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SWEEPING changes in short-wave radio technique have been made since publication of the last edition. These changes have called for a drastic revision of the book. The chapters devoted to apparatus design and construction have been rewritten all through, with new illustrations and new circuit diagrams. Needless to say, the new methods and technique which have so recently almost revolutionized ultra-high frequency working have been treated in full detail.

The twelfth edition is more than half as large again as the first edition. The chapter on receivers, for instance, has been enlarged and rewritten to cover all the recent developments; while the chapter on transmitters has been expanded to permit discussion of all the new methods devised during the last year. New circuits and layouts are given and a special attempt made to treat all possible problems which could be faced in designing or adjusting transmitting equipment. Drastic changes in circuit arrangements for the ultra-high frequencies have meant a complete rewriting of the chapter devoted to that subject. New transmitters and receivers employing new circuits are described for all three of the ultra-high frequency bands. Full details are also given of directive antenna systems for these bands. All of the chapters have had their share of attention to bring the book up to the minute. The chapters on antennas, keying, power supplies, have all been revamped so that all equipment and circuits can truly be said to represent the best in current practice.

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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 non-commercial 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 world 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. Correspondence should be addressed to the Secretary.

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A NEW variety of "license renewal trouble" is being experienced. It is the purpose of these lines to offer a few words of help to those who are exposed.

In the dim dead days now gone beyond recall, amateur station licenses and amateur operator licenses were issued separately by independent agencies. Some of them were extended varying lengths of time by proclamation. Of course every amateur who has gone up for a new ticket in the past year and a half has received the combination station-operator card license but there are still many of the separate licenses in existence. Because the old style of station license had been extended longer than the old style of operator license, it happened that during 1934 the only expirations were of operator licenses and we amateurs developed a pretty good understanding of how to take care of applications for renewal. We learned that it was only necessary to fill out Part I of the application blank, asking for a renewal of the operator license, and send in both the expiring operator license and the existing station license to the F. C. C., which would then issue a combination renewal, at the same time extending the station license to expire simultaneously with the operator license.

That same accident of extended dates is operating this year to change the circumstances completely. It happens that from January until some time in the summer of this year the only expirations are going to be of station licenses. That is why we called attention in a recent issue to the desirability of looking up the expiration date on your old station license and filing renewal application in plenty of time. Many of the fellows seem to be experiencing difficulty in filling out the forms correctly, and we learn that many applications have to be returned for correction. The matter is important because if the applications are not submitted in strict compliance with the rules and regulations, the licensee suffers delay and may have to go off the air while the papers are being corrected.

Let us suppose that you have an existing operator license that has some time to run and a separate station license that is to expire within sixty days. You write to your district inspector for an amateur application blank. The proper procedure then is to leave Part I blank, about the operator license, but carefully fill in Part II about the station license, go before a notary public and execute the "applicant's jurat," attach both of your licenses, and mail the whole business direct to the F. C. C. at Washington. If everything is in good order the result will be one of the new combination card licenses running for three years and resulting incidentally in the automatic extension of your operator license.

So far so good, but there have been some changes in regulations since those original station licenses were issued and some of them are not eligible to renewal. In the first place, a station license is now issued only to an individual who is himself a licensed amateur operator. If in the past you held a station license but no operator license, and had somebody else do your operating, you are absolutely out of luck unless and until you also qualify as an amateur operator. Moreover, with the exception of bona-fide clubs and a few military reserve outfits, a station license is issued only to an individual who is personally interested in amateur technique.

But we'll suppose that you're an ordinary American ham unencumbered by such considerations. With one exception you won't have much trouble, but it is an excellent idea to read over the amateur regulations thoroughly before filing out the form because you must not propose in your application to operate under any conditions that are prohibited by regulation. The one point referred to in the foregoing sentence is Item 30 of the application where space is provided for you to state that "during the past three months I have operated my amateur station in communication with three amateur stations as follows," followed by spaces to show the date, time, calls and licensees of three stations worked. The governing regulation is Rule 402 which states that "amateur station licenses . . . may, upon proper application, be renewed provided . . . the applicant has used his station to communicate by radio with at least three other amateur stations during the three-month period prior to the date of submitting the application . . . Proof of such communication must be included in the application by stating the
stations. The Commission is going on the thesis that they should devote more of their time and money to active stations and less of it to those whose activity does not warrant it. A station that has not been active within the last three months of its license period is ineligible for renewal and its station license will not be renewed. Moreover, a penalty for inactivity is applied to the applicant, in that he must wait ninety days before he becomes eligible to apply for a new station license. It is, in fact, just a little bit tougher than that: the station license is renewable only if the applicant has used his own station during the three-month period prior to the date of submitting the application. The applicant wants a new combination operator-station license but it will not be issued unless he himself has pounded brass in his own station within three months of the time that he files the renewal application.

Active amateurs will have no difficulty with this. It is simply necessary to consult the log and cite three cases of communication within the past three months where you operated, carefully filling in the required data so that the Commission may, by correspondence with the parties cited, verify the fact of your activity. If you have been inactive, there’s nothing to it but to get active again and be able to prove it. Moreover, it won’t do to have someone else operate your station, for it is necessary to supply an indication of your own operator activity before extending your operator license. Nor may you get your operator activity over someone else’s station, rather than your own, since you are not entitled to a station renewal if you do not possess an active station capable of engaging in communication. The rule is not new, having been in force a year and a half, but many an inactive amateur will run afoul of it for the first time in the coming months. It is only fair, we’ll all have to admit, that there be some restriction against renewing the licenses of non-existent stations. Although renewal as such is denied them, such fellows are not by any means barred from amateur radio; ninety days after their expiration date they are eligible to ask for a new station license and in all probability will get their old call again.

Starting next autumn there will be both operator and station licenses expiring, and both will have to be watched—but that is too far away to worry about now. By sometime next year everybody will be operating under the new form of combined concurrent licenses, and thereafter everything should be smooth sailing.

K. B. W.

Mirabile Dicunt

Marconi did not invent radio... The mighty R.C.A. once turned to hams to deliver a message to the Arctic for President Coolidge. The message was routed and a reply obtained. ... An apprehensive father appealed to the Federal Radio Commission to revoke his son’s license in order that the youngster might find time to eat his meals and sleep nights. ... B-r-r-r, Jack Frost has written a radio book! ... An amateur station pinch hit for one of Uncle Sam’s big Naval stations, signing the call, NBB. ... Tom Banzhaf, GCTE is the only ham on record to die while listening in.

One and Same

What used to be omnibus bar is now just plain, old bus bar. ... Cymoscope is another name for radio detector. ... Muscovy glass is mica.

Personalities

Hiram Percy Maxim, founder and President of the A.R.R.L., was the first paid member of the International Amateur Radio Union. ... The Old Man was first to mention the Wouff-Hong and Retty'snitch, but in the beginning he didn’t know what they were himself.

The Old Man’s warmest felicitations to the Czechoslovakian government which requires that prospective radio operators be “self-righteous, reliable, and irreproachable.” ... The first American ops’ tickets were labelled Certificate of Skill. ... It was once necessary to secure an experimental (“X”) license in order to use any wavelength below 200 meters. ... Failure to display radio licenses is an offense punishable by fine.

A popular book was dedicated to A.R.R.L.

Rambling Around

Hark ye, phone hounds—Oh Love Gain operates a restaurant in Boston. ... The Old Man, ham radio’s sage at large, has had QST smoking with his wrathful articles ever since January, 1917, yet his identity and location remain unknown. ... Mussolini and King George are among the dignitaries who have received messages handled by W22C. (Rufus P. Turner, WlAY, who contributes these facts, is willing to send proof of any of them on receipt of a stamped envelope.—Ed.)
A New Antenna System for Operating Control of Radiation

Fitting Antenna Characteristics to Varying Communication Conditions

By John L. Reinartz,* W1QP

In the list of amateurs who as amateurs have made original contributions to the world's understanding of short-wave radio communication, and hence to its practical development, the name of John Reinartz stands high. His work during 1924 and 1925 on the behavior of short waves and his resulting theory of short-wave radio propagation (published in QST) in our opinion rank as the pioneer piece in this field, even though it has not been so credited in the bibliographies of many later non-amateur workers and writers. The antenna system he describes in the present article is in logical sequence to his earlier work in the short-wave realm, since it promises to make amateur communication (and other communication, too) even more effective. From an amateur and to amateurs, we as amateurs present it.—EDITOR

EARLY in 1924, the author, with the cooperation of a notable group of other early experimenters, began the series of experiments in radio transmission on wavelengths below 60 meters which resulted in conception of the reflection theory presented in the April, 1925, issue of QST.1 This theory explained the phenomenon of the "dead belt," which we now call "skip distance," and included the hypothesis that there was more than one reflecting layer. In the light of confirmation of this theory by subsequent developments, the following prediction, quoted from that first article, is of particular significance:

"If we are willing to choose the wavelength for each particular distance and each particular time of day it is possible to put the region of strongest signal right on the receiving station and to obtain communication with strong signals but small input power."

Another significant point made in this article was to the effect that only waves which started upward at low angles were effective for long-distance communication on wavelengths below 60 meters, the then-considered low angle of 45 degrees from the horizontal being specifically mentioned. Further investigation of the most favorable angle followed in the summer of 1925, when the author was a member of the MacMillan expedition to North Greenland. As illustrated in Fig. 1, measurements on the apparent angle at which 20- and 40-meter signals from amateur and commercial stations arrived over the tops of the mountains surrounding Etah Harbor were consistently 18.5° above the horizontal.2 From this it was logically concluded that, at frequencies of the order of 7000 kc. and higher, only the energy radiated from the transmitting antenna at low angles above the earth's surface would be useful for communication over great distances where the reflected (sky) wave serves rather than the direct (ground) wave.

Still further investigation has shown that, while low-angle radiation in general is better for reflected-wave communication on the higher frequencies, one particular angle may be best for communication on the chosen frequency over a given path under conditions determined by the time of day, season of the year, receiving location, etc. In other words, the advantage of choice of the right frequency can be augmented by choice of transmitting antenna characteristics to fit the particular conditions existing for that frequency at the time of the QSO. In addition to choice of frequency

![Fig. 1](image)

therefore, choice of angle above the horizon on which the radiated energy can be concentrated, and perhaps of polarization of the emitted wave as well, unquestionably should increase the effectiveness with which the amateur is able "to put the region of strongest signal right on the receiving station and to obtain communication with strong signals but small input power."

