conventional reception of the signal is not at all severe. (Actually, a modulation factor of 8 or so does not have a serious effect on intelligibility, particularly of connected speech, but distortion on modulation peaks is quite noticeable.) Also at a modulation factor of 4, the sideband output is nearly half again as much as could be obtained with the same tube plate-modulated 100 per cent. The exact ratio will depend upon the relative plate efficiencies obtainable with grid and plate modulation.

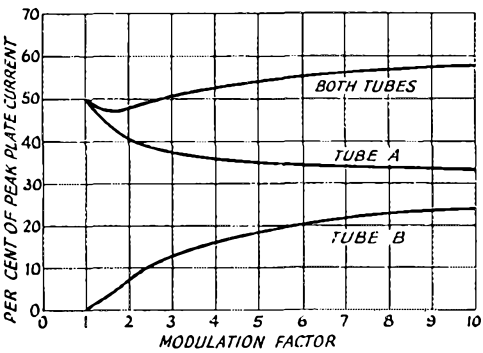


Fig. 6 — **Plate current in the two tubes of a d.s.r.c. modulated amplifier. These are average values referred to the instantaneous peak plate current. The curves also represent power input to the two tubes referred to peak power input.**

The comparisons above are in terms of a single tube in straight A3 as compared with the two tubes required for d.s.r.c. In the case of grid modulation it would perhaps be fairer to compare d.s.r.c. with the same *two* tubes in grid-modulated A3, since the same plate power supply and same modulator probably would serve in either case.

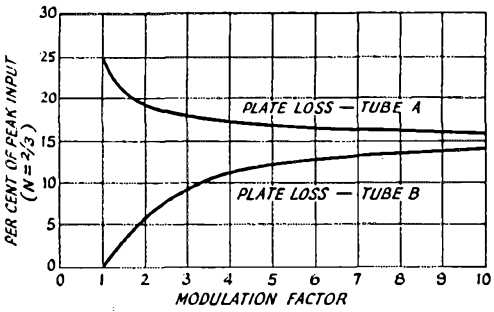


Fig. 7 — **Plate loss in the two tubes in per cent of peak power input, assuming a peak plate efficiency of ⅔ or 66⅔ per cent.**

This cuts the improvement figure in half. Comparing d.s.r.c. with plate modulation is more complicated, because in the latter case part of the transmitter tube capacity has to be used in the Class B modulator. However, it is of interest to note that when the modulation factor is in the region of 8 to 10, a d.s.c.r. grid-modulated transmitter will put out the same sideband power as the same two tubes in A3, plate-modulated 100 per cent.

The performance of the system when operation is at a fixed value of d.c. input — such as might be the case in a mobile installation where the available plate power is limited — is shown in Fig. 5. The basis of comparison is again grid modulation with $m=1$. Under these conditions calculation shows that when the modulation factor is about 3 the sideband output is equal to that obtainable with plate-modulated A3, assuming that all the d.c. input goes to the modulated amplifier. Actually, some allowance would have to be made for the modulator plate power in the plate-modulation case, so the comparison is even more favorable to d.s.r.c. In addition, the curves show that when $m=3$ the input without modulation is only half the input with sustained sine-wave modulation, so that the average drain on the power supply is actually less than the input to the modulated amplifier alone with conventional A3. It is easy to take advantage of this to secure still more modulated output. Taking these factors into account, as a rough estimate it should be possible to generate two or three times as much sideband power as can be obtained with A3 plate modulation, with the same average drain on the power supply. A modulation factor of 3 has substantially no effect on intelligibility.

The distribution of plate current between the two tubes in a d.s.r.c. system is shown in Fig. 6 as a function of the modulation factor. The plate currents of the individual tubes will be equal only when the carrier is completely eliminated. Fig. 7 shows the plate loss in each tube on the basis of an assumed plate efficiency (at the modulation peak) of 66⅔ per cent. A different value of peak efficiency will change the values given, but not the relationship between the losses in the two tubes. It is seen that Tube B need not be considered in

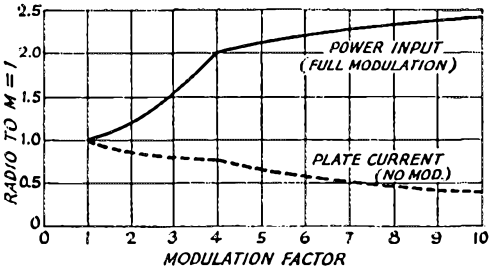


Fig. 8 — Permissible d.c. power input to a d.s.r.c. modulated stage for constant plate loss in Tube A. The solid curve shows the ratio of permissible plate input to permissible input with conventional A3 grid modulation. The dashed curve shows unmodulated d.c. input, as a function of modulation factor, when the fully-modulated input is determined by the solid curve.

designing a transmitter (if the same type tube is used in both sockets) since its plate loss at any modulation factors considered never equals the loss in Tube A. Fig. 7 is useful in determining operating limits with a particular tube type. Fig. 8 is a design curve showing the ratio of permissible d.s.r.c. power input, for fixed plate loss in Tube A, to the permissible power input with conventional 100 per cent grid modulation of a tube of the same type. The dashed curve marked "unmodulated carrier" shows the plate current (as a ratio to the plate current with A3) on the assumption that the plate voltage is the same in all cases. The difference between the two curves at any given modulation factor represents the change in plate current (or power input) from no modulation to full sine-wave modulation. Since the power input varies with modulation, the plate supply should have reasonably good regulation — although this is not too important if the amplifier is adjusted to operate properly at the plate voltage existing under peak conditions. An advantage is the fact that the average power input is comparatively low, thus lightening the load on the plate supply. The "full modulation" average value shown in Fig. 8 is not generally reached with speech waveforms that have the same peak as a sine wave.

Reception of D.S.R.C. Signals

As stated earlier, no special receiving technique is required for d.s.r.c. transmissions using modulation factors up to 8 or so. This appears to be the result of a number of fortuitous factors: In connected speech, context greatly aids intelligibility even though an isolated word might be subject to misinterpretation; the ear can recognize words even though they may not sound exactly like the original pronunciation; the average modulation percentage with ordinary speech is fairly low, so that only the occasional peaks suffer much distortion. The principal effect is that the voice is much louder than normally would be expected.

However, distortion does occur because the audio output of an ordinary detector is the same as the outline of the modulation envelope either above or below the reference axis; and as shown in Fig. 2F, such a trace is considerably different from the sinusoidal trace that results when it is possible to cross the axis. The only way in which such distortion can be eliminated is by "exalting" the carrier so that the modulation at the detector does not exceed 100 per cent. Because of the phase reversal in the transmitted signal, such an exalted carrier at the detector is varied in just the same way as it would be with sine-wave modulation in which the actual modulation factor is 1 or less.

The carrier can easily be exalted — that is, increased in amplitude as compared with the sideband amplitude — by using a crystal filter at the receiver. A sharp crystal gives the best results, but if the d.s.r.c. modulation factor is not too high (in the vicinity of 4 or 5, say) even a fairly broad filter can eliminate practically all distortion. A moderately sharp setting will handle modulation factors up to about 10. When a d.s.r.c. signal is tuned in its carrier should be set exactly on the crystal peak, as shown by the S-meter; this boosts the carrier to the point where the modulation percentage at the detector is reduced enough so that distortion is no worse than in normal reception of an A3 signal.

The reduced carrier that is a feature of d.s.r.c. inherently reduces heterodyne interference, and exalted carrier reception is a further aid in the reduction of both heterodyne and sideband interference. This method of reception is, in fact, beneficial in both A3 and d.s.r.c. communication, and deserves wider use than it gets. It is at its best with a really sharp crystal filter as described in *QST* some time ago.[6]

Practical d.s.r.c. transmitting circuits and design considerations will be discussed in a following article. The adjustment procedure is, in general, similar to that used with ordinary grid modulation and the same precautions must be taken with respect to obtaining a linear modulation characteristic. Although d.s.r.c. as a system does not cause the generation of spurious side frequencies, non-linearity in the modulated stage will cause effects similar to those observed from the same source in ordinary A3 transmission.

[6] Grammer, "House-Cleaning the Low-Frequency 'Phone Bands," *QST*, May, 1947.

SEE PAGE 10

Horizontal Hamming

Fun in a Sickbed with 25 Watts and a Blooper

BY GENE HANDSAKER,* W6QCK

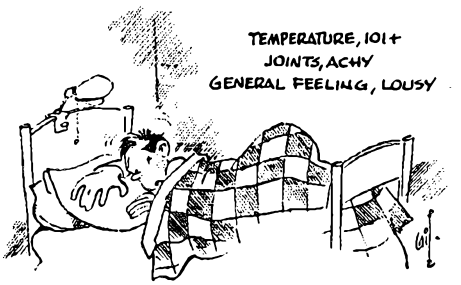
FINDING time for a hobby is a problem in this workaday world. It's worse when you've a wife, two demanding kids, a car to wash on week ends, fences to paint, and lawns that grow faster than you can push the mower.

I've just found the answer. It's beautifully simple and simply beautiful:

Get sick..

You'll rediscover the cobweb-clearing importance of your hobby. After you're well, you'll find it's easier than you thought to set aside a little daily time for it. If it's hamming you'll reawaken to the forgotten fun of rag-chewing.

The flu bug recently bit me, along with about 100,000 other Los Angelenos. Temperature, 101 plus; joints, achy; general feeling, lousy.



The doctor stabbed me in the counterpoise with 750,000 units of penicillin and put me to swallowing sulfa tablets. The combined curative input must have been a kilowatt. The temperature meter showed normal by next morning.

But the Fever Control Commissioner, or doc, ordered two more days in bed. Two big fat luxurious days — with the fellows in the office to carry on my work if it fell behind.

My XYL carried out my well-polished breakfast dishes. I lay there eyeing my usually neglected, always faithfully waiting station on its desk in a corner of the room. Twenty-five watts, crystal-controlled, on 40-meter c.w. A two-tube regenerative receiver. Both were built several years ago to ARRL specifications.

I wondered what signals were pulsing even then through the ether of my sickroom. The excitement was irresistible. I slipped out of bed into robe and slippers and seesawed the desk over next to my bed. A mayday call to the breakfast room brought my XYL with pliers and wire to lengthen the single-wire feeder, the receiving antenna, and the keying connection.

Back under the covers, I turned on the switches and sat back against two upright pillows. A large wooden tray, upside down on my lap, was my operating desk.

"CQ, CQ, CQ. . . ." The keying bug's healthy snap concealed the flu-bug weakness in my wrist. There was a reply, and it brought the company that misery loves.

W6WOD, of near-by La Crescenta, asked: "Well, Gene, have you had the flu yet? I just got over it, and now I have a peach of a head cold."

This naturally led to a comparison of temperatures, symptoms, and treatment.

W6JZV, Sierra Madre, confided: "I'm supposed to be sick today. I came down wid a vy bad sore throat last nite. So the XYL insisted that I stay home." This being a QSO during most folks' working hours, he inquired: "What do you have for an excuse?"

I recited my own miseries, and we had plenty of grist for rag-chewing.

W6CDG, West Sacramento, reported: "All OK hr but lot of flu went around."

W6QIA/6, Daly City: "Boy, flu is all around hr but so far I am vy lucky and missed it all. Wrk in grocery store and meet quite a few people who come in to do their shopping and have the flu with 'em. Am really worried abt blasted stuff."

Meanwhile I had gone all out — or all down — in operating comfort. I'd stretched out flat. The receiver was dragged over to the edge of the desk so the dial was within easy reach of my left hand. The keying board, on top of the covers, rested against my leg.

This luxurious set-up was more material for chatter. QUI quipped: "Boy, that's the life of Riley! QSOing while lying down! FB. Wid all that service, I don't think you want to get better.'

The kidding was just starting. W6GWI, a local, gibed: "How to be happy wid flu! . . . I think you're putting on an act. Will develop a cold in ear or smtg and pull a Gene. Hi! . . .

(Continued on page 116)

* 4710 Mascot St., Los Angeles 19, Calif.

The Novice One-Tuber

Simple and Inexpensive Construction for 80

BY DONALD MIX,* WITS

*PART I***

ANYONE who qualifies for a Novice Class amateur license is permitted to operate between the frequencies of 3700 and 3750 kc. in the 80-meter band. Although two other higher-frequency bands are available to the Novice, many will choose the 80-meter band as a starter because transmitting equipment need not be complicated. The license entitles the holder to use a maximum power input of 75 watts. However, good results can be obtained with much less than this legal limit. A low-power transmitter can be quite simple in construction and adjustment, and considerably less costly than one capable of handling the full 75 watts.

The little transmitter shown in the photographs is easily capable of working several hundred miles with a makeshift antenna. Yet only four common hand tools — screwdriver, pliers, a small hand saw and a soldering iron — are needed to build it. The retail cost of the parts used is a little over $15.00 (current net prices).

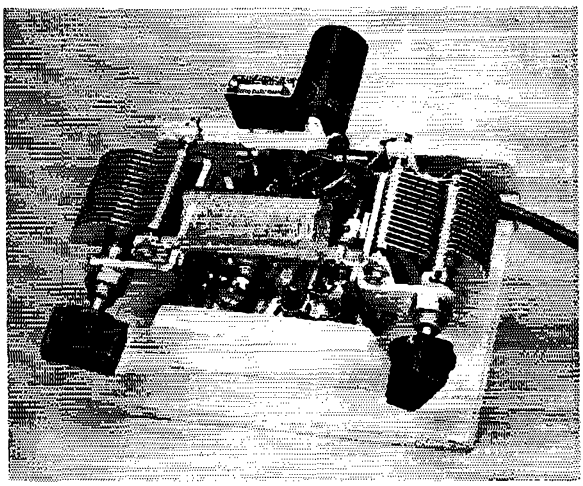


Fig. 1 — The completed Novice transmitter with tube and crystal in place. The strips of wood at front and back are safety barriers. C_2 is to the left, C_3 to the right.

A higher-power rig, or one working in the 11-meter band, might have to be built in a metal enclosure, and other precautions might be necessary to avoid interference with television reception in the neighborhood. But this transmitter has been operated with part of its antenna *inside* a TV receiver without causing interference. The low frequency and small power are factors contributing to this.

The circuit is designed to feed power into a random length of wire used as an antenna. Naturally, a full-size antenna, well elevated outdoors, will bring better results, but many short-distance contacts should be possible with an indoor antenna as short as five feet, if space for a longer antenna is not available.

The circuit is shown in Fig. 2. It is a variation of the Pierce-Colpitts circuit often referred to as the "grid-plate" circuit. The output circuit is in the form of a pi-section network. It is this arrangement that permits simple coupling to nonresonant lengths of wire. I_1 is a dial lamp used as a tuning indicator — an inexpensive substitute for a milliammeter. Since the small current drawn by the transmitter will not light the lamp adequately, R_3 is provided to bring the total current through the lamp up to give approximately normal brilliance. The transmitter is keyed in the cathode circuit. C_4 is to reduce key clicks.

Construction

The constructional design is not an attempt to be unorthodox. It is merely one way in which the transmitter may be built without the need for drilling a single hole. The parts are mounted on a framework of standard metal angle pieces. These can be obtained in any dime store or hardware store. They are the 1½-inch size (1½ inches on each leg) with two holes* in each leg. The framework is fastened to a baseboard.

Fig. 3 shows how the assembly is started. The crystal socket is supported on a pair of simple brackets made from No. 14 antenna wire. First, two pieces of wire are cut to a length of 2⅜ inches. Then a loop is twisted on each end, as shown in the foreground of Fig. 3. If you don't have a pair of long-nose pliers for bending the loops, you can start with a longer piece of wire. Make a twist of the wire around a nail of proper size. Then move the nail about 1½ inches along the wire and make another twist around the nail. Then snip the excess wire off at each end. When finished, the centers of the loops should be about 1⅜ inches apart. It may take a few trials to get the proper distance between holes. The most important thing is to make the two pieces alike, with the same distance between loops.

The tube socket is mounted between two angle pieces. The mounting screws are No. 6-32, ⅜ inch long. On each side, the socket flange is placed

* Assistant Technical Editor, *QST*.

** Part II will appear in June *QST*.

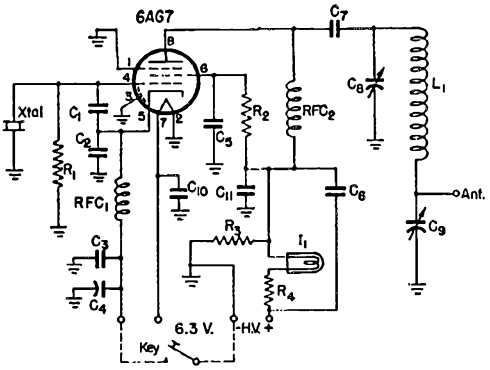


Fig. 2 — Circuit diagram of the Novice one-tuber.

C_1 — 47-$\mu\mu$fd. mica.
C_2 — 220-$\mu\mu$fd. mica.
C_3, C_5, C_7, C_{10}, C_{11} — 0.001-μfd. disk ceramic.
C_4 — 10-μfd. 50-volt miniature electrolytic.
C_6 — 0.01-μfd. disk ceramic.
C_8, C_9 — 150-$\mu\mu$fd. variable (National ST-150).
R_1 — 15,000 ohms, ½ watt.
R_2 — 22,000 ohms, 1 watt.
R_3 — 15,000 ohms, 10 watts.
R_4 — 100 ohms, ½ watt.
L_1 — 45 μh. — 70 turns No. 24, 1-inch diameter, 2¼ inches long (B & W 3016 with 13 turns removed from each end).
I_1 — 2.5-volt 60-ma. dial lamp, screw base.
RFC1, RFC2 — 2.5-mh. r.f. choke (National R100S or Millen 34102).
Xtal — Crystal between 3700 and 3750 kc.

behind the angle piece. The socket is turned so that its Pin No. 1 is toward the right as you look at it from the rear. Then a soldering lug pointed downward, the wire bracket for the crystal socket, another soldering lug pointing upward, and finally the nut, are threaded onto each mounting screw in that order. After fastening, bend each of the lugs outward at almost right angles.

A soldering-lug terminal strip is fastened across the angle pieces, below the socket, using the lower pair of holes. These terminal strips are commonly available in two types. In either style, one will be found that measures about 1½ inches between mounting holes. One type has an individual mounting foot at each end of a bakelite strip. This type has three terminals. The other type has a metal base extending across the bottom of the bakelite strip. This type has four terminals. If the four-terminal type is used, one of the terminals need not be used. A soldering lug must be placed under one of the terminal-strip mounting screws. This serves as a "ground" connection to the metal framework and is the "-H.V." terminal. All connections indicated in Fig. 2 by a ground symbol are connections to the frame. The screws holding the terminal strip will be temporary. They will be replaced later by the screws or nuts holding the r.f. chokes in place.

Before proceeding further with the assembly, it will be easier to do as much of the wiring as possible. Secure a length of small-diameter cambric tubing, known in the trade as "spaghetti." The small amount of wiring required can be done most easily with No. 22 bare wire. Enameled or fabric-covered wire of this size can be used, of course, but it will be necessary to scrape the insulation away at the ends when making connections. Regular flexible hook-up wire can be used, without the spaghetti, but it is more difficult to handle in very short pieces.

First, run a piece of wire through the holes in Pins 1, 2 and 3 of the tube socket and thence to the adjacent lower soldering lug to the right. Solder at all points except Pin 1. Then run a piece of wire from Pin 7 around the edge of the socket to the left and thence downward between the socket and its left-hand mounting nut to the left-hand terminal of the terminal strip as viewed with the socket terminals facing you. Cut a piece of spaghetti to length and slide it over the wire. Solder the wire at the terminal strip.

Now attach C_{10} between Pin 7 and the upper soldering lug to the right. Solder the connections to Pin 7 but not to the lug. Next, attach a length of wire about 2 inches long to Pin 4 and solder R_1 between Pin 4 and the lower left-hand grounding lug. Leave the other end of the loose wire free for the time being. Attach a short length of wire to Pin 5. Solder C_2 between Pins 1 and 5. Leave the wire free for the present.

Now cut one terminal wire of R_2 to a length of about ¾ inch and slip a piece of spaghetti over it. Attach it to Pin 6 and solder C_5 between Pin 6 and the upper left-hand grounding lug. This leaves one end of R_2 hanging free.

Now bend the loops at the tops of the wire crystal-socket brackets at right angles. Twist them around as much as necessary to make the loops line up with the holes in the crystal socket. Fasten the socket to the brackets with ½-inch No. 4 machine screws and nuts. Solder a short piece of wire between the right-hand crystal-socket terminal and the unsoldered lug to the right. Soldering at this lug also solders the lead from C_{10}.

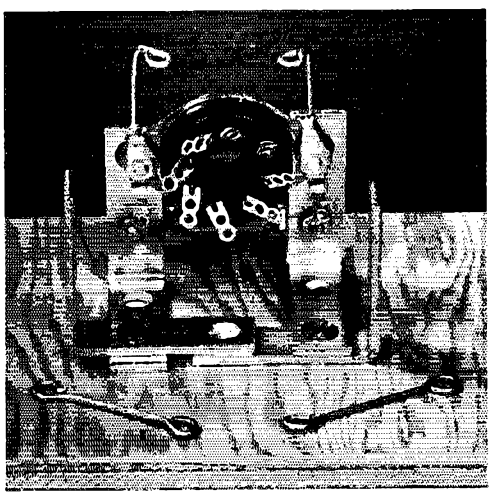


Fig. 3 — First steps in assembly, showing the manner in which the angle pieces are fastened to the baseboard. Much of the wiring can be done before fastening to the baseboard as described in the text. The pair of looped wires in the foreground show how the crystal-socket supports are made.

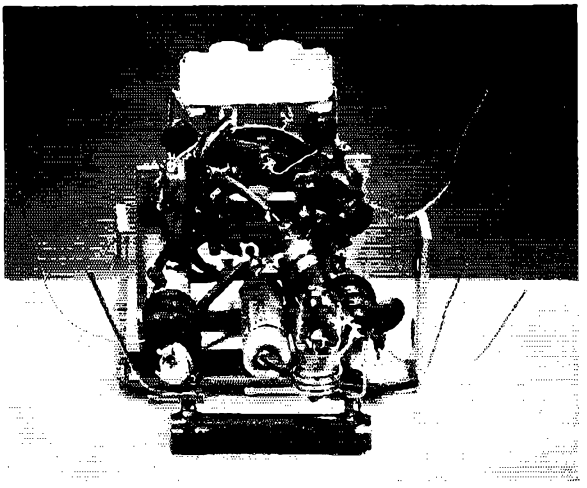


Fig. 4 — This view shows the assembly and wiring just before the variable condensers and tank coil are added. The indicator lamp is in the foreground, with R_3 running across the front. Attached to the chokes, C_3 is to the left and C_{11} to the right. C_4 is to the left of the lamp. Near the tube socket, the vertical mica condenser to the left is C_1, the horizontal one at the center C_2. R_2 is above the lamp. Below the socket C_8 is to the left and C_{10} to the right. Below to the right is C_7 with one side to be connected. RFC_1 is to the left and RFC_2 to the right. R_4 and C_6 are between C_4 and RFC_2.

♦

It is now time to mount the assembly on the baseboard. The dimensions of this baseboard are not critical. The one shown is a piece of ¾-inch plywood 6 inches long and 4½ inches wide. The rear pair of angle pieces for the tuning condensers (the pair in front in Figs. 3 and 4) and the pair attached to the tube socket are fastened to the baseboard with the same pair of ½-inch flat-head wood screws. The four pieces should be arranged as shown in Fig. 3. Under the right-hand screw, the socket angle piece is on top, while under the left-hand screw, the socket angle piece is underneath. The left-hand tuning-condenser angle piece overlaps the one on the right. If desired, a screw can be placed where the two holes overlap at the center. The assembly should be centered between the ends of the baseboard and placed so that the tips of the lugs on the terminal strip are even with the rear edge of the base.

Now the plate choke, RFC_2, can be mounted. This is the one to the right. The screw and nut used temporarily to hold the terminal strip will be removed, of course. A 6-32 screw is required for mounting National chokes, while a nut is needed for the Millen unit. Before tightening, turn the choke so that its terminals are on top.

Cut the leads of C_6 to fit between the right-hand terminal of the terminal strip and the outer terminal of the choke. Slip spaghetti over the leads before fastening. Do not solder. Attach the free end of R_2 and one end of R_3 to the same choke terminal, as shown in Fig. 4.

To prepare the indicating lamp, I_1, first cut one lead wire of R_4 to a length of 1¼ inches. Slip spaghetti over it and carefully solder the end to the solder tip at the center of the lamp base. Use no more heat than necessary and be sure that the solder is not spread around so as to short-circuit the bulb. For the connection to the brass shell of the bulb, somewhat heavier than No. 22 wire is preferable, but the latter will do if no other is available. Wind about three turns tightly around the shell. Cut the bottom end of the wire off close to the shell. If the fit appears loose, the wire can be spot-soldered to the shell.

Cut the wire from the shell of the lamp to about ¾ inch and fasten to the outer terminal of RFC_2, running attached R_4 out to the terminal strip. Run a piece of spaghetti over the loose end of R_4 and solder the wire to the right-hand terminal of the terminal strip along with the unsoldered end of C_6 already connected to the same terminal. Attach one side of C_{11} to the outer terminal of RFC_2 with a lead of only about ¼ inch and solder all connections to this terminal. A check should show that there are five connections to this point — I_1, R_2, R_3, C_6 and C_{11}.

Now cut the terminal wire of C_4 marked "+" or "positive" to about ¾ inch. Slip spaghetti over it and attach it to the middle terminal on the terminal strip, leaving the other end of the condenser free. With a short length of spaghetti-covered wire, connect Pin 8 of the tube socket to the inner terminal of RFC_2. Before soldering Pin 8, also attach C_7 with a spaghetti-covered lead of about ½ inch, leaving the other end of the condenser free.

The second choke, RFC_1, can now be mounted to the left. Cut the loose lead from Pin 5 on the tube socket to length, cover it with spaghetti and attach the end to the inner terminal of RFC_1. Cut and bend the leads of C_1 so that it can be soldered between the left-hand terminal of the crystal socket and the inner terminal of RFC_1. Before soldering at the crystal socket, cover the

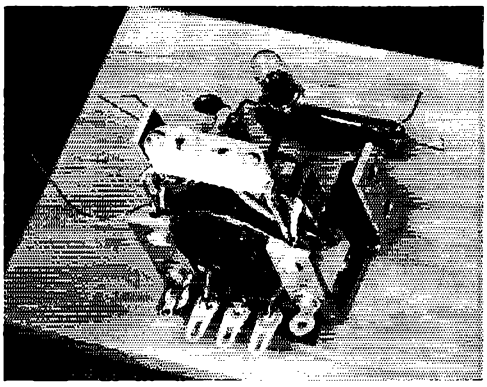


Fig. 5 — Rear view showing the mounting of the terminal strip. From left to right, the terminals are for positive high voltage, key, and heater. The lug to the extreme left is for connections to the other side of heater, the other side of the key and negative high voltage.

List of Materials

2 variable condensers	$ 5.28
1 Type 6AG7 tube	1.79
2 ½-watt resistors	.20
1 1-watt resistor	.15
1 10-watt resistor	.54
1 octal socket (Amphenol type 77MIP8)	.08
2 2.5-mh. r.f. chokes	.96
2 mica condensers	.48
6 disk ceramic condensers	.90
1 B & W Miniductor coil	.60
1 crystal socket (Millen 33102)	.36
1 dial lamp	.16
2 knobs	.20
1 50-volt electrolytic condenser	.59
6 angle pieces	.20
1 terminal strip	.05
Wood, wire, spaghetti, screws	.50
Crystal	2.80
Total	*$15.84*

loose lead from Pin 4 on the tube socket with spaghetti and also attach it to the left-hand terminal of the crystal socket.

Now run a spaghetti-covered wire from the center terminal on the terminal strip to the outer terminal of RFC_1 and solder at the terminal-strip end. At the outer terminal of RFC_1 also attach a short lead from C_3, leaving the other condenser wire free. We now have five loose leads, from C_3, C_4, C_7, C_{11} and R_3.

Now, with ¼-inch 6-32 machine screws (flat-head preferable), fasten an angle piece to the front mounting hole in the bottom of each of the two variable condensers, C_8 and C_9. Make sure that the mounting screws are short enough so that they do not protrude through and touch the stator plates of the condensers. Fasten each angle piece so that the condenser shaft will be pointing toward the front. In the spare hole in each angle piece, just below the condenser, fasten a soldering lug with a short 6-32 machine screw and nut. Point the lug upward and bend it outward after fastening. Lapping the left-hand condenser angle piece *over* the right-hand piece, fasten each condenser to its rear bracket which is already in place. Screw the front angle pieces to the baseboard.

Now cut off and solder the loose lead of C_7 to the rear stator terminal of C_8 to the right. (Place a soldering lug under the nut if there is none.) Also cut to length, cover with spaghetti and solder the loose leads of C_{11} and C_4 to the soldering lug to the right. Similarly solder the loose leads of R_3 and C_3 to the lug to the left.

The coil is mounted between the two front variable-condenser stator supports. First remove the specified number of turns from each end of the coil, being careful not to break the plastic supporting strips. Now bend a short piece of No. 14 antenna wire, or other fairly heavy wire, around the ends of the bottom supporting strip. Solder the ends of the coil windings to these pieces of heavy wire, being careful to keep the plastic strips in shape when they soften. Place a soldering lug under each of the top stator nuts of the variable condensers. By bending the lugs and the ends of the terminal wires in the right way, the ends of the plastic supporting strips on the coil will rest on the isolantite stator insulators. If desired, the coil support can be further strengthened by cementing the ends of the plastic strip to the stator bars with Duco cement, although this is not necessary. The ends of the three remaining plastic strips can be cut off close to the winding. The rear upper stator terminal of C_9, the condenser to the left, serves as the antenna terminal.

The only remaining wiring is to attach the power and key leads to the terminal strip at the rear. These may consist of individual lengths of flexible hook-up wire, a single five-wire cable (eventually split for the keying leads) or a three-wire cable and two separate wires for the key. Of the five wires, two will be connected to the grounding lug at the rear — the common 6.3-volt and negative high-voltage lead, and one side of the key. Of the three remaining wires, one connected to the left-hand terminal (transmitter facing you) will go to the second heater connection, one connected to the center terminal will go to the other side of the key, while the one to the right will go to positive high voltage. Don't get these connections reversed, because it will put the high voltage across the heaters! Form the wires so that they may be brought out toward one side or the other.

After connecting the terminal wires, a small strip of wood 1¼ inches high should be fastened to the rear edge of the baseboard with small nails. This and a similar strip 3¼ inches long at the front, between the two variable condensers,

(*Continued on page 116*)

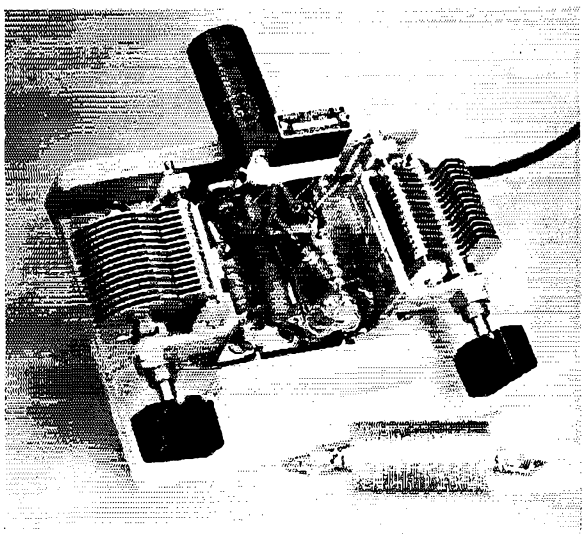


Fig. 6 — Transmitter complete except for coil.

Ground Resistance and Its Measurement

BY J. M. BRUNING,* K2BZ

PROPER operation and protection of electronic equipment usually requires that some part of the circuit be "grounded." Ground in this sense signifies an earth connection. The objective is to connect the apparatus through a low-resistance path to that portion of the surrounding earth — or water — which is highly conductive.

A water-pipe ground is not always satisfactory, and a ground-rod system may or may not operate properly. When trouble is experienced, the cause will usually be too high a resistance in the path between the pipe or rod and the surrounding earth. We must remember that the aim is to establish contact with that portion of the earth which is highly conductive. The better this objective is attained, the lower will be the ground resistance of the system.

The conductivity of the earth depends upon the composition of the earth's crust, and is determined largely by the moisture content of the soil and by the nature and amount of raw or dissolved minerals in the soil. Considering these factors and the nonuniform distribution of rock, shale, sand, etc., it should be evident that the problem of establishing a low-resistance path to the earth is somewhat more complex than it ordinarily appears.

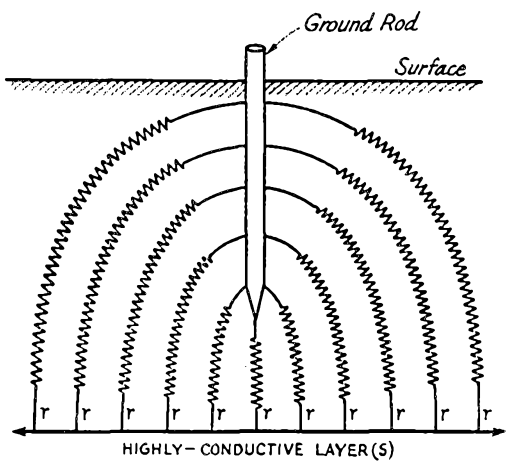


Fig. 1 — A ground rod has a large number of separate paths from it to one or more layers of the earth's crust. In this sketch each path is represented as having the same resistance, r, but this is not necessarily the case.

Good practice decrees that the ground lead should consist of a fairly heavy copper wire securely fastened to the equipment and to the water pipe or ground rod. The inherent resistance of this part of the ground system is usually negligible, but there is no sure method for estimating the effectiveness of the over-all installation. While existing literature describes at length various ways to install a ground system, little information is available to explain how to compare the effectiveness of existing grounds or how one can quantitatively determine the amount by which a ground system is improved by soil treatment or by the installation of multiple rods.

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Ground Rods

Each and every portion of the surface of a ground rod is connected through a separate path to one or more highly-conductive layers in the earth's crust, as shown in Fig. 1. Each path will have its own value of resistance, r. All of these paths are in parallel with each other, and the number of such paths is nearly infinite. Our problem consists of determining the joint resistance of a nearly infinite number of parallel resistors, each having an arbitrary and varying value of resistance. Skipping the mathematics, it can be shown that the summation for an *infinite* number of such parallel paths would be numerically equal to zero. This value of zero resistance is what we try to obtain in our ground system. While this figure cannot be reached, it can be approached. If the ground rod in Fig. 1 is increased in length, or in diameter, or if more rods are driven and connected in parallel, the number of parallel paths to the true earth will be increased and the resistance of the system will more closely approach zero.

Let us assume that the combined resistance of all the possible earth paths from a single ground rod can be represented by a single resistor, r_g, connected from the bottom tip of the rod to a zero-resistance conductive layer in the earth, located some distance below the rod. The value in ohms of the resistor, r_g, is the resistance to ground of the rod in question. This is represented in Fig. 2A.

Any other ground rod may be similarly assumed to have its individual value of ground resistance, essentially unaffected by the presence of any additional rods, provided these other rods are placed a reasonable distance away. This is shown in Fig. 2B.

For all practical purposes, the internal resistance of a rod having a diameter of one-half inch or more is negligible. Also, since one thousand feet of No. 10 copper wire has a resistance of

TABLE I

A_1 and A_2 in series: $A_1 + A_2 = 18$ ohms
A_2 and A_3 in series: $A_2 + A_3 = 33$ ohms
A_1 and A_3 in series: $A_1 + A_3 = 29$ ohms
M and A_1 in series: $M + A_1 = 12$ ohms
M and A_2 in series: $M + A_2 = 19$ ohms
M and A_3 in series: $M + A_3 = 28$ ohms

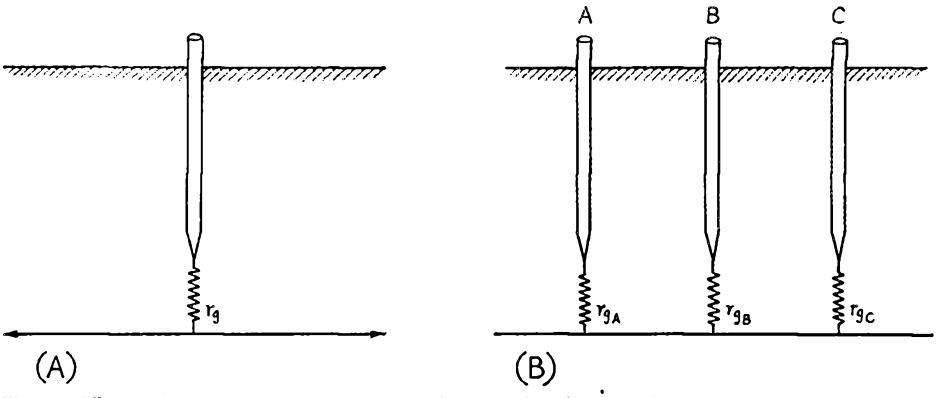


Fig. 2 — The resultant or effective resistance of the ground path can be lumped in a single value, r_g in (A). Three separate ground rods might have different resistances to ground, as represented in (B).

about one ohm, it is apparent that a short and heavy ground lead between the equipment and the grounding system can have but negligible resistance. Thus our ground resistance is concentrated in the earth itself, and the additional circuit resistance of the rod and its connecting lead can be disregarded. We can now redraw Fig. 2B, leaving out unnecessary elements, as in Fig. 3.

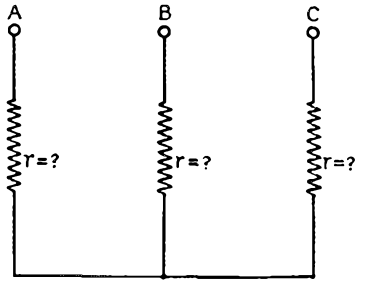


Fig. 3 — With three ground paths as in Fig. 2B, the calculation of any one becomes a simple problem in algebra, since direct measurements can be made between *A* and *B*, *B* and *C*, and *A* and *C*.

Solving for the Resistance

Fig. 3 consists of three unknown resistors strapped together at one end. If these resistors were placed on a test bench and a technician were provided with an ohmmeter, he could determine the value of each resistance simply by connecting his meter to the terminals marked *A*, *B* and *C*. By reading the values for different combinations and doing a little arithmetic, he could easily determine the resistance of any one unit.

If, for example, a = resistance reading between A and B, b = reading between B and C, and c = reading between A and C, simple algebra proves that $A = \frac{a+c-b}{2}$, $B = \frac{a+b-c}{2}$, and $C = \frac{b+c-a}{2}$.

In exactly the same manner it is possible to measure the ground resistance of any water-pipe or ground-rod system. Let us proceed to determine the ground resistance of a single rod. It will first be necessary to drive at least two and preferably three auxiliary test rods. These rods should be placed in a roughly symmetrical disposition around the master rod. Two test leads made of No. 14 insulated wire, terminated with heavy clips, will be needed to connect in sequence each two rods to an ohmmeter, as in Fig. 4. The series resistance of each pair of rods will be measured and recorded as in Table I. This table lists actual values measured on one ground system tested.

The ground resistance of the master rod can now be found in the same manner used for solving the resistor network of Fig. 3. By using the readings for M, A_1 and A_2, one value for M can be determined. By similarly using M, A_2 and A_3 and M, A_1 and A_3, two other values of M can be found. Substituting the above figures, values for M will be found to be 6.5, 5.5 and 7 ohms. The average is 6.3 ohms.

By similarly combining the indicated readings

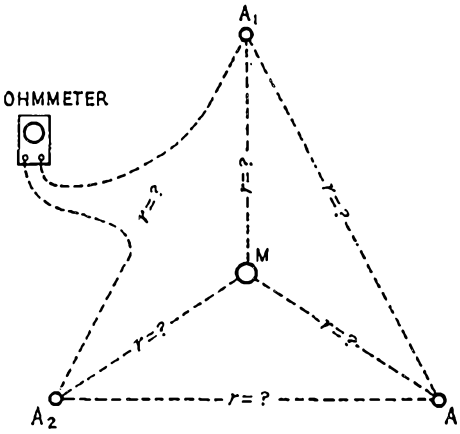


Fig. 4 — To measure the ground resistance at the rod *M* requires two or three auxiliary rods, A_1, A_2 and A_3, and a series of ohmmeter readings of all possible combinations.

for rods A_1, A_2 and A_3, we could determine their three values and their over-all average to be:

Rod A_1 = 7, 10.5, 6.5 = 8 ohms average
Rod A_2 = 11, 12.5, 12 = 11.8 ohms average
Rod A_3 = 22, 22.5, 21 = 21.8 ohms average

The accuracy of the above readings can be estimated by noting how closely the three separate values agree. Any set of readings indicating a major discrepancy should be discarded and a new set of readings taken. Measurements should be made in opposite directions and the results averaged before tabulating.

Rods should be driven a reasonable distance apart. Results have been found to be good if the separation is anywhere between ten and fifty feet. If the rods are too close, the accuracy of the readings may be affected. If too far apart, excessive ground potential may be encountered, causing the readings to fluctuate over a wide range.

After rods have been driven there will usually be a gradual rise in resistance measurements taken over a period of a few days as moisture and chemicals in the earth attack the surface of the rod. After several days this rise will taper off and subsequent measurements will remain relatively stable for fairly long periods of time. However, no ground system should be neglected for a period of greater than a year without rechecking the system's resistance. This should preferably be done in the spring of the year just before the lightning season, to insure adequate protection.

Earth Currents

In some locations the use of the d.c. ohmmeter becomes unsuitable because of large d.c. or a.c. components in the earth currents. For such cases the measurements can be readily made by using a Wheatstone bridge excited by a tone source of several hundred cycles or more and balancing the bridge for the lowest or null indication in a telephone headset indicator. This arrangement is shown in Fig. 5. If a Wheatstone bridge is not available, an acceptable substitute can be improvised by using two exactly equal resistors of about 1000 ohms for legs A and B in Fig. 5. A rheostat or pot having a range from 0 to 100 ohms can be substituted for bridge arm C, and the amount of resistance cut in by the rheostat at the point of balance determined by subsequent

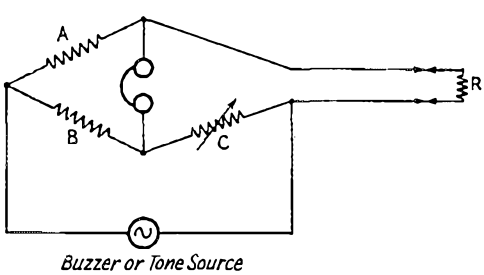


Fig. 5 — A simple Wheatstone bridge for measuring resistance in the presence of large earth currents. Resistors A and B should be equal and about 1000 ohms, and C should be a 100-ohm rheostat. R is the unknown resistance.

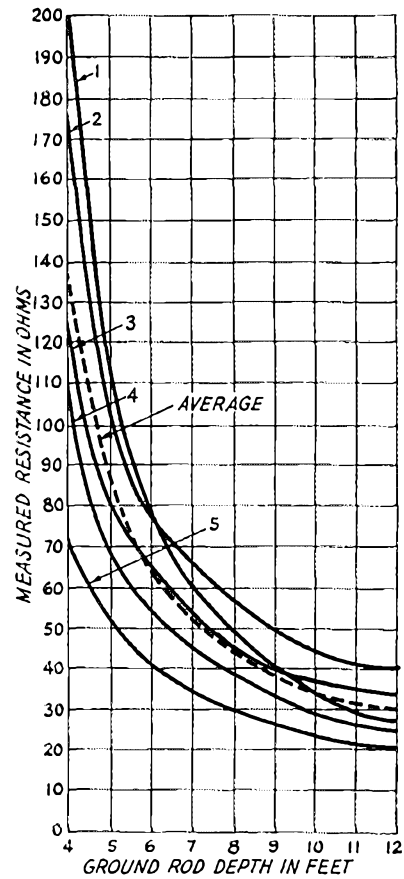


Fig. 6 — A graph showing the variation in resistance with rod length for five different cases. The variation decreases as the rods are made longer.

ohmmeter test. When the null indication is achieved, the bridge is balanced, and C is equal to the unknown resistance R.

Variation of Ground-Rod Resistance with Depth

Using the method described above, measurements were recently taken on a number of ground rods driven to a depth of twelve feet. These rods were used to form the grounding system for a steel tower erected in an exposed location. Due to the rocky and dry type of earth encountered, it was necessary to connect five rods in parallel to the central tower before the over-all ground system resistance was reduced to a reasonable figure.

Since the variation of ground resistance with rod depth is of interest, the actual values measured are plotted in Fig. 6.

It will be noted from Fig. 6 that there was a wide range in the values measured for different rods at identical depths. This variation was most evident at shallow levels and decreased as the rods were driven deeper into the earth. At a six-foot depth the rate of decrease in resistance began

to taper off. At ten feet all rods had a nearly uniform resistance. Readings at the twelve-foot level indicated that a practical limit had been reached. Driving the rods to greater depths would not decrease the obtainable resistances sufficiently to warrant the increased labor and expense.

Summary

The procedure given above enables a fairly accurate measurement to be made of the ground resistance of a rod, water-pipe or other grounding system. The measurement may be rapidly taken using conventional equipment in most cases.

It would appear that in order to be effective and uniform from day to day, ground rods should be driven at least eight feet deep. However, the improvement achieved beyond the eight-foot level will taper off so rapidly that there is little point in sinking a rod below a twelve-foot depth.

Still further improvement in reducing the ground resistance of a system can most simply be achieved by driving a number of rods to the desired depth and then connecting the rods in parallel, using heavy copper conductors.

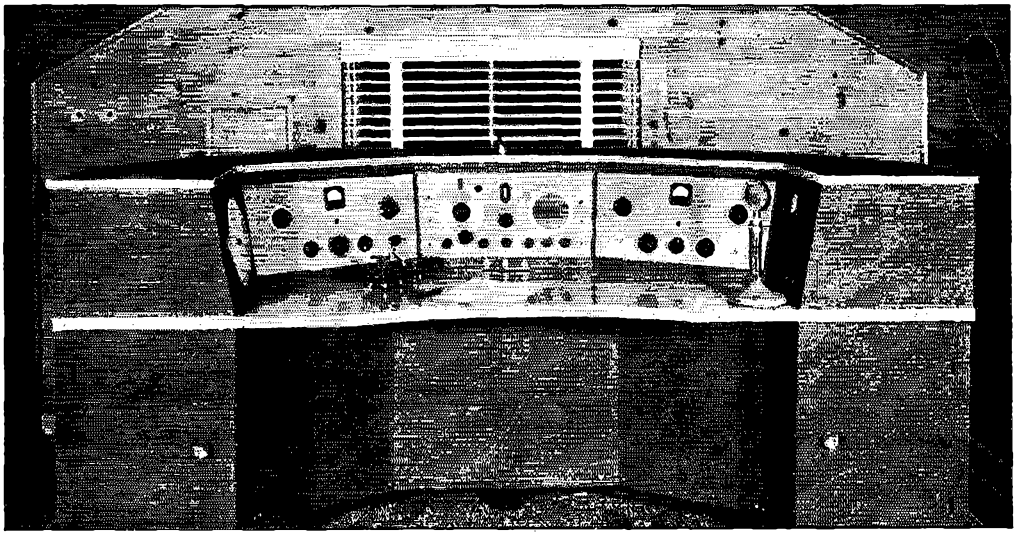
The grounding capability of any ground-rod system may be improved by conventional methods of treating the adjacent soil with dissolved rock salt or similar agent. However, the immediate improvement achieved may be at the expense of more rapid deterioration of the rod itself, necessitating frequent replacement.

When available for use, brass pipe or copper-plated iron rod will give superior results from the viewpoints of initially low resistance and long trouble-free life. For really low-resistance ground systems totaling less than one ohm, an entirely different technique is called for.

Cold water-pipe grounds should measure less than 20 ohms. Single ground rods may range from 20 to 500 ohms. When short rods are used or where dry soil is encountered, it may be necessary to parallel several rods. Of two grounds being compared, the one showing the lowest resistance usually will be superior in performance. Although satisfactory results may be expected if the measured ground resistance is below 10 ohms, every effort should be made to reduce this value as much as practicable.

The reader is cautioned to note that this article has dealt exclusively with the "d.c." resistance aspect of a grounding system. The dissipation of r.f. energy in the ground is an entirely different matter. Where an effective r.f. ground plane is required at or near the earth's surface, the use of an elevated counterpoise or a buried radial system may be required.

From the foregoing, it is evident that if a water-pipe or driven-rod system is to be used, the resistance of the system should be determined. The procedure described in this article will enable the required measurements to be accurately and quickly made.



W7EHZ — A Console-Type Station, 1951 Style

We believe you'll agree that Rudy Olsen of Coeur d'Alene, Idaho, has done himself proud in the construction of this neat operating position for his medium-power 'phone and c.w. station. Measuring 7 feet wide, 41 inches deep, and with five panel sections 12 inches high, the console frame is enclosed in "Spanish Leatherwood," a masonite material grained and finished to simulate Spanish leather. The desk top is surfaced with gray Micarta, and the metal trim is of the variety used in dressing the edges of linoleum counter tops. Power supplies are located in the lower compartments and connect to the units above through readily-accessible cabling at the rear. The top panel section contains, *l. to r.*, 24-hour clock, c.w. transmitter, SX-9 receiver, 10-meter 'phone rig, and modulation meter. Rudy is an electrician for the local lumber company which should explain the professional appearance of this homebuilt console. (*Photo courtesy W7FIS*)

A Linear Beat-Frequency Oscillator for Frequency Measurement

Circuit Details for Straight-Line-Frequency Tuning

BY RAYMOND W. WOODWARD,* W1VW

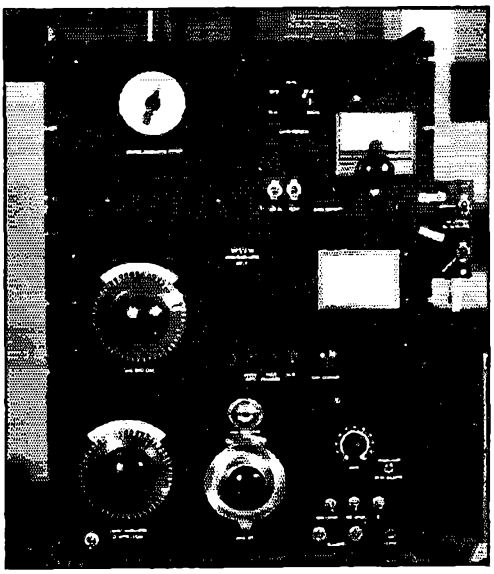
THE usual procedure in making precise measurements of radio frequencies is to beat the unknown frequency against a multiple of 10 kc. derived through suitable multivibrators and harmonic amplifiers from a secondary standard. This produces a beat note between 0 and 5000 cycles that is then independently measured. For work of medium precision, a direct-reading cycle meter may be used. For higher precision, one of the best methods is to compare the unknown audio note with a variable-frequency audio source such as a beat-frequency oscillator.

A beat-frequency oscillator requires a fixed-frequency and a variable-frequency oscillator generally operating in the range of 50 to 200 kc. Since the secondary standard has a 100-kc. oscillator that can readily be held to an accuracy of one part in 10 million, or 0.01 cycle, the writer had always thought that this should be the starting point for a suitable beat-frequency oscillator.

Before one was actually constructed, W9HQH described such a set-up.[1]

* % General Research Laboratory, Underwood Corporation, Hartford 6, Conn.

[1] Frank H. Mills, "An Interpolation Oscillator," *QST*, Nov., 1943.



The frequency-measuring equipment at W1VW. The linear beat-frequency oscillator is at the bottom and is adjusted by the PW dial. The dial in the center of the bottom panel is the zero-set adjustment.

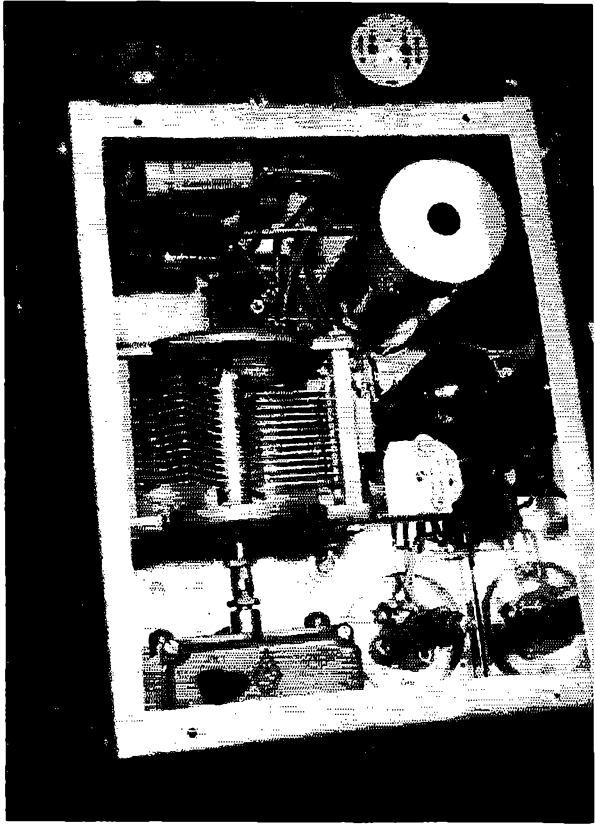
However, his variable oscillator did not suit the writer, since it was not linear, not subject to direct reading, and did not permit taking readings quickly. A tentative goal was set to obtain audio readings directly in cycles on a National PW dial without any interpolations and to give r.f. readings to an accuracy of at least 10 parts per million. Since these dials have 500 divisions, and by using a vernier index tenths of a division can be read, the dial would read 0 to 5000 cycles as desired. It was also hoped that when more time was available for taking readings and where interpolation could be made between 100-cycle calibration points, an accuracy of at least 1 part per million could be obtained (4 cycles at 4000 kc.).

This goal was easily met with the oscillator circuit to be described, and it is possible within a few seconds to take readings with an accuracy of 5 parts per million. Where a minute or more is available, measurements are better than 1 part per million; in fact, in many ARRL Frequency Measuring Tests readings are exactly the same as the official readings.

The Circuit

It is well known, of course, that an *LC* circuit with a straight-line-capacity tuning condenser will approach straight-line-frequency tuning if the tuning condenser is shunted by a much larger fixed capacitor. A little "armchair engineering" indicated that a "negative capacity" (inductance) in series with the tuning capacity in such a circuit will give a linear variation of frequency with dial rotation. By suitable choice of all constants in the tuned circuit (see appendix) the frequency change could be made 5000 cycles, or from 100 to 105 kc., for 180-degree rotation of the condenser, which likewise corresponds to 5000 dial divisions.

Fig. 1 gives the variable-oscillator circuit. The photograph shows the oscillator component of the entire assembly, which uses current tube types but is otherwise similar to that described by Mills. A transmitting condenser, C_1, is used to aid in stability. It should have semicircular plates, a spacing of at least 0.035 inch, and no backlash due to poor bearings. A capacity-*vs.*-rotation calibration should be made to insure that it is linear and also to have actual values available for determining other constants of the circuit. It is assumed that anyone interested in building equipment of this precision will either own or have access to measuring equipment such as an impedance bridge.



The oscillator with the shield cover removed. L_1 is in the round shield can and a similar can has been removed from L_2 to show its construction. C_3 is in another small shield at the side of the large box.

♦

The fixed capacitor, C_2, is a combination of silver micas, negative-coefficient ceramics, and a small ceramic or mica trimmer, to give the computed value of C_2 ±50 $\mu\mu$fd. The amount of negative compensation will have to be balanced experimentally after completion, to secure adequate temperature stability.

Trimmer C_3 is a zero-setting condenser used to reset the circuit to calibration points. It should be a small transmitting condenser (likewise for stability) as might be used in a low-power v.h.f. rig. The dial shown on this condenser in the center of the lower panel of the photograph need not be graduated but should have good slow-motion control.

For L_1, a b.c. antenna coil having an adjustable iron core was used. It should be shielded and the inductance should be set to the calculated value with the shield in place.

The main inductance, L_2, is composed of two of the adjustable iron-core inductors mounted on a wooden dowel, end to end, with the core-adjusting screws at either end. These coils are connected in series, with the inductances additive, and a tap brought out for the cathode connection. After adding L_3, the assembly should be rewaxed and enclosed in a shield can. The exact value of inductance is set using both top and bottom core adjustments, to maintain the cathode tap at the proper position.

The entire oscillator is enclosed in a separate shielded compartment. This box and the multivibrator boxes are all removable as complete units by disconnecting wiring plugs, and thus may be readily serviced.

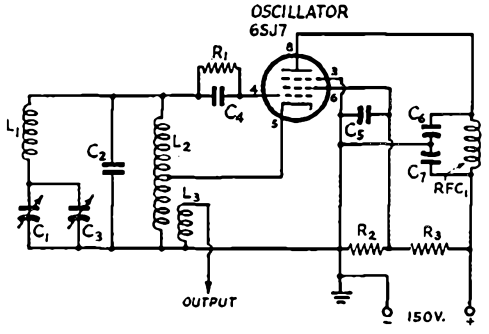


Fig. 1 — Circuit of the linear beat-frequency oscillator.

C_1 — 500-$\mu\mu$fd. transmitting condenser (see text).
C_2 — Approx. 5000 $\mu\mu$fd. (see text).
C_3 — 50 $\mu\mu$fd. (see text).
C_4 — 500-$\mu\mu$fd. silver mica.
C_5, C_6, C_7 — 0.1 μfd., 400 volts.
R_1 — 47,000 ohms, ½ watt.
R_2, R_3 — 20,000 ohms, 5 watts.
L_1 — Approx. 160 microhenrys (Meissner 14-7413).
L_2 — Approx. 460 microhenrys (two Meissner 14-1026). See text.
L_3 — 50 turns No. 30 wire at bottom of L_2.
RFC_1 — 80-mh. shielded r.f. choke (Meissner 19-5596).

General

In connecting equipment of this nature, where high precision is sought, generous use of isolating or buffer stages should be made from the fundamental crystal through all multivibrators, mixers, and output devices. All power supplies should have automatic voltage stabilization and ample capacity. The writer's complete equipment is shown in the photograph and comprises a total of 29 tubes. The top panel carries the 100-kc. crystal in a multiple-layered oven having an inner temperature of 92° F ±0.25° F. This oven has been operating continuously for over 15 years. The tuning elements of the crystal circuit are in a lesser-controlled portion of the oven assembly, with the tubes outside. This panel also contains a 10-kc. multivibrator, a harmonic amplifier, and output to the receiver. The tubes of the standard can be turned on at any time and, without any time delay, the 5000-kc. harmonic will be within 3 cycles of WWV. This can be brought back to exact zero beat with the zero-adjusting capacitor, and it will hold this setting within one cycle for several hours.

The middle panel contains a very stable e.c.o. for freezing signals to be measured, if they are of a transient nature. There is also a power supply for the two upper panels and an output to the receiver.

On the lower panel is the b.f.o. oscillator, 100-kc. amplifier, b.f.o. mixer, 1000- and 100-cycle

multivibrators, audio amplifier, electron eye for visual indication of zero beat in comparing audio signals, input from receiver, output to loudspeaker, and control switches and mixers. The power supply for this panel is a separate floor unit.

Adjustment

After the oscillator unit is completed and assembled with the remainder of the b.f.o., final adjustment should be made of C_2, L_1 and L_2. Temperature equilibrium should be reached and C_3 set at its midpoint. If the calculations have been carried out as in the appendix and the values of the components carefully set, little change should be necessary. However, due to unavoidable variations in linearity of C_1 and its end capacity effects, some adjustment will probably be necessary in order to have the correct frequency range of 100 to 105 kc. and a linear calibration.

A change in one value will necessitate a change in the others, as they are interrelated. The pattern of change will soon be discovered and a very close setting can be obtained. Observations should also be made on temperature drift and the negative temperature portions of C_2 corrected accordingly.

A vernier index is used on the PW dial. This is a paper scale mounted on a thin piece of metal or wood of a thickness to raise the scale to the same level as the edge of the dial and thus avoid parallax. Ten divisions on the vernier scale enclose eleven on the PW scale, and readings can readily be made to 0.1 or even 0.05 of a division (1 or ½ cycle).

Using the 1000- and 100-cycle multivibrators, a chart should be prepared giving dial readings for each 100-cycle point from 0 to 5000 cycles. The 1000-cycle point should be taken as a reference and before use the instrument "zero" should be set at this value by means of C_3.

Measurements

We now have three means of measuring audio residuals, depending on the precision required. First, we may take the PW dial readings and secure an r.f. accuracy of about 5 parts per million. Second, we can use the chart calibration and by interpolation obtain readings with an accuracy of about two parts per million. Third, by making the interpolation between 100-cycle reference points, checked at the moment, the accuracy will be better than one part per million, and probably about one part in four million.

Table I shows readings by the three methods obtained in the ARRL Frequency Measuring Tests required of Official Observers. It may be considered as typical.

Appendix

The proper values of inductance and capacitance in the oscillator circuit are best determined by calculation, using the known values of the particular components to be included.

Fig. 2 shows the basic circuit.

Equating the inductive reactance to the capacitive reactance,

$$X_{L2} = \frac{(X_{L1} - X_{C1})\,X_{C2}}{(X_{L1} - X_{C1}) - X_{C2}}$$

$$\text{or } \omega L_2 = \frac{\left(\omega L_1 - \frac{1}{\omega C_1}\right)\frac{1}{\omega C_2}}{\omega L_1 - \frac{1}{\omega C_1} - \frac{1}{\omega C_2}}$$

which gives the fundamental equation

$$\omega^4 L_1 L_2 C_1 C_2 + 1 = \omega^2 C_1 L_1 + \omega^2 L_2 (C_1 + C_2) \ldots . (1)$$

In this, the setting of C_1 is known for any desired frequency. Likewise, the value of C_1 is known for any setting of its dial and consists of C_0, the minimum value of C_1, plus the median value of the zero-setting condenser C_3, plus the proportional part of C_1 that is in mesh.

This leaves L_1, L_2, and C_2 as unknowns which must be determined. By taking three values of C_1 at desired frequencies, equations can be set up and the values of the unknowns found.

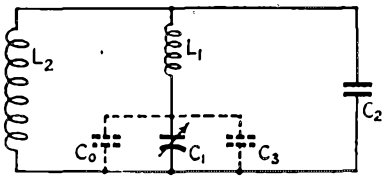


Fig. 2 — Basic circuit for straight-line-frequency tuning. C_1 is a straight-line-capacity condenser.

Since there is an appreciable irregularity at each end of the condenser calibration curve, it is preferable to choose dial settings and corresponding frequencies somewhat away from the end effect.

Thus at frequencies of 104.5, 102.5, and 100.5 kc., corresponding to dial readings of 450, 250, and 50 and audio frequencies of 4500, 2500, and 500 cycles, we find from the condenser calibration curve, after adding one-half the value of C_3 (24 $\mu\mu$fd.):

(2) $C_1 = 68 + 24 = 92$ $\mu\mu$fd. at 104.5 kc.
(3) $C_1 = 262 + 24 = 286$ $\mu\mu$fd. at 102.5 kc.
(4) $C_1 = 463 + 24 = 487$ $\mu\mu$fd. at 100.5 kc.

Let $A = \omega_1^2 C_1$ and $E = \omega_1^2$ in (2)
$B = \omega_2^2 C_1$ and $F = \omega_2^2$ in (3)
and $D = \omega_3^2 C_1$ and $H = \omega_3^2$ in (4)

then from (1)

$$AEL_1L_2C_2 + 1 = EL_2C_2 + A(L_1 + L_2) \ldots . (5)$$
$$BFL_1L_2C_2 + 1 = FL_2C_2 + B(L_1 + L_2) \ldots . (6)$$
$$DHL_1L_2C_2 + 1 = HL_2C_2 + D(L_1 + L_2) \ldots . (7)$$

(*Continued on page 116*)

TABLE I

	Method I		*Method II*		*Method III*	
Official Frequency	*Reading*	*Cycles Error*	*Reading*	*Cycles Error*	*Reading*	*Cycles Error*
3583.206	3583.210	4	3583.200	6	3583.206	exact
3596.930	3596.917	13	3596.937	7	3596.929	1
3717.948	3717.976	28	3717.946	2	3717.950	2
14,081.194	14,081.123	71	14,081.203	9	14,081.194	exact

The Monitone—Model 1951B

Improved Circuit for C.W. and 'Phone Monitoring

BY C. VERNON CHAMBERS,* W1JEQ

A KEYING MONITOR originally described by W3QED [1] turned out to be one of those simple and handy little gadgets that many of us just had to build into our receivers. Naturally, because hams will be hams, it wasn't long before VE3QV came along with a dressed-up version that didn't require any soldering-in so far as the receiver was concerned.[2] This last unit — the Monitone — had been barely warmed up before W1PRE showed us how simply it could be converted to a 'phone monitor.[3]

The Monitone-Model *1951A* was the outgrowth of the ideas presented by the fellows mentioned above. It incorporated all of the desirable features of the previous units and also included several improvements in circuit and layout design. This, then, was the Monitone in perfected form. At least, that is what we were permitted to believe for a few days. That brief but happy period of satisfaction was ended just as soon as Walt Bradley, W1FWH, had looked at the finished product and its circuit diagram. Walt's first "Why didn't you?" left us with no alternative but to rebuild immediately.

The Monitone-Model *1951B* is the outgrowth of the ideas suggested by the fellows mentioned above. This, then, is the Monitone in perfected form. At least, this is what we believe at the moment!

A comparison made between the new and the older Monitones will show that appearance, operating convenience and circuit performance have all been improved upon. Major differences between the two units are as follows:

The earlier model made use of a single control for regulation of the sidetone frequency and the audio volume. This particular operator never did find a compromise tone-volume level which remained pleasing for a sustained length of time. As a result, the new circuit provides for individual control of the oscillator tone and the audio output.

Provision for the monitoring of amplitude-modulated signals — thanks to W1PRE and W1FWH — is included in the design of the new monitor. Inclusion of FWH's recommendation makes possible the amplification of the 'phone signal being monitored.