Of course it is now well known that certain types of fixed antennas, such as the half-wave vertical and the harmonically operated horizontal, radiate principally at more or less low angles; and that certain other types, such as half-wave horizontal, radiate principally at high angles.3

*176 Wadsworth St., Manchester, Conn.
1 J. L. Reinartz, "The Reflection of Short Waves," QST, April 1925.
2 This observation was reported before a meeting of the New York Section of the Institute of Radio Engineers in the Fall of 1925.
3 The Radio Amateur's Handbook, A.R.R.L., Chapter Twelve. For more complete discussions refer to such texts
It is also well known that vertical types start the waves off with vertical polarization, while horizontal types start them off horizontally polarized. And there is no denying that different types do give widely different results, even when tried separately at the one transmitting location. But it is hardly practicable for each amateur station to be equipped with an assortment of antennas from which the operator may choose the particular type that will give him the best radiation characteristic for the conditions required by the QSO of the moment. He ought to have a single antenna which could be adjusted to suit these conditions. And it should be adjustable from within the shack, right at the operating position.

THE NEW SYSTEM

It was the desire to be able to do this and to make use of the type of radiation given by a horizontal system as well as the type of radiation given by a vertical system that led the author to evolve the antenna system shown in Fig. 2 and diagrammed "stretched out" in Fig. 3. Basically it is a current-fed Hertz antenna with one quarter-wave end section horizontal and with the other quarter-wave end section (wire No. 3) bent down vertical and carried into the operating room. All three of the vertical wires are conventionally spaced as feeders. In order to give control of the third wire, in so far as its contribution to the radiation pattern is concerned, this wire is connected through a tuning system to ground. The other two feeder wires are treated in the usual manner, connecting to the antenna coupling circuit of the transmitter.

At the top, where the three vertical wires end, No. 1 wire connects to the quarter-wave horizontal section and No. 2 connects with the No. 3 wire which returns to the operating room. When the system is operated as a current-fed Hertz antenna would be operated, two voltage nodes exist at the top of the mast, one (A) at the point of contact between No. 1 vertical wire and the quarter-wave horizontal section, and another node (B) at the point of contact between No. 2 wire and No. 3 wire. The third wire then functions to give considerable high-angle radiation vertically polarized along with the horizontally polarized high-angle radiation that normally takes place from a horizontal antenna placed a quarter-wave above ground. When, by manipulation of the tuning adjustments within the operating room, node B is moved downward along either No. 2 or No. 3 wire, then the radiation pattern takes on more low-angle radiation than high-angle. When the node is down from the top of the mast an eighth of a wave the greatest low-angle effect is noted. The field strength patterns illustrating this, shown in Fig. 4, were obtained from a scaled-down model built for 28-mc. (10-meter) fundamental operation. The movement of the voltage node B was indicated by the change in brightness of small Mazda lamps placed in the vertical wires every thirty-second wavelength from the top downward.

To facilitate duplicating known settings, all

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**FIG. 2—THE NEW ANTENNA SYSTEM IS BASICALLY A CURRENT-FED HERTZ WITH ONE QUARTER-WAVE END SECTION HORIZONTAL AND WITH THE OTHER QUARTER-WAVE END SECTION (WIRE NO. 3) BENT DOWN VERTICAL AND CARRIED INTO THE OPERATING ROOM**

Radiation characteristics of the vertical portion are varied by adjustment of the tuning, as described in the text.

**FIG. 3—THE WHOLE SYSTEM STRETCHED OUT TO DEMONSTRATE THE STANDING-WAVE VOLTAGE DISTRIBUTION**
changes are described in terms of the capacitance scale of C1. It is clear that when this condenser setting is varied from maximum to minimum, voltage node B shifts location along the No. 3 vertical wire (with resonance maintained by adjustment of condenser C2). In the graphs all settings refer to condenser C1, condenser C2 being either shorted out or set to a maximum value, as operating results indicate the need, and left untouched for the range of any one amateur band. The coupling coil L determines to a great extent the initial setting for C1. In general it is such as to place the voltage node an eighth-wave down from the top when the setting of C1 is near the maximum capacitance value, thus providing more than enough capacity range to move the node to the top.

The parallel tuning system of condenser C1 is such that it normally tunes to the frequency range of the amateur band which is being used. This tuning combination is used to restore resonance when an adjustment of C1 has been made. Resonance is indicated by the highest reading of the r.f. ammeter for that adjustment of the node position, this r.f. meter indication being different for different adjustments.

TEST RESULTS

Actual operation of the system calls for node B to be an eighth of a wave down from the top of wire No. 3 (low-angle radiation) during the daytime when operation is in the 3500- to 3900-kc. band, and up within a thirty-second of a wave from the top (higher-angle radiation) during the late evening hours. Repeated tests have shown that compensation for the advance of time from early evening to past midnight must be made by a change in the location of node B in order that maximum signal strength may be maintained at the receiving station. The results of a typical test demonstrating this are shown in Fig. 5.

During daytime operation, it is noticed that although there is one generally satisfactory setting, slight changes can be made in the position of the node to give "best" signal at some particular receiving location. Even when two stations are in the same general direction and at the same moderate distance from the transmitter but are separated from each other by a few miles, there is quite likely a different "best" setting for each station. This has occurred regularly when working with stations in and near New York City.

With two stations contacted at the same time, and adjustments made by shifting the node, the reports from each of the two stations always indicated that they did not agree with each other as to which was the best-signal setting. One would specify a setting that the other had said

FIG. 5—RESULTS OF TEST BETWEEN TRANSMITTING STATION AT MANCHESTER, CONN. (W1QP) AND RECEIVING STATIONS AT MARION, OHIO (WSMQS AND W9CMD), ON 3500-KC. BAND

Decreasing capacitance scale reading of condenser C1 corresponds to rising position of the node on wire No. 3. As shown in Fig. 4, raising the node gives higher-angle radiation—which is apparently more suitable for nighttime communication over this particular test distance on the 3.5-mc. band frequency used.

FIG. 4—ILLUSTRATING CHANGE IN THE VERTICAL-PLANE FIELD-STRENGTH PATTERN WITH SHIFTING OF THE CURRENT NODE ON WIRE NO. 3

The horizontal section is perpendicular to the plane of the paper. These data were obtained on a 28-mc. (10-meter) model.
was several points lower in signal strength, and vice versa. The indication here is that some control of polarization is effected, since the chance of two stations having identical receiving antenna conditions is very remote.

When stations in a line are contacted, such as from Manchester, N. H., through Thompsonville, Conn., New Haven, Conn., and to New York City, there is no agreement between any of the stations as to the best signal setting. Each name's a setting for a best signal that the others say is not nearly the best. This further indicates control of polarization. While the adjustment changes are then slight, they still are effective to a given receiving location. The total movement of the node location may be less than a sixteenth of a wave.

Night-time operation, on the other hand, has been over greater distances and has precluded direct ray (ground-wave) reception. In this instance the effect produced could be both change in polarization and in the effective angle of radiation. A day-time test to the same receiving location, carried on at two o'clock in the afternoon and on the same frequency, also indicated that a particular best setting was run through, on either side of which adjustment the signal strength was down a noticeable degree.

As shown in Fig. 6, the antenna system can be used for controlled radiation operation at twice the frequency that it was built for (Fig. 5B), or at four or eight times its fundamental frequency (Figs. 5D and 5F). Further, in all cases it can be used as a conventional voltage-fed antenna with simple two-wire feeders, wires No. 2 and 3 being connected in parallel (Figs. 5C, 5E and 5G). Hence we have then a truly all-around all-wave amateur antenna system. The control of the radiation pattern and the possible control of the polarization of the emitted wave still is evidenced at double and four times the fundamental frequency for which the system is designed, better signal response being reported over the conventional half-wave or full-wave voltage-fed system when used in the 40- and 20-meter bands.

The author wishes to acknowledge the help received from many amateur stations, notably W1CMB, W1MY, W1FND, W1YU, W2BGO, W2HOY, W8AKV, W8BAS, W8LUS and W8CMI.

More work needs to be done on the system to obtain all the information possible, since that given in this paper is but preliminary. Results so far obtained justify the system and point to eventual control of the factors that determine radiation of energy from a transmitter. It is also possible that directivity control can be obtained. Furthermore, this system at the same time saves half of the space that would be needed for a half-wave voltage- or current-fed horizontal antenna system such as is now common.

Amateurs Aid in Lost-Plane Search

ONCE more amateurs forsook family and fireside to help establish radio communication in an emergency. During a severe storm an American Airlines plane had crashed in a forced landing on Friday, December 28th, somewhere in the Adirondacks. The exact location was not known and weakened batteries on the plane's radio made it impossible to take an accurate radio bearing. With the weather 25 below zero the men had to be (Continued on page 78)
Stabilizing the Ultra-High-Frequency Transmitter

Resonant Short-Line Frequency Control for 2½- and 5-Meter Oscillators

By Ross A. Hull*

ON THE list of Things That Something Ought to Be Done About in ham radio, one very important item has long been the stabilization of ultra-high-frequency transmitters. The problem has existed since our ultra-high-frequency communication first became practical and has been increasing in importance from year to year as the u.h.f. bands have become more and more occupied.

Of course, a great deal of work has been done on the problem. Ways and means have been found, for instance, to provide oscillator-amplifier transmitters on 56 mc. Then, 56-mc. crystal-controlled transmitters have been improved to the point of practicality. These schemes, though, have never found much favor simply because of the great complexity of the necessary gear. Further, they have been really practical only for the 56-mc. band. The thought of a medium-powered crystal-controlled transmitter operating at, say, 1¼ or even 2½ meters is by way of being absurd.

We have always thought that this "string of amplifiers" method of getting a stable signal on the ultra-high frequencies represented the wrong approach—a method fundamentally unsuited for the job. Probably the first really effective simple method of stabilizing u.h.f. oscillators was the "long lines" control, in which system the normal grid circuit was replaced by a long pair of wires or concentric tubes comprising either a resonant or an aperiodic line. For some obscure reason, this method has never been widely adopted in amateur work.

The next simple stabilizing method of importance was that described by Dr. F. A. Kolster—the "derby hat" scheme. This arrangement, too, has failed to find much favor in amateur circles, probably because of the constructional difficulties involved in building the "hats" and because of their large dimensions.

Now comes what we believe to be an intensely practical and effective scheme based on suggestions made by Dr. F. E. Terman. We cannot help thinking that this new method represents a definite stride towards the ideal and that it will find wide use in ham work.

The basis of the scheme can best be explained by comparing it with crystal control. In the normal crystal oscillator, the grid circuit consists of the crystal itself—an electro-mechanical resonant circuit having a very high Q, a high ratio of reactance to resistance or a low power factor. In this arrangement, the crystal is displaced by an electrical resonant cir-

FIG. 1—A TYPICAL 2½-METER TRANSMITTER WITH HIGH-Q SHORT-LINE FREQUENCY CONTROL

The transmitter is very similar to the usual TNT affair except that the grid coil is replaced by a quarter-wave long resonant line made of large copper tubing. An extremely high order of frequency stability may be obtained with this arrangement.

* Associate Editor, QST.

FIG. 1—A TYPICAL 2½-METER TRANSMITTER WITH HIGH-Q SHORT-LINE FREQUENCY CONTROL

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cuit having a similarly high $Q$ and providing a similar electrical "fly-wheel" action. This resonant circuit is, of course, the crux of the whole matter.

In his paper, Dr. Terman points out that if we have a pair of parallel or concentric metal tubes, each a quarter-wave long, we can obtain a resonant circuit by bridging the tubes at one end. This, of course, is nothing new. He then goes on to show that the $Q$ of this resonant circuit goes up in direct proportion to the diameter of the tubes provided the correct order of spacing is maintained between the tubes. He establishes, for example, that a pair of tubes 10 cm. in diameter could provide a circuit with a $Q$ of 6500 which, he explains, is equal to or greater than that of a quartz crystal (at the higher frequencies). Here, then, is a stabilizing device which is at once simple and applicable to transmitters on any of the ultra-high-frequency bands on which we are now working.

For the last couple of months we have been experimenting with this stabilizing arrangement on the transmitters at W1AL. A description of these transmitters will probably serve to show the practical application of the high-$Q$ resonant line idea.

Fig. 1 illustrates the mechanical arrangement of the 112-mc. (2½-meter) transmitter—a typical example of a push-push oscillator with short resonant-line control. The line is, of course, the two vertical copper tubes connected together at the lower end with a movable jumper. Studied in conjunction with Fig. 2, this illustration is completely self-explanatory. It will be noted that the circuit departs somewhat from normal practice by having r.f. chokes in the four filament leads and in having no by-pass condensers from the plate or grid-feed leads. The r.f. chokes, particularly at the frequencies higher than 56 mc., were found to be essential. Even at 56 mc. they are of great advantage. The lack of by-pass condensers is no disadvantage. Rather, their elimination greatly simplifies the business of getting voltage nodes at the centers of the grid and plate circuits.

The 56-mc. transmitter at W1AL is illustrated in Fig. 3. Its circuit is exactly similar to that of Fig. 2, the only differences being in the length of the resonant line, the plate tank circuit and the size of the filament chokes.

In tuning this type of transmitter it is as well to start out with a resonant line a full quarter-wave long. Then, with the grids connected about one-third the line length from the shorted end, the plate tank is tuned until the plate current takes a sharp drop—indicating oscillation. The jumper on the line and the grid taps are then varied until oscillation is obtained at the desired frequency and with the lowest possible value of plate current. The oscillator is then coupled to the antenna circuit in the usual manner.

There are many things about this type of

![FIG. 2—THE CIRCUIT OF THE TRANSMITTERS ILLUSTRATED IN FIGS. 1 AND 3](image-url)

- $C_1$—For 112 mc., 35 µuf. per section—Hammarlund MGD-35X used.
- For 56 mc., 100 µuf. per section—National Type TMP 100 suitable.
- $C_2$—50 or 75 µuf., midget condensers.
- $L_1$—Single turn 2½ inches diameter for 112 mc. Single turn 4 inches diameter for 56 mc. Length of connections from the turn to the tuning condenser will have an obvious influence on the diameter of the turn used. Tubing of ¼ or ½-inch diameter is suitable.
- $L_2$—Single turn same diameter as $L_1$.
- $R_1_1$—10,000 or 15,000 ohm 10-watt resistor.
- R.F.C.—15 turns of No. 14 wire ½-inch inside diameter for 112 mc. 18 turns of same wire ½-inch diameter for 56 mc. Turns are spaced slightly.
- Copper tubes ¼-inch outside diameter and spaced ¼-inch are used in the 112 mc. transmitter. The 56 mc. tubes are ½-inch spaced ¼-inch.

There are many things about this type of
arrangement still to be studied. There is needed, for instance, a decision on the practical merit of line tubes of very large diameter. The largest tubes tried so far at W1AL were 2½ inches in diameter; the smallest, ½-inch in diameter. No very marked difference in performance was noted in the very rough survey made. Both of them, however, gave a signal steady enough to be receivable on a selective superheterodyne and with very careful adjustment of the transmitter, 'phone signals could be read on an oscillating autodyne receiver tuned to zero beat. Further experiment will doubtless reveal some optimum tube diameter taking both performance and cost into consideration.

A typical single tube circuit is that shown in Fig. 4. In this case a concentric line is shown. An open line probably would be of similar effectiveness. The chief problem in this case is adjustment of the grid tap. In practice, it would probably be necessary to drill several large holes in the outer conductor to allow appropriate manipulation of the grid-lead clip.

In determining the spacing of the conductors in these resonant lines, the following ratios are observed:

\[
\frac{b}{a} = \text{something between 9 and 10 for concentric lines and between 3 and 4 for the open type line}
\]

When\( b = \) inner radius of outer conductor in concentric line, or the spacing between tube centers in open line.

\( a = \) outer radius of inner conductor in a concentric line, or the tube radius in an open line.

In the case of the open line this is the equivalent of saying that the tubes should be spaced slightly less than their diameter.

While 800 tubes have been used in the transmitters illustrated, this does not mean that the new stabilizing scheme is not applicable to circuit employing other tubes. The resonant line may obviously replace the grid circuit in any normal ultra-high frequency oscillators using any of the conventional vacuum tubes. Appropriate adjustment of the line length and of the grid tappings will, of course, be essential.

**Another Successful 56-mc. Directive Antenna**

EAGER to break a 56-mc. path from Long Island through to Connecticut and down through New Jersey, Charles Nuebling, W2EKC, erected this stunning rotatable directive array. Using only a single 45 tube, the station has pumped a wallowing signal into W1AL (90 miles or so) and appears to be getting through to the third district consistently.

Though the whole structure appears to be frail, such is far from being the case. It has already withstood a 50-mile wind and, according to W2EKC, looks good for many more. The entire upper structure is of wood, supported on a heavy ball bearing and capable of being rotated with a “brass wheel” coupled with ropes. The supporting tower is 42 feet high.
Getting Cooperation in the Antenna System
A Practical Survey of the Important Features of Different Types

By William J. Goodell, Jr.,* W1BDH & W2DJT

WITH radio activity increasing, many of us are considering making changes in our rigs and many an eye is cast aloft with no doubt some thought as to how we can improve that long neglected radiation system. After all, the sky wire is really the most important DX-getting element of the station—and probably the most neglected.

In any radiation system there are three major considerations; namely, the radiator, the feeder system, and the impedance matching devices used between feeder line and antenna and between the feeder line and transmitter tank circuit. Proper consideration of any one of these factors alone will not give an efficient system; yet when each is considered with respect to the others, a truly efficient system results—to put it mildly, much more efficient than a good many of our present antennas! Therefore, it will be our object to point out how these factors affect our system and how we can coordinate them to our ultimate advantage. For no good reason at all, let us start with the radiator itself—the antenna—and see how, perhaps by a mere change in position, we can improve its qualities; boost its effective radiating efficiency.

VERTICAL AND HORIZONTAL DIRECTIVITY

Each radiator, whether of horizontal or vertical type, has characteristics in one plane or another as a result of which it sends out stronger waves in certain directions than in others. These directional characteristics depend principally upon two factors—the height above ground and the length of the radiator, both described in terms of wavelength (λ).

An antenna located near earth or ground (as amateur station antennas invariably are) has its directional characteristics affected by the presence of the earth because the radiation downward is reflected with a change in phase of the electrostatic field so that it will either add to or subtract from the direct radiated field according to the relative phases.

In general, radiation patterns showing the radiated field in both the vertical and the horizontal planes for any single radiator give us a picture of the performance to be expected. Consider the quarter-wave vertical radiator in Fig. 1, its relative directional radiated field being represented approximately by Figs. 2 and 3 in the vertical and horizontal planes respectively. We see from these two figures that while a vertical single wire radiates equal amounts of energy in horizontal directions that are perpendicular to the wire, the radiation in the vertical plane varies from maximum at or near the horizontal (low angles) to zero in the vertical direction (high angles).

Going to a more commonly used type, let us take a horizontal antenna and study its radiation patterns in the vertical plane for various heights above the ground. Assuming a perfect ground and a half-wave (fundamental) antenna or radiator in a horizontal position equidistant from the ground throughout its entire length, we find that the earth causes a distinctly different pattern for each quarter-wavelength we raise it above the ground. Relative patterns are shown in Figs. 4, 5, 6, and 7.

From Figs. 4 and 6 we quickly realize that a lot of energy is being wasted in high-angle radiation which, considering reflection from the ionosphere as shown at A in Fig. 8, would be ineffective. Hence, illustrative radiation patterns must not be taken as literally applicable to every antenna installation of the given length and height above ground. For instance, while the antenna of Fig. 1 would give a vertical plane pattern resembling the one shown in Fig. 2 at a frequency below 10,000 kc., where the ground could be considered finitely conductive, at a higher frequency the earth would become negligibly conductive and there would be no perfectly horizontal radiation. (See Short Wave Wireless Communication, by Ladner and Stoner, Chap. XII.) Hence the low-angle radiating properties assigned to such vertical antennas must be taken with exceptions for the amateur 14-mc. band and higher frequencies.—Ednor.
of no value at a distant receiving station, D. Lower angle radiation, as shown in Figs. 5 and 7, represents the more suitable condition which will give Ulla maximum reflected wave from the ionosphere to the distant receiver, as shown by B of Fig. 8.