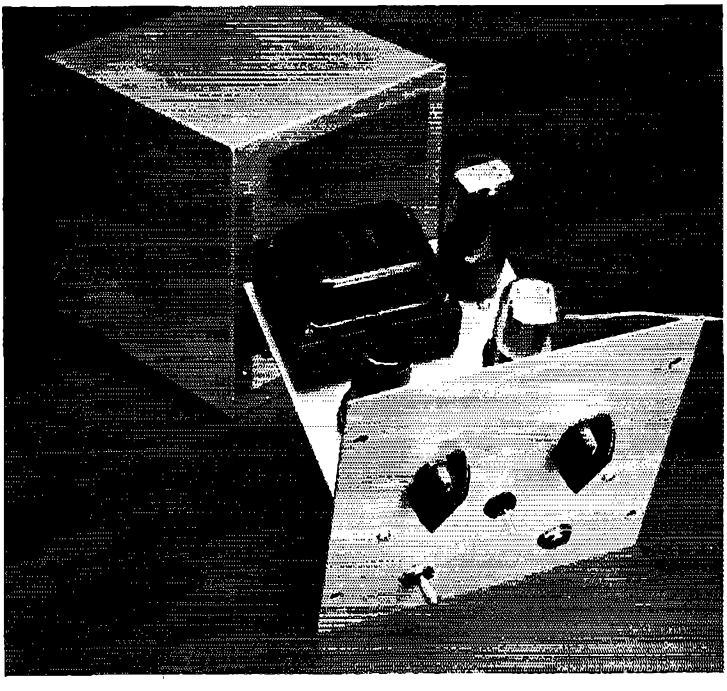
R.f. coupling to the input circuit can best be adjusted with the oscillator neon tube in view. The earlier model had the bulb mounted inside the chassis where it could be seen only by turn-

* Technical Assistant, *QST*.

[1] Ebert, "An Automatic Keying Monitor," *QST*, April, 1948.

[2] Paddon, "The Monitone," *QST*, September, 1948.

[3] Heacock, "Hints & Kinks," *QST*, December, 1948.



A front-top view of the Monitone-Model 1951B. The a.c. switch is at the bottom of the panel to the left of the headphone jack. Controls for tone and volume are to the left and right farther up the panel. The cabinet for the monitor is at the rear of the photograph.

ing the unit bottom side up. Model 1951B has the tube mounted on the front panel where it is ordinarily in clear view.

Finally, and of considerable importance to anyone having an already crowded operating position, the unit has been housed in an inexpensive cabinet so that it may be stacked with other pieces of gear.

The Circuit

The circuit diagram of the Monitone-Model 1951B is given in Fig. 1. It is basically similar to the circuit that was described in 1948,[2] so the present discussion will be confined to the new features.

R.f. input, taken from the field around the antenna coupler or the antenna feed line, is fed through the input jack, J_1, to a network consisting of RFC_1, the 1N34A and C_5. The rectified voltage at the junction of resistors R_8 and R_9 acts on the oscillator and the audio sections of the circuit just as it did in the older unit.

The frequency of oscillation for the neon tube circuit is to a large degree controlled by the time constants of C_6 and three resistors — R_{10}, R_{11} and R_{12}. The tone generated by the oscillator may be varied by changing the value of any one of these components. The potentiometer, R_{11}, is the tone control in this case and provides a frequency variation of several hundred cycles in and around the 1000-cycle range. A value of 3 megohms is shown in the parts list, but a 5-megohm control (we didn't have one available) would eliminate the need for the fixed resistor, R_{10}. R_{10} was installed in the circuit because the output from the oscillator, taken off at the junction of R_{11} and R_{12}, became too low at some settings of the tone control. S_{1B} is an on-off switch for the sidetone oscillator.

For monitoring 'phone signals the oscillator switch, S_{1B}, is opened and the 'phone switch, S_{1A}, is closed. With the switch set at the 'phone position, rectified audio voltage goes from the crystal diode to the audio gain control, R_6, and then to the amplifier section of the 6SL7GT audio tube.

The power supply uses a standard replacement-type power transformer, T_1, and a condenser-input filter. It will be noticed that the customary filter choke is replaced by a resistor, R_{13}. The total cathode current drawn by the 6J5 and the 6SL7GT does not exceed 5 ma. and the output of the conventional filter was better than 400 volts when working into this light load. R_{13} makes a less expensive — but perfectly adequate, under these conditions — filter component than would a choke and also reduces the output of the supply to approximately 250 volts.

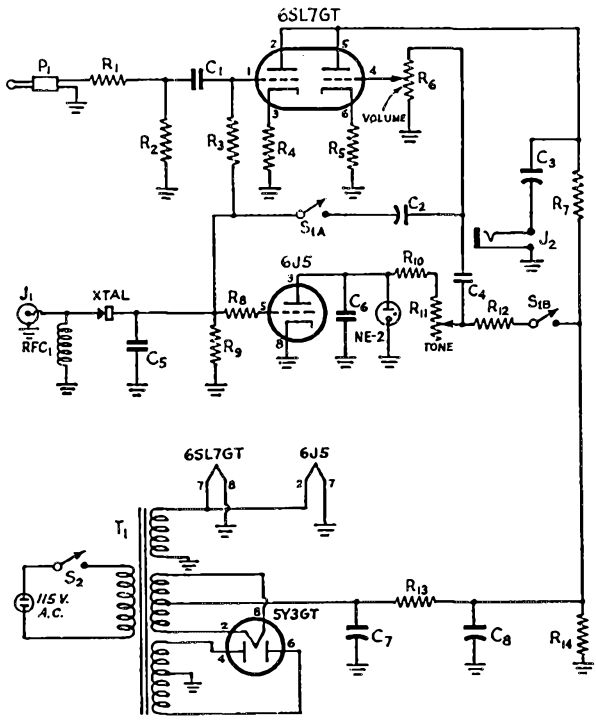


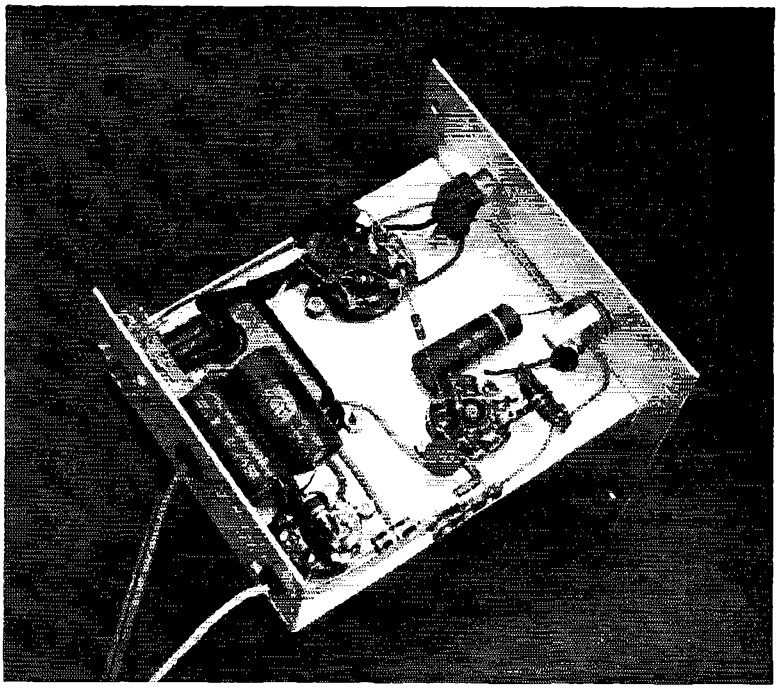
Fig. 1 — Wiring diagram of the Monitone-Model 1951B.

C_1 — 0.005-μfd. disc ceramic.
C_2, C_3 — 0.1-μfd. 400-volt paper.
C_4 — 250-$\mu\mu$fd. ceramic.
C_5 — 100-$\mu\mu$fd. ceramic.
C_6 — 0.001-μfd. disc ceramic.
C_7, C_8 — 8-μfd. 450-volt electrolytic.
R_1 — 6800 ohms, ½ watt.
R_2 — 1000 ohms, ½ watt.
R_3 — 0.56 megohm, ½ watt.
R_4, R_5 — 1200 ohms, ½ watt.
R_6 — 1-megohm potentiometer (Mallory U-53).
R_7 — 22,000 ohms, 1 watt.
R_8 — 68,000 ohms, ½ watt.
R_9, R_{10} — 1 megohm, ½ watt.
R_{11} — 3-megohm potentiometer (Mallory U-59).
R_{12} — 2.2 megohms, ½ watt.
R_{13} — 47,000 ohms, 1 watt.
R_{14} — 0.1 megohm, 1 watt.
J_1 — Tip jack.
J_2 — Open-circuit jack.
P_1 — 'Phone plug.
RFC_1 — 2.5-mh. r.f. choke.
S_{1A}, S_{1B} — S.p.d.t. switch; see text. (Mallory US-28.)
S_2 — S.p.s.t. toggle switch.
T_1 — Replacement transformer (Stancor P-6010).
Xtal — 1N34, 1N51, etc. Connect "cathode" to J_1.

Construction

An ICA aluminum utility box No. 29843, measuring 6 by 6 by 6 inches, is used as the cabinet for the monitor. One of the covers with which the box is equipped is used as the front panel for the case. We did not cover the rear of the cabinet and the resultant opening provides ventilation for the assembly. The chassis, formed from $\frac{1}{16}$-inch aluminum stock, is $4\frac{7}{8}$ inches wide, $5\frac{7}{8}$ inches deep, has a $\frac{5}{8}$-inch lip bent up at the front and a 2-inch foldover at the rear. The lip at the front is fastened to the panel and the 2-inch surface serves as the rear wall of the chassis.

The front-top view of the Monitone shows the 5Y3GT rectifier tube mounted to the right of the power transformer at the rear of the chassis. The 6SL7GT audio tube is to the right of the 6J5 and the sockets for these tubes are located $2\frac{1}{4}$ inches in from the panel. A rubber grommet having a $\frac{1}{4}$-inch clearance hole is used as the mount for the neon tube.



Bottom view of the monitor showing how the components are grouped around the tube sockets.

A bottom view of the monitor shows the power-supply components grouped at the rear of the chassis. The 1N34A crystal and most of the parts for the neon oscillator are mounted on the socket for the 6J5 tube and the audio components are on and around the 6SL7GT socket at the right of the base. Resistors R_5 and R_7 are terminated at the two-terminal tie-point strip located to the front of the audio tube socket and R_1, R_2 and R_{14} each have one end connected to the terminal strip at the right of the socket. A tip jack for the r.f. pick-up lead is mounted on the rear wall to the left of the 115-volt line cord. The shielded audio lead enters the chassis through a rubber grommet located at the right end of the rear wall.

Changeover switch $S_{1A}S_{1B}$ is mounted on the tone potentiometer, R_{11}, and is wired in a fashion which causes the 'phone section, S_{1A}, to close when the control arm for the potentiometer is rotated to the extreme counterclockwise position. S_{1B} should open at this setting of the tone control. $S_{1A}S_{1B}$, labeled by the manufacturer as a s.p.d.t. switch, is actually a pair of s.p.s.t. switches built into a single assembly.

Installation & Operation

The Monitone is made operative by plugging the audio plug, P_1, into the headphone jack of the receiver, the headphones into J_2 of the monitor, and applying 115 volts a.c. A length of wire must be run from the r.f. input jack, J_1, to a point where it can pick up r.f. from the transmitter antenna system. With S_{1B} and the power switch, S_2, closed, the transmitter may be turned on and the position of the r.f. pick-up lead (Caution! High voltage!) adjusted for a sustained oscillation of the neon tube circuit. Sufficient r.f. coupling between the transmitter and the monitor is indicated by a glow in the bulb and by the sidetone as heard in the headphones.

The r.f. field around the antenna system may vary in strength as the transmitter is switched from one band to another and, as a result, checks for adequate coupling between the monitor and the transmitter should be made on each band for which operation is contemplated. Usually, a coupling adjustment made at one frequency will suffice for all other frequencies as long as the pick-up line is coupled to the antenna tuner.

Although the Monitone-Model 1951B is simple, inexpensive and quite capable of adding to both operating convenience and pleasure, it cannot determine the true character of a transmitter signal. It does do a beautiful job of *hiding* clicks and chirps, but it hides them in a *single* receiver — *only* the one to which it is connected! Perhaps — no, it's a little too early to start thinking of Model 1951*C*.

Silent Keys

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

W2FAG, Richard A. Van Houten, Paterson, N. J.
W2OQT, ex-W9FMM, Donald M. Harring, Levittown, L. I., N. Y.
W3LB, Paul R. Kern, Reading, Penna.
W3LNE, Francis J. Walczak, Ellwood City, Penna.
W4RFT, Phillip L. Phillips, Nashville, Tenn.
W8ADL, Frederick C. Mills, Akron, Ohio
WØCZY, John A. Jahnke, Harlan, Iowa
VE7BN, Sgt. William J. Hatcher, R.C.M.P./B.C.P., New Westminster, B. C.

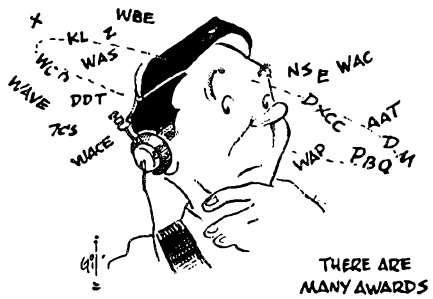
{Number Six in the ARRL Series on Amateur Operating}

Awards

BY RICHARD L. BALDWIN, W1IKE

THERE are many rewards in amateur radio. There's the thrill of working a faraway station, the pride in winning a contest, and the inner glow that results from having a first-rate station. Above all, there is that glorious feeling that results from our first QSO. Who can ever forget *that!*

Yes, these are a few of the rewards in amateur radio, and no certificate could ever compete with them. But for the fellows like you and me who prefer to have some tangible display of our operating achievements, there are many certificate awards available. Some of us who are primarily traffic men like to have a DX certificate or two on the wall just to show that DX king down the road that he isn't the *only* one who can do it. And what's to stop a DX man from making BPL some month? The same holds true for those of us who are rag-chewers, v.h.f. men, etc. Sure, these various awards — the merit badges of amateur radio — hold some attraction for all of us, 'cause we all like to prove at one time or another that we're just as versatile as the next fellow.

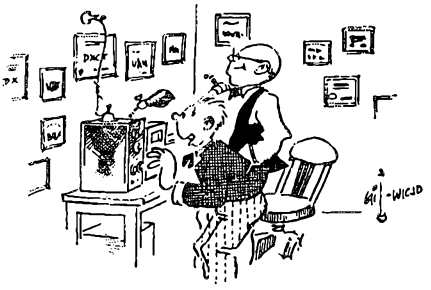


Working DX being the popular pastime that it is, a good many of these awards are based on our being able to produce QSLs from numerous foreign countries. On the other hand, there are many awards available for other achievements — such as for handling messages, for being a good rag-chewer, for being a top-notch operator, and so on. We can also win recognition by being the leading scorer in our section in such affairs as the Sweepstakes, the DX contest, the Ten-Meter WAS contest, etc. In such contests we are competing directly with our fellow hams in the same section. To win requires an efficiently operating station and skills that may take a long, long time to develop.

However, the awards that we are going to describe here are those which are, in a sense, noncompetitive. Take DXCC, for example. To work and receive confirmations from 100 countries takes time and perseverance. But if the ham on the other side of town makes DXCC, that doesn't prevent us from following suit. Unlike the DX contest, when we operate furiously for a couple of hectic week ends in an attempt to outscore the other locals, we can take our own sweet time in attaining DXCC. Of course, there may be hot competition on the evening that a new and rare country shows up on the band for the first time. But, if we don't get him the first night, the chances are good that we can stalk him patiently and QSO him when some of the excitement and furor has died down. Whether we work him tonight or next year, it'll still count for DXCC (*if* we get a card from him!).

If we've been on the air for a while, we may find that we have already unknowingly qualified for some of these awards. Or, as we read over the various requirements we may find one that strikes our fancy, and decide to set our sights for it. Without exception, these certificate awards will make handsome "wallpaper" for a radio shack, as well as add to our sense of achievement. And just watch the envy in the eyes of the visiting hams.

There are some general requirements that apply to all of the awards, and we will cover those first, touching upon the specific details as we discuss each of the awards. In all cases, when confirmation of contacts is requested, it is to be understood that "two-way" contacts are meant. An SWL report either of your signals alone or the contact between our station and another is never sufficient. Also, contacts with maritime-mobile and aeronautical-mobile stations are not valid for any of the awards. They should be



written confirmations, and photostatic copies are generally unacceptable. Every award requires that good ethics and sportsmanship have been adhered to. A fundamental requirement is that the applicant must have abided by the amateur regulations which are in effect for the amateurs of his country.

When a fee is required, to cover handling charges, payment should be made in the cur-

rency of the country from which the award comes. International Reply Coupons are an acceptable substitute in many cases, although often it is better to purchase an International Money Order. Incidentally, you should note that the redemption value of International Reply Coupons is considerably less than their purchase price.

Applicants should *always* include sufficient money, reply coupons, or stamps to cover return postage costs. This should preferably be by registered mail, as the organizations issuing awards can assume no responsibility for loss of cards and correspondence in the mails.

No attempt has been made to list the rules for these awards in their entirety. However, the information given is sufficient so that you will know in which direction to head to attain any of the awards.

ARRL Awards

A-1 Operator Club. Designed to promote a high caliber of operating in the amateur bands. To become a member, one must be nominated by at least two operators who are already members. In choosing members, the following points are considered: well-formed keying characters and good voice-operating techniques, use of correct procedure, copying ability, judgment and courtesy. Certificate issued by ARRL. No fee. An amateur does not apply for this award — he earns it.

BPL (*Brass Pounders League*). If your monthly traffic report to your Section Communications Manager (address page 6 each *QST*) is above a specified minimum, the SCM will forward a membership certificate. No fee.

Code Proficiency Certificate. Awarded by ARRL to those who submit accurate copy from one of the qualifying runs transmitted from W1AW, W6OWP, or WØTQD, at six speeds from 10 to 35 w.p.m. See Operating News section of *QST* for latest information. No fee.

DXCC (*DX Century Club*). Awarded by ARRL. Submit written confirmations of contact with at least 100 countries (see ARRL Countries List, p. 40, Feb., 1950, *QST*, or ARRL *Handbook*). Sticker endorsements for each additional 10 countries. No fee. No special endorsement for work on a single band. The regular award may include 'phone-to-'phone and 'phone-to-c.w. QSOs, while the DXCC with 'phone endorsement must have "'phone only" QSOs. Where no QSL card is available, countries may be verified by reference to ARRL DX contest logs, if the station was worked in an ARRL DX contest and has had its score reported in *QST*.

OTC (*Old Timers Club*). Open to anyone who holds an amateur call at the present time and who held an amateur license 20 years ago. To obtain the certificate, send ARRL a summary of your ham history. No fee.

Public Service Certificate. Another award that must be earned, not applied for. It is presented by ARRL to amateurs who render public service in time of emergency and in communication with expeditions, or who in some other way serve the public in any outstanding fashion by means of amateur radio.

RCC (*Rag Chewers' Club*). The purpose of the RCC is to encourage friendly contacts and to discourage the "hello-goodbye" type of QSO. To become a member, chew the rag for at least half an hour with a member of the RCC. Send a report of the QSO to ARRL, and ask the member you worked to do the same. When both reports have been received, your RCC certificate will be issued. No fee.

WAS (*Worked All States*). Awarded by ARRL on receipt of confirmations of contact with each of the 48 U. S. states (Maryland and the District of Columbia being counted as one). Special certificate if all work on 50 Mc. No fee.

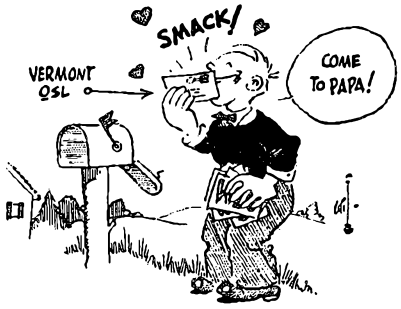
IARU Award

WAC (*Worked All Continents*). Issued by International Amateur Radio Union. Written confirmations required from each of the six continental areas (North America, South America, Europe, Africa, Oceania, Asia). IARU rules stipulate that the applicant must be a member of that IARU society which represents the country in which he lives, and that application must be made through that society; i.e., U. S. hams apply through ARRL. If an applicant lives in a country not represented by IARU, he may apply through ARRL upon payment of a 50c fee. Special endorsement for work on 'phone, and also for work on 50 Mc.

IARU Society Awards

AAA (*All Africa Award*). Issued to all members of member-societies of IARU who prove contact with all ZS call areas (ZS1-ZS9) plus 25 other countries on the continent of Africa, postwar. Minimum acceptable reports R3, S3, T8. Endorsed 'phone or c.w. Fee is 2/6 (50c U. S.). Send applications to the South African Radio League, P.O. Box 3911, Capetown, Union of South Africa.

BERTA (*British Empire Radio Transmission Award*). Issued only by RSGB at New Ruskin House, 28/30 Little Russell St., London, W.C. 1. Fifty written confirmations required from British Commonwealth and Colonial Empire call areas. Endorsement for 'phone. Fee and reports as in WBE award. Write to RSGB for a list of call areas.



DUF (*Diplome de l' Union Francaise*). Issued by the French society, award is in four parts. For first part: submit proof of QSO with French stations in three continents, plus at least four stations from countries of the list below. Second part: four continents, plus ten stations. Third part: five continents, plus twenty stations. Fourth part: six continents, plus thirty stations. No fee except for fourth part, which is 700 francs ($3.00 U. S.). U. S. hams send their applications via ARRL, including a list with all QSOs listed, including call letters, band, mode, date, time. List of French country prefixes: F, FC, DL5, FKS, EZ, FN, FI, FA, 3V8, CN, FF, FD, FE, FQ, FL, FB, FR, FP, FM, FG, FO, FY, FK, FW, FU.

Empire DX Certificate. Available only to members of RSGB of three years' standing. Submit proof of (a) contact on 14 Mc. with stations in 50 Empire countries or call areas plus (b) contact with 50 Empire countries or call areas on other than 14 Mc.

Helvetia 22. An appropriate certificate will be awarded to each European amateur who submits proof of having established c.w. contact on each of two different bands with amateur stations located in each of the 22 cantons of Switzerland, and to each amateur outside Europe who similarly proves contact with one station in each of the 22 cantons. Each QSL submitted as proof must show the abbreviation of the name of the canton: Zurich, ZH; Berne, BE; Lucerne, LU; Uri, UR; Schwyz, SZ; Unterwald, NW; Glaris, GL; Zoug, ZG; Fribourg, FR; Soleure, SO; Bale, BS; Schaffhouse, SH; Appencell, AR; St. Gall, SG; Grisons, GR; Argovie, AG; Thurgovie, TG; Tessin, TI; Vaud, VE; Valais, VS; Neuchatel, NE; Geneve, GE. Contacts must have been made on or after April 15, 1948. Send application and proofs to International Relations Officer, Union Schweiz Kurzwellen Amateure, Berne (Posthox), Switzerland. No fee.

WAA (*Worked All America*). Issued for confirmed postwar contact with 45 of the 57 countries in the American area, with applications to be sent to L.A.B.R.E., P.O. Box 2353, Rio de Janeiro, Brazil. Minimum reports of R3 and T8. Countries in the American area are defined as those in the continents of North and South America. No fee.

WABP (*Worked All Belgian Provinces*). Issued by *Union Belge des Amateurs-Emetteurs*, Postbox 634, Brussels, upon proof of having worked each of the nine Belgium provinces on two different bands. No fee.

WACE (*Worked All "CE"*). Submit to Radio Club de Chile, P.O. Box 761, Santiago, confirmation of contact with at least one station in each of the seven CE districts. Contacts may be either 'phone or c.w., on any band, but must have been made subsequent to Nov. 19, 1945. No fee.

WAP (*Worked All Pacific*). Issued by New Zealand Amateur Radio Transmitters, P. O. Box 105, Wanganui, N. Z. Requires proof of QSO with 30 or more prefixes in the Pacific area, all QSOs to have been postwar. No fee. The following are considered to be in the Pacific: ZL, VK, KB6, KH6, KP6, KJ6, KG6, KX6, KM6, KW6, KS6, DU (KA), VR1 through VR6, ZK1, ZK2, ZM6, FK8, FU8, VO8, V84, V85 Brunei, VS5 Sarawak, VK9 Papua, VK9 Territory of New Guinea, ZC2, PK1 through PK7, CR10, Bonin Islands, KC6, Palau Islands, Phoenix Islands (Br.), Union Islands. Minimum reports to be R3 and T8.

WASM (*Worked All SM*). Work one station in each of the 7 SM call areas and submit cards to S.S.A., Stockholm 4, Sweden. Only postwar QSOs count, and application must be accompanied by 10 IRC.

WBCN (*Worked the British Commonwealth of Nations*). Awarded by SARL to its members only. Other requirements same as WBE. South African Radio League, P. O. Box 3911, Capetown, Union of South Africa.

WBE (*Worked British Empire*). Issued by Radio Society of Great Britain upon receipt of five written confirmations of contact with British stations in each of the continental areas (North and South America here considered as one). U. S. hams may forward their application via ARRL. Fee is 2/6 (50c U. S.) for non-members of RSGB. Endorsement for 'phone. Minimum acceptable reports on QSLs to be R3 and T8.

Other Awards

East African Special Awards. The Radio Society of East Africa offers Annual Certificates to any amateur upon proof of contact in any calendar year with one VQ3 plus one VQ5 plus three VQ4 stations. Possession of five of these annual certificates plus proof of contact with one VQ1 will entitle the holder to the WEA (Worked East Africa) award. Fee is $1.00 U. S. (5 shillings). Send log extracts, instead of QSLs, to East Africa QSL Bureau, P.O. Box 1313, Nairobi, Kenya Colony, British East Africa. Awards are available for 1946-47 and 1948 onward.

KZ-25. The Canal Zone Amateur Radio Association issues a certificate upon submission of a simple list showing contacts with 25 KZ stations, with dates and times. No fee. Send application to CZARA, Box 407, Balboa, Canal Zone.

WACC (*Worked All California Counties*). Submit QSLs confirming contact with all 58 counties in the State of California. Stations contacted may be mobile, but mobile stations may not receive this award. Forward applications to the Oakland Radio Club, 906 Fallon St., Oakland, Calif. No fee.

WAJAD (*Worked All Japanese Amateur Districts*). Submit proof of contact with one JA station in seven of the nine JA call areas. Application to Secretary, Far Eastern Amateur Radio League, APO 500, Postmaster, San Francisco, Calif. No fee.

WAVE (*Worked All "VE"*). Submit proof of QSO with two different stations on two different bands in each of the Canadian provinces (Yukon Territory and Northwest Territories considered as part of British Columbia). Thus, a total of 18 confirmations is required. All QSOs shall have been made on or after January 1, 1939. In U. S. and Canada all QSOs shall have been made from one state or province. Fee is 25c. Send applications to Canadian Amateur Radio Operators' Association, 46 St. George St., Toronto 5, Ontario, Canada.

WFJS (*Worked Five Japanese Stations*). Submit proof of QSO with five JA stations, QSOs to have been since January, 1949. Application goes to Secretary, Far Eastern Amateur Radio League, APO 500, Postmaster, San Francisco, Calif. No fee.

WPR-25 & WPR-50 (*Worked 25 or 50 Puerto Rican stations*). Either 25 or 50 proofs of QSO with KP4 stations should be mailed to the Puerto Rico Amateur Radio Club, P. O. Box 73, Hato Rey, Puerto Rico. No fee. Upon request and proof, certificates endorsed to show work all on one band. Check with PRARC for information on higher endorsements.

YL WAS. Issued by the YLRL to any amateur who submits proof of contact with a licensed woman operator in each of the 48 states, with other rules similar to ARRL WAS award. No fee. Submit application to W1MCW, 19 State Ave., Queen Acres, Cape Elizabeth, Maine.

Miscellany

There are numerous excellent certificates issued by individual clubs and amateur groups throughout the world. The usual requirement for such awards is that the applicant have communicated with a certain number of amateurs in a specific state, city, or province. Space does not permit the listing here of complete details for all these awards, and so we suggest you get the dope from the next ham that you work in one of these areas. Here's a list of the miscellaneous awards as we know them:

Decagon Certificate of Achievement; Corpus Christi Radio Club, 1656 Armada Park, Corpus Christi, Texas.

Worked Ten Nashville Stations; Nashville Amateur Radio Club, 2701 Belcourt, Nashville 5, Tenn.

Worked Ten Greater Orlando Stations; Orlando Amateur Radio Club, Box 2067, Orlando, Fla.

Worked South Shore; South Shore Amateur Radio Club, P. O. Box 8, Quincy, Mass.

Sandia Base Friendship Award; Secretary, Sandia Base Radio Club, % General Delivery, Sandia Base Branch, Albuquerque, New Mexico.

Achievement Certificate; Southern Nevada Amateur Radio Club, Box 373, Boulder City, Nevada.

Worked New Hampshire: The Concord Brassepounders, P.O. Box 312, Concord, N. H.

Worked Cuba; Association of Radio Amateurs of Las Villas, P.O. Box 136, Santa Clara, Cuba.

Moorabbin & District Radio Club Certificate; 424 Centre Road, Bentleigh, S. W. 14, Victoria, Australia.

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The following awards are issued by other than bona fide amateur organizations:

Argentine DX Certificate; Radio-Onda, Cerrito 1222, Cap. Fed., Argentina.

Short Wave Magazine DX Award; 53 Victoria St., London, S.W. 1, England.

WAE (Worked All Europe); QRV, Box 585, Stuttgart, Germany.

WAZ (Worked All Zones); Cowan Publishing Corp., 67 West 44th Street (Suite 510), New York, N. Y.

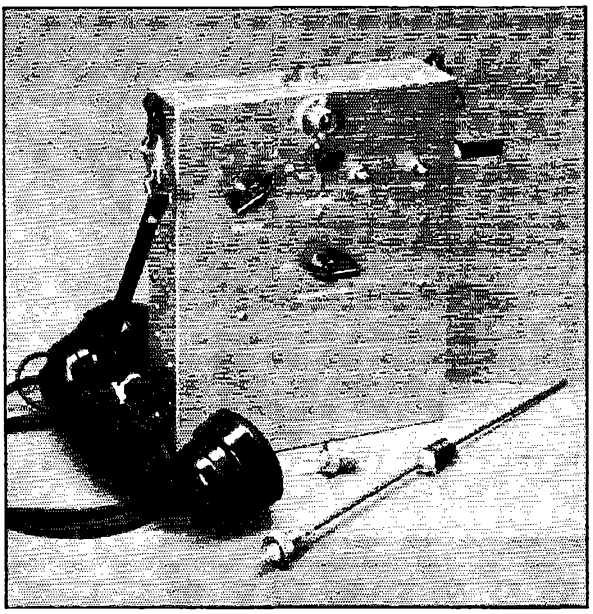
A Civil Defense Portable

A Four-Pound Station for Use Wherever Man Can Go on Foot

BY EDWARD P. TILTON,* W1HDQ

In years past we have thought of emergency communication almost exclusively in terms of "rigs with handles" — gear that could be used on a 6-volt battery, a small a.c. supply, or whatever source of power happened to be available at the moment. This sort of equipment was the backbone of the World War II WERS program, and it should occupy a prominent place in our plans for the present emergency, but a new need born of the atomic age may provide us with one of our most important communications tasks.

The radiological survey team is the new factor in the civil defense picture. Effective functioning of such teams requires on-the-spot communication, of a sort that is possible only with a compact self-contained transmitter-receiver that can be used in any spot where man can go on foot. It cannot be tied to a car storage battery, a gas-engine generator, or an a.c. line. It must have the smallest practical dimensions as to size and weight, so that it will be only a very minor encumbrance to the user. These are the major specifications; other requirements must be secondary to compactness and portability.



The complete portable 50-Mc. station for civil defense communication. In the foreground is a miniature center-loaded antenna system for short-range work. A dummy load for plugging into the antenna socket is also shown. The carrying strap is the familiar Twin-Lead.

At once the question arises as to the frequency to be used in this work. Should it be 28, 50, 144 or 220 Mc.? If the rig is to be the simplest transceiver type, 220 Mc. would seem to get the nod. The band is wide enough to permit use of the modulated-oscillator type of transmitter, and the length of a quarter-wave antenna at this frequency is attractive. Such rigs should not be built for 144-Mc. use, however, in view of the relatively narrow assignments set aside in that band for civil defense communications purposes, and a crystal-controlled transmitter would be wasteful of battery power and space, compared to one designed for 50 or 28 Mc. The 144-Mc. band will be fine for mobile and fixed-station work (more on that line in a later issue) but it appears to be ruled out for the light-weight portable station.

This leaves a choice of 28 or 50 Mc. if crystal control is planned, or 220 Mc. if it is not. The two lower bands have several practical advantages. Equipment of high quality is available for the control station at moderate cost on the commercial market, or it can be built with a minimum of trouble and expense. Crystal-controlled field stations for 6 or 10 can work in conjunction with other stations on those bands; their signals will require no special control-station receiver, as would be the case if unstable rigs were employed. The survey teams can then be tied in directly with other nets, with the assurance that they will always come in "on the nose," leaving no need for hunting around on the part of the control-station operator.

The selection of 50 Mc., in preference to 28 Mc., for the portable to be described was based on two factors. First, an antenna system of a given length will work better on the higher frequency. Second, the already heavy demands being made on the available space in the 10-meter band might make it difficult to find additional channels for the portable rigs in some localities. The rig can be made to work on either frequency, however, and the choice of one or the other may be based on local considerations.

Basically it consists of a transmitter having a single-tube r.f. section with an audio pentode as a modulator, and a simple superregenerative receiver with one stage of audio. Power is supplied by a 1.4-volt A battery, a 90-volt B, and a 6-volt C battery, all carried in the case. For maximum

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battery economy and circuit efficiency separate transmitter and receiver tubes and circuits are used, in preference to the transceiver type of rig wherein one set of tubes and circuits serves both purposes. In changing from transmit to receive, the filaments and antenna circuit are switched. Thus it is possible to use a low-drain receiver that puts a minimum of strain on the small portable batteries, resulting in an appreciably longer life than would be possible if the same battery drain were used in both transmission and reception.

Transmitter Circuit Details

The r.f. section of the transmitter uses a regenerative triode crystal oscillator [1] in the first half of a 3A5 dual triode, the second section of the tube working as a doubler. The crystal may be either a standard 8.4-Mc. cut, working on its third overtone, or any of the overtone-type 25-Mc. crystals may be used. Slightly more grid drive to the doubler is developed when a 25-Mc. crystal is used, and the adjustment of the regeneration is somewhat less critical, but either type of crystal may be used with good results. To hit the assignments set aside for wartime civil defense communication, crystals should be inside the following frequency ranges: 8392–8458, 8892–8958, 25,175–25,375 or 26,675–26,875 kc.

Adjustment of an oscillator of this type is covered in detail in April *QST*.[1] Somewhat more coupling between L_1 and L_2 is needed with the filament-type 3A5 than with heater-type triodes such as the 6J6, so L_2 is mounted directly inside L_1. As may be seen from the rear-view photograph, it is wound in the opposite direction and its grid end is adjacent to the plate end of L_1. Should there be insufficient feed-back with this arrangement, more turns should be added to L_2, or filament chokes may be added to the 3A5.

The doubler plate circuit is split-stator tuned, to permit addition of regeneration in the form of a small coupling capacitor, C_5, connected back to the second triode grid. If any tendency to oscillation is noticed in the doubler stage, the value of this condenser should be reduced.

Several variations of this transmitter design are possible with only minor changes. More power output may be obtained if the oscillator is run on 50 Mc., with the following half operating as a neutralized amplifier. The same general circuit arrangement may be used, but with a 50-Mc. crystal, and suitably reduced inductances for L_1 and L_2. A variable capacitor is then substituted for C_5, to permit neutralizing in the customary manner. The transmitter may be operated on 28 Mc. by substituting a suitable crystal (9517–9583, 9817–9883, 28,550–28,750, or 29,450–29,650 kc.), replacing L_3 with a 28-Mc. coil, and running the second stage as a neutralized amplifier. The values for L_1, L_2 and C_2 as given in Fig. 1 are usable for any crystal from 8 to 30 Mc.

The modulator is a 3Q4 audio pentode connected in the conventional manner, driven by a single-button microphone. Its power output is slightly less than is needed for full modulation of the 3A5, but adequate audio is obtained with close talking in a loud voice into the telephone handset. If more audio is wanted, a 3A4 may be substituted, at the expense of additional battery drain. Voltage for the microphone is supplied by the A battery.

[1] Tilton, "Overtone Crystal Oscillator Circuits," April, 1951, *QST*, p. 56.

The Receiver

The simplest possible arrangement was used for receiving. A 957 filament-type acorn tube is used as a superregenerative detector, with a 3Q4 audio stage. Even greater battery economy may be had with some other audio pentodes, but the 3Q4 was used to hold down the number of different types of tubes used. Both the receiver and modulator audio stages are biased from a common C battery.

Some experimentation with values of grid leak, R_3, and the plate by-passes, C_{11} and C_{12}, may be necessary for smoothest superregeneration. The highest value of grid leak that will allow superregeneration without squealing should be used, and the lowest value of by-pass that will permit superregeneration is generally to be preferred. Regeneration is controlled by means of the potentiometer, R_4. Note that this is connected directly across the B battery. Be sure that the switch mounted on the pot is turned to the "off" position when the equipment is not in use, otherwise there will be a drain of around 1 ma. through R_4, whether or not the filaments are lighted.

If the ordinary type of telephone handset having a low-impedance earphone is used, some sort of output transformer is needed for full audio output. Suitable output transformers are available, but a single-button microphone transformer connected in reverse can be used in a pinch.

Mechanical Construction

The entire rig is housed inside a 7 × 9 × 2-inch aluminum chassis without undue crowding. Looking at the rear-view photograph, we see that the transmitter r.f. section is at the left and the receiver at the right, with the send-receive switch mounted between the two. The transmitter oscillator-doubler tube is mounted in an inverted position, making for short leads to the r.f. circuits. The modulation choke is just to the left of the 3A5, and the modulator tube and the microphone transformer and receiver output transformer are mounted on the right-hand wall of the chassis. An aluminum shelf about 3¼ inches down from the top of the case carries three of the tube sockets and isolates the r.f. and audio portions of the units.

A wide choice of battery types and sizes is available. With the ones shown in the photograph, and with certain other combinations, the batteries may be wedged in place so that no special brackets or fittings are required. The C battery has terminals on both ends, the positive end making contact to the chassis automatically when the A and B batteries are forced into position. If longer battery life is desired, a separate

battery case could be made, and the rig itself could then be made in pocket-size proportions.

The general arrangement shown has been found to be convenient in actual use, when the rig is carried on a shoulder strap, as National Emergency Coördinator Hart is using it in our cover picture. Steel rings one inch in diameter and dog-leash catches were found in a local hardware store, but there is apparently a leather shortage at the moment. We were able to find no suitable carrying straps, but a 30-inch length of Twin-Lead solved the strap problem. The loops for mounting the rings on the sides of the case are made of the same material.

The back cover is fastened in place by four 6-32 screws fitted with rubber feet, so that the rig may be used in a horizontal position on any table top. This horizontal-vertical feature explains the presence of two antenna sockets, one on the top and one on the front of the case. Just below the antenna socket on the front of the case is the send-receive switch, shown in the "off" position. When the switch knob is horizontal the receiver is on; to transmit the switch is pushed to its lowest

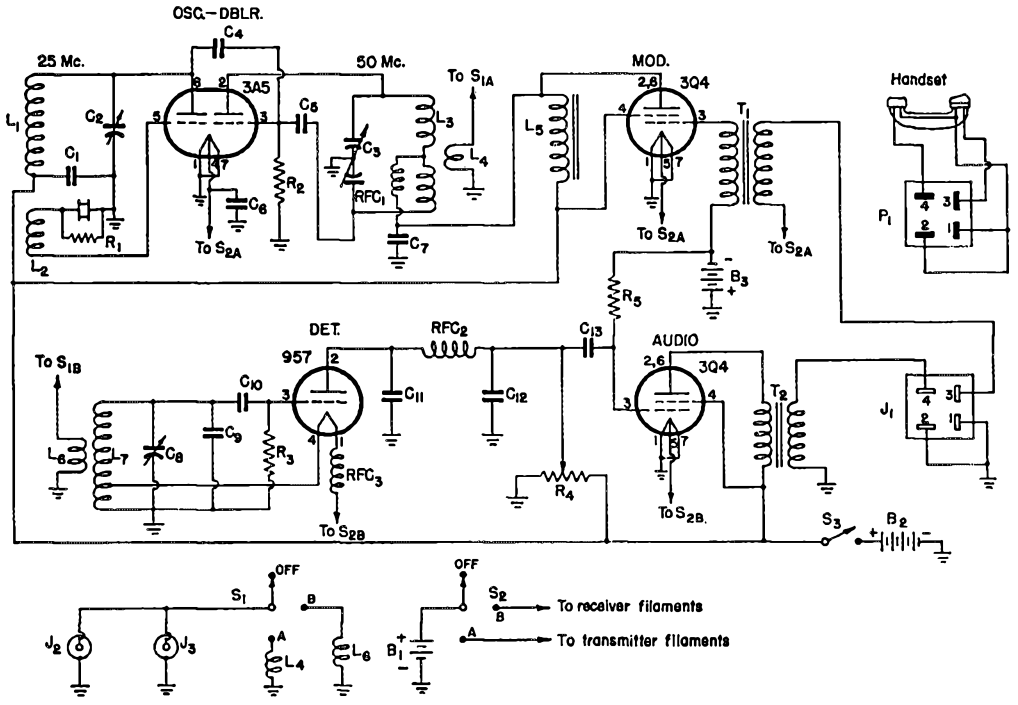
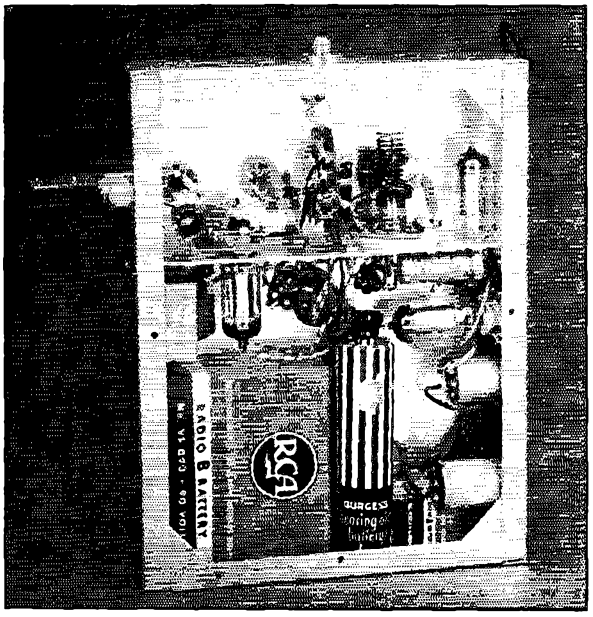


Fig. 1 — Schematic diagram of the portable transmitter-receiver.

C_1, C_6, C_7 — 0.0015-μfd. feed-through ceramic (Erie 362).
C_2 — 20-μμfd. miniature variable (Johnson 160-102).
C_3 — 11-μμfd. miniature butterfly variable (Johnson 160-211).
C_4, C_9 — 10-μμfd. ceramic.
C_5 — 5-μμfd. ceramic.
C_8 — 5-μμfd. miniature variable (Johnson 160-102).
C_{10} — 100-μμfd. mica.
C_{11} — 75-μμfd. feed-through ceramic.
C_{12} — 100-μμfd. disc ceramic.
C_{13} — 0.1-μfd. 200-volt paper tubular.
R_1 — 10,000 ohms.
R_2 — 18,000 ohms.
R_3 — 1 megohm.
R_4 — 0.1-megohm miniature potentiometer, with switch (IRC Q13-128).
R_5 — 330,000 ohms. All resistors ½ watt.
L_1 — 14 turns B & W Miniductor No. 3004.
L_2 — 10 turns No. 20 enamel, 5/16-inch diam., same length as L_1. Wind in opposite direction to L_1 and mount inside it, with crystal end of L_2 coinciding with cold end of L_1.
L_3 — 7 turns each side of center, B & W Miniductor No. 3004. Space ¼ inch at center.
L_4 — 1¾ turns No. 20 enamel, same diam. as L_3.
L_5 — Midget filter choke.
L_6 — 3 turns No. 20 enamel, 7/16-inch diam., spaced ½ wire diam.
L_7 — 10 turns No. 20 enamel, 7/16-inch diam., ⅜ inch long. Tap at 2¾ turns from cold end. Mount L_6 and L_7 with axis perpendicular to axis of L_3.
B_1 — 1.4-volt A battery (RCA VSO70, Burgess TE).
B_2 — 90-volt B battery (RCA VSO90, Burgess N60, Eveready 490).
B_3 — 6-volt C battery (RCA VSO68, Eveready 724).
J_1 — 3- or 4-prong female fitting (Jones S-303AB or S-304AB).
J_2, J_3 — Coaxial fitting (Jones S-201).
P_1 — 3- or 4-prong male fitting to match J_1 (Jones P-303CCT or P-304CCT).
RFC_1, RFC_2 — 50-μh. miniature r.f. choke (National R-33).
RFC_3 — 4-μh. 500-ma. r.f. choke (National R-60).
S_1, S_2 — 3-position 2-circuit switch (Centralab 1454). One required.
S_3 — Switch on R_4 (IRC 76-1).
T_1 — Miniature single-button microphone transformer (UTC "Ouncer" 0-1).
T_2 — Miniature output transformer for low-impedance earphone (UTC "Ouncer" 0-9).

Less expensive components for T_1 and T_2 are UTC "Sub-ouncer" hearing-aid components, Types SO-1 and SO-3. Suitable transformers may also be found in surplus BC-347C intercom systems.



Interior view of the self-contained portable, with back plate removed. The transmitter r.f. section is at the left, receiver at the right, modulator tube on the right wall. The detector coil was changed to a horizontal position after the photographs were made, to reduce coupling to the transmitter tank circuit.

position. The knob at the left is the receiver tuning, C_3, and the oscillator and doubler condenser shafts appear at the right. The crystal plugs into the upper right side of the unit, and the handset at the lower left. The regeneration control and B-plus switch assembly is mounted just above the middle of the front panel. The crystal and its socket may be mounted inside the case, if one objects to its protruding from the side as seen in the photographs. We have found it convenient to have it accessible for changes in frequency, however, and prefer the outside mounting.

Antenna Systems

A full quarter-wave antenna (55 inches) would be rather cumbersome for strap-carried gear, so we experimented with center-loaded whips. Recalling the considerable signal strength of low-frequency mobile units using antennas as short as 8 feet, it was no surprise to find that an antenna less than 2 feet long would do quite nicely for most work on 50 Mc. An antenna as short as a foot long can be used for close-in communication.

The antenna shown in the cover picture was made from two pieces of ⅛-inch brass rod, each 12 inches long, a Jones type P-201 coaxial fitting, a National PRC-3 coil form, a Millen 31001 ½-by 1-inch stand-off insulator, two soldering lugs, and a short length of No. 20 enameled wire. One end of each rod was threaded to fit the holes in the stand-off, and one of the rods was filed down small enough to fit into the pin of the coaxial fitting. The polystyrene coil form was filed (or turned) down to make a tight fit in the top of the coaxial fitting. The rods were screwed into the ceramic stand-off, and a soldering lug soldered to each to provide an anchor point for the loading winding. The latter has 16 turns close-wound, the spacing of the turns being later adjusted to give the best reading on a field-strength meter placed close by.

The short antenna shown in the front-view photograph was made in the same way, except that the rods are 6 inches long, and the loading coil has 23 turns. A convenient dummy load is also visible in the photograph. This is made by soldering a short length of wire to a 2-volt 60-ma. pilot lamp and soldering this inside the pin of a Jones fitting. The screw base of the lamp makes a tight fit in the top of the fitting.

Adjustment & Operation

Tune-up procedure is similar to that encountered in any transmitter, except for the power levels involved. With a 90-volt plate supply you don't have to worry about burning out pilot lamps! Check for crystal oscillation by inserting a low-range milliammeter in series with the cold end of R_2 and ground. If grid current appears as C_2 is rotated, check to see that it is on the proper frequency, and crystal-controlled. If there is self-oscillation, decouple L_1 and L_2 slightly. If no oscillation appears, increase the coupling. Next check for output and frequency at L_3. A full-brilliance indication in a 2-volt 60-ma. lamp should be possible. Pulling out the crystal should remove the grid current and output. If the doubler oscillates, decrease the value of C_5.

Total plate drain for the r.f. section should be about 12 to 15 ma. unloaded, rising to about 20 ma. under load. The modulator adds another 7 or 8 ma. Loading of the output stage, with either lamp or antenna, should be increased only to the point where satisfactory upward modulation is still possible, as indicated by an appreciable brightening of the lamp with modulation. The lamp causes no detuning of the final, so it may be plugged into one of the sockets (J_2 or J_3) and the antenna into the other. The transmitter controls may then be peaked for maximum lamp brilliance. Remove the lamp from the socket, and you're ready to transmit.

Once the detector is made to superregenerate smoothly, it is only necessary to adjust the antenna coupling. The antenna coil, L_6, should be inserted into the cold end of L_7 as far as possible without the detector pulling out of oscillation with the antenna attached. As the coupling is increased, the regeneration control will have to be advanced accordingly, but the coupling should be set at a point where there is still some margin of control of regeneration left on the potentiometer. Adjustment of the coupling need not be critical, as the sensitivity of the receiver will be found to be more than adequate to hear any sta-

(*Continued on page 118*)

A Coaxial-Tank Amplifier for 220 and 420 Mc.

High-Efficiency Operation on Two Bands with the 4X150A

BY RICHARD D. BRAYLEY,* W1PRZ

For some years crystal-controlled transmitters have been used on the v.h.f. bands without involving unduly complicated equipment. High-frequency crystals, improved circuit techniques and high-G_m tubes have made it practical to get on the air with stable high-quality signals at relatively little expense. Of course, some may question the sense of going to extremes in order to get set on bands that are presently used only for local work, but most of us who have built and used advanced gear have considered the results well worth the extra effort involved.

It is not the writer's intention to argue the relative merits of stable transmitters for use on 220 and 420 Mc., but in view of the evolution of ham radio in the past it appears that the trend toward better equipment will continue on these and still higher bands.

One real limitation inherent in v.h.f. and u.h.f. transmitting equipment is the difficulty in getting appreciable power out and up into the antenna. This is mainly the result of the large size and low efficiency (at these frequencies) of most available final amplifier tubes. The choice of tubes for u.h.f. transmitters is of paramount importance, and it is only with modern tubes and circuit techniques that it is possible to overcome this limitation fully.

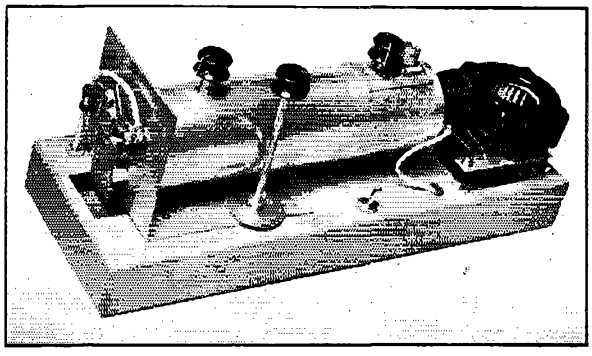
There are three basic types of amplifiers that may be used at these frequencies: the neutralized triode, the grounded-grid triode, and the beam tetrode. Though the neutralized triode can be made stable over a narrow band at ultrahigh frequencies, its adjustment is rather critical and parasitic oscillations are likely to cause trouble. The grounded-grid triode amplifier is very stable but it requires a huge amount of driving power and unless special high-μ tubes are used it is difficult to get much power out at 420 Mc. Beam tetrodes have been used in v.h.f. transmitters for a long time and have proven to be surprisingly efficient in simple circuits. The 829 and 832 are familiar examples of tetrodes that work well on 144 or even 220 Mc., but their usefulness falls off sharply when we approach the u.h.f. region.

A more recent addition to the beam-tetrode family is the 4X150A, a compact coaxial-electrode type designed especially for u.h.f. work. It has a large external anode with heat-radiating fins. It is absolutely necessary that forced-air cooling be provided for both the plate and the tube base. The latter must be air-cooled even when only the heater power is on. The screen connection for by-passing purposes is a circular ring between the plate and the base. Other connections are similar to the lock-in types of tubes, except that the central locking pin is the control-grid connection. Four pins are cathode connections, providing a very low-inductance cathode-to-ground lead. Two pins are used for the heater and another is the d.c. screen connection.

The Coaxial Tank Circuits

The amplifier described here uses the 4X150A in conjunction with coaxial output tanks and a parallel-plate grid tank. Admittedly, this type of construction is more difficult than parallel-rod open tank circuits, but the results more than justify the extra work involved. Removable plate circuits make possible the use of the amplifier on two bands. When the longer tank circuit is in place, as seen in the photograph of the complete assembly, the amplifier works "straight through" on 220 to 225 Mc., with surprising efficiency. With the shorter tank the unit becomes a doubler, providing output up to the present legal limit on 420 to 450 Mc. with ease.

* % The National Company, 61 Sherman St., Malden, Mass.



The 4X150A amplifier with the 220-Mc. tank circuit in place. The grid line may be seen at the left, where it makes a right-angle bend under the bracket on which the complete assembly is mounted. Tuning controls are, *l. to r.*, plate, grid and antenna series condensers. At the far right is the blower motor, connected to the tank assembly by means of a flexible rubber hose.

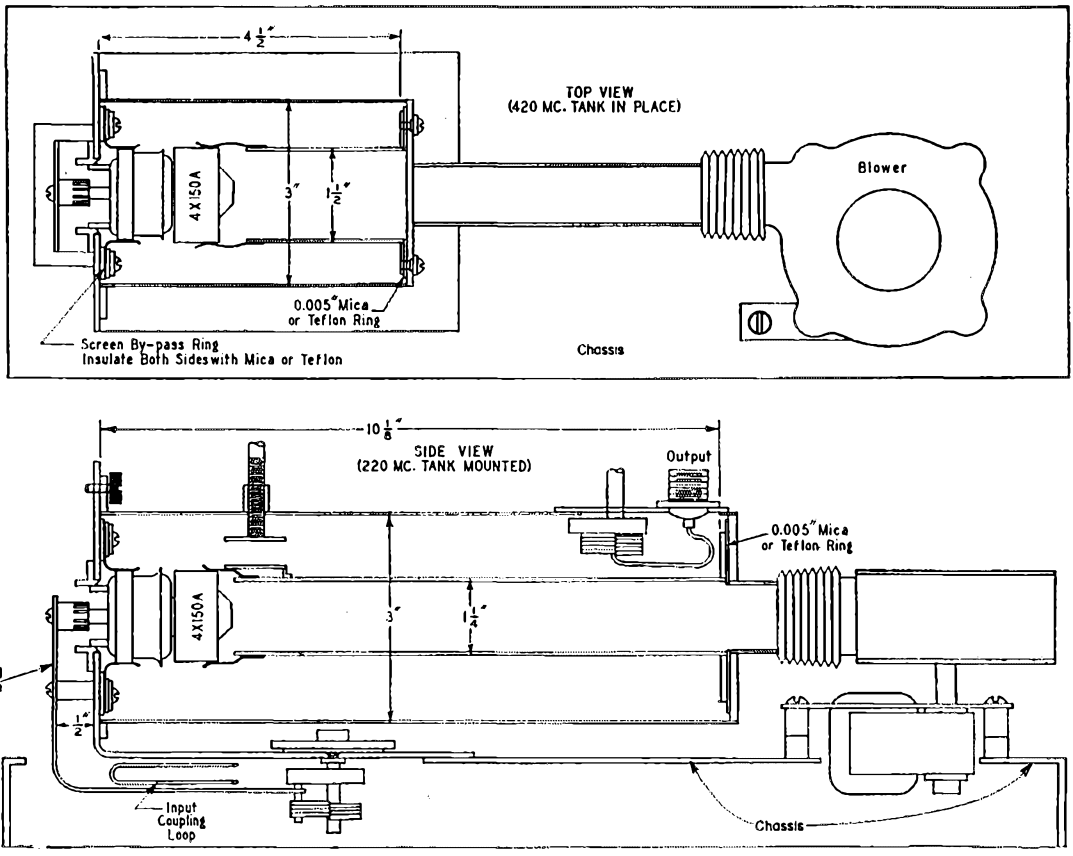


Fig. 1 — Cut-away drawings of the 4X150A amplifier, showing the construction of the detachable tank circuits for 220 (lower) and 440 Mc. The upper drawing is a top view, the lower a side view.

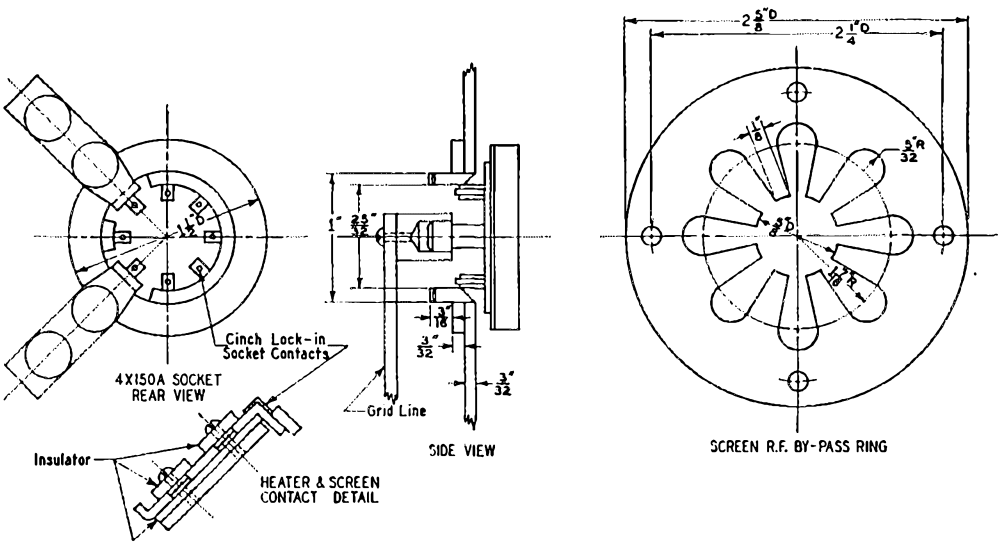


Fig. 2 — Details of the special 4X150A socket, constructed to permit a flow of air around the tube base. The screen by-pass ring is shown in its flat form, before bending the contact fingers, at the right.

The plate tanks are demountable by removing three knurled screws that hold the tank against the tube base bracket. The small hose used to connect the blower to the coaxial assembly is detachable, of course. It is an accelerator muff, available at any automotive parts store.

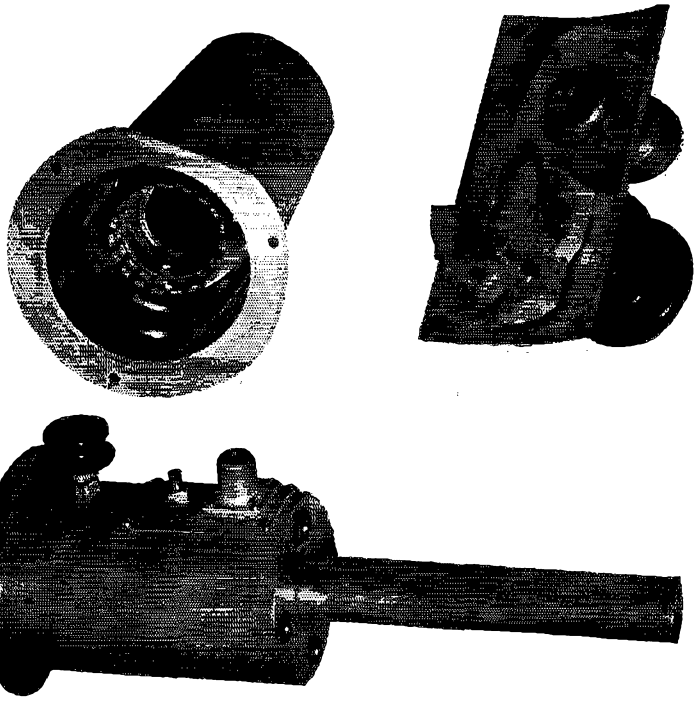
Each plate circuit is a quarter-wave section of low-impedance coaxial transmission line. Each has a blocking capacitor built into the closed end so that the high voltage can be applied to the plate via the inner conductor, allowing the outer conductor to be grounded for d.c. Two small discs mounted near the plate end provide a limited amount of tuning. A coupling loop and series capacitor provide a means of extracting energy through the coaxial fitting mounted near the shorted end of the tank.

The inner conductor has a contact-finger strip soldered to one end for making contact to the plate assembly of the tube. The fingers may be made by notching a flat strip of phosphor bronze and soldering it around the end of the pipe. Lengths of ready-made contact-finger strip may also be obtained from the manufacturer of the 4X150A tube, Eitel-McCullough, Inc., San Bruno, Calif. Air is blown through the inner conductor and comes out through the radiating fins of the anode assembly. Part of this air leaves the coaxial assembly by holes in the periphery of the outer pipe near the tube base, but most of it should be circulated around the tube base terminals, leaving the chamber through the tube socket.

At first a conventional lock-in socket was used for the 4X150A. This had been revised by adding small cut-outs to allow the air to pass out after flowing past the tube base. It was felt, however, that a better socket arrangement was desirable, in view of the importance of cooling the base of the tube properly. A homemade socket that allowed the air to circulate freely through the tube base terminals was then installed. This socket appears in two of the photographs, and details are given in Fig. 2. A somewhat similar socket is now available from the tube manufacturer (Eimac part No. 4X150A/4000). Tube ratings specify that at 150 watts plate dissipation at least 5.6 cubic feet of air per minute must be passed through the plate fins. This can be supplied by any of several small centrifugal blowers available on the surplus market.

Fig. 1 (top) is a sectional view of the top of the amplifier with the 440-Mc. tank circuit in place. The lower drawing is a side view showing the 220-Mc. tank in position. Note that in each case the outer conductor is soldered to a disc at the right end. In the center of this end plate is a hole, around which is soldered the extension to be connected to the blower. This is a short stub in the case of the 220-Mc. tank, but on the 440-Mc. one it must be long enough to make up the difference in the lengths of the tanks. In neither case does the extension have electrical significance.

The contact-finger strips soldered to the plate ends of the inner conductors are shown in the drawings, and may be seen in the end-view photograph of the 440-Mc. line. Also at this end of the line is the disc that serves as the stator of the tuning capacitor. This tuning device is shown in the drawing of the 220-Mc. assembly, Fig. 1. At the right end of the inner conductor is soldered a disc somewhat smaller than the inside diameter of the outer pipe. This supports the inner conductor and forms one plate of the d.c. blocking capacitor. A sheet of mica or teflon can be used for the dielectric, the latter being easier to handle. The mounting screws must have insulating shoulder washers, as the high-voltage lead is connected to one of them. Some means should be used to prevent the plate of the tuning capacitor from touching and shorting the high-voltage supply,



Side and end views of the 440-Mc. coaxial tank circuit. Construction is similar to the 220-Mc. tank except for dimensions. The output coupling loop and tuning assembly for the 220-Mc. tank are seen in the enlarged view at the upper right.

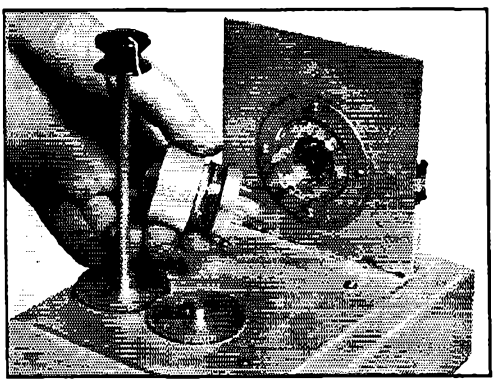
and it is suggested that a 50-ohm ½-watt resistor be connected in series with the high-voltage lead as a fuse. The antenna output circuit consisting of a loop, a variable series condenser and a coaxial output fitting is seen in Fig. 1 and in the 440-Mc. photograph.

The Screen- and Control-Grid Circuits

Details of the homemade tube socket are shown in the photographs and in Fig. 2. The contacts were taken from a Cinch lock-in socket. They can be held in place for soldering by putting them on any tube having the lock-in type base. The two built-up contacts are for the d.c. screen and ungrounded heater connections, and they must be insulated from the plate on which the socket is mounted. All other pins are grounded.

The screen r.f. by-pass capacitor is made from a sheet of phosphor bronze. It should be cut as shown in the detail, Fig. 2, and the fingers turned up to contact the screen ring on the tube, allowing space for passage of air to the tube base. This ring is insulated by a sheet of mica or teflon from the vertical plate on which the assembly is mounted, and another ring of brass is placed over it, also separated from the screen contact ring by another sheet of insulation. This brass ring provides a solid mounting and added capacitance for by-passing.

The grid circuit uses a half-wave parallel-plate line tuned to 220 Mc. One end is connected to the grid of the 4X150A by a cup mounted at the upper end of the plate, and the other end to a variable capacitor for tuning. The grid resistor is connected at the electrical center of the line, the point of minimum r.f. voltage. The grid line is bent 90 degrees and is supported on ceramic stand-off insulators. A slot is cut out of the main chassis so that the base and vertical portion of the amplifier assembly can be made of one piece and still be readily demountable. The rotor of the grid tuning condenser is grounded to the horizontal portion of the supporting bracket. It is geared to another shaft to allow tuning from above.



Top view of the 4X150A amplifier chassis with tank circuit removed. The contact fingers around the edge of the socket are part of the screen by-pass capacitor. Two gears offset the tuning control for the grid circuit mounted below the chassis.