From Figs. 4, 5, 6 and 7, it would appear that a half-wavelength represents a desirable height for a horizontal radiator operating at its fundamental frequency, giving us effectively useful radiation in a lobe from 25° to 45° above the horizontal. At a wavelength above ground we find the earth effect causing cancellation of radiation in the directions which make angles of 0°, 30° and 90° with respect to the horizontal, while the effect is a reinforcement of the radiation at 15° and 49° with respect to the horizontal. While this gives low-angle lobes, under some conditions these might cause selective fading at the receiving station because of the difference in the lengths of the paths traveled by the energy radiated at the two angles 15° and 49°.

It is already apparent that the height of our antenna above ground has a very direct and important bearing on its radiation characteristics and the resulting field strength of our signal at the distant receiving station. Now let us have a look at our other characteristic of antenna radiation, namely, that of varying its direction of maximum radiation in the horizontal plane.

Referring to Figs. 9, 10, 11, 12 and 13, we find that by changing our radiator's length from $\lambda/2$ to a length of $5\lambda$, we have moved our direction of maximum radiation from an angle of 90° with the antenna to a 22.5° angle, and at the same time have created four paths of maximum radiation instead of the original two. Corresponding changes are shown in the other figures in which we see the effect of lengths equal to $\lambda$, $3/2\lambda$, and $2\lambda$, various definite changes in the angles of maximum radiation taking place as the length of the antenna is varied with respect to the wavelength.

Thus we find that without moving the direction in which our antenna points (compass bearing) we may change its radiation distribution (angles of maximum radiation) by merely increasing or decreasing its length; or keeping the length constant, by changing the frequency in harmonic steps. While the figures shown are intended principally to illustrate radiation patterns in the horizontal plane, it also should be pointed out that the radiation pattern in the vertical plane is similarly affected by increasing antenna length in terms of wavelength, the lobes pictured as giving smaller angles with the line of the antenna, also giving concentration of radiation at low angles in the vertical plane. Hence the horizontal type antenna operated at increasingly higher harmonics gives lower-angle radiation. This accounts for the excellent results obtained on 7 and 14mc. by the many amateurs who use their 3,5-mc. fundamental antennas as $\lambda$ and $2\lambda$ radiators on the higher frequencies.

The above figures are further interesting in that they furnish the basis for some of the more recent types of directive antennas suggested for amateur use. Consider for instance the so-called "V" or folded long-wire antenna pictured in Fig. 14. Here we have two single wire radiators fed at the apex of the V and separated by an angle $\phi$. This angle is directly dependent upon the length of each radiator and is equal to twice the angle of maximum radiation from any single wire radiator pictured in Figs. 9 to 13 inclusive. Fig. 15 shows how their fields combine to create a beam in which the energy is concentrated, with very little radiation along the line XY.

To clarify the above, let us consider two examples: First we will take an antenna one wavelength on a side (this will hold for any of the ham bands). Referring to a single wire $\lambda$ in length (Fig. 10), we find its angle of maximum radiation is 54°; therefore $\phi$, which is twice 54°, or 108°, represents the angle of separation. Our antenna will be that represented by Fig. 16. Now let us take an antenna of a length per side of $2\lambda$, an entirely reasonable length for an amateur antenna for the 10-, 20-, or 40-meter band. By referring to Fig. 12, $\phi$ becomes 72° and our antenna looks like Fig. 17. Other combinations may be easily developed knowing the proper angle for the desired wavelength, or vice-versa.

**IMPEDANCE MATCHING**

Going on to our second consideration in the radiation system, let us consider the impedance matching question. Referring to the chart of Fig. 18, we have the cold facts laid out before us as to just what loss we can expect for any mismatch.
at any point in our system. Since examples are the best illustrations, let us consider two. First, suppose that we have a half-wave horizontal antenna which we wish to feed directly at the center with a 600-ohm line and that our antenna impedance at the point of feed is roughly 75 ohms. Under these conditions we have an impedance ratio of 75 to 600 or 0.12. Referring to our chart we find a loss of approximately 4.2 db. This, in terms of power supplied to our antenna, represents a loss of nearly 60%; in other words, only 40% of our power is getting into the antenna.

Another illustration of note is that of loss because of poor impedance matching between our transmitter tank circuit and the feeders. Here again we are attempting to couple two unequal impedances, a 600-ohm feeder line to, say, a 3000-ohm tank circuit. The loss under the extreme condition of a ratio of 600 to 3000 or 0.2 would be (from our chart) 2.8 db. With proper coupling, as by use of the pi-section network, this last loss can be made negligible with a resultant 25 to 30% increase in output and a consequent increase in efficiency. (See A. A. Collins' article in Feb. 1934 QST.) Other schemes, such as attempting to tap onto a tank coil at 600 ohms, etc., while partly reducing the loss, do not come up to the ease of operation and adjustment of this more adaptable system, and it is this form of coupling which is heartily recommended in every case for better efficiency.

It is interesting to note at this point that when using an impedance matching system at the junction of feeder and transmitter tank, quite often the impedance matching network has at its output not the supposed feeder line 600-ohm impedance, but an impedance of a different value which is a reflected impedance caused by an impedance mismatch at the antenna end. Hence standing waves will not be prevented from appearing on the feed line and, while it represents a tuned condition creating a better load on the transmitter, it is not the proper load as far as the antenna itself is concerned.

From the above it would appear that our greatest loss comes at the junction between the antenna and the feed line. One of the most commonly used systems around amateur stations today is a feed line comprising an integral number of λ/4 sections—a resonant feeder. Fig. 19 illustrates a typical set-up for this type of feeder and while it has the advantage of helping us get our antenna away from the transmitter and out into the clear, and is tunable over a wide frequency range, as a feeder system with a high degree of efficiency it has little to recommend itself. Among its faults are: High transmission line loss which increases rapidly with any change in its electrical length (due to tuning, weather, etc.); the creation of standing waves which, if the power is large, may cause insulation and constructional troubles; and promotion of a generally poor power factor. It is further recognized that, even should this type of transmission line be perfectly tuned throughout, its losses, because of the standing waves on it, can never be as small as those of the non-standing wave type or non-resonant transmission line. Hence, if we are to feed our antenna from a distance of more than a half-wavelength or so, it will pay us to follow the lead of the commercial companies and improve our antenna system by the use of the non-resonant type of line.

Two main drawbacks to the use of non-resonant transmission lines, as viewed by the amateur, are the trouble of making an impedance match between line and antenna and the fact that the antenna can only be used on one band. The latter is purely a question of how many bands the amateur wants to work on, what antenna system efficiency he is interested in having, and what he will tolerate in physical and mechanical difficulties arising in the construction of several antennas (bearing in mind that, by switching, the same transmission line may be used to feed any one of several antennas).

\[\text{FIG. 14}\]

\[\text{FIG. 15}\]

\[\text{FIG. 16}\]

\[\text{FIG. 17}\]

\[\text{FIG. 18}\]

\[\text{FIG. 19}\]

\[\text{FIG. 20}\]
COUPLING SYSTEMS

Various schemes have been devised for matching the non-resonant feed line to the antenna. A few of the more practical are shown in Figs. 20, 21, 22 and 23. Fig. 20 represents perhaps the most simple type of all to construct and adjust. (Reference should be made to The Radio Amateur's Handbook for the various dimensions of L, C, and A.) Some mention has been made of the fact that the impedance-matching "Y" is part of the antenna and therefore a rupture of the radiated field results which cuts down the efficiency of radiation from the flat-top. This is true; but even considering this fact, the gain of energy in the antenna itself through the use of an impedance match between feeder and antenna would tend to make this fault one of minor consideration.

In Fig. 21 we employ a transformer (coils) to match impedances. This gives one the idea of link coupling and, while perfectly possible for amateur use, has its largest drawback in the use of coils which have to be placed directly in the radiator.

In Fig. 21 we find the so-called quarter-wave matching link type antenna system. This system employs a quarter-wave section which functions as an impedance matching transformer, the theory of operation being that the antenna impedance $Z_a$ and the transmitter end impedance $Z_t$ are related to the line impedance $Z_L$ by the expression $Z_a \times Z_L = (Z_t)^2$. By choosing the proper spacing and size of the conductors in the linear transformer, any two real impedances may be matched providing they do not differ too much in value. This is the system developed by the Bell Telephone Laboratories for their high frequency antenna arrays at Lawrenceville, N. J. Reference should be made to the article by Johnson and Glover in the January 1934 issue of QST for the detailed specifications of this system.

Fig. 23 represents a system of match used to a large extent by the Radio Corporation of America on their commercial antennas, while Fig. 24 shows a similar type as applied by A. T. & T. The antenna is connected to a short-resonant line in Fig. 23, and the non-resonant line is then connected to the proper point on the resonant line to give the required terminating impedance. The short resonant line acts as an impedance-matching transformer in which the ratio of impedance transformation depends upon the point of connection. This matching method was used in the rotary beam described by W3CJJ in July 1934 QST, to which the reader should refer.

The latest and perhaps the most adaptable system of effecting an impedance match between line and antenna is shown in Fig. 24. Use of this system at KA1NA was described by Lieut. Redgrave in November 1934 QST. The Bell Laboratories receive the credit for its development and an

<table>
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<th>Ratio $I_{\text{max}}/I_{\text{min}}$</th>
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<tr>
<td>0.6</td>
<td>0.106 A</td>
<td>0.145 A</td>
<td>0.06 A</td>
</tr>
<tr>
<td>0.5</td>
<td>0.100 A</td>
<td>0.155 A</td>
<td>0.10 A</td>
</tr>
<tr>
<td>0.4</td>
<td>0.060 A</td>
<td>0.165 A</td>
<td>0.12 A</td>
</tr>
<tr>
<td>0.3</td>
<td>0.080 A</td>
<td>0.175 A</td>
<td>0.14 A</td>
</tr>
<tr>
<td>0.2</td>
<td>0.065 A</td>
<td>0.187 A</td>
<td>0.17 A</td>
</tr>
</tbody>
</table>

Distances and lengths of the line or loop are given in terms of $\lambda$ or one wavelength. Wavelength, $\lambda$, in meters, equals $300,000$ divided by frequency in kilocycles. One meter equals 3.28 feet.
excellent explanation of this system will be found in the Proceedings of the Institute of Radio Engineers for July, 1932, in the technical paper, "Transmission Lines for Short-Wave Radio Systems," by Sterba and Feldman. This system operates on the theory that a complex impedance, such as one finds on a resonant feed line, may be changed to the surge impedance of the line by attaching a shunt reactance of the proper value. A short section of line is used for this reactance and a position along the line for shunt reactance of either a leading or a lagging power factor may be chosen. This may be at a place on the line most convenient from an actual construction standpoint since one has a choice of two positions for every λ/2 length of line. Actual adjustment of the system is as follows:

The transmission line is first built to the desired length and attached to the antenna. With power applied, the standing waves on the line, resulting from the poor termination at the antenna, are measured for their maximum and minimum values by some form of a measuring device. (The one used at KAINA will do nicely; also see the above I.R.E. paper.) Points of minimum and maximum values should be marked on the line and the ratio of minimum to maximum determined. Once this ratio is known, a glance at Fig. 25 will indicate the approximate position and length of the shunt reactance or auxiliary line. It will be noted that in one case we have a short section of open line and in the other a closed loop, there being a short across the end of the latter.