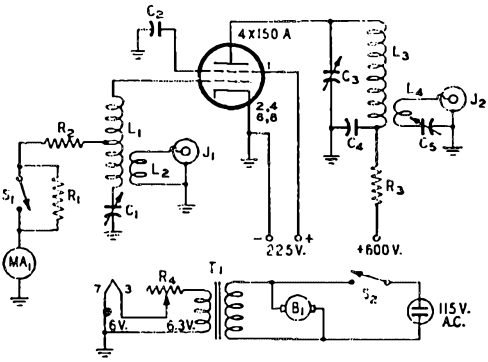
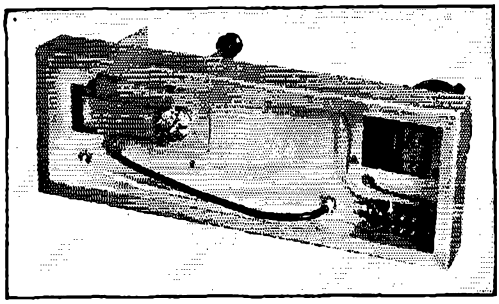


Fig. 3 — Schematic diagram of the 4X150A amplifier.
C_1 — 25-$\mu\mu$fd. variable.
C_2 — Screen by-pass (see text).
C_3 — Plate tuning condenser — two 1-inch diam. discs (see text).
C_4 — Blocking condenser (see text).
C_5 — Output coupling tuning condenser, 15-$\mu\mu$fd. variable for 220 Mc.; midget var. 1.5–5.1 $\mu\mu$fd. for 420 Mc.
R_1 — 10,000 ohms, 1 watt.
R_2 — 6800 ohms, 1 watt.
R_3 — 50 ohms, ½ watt.
R_4 — 2 ohms, 10-watt adj. (see tube manufacturer's filament-voltage instructions).
L_1 — Grid line. Brass strip 1¼ inches wide, ⅛ inch thick and 6¼ inches long, bent at 90°. R_2 connected 2½ inches from grid end.
L_2 — Loop of No. 14 bus wire mounted between L_1 and tube bracket, 2 inches long, ⅜ inch wide.
L_3 — *220–225 Mc.*:
10½-inch coaxial line, 3-inch o.d. outer conductor, 1¼-inch inner conductor (see text).
420–450 Mc.:
4½-inch coaxial line, 3-inch o.d. outer conductor, 1½-inch o.d. inner conductor (see text).
L_4 — *220–225 Mc.*:
Brass strip ¼ inch wide, 2½ inches long.
420–450 Mc.:
No. 14 loop 1¼ inches long.
B_1 — Blower motor (see text).
J_1, J_2 — Coaxial fitting.
MA_1 — Grid milliammeter, 0–25 ma. range.
S_1, S_2 — S.p.s.t. toggle switch.

Performance and Operation

The amplifier was tested with a v.h.f. wattmeter before being used on the air. With about 600 volts on the plate the unloaded current dip was surprising, looking more like what would be expected of a 7-Mc. amplifier. Loading the amplifier to 100 watts output at 220 Mc., as registered on the wattmeter, the plate input was only 125 watts, an efficiency of about 80 per cent! As may often be the case with beam-tetrode amplifiers, maximum output did not coincide exactly with minimum plate current, so the rig should be tuned for maximum output indication rather than by the plate meter.

Replacing the 220-Mc. tank with the 440-Mc. one, and changing the value of the grid leak, the amplifier was made to double. With 110 watts input the wattmeter indicated 45 watts output, or about 40 per cent efficiency. Grid drive in both cases was supplied by an 829 tripler to 220 Mc., with about 4 watts available from a 50-ohm line. For straight-through operation the grid current was adjusted to 10 ma. through a 6800-ohm re-



Underside of the 220- and 420-Mc. amplifier unit. The half-wave grid line is at the left.

sistor. When doubling, the resistor is increased by 10,000 ohms and the grid current is then about 6 to 8 ma.

The amplifier is intended for use with an f.m. exciter. Frequency modulation seemed to be more practical than a.m. for a number of reasons. It imposes a minimum of strain on the thin insulation in the built-in capacitors used in the plate tanks. It is not advisable to amplitude-modulate a frequency multiplier, but f.m. is entirely suitable. With f.m. it is legal to use a 50-watt carrier on 420 Mc., while with a.m. only 12 watts may be used at 100 per cent modulation under the present restrictions. Lastly, anyone who has tried to use any amount of power on these bands in a heavily-populated area knows the advantage of f.m. over a.m. in the matter of BCI.

The writer wishes to acknowledge the assistance given by Cal Hadlock, W1CTW, in getting this information down on paper. Without his help and insistent prodding it is certain that this article would never have been written.

Appendix

The lengths and sizes of coaxial and flat plate lines used as tuned circuits need not be determined by trial and error. In the case of the transmitter described, all the tuned circuits were calculated and then made up roughly for trial. In only one case was it necessary to make changes and this error was partly due to a wrong approximation of the output capacity plus tuning capacity which is hung across the open end of the plate tank.

The characteristic impedance of the transmission line may be found by looking in a table or by formula.

For coaxial lines: $Z_0 = 138 \log \frac{D}{d}$.

Z_0 = characteristic impedance.
D = inside diameter of outside conductor.
d = outside diameter of inside conductor.

For parallel plate line: $Z_0 = 377 \frac{S}{W}$.

S = spacing between plates.
W = width of plate.
Note: W should be several times S.

For a practical case, let us consider the quarter-wave coax line used in the described transmitter on the 440-Mc. band.

With the tuning condenser set at near minimum capacity, we can say a total of 4.7 $\mu\mu$fd. is across the open end. Its reactance (X_C) at 450 Mc. is about 75 ohms.

The inductive reactance of the quarter-wave coax line is:

$$X_L = Z_0 \tan \frac{2\pi l}{\lambda}.$$

Where Z_0 = characteristic impedance or 40 ohms.
l = line length in inches.
λ = wavelength in inches or 26.2.

For resonance X_L must equal X_C, therefore

$$75 = 40 \tan \frac{2\pi l}{26.2}.$$

Dividing both sides by 40 we have:

$$1.88 = \tan \frac{6.28\, l}{26.2}.$$

This expression is in radians, so as we find the angle whose tangent is 1.88 is 62.0° we go one step further — 62.0° is 1.08 radians.

Rewrite as:

$$1.08 = \frac{6.28\, l}{26.2}.$$

Solving for l we get: l = 4.5 inches.

Anyone planning to build either transmitting or receiving gear for 220 or 440 Mc. should not overlook the possibilities of parallel-plate tuned circuits. They lend themselves very well for use with ordinary miniature and lighthouse tubes. They are simple to construct and can be coupled into and out of very easily. A receiver using this construction with 2C40 lighthouse tubes was built having a noise figure of 7 db. at 400 Mc.

Strays

The Navy Department has announced important revisions in the programs providing opportunities for Naval Reserve officer commissions. The programs of particular interest to radio amateurs were described on page 60, March, 1951, *QST*.

The first change is that an applicant may apply 120 days before his graduation from an accredited college or university. Previously, an applicant could not apply until he had completed his four-year course and received his degree.

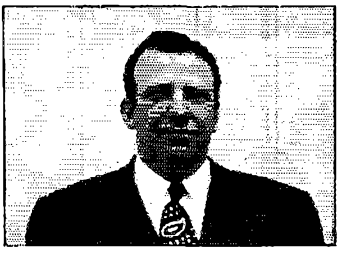
A second change is in the prerequisites for application for a General Line commission in the Reserve. Candidates are now required to have completed mathematics through trigonometry (either in college, university, or secondary school). This considerably lowers requirements which previously called for 18 college semester hours of mathematics and physics.

Also, in the case of applicants for General Line commissions, the Navy has lowered the minimum vision standards from 15/20 to 10/20. In all cases, however, vision must be correctable to 20/20.

Happenings of the Month

NATIONAL CONVENTION

An important date for your calendar is that of the 1951 National ARRL Convention, to be held in Seattle on July 27th–29th. Sponsored jointly by the West Seattle Amateur Radio Club and the North Seattle Amateur Radio Club, with John Gruble, W7RT, as general chairman, the convention committee is whipping into shape a gala program which it hopes will surpass anything previously offered.



General Chairman John Gruble, W7RT.

In the next issue of *QST* we shall have a feature story describing in detail the many activities which will take place. Here briefly, however, is a résumé of what the Seattle gang is planning for you: operation of an official convention station, W7AA, from exhibit headquarters at the Civic Auditorium; lots of commercial and amateur equipment displays, plus radio-controlled lawnmowers and models; an amateur TV station in operation; a major meeting of civil defense personnel, with government representatives; net meetings; a code-copying contest, both with stick and mill, for the national championship, amateur class; numerous special events for the YLs and XYLs; a welcoming committee of beautiful Washington belles; technical meetings; an ARRL meeting — in other words, there'll never be a dull moment.

Something a bit out of the ordinary as far as amateur conventions are concerned is the special train which the Northern Pacific Railroad will run from Chicago to Seattle. Leaving Chicago at 11:00 P.M. CST, on July 23rd, it will be specially equipped with 115 v.a.c. and antennas for use by the embarked hams; Harry Harrison, W9LLX, is handling details from the Chicago end.

There will be a special mobile contest, and as an additional — and unusual — service there will be mobile emergency repair facilities available. There is plenty of parking space in the vicinity of the Civic Auditorium, and the mobile gang will have no trouble in finding a place to congregate and compare installations.

Registration fee for participation in the entire convention is $8.50 ($7.50 for preregistrations, closing July 1st). If you wish to attend the banquet only, the price will be $3.50; attendance exclusive of the banquet is $5. All correspondence relative to the convention, including that concerning registration and hotel reservations, should be addressed to John Gruble, W7RT, 1921 Atlantic St., Seattle 44, Wash. And watch next month's *QST* for more dope.

LICENSE PLATES

Proponents of special call letter license plates found the national picture growing brighter the past few months as the governors of Georgia, North Dakota, Nevada and Tennessee signed into law bills authorizing the special tags. In all states, the support and assistance of local officials, including police and civil defense agencies, was obtained.

In Georgia, sparkplugged by members of the Cracker Emergency Net, amateurs pointed out to their legislators that the state could obtain the services of trained and equipped radio operators without cost, for emergency work. Despite considerable initial opposition, the bill passed both houses of the legislature without a dissenting vote.

In North Dakota, members of the Mouse River Radio Club of Minot took the lead. The bill passed both houses with only a few dissenting votes, state radio amateurs literally deluging members of the legislature with radiograms prior to the voting on the bill; no other bill in the 1951 session received so much mail. Many of the legislators commented on the efficient manner of handling the messages, one even saying that "those radio amateurs really have a first-class means of propaganda." It is interesting to note that opposition arising when the bill was in committee caused it to be rewritten so that administration of the special plates was placed under the state highway patrol.

Bills are known to have been introduced in 16 other states with Oregon and Iowa rejecting the special tags. No word has been received recently on the bills pending in Indiana, Kansas and Washington, but since these legislatures have adjourned apparently no action can be taken. Passage seems assured at this writing in New Jersey and Wisconsin. In addition, bills to provide for call letter license plates have been introduced in California, Connecticut, Delaware, Illinois, Maryland, Nebraska, Ohio, Pennsylvania, and Rhode Island.

As previously reported in *QST*, call letter license plates are already issued in Florida, Mississippi, Louisiana, Arkansas and the Canal Zone. Headquarters congratulates amateurs in all states for their fine work — and especially for their successes.

LIBERIAN THIRD-PARTY TRAFFIC

An agreement between the United States and the Republic of Liberia has been signed which provides for the exchange of third-party message traffic by amateur stations of each country. Like the recent agreement concluded with Ecuador, it provides that traffic must be of the type which would not normally go by established means of communications; however, in event of emergency amateurs may handle any type of message. It applies to territories and possessions of the U. S. and to our U. S.-licensed personnel overseas such as in occupied Germany and Japan.

F.C.C. PROPOSES MINOR RULES CHANGES

On March 21st FCC released a Notice of Proposed Rule Making covering minor amendments to our regulations. The "privilege" of operating certain experimental (non-amateur) stations licensed for operation exclusively above 450 Mc. is to be withdrawn — since other FCC rules no longer provide for such operation. In connection with renewal requirements, it is made plain that the affirmation of code speed ability must be at 13 w.p.m. for amateur licenses of Advanced, General and Conditional Class; the present language says the same speed as "originally required," which might be misconstrued to mean the 10-w.p.m. speed which was standard for the amateur exam many years ago. The proposed rules prevent issuance of a club station license to a Novice operator. Any comment on the rules must be filed by April 23rd; inasmuch as the proposed changes are largely editorial, and to clarify points of interpretation which in several instances were called to the Commission's attention informally by ARRL, the League does not plan to make any filing. The new language of the proposed rules is as follows:

1. Section 12.24 is proposed to be deleted.
2. Section 12.27 is proposed to be amended by transferring the reference to footnote 6 from sub-section (a) to the last word of the title sentence of the Section, and amending sub-section (a) to read as follows:

> (a) An amateur operator license, except the Novice Class, may be renewed upon proper application in which it is stated that the applicant has lawfully accumulated, at an amateur station licensed by the Commission, a minimum total of either 2 hours operating time during the last three months or 5 hours operating time during the last 12 months of the license term. Such operating time, for the purpose of renewal, shall be counted as the total of all that time between the entries in the station log showing the beginning and end of transmissions as required in Section 12.136(a), both during single transmissions and during a sequence of transmissions. The application shall, in addition to the foregoing, include a statement that the applicant can send by hand key, i.e., straight key or any other type of hand operated key such as a semi-automatic or electronic key, and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than that which is required in qualifying for an original license of the class being renewed.

3. Section 12.47 is proposed to be amended to read as follows:

> § 12.47 *Examination procedure.* All written portions of the examinations for amateur operator privileges shall be completed by the applicant in legible handwriting or hand printing, and diagrams shall be drawn by hand, by means of either pen and ink or pencil. Whenever the applicant's signature is required, his normal signature shall be used. Applicants unable to comply with these requirements, because of physical disability, may dictate their answers to the examination questions and the receiving code test and if unable to draw required diagrams, may dictate a detailed description essentially equivalent. If the examination or any part thereof is dictated, the examiner shall certify the nature of the applicant's disability and the name and address of the person(s) taking and transcribing the applicant's dictation.

4. Section 12.62 is proposed to be amended to read as follows:

> § 12.62 *Eligibility of corporations or organizations to hold license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization, nor for its use, except that in the case of a bonafide amateur radio organization or society, a station license may be issued to a licensed amateur operator, other than the holder of a Novice Class license, as trustee for such society.

5. Section 12.63(b) is proposed to be amended to read as follows:

> (b) One application and all papers incorporated therein and made a part thereof shall be submitted for each amateur station license. If the application is for station license only, it shall be filed directly with the Commission at its Washington 25, D. C. office. If the application also contains application for any class of amateur operator license, it shall be filed in accordance with the provisions of Section 12.22 of these rules.

6. Section 12.65 is proposed to be amended to read as follows:

> § 12.65 *License Period.* The license for an amateur station is normally valid for a period of 5 years from the date of issuance of a new or renewed license, except that an amateur station license issued to the holder of a Novice Class amateur operator license is normally valid for a period of 1 year from the date of issuance. Any modified or duplicate license shall bear the same expiration date as the license for which it is a modification or duplicate.

WATCH YOUR EXPIRATION

Nearly one-half of present amateur licenses expire during 1951. Check the expiration date on yours *now* and arrange to apply for renewal sometime in the 120 days preceding expiration date. See the article on regulations in March, 1951, *QST* for revised renewal requirements.

North Dakota Governor Norman Brunsdale signs the bill authorizing call letter license plates in the presence of (*l. to r.*) Arthur V. LeClair, WØNPE; Weston A. Bell, WØNVK, president of the Mouse River Radio Club; Representative C. W. (!) Baker, who introduced the bill; Robert M. Hart, WØJPW; and Ole Orson, WØGJJ, president of the Central Dakota Radio Assn.

The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* W1HDQ

HERE it comes again! May, that magic month when spring arrives (at last) in the coldest corners of the United States, has special significance for the v.h.f. man. If he's a year-round regular he knows that before this month is over the word will have gotten around that the v.h.f. bands are opening up again, and there will be a sudden burst of new activity. Or if he is one of the type that migrates to lower frequencies during the winter months he'll be blowing the cobwebs out of the v.h.f. gear and putting the beams back up for the annual reappearance.

The upsurge may even get started somewhat ahead of schedule this year. TVI and the declining sunspot cycle have taken their toll in 10-meter activity and interest; there will be little to hold the fellows who have divided their time between 10 and the v.h.f. bands in years gone by. To be sure, TV (no *I*) has provided a distraction during the winter months, but we think that the lure of better v.h.f. conditions will take care of that!

We have a new factor in our favor this year, too. Civil emergency communication planning is bringing new operators to 50, 144 and 220 Mc. in many parts of the country. Not a few are fellows who have had little interest in v.h.f. operation before. Some of them have already mentioned that they like what they have found in the world above 50 Mc., and they are doing more than just work out in the regularly scheduled drills of their civil defense nets.

No one is happy that a dangerous international situation has brought this about, of course, but since the v.h.f. bands occupy so large a place in the emergency picture we should make the most of this opportunity to spread the v.h.f. gospel. If a better appreciation of the value of our part of the spectrum is brought to a few (or many) hams, then our civil emergency program will not have been in vain, whether actual wartime use is made of it or not. Even with the limited scope of WERS, it made quite a few new v.h.f. men during World War II. The RACES program makes far more use of the v.h.f. spectrum. Doing our best to get it rolling successfully cannot help but bring a similar return.

March News

For a while it looked as if 50-Mc. work between North and South America would have to wait for another sunspot cycle. The record for the fall of 1950 was rather dismal in comparison to the same period in 1949. HC2OT, nearing the end of his stay in Guayaquil, Ecuador, wondered if it would be worth the effort to keep plugging away on 6 until the last possible moment, but he decided that he'd never feel entirely happy about it in later years if he didn't give the February–March period a good going over in 1951.

As reported last month, Steve caught an opening to Florida on Feb. 25th. Then on March 3rd the band opened up at 3:45 P.M. EST, with W5BDT and W5FXN remaining in until 5. A more widespread opening developed on the 11th,

2-Meter Standings

	States	Call Areas	Miles
W1HDQ	16	6	650
W1IZY	14	5	570
W1MNF	14	5	570
W1BCN	13	5	500
W1CTW	12	4	500
W1KLC	12	4	500
W2BAV	21	7	1175
W2NLY	18	6	750
W2PAU	15	6	740
W2DFV	13	5	350
W2CET	12	5	405
W2DPB	12	5	500
W2QED	12	5	365
W2FHJ	12	5	—
W2QNZ	12	5	—
W3RUE	17	7	760
W3NKM	17	7	660
W3QKI	16	7	820
W3LNA	14	7	720
W3KWL	14	6	480
W3GKP	13	6	610
W3OWW	13	6	600
W3KBA	13	6	—
W3KUX	12	5	575
W3PGV	12	5	—
W3LMC	11	4	400
W4HHK	15	6	660
W4JDN	13	6	—
W4JFV	13	5	720
W4IKZ	13	5	650
W4JFU	13	5	830
W4LVA	13	5	400
W4MEJ	12	7	665
W4OXC	12	7	500
W4CLY	12	5	720
W4FJ	12	5	700
W5JTI	14	5	670
W5ML	8	3	725
W5ERD	8	3	570
W5VY	7	3	1200
W5CVW	7	2	560
W5AJG	7	2	450
W5FBT	6	2	500
W5FEK	6	2	500
W5IRP	6	2	410
W5FSC	5	2	500
W5JLY	4	2	650
W5ONS	4	2	600
W6ZEM/6	1	1	415
W6GGM	1	1	300
W6YYG	1	1	300
W8WJC	20	7	775
W8BFQ	20	7	775
W8WXV	18	8	1200
W8UKS	18	7	720
W8EP	17	7	—
W8WRN	16	6	670
W8RWW	14	7	500
W8WSE	14	6	620
W8FQK	13	7	—
W8CYE	12	6	—
W8BAX	12	—	655
W8CPA	12	—	650
W9FVJ	18	7	790
W9UCH	18	7	650
W9EQC	17	7	820
W9SUV	17	7	—
W9BOV	15	6	—
W9WOK	15	5	690
W9AFT	14	—	—
W9NFK	12	7	690
W9UIA	11	7	540
W9FPE	11	5	800
W9GTA	11	5	540
WØNFM	14	7	660
WØIHD	13	6	725
WØEMS	13	5	1080
WØZJB	12	7	1097
WØWGZ	11	5	760
WØHXY	8	3	—
WØJHS	7	3	—
VE3AIB	12	6	600
VE1QY	11	4	900
VE3BOW	8	5	520
VE3BQN	6	4	540
VE3BPB	6	4	525
VE3DER	6	4	450
VE3EAH	5	4	380

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

with W4IUJ, West Palm Beach, Fla., starting things off at 2:23 P.M. He was followed by W5s OZI FXN PKX ACY BDT HEZ, W4LAW, W5s VV CXS UW AXY and DYB. March 15th brought an opening to PZ1A. On the 17th W4s GFE VV FNR IUJ and W5s BDT HEZ PKX and OZI were worked. LU1BV and LU5CK were added on the 21st, XE1GE on the 23rd. A big session on the 24th included contacts with W4MS, W5s SNT OUT FXN BDT OZI GYP ACY DSB QME FSC CXS PKX, XE1GE and XE1PA. Steve's final 50-Mc. QSO as HC2OT was, fittingly enough, with CE1AH, on the 25th.

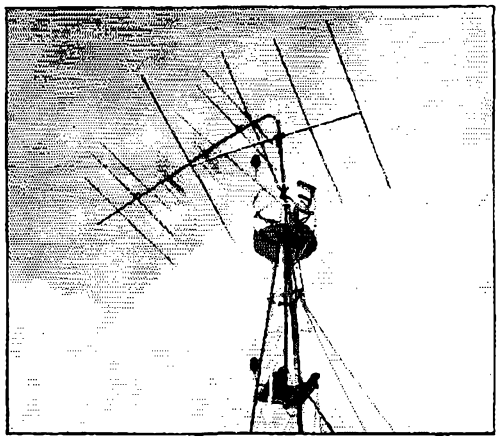
This last-minute rush brought the final total of Tropical Tramps to 144. Lest there be anyone at this late date who has not learned that you become a Tropical Tramp by crossing the Equator on 50 Mc. to work HC2OT, we explain that Steve's around 200 different stations worked included 144 north of the Equator, as follows: 14 W1s, 6 W2s, 5 W3s, 12 W4s, 46 W5s, 10 W6s, 1 W7, 5 W8s, 11 W9s, 8 WØs, 1 VE1, 2 VE3s, 10 XEs, 5 YVs, 2 HKs, and 1 each of PY7, PZ, TG, TI, HC and KH6. South-of-the-Equator contacts included scores of LUs, CX, OA and CE.

This remarkable record of 15 countries, 26 states, and all U. S. call areas worked on 50 Mc. was started in 1948, when the sunspot cycle was already on the decline. It represents a consistent effort of the highest order. What it has meant to the 50-Mc. fraternity of the Western Hemisphere is almost beyond words, so as we report the dismantling of this famous 50-Mc. DX station, we say in behalf of 6-meter men everywhere, to H. E. M. Stevenson, W5DNN/HC2OT, "Well done — we'll be waiting to hear about that new assignment!"

W4FNR, Ft. Lauderdale, Fla., reports that HC2OT was coming through between 2:58 and 4:35 P.M. on the 17th. The fourth harmonic of HCJB, just below the band edge, some f.m. signals on 49.9, and W5BDT in contact with LU9MA were heard during this period. Ab worked a bunch of W5s and heard W6OB between 6:20 and 8 P.M. on the 16th, and LU6DO came through briefly at 8:25. This evening reception of South American signals makes it appear that W4FNR was on the northern edge of one of those openings that occur so regularly in Latin America at this season of the year. But what was W6OB doing in there? This is early in the year for double-hop *Es!*

From HK1DX, Barranquilla, Colombia, we learn that though he was on the job regularly he heard no 50-Mc. DX in February. The band was open to Argentina, usually between 7 and 9 P.M. EST, on March 6th, 11th and 16th.

The 2-meter DX season officially opened on March 5th, for the Middle West and South, at least. W5VX, Little Rock, Ark., writes that he and W5FAL and W5OCP were working into the St. Louis area and into much of Illinois that night, for their first DX in that direction in their 2-meter experience. WØIHD, Overland, Mo., worked all three, though he missed a chance at



No — this isn't a moon-radar set-up; it is the stacked 6-element 50-Mc., 15-element 144-Mc., and 4-element 28-Mc. arrays at W5ONS, Victoria, Texas, after an overdose of wind and ice.

Texas and Oklahoma stations that were worked by some of the gang earlier in the evening.

From Bill McNatt, W9NFK, who can get such information into his *V.H.F. News* faster than we can report it in *QST*, we learn that stations as far south as W5VY and W5QNL in San Antonio were working up through the Middle West as far as the Peoria area. This is phenomenal DX for so early in the season.

Aurora effect was observed frequently during March, though most of the openings were minor ones of short duration. An exception was the evening of March 14th, when 50-Mc. contacts were made over much of W1, 2, 3, 8, and VE1 and 3, in a pronounced opening that lasted from about 7 to 9:30 EST.

While it is not always possible, because of space limitations, to list the aurora observations in detail, we do want to thank those who have taken the trouble to send in aurora reports. There are questions regarding aurora propagation that have not yet been answered. Aurora effects on v.h.f. propagation are now under study and detailed observations by amateurs are needed. You can help by watching carefully for signs of aurora effect and then making a record of what you hear and work. Send in the reports regularly, preferably having them in our hands by the 25th of the month, and we will see that they reach the proper people. More on this work in a later issue.

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

In many localities where there was already a core of active v.h.f. men around which a civil emergency organization could be built, the v.h.f. bands are getting the attention they deserve in local planning. An outstanding example, culled from the bulletin of the Central California Radio Club Council, is the situation in San Mateo County, where 40 mobiles and 25 base stations are already in operation on 144 Mc. W6TEZ, the county EC, reports that their technical

problems are solved to the point where they are now able to devote their time to training personnel. All the base stations are of similar design, and 25 of the mobile units are identical.

In Columbus, Ohio, assembling of a satisfactory number of emergency equipments is being accomplished as a result of assigning specific responsibilities to various hams. W8UZ heads up the transmitter project, and with the help of W8QQ several units have been put into service. The standard 2-meter line-up is a 6J6 oscillator-multiplier, another 6J6 doubler, and a 2E26 final. W8WRN has the job of building receiver front ends, including crystal-controlled and tunable oscillator designs. W8MEN is handling the i.f. strip, with noise limiter and audio system, and W8YBF is building mobile antennas.

The Oxford County (Maine) Amateur Radio Association has a neat idea for a three-band omnidirectional antenna for civil emergency work. It is a coaxial dipole with skirt and spike both 55¾ inches long, working as a half-wave system on 50.4 and 3 half-waves on 146.8 Mc., both center fed. A separate feeder running parallel to the coax for a distance of 76 inches below the skirt permits the system to be used as a "J" antenna for 29.5 Mc.

If you are part of a group making use of the v.h.f. bands in civil emergency planning, we invite you to send along the details of your work for use in these pages. Your experiences may serve as a guide to others still in the paper stages.

We know that VE3 has the largest v.h.f. representation of any of the Canadian call areas, largely the result of the enthusiasm of the gang within working range of Toronto. But Ontario covers a lot of territory, and VE3s KF and RM would like it known that there is now considerable interest and activity on 6 and 2 in and around Ottawa. So far these fellows have heard no outside stations, but judging from how the f.m. and television stations in Northern New York come through, working into the same areas on 50 or 144 Mc. should be principally a matter of getting the fellows to turn their antennas in the right direction at the right time. The Ottawa gang would welcome some schedules to this end.

Out in Cheyenne, Wyoming, W7OWZ is managing to find something doing on 144 Mc. nightly, what with the coöperation of WØELL in Denver and WØFRQ in Ft. Collins, Colo., and W7MVK in Laramie, in keeping schedules at 7 o'clock nightly and 10 A.M. Sundays. Other stations are due to join this group shortly. Tests are being conducted with W7JRG, Sheridan, Wyo., but nothing has been heard either way.

Lost — by W8QYD — a chance at the first 50-Mc. WAS from W8. Having worked up to within three states of the goal, Tucker has moved to Benbrook, Texas, and now must start over. Texas added another v.h.f. man recently in W3FZQ, who was transferred from Philadelphia to Houston. W3FZQ/5 should be on 50 Mc. from Bellaire, Texas, in time for the opening of the sporadic-*E* season.

Another v.h.f. man who has lost sizable totals of states worked on both 6 and 2 is none other than ARRL's Roanoke Division Director, W4CVQ, who recently moved from Fayetteville to Raleigh and must now start over with his states-worked records.

It is still possible to do all right with low power on 50 Mc. W5GNQ, Shawnee, Okla., has racked up 46 states and 6 countries to date with 15 watts input. Avery uses a good converter working into a communications receiver, but he says that just about everything he has worked could also be heard on a superregen he built from a 1931 *QST!*

W3OTC, Silver Spring, Md., is threatening to suc. After months of building up a reputation as a 50-Mc.-only man, we list his V.H.F. SS score in the 2-meter column! Sorry, Bob, and hats off to a fellow who keeps plugging in the middle of such hot Channel 2 territory. There are others who are standing by the 50-Mc. band in the Washington-Baltimore area. The following have taken to Sunday-morning get-togethers on 6 to keep things moving: W3s OJU PCB QCQ JVI GGR KFM OTC, W4s LVA and HVV.

50 WAS Mc.

Standings as of March 25th

WØZJB.....48	W5VY.....47	W9ZHB.....48
WØBJV.....48	W5GNQ.....46	W9QUV.....48
WØCJS.....48	W5JTI.....44	W9HGE.....47
W5AJG.....48	W5ONS.....44	W9PK.....47
W9ZHL.....48	W5ML.....44	W9VZP.....47
W9NJT.....48	W5JLY.....43	W9ALU.....46
W6OB.....48	W5JME.....43	W9QKM.....46
	W5VV.....42	W9RQM.....45
W1CLS.....46	W5FAL.....41	W9UIA.....45
W1HDQ.....46	W5NHD.....41	W9UNS.....42
W1CGY.....45	W5FSC.....41	
W1LLL.....44	W5HLD.....40	WØQIN.....47
W1KHL.....43	W5HEZ.....35	WØDZM.....47
W1HMS.....43		WØNFM.....47
W1LSN.....41	W6WNN.....48	WØINI.....47
W1EIO.....40	W6UXN.....47	WØTKX.....47
	W6IWS.....41	WØKYF.....44
W2RLV.....45	W6OVK.....40	WØJOL.....44
W2BYM.....44	W6TMI.....40	WØJHS.....43
W2IDZ.....43		WØPKD.....43
W2AMJ.....42	W7HEA.....47	WØHVW.....42
W2MEU.....42	W7ERA.....47	WØMVG.....41
W2GYV.....40	W7BQX.....45	WØIPI.....41
W2QVH.....38	W7DYD.....45	
W2FHJ.....37	W7JRG.....42	VE3ANY.....42
	W7BOC.....40	VE3AET.....32
W3OJU.....45	W7JPA.....40	VE1QZ.....32
W3NKM.....41	W7FIV.....40	VE1QY.....31
W3JVI.....38	W7CAM.....40	HC2OT.....26
	W7KFM.....40	XE1GE.....19
W4FBH.....46	W7ACD.....35	
W4EQM.....44		Calls in boldface are holders of special 50-Mc. WAS certificates listed in order of award numbers. Others are based on unverified reports.
W4QN.....42	W8NQD.....42	
W4FWH.....42	W8YLS.....41	
W4CPZ.....39	W8CMS.....41	
W4OXC.....39	W8LBH.....38	
W4MS.....39	W8RFW.....37	
W4BEN.....35	W8UZ.....37	
W4FNR.....35	W8WSE.....36	

Armed Forces Day—May 19th

Receiving Competition and Military-to-Amateur Test

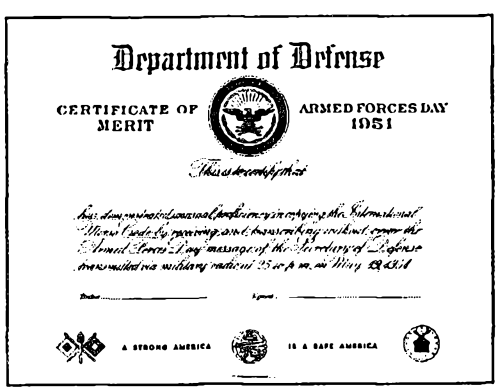
FOR the second straight year the Army, Navy and Air Force will pool their communications resources and offer a double-header program for the radio amateur fraternity on Armed Forces Day, Saturday, May 19, 1951.

The three services will co-sponsor a receiving competition and a military-to-amateur test. The receiving competition will be identical with the one held last year; the military-to-amateur test is something new and different, designed to take the place of the QSO and message-handling contest featured on the 1950 program.

The Armed Forces Day program for this year is as follows:

Receiving Competition

A message to amateurs from the Secretary of Defense will be broadcast on 12 military frequencies from Army, Navy and Air Force stations. Any listener who can receive and copy the International Morse Code message may send his copy to Armed Forces Day Contest, Room 2B313, The Pentagon, Washington 25, D. C., where representatives of the three services will


Department of Defense

CERTIFICATE OF MERIT

ARMED FORCES DAY 1951

This is to certify that

has demonstrated commendable proficiency in copying the International Morse Code by receiving and transcribing without error the Armed Forces Day message of the Secretary of Defense transmitted via military radio at 25 w.p.m. on May 19 1951

Date _____ Signed _____

A STRONG AMERICA — IS A SAFE AMERICA

Certificate of Merit to be awarded those making perfect copy of the Secretary of Defense's Armed Forces Day message.

check it against the original transmission. All who submit a perfect copy will receive a Certificate of Merit (see illustration), attesting to their code-copying proficiency. Be sure to state the time, frequency and call of the station whose transmission you copy.

The following times, calls and frequencies will be employed for the Receiving Competition. (Eastern Standard Time has been used throughout. In converting to local time for your area, remember that EST is five hours earlier than Greenwich Time, and is one hour later than Central Standard, two hours later than Mountain Standard, and three hours later than Pacific Standard Time.)

Time	*Call Sign*	*Frequencies*
2000 (EST)	*AIR* (Air Force Radio Washington, D. C.)	14,405, 20,994 kc.
	NSS (Navy Radio Washington, D. C.)	122, 4390, 9425, 12,630, 17,000 kc.
	WAR (Army Radio Washington, D. C.)	3497.5, 6997.5 kc.
2400 (EST)	*AIR* (Air Force Radio Washington, D. C.)	14,405, 20,994 kc.
	NPG (Navy Radio San Francisco, Calif.)	115, 9255, 12,540 kc.
	WAR (Army Radio Washington, D. C.)	3497.5, 6997.5 kc.

Each transmission will be preceded by a 5-minute CQ call. All transmissions will be at 25 words per minute. Should characters for any reason be transmitted with improper spacing, such as tape-punching errors, etc., such errors should appear in your transcription. It is not necessary to copy more than one station, and no extra credit can be given for so doing.

Military-to-Amateur Test

Here is an opportunity for every licensed amateur to work the headquarters stations of the Army, Navy and Air Force direct, and to receive an official QSL acknowledging the contact and showing the RST report of your emission as logged at the military headquarters stations. Each of the military headquarters stations will QSL separately, so if you're ambitious you can get three different QSL cards.

AIR, NSS, and WAR will be on the air between the hours of 1800 and 2400 (Eastern Standard Time) on May 19, 1951, to contact and exchange QTH, signal-strength and readability information with amateur radio stations. The military stations will work on spot frequencies just outside the 80-, 40-, and 20-meter bands. No traffic handling or message exchange will be permitted. Prompt and courteous operating practices will make it possible for the military stations to contact a larger number of amateur stations during the six hours for which the test is authorized.

Here's where to find the military stations:

AIR (Air Force Radio Washington) — 3497.5 (A1), 7635 (A1), 14,405 (A3) kc.

NSS (Navy Radio Washington) — 3415 (A1), 7375 (A1) kc.

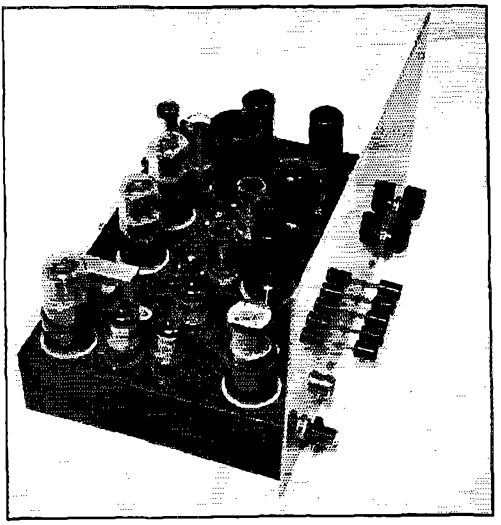
WAR (Army Radio Washington) — 4020 (A3), 6997.5 (A1), 13,947.5 (A1) kc.

IF there haven't been a number of two-way s.s.b. QSOs with England on 75 by the time you read this, it won't be the fault of **G3CU**. He sent out a mimeographed sheet giving the listening and calling schedules of the active Gs on s.s.b. These won't be repeated here because the news will reach you too late, but they were passed around by the s.s.b. gang and by the 75-meter bulletins from W1AW.

New **W1JEO/6** crystal rigs are being used on 75 at **W6BAY, W6EBQ, W6VSF** and **W6WI**, and **W6GGM** is using phasing, according to W6WI. Frank's rig ends up with a pair of 4E27s running 400 watts. The receiver is an SX-25 followed by a BC-453 that has been modified to use a conversion-type detector (April, 1948, *QST*), all ending up with a Selectoject. He reports that this arrangement clearly outperforms the SX-25 and its standard b.f.o. Frank also passes along the tip that a BC-453 with a.v.c. is a big help in aligning the W1JEO crystal filter. He ties a v.t.v.m. across the a.v.c. line while aligning the unit, and it gives him a sensitive detector and a good frequency calibration.

W3ASW reports that he has now worked over 100 different s.s.b. stations, thereby being the

(Continued on page 120)



This is the s.s.b. exciter used by John Webb, WØAHM, to drive his 807 amplifier on 75. Borrowing ideas from here and there, one of the features of the exciter is the push-button selection of either sideband or sideband-plus-carrier. The tube line-up is 6SL7 speech amplifier, (3) 12AU7 phase shift, 6SN7 modulator, (2) 6SN7 balanced modulator, 6J5 crystal oscillator, (2) 6SK7 gain-controlled buffers, and 6V6 cathode-follower output.

Preview – DX Contest C.W. Scores

IN accordance with our regular custom, we are pleased to pass on some of the early claimed c.w. scores in the 1951 ARRL International DX Competition. Large numbers of entries are being received in each mail and the final outcome of the fracas will probably be a bit different from that indicated by the figures listed below. However, this advance listing will give some indication of how this year's contest stacks up against previous DX activities.

Propagation conditions were far from being as favorable for long-distance work as they were a year ago, but this factor did not dampen the enthusiasm of those DXers who were out to make the highest possible scores or to pick up new countries, states or provinces. The usual pile-ups occurred whenever rare stations appeared and the spirit of competition was as keen as ever.

Here's a list of the highest claimed scores reported as of late March from the W and VE call areas: W1LOP 85,560, W2WZ 209,169, W3LOE 295,020, W4KFC 251,091, W5ENE 164,808, W6MVQ 146,772, W7PGS 49,980, W8JIN 213,729, W9LM 198,690, WØDAE 87,750, VE1HG 10,836, VE2BK 12,546, VE3AGX 8520, VE5QZ 4131, VE7EO 16,473. Of the W/VE logs thus far received, those from the following show contact totals above 200: W3LOE 452, W4KFC 405, W2WZ 381, W8JIN 373, W9LM 358, W5ENE 327, W6MVQ 302, W3GHS 298, W3JTC 294, W4BGO 293, W4JGR 293, W3BVN 286, W3JTK 286, W6AM 286, W1BIL 234, W1LOP 230, W4KWY 229, WØDAE 225. Highest multipliers reported: W3LOE 220, W4KFC 207, W8JIN 191, W9LM 185, W2WZ 183, W5ENE 168, W6MVQ 162, W4JDR 161, W3GHS 152, W4BGO 152, W4KWY 151, W3GTK 150.

Outside W/VE, the following have submitted the highest claimed scores from their respective countries: CN8EJ 40,352, CT1AL 10,992, KG6IIU 3211, KL7PB 43,965, KP4KD 160,197, KV4AA 649,467, ON4TQ 1360, OZ4H 33,600, PY2DV 42,455, SVØAB 1680, XE2OK 52,290, ZB2I 6916, ZS6FN 3432. Top reported contact totals: KV4AA 2389, KP4KD 796, XE2OK 581, KL7PB 490, CN8EJ 425, PY2DV 419. High multipliers: KV4AA 91, KP4KD 67, KL7PB 45, PY3DV 35, CN8EJ 32, OZ7H 32, XE2OK 30.

It must be emphasized that all scores, contact totals and multipliers quoted above are *claimed* by the contestants. Intensive checking will be necessary before the final results, which will appear in a later issue, can be announced.

See June *QST* for the highest claimed scores in the 'phone competition.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Upon chancing to run into W1AXF, who lends his talents to Chatham's WCC juggernaut, we expressed curiosity as to how this great ship-working coastal station was making out in the prevailing poor high-frequency propagation conditions — especially inasmuch as the global coverage enjoyed by WCC is quite akin to that aspired to by the DX-minded amateur.

Mac grants that communications these sunspottish days often becomes somewhat of a trial. Lately, 12 and 16 Mc. have been handling the bulk of WCC's traffic during the day but the m.u.f. takes a fast dive and the boys must be on the ball to streak for the lower frequencies without losing QSOs. The 4-kw. job on 22 Mc. has had it rather easy because of the same low m.u.f. while the 8-Mc. rig is often busy for great distances around the clock. The ships (like many DXers) have been trending toward the lower frequencies and the 5-Mc. range is becoming well used.

Curiously enough, the h.f. signals of WCC (roughly on 5, 6, 8, 12, 16 and 22 Mc.) aren't the result of superduper arrays of arrays. The station has to be heard in many directions simultaneously and this is accomplished handily for each frequency by feeding up to 30 kw. into high single dipoles fed with flat open lines.

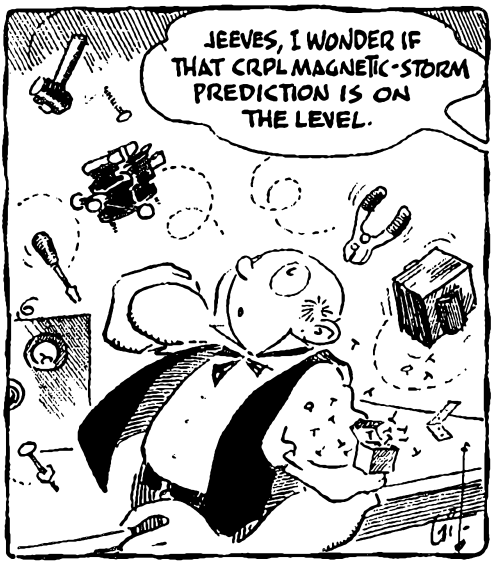
Receiving is a different matter. Since "you can't work 'em if you can't hear 'em," there are available numerous antenna combinations — rhombics, et al — to aid in this respect. A central 300-foot tower at Chathamport bears the brunt of these beams. The nearest-sounding thing to a ham band in the radio spectrum is probably a ship band — the QRM can be stupendous.

While some phases of coastal-station work may be analogous to ham-band DXing, there *is* some difference. For example, one can't merely plead QRM, QRN or QRJ, drop a QSO and look for another louder signal. Every contact must be completed satisfactorily if humanly possible.

One might figure that after hours of this pain and strain the personnel would go off duty to photographic dark rooms, stamp catalogs or just evenings with good books. Actually, however, W1s AXF BMW FZT GGB GRC IKU JNI JNM JOH JSD RBV SGU and SQO find enough surplus enthusiasm to keep their tickets in good standing.

What:

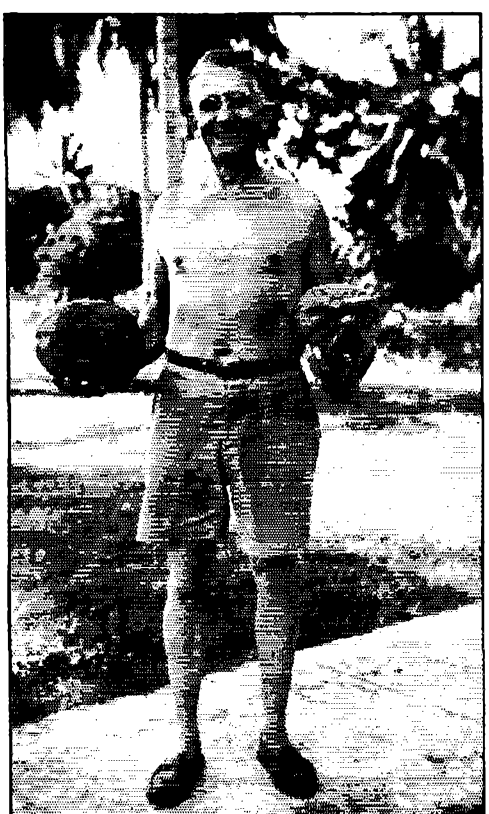
"Lost my rhombic due to a move of the station but have folded dipoles on all bands up about 90 feet in the air and they seem to work okay," opines DL4FS. Guy emphasizes this on *twenty* by way of **AP5B** (14,008), **CN8MR** (14,006), **EA8BC** (14,075), **MD2PJ** (14,180), **SP1JF** (14,010), **SV1SP** (14,050), **TA3GA** (14,003), **UA0AA** (14,022), **SV0AB** (14,012), **VS1DX** (14,025) and **3V8AN** (14,048). The Turkish entry is unknown to TA3s FAS and GVU, thus possibly a weirdy. DL4FS counted fresh cards from FF8s AC JC, FM7WF, FY7YF, FN8AD, VP5BF, VS7s NG NX and UQ2AL which served to qualify him for DXCC . _ . _ . _ One **AC4NC** has been heard by W1ONV around 14,060 kc., and W5FXN is gunning for ZC4TF (14,001), **VQ5AU** (14,058) and **UG6KAA** (14,080). Jim added a new country in **CP5EK** (14,065) and would like to know how to get the following to QSL: HA5s PB BD, MI3s IM ZZ, UA0s FR KFD, PZ1QM and SP1CM . _ . _ . _ CT3s AA AB (14,030), FY7YB, VU2BC, 9S4AX (14,016), **UO5KAA** (14,112), **UP5KBC** (14,080) and others are designated by W5MPG. Rex found AP2N, VR1C, HZ1AB and ZS3S QSLs cluttering up his post box . _ . _ . _ Erecting that new beam, **WØAIH** surrounded choice items **LJ3B** (14,050), **FQ8AF** (14,010), F9QV/FC, **CR5AA** (14,060), **JA2KW** (14,019), **VS1DZ** (14,072), **SP5ZA** (14,072), **CS3AA** (14,050), **PZ1AL** (14,034), **EK1AQ** (14,055) and UA1KB . _ . _ . _ VE3CCK is another who prefers the "when" classification and submits a substantial list of trophies (EST): CN8EP (1630), CN8AG (1300), CR5AA (1230), GC5OU (1445), YN1AA (2210), YU3AC (0930), VP1BR (0820), VP8AI (2145), VQ4KRL (1330), TF3BG (1550), FA3VV (1235), FP8BX (1710), EA8JR (1730), EK1SP (1630), ZD2GAJ (1520), ZE3JP (1700), ZS3Q (1415) and SP1JF (1445). Ronald scared up 78 countries in his first 9 months on the air but still seeks an Asian. He further writes, "My antenna is about 30 feet from a TV antenna and the TV set has a booster. Rig causes just a faint white haze." Well, some guys just live right, that's all . _ . _ . _ CX6AD (14,015), **HH2JC** (14,012), **VP8AI** (14,007), VP4LZ (14,110), VQ2GW (14,050), VR1C (14,134), **JA2KW** (14,016), **TF3MB** (14,068) and others answered W9HUZ in E. St. Louis . _ . _ . _ W9AND and W2JBL were among those to capture **FP8BX** (14,070) and Wes also added **YO3RI** (14,000) and **EA9AP** (14,002). George mentions a QSO with a Dresden-located DL8DAA . _ . _ . _ Did you happen to run across FP8AW? That was none other than veteran DXer HB9AW on a trip to St. Pierre. This via W3BXE. *Everybody* seems to be getting into the FP8 act — Jeeves is itching to try it, too. But he wants to be different and go to Miquelon . _ . _ . _ In addition to search-



* DX Editor, *QST*. Please mail reports of DX activity to W9BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.

ing for unworked California counties (the WACC, you know), W8YGR knocked off ZB2I (14,090), ZE3JQ (14,035), ZD2DCP (14,050) and GC2ASO (14,010) . . . . . We credited W2GVZ with working YI3BZL, AR8AB and some ZD1s in a past column when we should have more properly said he was hot on their trails . . . . . Sifted out of the fifth layer by W8NOH were MD2MD, TG9AS, ZE3JV, CN8EQ and long-pather VK5YF . . . . . W6JVE feels that some of the lads would be interested to know that JA2KK, TF3ZM, HC2KB, VE8OU, XE1BM, KG6HG, KS4AC, OAs 4AP 8A, YVs 4AX and 5BJ do QSL . . . . . Out in the Land of The Signals, the So. Calif. DX Club's *DX Bulletin* rounded up interesting prospects OY3IGO (14,077), MD2BC (14,028), VT1s AC (14,060-100 t6) AF (14,080), HS1VR (14,085) and UP2KBC (14,090). The No. Calif. DX Club's *DXer* has it that OA8A (14,015) is located in the "jungle district" of Peru, some 300 miles from Lima, and is the only OA8 active on 14 Mc. . . . . SWL Bud Rugel has a few the gang may have overlooked: FO8AG (14,050), MI3VG (14,016), VK9QK (14,059), VQ2BNU (14,035) and AP2N (14,130).

All seems fairly quiet on the *twenty 'phone* front but the *DXer* makes mention of UP2KBC, YU1CAG and FQ8AC while DL4FS worked MD2PJ (14,180), ... Ecuador would still be a good spot to find oneself marooned with rig and receiver. MI3RP (14,353), FO8AB (14,321), New Guinea VK9s MR (14,333) YT (14,349), ZE1JV (14,174), ZK2AA (14,325), HA5BD (14,176), VP5BP (14,164) of the Caymans, VS7SU (14,160), VU2s AK (14,166) CP (14,158) CR (14,362) and JU (14,362) were accounted for by HC2JR. John, aided by W3HUV, informs us that HC8GI may be active from the Galapagos ere you read this and the same goes for TI9GRC on Cocos. A mouth-watering three-way rag chew involving ZM6AA, ZK2AA and VR5GA was recently overheard by HC2JR . . . . . John DeMyer speaks of a QSL



Ralph W. Bird, W5KWY, possibly better known as KS4AJ, arms himself against DX hogs while enjoying some sunshine on Swan Island.

First North America-Asia QSO on 160!

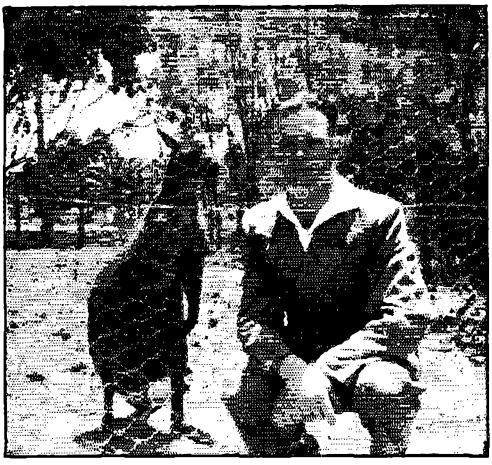
On January 14th VE1EA, Windsor, Nova Scotia, worked HZ1KE, Taif, Saudi Arabia, for the first N.A.-Asia 160-meter QSO on record. Confirming QSLs have been exchanged.

from ZD6HJ who runs 40 watts to a tuned doublet on this band.

While twenty was at low ebb the boys were beating *forty* to a pasty pulp. W9HUZ crossed off KW6AR (7030), FF8s AC (7006) JC (7001), FQ8AC (7039), FP8BX (7010), W5NGE/KC6 (7008), CR7CI (7017), TA3GVU (7018), ZD9AA (7065), OA4BR (7057) and HH5BL (7012) . . . . . That ZD9AA as well as ZK1AB were racked up at W7NFF while W6BES also hooked ZK1AB plus DU1MB, FA8DA, FO8AC (7045 t7) and numerous Gs . . . . . VS7NX (7009), VP8AK (7003), ZD4BC (7013), UA9KCA (7012), UR2AM (7018) and VP4TB (7006) found themselves in the DL4FS log. VP4TB laid claim to running 1.8 watts! . . . . . W7GVH reports a lot of CQs from one FI3AG on 7045 kc. who was evidently performing without benefit of a receiver . . . . . YV6AO was raised by W3QYG and W1PQI while W8FRD took on VP7NM . . . . . W3DLI snapped up ZS5OS (7008), KG4AQ, VP5BM, HH2LD and VP9DDD during television commercials . . . . . If you were a Cuban you might possibly work CTs, Fs, EAs and IIs on 7-Mc. 'phone as CO6OK does. But W3KU will settle for providing Delaware QSOs to all and sundry on 7056 kc. Ernest is usually available there from 0400 to 0530 EST and at approximately 2345 EST on Fridays and Saturdays . . . . . The previously mentioned *DXer* and *DX Bulletin* had their constituents out for 7-Mc. blood, judging from the following list of juice reported heard or worked: VS6AC (7024), VR2AA (7020), UA1KAI (7015), UA3KAA (7024), UAØKKB (7046), CX1SG (7003), VP8AJ (7008), HZ1KE (7027), AP2A (7015), EK1RW (7061), CR7AD (7036), CT1DJ (7023), CT3AB (7033), OH1PR (7004), VP5s BH (7032) and BM (7010) . . . . . SWL W. Mulvey has four that sound good: UB5KAB (7016), YU3FLF (7000), MD4ZK (7017) and MP4KW (7001).

As the higher-frequency bands undergo some of the usual seasonal improvement, *eighty* gets less of a play. But don't sell this band too short too early . . . . . Contacts with FA8BG (3506), F9DN (3531), DL1MZ (3503), ZL1BY (3505) and CE2DY (3529) were procured by W9HUZ and W9AND worked VP4LZ (3527), ZLs 3PJ 4BO and 4BJ . . . . . DL4FS came upon YU1AA (3510) and PY7WS (3510) and W4KFC reports the following 75-meter 'phone DX available: VPs 6FO 6SD 7NH 7NR 9AF, HC2OS, HK4DP, F8MG, G2PU, LX1JW, CN8EP (3563) and CT1BW (3600). Vic's buddy W4FV now has 26 countries on seventy-five while W4KFC himself has 74 80-meter countries . . . . . *86* 3.5-Mc. countries rest in W2QHH's ledger and Howy's latest include FP8BX (3517), 4X4RE (3521), VP3CW (3515), VP5s BM (3511) FR (3503), HP1BR (3527), VP7NM (3528), IIAIV (3656), CN8EJ (3563), FA8DA (3503), SP1JF (3514), OZ1W (3555), OA4J (3530) and OK1GM (3513). He also raised ZB2I, possibly participating in the first W-ZB2 3.5-Mc. QSO . . . . . ZM6AK made it No. 91 on the band for W4BRB, and also added joy to the shacks of W8BHW and W6ZAT. Acknowledging that the home stretch will be toughest, Gene is now in hot pursuit of ZD4AB (3505), FO8AC, and CM9AA's coming expedition to FG8. Gene also mentions that CR6AQ is being heard on the West Coast, and that W6ZAT has copied HZ1KE (3501) S4.

Said seasonal improvement probably won't apply to *ten* meters but we do have a few reports of note. W2AEB was able to find VQ2JD, YV1AU, MI3XX, FF8PG, CR6CB, EA2DA, ZL2BN and VK2ID, and W1MMV provided IS1AEX, EK1RW and FO8AB with Vermont contacts. Jerry advises DX in need of Vermont to call "CQ Vermont" persistently as there are several active ten-'phone DXers in the state. Can anyone give W1MMV info regarding one LY1BC? . . . . . ZEs 1JE (28,152) 2JE (28,152) 3JV (28,200), KV4AW (28,700), VR1E (28,416) and VP2SE in the Windwards (28,386) entered HC2JR's collection . . . . . W8NOH did well: ZD1SW, ZE3JT, ZS3O, ZS4D, ST3M and HC1DL. ZS4s, while fairly rare, help represent South Africa proper . . . . . VP6s FR HR JK MD, VP1BOY (28,350), ZP3AW, OQ5NK, HI6EC (28,250) and YN4CB came back to W2ZVS.



There really are kangaroos on Kangaroo Island, insists VK5XK. To prove his point, the widely worked South Australian poses with one of the neighboring BCLs.

One-sixty, having had a real fling this season, is probably heading for summer hibernation. The dust is still clearing, however. _ . _ . _ W9CVQ is in receipt of the following good tidings, dated March 11th: "Your 160-meter signals heard by us in Tauranga, New Zealand, RST 329 at 0642 to 0700 GT. Congratulations. 73." The signers were ZLs 1AH and 1MP. Mac admits this made him as excited as he was when he first heard BBC station 5SW, at the age of 12.

Where:

All cards for Liechtenstein stations — now using the prefix HE9L in lieu of HE1 — will be relayed by the USKA of Switzerland, we are notified by HB9EL . _ . _ . _ EL2P asserts that stations giving Roberts Field QTHs can be QSLd care of Pan American World Airways, Roberts Field, Liberia, and EL hams affiliated with Firestone answer to Firestone Plantations, Harbel, Liberia . _ . _ . _ The QSL bureau for VT licensees is being handled by VT1AC. The address: Doug Taylor, VT1AC, Box 54, Kuwait, Persian Gulf. This via Mr. Bud Rugel . _ . _ . _ It is apparent to W1IKE that many DXers are not familiar with the fact that some overseas QSL bureaus relay cards on a members-only basis. Unless advised during QSO to "QSL via so-and-so bureau" your safest and fastest bet is to QSL *direct*.

AC3PT	P. T. Namgyal Maharaj Kumar, Sikkim P. O., Gangtok, Sikkim State
CN8EP	Navy 214, % FPO, New York, N. Y.
CR6AK	Francisco A. Soares, jr., P. O. Box 172, Sa Da Bandeira, Lubango, Angola
CR6CB	P. O. Box 1045, Luanda, Angola
C83AB	APO 406, % PM, New York, N. Y.
DL4RH	Chas. Ruckstuhl, APO 407A, % PM, New York, N. Y.
EL2R	Rudolph Richards, Pan American World Airways, Roberts Field, Liberia
FG8OA	(QSL via ARRL)
FP8AW	(QSL via W2SN)
ex-G2DMS	(QSL to W3NNQ)
HE9LAA	Hugo Hilti, Schaan 378, Liechtenstein
ex-HL1AL	Jack Thorn, 512 Domer Avenue, Apartment 201, Takoma Park 12, Md.
I5ZC	Nicola Lucenti, Mogadishu, Italian Somaliland
JY1XY	Leslie Berkley, QSL % RAF Station, Amman, Jordan
KH6KL/KP6	QSL to P. O. Box 5392, Honolulu, T. H.
KJ6AI	1959th AACS Sqdn., APO 105, % PM, San Francisco, Calif.
KL7ABN	Box 5, Healy, Alaska

♦

Six well-known Italian DX men and members of DXCC are IIs AIV PL IY KN RM and AY.

May 1951

ex-KS4AI	Ralph W. Bird, W5KWY, Route 1, Lacombe, La.
KW6AR	(QSL via ARRL)
ex-OY3RD	(QSL to OZ7RD)
SU1AD	(QSL via ARRL)
SV0WB	(QSL via DL4 Bureau)
ex-VO6EP	A. S. G. Grant, Geodetic Survey, Dept. of Mines & Technical Surveys, Ottawa, Ontario, Canada
VP4LZ	(QSL via PY1AJ)
VP6GJ	C. E. St. John Salters, St. George, Barbados, B. W. I.
VP6IC	P. O. Box 235, Bridgetown, Barbados, B. W. I.
VQ2JN	John Norte, Box 41, Livingstone, No. Rhodesia
W9ODN/KX6	QSL to Howard Deller, 278 Spruce St., Philadelphia, Pa.
ZD4BC	Box 27, Prestea, Gold Coast
ZD9AA	(QSL via SARL)
3A2AC	(QSL via ARRL)
4X4CJ	R. Avigor, 4 Nachlat-Benjamin St., Tel-Aviv, Israel

W1s DJV EWF IKE ODW RWS, W2s AEB ZVS, W5FXN, W6s ALQ EUV, W8s CVU NOH, W9s AND CFT KOK WIO, DL4FS, VE3CCK, XE1AC, Messrs. P. Bates and P. M. Crawford volunteered the preceding pitch.

Tidbits:

W6ALQ was happy to collide with some Palmyra Island activity in the person of KH6KL/KP6. The latter is former W6LIQ and he's particularly interested in giving the boys who haven't yet chalked off this country preference over other contacts. Max lists as one more Palmyra possibility, KH6ACL/KP6 . _ . _ . _ An Indian prince gives us another crack at some ham royalty with his new station, AC3PT. This via W9KOK and Mitch also mentions that he is handling AC3SQ QSLs for contacts dating from 1 January this year. So slip your AC3SQ-destined pasteboards to W9KOK, Montague Rd., Winnebago, Ill. _ . _ . _ Speaking of AC stations, John DeMyer noted the bands going crazy from time to time over folk like AC5AA and AC4MU, using 'phone. Present use of such prefixes by the MARS may lead to further confusion along this line but most DXers should be able to spot the Asian variety of AC signals without difficulty . _ . _ . _ In the regrets department we are sorry to hear from W5MPG that W5ASG of Arkansas DX fame suffered damage to his business property through a serious fire . _ . _ . _ Sharp-eyed W2GVZ had us casting about for a good answer as to why we listed VP8AP in two locations at once in a recent issue. John DeMyer of Lansing saved the day by quoting a letter from the guy. Same epistle has VP8AP pulling stakes on South Orkney and moving to South Georgia. Read on, however; the call VP8AP *will* remain at Orkney under a new operator and Dave will get a new moniker on Georgia. So, you see, all is clear and simple. Anyway, John hears that South Georgia uses d.c. mains, meaning a modification necessity for Dave's rig and which may keep him inactive for a spell. Gee, the authorities down there could do us all a favor by issuing calls indicative of some geographic distinction. [Especially for we-know-who's benefit — *Jeeves*] . _ . _ . _ Utah is being sought desperately by G3AIM according to W1RWS and we find that CN8EP's home call is W0BAI . _ . _ . _ ". . . I never work anyone who is exactly on my frequency. If I do happen to be getting

(*Continued on page 121*)

The C.W. Man's "Selectoject"

A Simple Modification of the Original Circuit Which Greatly Reduces "Ringing"

BY OSWALD G. VILLARD, JR.,* W6QYT

It is a characteristic of the original "Selectoject" [1,2] that by advancing the regeneration control, the bandwidth in the "boost" position can actually be made too narrow for practical c.w. reception at the lower audio frequencies. The resulting loss of sidebands associated with even low-speed keying makes the signal "ring" and blurs the characters. The only recourse is to widen the bandwidth by cutting down the amount of regeneration. But this in turn reduces the "boost" and causes a loss in selectivity. Although ringing is not as troublesome at the high audio frequencies (3000 cycles and above) it is definitely noticeable from about 1500 cycles on down.

Happily enough, this problem may be brought under control by a simple modification of the original circuit [3] without affecting its other properties in any way. The result is a tunable selective audio amplifier in which absolute bandwidth is substantially independent of center frequency, thereby greatly increasing the utility of the device in c.w. reception. The ease with which this may be done is believed to be a rather unique feature of the "Selectoject." Equivalent results *can* be achieved in other continuously-tunable *LC* and *RC* amplifiers, but only at the expense of considerable complexity.

Explanation of the modification properly begins with a description of an interesting characteristic of the "Selectoject" which was not discussed in the original article. It turns out that the shape of the response peak in the "boost" position is substantially identical with that of a tuned circuit having a Q equal to the "resonant rise" of voltage of the regenerative *RC* amplifier. The agreement is especially good for Qs — and resonant rises — above 5. Fig. 1 shows as an example, a Selectoject response curve whose "resonant rise," defined as the ratio of the response at resonance, to the response with no feed-back, is 10 times. (The corresponding feed-back factor, $A\beta$, is $0.9 \angle 0°$ at resonance.) This curve is seen to agree very closely with that of a parallel-resonant *LC* circuit having a Q of 10, for frequencies in the neighborhood of the peak. At frequencies very far from the peak, it must be pointed out, the *LC* circuit response continues to drop off, whereas the feed-back amplifier response does not.

The agreement at the resonant peak, nevertheless, is as convenient as it is fortuitous, since it permits one to use all the usual *LC* rules of thumb, universal response curves, etc., in determining the *RC* amplifier's response. This relationship is not as simple in the case of other tunable *RC* circuits such as the Wien bridge.

To the extent that one is interested only in the response near the resonant peak, the Selecto circuit provides the experimenter with an extremely flexible and convenient electronic "tuned circuit." Here is a resonant circuit whose Q is continuously adjustable and which may be set as high as one would care to have it, and whose center frequency may be tuned over the entire audio range without affecting Q or the amplification at resonance. Such a circuit is especially useful at the low audio frequencies where really high-Q resonant circuits are virtually nonexistent.

Selectivity and Bandwidth

We are now in a position to see why the Selectoject can be adjusted to be too sharp for c.w. at the lower audio frequencies. But first, some important definitions. "Selectivity," in the following, will be taken to mean the ratio of response at resonance, to response at frequencies far from resonance. "Bandwidth" is taken to mean the width of the band between 70-per-cent-response frequencies. Both are illustrated in Fig. 2. By "per cent bandwidth" is meant bandwidth expressed as a percentage of center fre-

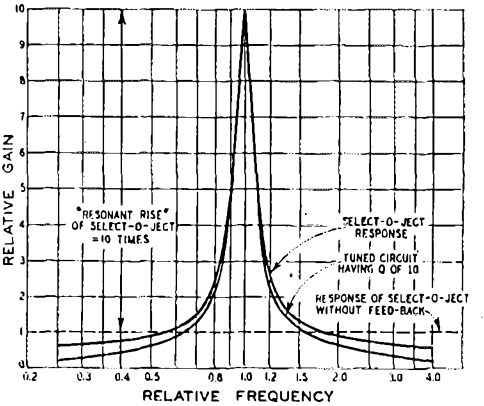


Fig. 1 — The Selectoject response peak closely approximates that of an *LC* circuit having a Q equal to the Selectoject's "resonant rise."

*Trustee, W6YX; Dept. of Electrical Engineering, Stanford University, Stanford, Calif.

[1] O. G. Villard, jr., and D. K. Weaver, "The 'Selectoject,'" *QST*, Nov., 1949, p. 11.

[2] O. G. Villard, jr., "Tunable A-F Amplifier," *Electronics*, July, 1949, p. 77.

[3] O. G. Villard, jr., "Independent Control of Selectivity and Bandwidth," *Electronics*, April, 1951, p. 121.

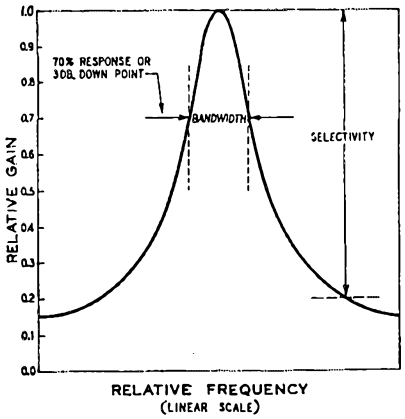


Fig. 2 — Definition of "bandwidth" and "selectivity."

quency. By "absolute bandwidth" is meant the width of the band in cycles.

We are ordinarily not accustomed to thinking of a keyed c.w. signal as possessing sidebands, but it does. Keying is merely another form of modulation. If such a signal is passed through a circuit so selective that some of the sidebands are rejected, the effective depth of modulation is reduced, and the signal is said to "ring."

The conventional crystal filter, which is nothing more than a simple tuned circuit of very great Q, is designed in practice so as to introduce only a slight ringing in the sharpest position, not enough to reduce signal intelligibility to any appreciable extent. The corresponding bandwidth turns out to be of the order of 100 to 200 cycles at 455 kc. in typical commercial receivers. (Crystals *could* be made to give a narrower bandwidth, but the ringing would then be excessive.) In simple tuned circuits of the quartz or LC type, there is a relationship between bandwidth and selectivity such that when one is defined, the other is automatically determined. Since a crystal filter in the "sharp" position almost entirely determines the selectivity of a receiver (the i.f. amplifiers being broad by comparison), it is interesting to calculate the equivalent Q of the crystal from the known bandwidth. For a Collins 75-A-1 receiver this bandwidth is 200 cycles at 6 db. down, which corresponds to a crystal Q of 4400.

Simple tuned circuits, including quartz crystals and the Selectoject in which both tuning resistances are varied, have a constant *percentage* bandwidth for a given Q as resonant frequency is changed. This means that a tuned circuit having a Q of 440 at 50,000 c.p.s. has the same bandwidth in cycles as a circuit having a Q of 4400 at 500,000 c.p.s. Now the sidebands of a keyed or modulated signal extend out on each side of the carrier just as far no matter where the signal is in the spectrum. Thus if a tuned circuit at 500 c.p.s. is to have the same bandwidth (and the same performance with keyed c.w.) as a 75-A-1 quartz crystal, its Q can be no greater than 4.4! Since c.w. reception — if one neglects the audio image — is nothing more than a process of frequency translation, the comparison is a fair one. We see at once that the Selectoject, which can readily be adjusted to have a Q of 100 or more at any audio frequency one likes, is normally much too sharp for c.w. reception at the lower audio frequencies. We could use the *selectivity* corresponding to a Q of 100, but the accompanying *bandwidth* is too narrow. At 100 c.p.s., a Q of 100 implies a bandwidth between 70 per cent points of *one cycle*, and it takes one-third of a second for an oscillation in such a circuit to die down to approximately one-third amplitude after the applied signal is removed!

At the high end of the audio range, the situation is not so bad since the crystal filter is equivalent to a Q of 44 at 5000 c.p.s. What one would like would be some new type of circuit in which the selectivity at any frequency always corresponded to a Q of 44, but whose *absolute* bandwidth remained nearly constant at the value corresponding to a simple tuned circuit of that Q at 5000 c.p.s.

Bandwidth and Phase-Change Rate

Inspection of the basic circuit of the Selectoject, given in Fig. 3, shows that tuning may readily be accomplished by varying only *one* resistor, either R_1 or R_2, instead of varying both simultaneously. There should be no change in the net feed-back voltage, and hence no change in the height of the response peak, if the phase-inverter plate and cathode resistances R_3–R_4 and R_5–R_6 are carefully matched. This is because each phase-shift stage is designed to produce an output voltage constant in magnitude, but variable in phase.[1] The original circuit operated with a 90-degree phase shift through each stage, and with the time constants R_1–C_1 and R_2–C_2 equal. If we tune *one* resistor alone, these time constants become unequal. The resonant frequency then becomes that for which the sum of the two phase shifts equals 180 degrees. Thus one stage might have a 10-degree shift, and the other 170 degrees.

It may be shown that in a circuit such as Fig. 3, the bandwidth is determined by two factors: first the amount of feed-back (which also controls the height of the resonant peak) and second, the rate of change of phase with frequency around the feed-back loop. Obviously,

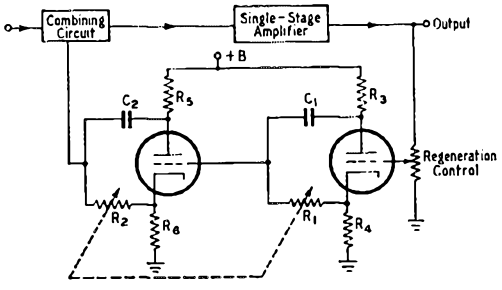


Fig. 3 — Basic circuit, Selectoject in boost position.

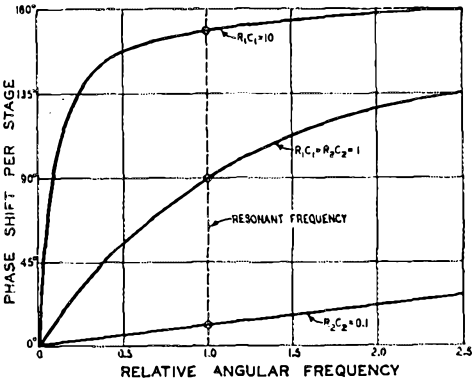


Fig. 4 — The slope of the phase-*versus*-frequency curve is reduced when the time constants are dissimilar.

the more rapidly phase changes with frequency, the more quickly the feed-back voltage vector will sweep through the particular phase position which gives rise to pure positive feed-back and maximum amplification. If we can slow down this rate of change of phase, then for a given amount of feed-back (and a given height of resonant rise) we have a means for broadening out the bandwidth.

The way to slow down the rate of change of phase is simply to let the two tuning time constants become dissimilar. The action is illustrated in Fig. 4, which is a plot of phase *versus* frequency through one stage for various time constants. When both time constants are equal, operation follows the center curve and maximum amplification (positive feed-back) occurs when the phase shift per stage is 90 degrees. If one time constant is made ten times as large as this reference, and the other one-tenth as large, it turns out that "resonance" will still occur at the same frequency but the phase shift through one stage will become roughly 12 degrees and

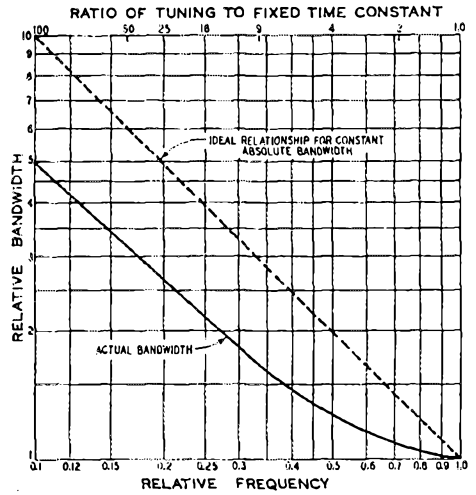


Fig. 5 — Relative bandwidth and relative frequency as a function of the ratio of the tuning time constant to the fixed time constant.

that through the other 168 degrees. The slopes of the individual curves are now seen to be much flatter so that total rate of change of phase with frequency is greatly reduced.

A convenient method of operation is to let the two time constants be equal at some relatively high frequency, such as 6000 c.p.s., and then to tune by changing one time constant while leaving the other fixed. Fig. 5 shows the resulting variation of relative frequency and relative bandwidth as a function of the ratio of the tuning to the fixed time constant. Note that a larger change in time constant is now needed to produce a given change in resonant frequency; it is found that frequency varies inversely as the square root of the ratio of the tuning to the fixed time constant, instead of inversely as the two (equal) time constants as in the original circuit.

The dotted line shows the ideal relationship for constant absolute bandwidth, and the actual bandwidth curve is seen almost to parallel this line over a good share of the frequency range.

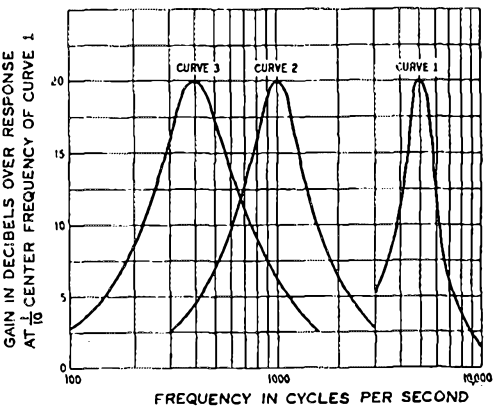


Fig. 6 — Measured responses of typical Selectoject with "constant absolute bandwidth" modification when tuned to center frequencies of 400, 1000 and 5000 c.p.s.

Thus, at one-tenth frequency, the actual relative bandwidth is 5 times as great, whereas ideally it should be 10 times as great. This is quite a good approximation, and if a better one is desired, the resonant frequency at which the two time constants are equal can be made higher than the highest frequency of interest.

Fig. 6 shows some actual response curves for a "constant absolute bandwidth" Selectoject designed in accordance with this procedure. In practice, with this circuit, ringing of c.w. signals at the lower audio frequencies is greatly reduced, and there is virtually no difference between performance at the high frequencies and at the very low. Adding a Selectoject to a receiver is like adding a filter having a bandwidth equivalent to that of a standard quartz crystal, along with a selectivity about equal to that of an additional i.f. stage. The effect, with inexpensive receivers, is comparable to adding a crystal filter. In the case of high-quality sets, it is comparable to having two crystal filters in series.

Circuit Constants

The tendency for amplification in the Selectoject to fall off at the higher audio frequencies is controlled to a considerable extent by the size of the phase-shifting condensers C_1 and C_2 of Fig. 3. It is recommended that when possible these be no larger than 0.001, and preferably 0.0005 μfd. The resistors R_1 and R_2 may be made as large as 5 megohms without difficulty, when low-current tubes such as the 12AX7 are used, thus enabling operation at very low frequencies. With grid impedances this high, hum pick-up from the heater wires is a possibility; if trouble is encountered, shielding or twisting the wires will cure it. Fig. 7 shows a laboratory gain-*versus*-frequency curve for a typical amplifier with 0.001 phase-shifting condensers.

When only one time constant is varied for tuning, as in the constant-bandwidth modification, the values of R_1–R_2 and C_1–C_2 must be chosen with some care. A recommended design is shown in Fig. 8. The associated plate and cathode resistors should be as small as possible for best high-frequency response, although gain around the feed-back loop may suffer somewhat. However, there is usually ample gain available. These resistors must be matched with care, and use of precision resistors is recommended for best long-term stability. The circuit of Fig. 8 is designed to cover the frequency range 300–6000 c.p.s. when the d.p.d.t. switch is thrown to the No. 1 (c.w.) position. (In the other position, the frequency range is from 16 c.p.s. on up.) Tuning is then done in one stage only, preferably the first. Components are so chosen that $R_1C_1 = R_2C_2$ at 6000 c.p.s. (R_1 has a value of 12,000 ohms at this frequency.) When R_1 is at the full 5 megohms, R_2C_2 is approximately 400 R_1C_1, and the frequency is $6000/\sqrt{400}$ or 300 c.p.s. C_2 in position No. 1 is assigned the value 0.0002 in order to minimize circuit loading and give best high-frequency response. Further design details will be found in Reference 3. When the switch is thrown to position No. 2, the two time constants are always approximately equal since R_1 and R_2 are ganged.

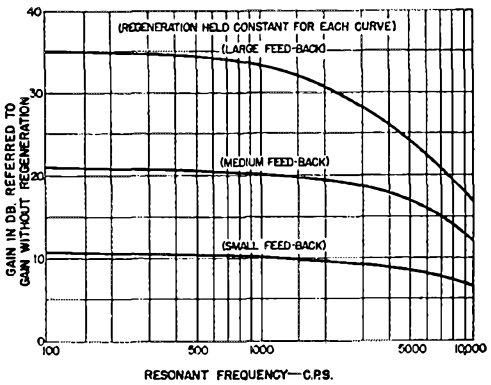


Fig. 7 — Typical gain-*versus*-resonant frequency curves for circuit of Fig. 3 when $R_1C_1 = R_2C_2$ and $C_1 = C_2 = 0.001$ μfd.

In ham work, the d.p.d.t. switch may conveniently be ganged with the "Reject-Boost" switch, since one would always want the "constant absolute bandwidth" feature in the "boost" position with c.w., but not in the "reject" position with 'phone. The reason is, of course, that it is desirable to have the width of the rejection slot at all times as narrow as possible, so as to reduce intelligibility the least. Constant percentage bandwidth in the "reject" position means that the slot becomes relatively narrower at the low frequencies, which is what we want.

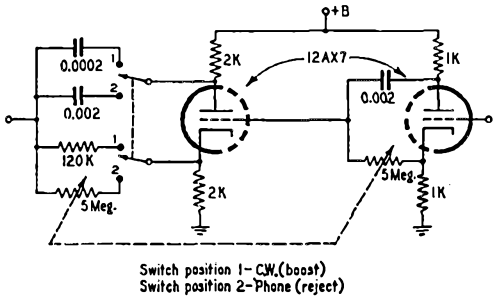


Fig. 8 — Recommended design of phase-shifting circuits for "constant absolute bandwidth" modification of Selectoject. The d.p.d.t. switch may be ganged with the boost-reject switch in the original Selectoject, if desired.

It is interesting to note that the ability to obtain wider-than-usual bandwidth at maximum selectivity with the Selectoject gives a response peak which is otherwise duplicated with *LC* tuned amplifiers only by cascading two or more stages of lower *Q*. It may be shown that the resposen of an *RC* amplifier having a resonant rise of 100 times and a bandwidth five times "normal," approximates very closely the response peak of two cascaded tuned *LC* amplifiers having individual *Q*s of 10.[3] Thus a single tunable stage in effect can be made to do the work of two stages in series.

It is to be emphasized that the phase-shifting circuits of Fig. 8 may be substituted in any model of the Selectoject, commercial or home-made. Changing plate and cathode resistors of the phase inverters to the values shown in the figure is helpful but not absolutely essential. This is the *only* modification needed for constant absolute-bandwidth operation — no other change is normally necessary. If the circuit should fail to oscillate after the modification, the amplifier gain may be increased by making its plate load resistor somewhat larger. (This is R_8 in Fig. 7 of Reference 1.)

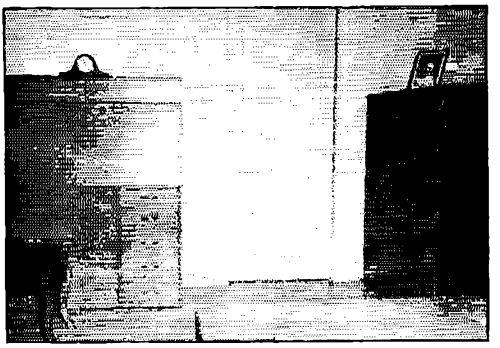
The curve of operating frequency *versus* dial rotation will not be the same in the "boost" and "reject" positions when the "constant bandwidth" modification is present, of course, because the total operating range is restricted in the former position. However, this restriction is in reality an advantage as it gives a bandspread effect which makes tuning noticeably easier than with the original connection.

A Planned Station—for Convenience and Appearance

BY HERBERT G. EIDSON, JR.,* W4DMX

"TAKE that junk out or I'll throw it out, YOU along with it!" These were the kind and loving words that greeted me one day about a year ago from my adoring bride of ten years. She was hotter than a mouse on a kilowatt tank, so when I slowed her down to 33⅓ r.p.m., I began to understand that our honeymoon was rapidly drawing to a close; that is, unless I did something about the pile of radio gear stacked in the corner of the living room of our new brick home. I tenderly thought of this mess of wires, tubes, condensers and overheated transformers as my Amateur Station. My XYL did not share these endearing thoughts with me, as she had other names for the possessed corner and other ideas about what to do with it. She did — definitely!

After a dinner downtown, and a movie to my spouse's liking, she was able to listen a little to reason and to talk coherently about this major crisis in our young lives. It developed that my



Puzzle: Find the ham station. This is the shack at W4DMX, proving that a rig doesn't have to be obvious when not in use.

wife's dear mother (bless her, she can't last much longer!) was the fuse for this stick of dynamite that nearly blew me out of my house. *She* thought a home should look like a home, not like a blacksmith shop, and that it should be cleaned up immediately if not sooner, but pronto. A compromise was finally reached where if I concealed the rig and all its branches of associated equipment I could still remain the proud owner of a ham station and continue to live with the girl of my choice — but on probation, of course.

It was decided immediately that building the transmitter into the wall was out of the question, so a cabinet type of construction was the only answer. The transmitter and operating desk should not be made of odd proportions and should blend in fairly well with our other furniture in the dining room (the shack) and the adjoining living room. Available space was carefully measured and the cabinets designed accordingly.

Now that the face-lifting process is complete, the little woman is happy. I am also, and even my mother-in-law insinuates I did a nice job in the conversion. I believe she thinks of me as a human being again, for she refers to me by using my first name now, rather than "it," as she used to do. You, too, can be happy though married. Here is the way to accomplish it.

Desk Construction

The operating desk is built for a twofold purpose. It can be used for letter writing, using either pen or portable typewriter, or radio operating. A row of pigeonholes is built into the upper section of the cabinet for the storage of letters, stamps, pens, etc. Five neat drawers are provided in the lower section for writing paper, bottles of ink, small tools and completely unusable prizes won at hamfests.

The main radio operating section is disclosed when the hinged front is lowered to normal horizontal position. This compartment contains the receiver with its S-meter and 'speaker, and other equipment including a VFO, a modulation monitor oscilloscope, and the clipper-filter audio preamplifier with microphone. The microphone is on a desk stand; during operating periods it is taken from its hiding place behind the audio preamplifier and placed on the outstretched hinged front.

The lower storage space is provided with one shelf, to hold a portable typewriter and spare tubes, while the lower sections will accommodate a BC-221 frequency meter, with room left over. The left side of the lower door is hinged at the top, bottom and center, while the folding front is hinged at four places with small brass hinges. These are recessed into the wood about the depth of the thickness of the hinge's pivot to hide it as much as possible and to provide smoother operation. The knobs and handles shown are made of solid brass and lacquered to prevent oxidation. The folding front panel has no knob; it is easily brought down to operating position with the fingers, for it protrudes about ½ inch on each side. A small cabinet catch is provided in the left-hand top corner to hold it in place when the desk is not being used. Brass elbows measuring a total of 20½ inches in length hold the hinged front horizontal when the desk is in use. These are made from ½- by 1/16-inch brass stock and lacquered.

With a few exceptions, all main sections of the desk are made from ¾-inch plywood. The lower-section door is made from ½-inch plywood, as is the shelf in this compartment. The partitions for

* % Radio Station WIS, Columbia, S. C.

the pigeonholes are of the same material. The drawers have masonite bottoms, and ½-inch plywood is used for the front, sides, and back.

Nails of proper sizes are used throughout the desk. This was found to be easier than applying screws and just as strong, provided a large number of nails was used.

The masonite back of the desk is recessed 1½ inches to allow the desk to stand tightly against the wall and still let the avalanche of wires and cables flow from behind and to the floor, unseen. These control and audio cables pass through a 3-inch-square hole, cut into the baseboard, travel underneath the floor and arrive at the back of the transmitter cabinet through a similar entrance in the baseboard. The RG-8/U cables from the 10- and 75-meter antennas in the backyard come in to do their work through the same opening, and thus no unsightly wires are visible.

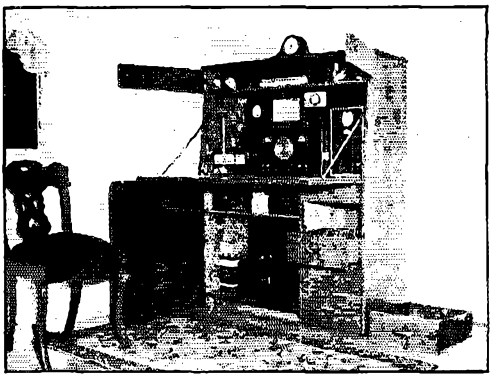
The desk is mounted on rubber-tired casters for easy access into the back of the desk and the rear of the components in the main section. Several holes are cut into the masonite to admit wires and cables to the desk equipment.

Sanding and finishing of the desk will be described fully at the end of the section concerning the transmitter cabinet.

Transmitter Cabinet

The transmitter framework is made entirely of well-seasoned thoroughly-dry pine. The front supporting section is composed of 2 by 4s held together by toe-nailing and sheets of "tin." The end pieces are reinforced by 2 by 2s which also strengthen the sides of the cabinet when they are nailed on later. The bottom is made from 2 by 2s with a short 2 by 4 in the center. This center piece must be wide because it supports the ends of two of the heaviest chassis of the completed transmitter, the high-voltage supply and the modulator. Five rubber-tired casters are securely mounted beneath this bottom frame, the fifth caster being placed in the front center to do its share of the weight lifting. A sixth one in the center back section was not considered necessary and, too, it would have gotten in the way of the many cables and wires which come through the baseboard and travel underneath the base framework into the transmitter. A small hole for these cables was cut into the bronze shielding screen wire tacked to the bottom of the base frame.

Twelve 10 × 12-inch steel shelf brackets were fastened as shown in Fig. 2 to support the three tiers of two chassis each. The highest one on the left has no radio equipment mounted on it, at present. It was designed into the transmitter as a future expansion item, as were several extra meters and control knobs.



The operating position at W4DMX, with the drawers and doors opened out to show the construction. All wires run down the back and under the floor to the transmitter.

The two sides were nailed on, using finishing-type nails. These sides are made from ⅜-inch plywood and covered with bronze screen wire for shielding. The front doors are cut from ⅝-inch fir plywood and hinged in three places as shown. Two "ball and socket" catches are mounted into the edges of the doors where they meet so that they will remain aligned when closed. A ¼-inch brass rod protrudes ½ inch out of the top edge of

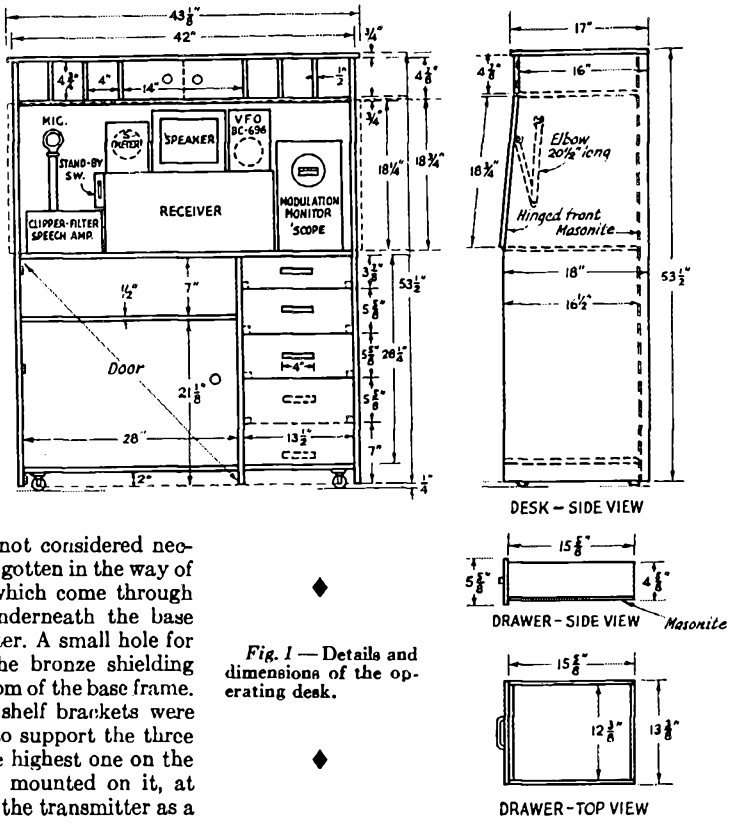


Fig. 1 — Details and dimensions of the operating desk.

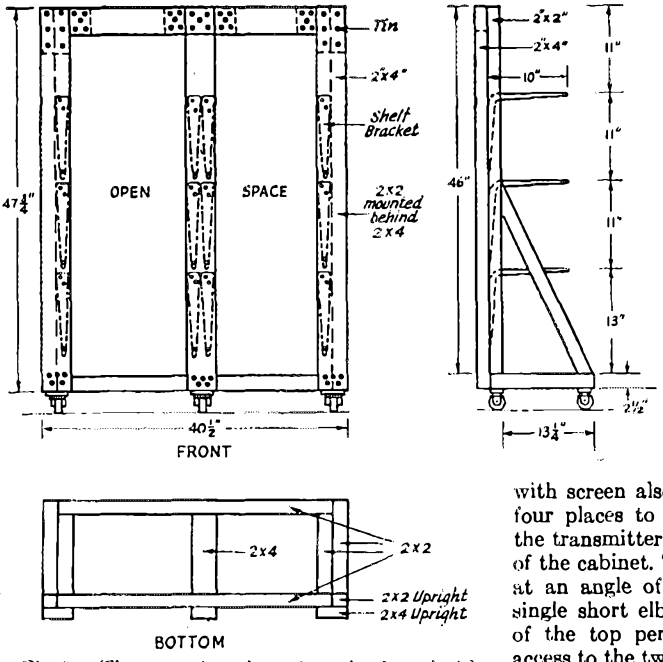


Fig. 2 — The transmitter frame is made of wood with metal shelf brackets for the transmitter and power-supply units.

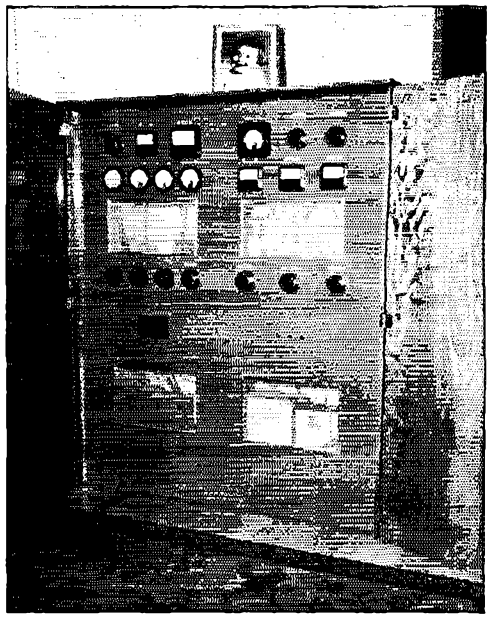
the left door and this fits neatly into a hole cut to receive it in the folding top of the transmitter cabinet. This eliminates the need for knobs or handles and produces a clean, smooth outside appearance when the cabinet is not in use. The doors swing open when the top is raised slightly. If you are plagued by the patter of small feet and all the youthful inquisitiveness that goes with them, then it is a godsend to be able to say: "Look, Ma, no handles!"

When the doors are closed, there is a space of 1½ inches for protruding dials, knobs and meters that are mounted on the front panel. This panel is made of masonite, painted medium gray. Before this panel is nailed along its edges to the front 2 by 4 framework, a bronze sheet of screen wire is stretched tightly across the framework and tacked into place. The proper holes are cut out for shafts, meters and main switch after marking. The four windows which are cut in the panel are *not* cut out of the screen.

After three coats of medium gray enamel paint were sprayed on, and one coat of satin finish varnish brushed on, the small nail heads around the edges of the panel were covered with corner aluminum stripping on the top and both sides. The top strip was held tightly against a wooden piece of plywood, three inches wide and ¼ inch thick, that is mounted flat across the top of the panel. This completes the "built in" appearance of the front panel and also allows something for the top to rest upon, when in the down position. There are four windows in the panel, which allows plenty of cooling air for the rectifier tubes and transformers and other components that tend to run hot. These openings are covered with the bronze wire previously mentioned and painted with one coat of silver paint. Care should be taken when painting with the brush to blow firmly with the mouth close to the freshly-painted screen, thus removing any clogs that tend to be set up. The finished job will seem to be a satin silver plate and very neat in appearance. Each window is rung with aluminum molding, made especially for masonite. The corners are mitered for better looks. One short piece must be cut in the center to allow this last strip to slip into place; however, this cut is hardly noticeable when dressed properly.

The folding top is covered with screen also and hinged at its back edge in four places to a 1 by 2 running the length of the transmitter and holding the back top corners of the cabinet. The top is held in the up position at an angle of approximately 70 degrees by a single short elbow of the locking type. Folding of the top permits the operator to gain easy access to the two top chassis and to make adjustments there.

The back of the transmitter is made of a framework of ¾ × 1 ¾-inch pine, covered with bronze screen. This completely shields the transmitter when the top is dropped down after the front doors are opened. The 115-volt input is by-passed to ground to prevent radiation through the power system of the house.



Opening the doors of the transmitter cabinet reveals this extremely neat transmitter. Wire screen completely surrounds the transmitter and helps in the reduction of TVI.

Along the edge of the 2 by 2s running vertically along the right side of the transmitter framework, as viewed from the back, is a line of 115-volt bakelite receptacles into which the different units plug. Appropriate switches are provided to control these. A relay system is interconnected with this to allow complete break-in facilities, controlled from the operating desk. A toggle switch mounted on the VFO at the desk selects two of these relays, which provide voltage for the oscillator, but does not allow any other high voltage to come on. This enables quick and accurate QSY and/or zero-beat adjustments when getting ready to call another station on his frequency. This arrangement does not QRM anyone during adjustment, for the carrier is not on the air.

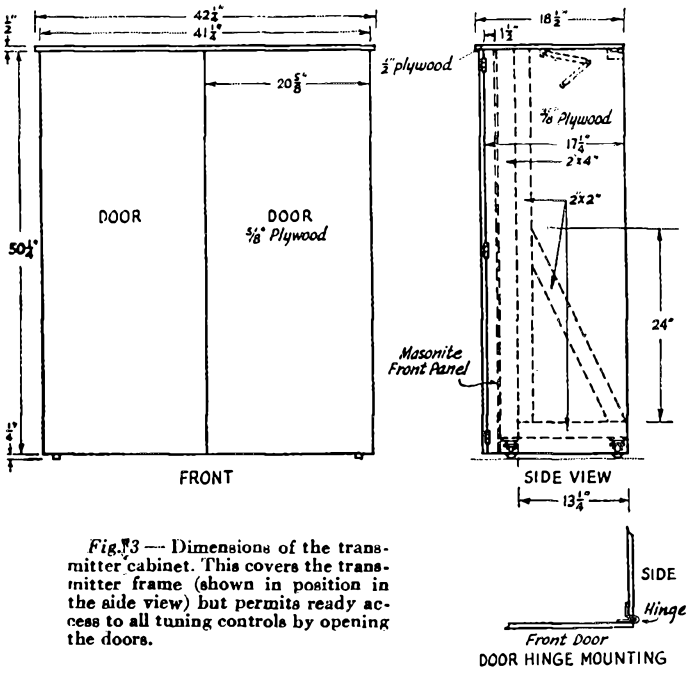


Fig. 3 — Dimensions of the transmitter cabinet. This covers the transmitter frame (shown in position in the side view) but permits ready access to all tuning controls by opening the doors.

Preparation for Finishing

The following material was used in finishing the cabinets:

6 sheets of No. 1 flint paper
4 sheets of No. 180-C Carborundum waterproof paper
1 very small paint brush
2 two-inch paint brushes
1 ½-pint can paste wood filler, transparent
1 small can of wood putty
1 pint golden oak stain
1 quart of clear varnish
1 pint of satin-finish varnish

All edges of the different sections were thoroughly sanded down using No. 1 sandpaper.

When all sections were nailed together, using finishing nails, a punch was used to drive the small heads below the surface of the plywood. About two tablespoons of wood putty was mixed at a time and all nail holes and small cracks were filled in carefully. After 24 hours allowed for drying, the cabinet and desk were sanded thoroughly all over, using fine Carborundum paper. It was found best to wrap the sandpaper around a small flat piece of plywood; with this a very flat sanded surface was obtained over the softer places produced by the filler. A lintless soft cloth, moistened in water, was used to wipe all surfaces clean.

The wood filler was stirred well and thinned with turpentine until a consistency of thick cream was obtained. Using the very small brush, a small drop was placed on each place where wood putty had been applied. The edge of one of the larger brushes was used to apply filler to all edges of the plywood sections. A soft cloth was used to wipe away excess filler immediately, before it became dry. A whole day was allowed between this operation and the staining.

The final cycle of the finishing began with one coat of golden oak stain being brushed on with a clean two-inch brush, being careful not to allow the stain to run. This is best done by using a brush stroke from bottom to top and wiping with a lintless dry cloth immediately. Another 24 hours was required for drying. The first coat of clear varnish came next, covering every portion that would be visible to the eye, inside compartments, drawers, etc. Before the second coat of varnish was applied, fine Carborundum paper was again used all over the outside surfaces, then a moist cloth removed all foreign matter. When the second varnish layer was completely dry, then the final coat was carefully applied. This was the finishing satin varnish, which took away the high gloss and gave the surface a hand-rubbed look.

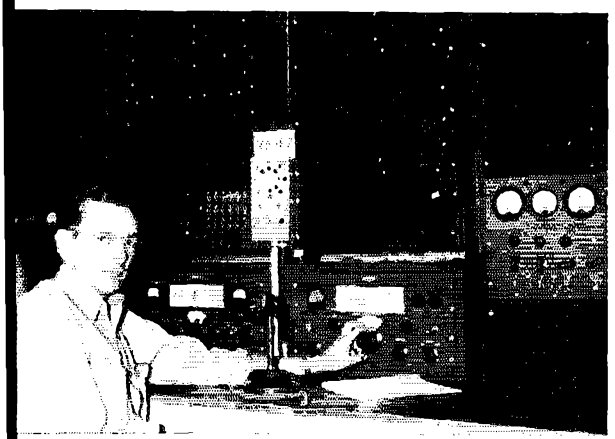
It is a rather pleasing experience to have visiting hams drop in, look around a bit, and ask, "Where's the rig . . . in the attic?" It is then with paternal pride that this writer unfolds the doors and displays the product of his months of labor.

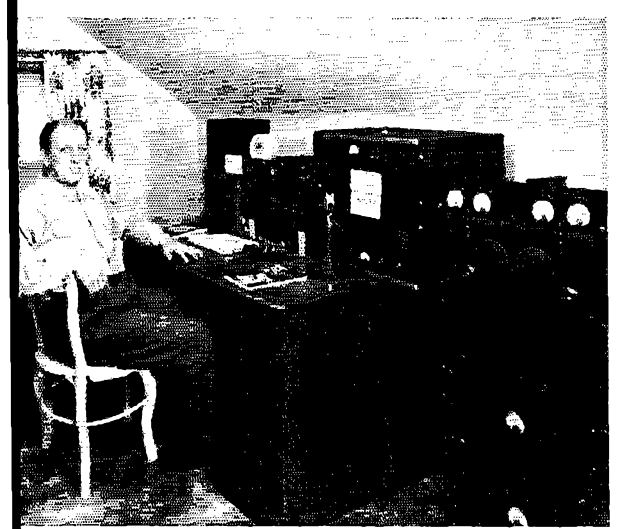
Switch to Safety!

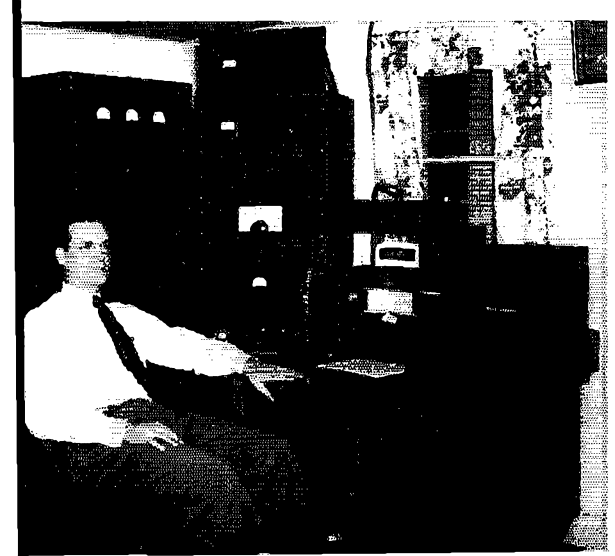
We are saddened to have to report the untimely passing of **John A. Jahnke, WØCZY**, who was accidentally electrocuted on March 6th while demonstrating a new transmitter to his son.

17th Sweepstakes Contest

PART II: *Final Results — 'Phone Section*







LAST MONTH we reported the final scores chalked up by c.w. contestants in the 1950 ARRL Sweepstakes. To complete the report on the 17th SS, the final scores of the 'phone contingent and the aggregate scores of groups participating in the club competition are presented. It is our pleasure also to include with these tabulations some photographs of the operators in both the c.w. and 'phone phases of the Sweepstakes who came up with award-winning scores.

Plagued by the atmospheric and ionospheric storms already mentioned, 'phone SSers probably found it more difficult to make contacts than did their brass-pounding brothers. Nevertheless, 'phone scores compared favorably with those of the previous Sweepstakes, when considerably better operating conditions prevailed. A few 'phones even topped their 1949 scores! Given a better break in conditions, this SS undoubtedly would have produced many more high 'phone scores than any earlier competition. The number of entries received was much smaller than that of previous Sweepstakes. It can be assumed that many of the participants who were forced off the air during the second week end didn't bother to submit the scores they tallied on November 18th and 19th. A total of 163 did submit entries and certificate awards are being made to the high scorer in each of the 57 League sections from which reports were received. Hearty congratulations to the 'phone award winners in the 17th SS.

Highlights

For three 'phone contestants it was truly an all-section Sweepstakes. W1ATE, W6QEU and WØDEI doggedly pursued the more elusive sections until they had worked all 72, a notable accomplishment in any contest and even more laudable under the poor conditions that prevailed in this activity. The persistent efforts of W3DHM brought him contacts with 71 sections. The following each worked 70 sections: W3KQU, W4CYC, W5FAG, W8NOH.

It remained for a 'phone participant to set the only new record made in the 1950 SS. W6QEU had 854 contacts and topped by a margin of one contact the previous all-time record of 853 made in 1949 by W6UBT operating W6OGZ. The fol-

♦

Top left: Alvin U. Haugen, WØPRZ, South Dakota section 'phone winner, top-scoring WØ entrant. *Center:* Fred Keller, W8OYI, amassed 113,160 points to lead his call area and receive the Ohio c.w. award. *Lower left:* Reginald R. Cain, jr., W4CYC, made the top W4 score, won the Alabama section award.

CLUB SCORES

Club	Score	C. W. Winner	'Phone Winner
Potomac Valley Radio Club	2,752,924	W4KFC	W4LIM
Frankford Radio Club	1,975,751	W3BES	W3DHM
Rebel Radio Club	416,464	W4RBB	W4POF
Buckeye Short Wave Radio Assn.	381,943	W8QYI	———
Wisconsin Valley Radio Assn.	354,289	W9RQM	W9ZTO
Baton Rouge Amateur Radio Club	305,792	W5NGN	———
Queens Radio Amateurs	299,464	W2KPA	———
El-Ray Radio Club	294,963	W1BOD	———
Sandia Base Radio Club	280,086	W5FVO	———
Hamden County Radio Club	262,885	W1JYH	W1CJK
West Side Radio Club	261,663	VE3AWE	———
Sioux City Amateur Radio Club	242,367	WØFZO	———
Concord Brasspounders	204,138	W1AOQ	———
Mid-Cities Radio Club	196,740	———	———
Hutchinson Amateur Radio Club	186,056	WØDJE	———
Detroit Amateur Radio Assn.	181,560	W8SCW	———
Connecticut Wireless Assn.	179,664	W1BIH	———
Garden State Amateur Radio Assn.	165,035	W2TPJ	———
West Park Radiops	156,493	W8BWC	W8AJW
Narragansett Assn. of Amateur Radio Operators	152,975	———	———
Northwest Amateur Radio Club	148,140	———	———
Case Institute of Technology Radio Club	134,566	W8DAD	———
York Road Radio Club	127,113	W3LVF	———
San Antonio Radio Club	125,371	W5FNA	———
Point Radio Amateurs	115,636	W9KXK	———
Nassau Radio Club	114,947	———	———
Syracuse Amateur Radio Club	112,545	W2EMW	———
Dayton Amateur Radio Assn.	104,700	———	———
Lancaster Radio Transmitting Society	103,716	W3NOK	———
Columbus Amateur Radio Club	93,285	———	———
Elmira Amateur Radio Assn.	65,796	———	———
DX Club of Pennsylvania	64,882	W3BIP	———
Oshkosh Amateur Radio Club	61,873	———	———
Red River Radio Amateurs	45,681	———	———
Springfield, Mo. Radio Club	35,572	———	———
Milwaukee Radio Amateur Club	35,222	W9ONY	———
Canton Amateur Radio Club	31,033	W8AL	———
Philadelphia Wireless Assn.	27,847	W3QLI	———
South Lyme Beer, Chowder and Propagation Society	26,642	W1DF	———
Greater Cincinnati Amateur Radio Assn.	21,616	———	———
Tri County Radio Assn.	18,533	———	———
Green Bay Mike and Key Club	9717	———	———
Stratford Amateur Radio Club	7438	———	———
Eastern Mass. Amateur Radio Assn.	5290	———	———
Tuboro Radio Club	4782	W2JSV	———

lowing tabulation lists the high scorer in each licensing area:

W1ATE	46,584	W9ZTO	29,120
W2PVG	20,956	WØPRZ	41,676
W3DHM	50,552	KH6MG	26,649
W4CYC	59,850	KL7PB	6201
W5FAG	56,438	VE1OM	320
W6QEU	122,832	VE2ID	8418
W7EYD	38,940	VE3BJO	4864
W8NOH	42,043	VE6TK	6240
	VE7VO	20,894	

Club Participation

Competing for the special gavel award offered to the club whose members submit the highest aggregate score, 47 groups submitted entries. The Potomac Valley Radio Club outpointed by a healthy margin the Frankford Radio Club, holder of nine SS club awards, to win the 1950 gavel. PVRC is now the proud possessor of two gavels, having won their first in the 1949 Sweepstakes. Third place was taken easily by the Rebel Radio Club, a group that will bear watching in future club competitions if the improvement they made this time over their 1949 aggregate (132,942 points) is any indication.

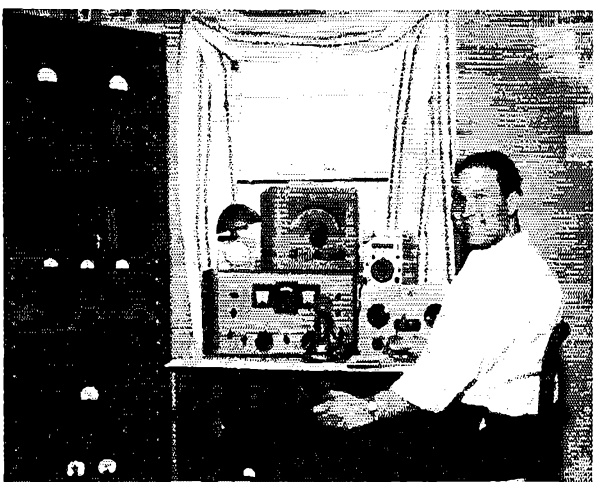
An accompanying tabulation lists the standings of other clubs that submitted aggregate scores. Special certificate awards are being made to the leading c.w. and 'phone operators in each club that submitted the minimum number of entries required by the rules.

—···—

The 18th ARRL Sweepstakes is scheduled for November 17th–18th and 24th–25th. Mark your

(Continued on page 124)

Lower left: Quebec c.w. award winner Thain H. McDowell, VE2NI, tallied the second highest score in Canada. *Lower right:* In addition to winning the Michigan 'phone award, smiling Louis Gerbert, W8NOH, racked up the highest score in the W8 area.



Voice-Controlled Break-in . . . and a Loudspeaker

An Electronic Method for Offsetting Feed-back

BY EDWARD F. NOWAK,* W1FAJ

Much of the popularity of s.s.b. operation can be ascribed to the widespread use of voice-controlled break-in, which permits QSOs and round tables that are not slowed down by long monologue transmissions. There are many methods for obtaining voice-controlled break-in, some of them completely electronic and some that use relays, but they all turn on the transmitter while the operator is speaking and turn it off when he isn't. One of the slight annoyances to many operators has been the need for wearing headphones during this type of operation, since a signal from a loudspeaker would normally be picked up by the microphone and turn on the transmitter, blocking the receiver. The following is a description of the system in use at W1FAJ that permits loudspeaker operation with voice-controlled break-in.

The Circuit

Referring to the wiring diagram in Fig. 1, a d.p.d.t. control relay is in the plate circuit of the control tube, V_4. The relay in use here is one that operates on about 4 ma., and so the paralleled halves of a 6SL7 were used for the tube. A higher-current relay might require a 6SN7 at V_4. With no signal to the grid of V_4 the bias, as determined by R_6, cuts off the plate current. With the relay unenergized, the receiver is turned on and the transmitter is turned off.

*727 Tower Ave., Hartford, Conn.

Audio from the speech amplifier (ahead of the gain control) is amplified in one section of V_1 and rectified in V_2. The rectified signal develops a positive voltage across R_4 that overcomes the bias from R_6, causing plate current to flow in V_4 and the relay to close. The positive voltage between points Y and X depends upon the strength of the signal and the setting of R_1. With no signal through the lower half of V_1, the only voltage appearing between Y and Z is that developed across R_4.

With the microphone on the operating table near the loudspeaker, any signal coming from the loudspeaker will be picked up by the microphone and would normally actuate the relay, if R_2 were closed off and no signal were passed through the lower half of V_1. However, as R_2 is opened, more and more of the signal in the receiver will be amplified through the lower half of V_1, rectified in V_3, and appear as a *negative* voltage across R_5. By judicious setting of R_2, the rectified voltage across R_5 will be equal and opposite to the voltage across R_4. Hence any signal originating in the receiver has no net effect on the control tube, V_4, and thus will not affect the relay. However, any signal that comes through the upper channel only, such as a word spoken into the microphone, will result in a larger voltage across R_4 than is being developed across R_5, and V_4 will draw current and the relay will close.

(*Continued on page 128*)

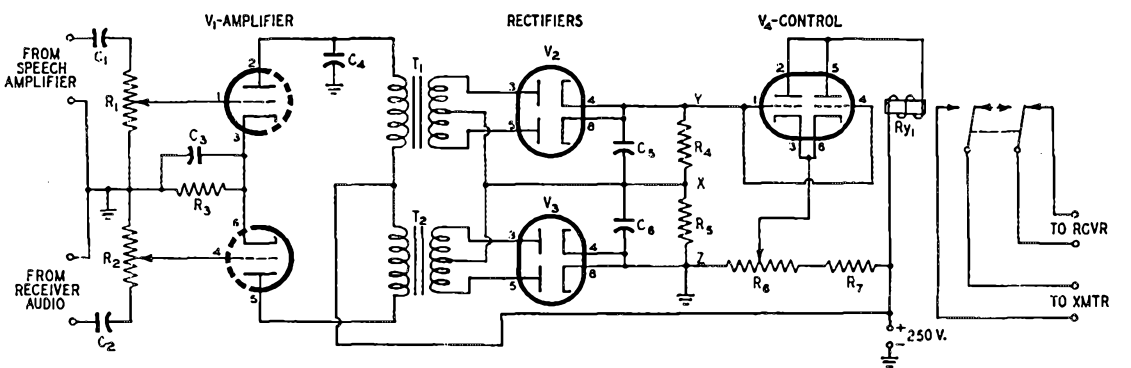


Fig. 1 — Wiring diagram of the voice-control break-in unit.

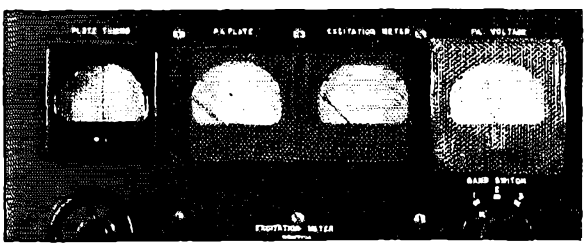
C_1, C_2 — See text.
C_3 — 25-μfd. 25-volt electrolytic.
C_4 — 0.25-μfd. 400-volt paper. See text.
C_5, C_6 — 0.25-μfd. 200-volt paper.
R_1, R_2 — 1-megohm potentiometer.
R_3 — 470 ohms.
R_4, R_5 — 0.75 megohm.
R_6 — 500-ohm wire-wound potentiometer.
R_7 — 10,000 ohms, 10 watts.
T_1, T_2 — Push-pull input transformer, 1:1 ratio (Stancor A-4711).
Ry_1 — Sensitive relay, 4 ma. operating current.
V_1 — 6SN7.
V_2, V_3 — 6H6.
V_4 — 6SL7. See text.

Chasing the Tennessee Valley Indians out of the BC-610 Transmitter

Detailed Procedure for a Well-Known Surplus Rig

BY LESTER C. HARLOW,* W4CVO

ONE of the most popular high-powered transmitters to appear on the surplus market at the close of the shooting part of World War II was the Model BC-610. It gave plenty of power and required very little work to return it to the amateur bands (it was an improved version of the prewar Model HT-4). The tremendous postwar expansion of the television industry and the appearance of thousands of television receivers in homes soon brought out the fact that the BC-610 transmitter was also one of the best TVI generators. As a result, more and more of these fine transmitters were operated during times when television programs were not being broadcast, or they were offered for sale at bargain prices to amateurs living in areas where "picture boxes" were still unknown. As one who likes to operate his amateur transmitter when he wants



Front panel of BC-610 transmitter showing screen wire covering openings and filament voltmeter.

to (we have enough legal restrictions as it is) it was decided to get the TVI out of the transmitter, so that I could flirt with that YL operator in California while my family enjoyed favorite TV programs.

A study of all of the published articles on TVI indicates that it is caused by:

1) Radiation directly from the transmitter because of insufficient shielding.

2) Radiation from power lines and control cables.

3) Radiation from the antenna transmission lines and the antenna.

A careful check of the BC-610 transmitter with an r.f. probe indicated that it is an offender on all counts.

Unfortunately, there is nothing simple that can be done to this surplus transmitter to clear up all of the TVI. If you are looking for a quick way to get rid of the TVI in one easy lesson, read elsewhere. To clean up the TVI in the BC-610 transmitter you must do many things, each of them contributing a small part to the solution of the complete problem. But it *can* be done!

Shielding

The way to start eliminating TVI in the BC-610 is to make it well shielded. Cover the louvre in front and the upper louvres on the two side and back panels with a solid sheet of aluminum or copper. There will still be sufficient ventilation for amateur operation. Cover the remaining side and back louvres with copper or bronze screen, preferably the type having a very fine mesh. Be sure that both the solid sheets and the screening are well grounded to the frame. Use at least six fastenings for each piece. If the original mounting base (the one having the shock mounts) has been removed, be sure to cover the bottom of the power-supply chassis with a sheet of aluminum. It, too, should be firmly fastened to the chassis with screws. In other words, all openings where r.f. could possibly leak out must be covered with some kind of shielding material.

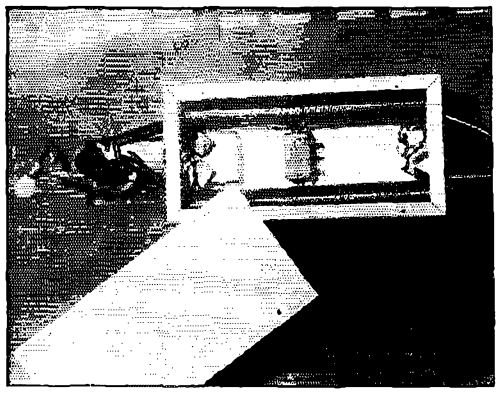
A piece of screen must be fitted in behind the plate tuning dial and over the opening in front of the two milliammeters. The screws holding the studs for fastening the meter-mounting plate can be used to ground the screening. Screen shielding must be fitted over the filament voltmeter, and then grounded to the frame. The hinges for the two top-compartment access doors do not provide sufficient grounding. It is necessary to by-pass these hinges with copper-ribbon straps (not braid). The transmitter must be connected to a good ground system, both for d.c. and for r.f. If the rig is located on the ground floor of a building, it might be well to connect it to a driven rod. At least it should be connected to the nearest cold-water pipe.

The above steps, if carefully carried out, will eliminate the TVI being radiated because of inadequate shielding.

Power- and Control-Line Filtering

The a.c. line to the BC-610 must go through a filter mounted as close as possible to the power-input socket (see Fig. 1 and photograph). If such a filter is not used, TVI will leak back and be radiated from the house wiring. Specifications for this type of filter appear in the ARRL *Handbook*

* Lieut. Cmdr., USN, Norfolk Naval Shipyard, Portsmouth, Va.



Rear of BC-610 transmitter showing line filter. Also seen are the louvres, the lower ones covered with screen and the upper ones covered with aluminum sheet.

as well as in other publications. A circuit diagram is shown in Fig. 1. Additional filtering may be provided by running the power leads from the wall socket to the filter and from the filter into the transmitter in RG-9/U cable, grounding the outer conductors and using the inner conductors for the "hot" leads. The case of the filter must be grounded to the transmitter frame.

The control cable between the transmitter and the BC-614 speech amplifier, if used, must be replaced with a shielded cable carefully grounded at both ends. In addition, the leads must go through r.f. chokes and be by-passed to ground inside of the transmitter at the control-cable socket. These steps prevent the cable from acting as a radiator. If a VFO output cable goes into the transmitter its shielding must be grounded at the point where it enters.

The Final Amplifier

If the preceding steps are followed, there should be little, if any, TVI radiated by the a.c. and control lines. You will note that the grounding of all shielding has been stressed; it is very important.

To improve the operation of the transmitter in the 14- and 28-Mc. bands, as well as to eliminate TVI, it is necessary that the flexible braid used in the final-amplifier stage be replaced with copper tubing or copper strap.

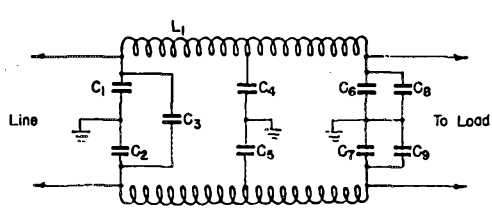


Fig. 1 — Circuit of the power-line filter shown in the photograph.

C_1, C_2; C_4, C_5; C_6, C_7 — 0.01-μfd. 400-volt dual paper units.

C_8, C_8, C_9 — 100-$\mu\mu$fd. 400-volt mica.

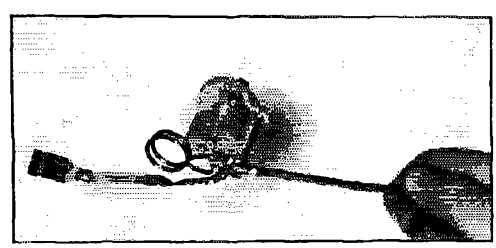
L_1, L_2 (lower winding) — 130 turns No. 10, 1-inch diam., close-wound, tapped at center.

It may be necessary to install a trap, tuned to the television channel that is most affected. This will have to be determined by local experience. If required, the trap is installed in series with the plate lead (see photograph). One of the secrets in making these traps effective is to use low L and high C. The one shown consists of 2 turns of No. 14, ½-inch diameter, ½ inch long, shunted with a 50-$\mu\mu$fd. air trimmer. The actual tuning of the trap to the proper frequency must be done with the filaments off. *Do not attempt to adjust this trap or make any other adjustments inside the transmitter with the filaments turned on.* Death is permanent. Eliminate the TVI, not the operator! When the filaments are on, there is also 360 volts of bias applied to the adjacent grid connection.

Underneath the 250TH socket are two filament by-pass capacitors. In order to make them effective at all frequencies, they must be additionally by-passed with two 100-$\mu\mu$fd. capacitors. The above steps should clean up the final amplifier stage.

The Exciter

The bulk of the TVI is generated in the exciter stages, especially the 807 stage. Unusual attention must be given to details and possibly a number of other things must be tried. The plate lead



Lead between plate tank capacitor and plate connection of 250TH tube showing trap adjusted for Channel 1.

to the 807s should be filtered. Remove the insulated bushing going through the chassis and install a 6-inch length of ¾-inch copper tubing, grounding the lower end to the chassis. Remove the outer jacket and braid from a 10-inch piece of RG-9/U cable and thread the remainder through the copper tubing. Connect the lower end to the switch, and the upper end, after being cut to proper length, to the two leads going to the plate terminals of the 807s. From this junction, connect a piece of copper tubing or strap to the interstage coupling capacitor to the 250TH.

If necessary, install a tuned trap, similar to that previously described above, in series with the 807 plate leads. Tune it to the proper frequency with a grid-dip meter, observing the necessary precautions. Install additional by-pass capacitors around the screen by-pass capacitors, taking care to keep the leads to ground as short as possible. Use a 100-$\mu\mu$fd. capacitor with sufficient voltage rating.

The exciter stages should be operated as straight amplifiers, if possible. If operation on 7 Mc. or higher is desired, it is suggested that

7-Mc. crystals be used. This will require some modification inside of the box inasmuch as the equipment normally operates with 3.5-Mc. crystals. This change is not hard to make. Open the box and place it so that the crystal socket is on the left. A coil wound on a ceramic form located 1¼ inches in from the left-hand side with one lead going to the crystal socket and the other going to a terminal will be seen. Remove approximately one-third of the turns from this coil and check the crystal for oscillation. It will be necessary to experiment to determine the proper number of turns for best operation of the crystal.

If a VFO is used, feed the signal in as close to the operating frequency as possible, and rewind the 6L6 and 807 tank coils, if required, to the proper frequency. It is better to operate the 6L6s and 807s as straight amplifiers.

Output Circuits

An antenna tuner should be provided to prevent or reduce the TVI radiated by the antenna system. Any recent edition of the ARRL *Handbook* will show the proper type of tuner to use, depending upon the antenna and transmission-line system employed. The antenna tuner will, by its very nature, provide additional suppression.

Between the antenna tuner and the transmitter install a half-wave filter or a low-pass filter. Ground the case of the filter to the frame of the transmitter. Keep the lead between the transmitter output terminals and the filter to an absolute minimum. If a half-wave filter is used, it is necessary to have a different filter for each band of operation.

Since ham transmission lines seldom are truly balanced, the standing-wave ratio should be made as low as possible. An easily constructed r.f. bridge is a great help in this tuning procedure. If 28-Mc. operation only is contemplated, a quarter-wavelength shorted stub, spaced ⅛ wavelength from the transmitter or filter terminals, connected across the transmission line, often will help.

If you have carefully followed all of the steps outlined above you will find that the TVI will be gone so far as the transmitter is concerned. The memory of it will linger on in the near-by receivers that are poorly designed, despite the fact that they may be well-known brands and might have cost hundreds of dollars. The BC-610 transmitter is sometimes operated at inputs up to one kilowatt (depending upon the conscience of the operator) and normally at inputs of at least 500 watts. This alone will cause it to blanket a number of television sets operating in the immediate vicinity. Most of these sets will be found within three hundred feet of the antenna. To get rid of this type of interference, try to get the owner to connect his set to an outside antenna. This will prevent the a.g.c. of the television receiver from operating wide open and will also reduce the amount of nonamateur interference picked up for which the amateur usually is blamed. The main reason for using an outside antenna is to get sufficient signal from the television stations and some selectivity from the antenna itself. Indoor antennas (despite the high-power sales talk) seldom give enough signal to the input terminals of the receiver to enable the a.g.c. circuits to operate as they should. Yet many of these inferior antennas are being foisted off on the public as being "just as good" as outside antennas.

If the interference still persists, get the serviceman to connect a high-pass filter across the antenna input terminals of the receiver. These high-pass filters are available at a nominal cost or may be easily constructed. If it is found that the high-pass filter will clean up the TVI in the receiver, it should be paid for by the owner, not by the amateur. If you really want to go broke in a short time, try buying filters for everyone to make up for the deficiencies in their sets over which you have no control. When making these tests, have the serviceman do it, for many sets are covered by warranty or service contracts and anything you might do to the set, even turning the knob, will make you liable for anything that might happen to the set later on. Don't touch them if they are under warranty. The serviceman will usually try to blame the amateur, but if you insist that the trouble is not your fault, the set owner is usually reasonable and will pay for the filter. One thing that helps to make a good impression is that many of the near-by telephones may pick up your transmissions. However, a call to the

(Continued on page 130)

Exciter stage showing copper tube mounted between 807s with insulated lead coming up through the center. Also installed is a plate trap adjusted to Channel 4.

Correspondence From Members-

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

NUMEROLOGY AND AMATEUR RADIO

341 Lockwood Ave., Northfield, Ill.

Editor, *QST:*

I am astounded and deeply disturbed . . . that a journal with the high technical and scientific reputation of *QST* would print such balderdash as appeared in the April issue. Such nefarious mumbo-jumbo lacks even the *slightest* scientific support. That the editors should deem it "a pleasure and privilege" . . . is almost too much! . . .

Radio amateurs have already quite enough to take into account . . . without having to fit their call letters into the equation.

— *Hubert Woods, W9IK*

Farmville, Va.

Editor, *QST:*

. . . Hams have a higher order of intelligence than to believe that their lives are governed by a call letter combination issued . . . by the FCC.

— *C. K. Chrismon, W4GWW*

5025 54th Place, Hyattsville, Md.

Editor, *QST:*

I am pleased to announce that my call, W3VGU, yields the compound number 22, which according to the author is rarely found and indicates the highest intelligence, spiritual and psychic powers. Do you suppose that the Madame would be interested in meeting such an unusual guy?

— *Samuel J. Ferraro, W3VGU*

230 S. 15th St., Philadelphia, Pa.

Editor, *QST:*

With respect to your article on Numerology . . . if you want a 20-page thesis on "Watts in a Hot-Dog" completely analyzing the cooking of such a beast by electricity, with graphs and equations, let me know. I might release it for publication!

— *George T Hunter W3QAR*

306 Patterson Court, Takoma Park, Md.

Editor, *QST:*

. . . I was startled to find an article on "Numerology and Amateur Radio" in the April issue. . . .

— *C. K. Street, A. M. Brit. I.R.E., G3DKS*

P.S.: Are you pulling our legs? — *C.K.S.*

330 West 42nd St., New York, N. Y.

Editor, *QST:*

Your April 1 piece by "Leigh-Falcon" is reminiscent of "Alice in Wonderland" in that it fascinates the children by one device and appeals to the sophisticated adult by other means. . . . Such ideas are hard to come by and to work up in acceptable form. Congratulations and keep your nose to this particular grindstone.

— *Alex McKenzie, W2SOU*
Associate Editor, Electronics

APRIL ISSUE

9226 Alexander Ave., South Gate, Calif.

Editor, *QST:*

Credit where credit is due. The April issue of *QST* was a bang-up good job!

— *Virgil Talbott, W6GTE*

1515 W. 101 St., Los Angeles 47, Calif.

Editor, *QST:*

Congratulations on the finest issue of *QST* in months. . . .

— *Lee Lamascus, W6JQP*

9295

Forrest City, Ark.

Editor, *QST:*

I am glad you are still holding firm with the FCC in regards to present Class A licensees. I think the FCC is being like a dictator in putting over their laws regardless of what anybody wants or thinks. Please stand back of the old-timers and don't let us down.

— *Charles S. Fleming, W5DYL*

P. O. Box 663, Bozeman, Mont.

Editor, *QST:*

As a holder of an amateur license since 1914 and in almost continuous operation since then, I am hoping that the League will put enough representation and pressure with the formal request to reopen the hearings on the recent FCC amateur regulations.

— *R. Earl Dawes, W7ED*

A TRIBUTE

APO 206-A, Postmaster, N. Y.

Editor, *QST:*

On the occasion of closing down TA3GVU after over two years of operation, I want to take this opportunity publicly to thank W2SN for his unselfish effort in assisting me in getting the QSLs delivered.

I think many amateurs are too apt to take their QSL managers' services as a matter of course. Exceptionally, some of them write and thank them personally, but the usual attitude seems to be one of complaint that cards do not reach them sooner. The fact that these QSL managers are old-time hams like themselves, who voluntarily give up thousands of man-hours of their time on behalf of their fellow men, is too often forgotten or ignored.

OM Yahnel, W2SN, as one of the old-timers of the "QSL Manager" system, deserves especial praise, and I want all your readers to know that there will always be a warm spot for him in the heart of at least one ham operator.

— *Fred J. Elser, TA3GVU*

ROTTEN TRAFFIC

1420 Fourth Ave., Boulder, Colo.

Editor, *QST:*

Let's have an end to some of the rotten traffic which is being accepted all over the country by stations trying to make BPL with originations. I recently had occasion to handle a message with several coined and artificial words in the text: such as "cancha," "doncha," etc. With all the dual words, the check still showed them as single words. To make matters worse, these come through with insufficient addresses, garbled names, and other faults which make their delivery or relaying more difficult. If they were worth while, like messages from wounded servicemen to relatives or vice versa, I would not mind putting out special effort on them, but I am getting plenty disgusted with the other kind.

— *Eugene M. Link, W9IA*

YES??

421 S. E. Main St., Blackfoot, Idaho

Editor, *QST:*

In reply to Dr. Paul Popenoe's syndicated newspaper column, "Modern Marriage" (page 49, Strays, February *QST*) — being a bachelor 25 years old, it is my opinion that the serious-minded girl doesn't have to have a ham set to invite me over. We could talk about *my* ham station and then get down to business.

— *K. B. Anderson, W7LQU/7*

(*Continued on page 132*)

Hints and Kinks For the Experimenter

LOW-IMPEDANCE BIAS SOURCE FOR CLASS-B MODULATORS

PROVIDING a good low-impedance bias source for use with Class B modulators has always been a problem with a high nuisance value, especially in modulators where the grid current requirements are high. Batteries have been about the simplest way out, but batteries are expensive, and they don't last very long when they are tied onto the grids of a pair of tubes like the 810. The circuit shown in Fig. 1 solves the problem permanently, and at low initial cost, because the tubes used are readily available from surplus stocks, and the other parts are inexpensive.