(Continued on page 88)

'Phone-C.W. QSO Contest
February 9th—10th; February 16th—17th

How many 'phone stations can any key-pounding amateur radio operator QSO in two week-ends? How many c.w. telegraph stations can any ham operator behind a mike contact in the same time? All 'phone hams are invited to try it! All brasspounders likewise! The final score. 'Phone-'phone and c.w.-c.w. QSO's do not count, but all 'phone-c.w. QSO's should be recorded by a simple tabulation in the form suggested herewith.

This contest is designed to produce new QSO's for you; this should result in new friendships, new acquaintances among neighboring hams. It is a heap of fun to roll up scores and test the range and reliability of our stations. A chance at new records, an opportunity to brush up code skill to rank with the best of them, a chance to

(Continued on page 88)

Report of 'Phone Station W5XYZ

A.R.R.L. Section * .............................................................
Name and address ...........................................................

<table>
<thead>
<tr>
<th>Date and Time (Local)</th>
<th>Frequency Band</th>
<th>Station Worked</th>
<th>Section (New sections indicated by check)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 9th</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:01 p.m. C.S.T.</td>
<td>3900 kcs.</td>
<td>W2DBQ</td>
<td>/N.Y.C.-L.I.</td>
</tr>
<tr>
<td>3:12 p.m.</td>
<td>14,150 kcs.</td>
<td>W9BAZ</td>
<td>/Ky.</td>
</tr>
<tr>
<td>3:30 p.m.</td>
<td>3900 kcs.</td>
<td>W1BWD</td>
<td>/Conn.</td>
</tr>
<tr>
<td>4:20 p.m.</td>
<td></td>
<td>W9PPM</td>
<td>/Ky.</td>
</tr>
<tr>
<td>4:30 p.m.</td>
<td></td>
<td>W6LIE</td>
<td>/San Francisco</td>
</tr>
</tbody>
</table>

Claimed Score: 5 stations worked in 4 different Sections
5 X 4 = 20 (total score)

Form for Reports to A.R.R.L. on 'Phone-C.W. QSO Party Showing How Work Should Be Tabulated
THE sixth annual Armistice Day Message from the chief signal officer of the Army to all members of the Army Amateur Radio System was transmitted on the night of November 12, 1934 from WLM-W3CXL, the Army Net Control Station of the A.A.R.S., located in the War Department in Washington, D. C.

In accordance with established practice the reception of this message was made a competition for the nine corps area organizations of the A.A.R.S. This year, in addition, competition was held between the states composing each corps area. Each amateur was requested to copy the message and mail the copy to his Corps Area Signal Officer to be checked. Each state and corps area was scored on the percentage of properly copied and serviced mailed-in copies received from all members of the state and corps area.

The message was transmitted at the regular broadcast periods of 7:00 p.m. and 10:00 p.m., E.S.T., on the special A.A.R.S. frequencies of 3497.5 and 6990 kcs. simultaneously. Most of the corps area net control stations rebroadcast this message once or twice to assist members who were unable to hear WLM-W3CXL.

The Chief Signal Officer’s message was as follows:

"TO ALL ARMY AMATEURS—
ON THIS SIXTEENTH ANNIVERSARY OF THE SIGNING OF THE ARMISTICE IT IS BEFITTING THAT WE PAUSE TO HONOR THOSE WHO DIED TO MAINTAIN OUR NATIONAL HONOR AND INTEGRITY STOP THE SUPREME SACRIFICE THEY MADE FOR US SHOULD SPUR US ON TO A UNITED EFFORT TO BE READY TO HELP OUR COUNTRY IN ANY LOCAL OR NATIONAL EMERGENCY OR DISASTER SO THAT FUTURE LOSS OF LIVES WILL BE MITIGATED TO THE GREATEST EXTENT POSSIBLE STOP TO YOU WHO HAVE SO WILLINGLY GIVEN YOUR TIME AND ENERGY TO PERFECT AN EMERGENCY RADIO COMMUNICATION SERVICE THAT WILL BE AVAILABLE WHENEVER NEEDED BY OUR GOVERNMENT AND THE RED CROSS I GIVE MY MOST WHOLEHEARTED THANKS AND COMMENDATION—

IRVING J. CARR, MAJOR GENERAL
CHIEF SIGNAL OFFICER OF THE ARMY"

In response to this message 948 properly prepared and serviced copies were received by the nine corps area signal officers from the 1,511 members of the system, or a percentage of approximately 63. No record was kept of the number of messages not properly copied and serviced.

To the Fourth Corps Area went the honors for having the highest percentage of members mail in copies of the message.

The records of each corps area in order of their standing are as follows:

FOURTH CORPS AREA, comprised of the states of Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee (Captain Harry L. Vitzthum, Sig. C., W4SM-WLR, Liaison Agent and Captain Myrl F. Jones, U. S. Army, Retired, W4IR-WLR, Radio Aide), with 125 members, received copies from 101 members or a percentage of 81. The states of South Carolina (W4MN, N.C.S.), and Florida (W4AKJ, C. W., Net Control Station and W4LS, 'Phone Net Control Station), tied for first place within the corps area with 100% returns from their members.

The Fourth Corps Area honor roll includes:

SEVENTH CORPS AREA, comprised of the states of Arkansas, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota and South Dakota (Captain John J. Downing, Sig. C., W9BNT-WLU, Liaison Agent, and Mr. H. W. Kerr, W9DZW-WLUY, Radio Aide), with 173 members, received copies from 132 of them, a percentage of 76. Missouri won first place with 96% of its members sending in satisfactory copies of the message. Their call letters include W9BFC (N.C.S.), W9ENF (Alternate N.C.S.), W9BSB (Phone N.C.S.), W9AJJ, NNZ, BMA, FHY, ECE, CIR, MZD, GSO, IXX, KCG, RTG, GTK, PYF, ARH, OQI, DHN, EPV,
EIGHTH CORPS AREA, comprised of the states of Arizona, Colorado, New Mexico, Oklahoma, and Texas (1st Lieut. Louis J. Tatam, Sig. C., W5OW-WLJ, Liaison Agent), has a membership of 98, of whom 67 or a percentage of 68 mailed in acceptable copies. New Mexico led all others with a maximum score of 100%. This state's honor roll includes W5CGJ (N.C.S.), W5ZM (Alternate N.C.S.), W5CJP, DLG, DUI, ND.

FIFTH CORPS AREA (Staff Sgt. Richard W. Martin, 18th Signal Service Co., Liaison Agent and Lieut. Loren G. Windom, Inf.-Res., W5ZM-W6UO, Liaison Agent), comprised of the states of Indiana, Kentucky, Ohio and West Virginia, has 165 members of whom 102 submitted copies, a percentage of 61.8. Kentucky and West Virginia tied for first place with a score of 100%. Their honor roll includes: Kentucky: W9HAX (N.C.S.), W9CXV, CHE, BRY, CFL, ENJ, EQY, CYK, BFW, AZU, APU, AOT, EBD, EGD, GE, EMA, DQB, COQ, EUL, EUL, EHL, DWE, ALF, EHX, DZW, EQC, EPX, BXP, DDU, BSM, CIV, DVO.

NINTH CORPS AREA (Captain R. B. Woolverton, Sig. C., W6ZG-WLY, Liaison Agent and Mr. J. H. MacLefferty, Jr., W6RJ-W6VLB, Radio Aide), comprised of the states of California, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming and the Territory of Alaska, has the greatest number of members among the corps areas. With a membership of 303, they attained a percentage of 61.4 with 186 members submitting satisfactory copies. Nevada won the contest among these states with a 100% score. Its honor roll includes: W9UOF (N.C.S.), W6OIJ, GQZ, ROJ, OXJ, BMA, DSE, LQJ, TQV, BVD, JXJ, NHJ, NQJ.

FIRST CORPS AREA (Captain George W. Morris, Sig. C., Liaison Agent and Mr. Fred C. Bigelow, W6JL-W1PI, Radio Aide), comprised of the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, has a membership of 116 members, 71 of whom sent in satisfactory copies, giving a percentage of 60. Their honor roll includes: W6UMO (N.C.S.), W6ADP (Alternate N.C.S.), W6AAX, GYX, HGJ, IKJ, EGA.

SECOND CORPS AREA (Captain James A. Eyster, Jr., Sig.-Res., W6L-JW2SC, Liaison Agent and Captain David Talley, Sig.-Res. W6NA-W2PF, Radio Aide), which includes the states of Delaware, New Jersey and New York with a membership of 85, received satisfactory copies from 51 members giving them 60% for score. The leading state was New York with 56% score won by the following honor members: W5CN, CSE, BME, DZU, ESY, JMG, JE, AQE, CDE, EEU, FYP, GZM, LJD, JAK, EEN, W2BJA, FDQ, EQY, OQ, LG, DBQ, PF, SC, ELK, DFU, BGS, HF, CA, GRB, SX, DWQ, EYS, BGO, GGP, BWS and EJZ.

THIRD CORPS AREA (1st Lieut. H. O. Bixby, Sig. C., WLQ-W3SN, Liaison Agent, and Mr. E. D. Hartman, Radio Aide, WLQ-W3OK), comprised of the states of Maryland, Pennsylvania, Virginia and the District of Columbia, had 165 of their 300 members submit properly prepared copies giving them 55%. The winning state was Virginia with 79% and with the following stations on their honor roll: W3FJ (N.C.S.), W3BYA (Alternate N.C.S.), W3BJX, EQU, CHE, BRY, CFL, ENJ, EQY, CYK, BFW, AZU, APU, AOT, EBD, EGD, GE, EMA, DQB, COO, EUL, EUL, EHL, DWE, ALF, EHX, DZW, EQC, EPX, BXP, DDU, BSM, CIV, DVO.

SIXTH CORPS AREA (Pvt. R. J. Dutch, Sig. G., WLTA-W9ANR, Liaison Agent, and Lt. C. W. Roth, Sig.-Res., WLTA-W9DOU, Radio Aide), comprised of the states of Illinois, Michigan and Wisconsin, has 141 members, 72 of whom submitted satisfactory copies giving them a percentage of 50. The leading state was Illinois with a 73% score. The members on the Illinois honor roll include W9IVF (N.C.S.), W9CGV (Alternate N.C.S.), W9ANR, DOU, KJY, FP, KZV, ILH, IE, B, HUN, DPD, HQH, HKN, MLH, XKE, OXA, ORT, KOQ, MKK, JO, NNG, NBB, HUX, ICN, MIN, INZ, OMA, DBQ, AMO, PGB, DAY, NXXG, KRZ, NXZ, NQG, STG, LNI, HB, HPG.

The chief signal officer is very gratified that so many amateurs participated in the competition this year. It is an increase of about 25% over that of last year's Armistice Day Message Contest.

Getting Coöperation in the Antenna System

(Continued from page 80)

The auxiliary line or loop is cut to length and hung on the feeders loosely at the approximate position, good contact between feeders and auxiliary line being necessary. A check is then made on the standing waves with the measuring device and slight final adjustments are made by sliding the auxiliary line along the feeders until the standing waves are reduced to a minimum. Two r.f. meters a quarter-wave apart in one of the feeders will also assist in this adjustment, their readings being approximately equal when a perfect termination has been made. The feed line then loses its standing waves and becomes a simple low-potential line with a correspondingly low power-transfer loss between the transmitter and antenna. It is evident from the figures that the non-resonant transmission line should be at least (Continued on page 70)
IT HAS long been the opinion of the writer that the antennas used at the great majority of amateur stations, in this country at least, leave much to be desired as far as efficiency is concerned. When it is considered that some operators obtain almost unbelievable miles per watt with some tricky form of antenna, and not the directional kind at that, it can be seen that any improvement that can be made in this part of the transmitting equipment is of great value.

After working with all forms of conventional antennas on several bands, the author finally decided to start working on this situation earnestly and try some of the schemes that most of us somehow never get around to trying out. In this search for a better antenna, the first thing decided upon was that so far as possible there should be no standing waves in the system except on the radiator itself, where they belong; hence, all impedances in the system should be matched as nearly as possible to perfection.

With the above ideas in mind, the advantages and disadvantages of the various matched impedance systems were studied in order to determine which might prove to be the most useful to the greatest number of amateurs. On first sight it was found that all of these better known systems have certain features which make them more or less uninteresting to a large number of prospective users.

The antenna matching arrangement finally decided upon as having the best possibilities, as far as the above conditions are concerned, is that described briefly in F. E. Terman's *Radio Engineering*, pages 538-542, and is similar to that used by W3C1J in the rotary beam described in *QST* for the purpose of bringing this arrangement to the attention of the amateur fraternity and of giving simple means for adjusting it for proper operation that this article has been written.

This antenna employs a resonant quarter-wave transformer section. This quarter-wave section actually consists of an end portion of the antenna folded back on itself, as in the Zeppelin feed arrangement, and may be made of the same conductor as that of the antenna. In fact, this is to be preferred. The conductors of the quarter-wave section should not have an insulating covering of any kind, as will become evident later on in this discussion.

As pointed out in numerous places in the literature on the subject, the impedance of a quarter-wave section with a closed end varies along its length from a low value at the closed end to a value of several thousand ohms (ideally, infinite impedance) at its open end. Since the impedance at the end of the antenna is also high, what better device could be asked to match the impedance of a feed line of any ordinary value of impedance to the high end-impedance of the antenna properly?

The basic idea is shown diagrammatically in Fig. 1. A method of use for both horizontal and vertical radiators is shown, although other arrangements will no doubt occur to the prospective user which will enable him to fit the system to his particular requirements. The shorting bar is used, as described later, to adjust the quarter-wave section (any odd quarter-wave length may be used but a single quarter-wave section is best for obvious reasons) to the proper length under operating conditions. The position of the feeders is determined experimentally for a line having any customary value of impedance, under actual
working conditions, without the use of mathematics.

The length of the radiator proper is figured from the usual formulas found in the Handbook and the quarter-wave section is made a foot or so longer than the computed value in order to allow for adjustment. The spacing of the wires in the quarter-wave section preferably should be the same as the spacing of the feeder system, although a slight deviation from this value will not introduce any serious losses.

The feeder system may be of the conventional parallel-wire type or may consist of a transposed line in order to maintain a more perfect balance to ground. If the transposed line is decided upon the transposition insulators should be placed at equal distances along the line. As there are no standing waves on the feeders when the tuning process has been completed, the value of spacing between the transposition blocks is not extremely critical; but it will pay the user to make the line as symmetrical as possible. The length of the line may be anything up to a thousand feet or so, if necessary, without introducing any serious losses. The surge impedance of the line need not be known because, regardless of its value, the line can be matched to the quarter-wave section. The feed line can be matched to the output tank of the transmitter by any of the usual systems shown in the Handbook.

GETTING THE RIGHT ADJUSTMENT

After the foregoing parts of the antenna have been erected the tuning process can be started. In order to facilitate this work it is advisable to construct some sort of a field strength indicator. The one described by Norder on page 22 of Hints and Kinks and shown schematically in Fig. 2 will be quite satisfactory. The parts for this little instrument should be available around almost any up-to-date ham shack. Naturally, the operating frequency of the transmitter should fall within the tuning range of this indicator. This meter is placed well away from the antenna but near enough to the shack so that the operator can conveniently observe the approximate position of the meter pointer while making adjustments.

The shorting bar is placed at the measured quarter-wave point on the "transformer" to start with, and the feeders are temporarily connected a point approximately one-third of the distance from the shorting bar to the antenna proper, for a transmission line of between 400 and 600 ohms impedance. The transmitter is then started up (when there is practically no use being made of the band, incidentally), and the feeder system loosely coupled to the output tank. The field strength indicator is tuned to resonance and the reading noted. It may be necessary to connect a short piece of wire to the indicator as shown in Fig. 2 to increase the pick-up if the transmitter power is low. If this is done, care should be taken that the position of the pick-up wire is not allowed to change during the tuning up process.

The position of the shorting bar and the position of the feeders are then varied alternately, by small amounts in both directions along the quarter-wave section, until the field-strength meter indicator shows the highest reading.

As a final check on the adjustments arrived at in this manner it is necessary to couple the feeders to the final tank of the transmitter in such a manner that the proper value of load is obtained on the final stage, after which the above adjustments should be rechecked in order to correct for any unbalances brought about by changing the loading at the transmitter end of the line. At this point in the procedure it is also necessary to check the feeders for standing waves. This can be done by means of a thermocouple galvanometer, if one happens to be available; or with the field-strength indicator previously described, provided that its sensitivity is reduced by detuning the tuned circuit—or better, in some cases, by removing it altogether. By touching either instrument to the feeders, an equal reading should be obtained on each feeder separately or at different points along one feeder. If this is not the case, the position of the feeder tappings on the quarter-wave section should be changed slightly until this condition is obtained. For the hypercritical, it would pay to readjust the shorting bar again for maximum current, although once the maximum indication point is found, as shown by the field meter, the feeders are in general pretty close to the proper point.

With regard to this last operation, the writer noticed that in approaching the proper point for the feeders from one direction, one feeder was "hotter" than the other; whereas when approaching this point from the other side the previously "hot" feeder became the "cold" one. By this means it was possible to determine on which side of the proper point the feeders happened to be located. In order to make the adjustments described above with the power on, it is advisable to make sliding joints for adjustment purposes. And if severe radio frequency burns are to be avoided, all adjustments should be made by means of a heavy pair of pliers grasped firmly in

(Continued on page 41)
IN 1897 in Crefeld, Germany, a three-year-old tot sat entirely nude on the sidewalk outside his home and read newspapers upside down. Passers-by smiled; a harassed mother coaxed and pleaded. Such is the earliest recorded incident in the literary career of Lieut. John Leonard Reinartz, perhaps the most widely known figure in Hamdom. His radio career began in 1909 with a coherer and single-slide tuner; in 1910 there was a spark coil transmitter signing JL. With the World War John went to Camp Upton, Long Island, became disabled, and then taught prospective radio men. He developed the famous Reinartz tuner in 1921, and the transmitting circuits with which Leon Deyo and Fred Schnell and he worked across the Atlantic in 1923. In 1925 he first proposed the reflection theory explaining the peculiar behavior of the then-new short waves. In the same year he went North with MacMillan and Byrd, demonstrating the efficacy of the short waves. At present, he divides his time between the "best girl," amateur and Naval Reserve activities, and research work for RCA.

"THE Dixie Squinch Owl," that harbinger of good cheer from the 4th C.A., A.A.R.S., is edited, published, addressed, licked and tooted to the post office by Radio Aide Myrl F. Jones, W4IR. The king of the Squinch Owl's domain was born in the 5th C.A. (Kaintuck') but moved to the 4th C.A. (Jawjuh, no less) as soon as he was old enough to do something about it. His radio experience dates from 1908, when he began to monkey with field radio sets of the Signal Corps, mostly on the heavy end of a hand generator. From then on the tale goes: Radio operator at Nome and St. Michael, Alaska, 1909 to 1912; radio operator, U.S. transport service at sea, 1913; submarine cable operator at Valdez, Alaska, 1914; captain commanding Company "A", 6th Field Signal Battalion, 6th Division, overseas. The rest of it is contained in the inimitable autobiography which is the proud possession of each member of the 4th C.A. It... but you'd better try to get a copy from W4IR. Latest achievement is Armistice Day win!

REV. ROMUALD FOX, O.S.B., finished building a new $70,000 church in Valley Falls, Kansas, in 1926. At the same time he gave way to the radio broadcast bug that had bitten him in 1921, and installed an RCA Model ET-3615-3620 broadcast station. In 1927 he got the amateur call W9ESL, and he's been active in the game ever since. He has been A.A.R.S. Corps Area net control on 'phone, and organized the original 'phone net in the 8th C.A. O.O., O.R.S., O.P.S., O.B.S., P.A.M., Wouff Hong degree team—he has played the game of amateur radio to the full. Just at the moment, he's working hard on a large sound trailer (Black Maria style) used for public address work at church, civic and school affairs.