The arrangement makes use of Type 2050 and 2051 thyratrons as regulator tubes. When connected as shown in the diagram, with the control- and screen-grids tied to the cathode, these tubes will regulate at 8 volts and 13 volts respectively. At the low anode voltages encountered in normal biasing service, they can be used to regulate up to

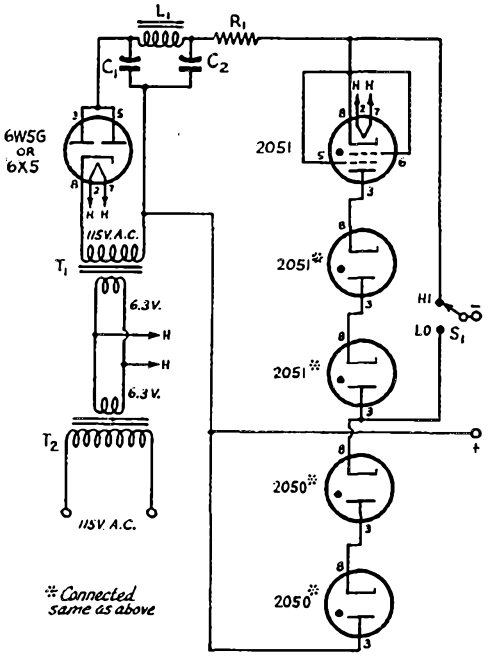


Fig. 1 — In this low-impedance bias supply, thyratrons are used as voltage regulators. Two filament transformers are used "back-to-back" in an inexpensive arrangement suitable for biasing Class B 810 modulators or other similar tubes.
C_1 — 40 μfd., 150 volts.
C_2 — 20 μfd., 150 volts.
R_1 — 3000 ohms, 10 watts.
L_1 — 8-hy. 50-ma. filter choke.
T_1 — 6.3 volts, 1 amp.
T_2 — 6.3 volts, 4 amp.

100 ma. average current, considerably more on peaks. Thus, they may be used to hold grid voltage constant over the full range encountered in most ham rigs. Because these tubes have indirectly heated cathodes they may be operated from a common filament winding.

By judicious selection of the number of each of the two types used in the series-connected arrangement, a wide variety of bias voltages may be obtained. For example, in the rig at W4BBL, a "hi-lo" power switch is used to change the plate voltage on the final and the modulators from 2200 volts to 1100 volts. This requires a corresponding change in the bias applied to the modulator tubes. By having three 2051 tubes in series at the high end of the chain and two 2050s at the low end, 55 volts bias is obtained when the switch is in the "hi" position, and 16 volts when it is turned to "lo." Other combinations can be worked out by rearranging the number and type of tubes used. — *C. S. Harrill, W4BBL*

PLUG-IN COILS FOR THE GRID-DIP OSCILLATOR

AN inexpensive set of plug-in coils for the grid-dip oscillator, or any other device requiring only two contacts, can be made from old octal tube bases. Remove all but two alternate pins, and the center guide pin from the base, and wind the coil on the bakelite "form." This arrangement may be plugged into the 19/32-inch ceramic crystal sockets that are commonly used today. — *E. B. Chapman, W2LDS*

SOLDERING HINT

RESEARCH has revealed that the brief overheating resulting from soldering operations can permanently change the value of small carbon resistors by as much as 20 per cent. To avoid this, attach some heat-dissipating medium to the lead while it is being soldered. Holding the resistor lead in long-nosed steel pliers while it is being soldered and for 10 or 15 seconds after the heat is removed will serve the purpose, but for those who like to be fancy, a "thermal shunt" made by adding heavy copper jaws to a crocodile-type clip can be used in the same manner. — *U. S. Dept. of Commerce*

WINDING LARGE-DIAMETER COILS

WHILE casting about for a way to wind a 160-meter coil for my BC-610E I hit upon the following method which can be applied to other sizes of air-wound coils requiring fairly large physical dimensions.

Select an ordinary tin can with the approximate diameter required. One or both ends of the can

(Continued on page 134)

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
JOHN E. CANN, W1RWS, Asst. Comm. Mgr., C.W.
GEORGE HART, W1NJM, Natl. Emerg. Coördinator

J. A. MOSKEY, W1JMY, Deputy Comm. Mgr.
L. G. McCOY, W1ICP, Asst. Comm. Mgr., 'Phone
LILLIAN M. SALTER, Administrative Aide

Newcomers Attention! W1AW Slow-Speed Code Starts May 1st! Did you see page 70 of April '51 *QST*? Each Sunday, Tuesday, Thursday, and Saturday starting May 1st W1AW is sending slow-speed practice transmissions to assist anyone interested in learning code to get regular practice. These transmissions start at five w.p.m. at 9:30 P.M. EST Sun., Tues., Thurs. (8 P.M. EST Sat.) and progress in about an hour through 7½-, 10- and 15-w.p.m. This is our *practical* "welcome" to the candidates for Novice Class license; steps are in progress to enlist other amateurs in directing some practice in your direction and many radio clubs write that they will set up programs this summer and fall to help in the local community. Do *not* conclude that you should listen just to the five-w.p.m. (slowest) speed. *Stick with us each night the above ranges are transmitted right through to the end of the fifteen words per minute.* You have to listen to code at speeds *faster* than you can write down to learn how to dismiss any illegible and unfamiliar characters without letting them throw you off the track.

Many, many of the old timers you will hear operating are amateurs who learned by copying fast code right from the start, perhaps only the letters of oft-repeated calls, and the first letters of whole words, and fragments here and there. But what a thrill when two-and three-letter sequences begin to spell words and make sense. To all those who have no operator licenses or "tickets": Get another local buddy interested in practicing with you if you can. But in any event remember that hundreds of thousands of amateurs have learned the lore of amateur radio by individual efforts. Get a small receiver, built by yourself as described in *How to Become a Radio Amateur*, or a manufactured version which has a beat oscillator to get code. Then follow our W1AW code practice, and try the earlier and later official bulletin transmissions too. Keep at the practice. If you start right now in May you should be fairly well along and ready to go to FCC in July for a Novice Class ticket! Good luck!

New ARRL Code Proficiency Certifications for 10 w.p.m. Beginning with monthly qualification runs effective May 1st, Code Proficiency Certificates will be issued by the League for the first time for 10-w.p.m. qualification. The FCC license itself is the big reward opening the door to all the good things that Amateur Radio has to offer the Novice, but here is a first milestone on the way to that FCC General Class license — and when the second milestone, which is a 15-w.p.m. endorsement sticker, has been won we're ready for that FCC 13-w.p.m. exam, allowing for a drop of one or two words per minute in our code speed if we get nervous during the test. ARRL's 10-w.p.m. certification is not only available to Novice Class personnel, but we'll be happy to extend it to anyone working for a FCC General Class ticket, or for that matter to any amateur who hasn't acquired a Code Proficiency Certificate to date! This is all part of the ARRL CD program which identifies our whole Amateur Service and individual members (to their credit!) with interest in progressively advanced technique and operating standards and objectives! Start your practice today. Step right up on the first W1AW qualifying run to include this speed and *get yours!*

Armed Forces Day — May 19th. This year's celebration of Armed Forces Day will give amateurs a chance at some two-way contacts with important stations of the Armed Forces. Don't forget to try to mark the occasion by a personal contact! See the full announcement of this test and frequencies of NSS (Navy), AIR (Air Force) and WAR (Army) elsewhere in this issue.

Try your luck in the Armed Forces Day Receiving Competition. Demonstrate your skill in making *perfect* copy if possible of the 25 w.p.m. text which is sent in four to five minutes usually. See August '50 *QST* for list of those getting the special Certificates of Merit signed by the Secretary of Defense following the *last* competition. The Armed Forces will send the competition message on twelve different frequencies and use four stations (above and NPG) to get it to you. Send in your copy; aim to be a certificate winner and make the *QST* list for *this* year!

Liberia Traffic Agreement. Traffic men are familiar with the general prohibition contained in the international telecommunications agreements concerning handling third-party communications with the amateurs of other nations unless special agreements are completed between treaty signatories. Last fall Ecuador was added to Canada, Chile, and Peru as nations with which there are such special agreements, the messages and other communications, of course, of the type that would not ordinarily go by commercial circuits, and *not* involving any compensation or benefits for such operation. It's a genuine pleasure to record that the Department of State now announces completion of similar arrangements as now effective between the U.S.A. and *Liberia*.

Observers Needed! It is the present ARRL policy to expand somewhat the Official Observer system, especially in the categories of 'phone- (Class III) and of c.w.-signal (Class IV) observing work. If you have good receiving equipment and are an experienced amateur with know-how in distinguishing between images and the signals themselves and alert to double-check against the chance of mistakes introduced by propagation conditions or receiver overload you can take this on, if interested. It is also required for appointment by SCMs that you be an inherently honest amateur of some judgment and tact and live in ARRL field organization territory as set down on page 6 of *QST*.

The ARRL Board of Directors has in the past commended the activity of all members of the Observer system and suggested expanding our effectives. FCC officials have also praised the system and informally recommended its extension. How would you like to belong to the select group assisting other amateurs to avoid FCC notices and trouble by using the coöperative-notice forms supplied by ARRL? Inquiries by radiogram or message will be acknowledged by sending you a more detailed outline of duties and system policy and some sample forms. Our application form could then be sent your SCM who alone is the man who must consider your qualifications and make any appointments by his notification to Headquarters.

Operating Code and Recommendations. The following operating precautions are reprinted from March 1951 *QST* as recommendations to aid the security of amateur radio and the security of the nation.

1) Watch for any possible signs of radio activity that do *not* belong in our bands, strange or subversive or suspicious. Report all such to the Field Engineering and Monitoring Division of the FCC without delay for any necessary study or investigation.

2) Limit on-the-air discussion to radio technique and personal matters.

3) Do *not* discuss any happenings that might have military intelligence or political significance.

4) Follow each FCC regulation with scrupulous care.

5) Contact no unlicensed stations.

6) Do not permit unlicensed operators to use equipment.

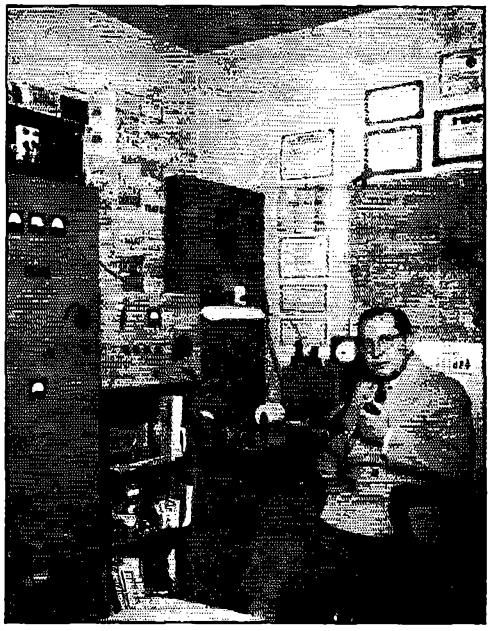
7) Sign each transmission with your assigned call.

FD Reminder. Need we remind one and all that the June Field Day, largest annual ARRL operating activity, is now only another six or seven weeks away? Yes, June 23rd–24th will soon be here. *Equipment building* for civil defense purposes and vacation pleasure will fit into FD plans too. Spring and early summer will be the time to get *car mobiles* as well as portable and emergency gear ready. Complete copy of the FD rules has been mailed all affiliated clubs and we have a few extra copies to send any club not yet having this information. — *F. E. H.*

MEET THE SCMs

M. W. Mitchell, WØIQZ, SCM of Colorado, obtained his license April 1, 1931, with the call W9IQZ.

A participant in DX, Sweepstakes, and other ARRL contests, he formerly held appointments as PAM, ORS, OBS, and OPS. He possesses A-1 Operator, WAC, WAS, RCC, ROWH, and 20-w.p.m. Code Proficiency certificates and also two Public Service certificates, one for emergency work in the Texas-Oklahoma Tornado of April, 1947, the other for assisting in the Midwest Blizzard of November, 1948.



The transmitter line-up at WØIQZ is 6C4 Clapp oscillator, 6SH7 Class A, 6V6GT doublers from 80 through 10, 807 driver, 304TL final running 250 watts input on 'phone and 300 watts on c.w. Speech equipment: 6J7 high-gain, 6C5, 6N7, 6A3s p.p. drivers, TZ-40s Class B modulators. Receiver: Super-Pro. Antenna: 99-foot flat-top, center fed on all bands. Emergency gear: BC-454 receiver converted for use on either 6 volts d.c. or 115 a.c. from the same power supply. Bands used are 3.5-Mc. c.w., 3.85-Mc. 'phone, 7-Mc. c.w., 14- and 28-Mc. 'phone and c.w.

Last October SCM Mitchell was named Personal Radio Aide to Governor Walter Johnson to act as liaison between the amateurs of Colorado and the civil defense organization. Since the election of a new governor he no longer is serving in that capacity but hopes to renew this work shortly.

For recreation Mitch indulges in golf and target shooting when time permits. He is employed as lead communications operator by United Air Lines.

A.R.R.L. ACTIVITIES CALENDAR

May 5th: CP Qualifying Run — W6OWP
May 16th: CP Qualifying Run — W1AW, WØTQD
June 8th: CP Qualifying Run — W6OWP
June 9th–10th: V.H.F. Contest
June 19th: CP Qualifying Run — W1AW, WØTQD
June 23rd–24th: ARRL Field Day
July 8th: CP Qualifying Run — W6OWP
July 19th: CP Qualifying Run — W1AW, WØTQD
July 21st: CD QSO Party (c.w.)
July 28th: CD QSO Party ('phone)
Aug. 10th: CP Qualifying Run — W6OWP
Aug. 20th: CP Qualifying Run — W1AW, WØTQD

TRAFFIC TOPICS

During each calendar year, a record is kept of the performance of all amateurs, operating alone from their own stations, who by their efforts in traffic handling find themselves in the honored columns of the BPL. It is not hard to do this and doesn't take much of our time — and at the end of the year we have two significant figures: a total of BPL points for each amateur who made BPL during the year, and a total of all BPL points made by each amateur who has appeared in the BPL since 1946 (postwar). An annual summary of these will then indicate not who handled the most traffic during a month, but who is doing a continuing outstanding job of traffic passing. We therefore present in this column, this month, with appropriate fanfares and trumpets, the "high ten" for the year 1950, and the high ten for the postwar period. The figures in parentheses are BPL points. Four points are awarded for making the BPL on any basis, and an additional point is awarded for each 100 points in the BPL message total each month.

1950	*Postwar*
W6CE (376)	W6CE (699)
W3CUL (325)	W7CZY (642)
W7CZY (303)	W4PL (562)
WØZJO (195)	W3CUL (401)
KG6DI (180)	W7CKT (335)
W4PL (137)	WØZJO (296)
W6JZ (136)	KG6DI (277)
W5L8N (84)	W5GZU (257)
W9ESJ (82)	W2TYU (250)
W9EBX (78)	W6REB/WØHMM (243)

We doff our hats to Tim, W6CE, who not only repeated and bettered his 1949 performance, but who climbed also to the top of the postwar list. W6CE topped the BPL five times and handled a total of 32,273 messages during the year (over 2500 per month average). His high traffic total for one month was in March when he racked up 5586, his low in July, a "piddling" 732. W6CE's 1950 performance is one which has no precedent and which, we predict, will be a record for some time. His present absence from the traffic lanes on the West Coast has left a vacuum which the boys out there are being hard pressed to fill.

Mac, W3CUL, a virtual unknown in 1949, made her presence felt early in 1950, climbed up to third place by May, and in December with a terrific spurt beat W7CZY out of second place. Her December traffic total was 6723, an all-time record. Larry, W7CZY, played tag with W6CE at the top of the BPL most of the year, but was not able to keep up with Tim's terrific pace, and by September Tim had a firm grip on the top rung of the ladder. Even so, Larry handled 25,876 messages and headed the BPL three times — no mean accomplishment. All three of the top stations made BPL•100% during 1950. Hal, WØZJO, took a vacation in July and missed it just that once.

Last year W6s were listed in the BPL *more* than any other call area, by a wide margin. The W7s, which led the flock in 1949, dropped to fifth last year. An odd thing: The total number of BPLs in U. S. and Canada in 1950 was exactly the same as in 1949 (443), but the addition of BPLs from the Pacific area makes the total slightly larger for 1950. Here's the tabulation by call areas:

Call Area	*No. BPLs*	*High Station*	*Runners-Up*	*BPL Traffic*
W6	86	W6CE	W6JZ, W6DTW	69,661
WØ	49	WØZJO	WØAY, WØQXO	37,834
W9	46	W9EBX	W9ESJ, W9QLW	24,610
W3	45	W3CUL	W3GEG, W3NRE	42,405
W7	42	W7CZY	W7IOQ, W7JJK	39,188
W8	39	W8RJC	W8AUJ, W8NOH	14,021
W2	38	W2RUF	W2CDQ, W2VNJ	16,046
W1	32	W1CRW	W1NJM, W1EMG	13,531
W5	31	W5LSN	W5GZU, W5MN	20,838
W4	28	W4PL	W4ANK, W4PYV	19,098
VE	7	VE3IA	VE3BUR, VE7TF	3620

The 1950 splurges of W6CE and W7CZY were too much for Ben, W4PL, who is under doctor's orders to take it easy and spent part of the year vacationing. Tim and Larry left him behind in the postwar traffic column, and W3CUL, who pinch-hit for him on the Hit & Bounce Net, crept into fourth place. The postwar column has now reached the place where it will take some doing for any individual to find a place in the high ten on the basis of one year's performance — and note that some of the old-timers who aren't handling traffic any more, such as W7CKT, W2TYU and W6REB, still rate a place because of their performance in past years.

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The year 1950 also saw a considerable increase of interest in the National Traffic System, with better-operating nets and more efficient dispatching of traffic throughout the three net levels. More section nets are holding their meetings at 1900 and 2200 and being more reliable in sending representatives to their regional nets. The regional nets are therefore better attended, and more traffic is finding its way into NTS routes. While W2CLL continues his stellar job of managing the Eastern Area Net, which is a model of operating efficiency, particular credit is due to W9CBE, who has done such a magnificent job of reviving the Central Area Net, and to regional managers WØSCA and W4BAZ for the upswing of activities in their respective Tenth and Ninth Regional Nets. As a matter of fact, *all* NTS net managers deserve a word of praise for their 1950 efforts, and we wish it were possible to mention here the contributions of *time* and *effort* made by each.

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A new section c.w. net for the Southern Texas Section has been formed by co-managers W5RIH and W5PTV who announce that the net is open to all comers, but they are especially anxious to have Southern Texas amateurs participate. The net is listed in this month's supplementary listing.

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W5AHT, Oklahoma SCM, uses message blanks of different colors for the different categories of traffic handled, to facilitate counting at the end of the month. With delivered messages, he also slips in small printed explanations of the amateur traffic-handling service. Frank says this brings him some traffic.

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National Traffic System News. What are your plans for the summer? Is your net going to continue to operate and handle the traffic that will need to be handled, or is it going to fold up like an accordion at the first sign of balmy weather? Most net managers we have talked with so far feel that summer conditions cannot be much worse than

♦

One of the new Novice licensees? Not a bit of it! This young fellow is VE2AFV, ORS, an NCS of the Swing Shift Net and a member of the Eastern Shuttle Net. Licensed at 11 years of age, he is now 13 and, according to proud father VE2TA, "has a fist like a tape at 30 w.p.m." When he took his ticket, he was the youngest known licensed amateur in the British Commonwealth of Nations. We strongly suspect that he is the youngest NCS of a c.w. traffic net. Any challengers? (*R. E. Fleischman photo*)

♦

QST for

those we have experienced during this winter's operating season, and we are inclined to agree — and yet NTS did a good job. By the time this appears in *QST*, your plans for summer operation should be well advanced. If not, better get after them, or you will find your personnel melting away to the lure of the great outdoors.

Here's the summary of operation on NTS nets who reported their February figures:

Net	*Sessions*	*Tfc.*	*High*	*Low*	*Average*	*Most Consistent*
W. Mass.	40	67	16	0	2	
Ind. (QIN)	41	599	57	0	15	
1RN	40	301	23	0	8	W. Mass., Me., N. H.
2RN	20	253	37	0	13	
3RN	40	174	31	0	4	
4RN	40	428	61	1	11	S. C., Va., N. C.
RN5	32	202	21	0	5	Tenn., Ala., Ark.
RN7	40	256	27	1	6	Wash., B. C.
8RN	31	108	19	0	3	Mich., Ohio
TEN	20	961	98	14	48	Minn., Nebr., Ia., Mo.
TRN	—	57	6	0	3	Ont.
CAN	23	736	77	6	32	All 100%
PAN	24	864	79	12	36	All 100%

If NCS will report traffic handled and representation reported promptly after the net, the net manager will be able to get his report to us by the 15th of the month. Some reports arrive late, some not at all. Let's get more reports summarized in the above tabulation.

Last month's activities ran a little long, so we are condensing it somewhat this month, and reporting only items of general interest.

First Regional Net (W1BVR): Certificates have been issued to W1KUO and W1OAK.

Seventh Regional Net (W7NH): Representation is needed from Oregon, Wyoming, Alberta, Saskatchewan and Alaska. The late session has been held at 2230 PST instead of 2130, but will soon be returned to the regular time as additional personnel becomes available.

Tenth Regional Net (WØSCA): Present plans are to continue full operation of TEN throughout the summer months. Six TEN members made BPL in December. Nightly liaison is maintained with DON and RN6. Certificates have been issued to WØs AUL AY CAQ CGP CGZ DEA FDJ FER GMZ IQY ITQ IXL JDJ KFF KJP LHB LHS NIY NWF NYX OLB PHR QAO QVA RJF RYG SCW SSW UVL WGM YTA ZWL.

Thirteenth Regional Net (VE3BUR): Representation from the Maritime has greatly improved, due primarily to the efforts of VE1OM.

Central Area Net (W9CBE): CAN will operate the year around, meeting difficulties as they come. NCS and PAN liaison stations will arrange for substitutes when they are away on vacation. Section representatives will report directly into CAN in case their regional net is not operating. Study is being given the matter of a change in frequency. A Saturday night session with WØQAO/9 as NCS is now being run, in order to avoid holding traffic over the week end. Certificates have been issued to W9KQL, W9QLW, WØAUL, WØQVA, and WØSCA.

Pacific Area Net (WØZJO): Additional stations to share the NCS job on PAN are needed. At present, WØZJO and W7NH are taking the whole load, although others are being worked on. The job requires a good operator, a good signal (PAN covers the largest area of any), and some training. Come now, how about some of you fellows stepping forward?

SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listing on pages 58 and 59 of November 1950 *QST* and subsequent supplementary listings. These corrections and additions were received up to March 15, 1951. An asterisk (*) indicates correction from one of the previous listings mentioned above.

Name of Net	*Freq.*	*Time*	*Days*
Clackamas County Emer. Net (Ore.)	29,620	1800 PST	Daily
Indiana Phone Net (HEN)*	3910	1830 CST	Mon.–Fri.
		0900 CST	Sun.
Iroquois County AREC Net (Ill.)*	3920	1200 CST	Mon.–Sat.
Maine AEC Net*	3588	1645 EST	Mon.–Fri.
Michigan Hot Air Net	3930	1230 EST	Daily
Michigan QMN Net (QMN)*	3663		Mon.–Sat.
(Slow)		1700 EST	
(Medium)		1800 EST	
(Fast)		1900 EST	
		2200 EST	
Missionary Amateur Net No. 1	3525	1915 CST	Mon.–Fri.
(MAN-1)	7050	0915 CST	Tue.–Fri.
Missouri Emergency Net*	3900	1830 CST	Mon., Wed., Fri.
		1230 CST	Tue., Thu., Sat.
Montana Phone Net*	3910	1900 MST	Mon., Wed., Fri.
New Mexico Emerg. Phone Net	3838	0730 MST	Sun.
		1800 MST	Tue., Thu.
N. Y. State Civil Defense Amateur Radio Net	3995	0900 EST	Sun.
Ohio Buckeye Net (BN)*	3730	1900 EST	Mon.–Sat.
Oregon Slow Net (OSN)*	3585	1830 PST	Mon.–Sat.
	7170	1200 PST	Sun.
Puerto Rico AREC Net	3559	2000 AST	Mon.
	3925	2000 AST	Wed.
Sea Gull Net (Me.)*	3961	1715 EST	Mon.–Fri.
Sixth Regional Net (RN6)*	3725	1900 PST	Daily
		2130 PST	
S. E. Mo. 160-Meter Phone Net	1920	2000 CST	Mon., Wed., Fri.
Totem Emergency Net (Wash.)	29,000	2000 PST	Tue.
Traffic Central Net (Texas)	3657	2100 CST	Daily.
Virginia Fone Net (VFN)*	3840	1930 EST	Mon.–Fri.
Virginia Slow Net	3680	1830 EST	Mon.–Fri.

BRIEF

Meetings of the Canal Zone Amateur Radio Association are enlivened by recordings of the current Voice of America-ARRL weekly amateur program. Route Manager KZ5CC takes them off the air with his wire recorder the previous Saturday night.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for February traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	206	1308	1251	144	2909
KG6FAA	261	623	542	78	1504
WØZJO	17	603	561	39	1220
W9ILH	20	583	571	12	1186
W7IOQ	24	580	526	53	1183
W6KYV	72	543	264	279	1158
JA3AC	581	286	277	0	1144
W6JZ	7	566	512	32	1117
W8IB	12	505	447	52	1016
W7CZY	4	477	449	7	937
W3NHI	26	364	409	38	837
W6GYH	21	404	248	156	829
W5LSN	0	371	358	12	741
W9JTX	12	362	337	27	738
W2RUF	16	350	266	43	675
W8RJC	29	301	287	13	630
WØAY	29	272	257	46	604
W5GZU	19	290	264	23	596
W8AUJ	28	291	226	10	555
WØSCA	13	269	261	2	545
W4ANK	23	255	190	44	512
W5BRS	19	245	158	87	509
W2BO	8	264	200	36	508
W9UIJ	3	266	221	16	506
WØTQD*	5	0	1209	6	1220

The following made the BPL for 100 or more *originations-plus-deliveries:*

K4AIR	217	W2VNJ	117	W8AL	106
K4WAR	182	W4BAQ	109	W8DAE	103
WØLVG	132	W4CMP	106	W9DGA	102

A message total of 500 or more or 100 or more *originations-plus-deliveries* will put *you* in line for a place in the BPL. The Brass Pounders League is open to all operators who qualify for this monthly listing.

Rules for FCC's new Disaster Communications Service became effective March 21st. This is *not* the Radio Amateur Civil Emergency Service for which certain segments of our bands are earmarked, rules for which are still in the making. The DCS is a service operating in the 1750-1800 kc. segment (see details, April *QST*), that can receive *supplementary* utilization by some AREC groups both in civil defense and in preparation for participation in natural disasters. As far as we amateurs are concerned, DCS is primarily useful as a means of effecting and maintaining liaison with *other* local radio services on a common frequency for which amateur as well as other services will be equipped at their control center. The availability of the 1750-1800 kc. DCS frequencies for use by agencies not at present having radio frequencies assigned is of no interest to us, since we now have and in the event of war will continue to have our own assigned frequencies.

What we do not now have is radio liaison with other community services which have radio facilities — unless in special cases our units, at control points, are able to monitor police, fire, utilities, taxicab, etc. frequencies (with all the associated extra equipment necessary). AREC leaders would do well, we think, to enter into any community plan utilizing the DCS for liaison between all services, with the amateur service as one of those participating. We might even broach the subject, *provided* we ourselves can muster the gear and personnel to equip one of our controls for operation in this band. At the same time, however, we should remember that we have responsibilities on our own frequencies, and we should not, if it can be avoided, allow our strength to be drained off to an unreasonable degree by participating in the DCS on behalf of some other service. Let's retain our identity as amateurs operating in the *Amateur* Service.

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A flood in the Skagit Valley of Washington called for some emergency operation by AREC members under the direction of EC W7LVB. Here is a paraphrase of his report:

We went on the air from our home station around noon, Feb. 10th, keeping in contact with W7BBP in Hamilton until about 7 P.M. At 11 P.M. the Red Cross needed stations at Mt. Vernon and Conway. W7GAT set up at the Conway Fire Hall and W7LVB at Red Cross headquarters in Mt. Vernon. W7OZX and W5RDU/7 assisted at Mt. Vernon. Contact was made with W7GAT and many important messages were handled for the sheriff and Red Cross. When the Conway dike burst, W7GAT had to throw his gear in the car and drive through two feet of water to get out. Shortly afterward he was on the air again from the Conway schoolhouse. Operation was terminated on the evening of February 11th. No QRM was experienced on the 3695 frequency used — a fine example of coöperation by many amateurs who stood by until the emergency was terminated. Those who took part: W7s BBP DQ GAT KGV LAN LVB OZX, W5RDU/7. — *W7LVB, EC Sedro Woolley, Wash.*

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How would you operate if an atomic bomb dropped somewhere in your area? If you have a plan, have you ever tested it (without the bomb, of course)? The AREC boys in and around Camden, N. J., have. On January 13th they got together with Civil Defense, Red Cross and CAP officials for a simulated atomic bomb test, assuming all wire communications to be destroyed. A net control center was set up at the Camden City Hall with stations on 10 and 2 meters, with a number of fixed stations in the suburbs on call. Twenty mobiles were available on 10 and 2. Operation started at 0930 and continued until 1220, during which time heavy traffic was handled with only one receiver failure, which was repaired in eight minutes. At 1220 control stations were "bombed out" and designated mobiles took over NCS according to a prearranged plan. Bell Telephone linemen ran emergency lines to the control mobiles. The main control returned to the air ten minutes later with emergency power. All civil and military observers, including Camden's mayor, were highly impressed with the quality of communications provided by amateur radio. K2AA (South Jersey Radio Assn.) was the call of the main control. Mobiles were W2s BDI CPK EWN JAV JRO NBJ OQN OWA PAU PFQ PML REB SPV UCV VX WVN YPQ YRW ZEA and ZFA. Fixed stations in suburbs were W2s ADA BQ EH FXN LY and PAU. Operating assistance was furnished by W2s DAJ EET GQO PFQ PNA PTM SDO and TJX. In charge was EC W2UCV.

THE BIG FREEZE

Once in a while John Q. Frost and Old Man Disaster get together and take a trip south for the winter, and when they do there is always the dickens to pay. This rambunctious duet made two such trips in rapid succession in February, their itinerary varying only slightly, and left suffering and destruction behind them both times. The part played by the amateurs in alleviating the suffering and averting the destruction is only a small part of the whole story, but it's the only part we are concerned with, so here goes:

The first storm started on January 31st and lasted through February 1st. While the storm itself extended over a wide area, it was manifested in the form of damaging ice accumulation through a belt taking in most of Kentucky, Tennessee, Mississippi and Louisiana, and the upper northwest corner of Alabama. The necessity for amateur participation did not end on February 1st, of course; in fact, it was only just getting started then, and was not ended until February 9th, or 10th, so great was the damage inflicted on wire lines, both power and communications. Some of the story was told in last month's *QST* in early reports, but there remains much more to be told. Louisiana SCM W5GHF sums up the situation nicely by estimating that something like 85 per cent total destruction of all communications facilities resulted in the handling by amateurs of some 10,000 messages for railroads, natural gas lines, power companies, Western Union, TVA, Bell Telephone, CAA, press associations, state police, weather and hundreds of other services over a period of several days.

In Natchez, Miss., one of the hardest-hit cities, W5s KZM, KHB and IHP all found themselves without power, and all generators they had counted on were either out of order, in use, or otherwise unavailable. By 1700 on January 30th, however, they had W5KZM on the air with 15 watts into a makeshift antenna, and contact was made with the Magnolia Net on 3870. City officials and certain critical industries were notified that Natchez was no longer isolated, and traffic with the outside began to flow. W5s LPL, OQH and QKX showed up to help, and the local Naval Reserve station, K5NRW, got on the air to help relieve the traffic load on W5KZM. Six long and dark days were required before the first commercial wire service was restored. During that time thousands of words of press were handled, and other agencies served included the power and telephone companies, railroads, and dozens of others in addition to several special emergency communications for which the group was called upon. The emergency set-up was visited by the local civil defense chairman and his co-chairman on communications. "Next time," says PAM W5IHP, "we'll be ready."

In Memphis, EC W4BAQ reports operation beginning at 1530 on January 31st when he was informed that W5GG and other Mississippi stations needed a Memphis contact. W4JWO and W4BAQ provided it, and Tennessee stations in other near-by cities where contact was needed were alerted by the local broadcast station. A portable transmitter was carried by W4BOR to Holly Springs, Miss., and later moved to New Albany when wire communication was restored. Two meters was used for local coördination in Memphis between W4BAQ, W4HHK and W4DI. In all, traffic was handled for three railroads, Western Union, newspapers, radio stations, weather bureau, TVA, press associations and others, including several death messages.

The well-oiled Tennessee AREC machinery was rolling in other parts of the state, too, as reported by W4GEH, W4LUH and W4LCB. W4GEH, Jackson EC, reports assistance rendered to the railroads by the Jackson gang and other amateurs throughout the area, this assistance making possible the continuance of railroad transportation which would otherwise have been completely bogged down by lack of communication. The operation included the setting up, in Jackson, of W4IOK as headquarters control, the dispatch of portable equipment to towns in Tennessee and Mississippi for which there was no other communication,

and the use of many stations outside the area of destruction to help relay messages which could not get through direct due to prevailing skip conditions. Despite all the relaying necessary not a single mistake was made in transmission of orders and instructions during the emergency. Railroads served were the Gulf, Mobile and Ohio, the Illinois Central, and the Southern. Many other agencies were also served during the process.

W4LUH details the operation of the Tennessee 'Phone Net, which rendered general assistance to everybody concerned. This net functioned in close coördination with the nets of adjoining states and was instrumental in providing emergency stations which reported in with badly-needed contacts. Many amateurs stood by silently until there was a call for their assistance. W4LUH started as net control station, but lost power and NCS was taken over by W4AEE. When he in turn lost power, W4KH took over, and so it went. Every time the NCS went off the air because of power failure, there was always another station waiting to take over in his place, ten different stations so acting before the emergency was over. Messages flew thick and fast, on and off the net, relayed from amateur to amateur, carried, telephoned, radioed from police car to police car, from fixed station to mobile station, by 'phone and c.w. within the same band, cross-band, or transferred from one band to another by land wire. The Tennessee 'Phone Net can be and is proud of its record of service during this emergency.

W4LCB reports some emergency work performed by amateur radio at the CAA communications station at Graham, Tenn. He set up a small rig on 160 meters, using his home station as a relay to 75. From January 31st thru February 6th, W4LCB handled all official CAA traffic out of Graham, and in addition handled much emergency traffic for Centerville. The set-up at CAA was operated by W4GU and W4ORH, under the former call, and these two amateurs were marooned for three days at the CAA station. W4LCB was the only operator from his home station.

For Louisiana, our report consists of a collection of clippings, press reports handled by amateur radio, and photostats of letters of thanks from various officials, sent in by W5BSR through SCM W5GHF, who despairs of adequately reporting the calls of all Louisiana amateurs who took part. The collection of material shows, however, that services were rendered to the Cities Service Pipe Line Co., Western Union, Bell Telephone, and others. With such assistance, naturally the newspapers carried many articles praising the efforts of hams both in Louisiana itself and outside the state. Naval Reserve amateur stations also figured in the services rendered.

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The second storm started on February 13th, almost on the heels of the first one, and affected Western Arkansas, Oklahoma and Northern Texas. Amateurs, nets and AREC members in all three sections sprang into action to bring needed communications relief. As Bill Green, W5BKH, SCM for Northern Texas, puts it, "Ice storms are becoming rather matter-of-fact occurrences . . . now and we would feel a bit lost without our annual workout." And to verify his statement, Bill sends us reports from two ECs and an RM who turned in outstanding jobs. W5ATG, NCS for the Northeast Texas Emergency Net, indicated he went on emergency power on the evening of February 14th and alerted the net, with the assistance of W5HBD and W5MAW. As stations reported in, the Illinois Emergency Net, which operates on the same frequency, moved to another channel to avoid interfering. Operation continued through Friday, Feb. 16th, and W5ATG indicated the following types of traffic handled: train orders and handling information, death and sick messages, hospital oxygen requests, weather reports, press, telegrams, telephone calls, and personal messages. RM W5GZU organized a traffic net on 3960 which then moved to 3940 to handle traffic in the emergency net. Much of the traffic, particularly with low-powered stations, was handled on c.w. W5BKH says particular credit is due to W5s MAW, LEZ and QHI for their efficient handling of the net during its long hours of operation.

Paris EC W5CTM, in one of the hardest-hit towns, reports that activity started on February 14th when he checked with the telephone company, Western Union and railroads to find that many communications were out. When commercial power failed he put the local Naval Reserve station, K5NBY, on the air with low power, and with the assistance of W5s KVV PMZ NY PAM and his own station handled some 116 messages consisting of railroad dispatching, telephone crew securing, gas company pressure reports, press, truck movement reports, sick reports, death messages and other emergency-type traffic. Operation started on 3940 but was later moved to 3657 to avoid QRM. Operation continued from the afternoon of February 14th to the evening of February 16th, working shifts and keeping traffic moving. W5CTM says, "Amateur Radio is better respected in the community now."

In Arkansas, communications were out in Harrison, Eureka Springs, Siloam Springs and other smaller communities in the northwestern part of the state. W5LUX was on in Harrison, W5OUI and W5MED in Eureka Springs, and W5BAB and W5DRW in Siloam Springs, all keeping traffic rolling to the outside. W5MRD used his mobile rig to connect Booneville to the outside world. These stations handled approximately 300 messages, in addition to thousands of words in news dispatches. Communication was almost entirely by amateur radio throughout the state, and in addition to the above, messages were handled to and from Fort Smith (W5ICS), Little Rock (K5NRL), Danville (W5MRD) and Tulsa, Okla. (W5BBS, W5GZS, W5WI, and W5AHT).

—•••—

No attempt has been made in the above to list the some 300 amateurs who were known to have participated in this double emergency. Sorry, fellows, it just cannot be done and also give a résumé of the operation. Our state of emergency organization and preparation has arrived at the point where it is a rare exception when amateurs are not involved in a communications emergency, and every reporting official has indicated that many calls were omitted from his list. Some who took part will inevitably go unrewarded except for their own personal satisfaction in having rendered a service — and for most this is reward enough. Those who were reported as having participated will receive Public Service Certificates in due time. —*G. H.*

♦

On January 29th the AREC of Anderson, Ind., was called upon by the mayor of Anderson to show that amateur radio could establish and maintain communication with both fixed and mobile stations. The gang set up control stations on 160, 75, 40 and 10 meters and put 12 mobiles in the field. The demonstration which followed was most impressive to the over 100 persons who attended representing various industries, civic, fraternal and social groups from the city and neighboring town, including the mayor of Anderson and other city officials. Shown in the photo are the four control positions and part of the interested multitude which assembled to watch. (*Photo compliments of "The Bulletin," Anderson, Ind.*)

W1AW OPERATING SCHEDULE

(All Times Given Are Eastern Standard Time)
Operating-Visiting Hours:

Monday through Friday: 1500–0300 (following day)
Saturday: 1900–0230 (Sunday)
Sunday: 1430–2200

General Operation: Refer to page 61, September, 1950, *QST*, for a chart showing W1AW general operation. This schedule is still in effect and is not reproduced herewith for space considerations. Mimeographed complete master schedules of all W1AW operation in EST, CST, MST, PST or GCT are available upon request.

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

Frequencies:

C.W. — 1887, 3555, 7215, 14,100, 52,000, 146,000 kc.
'Phone — 1887, 3950, 14,280, 52,000, 146,000 kc.

Times:

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

Code-Proficiency Program: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130, Sunday through Friday and at 2000 EST, on Saturday. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 15 w.p.m. on Saturday, Sunday, Tuesday and Thursday. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run from W1AW and WØTQD is scheduled for May 16th; from W6OWP, May 5th.

The station staff:

J. M. Powell, W1QIS, "mp"
J. I. Barrett, W4KVM, "jim"

CODE-PROFICIENCY AWARDS

Have you received an ARRL Code Proficiency Certificate yet? Twice each month special transmissions are made to enable you to qualify for the award. The next qualifying run from W1AW/WØTQD will be made on May 16th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 1887, 3555, 7215, 14,100, 28,060, 52,000 and 146,000 kc. WØTQD will transmit on 3534 kc. The next qualifying run *from W6OWP* only will be transmitted on May 5th at 2100 PST on 3590 and 7248 kc.

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

Code-practice transmissions are made from W1AW each evening, Monday through Friday, at 2130 EST. References to texts used on several of the transmissions are given below.

Date	Subject of Practice Text from March *QST*
May 1st:	*Hamming by the Touch System*, p. 10
May 4th:	*A Two-Stage Linear R. F. Amplifier*, p. 13
May 7th:	*An Electronic Lightning Calculator*, p. 17
May 10th:	*The "WWV-er,"* p. 24
May 15th:	*An All-Band Mobile Station*, p. 34
May 18th:	*The Deluxe Fixed-Portable Package*, p. 42
May 21st:	*Technical Topics*, p. 49
May 23rd:	*Using the Pi-Section Antenna Coupler*, p. 58
May 29th:	*The World Above 50 Mc.*, p. 61

FEBRUARY FMT RESULTS

The First 1951 ARRL Frequency Measuring Test, open to both ARRL Official Observers and other amateurs, provided another convincing demonstration that hams have the ability and the equipment to measure radio frequencies with extreme accuracy. A total of 137 entries was received, 55 from Official Observers and 82 from non-Observers. Each participant has received a report comparing the accuracy of his measurements of the special W1AW FMT transmissions with those made during the test by a professional frequency measuring laboratory.

Leading entrant in the OO group was G. Donald Fenton, W1MUN, a consistently high performer in many previous tests. First-place honors in the non-OO category were shared by Ralph L. Vacca, operating gear at the M.I.T. Radio Society's station W1MX, and Lloyd W. Root, W8HB, an old hand at winning the top position in FMT's. The standings of other leaders in the test are given below. In accordance with the announced rules, no entry consisting of a single measurement was considered eligible in the competition.

LEADERS

Observers	*Parts/ Million*	*Non-Observers*	*Parts/ Million*
W1MUN	0.5	W1MX	0.8
W9CII	0.9	W8HB	0.8
WØOTR	1.6	W4HER	1.4
W2FE	1.7	W5LHZ	2.1
W9CSU	3.0	W8WXY/8	2.6
WØRRW	3.1	W1MBL	2.8
W8BGY	3.2	W6NRM	2.8
W3BYB	3.4	W9LZP	3.6
W3ADE	9.7	W4AQL	3.7
WØVSK	10.3	W9PHV	5.0
VE6HM	10.5	W5PIN	5.1
W4PWX	12.2	W3LVF	5.6
W2WI	14.2	W1IHI	6.7
W8YJE	15.0	W3KXP	6.9
W7CT	15.1	W7CQE	8.1

The following ratings are based on a single measurement: OOs — W8PZT 1.4, VE6LZ 4.0, W8GBF 6.7; non-OOs — W1SPD 1.9.

DX CENTURY CLUB AWARDS

HONOR ROLL

W1FH.....237	W2BXA....227	W6EBG.....225
W8HGW.....234	W6ENV....227	W3GHD....223
W6VFR.....231	G2PL.....226	W3CPV.....223
W3BES.....229	WØYXO....226	

RADIOTELEPHONE

W1FH.....197	VQ4ERR....189	W9RBI.....178
LU6AJ.....193	W8HGW....188	W2BXA....175
XE1AC.....192	PY2CK.....187	W1JCX.....174
	W6DI.....181	

From February 15 to March 15, 1951, DXCC certificates and endorsements based on postwar contacts with 100 or more countries have been issued to the amateurs listed below.

NEW MEMBERS

SM5KP.....171	CR7BC.....104	W2PZM....101
G3AIM.....120	W4NKQ....103	G3RB.....100
G8UG.....116	W4LYV.....103	PY2NX.....100
SM5WJ.....116	IS1FIC.....103	W4JUJ.....100
LA5S.....106	TA3FAS....102	G3BXN.....100
W9AHP.....105	4X4CZ.....102	VE3TB.....100
G2FQP.....104	HZ1KE.....101	4X4CJ.....100
W2OCI.....104	W3TXQ....101	W2EQS.....100
	VE6MZ.....101	

RADIOTELEPHONE

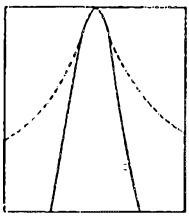
W9ROQ.....155	G8UG.....104	ZL3LR.....102
W8QAD.....110	ZS6LW.....104	WØWSH....102
W7EKA.....109	LA7Y.....103	ON4PJ.....100
G4ZU.....105	W3EVW....102	CM9AA.....100

ENDORSEMENTS

W3JTC.....220	W4LZF.....171	HAMU.....128
W9RBI.....213	W4CYY....162	ZS6LW.....126
VK2DI.....202	W9ABA....150	W3ALB.....122
W3EPV.....200	W9BQE.....145	W7AYJ.....121
G8IG.....182	W1LZE.....142	W1BOD.....120
W5GEL.....181	ZL3CC.....140	W1LQO.....116
G8KP.....181	W4ZD.....133	W9EXY....110
LA7Y.....180	PY4IE.....130	SM5DZ.....110

RADIOTELEPHONE

SM5KP.....163	HASM.....130	CE3AE.....119
W1ENE.....152	HAMU.....126	HBIC.....111
W9RNX.....140	ZS6FU.....120	W6YI.....110
HYJ.....130	W3MAC....120	W2IUV.....110



MANY old-timers will remember an expression that was used way back in the roaring twenties. I may be wrong, but I believe it was first used with regard to the fellows who felt that the way to reduce the ripple of a power supply was to pile on all the chokes and capacitors that one could get his hands on. If you hung on enough chokes and capacitors, the ripple was sure to be reduced sufficiently. This system was called "brute force and stupidity". Of course, there were (and still are) other applications. A few years ago, I endangered my well-being by applying this expression to a somewhat unstable modulated-oscillator being used on two meters with an input of over 900 watts.

The "brute force" system *does* work and there are applications where it may be the most effective way if the "stupidity" is replaced with "know-how". Such an application of "brute force and know-how" has resulted in improved selectivity in the HRO-50 receiver.

Sharper selectivity could be obtained by lowering the frequency of the intermediate frequency amplifier. This method would have two drawbacks. One is the poorer image ratio that would result. The other is the fact that this would narrow the selectivity curve all over. The "nose" would be narrowed in the same proportion as the "skirts". The nose of the present HRO-50 is now about four kc. wide. W1JEL has made rather extensive tests that show that this is about the minimum width that can be used for conventional double-side band reception without loss of readability. More on this in a later page.

It is much better to keep the intermediate frequency as high as possible without hiatus (look it up, I had to) in the tuning range of the receiver. By keeping the intermediate frequency at 455 kc., we do not affect the image ratio. How can we get better selectivity without narrowing the nose?

Examining selectivity curves of double-tuned circuits, particularly those using critical coupling, it will be noted that the nose is relatively flat while the skirts are steep. If we add more transformers to the circuit, very little change will be effected in the nose but the skirts will be pulled in considerably. Raising the Q of the transformers will not have nearly as much effect and this effect is apt to be reduced under conditions of high humidity. Pulling in the skirts produces a very definite and worthwhile reduction in splatter and heterodyne interference from signals very close to the desired one while not reducing the readability of the wanted signal.

Following this idea, the intermediate frequency amplifier of the HRO-50 has been changed by increasing the number of stages from two to three and the number of IF transformers from two to six (not including the crystal filter). More than six transformers would not be economically worth while as this procedure follows the law of diminishing returns. This change reduces the skirt selectivity from about twenty-four to about eleven kc. at 60 db down while the nose is still about four kc.

In line with our policy of making any minor changes in the HRO as soon as practicable when it is found that improvements are possible, this change is being made in the HRO-50 immediately. The new model will be called the HRO-50-1 and will be available shortly.

CAL HADLOCK, W1CTW

ACK RADIO SUPPLY CO.
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WALTER ASHE RADIO CO.
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LEW BONN CO.
1211 LaSalle St.
Minneapolis 3, Minn.

C & G RADIO SUPPLY
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CONSOLIDATED RADIO COMPANY
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King, William and Hughson
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M. N. DUFFY AND CO.
2040 Grand River Ave., West
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FEDERATED PURCHASERS, INC.
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HARRISON RADIO CORP.
Jamaica Branch
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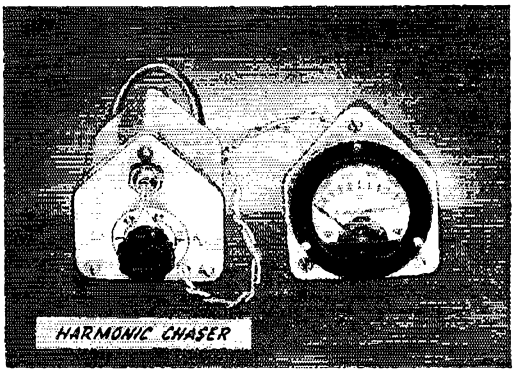
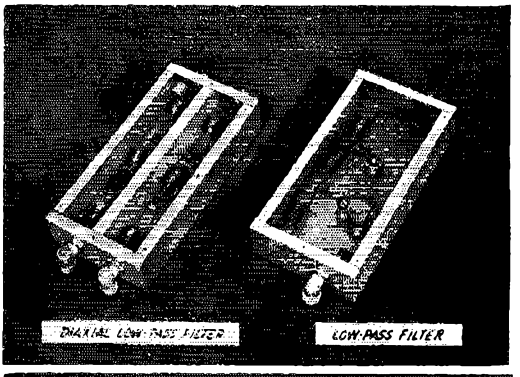
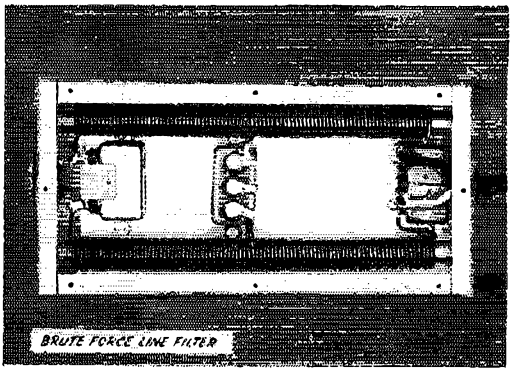
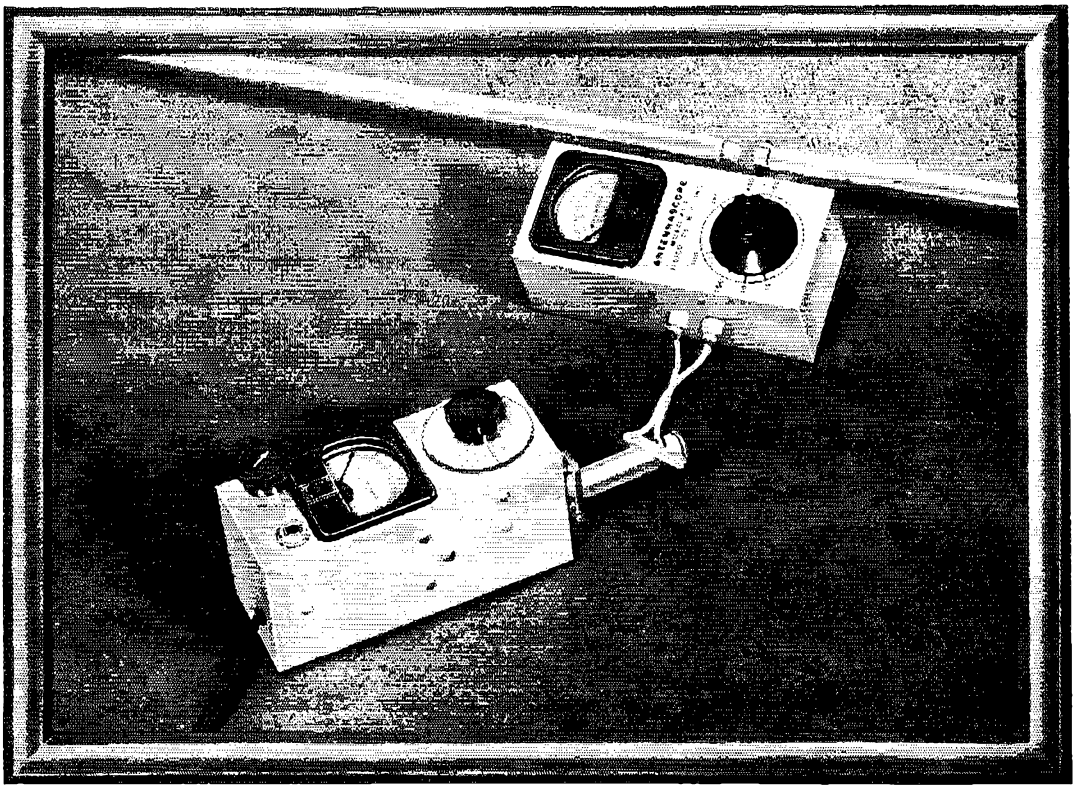






TVI Silence YOU



These are critical days for everyone and as a result amateur radio is doubly important. It remains the all-important emergency communications service for disaster and Civil Defense. It affords amateurs an opportunity to relax and enjoy themselves while training and developing their skills . . . better fitting them for tomorrow's hard task on the home front and abroad.

(PICTURED ABOVE)

GRID DIPPER
Based on the original grid-dip oscillator designed by W2AEF, the new model incorporates all the improvements to the basic instrument. The Grid-dipper kit includes a special case, tube, internal power supply and 0-1 ma. meter.
Range: 3Mc.–250Mc. In six steps.
Input: 105–125 V. 50–60 Cy.
GDO, complete kit with assembly and operation instr..... **$29.50**
Wired and tested, additional..... **$13.50**

ANTENNASCOPE
The instrument to give you positive antenna performance and efficiency resulting in less TVI. An impedance measuring meter used in conjunction with the Grid Dipper. Measure radiation resistance, resonant freq., transmission line impedance, receiver input impedance, feedline standing wave ratio, etc. Each kit complete including 100 μa Meter.
ANTENNASCOPE—complete with instructions..... **$24.95**
Wired and tested..... **$29.95**

TVI has forced thousands of amateurs off the air and, we say, needlessly! You can operate your transmitter, if it reasonably adheres to accepted engineering practices, by incorporating the tremendously effective TVI elimination accessories popularized by Eldico's amateurs and engineers.

Every station returing to the air becomes a valuable national asset. Do your part and stay on the air.

(PICTURED ON OPPOSITE PAGE)

HARMONIC CHASER
Modified absorption type wavemeter for locating, measuring and identifying transmitter harmonics. Will not swamp from the fundamental. Requires an external current indicator as listed below:
TVH—complete kit with instr. less meter.... **$6.98**
TVH—wired and tested. less meter..... **$10.98**
TVH500—500μa Meter in matching case.. **$7.50**

LOW-PASS FILTER
ELDICO's now famous TVD-62 is a two section M-derived low-pass filter supplied with coaxial connectors for the input and output. Attenuation of harmonics radiated by the antenna is in excess of 60db. The TVD-62 will handle up to 1 kw. A.M. and is designed for 52 or 72 ohm coaxial feedlines.
TVD-62 Complete with Instr..... **$9.99**
TVD-62 Wired and tested **$12.99**

HIGH-PASS FILTER
ELDICO's famous, compact, high-pass filter for reducing and eliminating r.f. from the TV receiver. Quickly and easily assembled in minutes. Install directly at antenna coil of TV Receiver.
Size: 2¾" x 1¾" x 1"
TVR-300: 300 ohm Filter.. **$1.98**
TVR-62: coaxial 52–77 ohm **$1.98**
Either filter wired, tested.. **$3.98**

BRUTE FORCE LINE FILTER
R.f. feeding back through the power lines is a serious source of TVI and BCI. Patterned after the recommended model in the ARRL Handbook, the brute force line filter kit comes in 2 models—1 kw. and 2.5 kw. The TVL-1KW supplied with heavy duty line cord and plug and female a.c. outlet receptacle. The TVL-2.5KW is equipped with BX clamps for securing a.c. lines.
TVL-1KW: Max. line drain of 1 kw. Complete kit with instr..... **$7.98**
Wired and tested..... **$10.98**
TVL-2.5KW: Max. line drain of 2.5 kw., **$13.98,** W. and T. **$19.98**

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Station Activities

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

ATLANTIC DIVISION

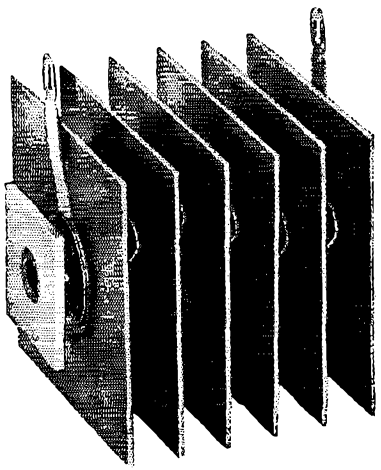
EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — ADE joined the MARS. The Hazelton ARC enjoyed the ARRL film on TVI. The Abington Township ARA is practicing for Field Day with some interclub contests. They boast two new members, RFI and RCE. BIP is building a 2-meter transmitter and a superhet receiver. EU says, "XYL bought me a new '51 Plymouth for her birthday!" EU will use it to visit hams this summer. New officers of the Harrisburg ARC are MBK, pres.; AIL, vice-pres.; KEK, treas.; ADE, Emergency Coördinator; KCL, publicity. The Club now has quarters in the Red Cross Building. March 1st marked the beginning of the fourth consecutive year that the Penn-Harris Net has been operating on 144 Mc. They are well along with their civil defense plans. The PACRC continues to function almost 100 per cent on defense communications. BYB, DYL, and MYL continue in office as president, secretary, and treasurer, while 2UCV is the new vice-president. The West Philly RC has set up a station in the main control center and reports it to be working out well. There are numerous meetings and plenty of activity afoot in the suburban Philadelphia section, a report on which will be published soon. 9ERU, well-known for having held the code speed record, visited Philadelphia for a chat with some of the local code merchants. CTJ, who lives near the WPTZ transmitter site, got tangled in one of WPTZ's microwave receiver i.f. systems and was broadcast far and wide over TV. What kind of TVI shall we name this? Early reports indicate that the York Road RC has won the VHF SS. CHV and his XYL left for Manila, Philippine Islands, in late January. Wenger will be associated with the International Division of the U. S. Department of State. He will do engineering work in connection with the Voice of America broadcasting station, designing equipment and directing its installation and operation. Traffic: W3CUL 2909, NHI 837, PDJ 159, BIP 135, ADE 39, OML 36, QEW 10.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Eppa W. Darne, W3BWT — "Civil Defense Planning" was the principal topic of discussion at the Rock Creek Amateur Radio Association's Feb. 9th meeting. At the Feb. 19th meeting of the Baltimore Amateur Radio Communications Society a talk was featured by Mr. Richard S. Snyder, jr., of Ballistics Research Labs., Aberdeen Proving Grounds, his subject being "Phases of Electronics Computers of Interest to Hams." The Maryland Mobile Net now has 30 stations. The Washington Radio Club at its Feb. 10th meeting presented a series of talks on v.h.f. and u.h.f. converters by 3JES, 4SBA, and 3OTC. The Chesapeake Amateur Radio Club presented Daniel H. Burkhardt, State Adjutant, American Legion, and his talk, "A Basic Understanding of the Red Fascist, and the Necessity for an Emergency Amateur Network," at its Feb. 6th meeting. At the Feb. 20th meeting Dr. Harold Shutz, of Glenn L. Martin Co., spoke on microwaves. A report from the civil defense director of Prince George County was the feature of the Feb. 16th meeting of the Capitol Suburban Radio Club which now meets at the University of Maryland, Building R, Room 103. Newly-elected officers are MVO, pres.; ZM, vice-pres.; HVS, secy.; CEK, treas.; QNY, corr. secy. The U. S. Naval Academy Radio Club's station, ADO, is securing an additional 350-watt transmitter. At the Club's Feb. 11th meeting, 9FFH gave a talk on Superhets. ADO meets the MDD Section Net and Swing Shift Net. The Howard Amateur Radio Society of Howard University, elected the following officers: C. L. Roberts, pres.; PLP, vice-pres.; Elmus Ball, rec. secy.; Roger Hill, treas.; C. K. Greene, act. mgr. Since this will be my last report as SCM, I wish, at this time, to express my sincere thanks to all the section members who have worked with me in making our section one of the best. IZL schedules 9GDC, enabling a neighbor to talk to his folks. CEB now has an HRO receiver. COK has been appointed ORS. LUN is making tests on a "notch" antenna for use on 144,220 kc. and 420 Mc. KYG gets out well on 7 Mc. with a "loaded" downspout. SEY, LMC, CJN, KOU, MTE, and NHL keep 144 Mc. "hot" around the Baltimore Area. CJN, ex-OZS, got his old 1924 call back. WIT worked 53 stations in the V.H.F. Contest. RFZ is a new call at Towson, Md.

(Continued on page 82)

MALLORY HAM BULLETIN

It Will Pay You To Try MALLORY Selenium Rectifiers



It is believed that only a comparatively few amateurs have taken full advantage of the economy, efficiency, convenience, and reliability Selenium Rectifiers can offer when employed in amateur transmitters, receivers, and test equipment.

Yet, very *definite* economies can be effected in certain amateur power supply circuits when conventional vacuum tube rectifiers are replaced with inexpensive Mallory Dry Disc Selenium Rectifiers. Selenium Rectifiers require no filament voltage, thus the power transformer may be eliminated entirely in many cases, or reduced in size substantially, in others. In addition, no rectifier tube socket is needed, and interconnecting wiring is reduced to an irreducible minimum.

Circuit efficiency can be improved considerably, too. The voltage drop across a Selenium Rectifier stack averages only about 5 volts as compared to 15 to 80 volts in tube rectifiers. Rectifying action is practically instantaneous in a Selenium Rectifier, since no filament "warm-up" period is necessary. As a result, a Selenium Rectifier is ideal for bias supply rectification where important bias voltages must be made available prior to application of anode potentials.

Mallory Selenium Rectifiers are convenient for the amateur to install. No socket-hole punch or other special tool is needed. A single clearance hole for a No. 8 machine screw or stud is all that is required to mount the rectifier in practically any position above or below a chassis.

The name Mallory on a Selenium Rectifier is your assurance of unconditional reliability, for the average life of a Mallory Selenium Rectifier is equal to or better than almost any other component in your equipment. Tested at an elevated stack temperature of 100° C. (15° C. above recommended operation), Mallory Selenium Rectifiers had an average life expectancy of more than 7000 hours with less than 4% loss of efficiency.

NOTE: This amazing record was compiled with standard Mallory 85° C. FP and TC Electrolytic Capacitors in the input of the load test circuit. Since the average life of any Selenium Rectifier depends greatly on the quality of the electrolytic capacitor used with it, extreme care should be exercised in selecting a capacitor for this important job. Standard Mallory FP or TC Electrolytic Capacitors, obtainable from your Mallory Distributor, will assure you of the kind of operation you want when using Selenium Rectifiers in your own equipment.

Your Mallory Distributor can supply you with 11 values of Mallory Selenium Rectifiers ranging from 35 to 450 milliamperes and operating at an RMS voltage of 130.

See him today, for that unbeatable combination of Mallory Selenium Rectifiers and Mallory FP or TC Electrolytics, as well as for all those other fine Mallory parts, including resistors, ham band switches, controls, rheostats, potentiometers, pads, tubular capacitors, transmitting capacitors, vibrators, and vibrator power supplies—practically everything you need to keep your equipment in good operating condition.

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OTG is on 7 Mc. MQF has TVI troubles. GZH, EC for Delaware, has been helping county groups plan for civil defense. CJT has a Collins TCS transmitter and is on 1.7, 3.5, and 7 Mc. RIC is a new Washington station on 28 Mc. MCG has completed a new floor for his shack. HKS is on 3.5, 7, 14, and 28 Mc. with 40 watts. DQB is on 3.5-Mc. c.w. and 144-Mc. 'phone, and for the latter has a three-element horizontal beam and a grounded plane antenna. COK gets "across the pond" on 3.5-Mc. c.w. using 30 watts. CDQ, LSX, and MSU had trouble finding OMs to work in YL/OM Contest. FWP is having power leak troubles. ECP completed his postwar WAS during March LO-Nite. REB is a newly-licensed station in the section. Traffic: W3LZM 251, JZY 217, HJV 201, GZH 161, ECP 137, AKB 135, CVE 61, FWP 45, MCD 26, ONB 26, BWT 17, ADO 13, GUS 13, JHW 8, NNX 8, CJT 6, IZL 4, COK 2.

SOUTHERN NEW JERSEY — SCM, Dr. Luther M. Mkitarian, W2ASG — BAY has been appointed chairman of communications for c.d. in the Haddonfield Area. Camden County emergency nets meet as follows: 144-Mc. Net at 7:30 P.M., 1st and 3rd Wednesdays; 29.5-Mc. Net at 7:30 P.M., 2nd and 4th Wednesdays. ATJ and UCV are acting as NCS, respectively. ZI has received a Public Service certificate award for his services during the Northeastern Hurricane of last November. The Bridgeton-Ocean City-South Wildwood Net meets on 160 meters at 11:00 A.M. Sundays. PCF, who recently received his Class A ticket, is acting as NCS. K2AZ has a new rig on 3.5 Mc. ORS, who tops the list of traffic-handlers this month, is conducting code practice classes for the Boy Scouts. OSV has been demonstrating emergency radio communications to c.d. officials in Gloucester County. Traffic: W2ORS 144, ZI 126, K2AZ 71, W2EBW 44, RG 17, ASG 8, ZYV 8, PFT 5.

WESTERN NEW YORK — SCM, Harding A. Clark, W2PGT — REC: SJV. RM: RUF. The New York State Net and New York Slow Speed Net on 3720 kc. and the New York State 'Phone Net on 3995 kc. have been recognized and appointed as official civil defense nets by the State c.d. authorities. All intracounty nets are urged to arrange a tie-in with these nets. For information contact PGT or SJV. The KBT Club recently held a meeting at the Veterans' Hospital and inspected the radio facilities and discussed club emergency plans. At the RAWNY meeting PXH, who is chief operator at American Airlines, presented sound and color films on Mexico, resulting in some of the gang threatening to move to XE-Land. TIY visited SJV during a business trip to Buffalo. FAN is Asst. EC for Lockport. CYQ is Asst. EC for Yates County. VTR is Asst. EC for Ontario County. UHI has a new QTH and is busy moving and getting back on the air. ZJ has been reporting in to NYS and providing a much needed Elmira outlet. Several of the Elmira gang can be found each evening on 3750 kc., OCP, SNW, UBU, and ZJ being among the regulars. QBJ is heard on 3.5-Mc. c.w. with a nice signal. UMJ is c.d. coördinator for Corning. YY is rebuilding but gets on 3.85 Mc. to break the monotony. ABM is trying to catch PJM in DXCC and thinks new feeder system will do the trick. The Rochester Mobile Club held a hidden transmitter hunt, the winners being SCZ, BDY, DFS, and ZZS, in the usual order. SGJ/mobile worked KV4AQ. The Club frequencies now are 29,493 and 29,640 kc. That old DX hound, QHH, now has 83 countries on 3.5 Mc., all confirmed and worked across the pond on 160 meters with 20 watts when he snagged GW3ZV. Howie is waiting for a new 75A-2 and says the SW3 isn't much to work with. RUF continues to lead the traffic gang with DJF, a newcomer, also running up nice totals. RUF reports NYSCD now is underway with many oldtimers joining. The aim is a station in every county. NYS handled 467 messages in February. A new member to NYS is DPL, Niagara Falls, who had a perfect score in reporting in to NYS every night during February. Traffic: W2RUF 675, DJF 183, TYC 156, PGT 50, QHH 49, SJV 49, KBT 47, BRS 41, W8GSJ/2 32, W2RUT 29, DPL 27, FCG 24, RZP 20, NVB 19, HYQ 18, QKX/2 15, GTI 14, ZJ 12, WOE 11, BLO 10, EMW 4.

WESTERN PENNSYLVANIA — SCM, Ernest J. Hlinsky, W3KWL — Your SEC and your SCM urge each and every one of you to do all you can to assist your local and section ECs. Please report to your SCM by the first of each month so that he can turn in his report to ARRL by the 7th. ODU reports the January CD Party netted him 25,000 points; he also made use of his Class A license for the first time in two years. DNO says you don't know what troubles are until you find you have a blown transformer, soft 75TH, and a beam that needs tuning. UHN maintains a nightly schedule on West Pennsylvania Traffic Net and does a nice job at it. PTU is organizing E.C. for Cameron County. LIW says he is too QRL to do much radio. All you boys with ORS appointments: Better read your obligations to your section and report into WPA as often as you can. The WPA Net is the worst it has been in years. C'mon, fellows, let's try QNI at least once a week. RMU reports he now is active after a four-year layoff. Look for him on 3.5- and 7-Mc. c.w. Down Altoona way we read that 160 meters is the band for LQD, POP, PRO, POZ, QPF, and LJQ. MBB is trying hard to carry on as EC. Thanks for the Club's roster of club members mailed to your SCM. Up north LQQ reports the McKean County EC Net is quite active. NDE renewed his EC and OBS certificates. His

(*Continued on page 84*)


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No. 8410 Nominal Capacitance 33 mmf per ft. Use for crystal, ribbon, and carbon microphones.
No. 8412 Nominal Capacitance 68 mmf per ft. Use for carbon microphones.
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club station, KYR, is quite active on 3.5 Mc. The South Hills gang of Pittsburgh had a 10-meter ground-wave contest March 3rd. Up Oil City way LST reports that MLG and OOF are to be congratulated on their new jr. operators. KXQ received a nice promotion with the Bell Telephone people. LFK says to keep peace with TVI is to stay clear and suggests you operate and coöperate. The Steel City Radio Club station, KWH, can be heard on at least 144 Mc. Ask DNO how to get new 100THs for Christmas. Nice work, RXT, on your v.h.f. write-up in your club paper. Traffic: (Feb.) W3NRE 289, NCD 136, UHN 30, LEV 13, KWL 11, LQQ 6, QVL 5, LIW 2, ODU 2. (Jan.) W3DNO 30.

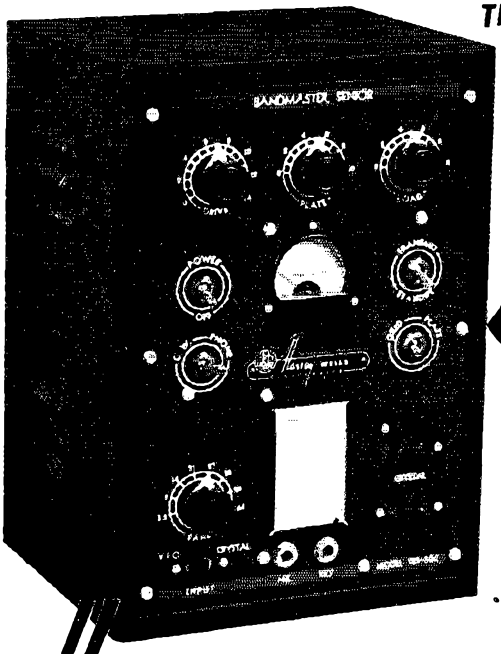
CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — Section Nets: IEN, 3940 kc. ILN, 3515 kc. SEC: QLZ. PAM: UQT. RM: BUK. ODT snagged 15 stations in recent V.H.F. SS. SKR is rebuilding the final and is QRL 12 hours daily at his work. ILH's traffic total can be traced to contacts with 6HQX, a Marine Base in California. BGN is planning to go mobile in new car while trying to eliminate TVI. CRD built broad-band crystal-controlled 2-meter cascade converter for his HRO-50. The Quad City Amateur Radio Club is spurring activities with its new club bulletin. LJP is in charge of civil defense communications for Pekin. HLF is Assistant EC in charge of the amateur radio section of the organization. 9KEI now is located at Springfield and his new call is MKU. KFU is confined to his home with a lingering illness and can vouch for the value of ham radio. Francis has 100-watt rig, three-element beam, and rotator, thanks to the Tri-Town Radio Amateur Club members who made the project possible. LAX is activities manager and station trustee for LLW, the Moody Bible Institute Amateur Radio Club. PGO finished 28-Mc. equipment and is ready to install same in his car. CMU reports interest high in emergency work around Rockford. YTV finally received his WAS award. IAY is working on 2-meter gear. YIX has new vertical half-wave antenna for 28 Mc., but is waiting for the band to open. NN gave the DX band back to the Indians! New hams in Springfield are MME and MNE, both products of club code classes, making a total of eight to date. DPY reports more than 30 countries on 'phone in the DX Contest. NIU expended a little effort to help the License Plate Bill now pending. A look through the Starved Rock Radio Club bulletin shows a great deal of interest in 160 meters and emergency work and planning in and around that section of the State. MEM finally overcame troubles and now may be heard on 3.5- and 7-Mc. c.w. and, when time permits, on ILN. We now have more than fifty counties in Illinois with an active EC. If you do not know yours, please contact EVJ or QLZ at once. Traffic: (Feb.) W9ILH 1186, YIX 162, KQL 120, LAX 96, BUK 85, 8XL 85, UBP 75, PEK 63, YTV 28, LIN 19, HKA 14, CMU 12, IAY 4, NN 4. (Jan.) W9BGN 27, DUA 4.

INDIANA — SCM, W. E. Monigan, W9RE — SEC: PHV. PAM: BKJ. RM South: DGA. RM North: RCB. TT says 144 Mc. looks good. DLI also is on 144 Mc. SQN is busy on TV repair. DHJ says too much work ties him up. MOH is *Mrs.* KYE. New calls in Indianapolis are MEK, MFH, and MHP. A new call in Muncie is MEA. DUK, Delaware Amateur Radio Club at Muncie, now is on 144 Mc. JUJ is on 144.8 Mc. daily. OMD also is holding 144-Mc. schedules. The New Albany Amateur Radio Club has been affiliated with ARRL. There is not much news this month; get your reports in early, fellows, so I can forward to ARRL on time. If interested in traffic, contact RCB or DGA for c.w. or BKJ for 'phone. If interested in emergency or civil defense work, contact PHV. New Official Bulletin Station is AB; new Official Relay Stations are NZZ and NXU; new Official Observer is FJI. Traffic: W9JTX 738, JUJ 535, QLW 443, TT 366, RCB 289, DGA 242, NZZ 189, LZI 173, PMT 61, HUV 56, BKJ 47, DOK 46, DHJ 33, TG 30, BDP 20, JBQ 19, NXU 17, K9WAA 10, W9YB 7, NH 4, RE 4.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — SEC: UFX. PAM: ESJ. RMs: CBE, LFK, CWZ. Nets: BEN ('phone) 3950 kc. 6 P.M.; WIN (c.w.) 3625 kc. 7 P.M.; WIN (slow c.w.) 3625 kc. 6:30 P.M. SUF received net certificates from both 9RN and CAN. IXA is putting finishing touches on new rig. 9QAO/9 is new ORS at Black River Falls. CWZ reviewed latest information on c.d. operation at the Point Club meeting. JGG is new ORS at St. Point. UIT worked 2 ZLs, HC, VP6, and KP4 on 3.85-Mc. n.f.m. ANM is about ready with a separate rig for home operation. HDZ is TVI-proofing his rig. JM is playing with TV. LIK has police and ham rig in his car. JGG has new Class A ticket. New ECs are SGG, EWC, HMX, and ELY. BVG has A-1 Operator's certificate. Officers of the Blackhawk Club are KBT, pres.; FCY, JEY, and NSG, vice-pres.; LVB, program dir., LAV, pub. mgr.; FPR, secy.-treas.; SGG, act. mgr. and EC. LVB has a new 75A-1. HSQ, GAB, and SGG are mobile on 28.9 Mc. FPR has new "Viking" transmitter. KBT renewed OPS originally issued in 1937! MKY is a new ham in Merrill. UIM is working on c.w. net. KXK has 97 confirmed out of 103 countries worked. RBI goes this one better with 213 confirmed out of 214 worked! SFL plans on a good antenna at new QTH. C.d. and call

(*Continued on page 86*)



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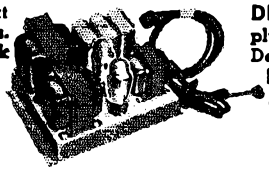

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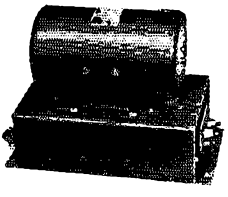

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letter license plates have kept UFX busy. ANA visited the Wausau Club. TQ is working on RTTY units. GIL and LJT are new on 144 Mc. FAN worked into Indiana and Illinois on 144 Mc. More mobiles are urged for c.d. operation, with 29,620 kc. as a net frequency for Wisconsin units. Traffic: (Feb.) W9ESJ 493, CBE 281, KZZ 236, BVG 230, SUF 127, IXA 125, IQW 39, WØQAO/9 39, W9CWZ 31, DR 30, IQM 28, RQM 26, IVE 25, UIT 22, ANM 21, MUM 13, HDZ 10, IHW 9, OVO 9, JGG 6, BZU 5, RKT 5, GPU 4, MUM 3. (Jan.) W9SUF 180, JGG 22.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Rev. Lawrence C. Strandenaes, WØJWY — North Dakota House Bill 606, permitting hams of the State to have call-letter license plates, recently passed both branches of the Legislature with overwhelming majority. Chief credit goes to NVK, along with Representative Baker of Ward County and the Minot Mouse River Valley Radio Club. AZV is getting the emergency set-up perfected in Stutsman, Foster, and Eddy Counties. VSK reports that HAI is back in Valley City working for KOVC, and that JWL will move to Ohio. Active in the Barnes County Emergency Net are VSK, NQY, SRH, BOR, AUD, and HAI. New officers of the Jamestown Club are NBS, pres.; and AZV, secy. Recent new EC appointees: FPW, BWY, UBB, TSB, AOX, and NVK. Traffic: WØLHB 23, ZCM 17, KOY 13, NVK 11, KRC 8, BWY 6, AAM 5, BIH 5, FNZ 5, VSK 5, DOW 4, RBS 4, RRW 4, UGM 4, CYN 3, JWY 3, CHA 2, PUP 2, JLA 1, RNS 1.

SOUTH DAKOTA — SCM, J. S. Foasberg, WØNGM — Asst. SCM, J. W. Sikorski, ØRRN. The following report was written by RRN. New officers of the Mitchell ARC are GCP, pres.; SDE, vice-pres.; John Sills, secy.; Larry Webb, treas.; HDO, act. mgr. RWE is on c.w. after several years on 'phone, and spends most of his time on 7 Mc. GWH and ZRA, Sioux Falls, and SDE, FJS, HDO, and HYV, Mitchell, all participated in CAP simulated bombing of Huron. FJS has new Lysco, p.p. 807s and clamper tube modulation. RRN is working as extra man at station KSOO. CAR now is ORS and is building T-55 c.w. rig. The Mitchell Club cleared more than $80 by auction. GCP has returned from a two-month vacation to the West Coast and will take over as NCS of the South Dakota c.w. net. The net needs more participants. It's 3720 kc., 7 P.M., Mon., Wed., and Fri. We should have 50 stations on every night. Traffic: WØPHR 112, FJS 10, RRN 10.

MINNESOTA — SCM, Charles M. Bove, WØMXC — Asst. SCM, Jean Walter, KYE. SEC: BOL. Asst. SEC: BGL. Minnesota is proud to state that it has five nets operating at full capacity. The MSN, c.w., meets daily on 3795 kc. at 1900 CST. The MSN, noon 'phone, meets daily on 3960 kc. at 1205 CST. The MSN, evening 'phone, meets daily at 1800 CST on 3960 kc. The Northland Net meets daily on 160 meters at 1900 CST and the Mesabi Net meets on Mondays and Fridays at 1900 CST on 1895 kc. The Northland Net, with EYW as Net Control, boasts of 35 members. VHE now is running 80 watts and using screen-grid modulation. DZM is moving to Minneapolis. PSD now is in Ashby. EYW has been conducting code classes. VHE now is mobile on 160 meters. WVT now is Class A. The Runestone Radio Club now has 16 active members. DAB has a converted 458 on 160 meters. HRY has been elected president of the Duluth Ham Club. Milt also has been appointed EC. NYJ has moved to a new QTH in St. Paul. BOL is on low-power c.w. BRA is instructing two students in c.w. AIH has received his Class A license. Paul also is building a screen-grid modulator and a 20-meter beam. BOL works on Glide Slope receivers for N.W. Airlines. MRX has c.d. Emergency Corps all ready to go with a total of five amateurs and two gas generators. PVS and GHN, of Moorhead, are on the job, along with TSN, chairman of the local c.d. committee. HRY and about 20 other hams have offered their services to the c.d. in Duluth. QEQ is building a new rig using a pair of 813s. LVG, MRX, and BOL, together with Col. Disser of the CAP, had a dandy demonstration with the c.d. handling messages from aircraft spotters throughout the State and relaying to the filter center in the Buzza building in Minneapolis. RHT is operating JA2KM. LVG is handling traffic on 14 Mc. with Camp Rucker, Ala. Traffic: WØLVG 341, ITQ 300, HEO 222, KFF 121, EPJ 77, BGY 68, MXC 56, RXL 24, BPI 16, EYW 16, UCV 15, MRX 14, RA 12, MLM 11, WAS 10, AAS 8, BOL 8, AIH 6, HRY 5, CWB 3, BBM 2.

DELTA DIVISION

ARKANSAS — SCM, Dr. John L. Stockton, W5DRW — EA is State Director of MARS. ANR is NCS of MARS c.w. net and GII is NCS of MARS 'phone net. LNW is with the Voice of America in North Africa. OXL is mobile aeronautical from Tinker Field, Oklahoma City. BAB has a new HRO-50. AY is new EC for Little Rock. AJA operates on 3.5, 3.85, and 7 Mc. with two converted Western Electric jobs. PZB is on 28 Mc. with 807. GWT has new 1st-class commercial ticket and a position with Philco. BRW is mobile on 28 Mc. and hopes to be on 3.85 Mc. also soon. PZB has been elected president of the Ft. Smith Club to

(Continued on page 88)

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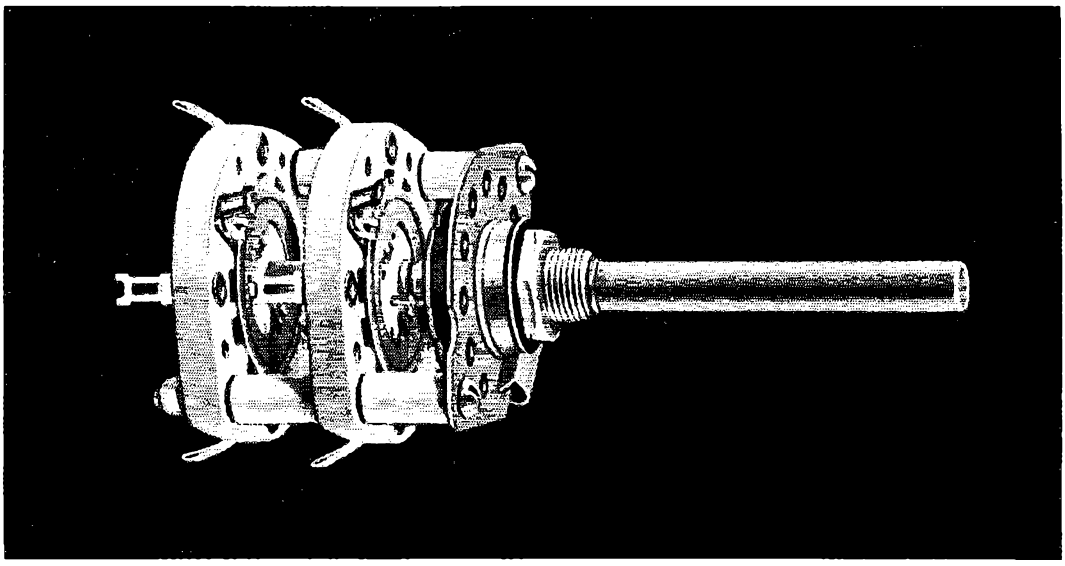

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take LNW's place. RER keeps schedules with Guam for GI contacts with home. DYF has new 32V-2. OUI, ICS, LUX, MRD, HPL, BAB, and DRW were QRL during sleetstorm. JZL has new NC-173 and BC-459 on 7 Mc. PTD worked about 20 countries the first week end of the DX Contest. QKZ QSOed UAØKFD. IDL has a pair of 813s on 14 and 28 Mc. ONL is QRL school work. The tag delay was regretted by all but was unavoidable. EGY, ICS, and AY have been making civil defense plans for communications. Traffic: W5ICS 263, ANR 108, LUX 105, DRW 97, MRD 82, FMF 62, EA 47, HPL 46, ONL 33, BAB 30, RWJ 5, ASO 2, BJH 2.

LOUISIANA — SCM, Robert E. Barr, W5GHF — Thanks to LVG for his first traffic report. HEJ, MAV, EB, KU, CEW, and other hams in the Area furnished communication facilities during the recent CAP simulated emergency test at Natchitoches. The new 40-meter net, under the direction of NG, Route Manager, got under way on Sunday, Feb. 25th, with a good attendance. This net will be known as CFN, or the Crawfish Net. NG invites all hams to participate in the new net, regardless of code speed. OLK, who has been practically non-existent on the ham bands for some time, is firing up for new activity. Minden now has two Class A stations that are active, GCS and FYZ. RDD, of Cotton Valley, is working MARS frequencies. CEW knocked off several juicy DX contacts on 3.85-Mc. 'phone during the DX Contest. HEJ has a separate rig on low power for MARS, and is rigging the Collins transmitter for crystal-control. CNG is planning code instruction schedules on the 3.85-Mc. 'phone band. KCH again is active on the Pelican Net. BMM is rebuilding the ten- and twenty-meter dual beam. QIX operates 28-Mc. mobile. Among those in the State who have 'phone patches are IYO and QH, in Shreveport; IVF and EB, in Monroe; GHF, in Springhill; HHT, FMO, and KTB, in New Orleans. ZAB is MARS director for Louisiana. Traffic: W5NG 228, LVG 90, GHF 86.

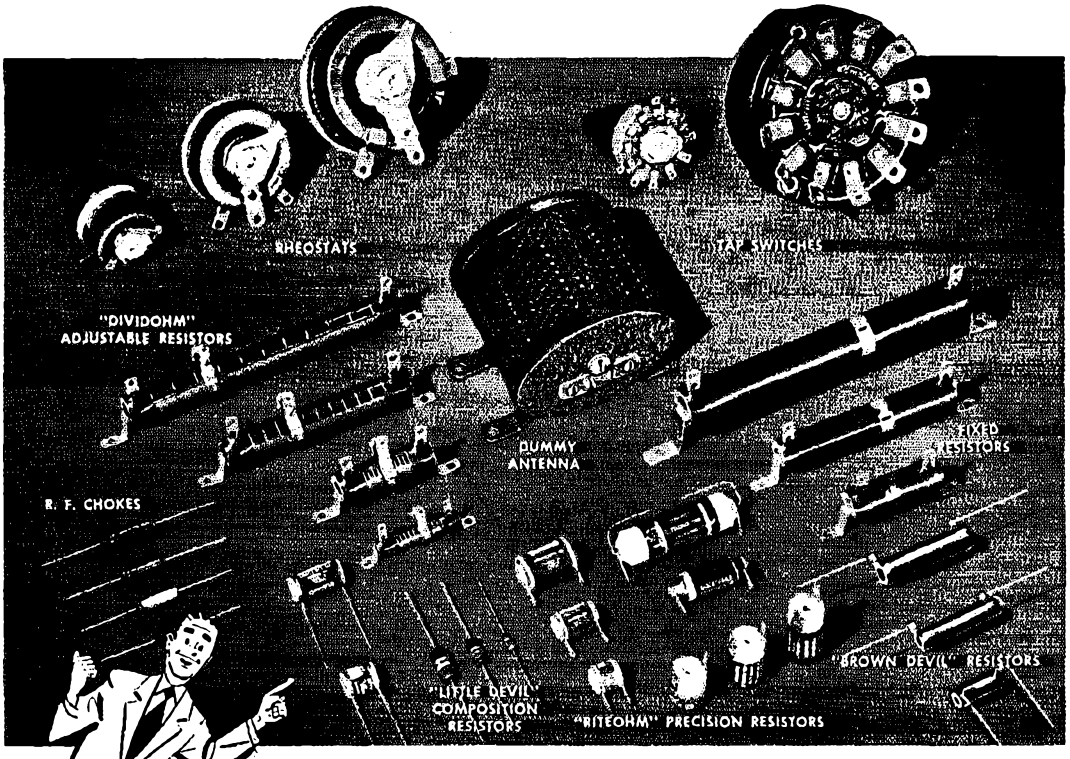
MISSISSIPPI — SCM, Norman B. Feehan W5JHS — LN is new PAM. QMQ is OBS. RDA and RFA are Class A. RDA has 250 watts on 3.85 Mc. SHX, who is blind, and SHY are new hams on 28 Mc. in Jackson. FFF is running 300 watts to a 4-125. NPO is active on 3.85 Mc. each noon. NNZ is back on 3.85 Mc. with an FB signal. Tex Beneke, 2CKD, and Maggi, 2EHR, were made honorary members of the Gulf Coast Shrimp Net. 5PWW now is 4SJG at Huntsville, Ala. WZ now checks into the Alabama 'phone net along with the Magnolia and Rebel Nets and TLAP. EGE and IGW make a very good traffic showing on the Rebel Net. QMQ has moved to Keesler AFB. 8JD has TBS-50 in his car and worked Canal Zone on one of his first contacts. SJN is a new member of the Shrimp Net. PPB now is on 3.85-Mc. 'phone. Gulf Coast Club officers are DT, pres.; RWN, vice-pres.; SKB, secy.; ANP, treas.; DLA, act. mgr. Traffic: W5WZ 122, JHS 95, QMQ 85.

TENNESSEE — SCM, D. G. Stewart, W4AFI — The call letter license plate project was brought to a successful conclusion on March 1st. The Middle Tennessee group, under the leadership of AEE, EC for Davidson County, participated in a simulated emergency with the c.d., CAP and Red Cross. The problem was the bombing of Murfreesboro and lost aircraft. 3.85- and 28-Mc. fixed and mobile units were used with excellent performance. FLW is conducting 50-Mc. tests with FWH and finds he can work consistently over the 130-mile span. HI meets the 160-meter net and is joining MARS. NNJ produced and delivered another of those informative bulletins. OGG meets the Rebel Net and Trunk Line J. RPT is on 7 Mc. meeting TXN and schedules 7OTN. AKJ is doing his spring planting. NPS again is active with new TVI-proof rig. NJE recently finished rebuilding in de luxe style he also is sporting new 84-foot tower with three-element 14-Mc. beam on top. ROF, a new call in Lewisburg, is on 28-Mc. mobile. The Fountain City Radio Club recently was approved for ARRL affiliation, with FX, pres.; ON, vice-pres.; and HHQ, secy.-treas. Are those Field Day set-ups ready? Traffic: (Feb.) W4APC 369, BAQ 243, NNJ 221, OGG 195, LUH 110, IIB 83, AFI 66, LCB 58, RPT 45, AKJ 40, RMJ 37, FDF 33, HHQ 32, RDK 32, NDC 28, FX 23, AEE 15, OCN 13, RZH 13, FHP 12, FLW 10, PMR 6, PFP 4, FEB 3. (Jan.) W4IIB 29.

GREAT LAKES DIVISION

KENTUCKY — SCM; I. W. Lyle, jr., W4KKG — VP turns in a nice OO report each month. YCC was active participant during the icestorm emergency. SFD, member of the 89 Club, is active on 3.85-Mc. 'phone. The Paducah Amateur Radio Club is going good with NBS, pres.; NEP, vice-pres.; NGU, secy.-treas.; and JYX, act. mgr. BNW works all bands daily; he has TBS-50 and other rigs. DTI, ex-Tennessee ham, reports into KYN regularly. MDB is busy with job as NCS for 9RN-Trunk Line J. IYH is a member of the Queen City Emergency Net. BAZ burned the midnight oil during the icestorm emergency and piled up a big traffic total. NIX is DX hunting on 7 Mc. NBY is busy with KYN and KYB work. MWX is working on new slow-speed net. CDA has a big job getting new stations for KYN. OGB is working on emergency communications with Henderson city officials. JDU is Northern Kentucky outlet

(Continued on page 90)



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for KYN. BXU is handling Camp Campbell traffic. LMN has moved across the river and now is a W9. YPR did a fine job during the icestorm. SHD has a mobile rig running 30 watts to an 815. MGT, our SEC, travels the State working with the ECs. CMP has a nice rig for all-band work. CDO keeps his ears open for that rare DX and works it. MVL has a "V" beam for 3.85-Mc. work. PRT is looking for a good substitute for 14-Mc. beam. Traffic: W4BAZ 417, MGT 195, CMP 164, NBY 140, YPR 105, MDB 95, MVL 86, CDA 46, YCC 46, MWX 44, KKG 24, PRT 22, JDU 14, OGB 9, NIX 5, VP 4, SFD 2.

MICHIGAN — SCM, Norman C. MacPhail, W8DLZ — Asst. SCM c.w., J. R. Beljan, 8SCW. Asst. SCM 'phone, R. B. Cooper, 8AQA. SEC: GJH. PAMs: YNG and TTY. RMs: UKV and YKC. New appointments include BHL as EC for Lenawee County, BKX as EC for Kalamazoo County, CLF as EC for Saginaw County, DWB as EC for Emmett County, GNS as EC for Alger County, ZGV as EC for Bay County, and ZZU as EC for Allegan County. OBS appointment went to HUD and ORS to EJD. Grand Rapid's Annual Midwinter Hamfest was held Feb. 24th, with more than 300 attending. Civil defense was the theme and Dick Baldwin, 1IKE, from ARRL Hq., was the guest of honor. Dick also visited clubs in Detroit, Flint, and Windsor, Ontario. Congratulations to the new officers of the Allegan Area Radio Club. They are EXF, pres.; Ralph Goss, vice-pres.; FLA, secy.; COM, treas.; and JUQ, act. dir. Special congratulations to the members of the Midland Radio Club. BVY reports all of them are AREC members. A 100 per cent membership in the Emergency Corps is something every club should boast. EKY and family have been c.w.ing at the OAF residence. AQA still is walking around on air since receiving his QSL card from KH6TI, confirming a 6 A.M. QSO on 3.85 kc. SWF also is A8SWF on the MARS network. K8AIR is doing a terrific job of overseas traffic for our principal Michigan outlet. BVY boasts a new 32V-2. Delegates to the annual meeting of the Michigan Council of Clubs voted to prepare a roster of all clubs in Michigan, for distribution to all clubs. UKV combined pleasure with business at the Hamfest, visiting several shacks while in Grand Rapids. AQA's living room looked like Grand Hotel. Congratulations to ZZU on making DXCC. Traffic: (Feb.) W8RJC 630, YKC 201, EXZ 129, DWB 119, ELW 102, IV 95, QBO 85, WXO 74, DAP 67, TZD 60, WVL 59, TDO 57, W2RTZ/8 40, W8TUX 35, BVY 25, UGD 25, AYV 23, TQP 19, AQA 17, DLZ 17, QIX 17, DSE 16, OAF 16, FX 13, JUQ 11, TTY 10, LR 7, ZEE 3. (Jan.) W8YKC 190, AYV 83, ELW 82, WXO 43, EXZ 26, WVL 16, OAF 14, TUX 13, EJD 11, DOI 10, EGF 6, YMO 6, TTY 5.

OHIO — SCM Leslie Misch., W8HGW — Asst. SCMs, C. D. Hall, 8PUN; J. E. Siringer, 8AJW. SEC: UPB. PAMs: PUN and AJW. RMs: PMJ and DAE. New appointees are DZX as ORS and DMJ as OBS. IB and DAE again made BPL, along with AL, NGW, QSL Mgr., again wishes it brought to the attention of the gang that many DX men are sending in envelopes that are far too small. Walt claims that envelopes 5½ x 7½ inches are the ideal size. TRX now is 1TRX in Middletown, R. I. EZE, 16 years old, is a freshman at Kenyon College. OZA is back in the Army. The Ohio Council Net, on 3860 kc., meets on Tuesdays at 6:00 P.M. EST. PBX is interested in joining a 160-meter net. YCP gave an interesting talk on traffic-handling at the Dayton Amateur Radio Assn. meeting. DZX is initiating a slow-speed net at 6:00 P.M. Interested parties should get in touch with Sam. CARA's Howard R. Young Memorial Station, located at Red Cross Headquarters in Columbus, now has the call W8TO. BUM now has worked 98 countries. DAE found conditions poor during the c.w. portion of the DX Contest. IB, in addition to his heavy traffic load, was active during the first half of the DX Contest. Interesting items gleaned from the *R.F. Carrier:* FYT, XYL of FYR, is the fifth YL amateur in the Dayton Area; QYD has moved to Fort Worth, Texas; new members are FFM and Joe Rote; DMV is NCS for the Dayton Net, which meets every Monday at 7:00 on 7250 kc. The newest bulletin to arrive here is *Shack Gossip*, which is edited by Mrs. TWD and Mrs. BBO. From this newsy bulletin we learn that the VDDs have a new 8-lb. male harmonic; the BNs are journeying to California; TWD is mobile on 160 meters, as is MSW; seventy amateurs heard Dick Baldwin at the Club's February meeting. The Cuyahoga County Ten-Meter Groundwave Contest was held March 31st. PBZ, EC, reports that 42 mobile units are available for any emergency in the Cleveland Area. The Columbus *Carascope* tells us that two of the members received their tickets, with the calls GKE and GKN; IJ has a new 75A-2; EYE has a new 144-Mc. rig. The *Q5*, of Springfield, informs us of the following: The c.d. committee is composed of DCJ, chairman, SGQ, BMC, OKB, BLN, CAK, and CSM. OG is the interference committee chairman. Helen Harris, XYL of UKS, writes that Swami Sammy has worked 40 countries on 3.85-Mc. 'phone with his new 32V-2. Some of his "local" DX includes ZS6DW, ZL2BE, and numerous Europeans. BF again is active in 14-Mc. DX. ARRL now is issuing Public Service certificates for operation in the November blizzard. Any operator who participated and did not get a certificate should get in contact with his EC or with UPB. We again recommend that club secretaries write the SCM

(*Continued on page 92*)

"I've been amazed . . ."

(by Eimac tubes, of course)

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March 15, 1951

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San Bruno, California

Gentlemen:

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I run the 4-125A's in a super-modulated circuit and, frankly, I've been a little brutal in the way I work them, especially the one that is the positive modulator. It is biased to cut off with no modulation and a potential of 2600 volts is placed on the plate and 800 volts on the screen grid of this tube. During modulation, the positive half cycle of audio removes bias to a value which will allow the tube to conduct. During a recent transmission, this positive modulator lit up to blinding incandescence and remained that way for what was probably 5 or 6 seconds. By this time I had collected my wits and cut the power.

The grid coupling capacitor between the driver stage and the 4-125A had broken down. This disabled the bias supply and put the entire positive 600 volts from the driver plate supply on the grid of the 4-125A.

This 4-125A is still in daily use at W6DHR and is still as hard as a rock.

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Sincerely,

John B. Sargent

John B. Sargent (W6DHR)

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regarding their club's activities. Traffic: W8IB 1016, DAE 383, YCP 240, AL 212, DZX 95, UPB 94, ARO 85, CBI 76, WE 44, WAV 36, EQN 32, WAB 28, AJW 22, GZ 16, QIE 11, DXO 10, LBH 9, AVT 4, BEW 3, RN 3, BUM 2, EZE 2.

HUDSON DIVISION

EASTERN NEW YORK — SCM, George W. Sleeper, W2CLL — SEC: NJF. PCQ reports splendid progress with 2-meter net extending from Queens to Saratoga. NJF finally is on 160 meters with new mast. FAR, JPX, and QGH are building pint-size emergency equipment. JAM is mobile on 3.85 and 28 Mc. DIJ now has an XYL. ISG is on with new RTTY. BWS is mobile with gas-driven car generator. MZV is in the Army. BSA has gone to Europe. KKE completed vest pocket portable for a trip to South America. HF moved from N. Y. C. to Carmel. POY is in the Navy. IJG is going great with N. Y. c.d. net on 3995 kc. TYC is QRL with NYS bulletins. HCS is junking LF for 144 Mc. AWF now is an NCS on NYS. RYT is experimenting with mikes. CLL visited PGT. ILI and NJF are speaking at club meetings. QUJ has ground plane on 144 Mc. YBK is ensconced in a 150-year-old house on a big rhombic farm. CLL spoke to the AARA. ANB has a new jr. operator. KPT is FB after a stay in the hospital. PCQ had a big AREC meeting in Middletown and is chief of communications for Orange County c.d. Watch for State c.d. information as progress is being stepped up. HTU is fussing with clamp modulator. LRW is QRL on MARS. FEN is putting the finishing touches on a new antenna. CLL visited 1EOB. LDS has been appointed deputy communications director for Dutchess County c.d. JQI is being removed from the sick list. UKA lectured at SARA. RMA and KLZ are cross-band on 420 and 144 Mc. Congrats to LRW, who now is DXCC. CRE has a new jr. operator. Appointments: VII as EC for Chappaqua, YIA as EC for Eastchester, IJG as PAM, KBT as RM, NJF as OPS. Endorsements: HUM as EC for Columbia County, CEV as ORS. Traffic: W2TYC 156, CLL 47, BRS 41, W8GSJ/2 32, W2GTC 26.

NEW YORK CITY AND LONG ISLAND — SCM, George V. Cooke, W2OBU — Asst. SCM, Harry Dannals, 2TUK. SEC: BGO. RMs: PRE, TUK. In Queens, IHP is the new Red Cross liaison. Queens AREC now has 125 members, 48 of whom are c.d. stations and 22 active 144-Mc. stations now operating on c.d. frequencies, 145.62 and 147.15 Mc. The 10-meter net boasts 40 active stations operating two nets, 29.520 Mc. at 1900 and 29.6 Mc. at 2300, with JSV as Asst. EC for the late net. SYW, Queens County EC, still is enrolling AREC and c.d. members. SJC would like to hear from all of you. Write Lt. (jg) E. Pattacchiola, U.S.S. *John W. Weeks* (DD701) c/o F.P.O., N. Y. C. DUP, Bronx EC, is working on 220-Mc. walkie-talkie gear for c.d. use. Brooklyn has added 15 AREC members in the past month, totaling 75. A new afternoon net is functioning on 29.5 Mc. at 1500 on Fridays and a new cross-band net, 28 and 144 Mc., operates every Thursday at 2300. The Staten Island nets, under EC VKF, had an extremely busy month, with the Civil Air Patrol staging a simulated bombing attack with ten planes participating. The AREC handled all communications with JLC, NFH, ZRA, EXJ, PFL, OFD, GNX, EFA, and VKF as operators. NFH, in Richmond, a polio victim, sent a call for assistance when he found his steam pipes groaning and crackling because something was wrong with the dampers. 5RMK, New Mexico, answered his call on 28 Mc. and relayed to LOY in New Jersey, who telephoned N.Y.C. police, who arrived within 10 minutes of NFH's call. In Suffolk County, EC AJF is mobiling during drills with BEF, LCU, and DFT covering the fixed spots on 3995 kc. every Sunday at 1100. Babylon, Huntington, Smithtown, Islip, and Brookhaven have organized c.d. nets. The DPW 'phone net terminates at its southern extremity at Babylon. EKI has his 144-Mc. net working with the Red Cross. HCA is EC for Sayville and eastward and JFU is EC for Smithtown. CLG is Asst. EC for Freeport and CB is Asst. EC for Rockville Center. Nassau, with FI as EC, reports 75-meter AREC net operating on 3910 kc. Sundays at 1000 with more than 20 stations. IAG, Queens 10-meter EC, established intercounty net and is arranging 10-meter link to Philadelphia. FBMH now is living in Woodside and is joining the Astoria Radio Club. RDK is new ORS and OBS. The Levittown Club conducts a net on 7173 kc. Sundays at 0800. The New York Radio Club officers are BW, pres. FEZ, vice-pres. OBB, secy. YOU, treas. PL is seeking recruits for communications for Inter-Security Company, New York Guard, meeting in 9th Regiment Armory. KYN, station of the Knickerbocker Radio Club, now has gear on all bands, including MARS. New members are UUF, BNN, DLC, and ZED. EME, 16 years old, is a new licensee in Eastport. QYZ replaced lost antenna. SQB is back on 28 Mc. after a long absence. JKM, prexy of the Valley Stream High School Radio Club, reports code and theory classes are paying off, with GCA the first to get his ticket. TUK, RM for NLI Traffic Net, which meets at 1930 Mondays through Fridays on 3710 kc., states membership and traffic are on the upswing. VNJ finally made WAS, working Arizona with 15 watts. GP is back on 3.5 Mc. with 15 watts after years on 7 and 14 Mc. and now is a regular in the NLI Net. PF cleared two TVI cases with high-pass

filters. Traffic: (Feb.) W2BO 508, VNJ 468, EC 161, OBU 138, TUK 78, MQB 71, RQJ 41, JBQ 20, OUT 19, GP 17, BVL 14, IAG 11, IN 11, PF 9, KVG 7, LPJ 6. (Jan.) W2JBQ 6.

NORTHERN NEW JERSEY — SCM, Thomas J. Ryan, jr., W2NKD — Attention club secretaries: PLEASE put this column on your mailing list for news about your members and your club activities. ANJ and DWJ are readying gear for the latter's rural home and call FYZ. New officers of the Raritan Valley Club are NQA, pres.; TVZ, vice-pres.; IAT, treas.; EKU, secy.; and UK, license trustee. GRZ finished 144-Mc. mobile rig. CGJ and his committee have installed a complete station in the Ridgewood Red Cross. NCY left April 16th for a refresher course as Air Force major at Scott Field, Ill. FMG is the new EC of Wanamassa. GYG is the new Net Control Station of the Union County 2-meter net. It meets at 2000 every Thursday. The Westfield AREC group has completed construction of ten 144-Mc. rigs for mobile use. The Cranford AREC group has completed a similar project. LOP is the alternate Union County station in the N. N. J. 75-meter net. The Garden State ARA, on February 28th, featured a talk by Frank C. Temple, chairman of the Central New Jersey Civil Defense Communications Committee. His talk outlined the State organization, warning system, planned operation of telephone personnel, control center set-up, and he stressed the urgent need for more and more amateur mobile units. K2BO, EC of Morris Township, reports the installation of a 144-Mc. rig at the local o.d. headquarters. Similar equipment will be placed in four firehouses in the Township and several mobile units will be placed in operation. Assisting in this project are UQQ, DAE, and WCM. The entire New Jersey amateur radio o.d. committee met March 20th at the Elizabeth Y.M.C.A. Details of the meeting will be reported next month. Traffic: W2CUI 312, CGG 119, CCS 94, WCL 70, EWZ 52, LMB 47, NCY 43, ANG 30, OUS 11, LQP 6, CFB 5, CJX 4, AWY 3, NIY 2.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, WØPP — It is with deep regret that we must report the passing of CZY of Harlan. John was showing his new 50-Mc. rig to his son and friends and got across the hot ones. Let's all be just a bit more careful. SCA again leads the State in traffic, making BPL and also holding up his end in TLCN, TEN, and 6RN. YTA says he's made a fifth of his BPL. NYX reports that IZH now is in the Navy in Alaska. SCK is going back into the Army Air Corps. QVA reports two new stations on TLCN, AQL of Grinnell and TCC of Cooper. UHC reports all his extra time is devoted to the workings of the newly-formed Iowa Great Lakes Amateur Radio Club. The Club is unique in that it started with eight licensed hams and forty unlicensed. Of the latter four already have won their ham tickets. Twenty-five more are planning to take the exam in March. That's great work, fellows. *Splatter* reports that QZP now is in military service and ZAM has been called. WLL is getting the bugs out of his rig. GCZ is all tangled up with TV antennas and hasn't time to warm up his filaments on the rig. DLD and EBK say, "Business before pleasure, dang it." MRO is sporting new National 173. BQJ is making new exciter. QDB is on 3.5- and 7-Mc. c.w. Hope you fellows did your duty with respect to nominations for SCM. It won't be long before you'll reap your reward in this respect, so keep your peace. Traffic: WØSCA 545, QVA 122, NYX 103, YTA 103.

KANSAS — SCM, Earl N. Johnston, WØICV — ICV and UPU attended c.d. meeting called Feb. 28th by YCT, EC of Johnson and Wyandotte Counties, with top ranking c.d. officials and KCK and about fifty hams attending. The WARC of Wichita now has 35 mobiles and is holding simulated emergencies. MVG, of Salina, is c.d. official on radio communications. The Eldorado Amateur Radio Club and the KVRC of Topeka have formulated disaster plans. The second annual hamfest at *Plains, Kansas*, was held at the town hall March 4th. AQD, VGX, and 5PHM did a swell job for the gang as more than 20 prizes were given away. The CKRC gang, at Salina, is active all the way from 2 to 160 meters. INW is experimenting with 144-Mc. VFO after moving to new QTH. BDK is on 50 Mc. The CKRC gang has a ragchew on 160 meters every Sunday P.M. ALD, of *Hoisington*, is active on *High Plains Net* and MARS. BNU sold his 32V-2 and now has Harvey-Wells on 3.85 Mc. with the big rig on 14 Mc. HVL has moved to Clearwater. IJV reports in regularly on Kansas 75 'Phone Net with BC-696. LIX still is working with surplus Super-Pro. KØNBM soon will have BC-610 to report in on Kansas 75 'Phone Net. YFE is working with s.s.s.c. crystal filter exciter besides his traffic handling. UBI, of Paola, has just completed 144-Mc. rig and converter. 144-Mc. activity has increased in Wichita. Traffic: WØFDJ 90, NIY 72, WGM 39, MUY 22, YFE 14, KXL 10, NFE 8, KØNBM 7, WØICV 6, BNU 5, ALD 4, LIX 4, HBL 3.

MISSOURI — Acting SCM, H. Glenn Lipscomb, WØHUI — QMF is keeping weekly schedules with PLJ on 144 Mc. 144-Mc. activity is low in Southeast Mo. PLJ reports hearing 9SUV and 9VZM but did not make contact with them. He contacted 9BOV recently. PTG has 420-Mc.

(Continued on page 94)

receiver under construction. He has a new 144- and 50-Mc. antenna. WAP is working lots of schedules, mostly on 3.5 and 7 Mc. NNH, IQY, JEJ, and NIY have been assisting OUD as NCS on MON. Traffic is much lighter. 4ALA, 0CEX, ZZB, QMF, and XYLs visited with PTG recently. QMF built line filter to eliminate TVI and BCI. EBE is off the MON Net because his father is in the hospital. GCL is converting BC-191F for the Rolla Club. Another icestorm emergency existed in the Springfield Area February 16th. Communications were out between Fort Smith, Ark., and Monett, Mo. CAA lines were out in Springfield. Mobile units were used to relay traffic to Springfield and then relayed from a fixed station. 5ICS called Springfield on 3.85-Mc. 'phone with a request for special supplies needed because of broken power and communication lines caused by the ice coating. HUI acted as control station. Fifty stations called in from Missouri, Oklahoma, Kansas, Arkansas, and Illinois, standing by and assisting with traffic. Traffic: WØWAP 107, OUD 48, PTG 12, QMF 6.

NEBRASKA — SCM, Scott E. Davison, WØOED — EUT reports WOW emergency service net holding regular drills on 29 Mc., with seven mobiles and an NCS. RYG is a new ORS in Lincoln. AY and TQD again banged out BPLs. TQD is practically tied down with overseas traffic. New officers of the North Platte Club are UBN, pres.; TMK, vice-pres.; SAI, scribe; ATU, treas.; and KON, asst. secy. Net certificates have been issued to CHA, 7IIC, EAZ, ECR, THF, DHO, and 50QT, who are members of our 1.9-Mc. emergency net. We are sorry to lose DEA, but we welcome KTQ as Acting Director. AY held open house recently in honor of IXL, who was his guest en route East. JED holds a meeting for all ECs every Monday at 9 P.M. CC and HWM are ECs for Grand Island and South Sioux City Areas, respectively. GQF and LUE keep 7-Mc. warm. MJM is on 14-Mc. c.w. now. HLX is on 14-Mc. 'phone. RWV is on 14-Mc. 'phone. BPY is on 420 Mc. EDI's power supply burned up and he is back on with surplus 100-watter. VPR now is 3.5-Mc. mobile. BXJ has mobile with clamp tube modulation working FB. WYH's new QTH is Lincoln. CMO has QNY to Denver. HQQ got on c.w. and made 6 contacts in one night. AYO is now RM3c. FMW now is in MARS. AY has been appointed RM. Traffic: (Feb.) WØAY 604, RYG 348, FMW 55, IAJ 33, JED 30, KDW 27, EUT 24, SAI 18, DMY 17, BZR 11, PLZ 11, IDR 9, ZJF 8, THF 6, CC 2. (Jan.) WØTQD 1220, RYG 179.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — The gang at TIC, Barracks B at Canaan, received a nice write-up in the Falls Village paper, the *Country Advertiser*, complete with pictures. The Ridgefield boys, at TIB, also got some publicity recently in the Danbury paper. It all helps to promote amateur radio. New officers of SARC are ASO, pres.; SKO, vice-pres.; RFJ, secy.; Forslund, treas.; TCW, comm. officer. The Connecticut Wireless Assn. announces winners in the 3rd Annual Connecticut QSO Party. Five prizes were awarded. First prize went to RY, who scored 4845 points from 95 contacts with 51 towns. Next in line were LVQ 4386, LOP 4032, GVK 3182, ICP 2035. RY received a footswitch and an assortment of variable condensers and binding posts. Other winners received smaller but similar assortments of parts. The footswitch was donated by the Newington Amateur Radio League, the other items by Allen D. Cardwell Mfg. Co. and Superior Electric Co. AYC built a 50-kc. i.f. amplifier as per *QST* and says it works FB. TD gets on 3640 kc. early in the morning because of TVI and work schedule. AOS has a small VFO rig working on 160 meters for emergency work. ODW has his new MARS call, A1ODW, and has been appointed chief of communications for Redding Civil Defense. ORP is plenty busy with TV sales and service. CUH, ATE, and IKE submitted reports in the February FMT. THX is the call of the new Fairfield Univeraity Amateur Radio Society, just organized. NOA is the only licensed man in the Club to date, but a training program is in progress with the expectation that more members will qualify for licenses in the near future. The CARA now is holding its regular meetings at the Police Barracks in Ridgefield, which helps the treasury. HAX is active on the 7-, 28-, and 144-Mc. bands. LKF, in a lengthy report, advises that the AREC program is going great guns with the goal of an EC in every town in the State in order to tie in with the civil defense program throughout the State. This program is the greatest opportunity we amateurs have had, and it would be well for all of us to offer our services to the local directors in each town and city. Two or three cities already have appropriated sizable amounts of real cash for the purchase of amateur equipment for this purpose, and it is possible other municipalities might follow. Traffic: (Feb.) W1BDI 171, AYC 156, LV 137, NJM 121, VB 102, AW 101, HYF 54, KYQ 43, CTI 36, RWS 30, DJV 15, RFJ 15, NBP 14, HRR 6, KV 6, CUH 5, ODW 5, ORP 5, AOS 1. (Jan.) W1CUH 25, NBP 8.

MAINE — SCM, Manley W. Haskell, W1VV — HYH and SRQ, OM and XYL, are busy qualifying for ORS appointment. GE, FV, and LRQ were awarded Section Net certificates for Seagull Net attendance. The PAWA will sponsor the Annual Downeast Hamfest in Portland in June.

(Continued on page 96)

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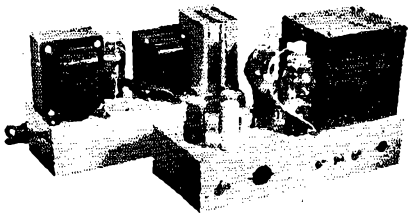

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ITU. Club president, is busy forming the hamfest committee. OTM has installed his rig in his filling station. AFT is trying to figure out how to get his mobile rig into his car. AMR dashes madly from the rig to the fire out in the backyard where he is evaporating maple sap into maple syrup. PTL, PAM for Maine, put two weeks in at a Boston hospital for a check-up and while there talked with XYL, Ruby, via KKJ and ITH with 'phone patches on both ends. OLQ also is installing a 3.85-Mc. mobile unit in his jeep so he can tell XYL Norma when to put on the beans. SFZ has returned to his old love of 7-Mc. c.w. ITH's XYL, Madaline, passed her Class B exam and now is waiting for that ticket. RYM filled in for PTL as NC of the Seagull Net until he was called to duty in the CAP. After that GE took over and also acted as anchor man at Portland for the CAP. Many Maine amateurs who are CAP members assisted in the search for a lost plane in the Millinocket area, providing plane operators, fixed stations, and mobiles. Traffic: W1QUA 142, LKP 84, OLQ 73, SWX 35, VV 32, PTL 31, NXX 28, QQY 24, HUL 21, SUK 17, ITU 13, AFT 12, QEK 11, EFR 10, QKG 8, QDO 6, AI 5, FV 5, KDE 1.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — New ECs: IAP and SKN. AWA is PAM for 50 Mc. CK, CLS, LJ, AKE, AWA, DA, HIL, CTW, and BAQ are on 50 Mc. EKT is very ill in the Melrose Hospital. PLQ held a meeting with OMD, ADL, AKD, PBM, IXD, PIZ, and PAG present. QCS held a meeting to talk over emergency work with Mr. Plant of the c.d. committee. JOJ is new QSL Manager for the W1 district. The Braintree Emergency Net is on Tues. at 9 P.M. on 28,560 kc. Active on 144 Mc.: AWO, JOB, NBT, DPV, IPC, JOZ, RPM, KRE, ASN, and KZD. SKN is trustee of SMZ at his school in Medford. A meeting of Region 5 was held in Boston with NXM, IPA, SSQ, DFS, IHA, LLY, PCR, MVO, RM, SIT, KTG, MCR, EK, BL, PXH, ALP, IMI, RQZ, BUG, and Mort Reardon present. AEZ and RX are on 144 Mc. RWT has his Class A license. PDG/KL7 is with the CAA in Fairbanks, Alaska. Look for him on 28 and 14 Mc. WK gave a talk at the South Shore Club on TVI. New officers of the Brockton ARC are FRZ, pres.; NZP, vice-pres.; OEG, secy.; IZB, treas. AAL is active on 14 Mc. CE3HN is visiting his folks in Squantum. ICP, of ARRL Headquarters, and ALP spoke at the Eastern Mass. Club. The Quannapowitt Radio Assn. had Mr. James Hurton, c.d. head of Wakefield, at its meeting. ZS6XQ, at the Boston City Hospital, recently had another operation. The Old Colony Amateur Radio Assn. meets the 2nd and 4th Wed. nights at the Community House in East Foxboro. Officers are NFQ, pres.; KQF, vice-pres.; SUR, secy.; HPV, treas.; MMY and ODQ, exec. board. The Newton gang held a drill with FUR, DYS, BL, NO, EYI, HLX, SIT, SQP, OMU, LMU, PWV, ENE, QPM, JOW, PFX, EK, and RM participating. EYI is new chief of defense net. NSZ is working on new receiver for 144-Mc. mobile work. The T-9 Radio Club held a meeting at CVM's QTH. CTR visited QP at East Harwich. The Framingham and El Ray Radio Clubs had a bowling match. AWA is head of communications for defense work in North Reading. News from Framingham: A net on 29,200 kc. meets Wednesday nights with RKD, RXH, RCJ, QQW, QIB, SRG, MEG, and MHC reporting in. New Class A hams: SON, SKW, QIB, RKD, RZF, RUW, SDY, and SOX, commercial 1st class. GD gave a talk at the Club on DX on 14 Mc. MHC had a QSO with VE2KK at a desolate Quebec WX station. The emergency net down the Cape Cod Area, on 29,240 kc. Tuesdays 7 to 8, have APN, AVY, CTZ, LYV, MBQ, ONK, OQE, OQT, PMC, SGL, SUE, and WU calling in. ODQ is director of communications for Mansfield. MMY is on 50 and 144 Mc. SCS is NCS of the mobile division of the Deep Sea Dragnet. QON, HUO, and HIH are members. ZR has 60-watt rig on 7 Mc. BB worked South America on 1.8 Mc., the first one to do it by working HC1JW. MYG handled traffic from Portland for a man on an oiler whose wife was in the hospital. PU, LVN, and AOG have been reporting into Eastern Mass. Net. FH and BGW are mobile on 3.85 Mc. for c.d. work. LAO, Saugus EC, has nets going Thursdays at 7:30 P.M. on 29.56 and 146.67 Mc. MGP has mobile rig on 28 Mc. UG is putting up beam for 28 Mc. over 14-Mc. beam for Collins and new HRO. LYV has worked 6 countries on 1.8 Mc. LMU, FUR, and ATD also are on 1.8 Mc. The Boston Mobile Group is on 29,680 kc. The Melrose Emergency Group is on 29,600 kc. The Boston Emergency Net is on 147.6 Mc. with a drill on Wednesday nights. Traffic: (Feb.) W1EMG 224, LM 146, JCK 124, TY 115, DMS 92, PU 75, SS 75, ZR 66, QGJ 34, BB 29, KKJ 29, QKM 25, ATX 23, BL 18, WU 7, HWE 6, AVY 3, LMU 1. (Jan.) W1BB 32, MHC 3, RXH 1, SRG 1.

WESTERN MASSACHUSETTS — SCM, Victor W. Paounoff, W1EOB — SEC: JYH. RM: BVR. Net frequency, 3725 kc., Mon. through Fri. at 7 P.M. and 10 P.M. Slow-speed net Mon. and Fri. at 6:30 P.M. Along with JYH your SCM had an enjoyable visit with Pittsfield Radio Club. AREC activities are progressing very nicely there. JYH also gave a pep talk to the Worcester County Radio Club. THU is handling considerable traffic for a newcomer to the section in spite of low power. BDV has storage-battery-operated equipment in the shack available at the flip of a switch. Among other things, being a brand-new papa has kept COI inactive of late. BVR is converting low-power rig to operate 28-Mc. emergency nets. MUN

played host to RDR and JYH after the recent c.d. meeting. MOK runs two sessions of the emergency net in Chicopee in order to accommodate second-shift workers. KJO expects to have ham rig for /MM operation aboard SS *Mobilight* running between New England and Gulf ports. RZG is giving 14 Mc. a try with ten watts. RHU's geiger counter broke down. New ECs: JOU, AGM, LSZ, SIB, and BDV. The Hampden County Radio Club voted in SIB, who became member No. 104. Considerable interest is shown in a West. Mass. QSO Party. Details later. PGQ and 9BIB/1 have been recalled to the armed services. SIT has Class A ticket. We are happy to hear that AZW's recurrent heart trouble is curable. If you haven't started your Field Day planning, better get going because time is growing short. Enjoyable visits were held with 2CLL, SCM E.N.Y., and 3DVW, ex-1DVW, who were in town recently. We still are looking for applications for ORS, OPS, OES, OBS, and OO appointments. What say, gang? Traffic: (Feb.) W1EOB 171, THU 108, BVR 49, AZW 41, JLT 17, GVJ 13, RHU 11, MOK 9, BDV 8, RZG 6. (Jan.) W1RHU 61, RZG 28.

NEW HAMPSHIRE — SCM, Norman A. Chapman, W1JNC — SEC: KYG. RM: CRW. See March *QST* for N. H. net schedules. AWZ is back on the air and ready to go on all bands, 160 through 2 meters. Did you know that Dot Evans, FTJ, is president of the YLRL? When in contact with JA2DS, Tokyo, Japan, be sure to ask for SKU; he comes from Hopkinton. POK needs only an Algiers QSL for his WAC. JTI would like to get a net started on 28 Mc. Look for him at 8:00 P.M. Thursday evenings. EWF has added a ZK (Cook Islands) contact to his list of DX stations. On Feb. 27th and 28th the Concord Brasspounders operated station OC/1 at the Suncook Hobby Show. Traffic was routed through RZD on 3.85- and 28-Mc. 'phone. IJB was chief operator, with AOQ, APK, and JNC assisting. Section Net certificates were issued to the following members of the N. H. Emergency Net: ANS, APK, APQ, AUY, AXL, BST, CRW, DUB, EWF, GMH, GTY, HRI, JGI, KPL, KYG, MCS, NKI, OST, PBE, PFU, POK, QGU, QJX, QJY, RFP, RYC, RYS, SAL, SGD, and SQF. I invite all club secretaries to send in a monthly report on club activities. Traffic: (Feb.) W1PFU 59, JNC 30, MCS 29, QJX 21, POK 19, GMH 12. (Jan.) W1RFP 3.

RHODE ISLAND — SCM, Roy B. Fuller, W1CJH — SEC: MIJ. RM: BTV. PAM: BFB. RIN meets Mon. through Fri. at 1900 on 3540 kc. A visit to the Providence RA at the Armory of Mounted Commands revealed an excellent station set-up to handle Providence c.d. amateur communications. Transmitters for all bands were in evidence with separate operating positions. The ground work for a proposed Federation of Rhode Island Radio Clubs was discussed and three clubs already have appointed two delegates for the first assembly, namely PRA, Cranston, and NAARO. Letters to all other active clubs have been sent, and I am awaiting replies before setting a date for the first meeting. The NAARO transmitter room has undergone a complete overhaul with console arrangement and separate operating positions for each band. New active 144-Mc. mobile stations in NAARO's 144-Mc. emergency net are BFB, QBZ, RVQ, and CJH. New Class A hams are NCX, KNE, and NES, all active on 14-Mc. 'phone. OLW reports first c.w. contact after ten years of active ham radio. NAARO visited the Foxboro, Mass., Radio Club recently. Traffic: W1BBN 114, BTV 44, CPV 15, HRC 11, OIK 10.

VERMONT — SCM, Burtis W. Dean, W1NLO — SOV has Class A ticket. MMV is on 144 Mc. with SCR-522. SVT has been appointed OBS. IT's ORS appointment has been endorsed. SPK and TFB take turns on VTN to cover the Middlebury Area. BNV and family moved from New Jersey to Vermont. BJP, IT, and RLS are working VE2AGK at Sherbrooke on 144 Mc. SVT is mobile on 29 Mc. ETE and LYD visited KJG recently. TIM is Harvey Merrick of Springfield. On Feb. 25th the BARC sponsored its first 10-Meter Treasure Hunt, QQN/M, with PMH and Fred Terrien, were hidden somewhere in Colchester. QEG was the first to find them. Mobile units taking part were QNM, with OKH as 2nd operator, QVS, RPR, TBG, and TEW, with NLO as 2nd operator. Don't forget the Annual ARRL Field Day June 23rd and 24th. Traffic: (Feb.) W1KRV 117, OAK 57, RNA 46, AVP 40, IT 28, JLZ 22, ELJ 9, NLO 9, KJG 2. (Jan.) W1KRV 147, OAK 61, RNA 47, JLZ 45, AVP 20, IT 17, ELJ 15, BJP 5, NLO 4.

NORTHWESTERN DIVISION

ALASKA — SCM, Charles M. Gray, KL7IG — PE and the EC gang have completed the plan for Alaska and are distributing copies to all Alaska hams. The main point is in case of emergency monitor 3995-kc. 'phone and 3505-kc. c.w. Alternate frequencies are 7130 and 14,260 kc., depending on conditions. For local work plan on using 28, 50, and 144 Mc. For roll call on Alaska nets, stations above 60 degrees latitude check into the northern net, PE and ADN, Net Control Stations, calling at 2200 AST. The southeastern net, with RU, IG, TI, CZ, and NXI rotating as Net Control Stations, call at 1800 AST. TM has been relaying S.E. traffic north on c.w. GI, Juneau EC, has been organizing things locally on 28 Mc. and holding weekly air checks. The Anchorage Radio Club now has a news sheet with AEG as publisher.

(*Continued on page 98*)

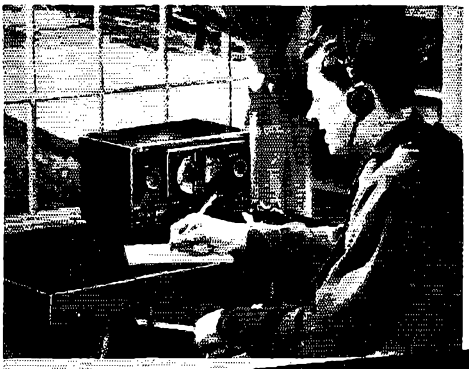
IDAHO — SCM, Alan K. Ross, W7IWU — Burley-Rupert: A newspaper clipping sent by MCM showed the activity of ECs HAH and FT, and members MJZ, VAC, JBK, NGU, MCM, and JHY in simulating radio communications to be furnished to aircraft spotters. Paper clippings and photographs came in from EC FRM of Lewiston telling of a simulated emergency for Lewiston. FRM and the Naval Reserve station K7NAZ directed the operations of AOO, OOW, HKK, ONP, and DTJ, with c.d. officials looking on. In addition to the above, we have ECs in Moscow, Twin Falls, Nampa, and Boise. We need an EC for Pocatello. NH is looking for relief as NCS of PAN, Boise: AHS and IWU are running down power leaks. GHT moved to Boise from Moscow. OUD, from Nyssa, visited the SCM recently. Move your traffic on the FARM Net on 3935 kc. or the GEM Net on 3745 kc. Boise "score" in the October SET was 155. Traffic: W7NH 448, EMT 30, FIS 25, IWU 8, GHT 2.

MONTANA — SCM, Edward G. Brown, W7KGJ — Helena and Thompson Falls are organizing for civil defense, as reported by BIS and BXL. BNU is using break-in. COH has been busy constructing a chicken house (probably a dog house). The Missoula gang is active in emergency work on 160 and 10 meters. CVQ is building a transmitter for a young Canadian ham. KUH has returned from Oklahoma, where he has been in CAA school. Thanks to the Butte gang for the excellent response in the recent emergency drill. GFV and SAW are moving to new QTH in Billings. JHR has been transferred from Dillon to Billings CAA office. AYG is newly-appointed EC for Eastern Montana. CPY is wintering in Florida. Rex also was in Mexico for a few months. OPM has just completed his new all-band 807 transmitter. KGF reports Montana 'phone net attendance has improved considerably lately. CAL is running 250 watts on s.s.b. BHB and BAR also are on s.s.b. LOD is grinding crystal for 'phone net members. Montana emergency work should be stepped up as indicated by the lack of reported activity. Traffic: (Feb.) W7KGJ 178, CT 117, KGF 26, BNU 24, COH 9, LBK 8. (Jan.) W7COH 40, LBK 14.

OREGON — SCM, J. E. Roden, W7MQ — ESJ missed BPL by one point. HLF reports more and more Oregon communities are becoming interested in the AREC. AXJ is rebuilding some surplus rigs for 144-Mc. operation. KTG has just finished a dandy 10/20-meter beam with a 2-meter beam of sixteen elements on top of a pole 80 feet high. JRU and IDJ received fine publicity on their emergency communications plans. EJF has solid footing with c.d. officials in the Coos Bay Area in his AREC planning. The Oregonian Amateur Radio Society, GCT, secy., will present an engraved cup to the most outstanding amateur in Oregon. IEJ is active again on the c.w. frequencies. NYW, the Baker Amateur Radio Club station, now is on the air on 3.85-Mc. 'phone, 3.6-Mc. c.w., and 7-Mc. c.w. New Baker Club officers are AOL, pres.; Ferd Renz, vice-pres.; NQD, secy.-treas. BS, former City Manager of Milton, now is new City Manager for Baker. FJD has moved from Burns and now is located in Roseburg. FNX reports new officers of the Astoria Club are HJU, pres.; EBQ, vice-pres.; COZ, secy. JMY now is mobile on 3.940 Mc. and is getting good results. AMF announces that he will accept registration fees now that Coos Bay is definitely going ahead with the OARA Annual Convention. Traffic: W7ESJ 221, AJN 121, MQ 118, OVO 106, HLF 104, IIV 77, BSY 72, GUR 47, AXJ 38, NOJ 21, NFU 16, FY 14, KTG 13, SY 12, KHV 11, BDN 10, NGG 10, ADX 9, GXO 9, BUS 7, NWE 7, ORX 7, JKU 4, JOG 4, KTF 4.