LAWRENCE J. RYAN, of Hannibal, Mo., is 73 years old and on the 75 meter 'phone band. If that isn't sufficient identification, we might tell you that he's also known as the Wooden Indian. Oh, yes, he's very well known indeed—oldest operator on the 4 mc. band, he claims; oldest active amateur in the world today, perhaps. Active? Why, he's super-active. Tune around on that 'phone band at any time—3 o'clock in the morning or 3 o'clock in the afternoon—and you'll probably hear him singing away, cheerful as ever. He's the best baritone on 75 meters, to hear him tell it; he'll sing your call for $2.00, and can that tremolo fill the old breast with pride! One thing more—Larry is the millionaire 'phone operator, ask him.
Seven A.R.R.L. divisions have just held elections to choose their directors for the 1935-1936 term. Four old directors were returned to office, three new ones elected, and a new alternate director chosen in each division.

In December QST we reported that the Roanoke and Rocky Mountain divisions returned Professor Caveness, W4DW, and Mr. Andrews, W9AAB, respectively, and that their respective alternates are Mr. J. Frank Key, W3ZA, and Mr. Lewis D. Stearns, W6BTX. No competing names were suggested for any of these offices, so that they were declared elected without balloting by the membership. There was competition in the other five divisions, however, and this is the story of the result.

**CENTRAL DIVISION**

The Central Division chose for its new director Mr. Edward A. Roberts, WSHC, of Cleveland, who won handily over Mr. G. L. Eldred, 1011 to 559. The former director, Mr. Windom, was not a candidate for reelection. Mr. J. B. Wathen III, W9BAZ, Louisville, Ky., was elected alternate director. The figures:

- For director: Edward A. Roberts 1011
- For director: George Lane Eldred 559
- For alternate: J. B. Wathen III 711
- For alternate: Carl L. Hansen 603
- For alternate: Wesley E. Marriner 249

Mr. Roberts, a retired executive of mature years, is active on both 'phone and c.w., holding A.R.R.L. certificates as Route Manager and O.P.S. He has an elaborate station incorporating three 'phone transmitters and two complete c.w. outfits for various purposes in the different bands.

**HUDSON DIVISION**

The Hudson Division elected a new director in the person of Mr. Kenneth T. Hill, W2AHC, of Great Neck, Long Island, while Mr. Robert M. Morris, W2LV, of Millburn, N. J., was elected as his alternate. Balloting figures:

- For director: Kenneth T. Hill 590
- For director: Bernard J. Fuld 441
- For alternate: Robert M. Morris 731
- For alternate: S. M. Riccobono 297

Mr. Hill, a telephone engineer, comes to the Board with twenty years of ham experience. We shall present a longer sketch of him, and of the other new directors too, in our "Hamdom" column soon.

**NEW ENGLAND DIVISION**

Director Bailey, old "KH," was returned to office by a whopping majority. Mr. Joseph A. Mullen, W1ASI, Ashmont, Mass., was elected the alternate. The count:

- For director: George W. Bailey 504
- For director: Horace Young 190
- For alternate: W. L. Lessard 82
- For alternate: Joseph A. Mullen 512
- For alternate: Isaiah Creaser 350

**NORTHEASTERN DIVISION**

Director Gibbons was likewise returned to the Board by a husky majority, while Mr. A. L. Smith, W7CCR of Missoula, Mont., is the newly-elected alternate. The tally:

- For director: Ralph J. Gibbons 310
- For director: Robert H. Votaw 101
- For alternate: A. L. Smith 201
- For alternate: M. R. Cooper 113
- For alternate: Nilio E. Koski 97

**WEST GULF DIVISION**

The West Gulf staged the real upset of the 1934 elections in a spirited campaign that brought in 61.8% of the ballots sent out, an unusually high percentage. Mr. Wayland M. Groves, W5NW, of Neches, Texas, was elected director over the veteran incumbent, Mr. Frank M. Corlett, and Mr. C. L. Nelson. The count:

- Mr. Groves 234
- Mr. Corlett 147
- Mr. Nelson 75

Mr. David H. Calk, W5BHO, of Houston, Texas, was the only candidate for alternate and so was declared elected.

Mr. Groves, the new director, is an active high-power 40-meter man whose experience dates back to the spark days. His YF is a harness, call W5DUR. He is chief clerk and telegraph operator for the Humble Pipe Line Company at Neches.

The directors have the right to appoint assistants to help them in their duties. Such assistant directors have no legal status in the A.R.R.L. machinery; that is, they are the administrative assistants of the directors but cannot vote or otherwise replace the director. The alternate director, however, is an official elected for the purpose of representing the division at Board meetings and casting its vote when the director cannot attend. On the other hand, an alternate
director is not an assistant director unless he is also so named by the director. His duty normally is simply to represent the division at Board meetings when called upon to that end by the director.

QST is certain that it speaks for the membership in welcoming the new members of the Board to the A.R.R.L. official family, and in expressing the gratitude of all of us to the outgoing directors for their splendid service to A.R.R.L. All of these men have worked sincerely, during the years of their office, to advance amateur radio and our League. This is particularly true of Frank Corlett of the West Gulf Division, who had been for nearly eighteen years a member of the A.R.R.L. Board. First elected a director in February of 1917, he was one of the war-time directors who participated in the post-war reorganization and was eight consecutive times reflected to the Board. He was the dean of the division directors and in length of service to A.R.R.L. as a director is exceeded only by Mr. Maxim. Ye Ed was a fairly-Young Squirt playing with a spark gap in Illinois when Corlett was first elected to the Board. Eighteen years! That deserves some rousing cheers.

The 1934 elections marked the first occasion where members were required to state whether they were licensed amateurs. The statistics are worth reviewing. Let us first get the facts straight: By a recent amendment to by-laws, the right to vote in A.R.R.L. elections is confined to members who are either amateur station licensees or licensed amateur operators, or who have maintained uninterrupted membership in the League since before the enactment of that change. That is to say, any member accepted by the League since the middle of last May comes into it under a by-law which plainly states that unless he is a licensed amateur he will not have the right to vote. On the other hand, members may not be deprived, without their consent, of rights that they had at the time they joined, so that even unlicensed members who maintain their membership without lapse are constitutionally entitled to vote—if they want to.

It has been suggested that membership itself ought to be confined to those who are licensed amateurs. The trouble with this proposal is that it would make the membership contingent upon a factor which is not within the control or knowledge of the League. A chap would get a license and want to join the League. First he would have to prove that he had a license. Then, during the life of his League membership, his station license might expire and he might forget to renew it, or perhaps it would be his operator license—and he would lose the right to be a member of the League. The F.O.C. might even get busy and suspend his operator license for over-modulation or working outside the bands, and that might be for two months or two years. Thus his A.R.R.L. membership would terminate or be broken into for variable and unpredictable periods of time, with no conceivable method for the headquarters to keep adequate check on it. No, the idea isn't practicable. Much thought has been expended upon this general subject for many years by A.R.R.L. directors and officers, all wishing for some method whereby A.R.R.L. determinations might be made by licensed amateurs only. Not for some years was the present idea uncovered, and it is the only workable one that has been. It provides, in short, for letting any interested person become a member of the League but for confining the vote (partially at present and rigidly as quickly as possible) to licensed hams.

Now for those figures we were talking about. They are shown in the table herewith. 81.6% of those who cast ballots in the 1934 elections are the possessors of station licenses, the figure varying from 77.1% in the Hudson Division to 86.9% in the Northwestern. There are some amateurs who have an operator license but no station license, and these accounted for 0.3% of the vote. A total of about 82% of the ballots thus were cast by members who are licensed amateurs, the residual 18% by those who are not at present the holders of either station or operator license and who rely upon membership prior to the last Board meeting for their right to vote. These

(Continued on page 80)

<p>| ANALYSIS OF 1934 BALLOTING |
| SHOWING ON WHAT FACTOR THE RIGHT TO VOTE WAS BASED |</p>
<table>
<thead>
<tr>
<th>Central</th>
<th>Hudson</th>
<th>New England</th>
<th>North-Western</th>
<th>West Gulf</th>
<th>National Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station License</td>
<td>82.3%</td>
<td>77.1%</td>
<td>83.4%</td>
<td>86.9%</td>
<td>81.3%</td>
</tr>
<tr>
<td>Operator License</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Total Licensed</td>
<td>82.6</td>
<td>77.4</td>
<td>83.5</td>
<td>87.1</td>
<td>81.9</td>
</tr>
<tr>
<td>Prior Membership</td>
<td>17.4</td>
<td>22.6</td>
<td>16.5</td>
<td>12.9</td>
<td>13.1</td>
</tr>
<tr>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

February, 1935
Grinding and Finishing Quartz Crystal Plates

By Ivan H. Loucks,* W9ON

QUARTZ crystal grinding consists essentially of shaping up the faces and edges of a properly cut quartz crystal blank so that it will oscillate freely in a transmitter and control that transmitter on some desired frequency. The conditions which must be met before the blank will do so may be briefly listed as follows:

1. The blank itself must have been cut from a good natural crystal and must be free from impurities or flaws in crystalline structure. If an X-cut or Y-cut, it must also have been cut so that its faces are exactly at right angles with either an "X" or a "Y" axis of that crystal.

2. The faces of the blank must be perfectly flat and parallel with each other.

3. The edges of the blank must be free from nicks, cracks, chips, sharp corners or other irregularities.

4. The thickness of the blank must be such that it will oscillate on the desired frequency. This critical thickness is different for the X, Y and zero coefficient-cut plates. While rarely identically the same for two plates of the same cut, it may be determined approximately from the curves or the formulas of Fig. 1.

If it can be assumed that the blank was properly cut from the original crystal, the first condition above may be disregarded. The grinding job, then, must include satisfying the other three. The equipment needed for this job consists mainly of a small glass plate, a supply of powdered carborundum, and a pair of micrometer calipers. The micrometers are the most important part of the grinding equipment, and should have a readable accuracy of approximately one ten-thousandth of an inch. Only a small amount of carborundum is needed, but several different grades should be available, ranging from No. 200 or No. 400 to the finest obtainable, which is about No. 900. This carborundum may be secured from any manufacturing optician. The glass should be as hard a grade as it is possible to obtain, and should be perfectly smooth and flat. "Flint" plate glass is preferred, but pieces of old automobil plate glass ten or twelve inches square are suitable and are easy to obtain.