WASHINGTON — SCM, Laurence Sebring, W7CZY — SEC: KAA. RM: JJK. FRU handles traffic on four nets. FIX reports the WSN meets on 7265 kc. at 1300 PST and averages six messages per session. KCU burned out a transformer during the YL/OM Contest. ZU checks into the c.w. section of the Alaska net ou 3695 kc. KL7TM is NCS. FWD and FWR are working on emergency gear. DRA nearly had to call out the AREC as he had a foot of water in his basement. LVB now has an emergency rig that will work from car, duck, boat, or plane. BX swapped houses with LEV. KIX has a 67-foot vertical for 3.85 Mc. MLZ has a welded aluminum gamma match beam on 14-Mc. c.w. GAT operated from Conway during the Skagit River flood. KAA is using clamper tube modulation and checking into the WARTS Net. AIB has joined the AREC and checks into W8N. ACF blew his big plate transformer so now is on flea power. LTK, EC for Pullman, joined the MARS and is NCS for the Inland Empire Emergency Net, which meets on 28,800 kc. at 2000 PST Sundays. EYS spent January in KH6-Land and now is back in Bellingham with schedules with KH6CT and JA2HB. APS still is busy at the bank, but manages to handle a message now and then. EVW is active on 29.3-Mc. mobile and MARS. ETO has been working LUs on 28-Mc. c.w. and 'phone. KTL reports in on OEN and WARTS. NWP now works at Boeing. BG finally handled a message again. DDQ expects to be called up for military service so will be portable from somewhere soon. IG works Yakima on 28 Mc. over the mountains. CWN is rebuilding again. EAU, EC for Lewis County, still is on the night shift. JPC, EC for Kirkland, checks into WARTS and has a fine mobile rig. Traffic: W7IOQ 1183, CZY 937, FRU 359,

(Continued on page 100)



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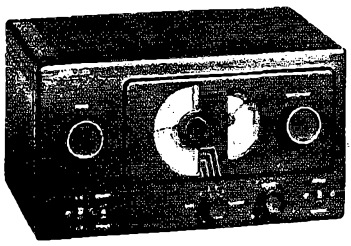

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PACIFIC DIVISION

HAWAII — SCM, John R. Sanders, KH6RU — Many U. S. Pacific Islands now have become a part of the Hawaii section. Please let the SCM hear from you, particularly if he can be of any aid with your traffic and operational problems. HARC and the Honolulu Mobile Club are engaged in extensive planning toward providing emergency communications for the Hawaii Disaster Relief Council. KA was unanimously endorsed by HARC to continue as assistant to the Pacific Director. KL operates portable 14-Mc. 'phone on Palmyra most Sundays when he flies down on business. AN built a new home at Waimanalo then had to add a room to hold the ham equipment. ADY finds the new baby at his house is curtailing his traffic schedules. HJ is busy with disaster aid station work. KR is busy with his new broadcast station KILA at Hilo. RU rode with the radar on the S.S. *Lurline* for two weeks, hence no column last month. Sorry, fellows. Traffic: KH6ADY 28.

NEVADA — SCM, Carroll W. Short, jr., W7BVZ — SEC: JU. ECs: HJ, JLM, JVW, KOA, KTH, MBQ, NIV, TJY, VO, and ZT. RM: PST. OPS: JUO. Nevada State frequencies are 3660, 7225, and 29,360 kc. Thanks are due OXX, CTK, JU, and ZT for pushing the Bill in the State Assembly for call letters on license plates. OBW received Certificate No. 6 for working 25 Nevada hams. The award is made through BJY, secretary of the Southern Nevada Club. EEF is on microwave. JLV, IPD, KTB, LWJ, and MAH are operating for Uncle Sam. MJP and KLK are building new rigs. ZT is new MARS station. GC had to rebuild 20-meter beam after wind damage. LXF has new Collins equipment. MXJ moved to W6-Land. CX had a visit from G3BIY. JLM works 3.5-Mc. c.w. and 3.85-Mc. 'phone. BNX and NSB are on 3.5 Mc. OXX has Collins 75A and 32V for stand-by! JU is on 3660 kc. with big rig and 3.85 Mc. with mobile. Meet your SCM mornings on 7225 kc. Traffic: W7JU 12, BVZ 9.

SANTA CLARA VALLEY — SCM, Roy I. Couzin, W6LZL — Your SCM visited the Salinas gang at its Feb. 20th meeting and had a very enjoyable time. OW, the president, had as guest speaker K6BJ, John L. Reinartz from Eimac. Another gratifying part of the meeting was the appointment of QNK as EC for the Salinas Area. I hope the Club gets behind him 100 per cent as he has a big job on his hands and every effort he puts into the job is a boost for ham radio. Other appointments are CAZ and QCB as OPS and YHM as ORS. HC is putting up a new antenna for the rig and TV. CAZ is gathering parts for civil defense rigs. He has eight- and twelve-element beams on 144 Mc. Bob Mason, in charge of Santa Clara County Communications, addressed the Los Altos civil defense meeting, which AEW and SYW attended. FTG, EC for the Palo Alto Area, reports progress very good on construction program of 144-Mc. gear. CIS is working hard on California civil defense net. QIE and CIS are giving a demonstration at South San Francisco High School on 144 Mc. and California civil defense net. The SCCARA is progressing with its 144-Mc. building program with the completion of a pilot model which worked very satisfactorily. Parts have been gathered for the group to complete at least fifteen in the near future. All those interested are welcome to participate; the more the better, as a great number would be needed in an emergency. At the February SCCARA meeting GD gave a very informative talk on 144-Mc. antennas. Traffic: W6HC 162, BPT 158, CIS 11, YHM 10, CAZ 6.

EAST BAY — SCM, Horace R. Greer, W6TI — Asst. SCM, Charles P. Henry, 6EJA. SEC: OBJ. ECs: ZZT, EHS, NNS, IT, IDY, LMZ, OJW, WJN. On March 7th the Central California Radio Council held its regular meeting at the Oakland Radio Club rooms. NGC, new ORS, has just acquired a new 32V-2 after being off the air for a year; he now is active on all bands. YDI still is plugging along. The first half of the DX Contest found the gang batting their brains out, with MVQ leading the parade. JZ turns in his twelfth consecutive BPL with a total of 1117 messages. QXN finds time to get some traffic through each month. WWT no longer is trustee of DQL, as he has moved. EHS is trying to get on 144 Mc. KPO is putting in copper pipe at Pinecrest to avoid the freeze. RCE has finished grid-dip meter. CBF has his ART-13 humming these days. The SARO 3995-kc. mobile gang helped out the S.F. Motorcycle Club in its annual endurance race, with AAQ, PMY, ZIG, and NTU doing a bang-up job. VS was used as Net Control Station. The following SARO members were present at the January meeting: BFZ, CBF, CBX, CML, CMZ, CVL, DDO, DSV, EHS, EY, FAQ, FCZ, GPY, JZ, KQQ, LCG, NZG, NZJ, QVI, QVQ, QWX, US, and ZKX. EY bought a new automobile and drove it back from Detroit. When 50 miles out of Chicago, because of ice conditions on the road and while trying to pass a truck, the car left the road and turned over. Mac was only shaken up but you should have seen the new car.

(Continued on page 108)


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Ray Meyers is working on special license plates for cars of amateurs in the State of California. MLZ reports that the number of the Bill is 893 and that State Senator Gibson is getting more support from his fellow law-makers. JVE built a new automatic adjustable one-tube two-relay 110-volt a.c. key that works FB. The Mission Trail Net asks the following question in its *Blazer*. "Got BCI and TVI trouble? When your neighbor growls at you about your transmitter busting up his pet soap opera or TV show, one way to humble him is to invite him over, show him the rig, etc. Then tell him to phone his wife and tell her to turn on the following: washing machine, electric shaver, automobile engine, sewing machine, electric vibrator, kitchen mixer, and other appliances handy. Then let him listen to the stuff he puts out that you have to listen to." OBJ is plugging along as SEC. PB has more antennas up per foot than anyone else. Traffic: W6JZ 1117, QXN 75, TI 2, YDI 2.

SAN FRANCISCO — SCM, R. F. Czeikowitz, W6ATO — Phone: JU 7-5561. SEC: NL. Phone: PL 5-6457. *San Francisco Area:* EC: BYS. Fourteen members of the SFRC and HAMS have signed up for the radio theory and radio mathematics night classes at the San Francisco City College. Warren Conant and his XYL, Mary, have a new jr. operator. GGC has a new Collins 30K and 75A-1. GCV has just completed a kw. transmitter for 14-Mc. c.w. NL has completed and is operating a 144-Mc. rig on the emergency net. The old original constitution of the SFRC, predating the war and the present club by many years, has been located and turned over to the club. JCG and SWP are handling traffic. We understand SWP's TVI has been cured, which no doubt will permit him to make BPL consistently again. The San Francisco Radio Club meets the fourth Friday at 1641 Taraval St., and the High Frequency and Amateur Mobile Society meets the second Friday at the local Red Cross Building, 1625 Van Ness Ave. *Santa Rosa Area:* EC: IEN. HQN is handling considerable traffic, and holds a 25-w.p.m. certificate. GGE is using 3.8-Mc. mobile as well as 28 Mc. ULF is building rigs for those with less available time. ELG has a 3.85-Mc. mobile working in his Cadillac. DTV, the president, and WOR, the secretary of the Sonoma County Radio Amateurs Club, are active on 144 Mc. JTR, a new member, is active on 3.5- and 7-Mc. c.w. with a GF-11. DZM has moved to his new home. FWD has a new rig running 200 watts on 3.85- and 28-Mc. 'phone. The Sonoma County Radio Amateurs Club meets the first Wednesday in the tap room of the Grace Bros. Brewery on Second St., west of the Freeway, Santa Rosa. *Marin Area:* EC: KNZ. The Marin and Tamalpias Radio Clubs are deeply interested and working together toward a county-wide amateur emergency net. Much has been accomplished in the planning, and a smoothly operating communications system soon should be a reality. All amateurs in the Marin Area are urgently requested to sign up for this essential work. The Marin Radio Amateurs Club meets the second Friday in the Engineering Lecture Room, Marin College, Kentfield. The Tamalpias Radio Club meets the third Friday at the radio room of ZUB, 232 Mirimar Ave., San Rafael. News from both clubs is solicited. *Eureka Area:* EC: SLX. The HARC continues to hold emergency drills with the 28-Mc. mobiles of the club members and the Emergency Corps works closely with the Red Cross, who have placed an amateur representative on their disaster committee as a result of the excellent work done during the Northern California floods. *Guam-Japan:* In the very short time that KG6AAD has been on the air, Clem has worked 53 different countries, and has started to handle traffic. KG6FAA continues to handle a large volume of traffic, with 1504 reported for February. JA3AC again reports a large total, having handled 1144 in February. Traffic: (Feb.) KG6FAA 1504, JA3AC 1144, W6JCG 46, HQN 41, KG6AAD 6, W6ATO 5. (Oct.) W6EQQ 24.

SACRAMENTO VALLEY — Acting SCM, Willie van de Kamp, W6CKV — Asst. SCMs: Northern Area, 6YNM; Central Area, 6CKV; Southern Area, 6SUP. SEC: KME. ECs: Met. Sacramento, AUO; Walnut Grove, AYZ; Dunsmuir, JDN; Mount Shasta City, EWG; Paradise (Chico Area), HBM; Roseville, GHP. RM: PIV. OBS: AF, BTY. PAM: ZYV. OES: PIV, GHE. OOs: ZYV, YNM, BTY, GDO, YV. OPS: JDN. Nets: Sac. Emergency (city) AUO NCS. Sac. Valley Net, JEQ NCS. Mother Lode, UNT NCS. Tall Pine, YNM NCS. *Northern Area:* DDC is installing 28-Mc. mobile in the car. IEO was called back into submarine service as RM2. OUZ is heard on 160 meters for schedules only. ANR, of Ruth, also is KIJ, at Redding. *Central Area:* ICO, of San Mateo, now is in Chico. KYO is on 144 Mc. WYX is back on the air after a move to Sacramento. The GERC devoted its February meeting to a discussion of communication requirements of various defense organizations. GUX built 1000/100-kc. frequency standard. Checks of local coverage with mobile on 10 and 160 meters favor 160. ZNU is building a house. TID cured BCI by reducing power. *Southern Area:* New officers of SARC are QEO, pres.; DJL, vice-pres.; WLI, secy.; GZY, treas.; QYQ, sgt. at arms; AK, rep. to Pacific Div. directorate. BVK spoke on c.d. and emergency communications. CIS discussed division matters. GDO is building p.p. 814. HTS schedules HRO daily on 3.5-Mc. c.w. ZF reported

(*Continued on page 104*)

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for active duty Feb. 23rd. Traffic: W6PIV 105, JEQ 104, KRX 72, JDN 49, HNL 28, ZF 27, IEO 23, GVA 8, HTS 6, GDO 5.

SAN JOAQUIN VALLEY — SCM, E. Howard Hale, W6FYM — SEC: FYM. ECs: CQI, FIP, GCS, GJO, HIP, HZE, JPU, EHN. RM: GJP. ORS: GJP, HU, GRO, LRQ. OPS: GRO. OBS: EXH, GRO, OHT, GS, GRA. OES: UWY. OO: FKL, GRO. EXH, at Ripon, is the first winner in this section of the W6MVK 2-meter Marathon Trophy. GJP reports SJVN activity is on the increase, with 123 messages handled during February. SJVN meets Monday through Friday at 1900 on 3525 kc. HZE reports that GJP is instructing code at Taft Night School and donating his salary to the Taft ARC treasury. EHN reports that the Bakersfield gang has an AREC program going with separate drills on 3.85, 28, and 144 Mc., and has installed 3.85-Mc. mobile in the Red Cross station wagon used by the Bakersfield Red Cross emergency director. EPQ, at Madera, sold out ham equipment lock, stock, and barrel to LBJ. GCS reports that Tulare County has 22 full AREC members drilling on 3895 and 1900 kc. New officers of Fresno ARC are MGN, pres.; PDD, vice-pres.; JCB, secy.; QON, treas.; PXP, ZNX, SUV, GUZ, and ZVP, directors. FKL is editor of *Skip*, the club bulletin. KFZ is a new call in Stockton. The Modesto Amateur Radio Club held its first meeting Feb. 27th at the home of GKX. The Club has an emergency net on 28.8 Mc. each Monday at 1930. Traffic: W6GJP 25, EXH 18, LRQ 17, QUE 17, K6AU 15, W6GYH 13, EPQ 11, FYM 8.

ROANOKE DIVISION

NORTH CAROLINA — SCM, Herman J. Jolitz, W4DCQ — SEC: ZG. PAM: DLX. RM: AKC. A very FB meeting was held in Charlotte with combined N.C. and S.C. League members present. CVQ and ZG gave timely talks on ARRL affairs and on emergency work. EDA has received Class A license and is keeping schedules on North Carolina c.w. net and on MARS. DSY, DCQ, IFR, and NYN were active in the first 'phone section of the DX Contest. A ham meeting on the order of the old Floating Club will be held in Asheboro early in April. Winston-Salem held a very successful EC drill with 15 member stations in operation on 144 Mc. An EC meeting held in Raleigh recently was well attended by the hams and the civil powers-that-be. The North Carolina 'Phone Net is in fine operation each week night with most of the members checking in each time. BKG and PZE are new Class A ticket holders. PNF is reëstablished at his old location in Fayetteville after his temporary move to Georgia. SGD, even though fighting the TVI, is getting well known on 28 Mc. She is interested in the radio side of the conversation more than the usual "Yak-A-Ta, Yak-A-Ta." It appears that the DX conditions laid the well-known egg during the first week end of the DX Contest. PMO got his beam hung in a tree while rotating it. Traffic: W4LCV 327, IMH 209, CYB 121, AKC 104, NZG 85, RGH 80, JPY 54, REZ 53, DLX 48, GMY 42, K4WSC 37, W4DCQ 18, EDA 17, DGU 13, SAL 12, CVQ 10, FRH 8, ANU 7, IYP 4, RXI 3.

SOUTH CAROLINA — SCM, Wade H. Holland, W4AZT — The Greenville Club held a successful meeting on TVI the first week of March with about 90 set-owners, servicemen, dealers, and hams present. The League film on TVI and the FCC releases fully explained why so much interference is received in this sub-fringe area. Most of the local hams have reduced harmonics below the interference level now. ANK made BPL again this month and reports that MRJ is on 28 Mc., BIZ is building a kw., and IW is a new member of 4RN. He also says that the Charleston group expects to get about fifteen new hams licensed shortly. PDM, PLX, and OHN are on 3.85 Mc. and FFH, of Charleston, has returned to the air on 3.85 Mc. after an absence of ten years. Reports to the SCM on traffic and activity get smaller each month. A message via radio, addressed to AZT in Greenville on any band, will be delivered promptly and included in each month's report. The fellows without stamps or time can originate an activity message while ragchewing and get the reports in that way. Traffic: W4ANK 512, IW 105, AZT 50, EDQ 22, FFH 20, JSM 15, MVX 2.

VIRGINIA — SCM, H. Edgar Lindauer, W4FF — Virginia hams are sponsoring and activating a slow-speed c.w. network (VSN) at 6:30 P.M. EST, Mon. through Fri. on 3680 kc. Its sponsors are none other than 'phone men! It appears like the new FCC rules have been read with an abundance of alacrity. Known pioneers are NBA, OGX, QDX, IPA, PXA, IYI, KDV, SAD, KMS, LCW, MUP, FV, PWX, LAP, MWH, and K4AIR. Following are NCS for VSN: Mon., FV; Tues., PXA; Wed., K4AIR; Thurs., QDX; Fri., SAD. KFC reports a total of 74 countries on 3.5 Mc. with three continents on 1.8 Mc. CVO, our OO has done good work checking non-amateur stations in amateur bands. SIY is a new ham in Portsmouth. JSR is sporting an antenna farm at new QTH. NV and KMS are new ECs at Norfolk and Fredericksburg. VFN has moved to 3840 kc. LAP and MWH are doing a bang-up job as RMs, aided by QDX. FV is setting the pace in traffic-handling with a season total of 791, followed closely by FF 629, and MWH with 505. NQV, our young 15-year-old

ham, also attracts attention as top-flight model airplane builder and national contest winner. The Second Annual

SECOND ANNUAL VIRGINIA QSO PARTY... MAY 6TH

A QSO party, open to all Virginia hams will be held between the hours of 1:00 P.M. and 9:00 P.M. EST, Sunday, May 6, 1951. Every licensed amateur in Virginia is urged to participate, if only for a few QSOs, in this affair!

Bands: 3.5 Mc., 7 Mc., 28 Mc. No power limit, or mode restrictions in this get-together. Objective will be to contact as many fellow Virginians in as many different Virginia counties as possible during the eight-hour period, exchanging certain information with each station worked. Stations may be worked only once on each band (regardless of mode used) but they may be worked again on a different amateur band.

Contest call is "CQ Virginia" on 'phone, "CQ Va" on c.w.

Information to be exchanged in each QSO is to consist of the following items: 1. Number of QSO (in the party). 2. Your call. 3. Your RS or RST report to station worked. 4. Your county. 5. Your name or nickname. For example . . . W4FF might send the following message on his third QSO in the party: "Nr 3 W4FF 589X FAIRFAX LINDY."

SCORING: Each message sent counts 1 point and each one received, 1 point. Two points, therefore, are possible from each QSO. Multiply total number of QSO points by number of different Virginia counties contacted in course of party for final score.

The following frequencies are suggested as rallying points during this affair: 3550-3600 kc.; vicinity 3680 kc. (VN frequency); vicinity 3840 kc. (VFN frequency); 3900-3950 kc.; 7050-7100 kc.; 28,800 to 29,000 kc. (c.w. and 'phone). Use the v.h.f.s, too!!!

There will be prizes for winners. Get on and meet your neighbors, neighbor! All Virginia hams, except SCM, and members of the contest committee on awards are eligible for awards. All logs should be mailed to SCM before June 1. Send in your log whether you have one QSO or a dozen! Scores will be announced in the Virginia Net bulletin (a copy to each participant submitting a log) and the winners in *QST*.

all-Virginia QSO Party gets under way on May 6th. RDJ is EC for Waynesboro and Augusta County. CLD is resuming PAM activities on VFN after a three-months' absence. JAQ experienced fire hazard troubles with the rig and was his own volunteer fireman. EMJ suffers from defense activities with less time for hamming. PWX modified a walkie-talkie for civil defense work. NAD reports his SEC burden is getting enjoyably heavier. Lucky for QDX, his XYL enjoys hamming too. K4AIR, who ties in with numerous regions, areas, and NTS systems, is excellent traffic outlet. Traffic: K4AIR 498, W4LAP 257, FV 249, MWH 169, PWX 126, QDX 124, FF 117, KFC 45, KFT 41, RY8 36, IA 31, MUP 31, JAQ 27, NAD 27, LR 23, PAS 18, CVD 15, KSW 11, BZE 10, IYI 7, CLD 6.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM — DFC has received his Old Timers certificate. He is one of our most consistent reporters. AUJ hits BPL again with his excellent traffic work. BOK has a new HRO-50. Morgantown amateurs KWL, YGL, FMU, and TDJ have formed a code and theory class and have 28 regular members. JKN, with his s.s.s.c. rig, finds results amazing with low power. ELX operates on 7 Mc. and is going to higher power. PQQ, now in France, is active on 14 Mc. with an F and a 3A2 call and hopes to operate portable in Andorra this summer. BWD operates portable in Lincoln and Pleasants Counties, which is good news for those working on Worked All Counties in West Virginia. Activity is needed in Wirt, Monroe, Wayne, Morgan, and Jefferson Counties. MARA will be active in Field Day signing SP. CLX is active on the WVN 'Phone Net. He also works mobile on 28 Mc. AEN and WVF now are active on 3.85-Mc. 'phone. Traffic: W8AUJ 555, DFC 31.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, M. W. Mitchell, WØIQZ — SEC: KHQ. RMs: ZJO and LZY. PAM: KHQ. ZJO made BPL again this month. With a total of 1220 he complains that traffic was a little light this month! We didn't know until this month that he was running up all these big traffic scores with an inside receiving antenna and now has an outside one to snag more traffic. KHQ's construction on the new rig is at a standstill for the time being. LZY reports SGG is back on the air with a new Viking and has taken his Class A exam. HJX still is working on three-band VFO mobile. Yours truly and CMO are building a 'scope. WUR, on his vacation to California, worked portable with an HT-18. CMO is organizing a state-wide emergency c.w. net on 3505 kc. This net will be entirely separate from the traffic nets, so let's all give him the help he needs. PGX is Assistant SEC. OTR is Class I OO for Colorado and CMO

(*Continued on page 106*)

is Class 1V OO. The two Denver 10-meter mobile nets, the Sky-high and the DACEN, located a mother and her daughter stuck in the sand on one of the back roads near Denver. This was very well handled and proved that amateur radio can be counted on in any kind of emergency. The Colorado Emergency Net will have practice drills on emergency power which will be unannounced, so dig up those emergency power supplies and rigs and make the CEN a REAL emergency net! Traffic: WØZJO 1220, IA 34, PNK 26, KHQ 25, LZY 12, HJX 7.

UTAH — SCM, Leonard F. Zimmerman, W7SP — The Bonnivile 10-meter 'phone net, with KUX, NAY, and OSV officiating, has established reliable ground-wave relay channels from LRV in Richmond on the north to AHD in Provo on the south. ZDX and the 10-meter mobile net are doing a very fine job with about 15 mobile stations in operation and several more under construction. This outfit probably will prove to be our most valuable emergency net. JOE has offered a prize for the first mobile to contact Ogden from Salt Lake County. NUZ reports MARS has changed its meeting time and frequency to 2100 MST Fridays on 4080 kc. The Ogden Amateur Radio Club, which meets the first Friday of each month, has started a very nice little bulletin which is called *Watts News*. Traffic: W7UTM 370, KUX 33, SP 9.

WYOMING — SCM, A. D. Gaddis, W7HNI — MVK, OWZ, and JRG are active on 144 Mc. HFV is back on 3.85 Mc. and the Pony Express Net. KUB rebuilt transmitter. HLA reports the Cheyenne Club is on the active list. MWS acted detective to deliver XYL message addressed as YL. GS has been pinch-hitting for his XYL during the illness of her mother. LVU is experimenting with control-carrier modulation. AMU is keeping 3760 kc. hot. ABO is busy fixing radios. MFL has returned from the Army. NOU reports good luck with low power on 3.5-Mc. c.w. CAP radio boys are going good on 2374 kc. NOU, MFL, and HNI visited the Sheridan Club. ØZAI/7 is new in Sheridan and is on the PE Net. WATCH YOUR MAIL FOR FINAL DOPE ON WYOMING'S ANNUAL HAM-FEST! It will be held about the middle of July. Traffic: (Feb.) WØZAI/7 14, W7HLA 10, OWZ 8, EVH 4, LVU 4, HNI 2, MWS 2, WØUFZ 2. (Jan.) W7LVU 7.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Lewis C. Garrett, W4LEN — Appointments made during February were CYL, BMM, and ISD as DECs; and BFM, CYC, GBR, MEM, and PPK as ECs. PHR is a new OO from Anniston. GJW is making plans to attend the National Convention, with a new 28-Mc. mobile for company. LWO is new editor of the Mobile Club paper — five legal-sized pages, including a description of 1BZ's automatic alarm circuit. RTM, MNN, and 8IKA/4 are transfers to the section on 3.85 Mc. RRZ received an FB write-up on his recent activity in "Ice Emergency" in a Mobile paper. Anniston Club officers are HA, pres.; PHR, secy. KVY, of Birmingham, really believes in emergency rigs; he has three rigs and gasoline generators ready to go, and is planning more and better. KCQ and KUX are planning big things on 144 Mc. from Tuscaloosa. BA, back on 3.85 Mc., is looking for the old gang. In addition to KIX and BFM, MVM and OAO also meet two or more nets each night. PQZ is a new AENP member from Brewton. Messages handled on Alabama Nets were AENP, 143; AENB, 57. Traffic: W4KIX 125, MVM 86, BFM 44, HFP 44, OAO 19, FGT 12, LEN 12, GJW 8, NLB 8.

EASTERN FLORIDA — SCM, John W. Hollister, W4FWZ — Total fair traffic was 1808. Also in there with previous list were KKG, LCV, KIX, JPY, OGI, and 2PRE. The AEC is now the AREC. See your EC or club secretary for information bulletin on RACES (Radio Amateur Civil Emergency Service). RACES was widely discussed at JARS meeting with Col. J. W. Hazelton, State CDA communications officer. FWI, at Miami CDC, sent questionnaires to 560 local amateurs and reports 200 replies were received immediately. OZC will handle the Gator Net this season. New Emergency Coördinators are RWM at Daytona, JZV at Live Oak, and LMT at Sarasota. CKB and LMT now are ORS. Clewiston: PNS has gone to Eglin Field. PJU now is Class A and has 117 DX confirmations with his 32V-1. Dade City: SAS has a 3910 kc. rock ready for next October when he goes up for Class A. Deland: WS finally got QSLs for 3.85-Mc. 'phone DX from those faraway places. He is on MARS 4020 kc. net. Write KJ for information. Jacksonville: The JARS Hidden Transmitter Hunt will be the first coming to my attention this year. Lantana: TR (1TU) is a welcome traffic-handler. Miami: GHP (ORS) handled 53 messages via 'phone patch! West Palm Beach: CKB reports GAU and TR are new Rebel Club members. Code classes brought tickets to RWA and RTX. New officers of the Club are QED, RTX, and CKB. NWO is off to Japan. FXM is DXing on 7 Mc. Winter Garden: OCG reports NGP is 1CGA on the high end of 7 Mc. looking for the old gang on Saturday nights. OCG is swapping around to result in more power. Lake City: We all extend sympathy to IQV, whose home was almost completely destroyed by fire. Traffic: W4OCG 363,

(*Continued on page 108*)

REPLACEMENT TYPE FILTER CHOKES

Inductance Ratings are at 10 V. 60 cy. with Rated Current Flowing as Recommended by the R.M.A.

Type No.	Inductance Henries	Current Rating M.A.	DC Res. Ohms	Volts Insul.	Dimensions H.	Dimensions W.	Dimensions D.	Price
★C-2973	1.5	10	95	1500	1 3/16	1 5/16	1	$.91
★C-2994	1.5	200	90	1500	1 5/8	2 13/16	1 5/8	1.18
C-2974	2.0	200	50	1500	2	3 1/4	1 5/8	2.26
C-2977	4.5	50	200	1500	1 5/8	2 13/16	1 1/2	1.29
C-2975	5.5	50	330	1500	1 5/16	2 3/8	1 1/16	1.06
C-2976	8	40	500	1500	1 5/16	2 3/8	1 1/4	1.06
★C-2995	8.0	100	375	1500	2	3 1/4	1 5/8	1.62
C-2981	8.5	50	400	1500	1 5/8	2 13/16	1 1/2	1.29
C-2985	20	15	900	1500	1 5/8	2 13/16	1 1/2	1.29
C-2987	16	50	550	1500	2	3 1/4	1 5/8	1.18
C-2990	15	75	400	1500	2 1/4	3 11/16	2 1/8	1.94
★C-2991	2	250	53	2000	2 5/16	3 11/16	2	2.59
C-2993	10.5	110	220	1500	2 5/16	4	2 1/4	2.59
★C-2996	1.0	300	60	1500	2 1/4	3 11/16	2	1.94

POWER TRANSFORMERS[1]

Receiver Replacement Type - Primary for 115 V., 60 Cy. Leads R.M.A. Color Coded - Mtg. Fig. C

Type No.	H. V. Secondary Volts	H. V. Secondary DC. M.A.	Rectifier Volts	Rectifier Amp.	Fil. Wdgs. Volts	Fil. Wdgs. Amp.	Dimensions H.	Dimensions W.	Dimensions D.	Price
*P-3045	120	50			6.3	1.5	2 1/16	2 5/8	1 5/8	$2.73
P-3047	240-240	50			6.3	2.5	2 1/2	3	2	3.23
P-3048	260-260	90			6.3	3.5	2 1/2	3	2 5/8	3.82
P-2949	240-240	40	5	2	6.3 c.t.	2	2 1/2	3	2 1/2	3.53
P-2958	240-240	50	5	2	6.3	2.6	2 1/2	3	3	3.53
P-3051	260-260	70	5	2	6.3	3	2 1/2	3	3	4.53
P-3052	280-280	90	5	2	6.3	5	2 13/16	3 1/4	3 1/2	5.00
P-2957	350-350	50	5	2	6.3 c.t.	2.6	2 13/16	3 1/4	3	4.26
P-2965	325-325	40	5	2	2.5 c.t.	4	2 1/2	3	2 3/4	3.97
P-2966	350-350	70	5	3	2.5 c.t.	9	2 13/16	3 3/4	3 5/8	4.70
					2.5 c.t.	3.5				
P-2967	350-350	90	5	3	2.5 c.t.	12.5	3 1/4	3 3/4	4 1/16	5.88
P-2968	400-400	110	5	3	2.5 c.t.	15	3 3/4	4 1/2	3 13/16	7.35
					2.5 c.t.	3.5				
P-2950	325-325	40	5	2	6.3 c.t.	2	2 1/2	3	2 7/8	3.67
P-2951	325-325	70	5	3	6.3 c.t.	3.5	2 1/2	3	3 1/16	4.26
P-2952	350-350	90	5	3	6.3 c.t.	3.5	2 13/16	3 3/4	3 5/8	4.70
P-2953	350-350	120	5	3	6.3 c.t.	4.7	3 1/8	3 5/8	3 13/16	5.44
P-2954	375-375	150	5	3	6.3 c.t.	5	3 1/8	3 3/4	4 5/16	7.06
P-2955	400-400	200	5	3	6.3 c.t.	5	3 3/4	4 1/2	4 1/2	8.23
P-2956	435-435	250	5	3	6.3 c.t.	3	3 3/4	4 1/2	4 3/4	10.29
	(80-volt Bias Tap)		2.5	10	6.3 or 5	3				
★P-3071‡	360-360	180	5	3	6.3	9	3 7/16	4 1/2	4 9/16	13.23
★P-3072	360-360	180	5	3	6.3	9	3 7/16	4 1/2	4 5/16	12.49
★P-3069‡	350-350	225	5	3	6.3	10	3 3/4	4 1/2	4 1/4	13.23
					6.3	2.7				
★P-3070	350-350	225	5	3	6.3	10	3 3/4	4 1/2	4	12.49
					6.3	2.7				
★P-3059	360-360	250	5	2	6.3	2.7	3 3/4	4 1/2	5 1/8	14.70
			5	3	6.3	9				
★P-3063	360-360	250	5	3	6.3	9	5 11/16	3 27/32	4 23/32	13.23
					6.3	.8				
					5	2				
★P-3061	362-362	295	5	6	12.6 c.t.	5	6 13/16	3 27/32	4 23/32	16.17
					5	2				
★P-3073‡ †	322-322	180	5	3	6.3	10	3 3/4	4 1/2	5	16.17
	205-205	70			6.3	2.7				
★P-3066 †	375-375	170	5	3	12.6 c.t.	5	3 3/4	4 1/2	5 3/8	14.70
	325-325	130	5	3	6.3	2.6				
★P-3067 †	400-400	220	5	3	6.3	10	3 3/4	4 1/2	5 3/8	14.70
	212-212	90	5	3	6.3	2.6				

*For use with Half-Wave Rectifier Type A Mtg.
‡Socket Type. See Figure CS.
[1] All TV Powers are Fully Flux and Static Shielded.
★Indicates TV Replacements.
†Max MA High Tap Only — P-3066: 320; P-3067: 300; P-3073: 220
Max MA Low Tap Only — P-3066: 340; P-3067: 340; P-3073: 325

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A-3105	2000-20000	150	2000-20000	150/300	60	3 7/8	3 1/8	4 1/8	9.41
A-3106	2000-20000	220	2000-20000	220/440	125	4 5/8	3 13/16	4 5/8	13.23

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OZC 239, LMT 192, GHP 114, OGI 72, WS 62, PJU 45, KJ 38, FWZ 37, DES 28, HWA 26, PZT 23.

WESTERN FLORIDA — Acting SCM, Edward J. Collins, W4MS — PRV has increased power. CNK and HIZ are heard on 144 Mc. RZV has become the DX man of Pensy. SAW is building up a kw. final. PAA has 32V-2 and beam going. JPD is on 28 Mc. ACB has FB beam. PQW has been busy on 144 Mc. and with emergency net. RDC is working in the emergency net, also. MEN is heard on 14 Mc. CQF has new rotator and is building beam. FHQ will be on v.h.f. soon. DHP is looking at v.h.f. work. PTK is getting 813 ready. AGB and NN keep 4 Mc. hot. MFY handles traffic for the Far East. KJV is heard aeromobile. HJA operates 144 Mc. from Milton. PWL is a newcomer in the Pensy Area. RCH is building high-power final. VR still is 7 Mc. exclusively. LT has very FB antenna set-up. ODO is getting 144-Mc. gear ready. PLA holds forth on the nightly round tables. QK is reworking the beam. BFD is planning v.h.f. RJH pumps a wicked ground wave into Pensy. MUX is back on the air again. NJB sold mobile rig. DAO quietly works 7 Mc. NOX prefers 14-Mc. c.w. EQZ wants HRO. Traffic: W4AXP 83.

GEORGIA — SCM, James P. Born, jr., W4ZD — The Bill granting Georgia hams automobile license tags with their calls now is law. New officers of the Columbus Radio Club are CVY, pres.; OVC and TJD, instruction committee; DSV, secy. Meetings are held twice a month on the second and fourth Mondays at the Infantry School, Fort Benning. The Savannah Radio Club is in its new quarters at 144 Bull St. HBB, the club station, soon will be on from that location. KGP is trustee for HBB. FNY now is on 3.85-Mc. 'phone. GMP, now in Key West, Fla., is operating OVP, the club station of which he is trustee. K4WAR's beam stopped rotating during the c.w. section of the DX Contest and cut down its score. KSZ is recuperating from an operation, and has his rig set by the bed. The Amateur Radio Club of Camp Gordon will hold Field Day activity at Clark Hill Dam. The Atlanta Radio Club's hamfest will be held June 10th at Robinson's Tropical Gardens on Paces Ferry Road on the banks of the Chattahooche River. A Collins 32V-2 transmitter will be given to some lucky attendant. KXX has moved to Atlanta. LXE has a new mobile rig on 3.85-Mc. 'phone. BOC has a new antenna and is on 3.85-Mc. 'phone. BOC and KWC have new DXCC certificates. FBH has 122 countries confirmed on 28-Mc. 'phone. Traffic: (Feb.) K4WAR 431, W4QCC 116, KGI 68, KGP 43, ZD 34, KOR 28, HKA 20, KSZ 8, MTS 7, NQO 6. (Jan.) W4KGP 116, KOR 14. (Dec.) W4KGP 152.

WEST INDIES — SCM, William J. Werner, KP4DJ — SEC: ES. KE has been appointed EC for the Aguadilla District. JM has been nominated communications director by CD. MX has been appointed radiologist by CD. FJ is on after a long absence using BC-474A. W3ENS visited KP4. HN installed rotator for 20–10 beams. ID now is NCS of 3925-kc. net. ES works across the Island with 3.85-Mc. mobile in motion. NJ has new Globe King. IQ and MD schedule K4USA on 7130 kc. nightly. Marge, KQ, was in the YL/OM Contest while the OM, IQ, was in the DX Contest. FAA has rhombic on 65-foot poles. KD got WPR-225. UW now is using VT keyer. MO and JQ report on the AREC c.w. net after a long absence. MO is using new transmitter. CB put up 3.5-Mc. Zepp. We need reports from MRAC, PRARC, and Cuba. Traffic: KP4FAA 29, DJ 20, AK 7, ID 6.

CANAL ZONE — SCM, Everett R. Kimmel, KZ5AW — The first issue of the revived *CZARA Bulletin*, edited by BT, was enthusiastically received. Lately, meetings of the CZARA start with the current fifteen-minute Voice of America — ARRL weekly amateur program. CG picks it off the air the previous Saturday night with his new wire recorder. Most of the active members of CZ AREC are now MARS stations. They VFOed to the MARS frequency the first drill night and landed right on the button with the Class I OOs grousing over the mountainous error of less than one part in three million. Called upon by a local steamship agent, AREC members AC, FL, GD, NJ, NM, and RM built up a weird network of KZ, HC, HK, HP, TI, and OA stations in an all-night radio search to locate an amphibian needed to remove a sick seaman from a ship near the Galapagos Islands. PC is Asst. EC in charge of mobiles. Traffic: KZ5FL 61, RM 6, BL 4.

SOUTHWESTERN DIVISION

LOS ANGELES — Acting SCM, Vincent J. Haggerty. W6IOX — A tri-county hamfest sponsored by the Santa Barbara Amateur Radio Club, for all amateurs in San Luis Obispo, Ventura, and Santa Barbara Counties, is planned for Sunday, May 20th at Tucker's Grove near Santa Barbara. Features of the one-day affair will be games, contests, raffles, a general get-together — all for a small registration fee. A copy of the *Long Beach Ham Oscillator* brings news of many and varied planned activities of the Long Beach Club. JQB is rebuilding a VFO and has erected three transmitting antennas. KYV is top traffic man for February, and by virtue of his several transpacific and local schedules a larger total is anticipated for March. GYH

(*Continued on page 110*)

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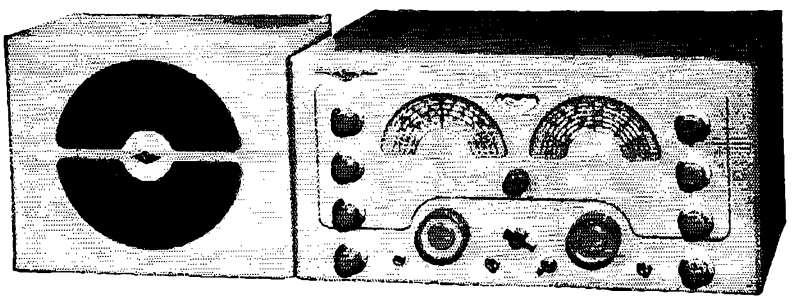

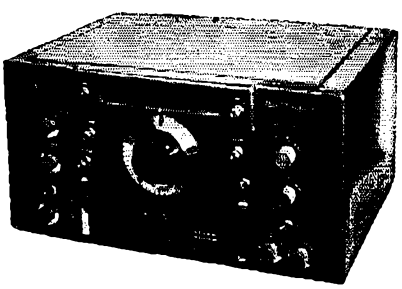

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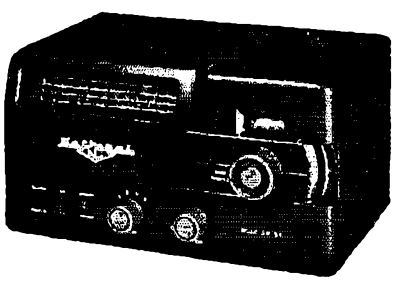

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turned in another big traffic total. DBY has a 144-Mc. conversion of an ARC-4 in progress. CMN is busy with traffic and plans for the Los Angeles Hobby Show. 7OHX/6 recently moved to Morro Bay from Oregon. HLZ is active on the Mission Trail and American Legion Nets. TDO is planning to get on 420 Mc. soon. FYW reports that the Paso Robles Club is working on a civil defense program with good results. AM has antennas pointed on Northern Europe for DX work. COZ reports that WUG has returned from Mississippi; BXP has new receiver; CZP is on 28-Mc. 'phone with Viking transmitter; COZ is sporting 24-hour clock; DGB, club secretary, had the flu; EWV is the first YL MARS station in the 6th Army Area; EXB is NCS of MARS Net Mon. at 7:00 P.M. on 27,994 kc.; GAE, club president, recently had a vacation; HYS is on 160 meters; HYO is selling out; JMY is working on 10-meter final; MJU is 28-Mc. mobile; LSR is 3.85-Mc. mobile; QE is helping SWLs get their tickets. WXG is learning to play the organ. WYM is back on 28 Mc.; WGG had transmitter troubles and TVI; YMY held high school Field Day over the Easter vacation; ZGY, now in the Army, is selling out; ARY gave tank rig to Tri-County Amateur Radio Assn. Traffic: W6KYV 1158, GYH 829, DBY 380, LDR 176, CMN 162, CKO 93, JQB 50, DTY 43, FMG 34, HLZ 27, W7OHX/6 25, W6TDO 20, FYW 12, AM 6, WMQ 6.

ARIZONA — SCM, Jim Kennedy, W7MID — Much excellent publicity for ham radio was again secured through the efforts of OIF, LQB, OLB, KUZ, and others who furnished communications for the annual Don's Trek to the Superstition Mountains. More than 800 messages were handled for the 1,200 people who made the trek. Operation was on 3.85 and 7 Mc., and coöperation was excellent from the gang on 3865 kc. In Tucson, JRC now is Class A. RIA now is 6RIA in L.A., and he had a nice write-up in the L.A. papers on his bedside station. KCS is on 3.85-Mc. 'phone from U. of A. and OYJ is ditto on 3.5-Mc. c.w. The new AZN frequency is 3785 kc. for c.w. to escape the new 'phone QRM. Meeting time is the same, 7:15 P.M. on Tuesdays and Thursdays. UPF has the Tucson police mobile panel truck equipped to work the ham bands, too. MLL figures a 44,000 score in the CD Party. JGX reports from the V.A. Hospital at Papago. BH and NDJ move lots of c.w. traffic through Arizona. QNO, radio operator in a B-29, flew over and worked the gang aeronautical mobile several times on 3.85 Mc. New mobiles in the Phoenix Area are NWA, KYN, PUM, ACD, OLZ, OLB, and LUK. Traffic: W7BH 76, K7NRZ 57, W7MID 36.

SAN DIEGO — SCM, Mrs. Ellen White, W6YYM — Asst. SCMs: Shelley E. Trotter, 6BAM; Richard E. Huddleston, 6DLN; Thomas H. Wells, 6EWU. SEC: NBJ. RM: ELQ. ECs: DEY and VJQ. AREC activity is hitting new strides in San Diego; VJQ reports 60 new members in the last month. The Imperial Valley Amateur Radio Association's Red Cross installation will take place shortly. The new time for the Orange County Emergency Net is Thursdays, 7:30 P.M.; 29,360 kc., A3 or A1; 7:00 P.M., 3535 kc., A1. The Orange County section of the Golden State Net meets Thursdays at 7:00 P.M. on 3965 kc. HDT, of Fullerton, is putting the finishing touches on a 144-Mc. cascode converter. JPL is putting all his spare moments into a 28-Mc. mobile rig. DQN recently installed a 3.85-Mc. mobile rig in his new Packard. Night school four nights a week keeps FMZ busy these days. Several of our most active amateurs in the section are victims of accidents and illness. LOL is in the hospital. VTV got tangled up with a 45-foot pole during the Soledad Radio Club antenna-raising. DLN, in the valley, was the victim of an auto accident. Dick is recovering and doing an FB job as Asst. SCM. ELQ has new AREC portable nearly ready to go! The San Diego County AREC furnished communications for the recent glider meet. Those helping were AMQ, ZYD, NBJ, VJQ, YXI, EWU, CIM, FMB, EOP, and CCK. The YLRL Field Day plans are progressing under the capable hands of JKE. VJT is settled in the new house but not an antenna is to be seen! WXJ/IGP are looking forward to a new ham shack this summer. YYM/YYN had an FB time at the February meeting of the Orange County Club! Congratulations to our newest OO, K6CN, ex-W4YE, an old hand at OOing! Traffic: W6BAM 396, ELQ 258, IZG 53, CNQ 40, FCT 35, FMZ 14, AD 4.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, William A. Green, W5BKH — Asst. SCM, Joseph G. Buch, 5CDU. SEC: AAO. RMs: GZU and LSN. PAM: IWQ. Appointments were made as EC to CMV, FNS, and POG; as ORS to ASA, CVW, GUD, GYW, HBD, KPB, MTL, QQU, RHC, and RGU; as OBS to FLA. Here is an excerpt from STEN reference to the South Texas icestorm: "A friend in need is a friend indeed. STEN is proud to say that those on whom we were depending came to our aid when they were needed. Our thanks to the members of North Texas nets who stood by to clear emergency traffic." NETEN gave assistance during another icestorm and ATG and his crew did a fine job, one of the outstanding features being the excellent team-work and procedure, with K5NBY, W5LGY, GZU, EN, FNS, and POG providing communications for

Paris, Commerce, Bonham, Denison, and Sherman, all isolated. On Feb. 4th CTARC, in connection with the Waco office of c.d., and DZ as EC carried out a simulated evacuation. Participating were seven mobiles with ATW, DZ, NCD, JUN, SAT, KRZ, RPH, and NWX. A newcomer to traffic, BRS made BPL. JOG sends code practice Monday through Friday 1900 to 2000 on 29,600 kc. The Lubbock ARC now is conducting code classes for prospective hams. The Abilene ARC Annual Banquet, with GFL officiating, was held Feb. 18th. SIB, the 11-year-old son of QJD and RTT, makes a ham family. RYI has new Millen rig, while DSV has 1-kw. gas-engine generator ready for the next storm. Traffic: W5LSN 741, GZU 596, BRS 509, BKH 212, QDF 169, ARK 166, CVW 145, LEZ 89, IWQ 63, QQU 44, PPS 43, LGY 37, BFA 36, HBD 26, JOG 25, GUD 23, ASA 21, AWT 16, IGU 14, RHC 10.

OKLAHOMA — SCM, Frank E. Fisher, W5AHT/AST — SEC: AGM. RM: FOG. PAM: ATJ. February and its sleet and ice kept AREC and the nets alert. MMH provided the Tulsa end of a circuit to Springfield, Mo., with ØHUI when CAA teletype circuit went out for five hours. BBS gave Siloam Springs, Ark., a Tulsa outlet during Siloam's icestorm which wiped out wire communications facilities. DRW, Arkansas SCM, fed Western Union and press to BBS, who was ably assisted by HFY, JJR, MAH, PHH, and WI. The South Texas Net, STEN, gave a nice four-day exhibition of what net training can accomplish. EHC has been appointed OBS. Listen to Carl's bulletin transmissions Sundays, Mondays, and Fridays on 3995 kc. The Oklahoma County AREC held two drills in February with good attendance. SLC, ex-KL7VO, now is mobile in Oklahoma City, and with AXM, BKN, MNY, ORM, OYW, POJ, RDE, and 8BIJ/5 form the 3.85-Mc. mobile section of the city's AREC. The DX bug has bitten SCX. JP has finished a new final with a pair of 4-125s. EGR, Ardmore EC, has been given permanent quarters in the Courthouse Building. OWG says he's still rebuilding and getting tired of working on the rig instead of using it. Lawton-Ft. Sill handled Easter Pageant traffic. There are plenty of BPL certificates ready, fellows. OLZ has a slow-speed net going on Tuesdays and Thursdays, 2000 hours. Give it a trial if you think the regular net is too much for you. OLZ and OPEN continue to build up membership. There's room for still more, however, so come on in. You'll be assured of a welcome. Traffic: (Feb.) W5FOM 143, MRK 139, AHT 110, OQD 72, FOG 66, MQI 53, PHR 41, IOW 35, MHS 27, MFX 25, JHA 15, LCN 14, EHC 13, WQ 12, OWG 11. (Jan.) W5JHA 23.

SOUTHERN TEXAS — SCM, Dr. Charles Fermaglich, W5FJF — OUG is building new gear. LIT has ART-13 in his Ford. IRP has 75 watts into twelve-element beam. QJD has 3.85- and 28-Mc. mobile. RTT is the XYL of QJD. RJW is active on 7-Mc. c.w. with p.p. 807s. QOF is doing lots of good with his mobile rig. NKM is active as OO. RIH is on 3657 kc. at 9 P.M. CST and handles messages from Japan, Korea, and points north. ABQ has portable at the police station. CVQ is active on c.w. FIW was active in the recent ice emergency. DIS is working 28 Mc. with 50 watts to an 807. PY reports the STEN received a flattering commendation from the FCC on the work performed during the recent icestorm emergency. Plan to attend the 6th Annual Convention of STEN at Kerrville on May 26th and 27th. Contact PY for details. AQE is active on OLZ, NTX, and STEN on 3.85 Mc. IPT is on 7, 3.5, and 3.85 Mc. and is reporting in on OLZ and CAN. AMK and LM are getting their share of 28-Mc. DX when the band is open. PNP is going mobile with a fine new rig. QGD is increasing power. PYC is on 28-Mc. 'phone at times. LFW moved to W3-Land. JIB and IPT are making plans to go to 144 Mc. KFY is on 144-Mc. net every Tuesday night. He is using 54th crystal harmonic to get on 420 Mc. IRP and AYU are getting good results with 420. NIY is on 3.5, 7, and 14 Mc. STEN. He reports SLX, a new ham in Jasper, is on 3.5- and 7-Mc. c.w. PTV is active on NTX, RBL, RN5, CAN, OLZ, TEN, TCN, and RAN and has schedule with GZU at 1830 on 3630 kc. and LSN at 1845 on 3630 kc. PTV has inaugurated a c.w. net for S. Texas called TFC Central Net (TCN) which meets on 3657 kc. at 2100 CST each night with PTV and RIH as NCS. RFG is active on El Paso Emergency Net at 8 P.M. Monday on 29,040 kc. He works CE1CP in a Chile mining camp for El Paso families to chat with their children in Chile. MRV has new emergency set-up with 2.5 kw. light plant. OQI is Class A now. FJF is captain in the State Guard (communications reserve). Any operators interested in State Guard operation in Harris County should contact him. PTV is OPS, OES, OBS, and OO. IRP, RTT, QJD, RJW, OQI, MRV, PTV, RVE, KFY, and DIS are official mobile units. QOF is new OPS. MK is heard on aeronautical mobile. OWL recently completed h.v. power supply. RVE, at U. of Texas, is on all bands with a pair of 807s. ADZ is working lots of DX! Traffic: (Feb.) W5PTV 159, FIW 79, RIH 52, MN 44, LGG 37, RFG 13, IPT 12, ABQ 7, CVQ 5, AQE 4. (Jan.) W5PTV 190.

NEW MEXICO — Acting SCM, Richard J. Matthias, W5BIW — SEC: PLK. PAM: BIW. Acting RM: NKG. PAM v.h.f.: FAG. New Mexico 75-Meter Emergency 'Phone Net has moved to 3838 kc. In addition to regular

(Continued on page 112)

net roll-calls (Sun. 7:30 A.M., Tues. and Thurs. 6:00 P.M.), many members monitor 3838 each week day at 6:00 P.M. BIW is acting NCS. The Albuquerque 2-Meter Emergency Net meets each Thursday at 8:00 P.M. on 146.8 Mc. with FVO as NCS, MYP and QAG as alternate NCS. Local 28-Mc. nets are operating in Albuquerque and Las Cruces. The State get-together will be a picnic, at White Sands Monument, White Sands, N. M., May 19th. The time: any time you can get there, Saturday — and last — until!!! Bring your own picnic lunch. A swap-fest is scheduled. Everyone is invited. MYA has offered to make a directory of N. M. amateurs. All amateurs in the State are urged to send their names, addresses and phone numbers to MYA. Band leader Tex Beneke, 2CKD, and his XYL, Marguerite, 2EHR, visited KBP, BIW, and DRA in January. NWI is getting out a news letter for Albuquerque Radio Club members. New officers of Four Corners Radio Club are SB, pres.; NSV, vice-pres.; NTN, secy.-treas. Mesilla Valley Radio Club had talks at its Jan. meeting by PLK, SEC, and Mr. M. E. Hangus, local telephone company manager and communications manager of the local civil defense group. Sandia Base Radio Club heard OAI speak on mobile techniques at its last Jan. meeting and QPK on series tube screen modulation at the 1st Feb. meeting. Traffic: W5QKJ 232. IGO 103, A5ZU 58, W5NKG 48, ZU 47, A5NKG 4, A5QKJ 3.

CANADA
MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — The AFARS Convention, held at Greenwood Air Station, was attended by some 150 VE1s as guests of the RCAF. FQ provided the QSL Bureau at the Convention for the convenience of the DX boys. Your SCM has been named to serve on the communications committee for Halifax Area c.d. and will report to the HARC direct. Plans are being made to list all available self-powered gear and locate the HARC power plants to best advantage in the event of power failure. Local building of 144-Mc. rigs is being done by TA, NO, and LZ. Interest and activity on this band also is seen at KM, WD, and BC. AFARS, Maritime 'Phone, and E.T.N. report nice totals. DB was active in BERU and schedules Belle Isle weekly. 3AYU, ex-VX, puts a nice 14-Mc. 'phone signal in from Picton, Ont., his new QTH. HH has a new Command set VFO going. AXR worked several of the Halifax gang while in VE6-Land. RR was heard knocking 'em off in the DX Contest but took time out for a ragchew with QZ in G-Land. EK was quite active in the recent CD Party. HD now puts out an FB signal on n.f.m. WD has his n.f.m. going nicely on 14 Mc. SF is on with s.s.s.c. on 3.8 Mc. Traffic: VE1MK 109, FQ 107, OM 48, AAK 37, EY 32, TO 28, YV 26, AL 17, YO 16, ABA 15, DB 13. MQ 12, PS 11, YC 11, AAL 10, ABJ 10, KI 10, JS 9, KF 9, KG 9.

ONTARIO DIVISION

ONTARIO — SCM G. Eric Farquhar, VE3IA — Asst. SCM c.w., W. Guillot, 3BUR; Asst. SCM 'phone, E. Kimble, 3FQ. Effective March 1st the 80-meter 'phone band became 3725 to 4000 kc. The Quinte Club is very active with v.h.f. work and AZV gave an enjoyable talk at the meeting. BUY, in and out of the hospital, is doing fine. BMG outlined the design and winding of transformers at the Mohawk Club. AEY is heard on 3.5 Mc. AGJ looks in on TV. AVK enjoys DXing while convalescing. Toronto and Hamilton 10-meter emergency nets are having regular drills. Founded in 1913, the Wireless Association of Ontario still is going strong. Present officers are DAN, pres.; ATB, secy.; MK, treas. The Ottawa Hamfest will be held May 24th. The Ontario 40-meter net now holds an extra Sunday session at 1300 EST on 7267 kc. The Frontier Radio Club held a very successful banquet at which W8SPF, Great Lakes Division Director, was speaker. W1IKE, experiencing his first visit to VE-Land, likewise enjoyed the southern hospitality the Windsor Area is noted for. MJ delivered a fine talk, with Steve Balke inspiring his listeners concerning AFARS. KM, SEC for Ontario, spoke on emergency work while pinch-hitting for the SCM, who was bogged down with flu. Newcomers in Toronto are EAU and BLB. Toronto's Nortown Club is putting out a fine bulletin, as is the Ottawa Club. Newcomers in the St. Thomas Area are BVK, BHV, BLJ, BZA, and BZM. Welcome to BTR, a newcomer in Barrie. TX, in North Bay, recently contacted a lost plane carrying two sick persons. He immediately passed the information to AFARS HQ., who followed it up. Result — all safe. Traffic: (Feb.) VE3BMG 146, IA 146, ATR 121, WY 91, BUR 88, APS 76, NI 68, BTZ 63, AYW 46, BUG 45, BL 43, BNQ 43, KM 39, AHA 35, PH 31, GI 27, DGZ 20, AHO 15, BPE 15, EAM 14, VD 4. (Jan.) VE3CP 15, OJ 4, YJ 2.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GL — ADX's XYL knits him socks with his call letters worked as a pattern! CA reports Phyllis still schedules VE8SF and VE2SX in the frozen north while the OM continues

(*Continued on page 114*)

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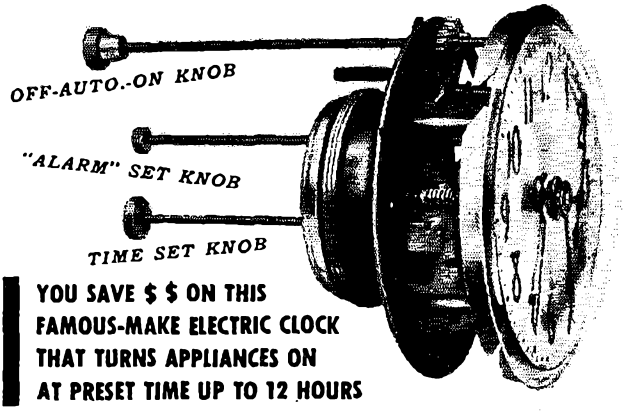

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debugging the TVI bugs. VI has 100 watts input on 144 Mc. ABJ, Shawinigan, and AGK, Sherbrooke, maintain schedule on 144 Mc. VE, PV, and ABJ took part in emergency traffic at the time of the collapse of the bridge at Three Rivers. DD is back on 3.5-Mc. c.w. ALR and AKF are endorsed and active on 3.8-Mc. 'phone. Activity on 144 Mc. continues high in the St. Maurice Valley and the boys there watch for signals from out of their own district. PQN continues to operate three nights a week with LO, AGG, BB, AKJ, CD, and GL more or less regular participants. AKJ still is using clothes line for antenna. The Lakeshore gang is laying plans for Field Day and looks forward to a bigger-than-ever "do" this year. LP has changed QTH from Roberval back to his old stamping ground, St. Jossaphat. The Montreal Amateur Radio Club now meets in Boy Scout Headquarters, 1531 Bishop Street, the last Wednesday of each month. The Club's plans for Field Day include individual transmitter groups of four operators each and interested stations and operators are invited to participate. BB and TA had W2VAQ as a visitor for a week. Traffic: VE2CA 59, CD 58, LO 32, AKJ 23, EC 18, AGG 7.

VANALTA DIVISION

BRITISH COLUMBIA — SCM, Ernest Savage, VE7FB — Our new EC for the south end of Vancouver Island is PO, and his assistant is EB. We wish to thank the retiring EC, TG, for his real good work. Vancouver amateurs had a simulated mobile emergency test with the B.C.E. Are you registered for emergency work? Hotrod Wilson still is on the soup diet; no teeth is the reason for the modulation you hear. MQ is heard more often on 3.8 Mc. AQS, DH, and GP are active on 28 Mc. from Nanaimo. HB, who has been in England, now is heading back home. XV has been under the weather, which is why he isn't heard. PD is back on 14 Mc. from Nelson. ACP worked a DL with 40 watts on 14 Mc. TN is in new QTH and back on again. ALL still is trying to mobile in his Austin but has troubles with converters and power supplies. LK is trying 811s. AMT now has 500 watts. AKG still is on the air. ARS is heard very well in Vancouver on 3.8 Mc. Traffic: VE7XA 73, AOQ 49, FB 13, UT 8.

YUKON — SCM, W. R. Williamson, VE8AK — The Yukon Amateur Radio Club is well organized and now meets once a month. The Club station, VE8CO, is on frequently. Technical free-for-alls and door prizes keep up interest. BT still is threatening to come on 'phone. AO is on a two-month leave with Austin. BK is heard burning the ether. DM, BN, BZ, and CI still get together on 3.8 Mc. Your SCM is leaving Yukon after nine years and hopes to work you from VE6-Land. Thank you all for your coöperation and best wishes to my successor.

PRAIRIE DIVISION

SASKATCHEWAN — SCM, Harold R. Horn, VE5HR — JK reports experimenting with Klystron on 3300 and 3500 Mc. and is building crystal exciter for 144-148 Mc. JD braved the worst storm of the winter to drive to Saskatoon. IC, with crew from power commission, was mobile in a snowmobile when the storm took lines down. KO is back on 3.8-Mc. 'phone after an absence of two years. MD and PK are new hams at Tisdale. TK is new at Moose Jaw. IL has a new car and is going mobile. NC and CO can be heard on 56 Mc. JT has been transferred to Dauphin. FW is out of the hospital, and SY went into the hospital. KG moved to new QTH just after putting up new skyhook. JW is doing fine as Regina EC and has his members working out on 28 Mc. HR has gone A3 and is spending considerable time on 3.8-Mc. 'phone after twenty years on c.w. PQ is building a 'scope. SW is on with controlled-carrier and an 829. JV is on 14 Mc. with folded dipole. Start now, gang, and save your dimes for the Annual Hamfest to be held in Saskatoon July 1st and 2nd. LS is the proud father of a son. 6UZ was a visitor to Saskatoon and renewed old friendships. Traffic: VE5DS 19, MA 17, HR 15, DR 7, HS 5, RB 5, YF 5, DN 4, PJ 4, SW 4, TE 4, PQ 3, LL 2, PD 2, LF 1.

Y.L.R.L. TWENTY-METER 'PHONE NET

A YLRL twenty-meter 'phone net has been organized because of the uncertainty of 28-Mc. 'phone operation. This net meets on 14,250 kc. each Thursday at 2:00 P.M. EST. Miriam, W3UUG, and Carrie, W9ILH, act as NCS. Procedure is as follows: Following net roll call, the NCS stands by for any new members desiring to report into the net. As each member reports, she gives the NCS the frequency on which she expects to operate during the afternoon. After reporting, members stand by on the net frequency to hear YLRL news. Thereafter, they move to their reported frequency to ragchew with others. If a member is unable to check in with either of the net control stations, she may contact a YL who can hear an NCS and request to be checked into the net later.

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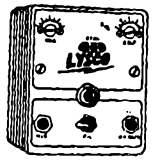

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10-11 Meters	3-6V6GT	B129T $33.55	A129 $29.95
20 Meters	3-6AQ5	A114T 33.55	B114 29.95
20 Meters	3-6V6GT	B114T 33.55	B114 29.95
75 Meters	3-6AQ5	A175T 33.55	A175 29.95
75 Meters	3-6V6GT	B175T 33.55	B175 29.95

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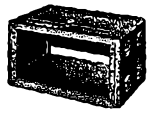

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(Use All Band Antenna on 10 by shorting coil)

110V AC IN YOUR AUTOMOBILE!

Terado's new Senior Model Inverter delivers 45 watts of 110-volt, 60 cycle AC from any 6-volt DC source! Ideal for your car, cabin, boat, house trailer, etc. Use for operating phonographs, lamps, electric shavers, motors, flourescent lights, etc., etc., etc. Compact—only 2½" x 2½" x 4" long. Complete with cord and provision for plugging into cigarette lighter socket. Standard AC receptacle provided for output.

6V DC to 110V AC — 60 cycles Model No. 6-1160 **$10.95**

JUNIOR MODEL — Identical to Senior Model except delivers 110 volts AC at 115 cycles (40 watts maximum). Ideal for AC-DC radios, lamps, etc. Model 6-110 Only $8.95

TWO METER ENTHUSIASTS

Send for complete listing of all currently available two-meter transmitters, receivers, converters, antennas, etc. Get away from TVI, QRM! You'll like two meters!

Horizontal Hamming

(*Continued from page 17*)

What are they measuring your temperature with? Tell them to put on a voltmeter and, when you get to a kilowatt, to put in a resistor. . . ."

That evening the aging little 25 watts proved it was still good for fair DX. On my back, I worked stations in Indiana, Texas, Vancouver, B. C., and Honolulu.

I'm back on my feet and back on the job now, and the station is back in its corner. I'm finding an hour or a half every day for hamming. Planning and building new gear. Rag-chewing with new-found friends like GWI and QIA.

QIA greeted me last night, from 400 miles up north, with: "Sure am glad to hear the flu bugs are letting you alone."

I'm glad they bit me, though. They reintroduced me to ham radio.

Novice One-Tuber

(*Continued from page 21*)

serve as barriers to prevent accidental contact with points where high voltage is exposed. There is little chance of getting hurt unless you deliberately stick your fingers into the works with the power turned on. You may get an insignificant burn from r.f. if you touch the coil or stators of the variable condensers with power on and key closed, but it won't injure you. Perhaps it will remind you to show proper respect for the high voltage d.c. which *is* dangerous.

Now add a couple of small control knobs to fit the ¼-inch variable-condenser shafts and the rig is complete. The transmitter is designed to operate from any supply delivering up to 350 volts. A suitable power supply, antenna suggestions and tuning procedure will be discussed in the next issue of *QST*.

Beat-Frequency Oscillator

(*Continued from page 28*)

These simultaneous equations can be solved in a number of ways, but the algebraic substitution method, although cumbersome, will probably be the easiest for those not acquainted with other forms.

From (5), (6), and (7)

$$[L_1(ADH - ADE) + DE - AH][L_1(BF - AE) + E - F] = [L_1(DH - AE) + E - H][L_1(ABF - ABE) + BE - AF]$$

Due regard must be paid to the units used — capacitance in farads, inductance in henrys and frequency in cycles per second. If a mechanical calculating machine is available, it should be used, otherwise use six- or seven-place logarithms as small differences of similar numbers are involved.

After substitution of the constants from (2), (3), and (4), the above will reduce to a quadratic equation of the form

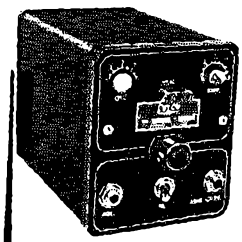
$$aL_1^2 + bL_1 + c = 0$$

(*Continued on page 118*)

Ham's Paradise!

OLDTIMER OR NOVICE

ONE OF AMERICA'S GREAT RADIO STORES



ATTENTION!!

C.A.P.

LYSCO

MOBILE TRANSMITTER

Designed especially for you—in round drawn case, black wrinkle finish, 4" x 4½" x 6", feeding a 50 ohm co-ax output—25 WATTS peak. Complete data sheet on Request.

Model No.	Freq.	Tubes Used & Prices	XMTR PRICE
A-140	2374 K.C.	3–6AQ5 —1.20 ea.	$29.95
B-140		3–6N6GT—1.92 ea.	
C-140		3–12A6 —1.74 ea	less tubes

B&W

- MINIDUCTORS
- TURRET ASSEMBLIES
- COILS • LINKS
- CONDENSERS
- TEST EQUIPMENT

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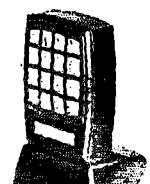
ELECTRO-VOICE MIKE and STAND

NIAGARA HAS THE COMPLETE LINE OF E-V MIKES FROM $7.50 TO $720.00



A brilliantly engineered and superbly styled low-cost mike. Complete adaptability to public address, recording and communications. Moisture sealed xtal-high impedance-output —50B. Freq. response 60–7500 C. P. S., 6 ounces wgt.

MODEL 915 crystal mike, complete with 7½' braid covered, shielded cable. Less stand.....$7.50

MODEL 415—reclining mike stand-mounts model 915 at 15 degree tilt.....$.90

MINIATURE TRANSCEIVER XFMR

Single button mike and plate to single grid.

PRI-1 1:100 ohms—terminals 3 and 4
PRI-2: 10,000 ohms—terminals 5 and 6
SEC: 40,000 ohms—terminals 1 and 2

Mounting holes 1½" apart—1½" high, 1⅛" wide, 1¼" thick. Many applications. **$1.45**

RME

VHF-152A	$86.50	RME 84	$ 98.70
DB-22A	77.00	YHF 2-11	146.00
HF-10-20	77.00	RME 50	187.50

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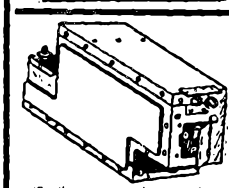
CIVILIAN DEFENSE 2-6-10

HY-LITE BEAMS TOPS 'EM ALL

2 Mtrs—4E2	$ 8.75
—8E2	20.50
6 Mtrs—PD3E6	21.00
PD4E6	24.95
10Mtrs—PD3E10	24.95
3E6–3E10	45.00
3E10–3E20	98.95

IMMEDIATE DELIVERY



NEW SHIPMENT!

ARC-5/R-28

2-Meter Receiver

Here is the 2-meter superhet you have been looking for! Absolutely one of the BEST available today! Tunes from 100 to 156 Mcs. in four crystal channels. (Easily converted to continuous tuning.) Tube lineup is as follows: 717A—R.F., 717A—Mixer, 2–12SH7—1st and 2nd I.F. (6.9 Mc.) 12SL7—Det-AVC-Squelch, 12SL7—1st audio-squelch amplifier, 12A6—2nd audio, 12SH7—R.F. Osc.—4th Harmonic Gen., 717A—Trip. 12th Harmonic Gen., 717A—Dblr.—12th harmonic gen. A highly desirable superhet, made of rigidly inspected parts and contained in a louvred aluminum cabinet measuring 7¾" x 4⅞" x 14". Complete with all tubes in original sealed cartons..... **$29.95**

FREE with each order for ARC-5/R-28 Receivers, one copy of Vol. 2 "Surplus Radio Conversion Manual" (Regular price $2.50). This volume contains circuit diagram and full description of above receiver.

BC 652-A

MOBILE RECEIVER

2 to 6 MEGS-IDEAL for Aircraft, Yachts, Amateur, Fire, Police, Taxicabs, Trucks, etc. Super sensitive (one full microvolt) 11 tube superhet circuit, including a crystal calibration check system. Continuously tuned range—noise limiter—each unit is brand new, complete with Dynamotor, Tubes, Circuit in original sealed cartons, wgt. 40 lbs..... **$39.95**

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All items ordered must meet with full approval or your money back.

which, in the example given, is

$$3365.276L_1^2 - 85.376L_1 + 0.013283 = 0$$

$$L_1 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{85.376 \pm \sqrt{85.376^2 - (4 \times 3365.276 \times 0.013283)}}{6730.552}$$

$$= \frac{85.376 - 84.303}{6730.552}$$

since the positive sign would produce an absurd result.

$$L_1 = 159.42 \times 10^{-6} \text{ henrys} = 159\ \mu\text{h}.$$

$$\text{Also, } L_1 + L_2 = \frac{L_1(BF - AE) + E - F}{L_1(ABF - ABE) + BE - AF}$$

$$= 618.90 \times 10^{-6} \text{ henrys}$$

$$L_2 = 618.90 - 159.42 = 458\ \mu\text{h}.$$

$$\text{Also, } C_2 = \frac{A(L_1 + L_2) - 1}{EL_2(AL_1 - 1)}$$

$$= 4966.0 \times 10^{-12} \text{ farads}$$
$$= 4966\ \mu\mu\text{fd}.$$

Civil Defense Portable

(*Continued from page 38*)

tion that can be worked with the low transmitter power.

When the receiver was first tested, a dead spot was in evidence on the transmitter frequency, as a result of coupling between the transmitter output circuit and the receiver detector circuit. This was corrected by turning the detector coil over to a horizontal position. This change was made after the photographs were taken.

Now we're ready to see what can be done with a fraction of a watt in the antenna on 50 Mc. The rig was designed for pack-set use, but we tried it first on the 4-element beam at W1HDQ. Stations out to 20 miles or so reported it S9-plus, and signals from as much as 100 miles away were received with good readable quality. No DX has been worked with the rig in this way as yet, but we think it will be possible to rack up some interesting miles-per-watt figures with it.

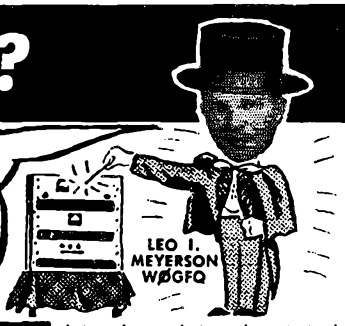
Using the 2-foot antenna contacts have been made over distances up to 15 miles, with S5 to 6 signal reports over fairly open (but not line-of-sight) paths. To check its performance in the type of service the rig was designed to render, W1LKJ was enlisted to man the home rig at W1HDQ while the writer drove and hiked around a radius of about 5 miles from the home station. No trouble was encountered in working within the confines of the hilly town of Canton, the signal from the portable holding up above S9 at the lowest spots in town. In and out of buildings, and around the main streets of the town shopping center, communication was of good telephone quality at all times. This was not surprising, as the distances were relatively short, but the payoff came when it was found that communication was also possible in most spots with the rig and antenna system entirely inside an all-steel closed car.

To test the value of the center-loaded whip, it was compared with an unloaded whip of the same length. Difference in received signal at the control station three miles away was between 15 and

(*Continued on page 120*)

TVI TROUBLES?

Do what hundreds of smart amateurs are doing. Switch to a WRL Transmitter. Our new Globe King and Globe Champion incorporate some of the latest TVI protective features . . . can give you complete "screened job" for small additional charge.



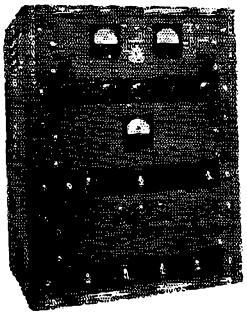
Let me know what you have to trade, any make or model. I'll allow you more for your present equipment. WRL buys more equipment . . . WRL sells more equipment. Our large volume of sales means faster turnover, greater savings for you! We finance our own paper . . . no red tape!

LOW DOWN PAYMENTS

NAME YOUR TERMS

PERSONALIZED SERVICE

NEW WRL 400-A GLOBE KING TRANSMITTER



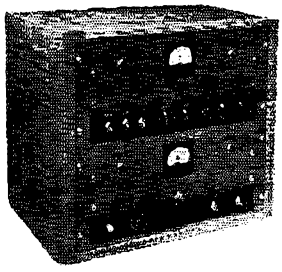
HIGH POWER
MORE WATTS PER DOLLAR

Our newest model with increased power—400 watts Phone, 425 watts CW. Incorporates some of the latest TVI protective features. Efficient performance on all bands—10 to 160 on phone and CW. Provisions for ECO. Complete with tubes, meters, and one set of coils.

KIT FORM $439.45 **WIRED-TESTED** $459.45

Low Down Payments

WRL 150 WATT GLOBE CHAMPION TRANSMITTER



MORE WATTS PER DOLLAR

R.F. Section a complete 150 watt XMTR. Provisions for ECO. Automatic fixed bias on Final and Buffer. Class B Speech Modulator. 150 watt input —10 thru 160 meter bands. Complete with tubes, meters,

KIT FORM $279.00 **WIRED** $299.00

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GUARANTEED CRYSTALS IN HOLDERS Type FT-243

160 METER

1.8 to 1.825 1.875 to 1.9
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$1.25 ea.

80-40 METER

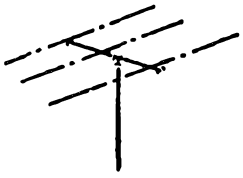
3.5 to 4.0 7.0 to 7.4

98¢ ea.

Please state frequency. We will come as close as possible.

NOW YOU CAN AFFORD TO OWN A BEAM

10 METER BEAM



Plumber's delight 3 element beam quickly assembled; furnished with Gamma match. Extremely light; all aluminum construction; grounded antenna; very low priced. Furnished less mast and lead. Full instructions furnished

Narrow spaced $15.95

Wide spaced $17.95

CU ON 20 - 10 & 75 METERS

GIANT RADIO REFERENCE MAPS

Just right for your control room walls. Approximately 28" x 36". Contains time zones, amateur zones, monitoring stations. Mail coupon today and.. **25¢**

Write for detailed XMTR specification sheets.

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Please send me:

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Name_____

Address_____

City_____ State_____

20 db., in favor of the loaded job. Even the midget loaded antenna shown in the photograph, less than one foot long overall, was superior to an unloaded whip two feet long. The one-foot loaded rod is entirely satisfactory for line-of-sight work at distances of several miles.

If some care is used in locating the control station, and if the antenna system is well up in the clear, it should be possible to cover at least a major portion of the average-sized city with good solid two-way communication.

One word of caution: The rig is not designed for long rag chews! The batteries will not last long if one persists in long-winded transmissions. There is a reserve of power, however, and the signal stands up well with battery voltages down to 60. For short-range clear paths even 45 volts puts out a good strong signal. The A battery voltage is somewhat more critical, but rotation of several A batteries will extend the service life of each of them appreciably. If transmitting is done judiciously it should be possible to get good service from both A and B batteries. The C battery service is practically equivalent to its shelf life.

Single Sideband

(Continued from page 50)

second or third one (depending upon W9PHV) to turn the trick, according to our records.

WØAHM is running a single 4-65A at about 200 watts. He uses a small transformer and a bridge rectifier, and points out that it is a good way to beat the cost of power supplies when using a high-voltage low-current tube like the 4-65A. It's an excellent thought, of course — with s.s.b. you can do quite a few tricks with power supplies, provided you keep the output condenser large. Plans for the future at WØAHM include a band-switching s.s.b. rig for 160 to 10 meters, complete with voice control.

The latest revised roster of active 75-meter s.s.b. stations compiled by **W3KPP** shows 101 stations in the U. S. and Canada. This is the seventh such list that Bob has compiled, and it represents quite a service to his fellow enthusiasts.

Don't miss the article this month by **W1FAJ** telling how he uses a loudspeaker with voice-controlled break-in. It's one of the neatest tricks of this or any other week.

The IRE Convention in New York attracted a number of the s.s.b. gang, and **W2SNQ** arranged a dinner where **W2NJR, W2AZW, W2MTJ, W3MBY, W4OLL, WØMNN** and **WØRZF** were present. **W6QYT** and **W7FFP** were around but couldn't get to the dinner where, oddly enough, some of the angles to s.s.b. were discussed. Most of the gang agreed that they like to see photographs of active s.s.b. stations in this column — we will be happy to run them if you will send them in.

And, just in case you think s.s.b. men take themselves too seriously, you should see the new

QSL card of WØMNN. The proud caption, "The first s.s.b. station in Kansas City, Mo.," is displayed under a picture of none other than Donald Duck! We're toying with borrowing the idea and adding a Chinese hat to our feathered friend, further to confound the critics.

— *B. G.*

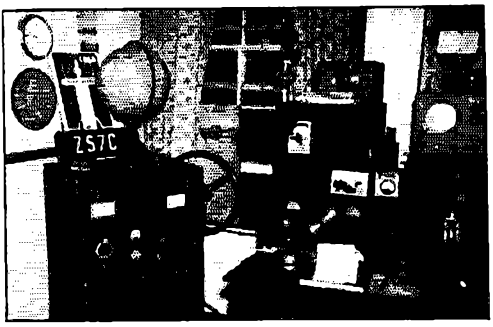
How's DX?

(*Continued from page 53*)

over to 'W,' the whole world comes back on my frequency, making that spot utterly useless!" So go the trials and tribulations of VS7RF as expressed in an air letter to W9AND. VS7RF was interested to hear that some joy-boy was using his call on 80 meters; he never touches the stuff. A pair of 35Ts and an HRO do quite well for him on 10 and 20. W9AND, incidentally, just barged into two acres of new QTH. This may explain the copper shortage . . . . . W4PFH was out to prove that it was possible to knock off 200 countries in a year but had to give it up at 187 with two months to go. He's now on Uncle Sam's payroll and operating out of Mississippi as W5DRJ . . . . . The QRP Item-of-the-Month will have to allude to W1HE and his trusty 5-watter. This fellow has 85 countries and WAC with said soup. Either a doublet or a 3-element rotary is used. What's more, we understand he uses this power all the time. To get the real kick from QRP work, you know, one doesn't have "the big rig" standing by; in fact, one doesn't have a big rig at all. 'Twould be not unlike carrying along a slung shotgun while hunting with bow-and-arrow . . . . . KS4AI and KS4AC have knocked off from Swan Island and are now once more W5s KWY and HDF respectively. The former, Ralph, raised his KS4 tally to 111 countries and stands a good chance for DXCC with 95 cards in the bag. That would be his second as he already has pushed W5KWY past the mark. Two more Swan stations should be firing up directly and they will be entitled KS4s AP and AQ. One of these will be ex-KZ5ES who reportedly works all bands, 'phone and c.w., with an 813. Thus this country should continue quite available. W5KWY, by the way, has the Louisiana license plates "KS4AI" on his car . . . . . Another chap who made tracks is ex-G2DMS who is taking up permanent residence in these U. S. and looking forward to the day when he'll be signing a W call . . . . . Everybody seems to be going somewhere, in fact. VO6EP closed his Goose Bay diggings and is awaiting the assignment of a VE3 call at his new Ottawa post. Just completing a new house, Art is afraid that he'll be QRT for a bit. Those still seeking a VO6EP card may reach him with a request using the address listed in the "Where" section. He was formerly VE1EP . . . . . ZS5LA told W9WIO that ZS2MI, ZD9AA, ZS7C and ZS8C are now all quite active on one band or another . . . . . SU1AD is providing the first legit Egyptian activity for a long time but to date has worked no Ws. He writes that he has *called* a few, however! He had better let them be call-less forevermore lest they break their heads upon their shack walls. SU1AD is "most strictly undercover" and accepts QSLs only via ARRL . . . . . The kilowatt of KW6AR still seeks N. H., R. I., Vt. and Del. for WAS and his favorite frequencies are 7070, 14,050 and 28,020 kc. on c.w. and 28,850 or 29,044 kc. while using voice. W1DJV relays this info, further mentioning that Ivan is with CAA . . . . . Formerly an Illinois 807-man, W6BES is learning the W6 ropes fast. Bud now cranks up 304TL finals for each band and has antennae to match . . . . . What HB9EL states is the first amateur ticket ever given by Swiss authorities to a permanent Liechtenstein resident was issued as HE9LAA. Friend E. Héritier adds, "Some HB9s are expecting to pass their summer vacations in Liechtenstein and to put their portable equipment on the air." Operation from this country was temporarily curtailed while regulations were being revamped . . . . . W4KVM/1 of W1AW learns that VE8MP will soon go into action at a spot 424 miles from the North Pole. This should make it the most northerly ham station and 'phone work on 75 and 20 meters is contemplated. W5SKI sponsored this gist . . . . . ZD2PLL's 300-watter has closed down according to Bud Rugel and EAØAB wrote John DeMyer to the effect he is shopping for antenna equipment with which to construct a new 14-Mc. beam . . . . . .

(*Continued on page 122*)

EL2P has a pair of 807s at 75 watts feeding a Vee and formerly held the calls W8TGQ and W2QYC. He prefers c.w. but reports that ELs 2R 2X and 9A all operate out of Roberts Field on 14-Mc. 'phone. Other active ELs are 6A of the Firestone Rubber Plantation on 10 and 20 'phone and 5A of Monrovia using 20 'phone. Harvey, EL2P, has been with Pan American World Airways since the end of the war. He advises QSL-seekers to use air mail because surface mail takes up to two months each way; PAA carries mail to and from Africa on a twice-weekly basis . . . . . Ex-HL1AL is anxious to hear from former officers and members of the American Amateur Radio Club of Korea of which he held the presidency. Also, anyone knowing the whereabouts of those who operated the Club station, HL1US. If you can help out Jack, use the QTH in "Where" . . . . . Bud Rugel sets us straight on Kuwait developments. VT1s AD DF and RF are now QRT but VT1s AB AC and AF keep



ZS7C has been bearing the brunt of Swaziland's QSO hunters for some time. Active on 40, 20 and 10, ZS7C employs a VFO-driven 807 at 50 watts, SX-17 and NC-57 receivers, and separate antennas for each band.

the place on the radio map. VT1AF runs 35 watts to an 832 on 14- and 28-Mc. 'phone and c.w.; VT1AB uses the same bands but A3 only, employing 100 watts on 807s; VT1AC sticks to 14-Mc. 'phone and c.w. with a signal emanating from a single 807 at 35 watts . . . . . The ham ambassador of good will for this month will just have to be W6AM. In the No. Calif DX Club's *DXer* we see that Don, through services rendered, received VR3C's pledged avowal to work ten Ws every Wednesday. This beats the old "thirty dollars every Thursday" routine by a nautical mile . . . . . W6AM crashed the So. Calif. DX Club's *DX Bulletin*, too, with a record of working KH6IJ on *eleven* bands — six c.w. and five 'phone. Also in this organ is word to the effect that W6CUF is hard at work lining up an expedition to Clipperton Island.

— • • • —

Undoubtedly to the great sorrow of the Chatham gang, WCC probably will never make DXCC. Unless, that is, Rule 8 and a few others were rescinded or amended. But be that as it may, the fat sig of WCC would still have to be voted "one most likely to succeed" in a 14-Mc. pile-up.

SEE PAGE 10

17th Sweepstakes

(*Continued from page 63*)

calendar now so that you'll be reminded to set aside those week ends for another bang-up operating experience.

'PHONE SCORES

Seventeenth Sweepstakes Contest

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is award winner for that Section unless otherwise indicated. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates power up to and including 100 watts (multiplier of 1.25). B indicates over 100 watts (multiplier of 1). . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3DHM 50,552–357–71–B–33, or, final score 50,552, number of stations 357, number of sections 71, power factor of 1, total operating time 33 hours. . . . Stations manned by more than one operator are grouped in order of score following single operator station listings in each section tabulation; calls of participants at multi-operator stations are listed in parentheses.

ATLANTIC DIVISION

Eastern Pennsylvania

W3DHM	50,552-357-71-B-33
W3LTU	39,060-315-62-B-19
W3EVW	300- 12-10-A- 1

Md.-Del.-D. C.

W3PWR	7964- 91-44-B—
W3EQK	7520- 94-40-B-17

Southern New Jersey

W2PQJ	6273- 77-41-B- 6

Western New York

W2PVG	20,956-169-62-B-23
W2DGV	1975- 47-25-B- 6
W2WZQ	32- 4- 4-A- 1

Western Pennsylvania

W3KQU	34,510-250-70-B-36

CENTRAL DIVISION

Illinois

W9QJR	16,986-149-57-B-15
W9IFA	8500- 85-40-A-12
W9FZJ	1679- 37-23-B- 3

Indiana

W9RZS	3118- 43-29-A-14
W9DCM	2146- 38-29-B—
W9BKJ	249- 45-30-B- 6
K9FAB	214- 10- 9-A- 5

Wisconsin

W9ZTO	29,120-182-64-A—
W9JBF	18,480-133-56-A-17
W9PTN	10,750-108-50-B-15
W9FDX	7584- 79-48-B- 9
W9HDV	3038- 49-31-B- 9
W9FTY	2600- 40-26-A- 8
W9DOR	1815- 33-22-A-16
W9QJB	1600- 32-25-B- 8
W9NRP	595- 17-14-A- 3
W9VHA	495- 18-11-A- 6
W9VWX	193- 11- 7-A- 5
W9FEO	150- 10- 6-A—
W9EWM	16- 4- 2-B- 1
W9PMS/9	5- 2- 1-A- 1

DAKOTA DIVISION

South Dakota

WØPRZ	41,676-304-69-B-23
WØILL	6930- 83-42-B- 9
WØLMB	1920- 32-24-A- 4

Minnesota

WØDEI	27,504-191-72-B-23
WØVIP	18,125-125-58-A-15
WØTKX	60- 6- 5-B- 1
WØBRA	32- 4- 4-B- 1

DELTA DIVISION

Louisiana

W5PXW	4710- 79-30-B-28
W5GHF	3100- 50-31-B—
W5RIQ	420- 14-12-A- 5

Mississippi

W5OAE	2688- 43-25-A-13

Tennessee

W4LUH	6750- 75-36-A-10

GREAT LAKES DIVISION

Michigan

W8NOH	40,425-231-70-A-30
W8BGY	2256- 47-24-B-10
W8PYP (W8s CRD FBV)	28,086-231-62-B-30

Ohio

W8AJW	42,043-251-67-A-29
W8LAX	16,530-144-58-B-20
W8OAC	6552-156-42-B-17
W8BNC	5996- 62-39-A- 9
W8BFH	5752- 59-39-A-13
W8MQG	2378- 41-29-B- 8
W8FNX	2016- 36-28-B- 5
W8FBZ	1138- 35-13-A- 6
W8TMA	750- 20-15-A- 1
W8NFD	518- 19-14-B- 2
W8VRK	304- 19- 8-B- 3
W8URD	10- 4- 1-A- 1
W8ZQH	3- 1- 1-A- 1

(*Continued on page 126*)

HUDSON DIVISION

N.Y.C.-L.I.

W2BWC	14,672–131–56–B–14	
W2MQB	2125– 43–25–B– 8	
W2VQA	385– 14–11–A– 2	
W2RQJ	336– 14–12–B– 2	
W2DIC	146– 13– 9–A– 4	
W2NNH	80– 8– 4–A– 2	
W2DBI	70– 7– 4–A– 2	
W2VL	2– 1– 1–B– 1	

Northern New Jersey

W2BTG	8442–101–42–B– 8	
W2DME	1680– 35–24–B– 6	
W2GKE	788– 23–14–A– 5	
W2JKH	585– 18–13–A– 1	

MIDWEST DIVISION

Iowa

WØHDX	1800– 30–24–A– 6	

Kansas

WØBNU	21,390–173–62–B–29	
WØMUY	10– 2– 2–A– 1	

Missouri

WØDEA	18,172–152–59–B–14	
WØMCX	18,150–165–55–B–26	
WØGUV	4026– 61–33–B– 6	

Nebraska

WØRQK	27,280–178–62–A–35	
WØGYM	12,455–118–53–B–18	

NEW ENGLAND DIVISION

Connecticut

W1ATE	46,584–326–72–B–23	
W1LVQ	10,229– 98–53–B–12	
W1AW	40– 5– 4–B– 1	
W1IKE	8– 2– 2–A– 1	

Eastern Massachusetts

W1BDF	40– 4– 4–A– 1	

Western Massachusetts

W1CJK	15,860–154–52–B–14	
W1JR	5950– 69–35–A– 6	
W1JYH	3– 1– 1–A– 1	
W1EOB	2– 1– 1–B– 1	

New Hampshire

W1BFT	7035– 67–42–A– 7	
W1JNC	6308– 87–29–A–17	
W1EWF	1188– 25–19–A– 6	

Rhode Island

W1BFB	20,727–165–63–B–18	
W8TRX/1	3031– 49–25–A–12	

Vermont

W1AXN	2376– 44–27–B–10	
W1MCA	442– 17–13–B– 2	

NORTHWESTERN DIVISION

Alaska

KL7PB	6201– 84–39–B– 7	

Oregon

W7MLJ	31,620–257–62–B–28	
W7GUR	1280– 40–16–B– 8	

Washington

W7EYD	38,940–265–59–A–31	
W7QGN	11,004–132–42–B–26	

PACIFIC DIVISION

Hawaii

KH6MG	26,649–213–63–B–27	
KH6IJ	4379– 78–29–B– 4	

Nevada

W7JUO	17,051–145–59–B–18	

Santa Clara Valley

W6BTE	30,475–230–53–A–30	
W6YX (W6s FZB IVX TOT VUW VXL WVP/DSS WZD ZBB)	56,097–414–69–B–40	

East Bay

W6TT	17,680–170–52–B– 8	
W6RLB	4588– 63–37–B–13	
W6RRH	125– 10– 5–A– 3	

San Francisco

W6YGQ	4414– 54–33–A–21	

San Joaquin Valley

W6QEU	122,832–854–72–B–35	

ROANOKE DIVISION

North Carolina

W4MRH	12,500–125–50–B– 8	
W4IZR	8550– 93–38–A–18	

South Carolina

W4AZT	2744– 50–28–B– 4	

Virginia

W4LIM	33,396–256–66–B–40	
W4FV	22,116–194–57–B–25	
W4KMS	13,568–128–53–B–22	
W4NUU	1064– 28–19–B– 8	
W4KVM	956– 26–15–A– 1	
W4KFC	630– 18–14–A– 1	
W4JUY	40– 4– 4–A– 1	

West Virginia

W8UYR	16,958–140–61–B–23	
W8CKW	588– 21–14–B– 1	

ROCKY MOUNTAIN DIVISION

Colorado

WØFUH	595– 17–14–A– 1	

Utah

W7NPU	8250– 78–44–A–11	

SOUTHEASTERN DIVISION

Alabama

W4CYC	59,850–430–70–B–37	
W4HA	11,607–110–53–B– 9	

Eastern Florida

W4CPG	38,285–300–65–B–30	
W4POF	35,440–222–64–A–31	
W4AYX	11,396–130–44–B–37	
W4BRB	1811– 35–21–A– 2	
W4QED	220– 11– 8–A– 3	
W4RTX	5– 2– 1–A– 1	

Western Florida

W4AGB	32,004–253–63–B–35	

Georgia

W4LXE	41,538–303–69–B–22	

(Continued on page 128)

SOUTHWESTERN DIVISION

Los Angeles

W6AM	32,562-243-67-B-20
W6BUK	832- 26-16-B- 6
W6KJK (W6MJA)	25,300-230-55-B-38

Arizona

W7PUM	39,060-248-63-A-28
W7OPS	2808- 53-27-B- 3

San Diego

W6CHV	43,065-261-66-A-34

WEST GULF DIVISION

Northern Texas

W5R1Y	13,680-115-48-A-13
W5LFQ	13,513-118-46-A-28
W5PXT[1]	1541- 34-23-B- 3
W5AWT	1416- 30-24-B- 5
W5ATW	504- 18-14-B—

Southern Texas

W5IHD	11,564-118-49-B-34
K5NRG[2]	1040- 26-16-A- 5
W5LGG	50- 10- 2-A- 1

New Mexico

W5FAG	56,438-323-70-A-36
W5SMA	52,140-316-66-A-39
W5RXC	26,847-240-57-B-23
W5NXF	5890- 62-38-A- 5
W5MYI	4818- 75-33-B- 9
W5KAO	3422- 60-29-B- 6

CANADA

Maritime

VE1OM	320- 16-10-B- 3

Ontario

VE3BJO	4864- 64-38-B-14
VE3RM	4720- 60-40-B-12
VE3DEP	143- 10- 6-A- 7

Quebec

VE2ID	8418- 93-46-B-22
VE2AHE[3]	7956-102-39-B-13
VE2BK	2106- 39-27-B- 4
VE2IZ	234- 13- 9-B- 8

Alberta

VE6TK	6240- 78-40-B-22

British Columbia

VE7VO	20,894-171-62-B-31
VE7VP	2880- 47-32-B-17

[1] W5LIU, op. [2] W5UPC, op. [3] VE2RP, op. [4] W9CMK, op.

Voice-Controlled Break-in

(Continued from page 84)

This balance will hold quite closely over a wide range of receiver volume-control settings, since the signal from the receiver is picked up *after* the receiver volume control.

Before the unit in use at this station was built, there was some fear that it would be difficult to maintain good balance over the required audio range, since this calls for like audio responses between the receiver, the break-in unit, and that portion of the speech amplifier in use with this combination. However, this did not turn out to be much of a problem, and it was solved by a little juggling of condensers, as will be explained later.

Adjustment

The unit is adjusted by first setting R_1 and R_2 to their "off" positions and setting R_6 to where the relay closes. Then R_6 is backed off to the point where the relay opens, and that's all for R_6. Then with R_2 still closed, R_1 is slowly opened, while the operator speaks into the microphone in a normal manner, until the relay closes whenever the operator speaks.

If now the receiver audio volume control is opened, a point will quickly be reached where signals from the loudspeaker will trip the relay, and this will happen long before comfortable room volume is reached. Start opening R_2 slowly until the loudspeaker output will not trip the relay, and the adjustments are made, after a further check with the receiver output at comfortable room volume.

This unit was first adjusted with C_4 out of the circuit and with 0.01-μfd. condensers at C_1 and

(Continued on page 130)

C_2. At 500 cycles the cancellation was excellent, but as the audio tone was run up to 3000 cycles, the voltage across R_4 gained over that across R_5. Substituting a 0.005-μfd. condenser for C_2 and adding C_4 made a big improvement, although there is still a slight rise across R_4 at the higher frequencies. However, work with the unit under actual operating conditions has been quite satisfactory. The values given here will quite likely require some modification in other stations, but it should take only a little time to match the audio responses satisfactorily. The values of R_4, R_5, C_5 and C_6 determine the hold-in time, and these particular ones give about a one-second delay with the relay that is used.

One point of interest is that, by setting R_2 so that the voltage across R_5 is appreciably higher than across R_4, the operator cannot break in if the other fellow is talking but must wait for a break between his words. Also under these conditions, if someone else comes on the channel while you are on, you are forcibly broken if you pause long enough for your relay to drop out momentarily. (Maybe that's what some of us need!)

There is no doubt that other versions or improvements and simplifications of this principle can be made. This is presented solely to show the basic idea. But, in any event, it is uncanny (pun intended!) to sit at the operating table with the loudspeaker at a comfortable volume and be able to "just open your mouth" to go on the air. Give it a try - you will enjoy it.

BC-610 Transmitter

(Continued from page 67)

'phone company will bring out a serviceman who will install a capacitor across the microphone button and clear up the trouble — all without charge to the customer. You do not pay the telephone company for that service; then why should you pay the TV serviceman? In one case, I had the TV set owner on my side by using that very argument against the serviceman for the TV set, when the man was trying to blame me anyhow. "The 'phone company fixed the 'phone so it does not bother — why can't you fix the television set?"

Results

The proof of the pudding is in the eating. So is the proof of measures taken to reduce TVI. With an input of 600 watts to my BC-610 transmitter and with the antenna of the TV receiver only six feet from the transmitting antenna, my family are able to watch their favorite programs while I operate on any amateur band that may be open. If there were any interference I would soon hear about it. After all, you can't tell your family that you are complying with all FCC regulations; that you have more than 40 db. of suppression; that they are in a blanketing area, etc. They only say, "We don't care about your db. — you are lousing up Kukla, Fran and Ollie."

(Continued on page 132)

The near-by neighbors are happy, and when all around me can watch their favorite TV programs while I operate, then I know that the effort and time spent to get rid of TVI has been well spent. Yes, TVI *can* be eliminated from the BC-610 transmitter.

Correspondence

(Continued from page 68)

PAGING T.O.M.

Box 436, Eastport, L. I., N. Y.

Editor, *QST*:

I would like to see you run a couple of the articles (or perhaps it would be better to say "essays") that T.O.M. wrote back in the early thirties. I had a chance recently to read a couple of the old issues of *QST*, and really got a kick out of it. Seems to me a little application of the Wouff Hong wouldn't hurt a few of the boys nowadays — a few of them seem to think that the bands are private concessions and that testers and tuners don't need to sign.

Outside of the above, I've nothing but praise for the way you succeed in putting out a well-balanced magazine. I can't say I like everything you print, but I read it all anyways. The editorials are FB all the time (maybe because I agree with them).

— *R. F. Wright, jr., W2YZT*

QST RIGS

349 Canterbury St., Gillingham, Kent

Editor, *QST*:

Congratulations on the excellent bandpass-tuned transmitter described in the August and September (1950) issues of *QST*. This rig is ideal from my point of view; it is nice and compact and should be a good first step in TVI reduction!

— *Eric R. Langton, G2HKK*

920 Prince St., St. Joseph, Mich.

Editor, *QST*:

The single-control low-power transmitter in January, 1951, *QST*, has outperformed any small job I have ever worked with. I usually use it on 40 meters, and with a haywire antenna system I can consistently work both coasts. Get darn good signal reports, too, and have heard many a comment about the nice keying it provides.

— *F. T. McAllister, W8HKT*

LEAGUE SERVICES

185 Shelter Lane, Levittown, N. Y.

Editor, *QST*:

Being a new member of the amateur fraternity and still a "lid," it behooves me to put my comment in *QST*. I believe your publication has, by far, accomplished more for the ham than can be described in any literature. In my case I have W1AW to thank for passing the FCC code test in obtaining my license. Of course, that is only a drop in the bucket concerning your numerous aids to the amateur, but that alone opened up a new world to me for which I am most grateful.

— *A. W. Meyers, W2KVS*

Washington and Lee University

Editor, *QST*:

The reference material which I requested has arrived in fine shape and serves the purpose for my term paper very well. I certainly wish to thank you for this service. You have been most kind and patient in compiling all the dope and forwarding it.

— *George S. Wilson III, W4OYI*

THAT COVER AGAIN!

Tachikawa, Japan

Editor, *QST*:

Given a hint by one of your readers concerning the tin of Holiday pipe tobacco shown on the December cover, I have found the following additional items: microphone by Astatic, calendar by Ever-Ready, receiver by National.

(Continued on page 134)

Wouff Hong by ARRL, pencil by Ticonderoga, log and radiogram blank by ARRL, pipe by Kaywoodie, 'phones by Trimm, watch by Bulova, shirt by Arrow, and body by Budlong.

Tsk, tsk, such commercialization!

— *Cal Graf, JA2FM/W5LFM*

THREE-PHASE R.F.

Box 1528, Mountain View, Alaska

Editor, *QST:*

The FCC has given me permission to use three-phase radio frequencies in transmission and reception of radio traffic.

Basically, there is nothing new about the set-up. The circuits are not regenerative, since there is no feed-back from the plate to the grid of the same tube. A tripole antenna is used, each whip being at right angles to both of the others, so that radiation is in three planes, at right angles to one another.

Is anyone interested in running tests and experiments with me?

— *Juan P. Miller*

FREE HEADPHONES

5221 Genesee St., Bowmansville, N. Y.

Editor, *QST:*

A friend of mine dismantled his rig, and in doing so he turned over to me three pair of headphones. I do not need these and will donate them to any deserving amateur, new or foreign, who will pay transportation charges.

— *W. E. Jones, W2QQ*

QSO RECORDS

1200 Catawba, Kingsport, Tenn.

Editor, *QST:*

Several local hams are trying to find out the best type of records to keep of QSOs and we are wondering if you could help us out. Personally, I started out with a small 3 by 5 card but somehow or other it seemed entirely too small. Then I designed an 8 by 11 sheet which fits a three-ring binder. All of the extra space on this sheet is used for taking notes during the QSO. A new local ham just starting up thinks these records should be kept on a 4 by 6 card. We realize that a ham could spend practically all his time bookkeeping, but I believe that certain records are necessary to supplement memory following initial contacts. Somewhere there is a ham who has an ideal system. How about helping us find him?

— *R. D. Delius, W4PHQ*

Hints & Kinks

(Continued from page 69)

may be cut out, but leave the rims intact for support. Next, using a sharp knife, cut a slit from rim to rim lengthwise, and repeat, making three equally-spaced slits. Now wrap the can in waxed paper, tucking the beginning of the wrapping into one slit, and continuing around the can until the same slit is reached to hold the end of the wrapping. Punch or drill small nail holes through both the wrapping and the can to hold the beginning and the end of the coil, and then wind the required number of turns. Coat the whole assembly with coil dope, and allow it to dry for 24 hours. At the end of this time, put the can into a crank-type can opener to remove the two end rims. The remaining three pieces of the can and the wax paper will now come out, leaving the desired coil. — *William Ash, W9FIF*

(Continued on page 136)

IMPROVED TUNING RATE FOR THE SX-43

When both a Q5-er and a sharp audio filter such as the FL-8 are used with an SX-43 receiver, tuning becomes quite difficult because the tuning rate is too fast, especially in reception in the 40-meter band. There is a simple way to ease this situation. First set up a marker oscillator of some kind on 7 Mc. (your transmitter VFO should be satisfactory). Then set the bandswitch to position "3A" instead of "3." Now set the bandspread dial to 7 Mc., as indicated by the dial marking. Tune in the marker signal with the main tuning dial, and then leave this dial alone, doing all further tuning with the bandspread dial. When set for 40-meter reception in this fashion, full rotation of the bandspread dial will cover only about 60 kc., giving a change of only 1200 cycles per dial division as compared to 10 kc. per division when the bandswitch is set to position "3." With this slow tuning rate the full benefits of the added selectivity gained through the Q5-er and the audio filter can really be appreciated. — *R. S. Palmer, W4MFI*

Strays

For those hams who are about to enter military service for the first time, the Army Signal Corps has some pertinent advice that will help in getting assigned to the electronics and communications branches. Take along your ham ticket and other documents which will evidence skill in radio. If formerly employed in the radio industry in some capacity, get your employer to provide a statement of experience. (This form is available from the Signal Corps on request.) Such credentials should be presented during reception center classification interviews. Statements of experience should be handed over to the interviewers, but personal papers should *not* be surrendered. Only certain types of skills are critically needed, and not every inductee can be reasonably assured of a SC assignment.

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C.W.	*'PHONE*
7100 kc. (day)	3875 kc.
3550 kc. (night)	14,225 kc.
14,050 kc.	29,640 kc.
28,100 kc.	

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

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

Strays

The Holland (Mich.) Amateur Radio Club is sponsoring a ham station and exhibit at the Hobby Show to be held in conjunction with this year's Tulip Festival. Visiting amateurs are invited to call at the booth or to work the HARC station on 10-meter 'phone, using mobile. Dates of the show are May 9th through 19th.

—···—

Chrysler Motors Magazine is contemplating an article on amateur radio and would like to hear from Chrysler Corp. employees who are also hams. Write Editor John B. Meagher, Box 1687, Detroit 31, Mich., giving name, call, address, and Chrysler affiliation.

BOOK REVIEW

Model Control by Radio, by Edward L. Safford, jr. 112 pages, 97 drawings, 14 photographs, 5½ x 8½ inches. Published by Radcraft Publications, Inc., 25 West Broadway, New York 7, N. Y. Price $1.00.

To appreciate this, you have to be interested in the technical side of radio, not just the business of talking to other hams and collecting "handles" and Q8L cards. It will help, but it isn't absolutely necessary, to be intrigued by the thought of "control-at-a-distance" by radio, an idea that has fascinated radiomen and model builders for years. Unfortunately for the radiomen, in the last decade practically all of the information on the subject has appeared as articles in the model magazines and not in the radio press. But even in the model magazines the demand exceeds the supply.

Mr. Safford, W5FKZ, has written an excellent book for the radioman. Unless you are already familiar with the field, you won't realize that you are actually getting, for the first time, a collection of all publicized methods of control-at-a-distance, and a down-to-earth philosophy on the whole business of radio control. In well-measured steps the book takes you through just about all of the possible methods of remote control of normal models (a reviewer has to leave the door ajar, just in case something else shows up), and any amateur who can follow a circuit can understand all of the principles involved.

This reviewer has noticed a tendency among model builders to think that the secret of remote control lies in the *radio* end of it, and they always seem to be looking for some magic solution to the problem. There isn't one. The problem of remote control really belongs to the modelers and, while radiomen can furnish a "wireless" link (with a reliability commensurate with their knowledge of electronics), the final success will always depend upon the mechanism that responds to the rectified radio signals. Mr. Safford's book tells what all of these mechanisms are, as well as pointing out the requirements for the necessary "wireless" links. It will save any radioman-turned-modeler a lot of leg work.

Strictly speaking, this isn't a "how-many-turns" or "square-inches-per-horsepower" book, because dimensions and circuit constants are not given in every instance. But details are given in a great many cases, and two complete systems, one simple and the other elaborate, for the control of a model truck or bus are described. Model boat and aeroplane builders will find a wealth of material dealing with their specific fields scattered throughout the book, but of course the basic problem is the same, and the answers vary only in degree and magnitude. The ideas and circuits and photographs will guide any radio-amateur-and-model-builder team as far along the road as anyone has gone. And if you're looking for a road that hasn't been trampled to death, here it is. — *B. G.*

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.
(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy. No cash or contact discount or agency commission will be allowed.
(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.
(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League take the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) Because error is more easily avoided, it is requested signature and address be printed plainly.
(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

QSLs. 100, $1.75 up. Stamp for samples. Grifneth, WJFSW, 1042 Pine Heights Ave., Baltimore 29, Md.

SUBSCRIPTIONS. Radio publications a specialty. Earl Mead, Huntley, Montana, W7LCM.

WANTED: Marconi coherer magnetic detector. Multiple tuner; deForest responder and other gear prior to 1920. Franklin Wingard, Rock Island, Ill.

QSLS! TAprint, Sumrail, Mississippi.

QSL'S-SWL'S. Meade, WØKXL, 1507 Central Avenue, Kansas City, Kansas.

QSLS, modern. Sample booklet 12¢. Stamps okay. Westerners see samples at leading Ham stores. W6GFV, van Groos, 1436 N. Serrano, Hollywood 27, California.

CONVENTION! ARRL National Convention in Seattle, July 27, 28, 29th, 1951. Plan your vacation in the Great Northwest during Seattle Centennial year. The time of your life! General Chairman: W7RT, 1921 Atlantic St., Seattle 44, Wash.

PHONE patch schematics, practical discussion. $1.00. Nichols, W1MRK.

QSLS, SWLS. They're better. Samples. C. Fritz, 1213 Briargate, Joliet, Ill.

CRYSTALS: Bassett precision Type 100A (FT-243) within 80, 40, 20 meter bands or MARS channels at $1.50 each. Specify exact frequency and include postage. Rex Bassett, Inc., Bassett Building, Fort Lauderdale, Florida.

WANTED: Complete or nearly complete files of Southern Edition of *QST* only, from January, 1935 to December 1942, both inclusive. Most copies were identified by publisher at bottom of last or next-to-last page before back cover. Must have both covers and be in good condition. Sumner B. Young, WØCO, Route J, Wayzata, Minn.

WANTED: transmission drive unit complete with motor for Amphenol Signal Squirter Beam Assembly. Right price desired and condition of equipment. Howard R. Sisson, 708 Francis St., St. Joseph 8, Mo.

TRYING for an amateur license? Sure check tests Class B & C, $1.75, Class A, $2.00. Amateur Radio Supply, 1013 Seventh Ave., Worthington, Minn.

TUBES . . . Hard to get? Send want list for quotations. Standard brands only. Quantity discounts available. Telradco, Box 108, Elizabeth, N. J.

QSLS. Samples. Larry's QSL's. Opportunity, Wash.

MOTOROLA used communication equipment bought and sold. W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

WANTED: Teletype 1/60TH HP synchronous motor. W6ITH. Moraga, Calif.

BANTAM transmitter manual for Emegency, Novice and general amateur use, $1. W4BIW, 751 San Antonio Drive, N.E., Atlanta, Ga.

SELL: BC348 110 VAC as manufactured, perfect condition, together with speaker, $75.00. W1NTE, 11 Berwick Lane, Cranston, R. I.

WANTED: Desk cabinet or rack dust-cover for Super-Pro. State price and condition. John M. Adkins, WJPUA, 101 Stafford Ave., RD No. 1, Bridgeville, Penna.

QSLS? SWLS? Modernistic? Cartoons? DeLuxe? Photographic? QSL samples 10¢. Sakkers, W8DED, Holland, Mich.

WANTED: Used hug, cheap WØBGJ.

SELLING out. Send for list. W5QDF, Clarendon, Texas.

WANTED: 6V Dynamotor 400 V. 375A. State condition and price. Herbert Kreckman, 11517 237th St., Elmont, Long Island, New York.

FOR Sale: complete rig in closed rack cabinet. Consists of Millen final, Millen exciter, VFX-680 811 modulator and power supply 1250 V 500 Ma., Millen 2-meter transmitter, 100 w. power supply modulator, a 2-meter beam and 4-element 10-Meter beam, an all-band mobile transmitter, Vibra Pack 375V 200 Ma., 20-meter mobile antenna and a 10-meter receiver and transmitter in one cabinet. Must sell. Need cash. Make offer. M. Finch, W2WLK, Mo. 3-3890, 22 Mission St., Montclair, N. J.

WANTED: BC-654 (SCR-284) PE-103, PE-104, GN-45; TCS sets, parts; RA-34 rectifier; ARC-1; BC-348; war surplus transmitters, receivers, power supplies, test equipment. Arrow Appliance, 525 Union, Lynn, Mass.

FOR Sale: BC-604 less tubes, meter $4.00. ARC-5 trans., $12.00, Sarkes Tarzian tuner, $3.00. Fada 10" TV, $100. 2M Handie Talkie, $6 pair. G-E 0-200 μa 4", meter $8. Transformers, etc. Ask for needs. D. Vettese, Box 4, Pomona, N. J. (D2OTI).

PRACTICALLY unused late model Collins 75A1 receiver, factory modified to match RG8U coax. In original carton, $300. Collins 45C1 low pass filter, $25; Thordarson 31W10AX high fidelity 10-watt amplifier, $50; Thordarson 15P21 CHT plate transformer delivers 1500/2000/2500/3000VDC 700 ma. $75. Matching choke and 872 rectifier transformer, $25 pair. New HK-257B's, $10 each. W9YBV, 190 E. North Avenue, Elmhurst, Illinois.

RAYTHEON Auto Transformers. 110 volt input, 90 to 130 volt at 1725 watt tapped output, beautifully cased, $12.50. DC power supply, 800 volts at 250 ma. on standard aluminum chassis, uses 866s, all parts overrated, $25.00. W3ALX, 934 Wyoming St., Allentown, Pa.

SELL or trade: 2500/2000 volt D.C. 500 ma. power supply, 1 Kw modulator with 810s Class B, pair 4-250A with filament transformers. W5DA, 4425 Bordeaux, Dallas, Texas.

SELL: BC-610E, 80 thru 10, speech amp. BC-614E cables, tubes, excellent condx. W1QUQ, 36 Harkness Ave., Springfield, Mass.

WILL pay $500 for a BC-610 Model E converted to 10. R. S. Willey, Haddam, Kansas.

JOHNSON Viking I kits assembled, with tubes, as a complete transmitter carrying a 90-day guarantee for $275.00 at Evans Radio, Concord, N. H.

SELL pair Eimac 250TL's. Only 300 hrs. Protected. $25.00. BC-224-F receiver (same as 348) with a.c. power supply, $35.00. Write for details and description. W4CYP.

Q-5'er BC-453-B, $10.50; SCR-274-N receiver a.c. supply, $5.50; BC-454-B, $6.00. All very good. All tubes. St. Louis area hams may see. Phone: 1014. Rev. Joseph O'Reilly, SS. Peter & Paul Church, Collinsville, Illinois.

PRACTICALLY new Viking transmitter with mike. Factory wired and tested. $225.00. Express collect. W5KVV.

HAMFEST Time: June 3, 1951. Come to Camp Ki-Shau-Wau where The Starved Rock Radio Club will again hold another big Hamfest. Follow Hamfest signs South from Junction of Illinois Routes 178 and 71 or East on blacktop road from Route 51 at Tonica, Illinois. One dollar advance registration, or one-fifty at the gate. For additional information write, W9MKS, Utica, Illinois.

SELL or Trade: *QST* 1923 to 1949. Want VHF152A or what have you? W8DBU, Wickliffe, Ohio.

SELL: General Electric type YRS-1 single sideband selector, new condition, $50.00. W4IVC, 1236 Westminster Ave., Richmond 27, Va.

SELL: ABC Radio Laboratories car radio converter. 1.5 to 6.0 mc., $22. Al Pollard, jr., 1521 NW 45th St., Oklahoma City, Okla.

QSLS. Samples. Noble Press, Chatham, Mass.

MADE WAS, WAC, and ORS with an HT-9, 150-watt phone/c.w. transmitter and SX-17 receiver. Both for sale at half price. In good reliable condition. Please write for details. Sgt Sackett, 1901st AACS, Travis AFB, Calif.

SALE: 300 watt c.w. xmittr. Photographs available. Best offer takes. W5PYU.

FOR Sale: BC-610E and BC-614E. Good condition; few changes, running time and line voltage meters added. B&W TVH coils for final. Exciter coils 160 through 10 meters. Full set of spare tubes, one 250TH, two 100TH tubes included. $550 or best offer. Will accept in deal compact high voltage power supply and 10 Amp Autotransformer. Walter Rozier, W5QPZ, Rt. 2, Box 149, Biloxi, Miss.

SELL QSTs August 1930 to August 1950. All in excellent condition. $25.00 postal money order. W9BXT, Harold Hoffmeier, 808 Ridgeway, Vincennes, Indiana.

WANT: Frequency meter TS-323/UR. Please state condition and price. W2IVX, 109 Willow Ave., Huntington, New York.

SELL Meissner 150B xmitr and exciter TVI-proofed: will demonstrate in apt. house TV set in same room; crystal mike input. Now used on 20 meters. Can be used down to 1.5 mc. $225 cash. Will deliver in NYC area; also sell FM Sonar 680, $40. Want: Collins xmitr 32V2 and/or Collins 75A1 recvr. Will consider a deal. Write best offer and details to W2QAI, David Adlerblum, 14C Aryl Ave., Yonkers, N. Y.

FOR Sale: RME-84 new, perfect condx. $75 F.o.b. C. Gouveia, 3310 63rd St., Sacramento 17, Calif.

SALE: Meissner EX signal shifter. Good condx, little used. $55.00. F. Kohl, 1329 21st NW, Washington 6, D. C.

SELL: Triplett 1696A modulation monitor. Wanted: TBS-50. George Kravitz, 7919 20th Ave., Brooklyn 14, N. Y.

WANTED: Collins 32V-2. Trade or sell Leica Model G with Summar f2 lens and case in good condition, Hektor 145mm lens with case in excellent condition and Sonnar 58mm f1.5 lens with case in fair condition. Ensign A. J. Morency, W8CPH, USS LST 883, c/o FPO, San Francisco, Calif.

SELL: Hammarlund 400X complete, $265, less than 100 hrs. use; VHF152A, spotless, $60; New BC-221, factory xtal, book, $60; Weston tube checker, perfect, $40; RCA port. radio unused, $35. D. Long, 184 L Street, So. Boston, Mass.

WANTED: "Ultimate" bug key; Marconi apparatus, Electro Importing apparatus; Wireless Specialty apparatus; "Wireless Telegraphy" by Collins; "Wireless Age", "Electrical Experimenter", "Marconigraphs". Most anything before 1920. L. Rizoli, W1AAT, 100 Bay View, Salem, Mass.

HAM slide rules. Barttro, W1LNX, 20X Grenville Rd., Watertown, Mass.

NEW crystals for all commercial services at economical prices, also regrinding or replacement crystals for Motorola, Link, G-E, and other commercial types. Over fifteen years of satisfaction and fast service! Eidson Electronic Co., Phone 3901, Temple, Texas.

UNCOMPLETED final, PR813, power supply, $35.00. Six BC-610 plate coils, $8. F.o.b. Write for details. W6RET, 550 So. G, Oxnard, Calif.

QSLS-SWLS. High quality. Reasonable price. Samples. Bob Teachout, W1FSV, 40 Elm Street, Rutland, Vt.

500 watt phone/c.w. xmitter complete. PP813's and 811A's. 60" shielded cabinet. Write for photo and details. $250. Also 35' Premax steel vertical antenna and base insulator, $20. W4MQC, 490 SE 2nd St., Hialeah, Florida.

SELL new RK 4D32 tube, $12.50; almost new Heathkit oscilloscope 827 and signal generator, $10; UTC transformers S-8 and S-19 both $7.50; Dick Rice, W9LOC, Monticello, Illinois.

BARGAINS new and used transmitters, Receivers, Parts: Collins 32V1, $395; Globe King, $315; HT-9, $199; HRO-7, $225; Temco 75GA, $225; Collins 75A1, $295; new 150-watt phone, $199; HRO-5T, $175; NC-173, $139; Hallicrafters S-47, $139; HRO Senior, $129; RME-45, $99; SX-17, $89.50; NC-46, RME-69, $69.50; VHF 152A, $69; SX-24, $69.00; Bud VFO 21, $39.50; NC-100, $59; Globe Trotter, $57.50; New Meisner signal calibrators, $24.95; MB-611, $29; 90800 Exciter, $29.50; Gonset 10-11 converters, $25; XE-10, $19.95 and many others. Largest stock trade-ins. Free trial. Terms financed by Leo, W9GFQ. Write for catalog and best deal to World Radio Laboratories, Inc., Council Bluffs, Iowa.

QSLS: Uncle Fred QSLs. Three color QSLS and up. Rainbow Map QSLs. DX QSLs. Bargain QSLs. Samples rushed, 10¢. Uncle Fred, Box 86, Lynn, Penna.

1N34 xtals, 75¢. Diode probe tube, 5/$1. Bantam 1-watt transmitter foundation unit with two crystals, coil and data, 98¢. Sell us your surplus tubes and gear. Send list, best price. "TAB", 109 Liberty St., New York City.

URGENTLY needed: Raytheon 4D32. Will pay full price. Jesse Gonzalez, W2EBM, 51 Clover St., Newark 5, New Jersey.

SELL or trade: Motorola 100 watt fixed xmitter FMT-50-B phase modulation. PR 807's and two tube pre-amplifier, $85. Consider tape or wire recorder. WØATO, Ralph Harvestine, 8300 West 38th Ave., Denver, Colorado.

$500 BUYS a complete amateur station. All commercial equipment. 150-watt Subraco 75-T all band phone and c.w. xmitr. 828 final. Meissner ECO. Ant. tuner, BC-221 freq. meter, Variac, 3 El. Workshop, 10-meter beam, rotator, selsyn indicators, HQ-129X, VHF-152A, R9'er, Q5'er, D-104 mike, Vibroplex, phones, spare xmitr tubes, spare parts, plus a beautiful 420 mc. xmitr-rcvr. Like new and in operation. Will not sell separately. No trades. Deliver within 100 miles of Philadelphia. WJCLP, 1332 Kynlyn Dr., Wilmington, Del. Phone Holly Oak 8-1587.

BARGAINS: New and reconditioned Collins, National, Hallicrafters, Hammarlund, RME, Millen, Meissner, Gonset, etc. Reconditioned S-38, $29.00; S-40A, $69.00; SX-43, $129.00; SX-42, $199.00; NC-57, $69.00; NC-173, $149.00; NC-183, $199.00; HQ-129X, $139.00; RME-84, $69.00; RME-45, $89.00; DB22A, HF-10-20, VHF 152A, SX28A, SP400X, HRO50, Collins 75A1, BC-610, others. Terms. Shipped on approval. List free. Write to Henry Radio, Butler, Mo.

WANTED: GE YRS-1. Please state condition and price. Ed Stephenson, Farmington, Conn.

NATIONAL Transmitter, 600W input on 10 to 80 meters, first class operating condition, refer National 1941 catalogue #400, formerly operated by Employees Club under W2ORO. All reasonable offers considered. Write P. O. Box 67, Irvington, N. Y.

WANTED: BC-221 frequency meter. New prop-pitch motor. Collins phone transmitter. George F. Norton, Athens, Georgia.

COLLINS 30J transmitter, 400 watts, 813's PP final. 80-40-20-10-6 meters. Speech clipper, negative peak limiter, push-to-talk custom built. 310C exciter. Government paid $2500.00 for same type. 75A-1 receiver. Equipment like new. $1500.00 F.o.b. Cedar Rapids. Buying Collins KW-1 and 75A-2. WØCVU, P. O. Box 224, Cedar Rapids, Iowa.

Index of Advertisers

AMERICAN RADIO RELAY LEAGUE
NATIONAL CONVENTION...

Seattle, Washington . . . July 27-29, 1951

1st • Plan to attend the Seattle convention during Seattle's Centennial next July. It will be a great meeting, worth your time and money.

2nd • Enjoy the best companionship by enrolling for the *Official Train*. Everybody's going! See the highlights and the great Northwest and share in the good fellowship of traveling together in a congenial party!

3rd • QSO while you ride! A car on the *Official Train* will be available with antenna and 110v AC power, so you can operate "RR Mobile".

Here's the Trip for You . . .

JULY 23—Assemble Union Station, Chicago, 10:00 pm. Check in at A.R.R.L. Counter. Board Official Train. Leave Chicago 11:00 pm, C.B.&Q.

JULY 24—Delegates join train today from central states and Northwest states. Leave St. Paul 9:00 am, Minneapolis 9:35 am, Northern Pacific.

JULY 25—Arrive Billings, Montana, 5:00 am. (Sleepers may be occupied until 7:00 am) Quick breakfast at N.P. Station. Another snack, Montana hotcakes, in Red Lodge—then the "Skyride" by bus, above the clouds. Many miles above 10,000 feet amid Montana's and Wyoming's lofty peaks. All day scenic thriller—unsurpassed for grandeur! Dinner Montana Hotel, with Montana members as hosts. Leave Billings 11:40 pm.

JULY 26—Helena, the state capital, at 7:10 am. Breakfast at Last Chance Gulch—Placer Hotel. Sightseeing tour to Frontier City on top of the Main Range of the Rockies. Lunch up there, too! To Garrison by bus, thence by train. Beautiful mountains, rivers, canyons and lakes. Arrive Spokane 8:25 pm.

JULY 27—Arrive Seattle, convention city, 7:30 am.

For convention information and train reservations, please address:

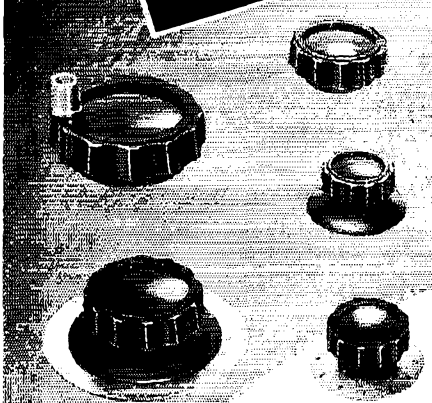
MR. JOHN GRUBLE, W7RT,
200 Smith Tower
Seattle 4, Washington

MR. HARRY HARRISON, W9LLX
73 East Jackson Blvd.
Chicago 4, Illinois

Questions Invited!

Now JOHNSON

KNOBS and DIALS



Distinctive! Versatile! Rugged!

Many Styles Available

Matching knobs in three sizes, 1⅛", 1⅝" and 2¾" diam., or assembled with phenolic skirts 1½", 2 1/16" and 3" diam., or with metal dial plates 1½", 2¾" and 4" diam. in various calibrations, and a spinner with the 2⅜" and 1⅜" knobs.

Other Types On Special Order

In production quantities, pointer types, friction disc vernier drives, special markings and calibrated dials, extra set screws, and other variations may be obtained.

Meant for the discriminating designer or buyer who seeks accessories in keeping with high grade equipment; apart from the too common, yet in quiet good taste.

Combining new, distinctive styling with unusually sturdy construction, these JOHNSON Knobs and Dials enhance the appearance of any electronic or electrical control equipment. The use of twelve flutes eliminates the usual octagonal, bumpy effect. Although essentially round, they retain excellent gripping surfaces. The "feel" is comfortable, positive, without sharp ribs or edges.

Knobs are molded of black phenolic material. Walls are extra thick for added strength and all types have heavy brass inserts. Metal dials are of nickel silver with beautiful chromium plating in satin etched finish. Visibility of dial readings is unusually good.

Knob Diam.	Shaft Diam.	Knob Only Cat. No.	Spinner Knob Cat. No.	Knob with Phenolic Skirt Cat. No.	Dia.	Knob with Chrome Dial Cat. No.	Diam.	Scale
2¾"	¼"	**116-280**	**116-286**	**116-281**	3"	**116-282**	4"	0-100 180°
2⅜"	¼"	**116-280-3**						
1⅝"	¼"	**116-260**	116-266	**116-261**	2 1/16"	**116-262**	2¾"	0-100 180°
1⅛"	¼"	**116-220**		**116-221**	1½"	**116-222-1**	1⅝"	100-0 180°
1⅛"	¼"					**116-222-2**	1⅝"	0-10 270°
1⅛"	¼"					**116-222-3**	1⅝"	1-7 180°
1⅛"	¼"					**116-222-4**	1⅝"	On-off 60°
1⅛"	¼"					**116-222-5**	1⅝"	Indicator

Write for illustrated sheet describing these exceptional JOHNSON Knobs and Dials.

JOHNSON *a famous name in Radio!*

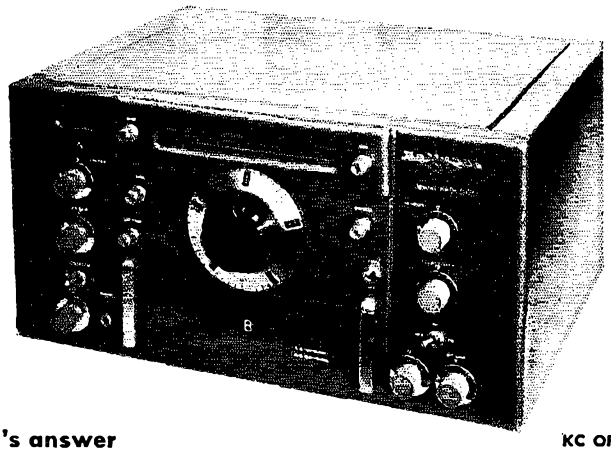
E. F. JOHNSON CO. WASECA, MINN.

PRINTED IN U. S. A.
RUMFORD PRESS
CONCORD, N. H.

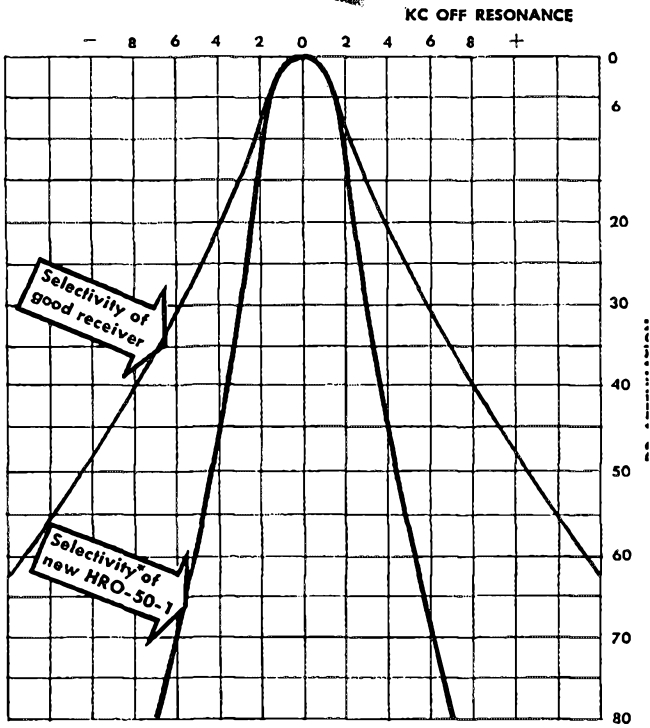
forget any standard of selectivity you have known before!

HERE IT IS! THE NEW HRO-50-1

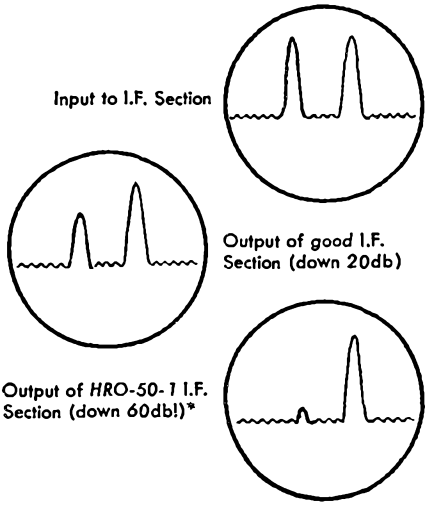
with 12 Permeability-Tuned I.F. Circuits!

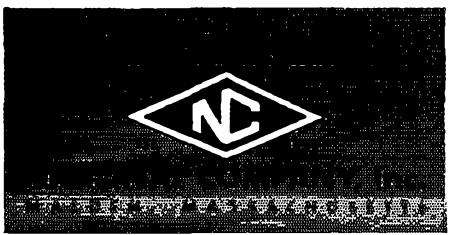


Here it is! National's answer to today's crowded bands — the new HRO-50-1! Employing 3 stages of I.F. and 12 permeability-tuned I.F. circuits (4 per stage), in addition to the crystal filter, the HRO-50-1 attains the highest degree of "skirt" selectivity ever achieved in a general communication receiver without narrowing "nose" selectivity. And, of course, it retains all the features of the world-famous HRO-50.



*Without using crystal filter!





All-miniature multi-purpose rig

...with RCA-5763 beam power final

EVER HAD A YEN for a pint-size rig with a quart-size wallop? Then consider the capabilities of this RCA *all-miniature* tube line-up...

With a simple, inexpensive 300-volt power supply, this team of miniatures will handle a full 17 watts input on cw and 15 watts on phone... right up to 175 Mc! The high efficiency and low driving-power requirements of the RCA-5763 beam power final and RCA-6AQ5 beam power modulators provide *more* output with *fewer* tubes and components. This adds up to ultra-compactness, operating economy, and unusually stable operation... whether you use this line-up for building a portable or mobile job... a VHF or CD rig... or a quick-change, multi-band transmitter for the lower frequencies.

To get all the tube power, performance, and life *you* pay for... buy genuine RCA tubes in the familiar red-black-and-white cartons from your local **RCA Tube Distributor.**

RADIO CORPORATION of AMERICA

ELECTRON TUBES — **HARRISON, N. J.**