Much has been said about cleaning a quartz plate in Carbona (carbon-tetrachloride), or alcohol. These may be necessary if there is grease on the blank; otherwise it is sufficient to wash it carefully in water and dry it on a clean cloth. This should be done every time the blank is to be inspected or "miked," to keep the carborundum out of the micrometers, and every time it is put in the holder of the test oscillator. The holder and the crystal must each be perfectly clean and dry whenever tests are made for oscillating properties.

In grinding the blank, a small amount of the appropriate grade of powdered carborundum is placed on the glass and enough water is added to make a fairly thick mud. The quartz blank is then scrubbed back and forth in this grinding mixture, with one finger, in long smooth strokes covering almost the entire face of the glass. The use of one finger, if held on the top center of the blank, reduces the tendency to tip the blank.

(Continued on page 74)
Operating Notes on the New Pentodes

Since the brief announcement of the new Raytheon RK-23 and RK-25 and R.C.A. 802 tubes in December QST, more detailed information on the tubes has been released by the manufacturers, and some of the tubes themselves are beginning to get around in amateur circles. Tests have shown that they do just about what would be expected of them, considering their power ratings. Besides the suppressor-grid modulation feature for low-power 'phone work, the typical pentode characteristic of high output with low excitation power makes them ideally suited to use as buffer amplifiers—and, for that matter, as final amplifiers in transmitters in which the number of stages must be kept to a minimum. An r.f. output of 25 watts is not difficult to obtain from one tube by going slightly over the normal plate-current rating, and this with excitation quite small in comparison to that usually handed to a 10 or other three-element tube of comparable power rating.

Both the 802 and RK-23 (to save space we’ll consider the RK-23 and RK-25 synonymous, since the tubes are identical except for their heater ratings) can be used in the same sockets in which the multitudinous 59’s are now installed. All the 59 connections still apply except for the plate pin, which is left blank in the case of the RK-23 and is used with the 802 to make connection to extra shielding inside the tube. This shielding is not a tube element, however, so the plate pin on the socket should simply be connected to ground. Fig. 1 shows the top-of-socket connections for both tubes.

By way of review, the general characteristics of the tubes are given below:

<table>
<thead>
<tr>
<th></th>
<th>802</th>
<th>RK-23</th>
<th>RK-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater voltage</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Heater current</td>
<td>0.05</td>
<td>2.0</td>
<td>0.8 amp.</td>
</tr>
<tr>
<td>Grid-plate capacitance</td>
<td>0.15</td>
<td>0.04</td>
<td>nufdl.</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>12.6</td>
<td>10.0</td>
<td>nufdl.</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>8.5</td>
<td>10.0</td>
<td>nufdl.</td>
</tr>
<tr>
<td>Max. plate dissipation</td>
<td>12</td>
<td>12</td>
<td>watts</td>
</tr>
<tr>
<td>Max. screen dissipation</td>
<td>10</td>
<td>12</td>
<td>watts</td>
</tr>
<tr>
<td>Max. plate voltage</td>
<td>500</td>
<td>500</td>
<td>volts</td>
</tr>
<tr>
<td>Max. screen voltage</td>
<td>250</td>
<td>200</td>
<td>volts</td>
</tr>
</tbody>
</table>

The safe plate current will vary with the type of service, depending upon the plate efficiency to be expected. In Class-C service where the tube is used as an unmodulated power amplifier—for example as a buffer or telegraph amplifier—with efficiency high enough to keep the plate dissipation within the maximum rating, the maximum plate current rating is 60 milliamperes. For other types of service the plate current will be limited by the safe plate dissipation.

The screen current will likewise vary in different types of service. It is important that the screen dissipation be kept at or below the rated value; i.e., the screen should not be allowed to show more than a dull red heat.

Suppressor-Grid Modulation

The suppressor modulation characteristics of the two tubes appear to be quite similar. Power outputs of the order of 3 to 3.5 watts, capable of being modulated 100 percent, are obtainable from both types of tubes under maximum operating conditions. The required peak audio grid swing on the suppressor is 65 volts with the 802 and 75 volts with the RK-23, negative bias on the suppressor being 45 volts on the former, 30 volts on the latter. The audio power requirements imposed by the small current taken by the suppressor-grid are slight, and are well within the capabilities of a Type 56 tube. Control-grid bias for suppressor-grid modulation is not critical, running between 75 and 90 volts.

The following table, taken from the published data on the 802, shows what may be expected from this tube as a suppressor-grid modulated amplifier under different operating conditions:

| Plate voltage | 400     | 500     | 500     |
| Screen voltage | 150     | 200     | 200     |
| Control grid bias (approx.) | -86     | -90     | -90     |
| Suppressor bias | -40      | -53     | -45     |
| Peak audio suppressor voltage | 40      | 53      | 65      |
| Peak r.f. excitation voltage | 125     | 125     | 125     |
| Plate current | 18      | 20      | 22 ma.  |
| Screen current | 28      | 25      | 25 ma.  |
| Control grid current | 7.5      | 5.0     | 4.5 ma. |
| Driving power (approx.) | 0.9      | 0.6     | 0.5 watts|
| Peak power output (approx.) | 8      | 12      | 14 watts|
| Carrier power output (approx.) | 2      | 3      | 3.5 watts|

The first two operating conditions are of interest because the audio-frequency suppressor voltage swings only to the zero-voltage point and not into the positive region, as is the case in the last column. The increase in carrier output resulting from driving the suppressor-grid into the positive region is quite small. In all cases the r.f. power required for excitation is less than one watt.

Suppressor modulation characteristics of the 802 are shown graphically in Fig. 2. The r.f. output current curve bends off quite sharply above 25 volts positive on the suppressor, indicating that this is about the limiting voltage for distortionless modulation.

February, 1935
GRID-BIAS MODULATION

The curves of Fig. 3, showing the performance of the 802 as a grid-bias modulated amplifier, also will be of interest. Two sets of operating conditions for this type of service are given below:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Approximate Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>400 500 volts</td>
</tr>
<tr>
<td>Screen voltage</td>
<td>150 200 volts</td>
</tr>
<tr>
<td>Control-grid bias (approx.)</td>
<td>-105 -130 volts</td>
</tr>
<tr>
<td>Suppressor voltage</td>
<td>0 0 volts</td>
</tr>
<tr>
<td>Plate current</td>
<td>25 25 ma.</td>
</tr>
<tr>
<td>Screen current</td>
<td>7.5 8 ma.</td>
</tr>
<tr>
<td>Grid current</td>
<td>2 1 ma.</td>
</tr>
<tr>
<td>Peak r.f. excitation voltage</td>
<td>125 145 volts</td>
</tr>
<tr>
<td>Peak audio grid voltage</td>
<td>40 50 volts</td>
</tr>
<tr>
<td>Driving power (approx.)</td>
<td>1 0.8 watts</td>
</tr>
<tr>
<td>Peak Power output (approx.)</td>
<td>12 10 watts</td>
</tr>
<tr>
<td>Carrier power output (approx.)</td>
<td>3 4 watts</td>
</tr>
</tbody>
</table>

Comparison of grid-bias modulation with suppressor modulation shows that the plate efficiency and output to be expected are approximately the same, and also that the same modulator tube that satisfies the requirements of suppressor modulation also will be adequate for grid-bias modulation. Slightly more excitation power is needed for grid-bias modulation, although the difference is not great. The chief differences between the two systems lie in practical operating considerations; the grid-bias system requires more careful adjustment than the suppressor system for linear modulation, and it is necessary to use a bias voltage having exceptionally good voltage regulation, such as a bank of batteries. Suppressor modulation, on the other hand, is quite tolerant so far as adjustment is concerned, and the bias for both control grid and suppressor can be obtained in the same way as they would in ordinary telegraph service.

The tubes also can be used as Class-B linear amplifiers, giving outputs and plate efficiencies comparable to those obtained with grid-bias and suppressor modulation. Because of the small power output, however, it is probable that a setup with a preceding modulated amplifier requiring, as it might, additional driving stages, would be an uneconomical way of obtaining three or four watts of modulated output. The tubes are not recommended for use as Class-C plate-modulated amplifiers.

USING THE TUBES AS AMPLIFIERS

If the tubes are used to replace 59 doublers in an existing layout with the hope that they also can be used as straight un-neutralized amplifiers, it is quite possible that some physical changes in the circuit will have to be made. As is the case with any screen-grid amplifier, care must be taken that there is no chance for feedback between plate and grid circuits by a path external to the tube itself. This may or may not mean that the input and output circuits will have to be shielded. From our experiments with the tubes it seems quite certain, however, that the tubes themselves have to be shielded, although complete shielding is not necessary. A short shield which encloses the base and lower part of the tube and extends up around the lower part of the plate is sufficient, its purpose presumably being to shield the plate lead from the rest of the tube and thus eliminate any extra and unwanted grid-plate capacity. Both types of tubes have been operated successfully with no tendency toward self-oscillation with no other shielding in the circuit than this. It was necessary, however, to arrange the input and output tuned circuits so that coupling between them was minimized (coil axes at right angles) and to have them fairly well separated physically. In compact sets the input and output circuits probably would have to be rather completely shielded from each other.

A typical amplifier circuit is shown in Fig. 4. The plate tuned circuit LC should be low-C at the operating frequency. The grid leak Rg, when used, may have a value between 20,000 and 50,000 ohms, the former giving somewhat more output when amplifying straight through and the latter better output when doubling. The difference is small, however. The by-pass condensers, C1, are not critical as to value and should be fairly large.
As power amplifiers, the tubes give greatest output when the screen-grid voltage is maintained at the recommended values. Increasing the screen voltage beyond this only causes the tube to become unstable and exhibit the usual sign of grid emission—climbing plate current. Very nearly maximum output can be obtained with the suppressor grid tied directly to the cathode. A slight increase in output results when the suppressor is operated at a positive potential of one of the tubes used as a regenerative amplifier. A slight increase in output results when the need be made for intentional feedback. Cathode bias may be used according to the alternative system shown in Fig. 4, in which case the grid leak R may be omitted. The cathode resistor R1 should be variable and have a maximum resistance of about 2000 ohms, and should be capable of dissipating about 10 watts. The adjustable feature makes it possible to find the optimum operating bias. Cathode bias offers protection to the tube, in case of excitation failure, which is lacking when the grid leak alone is used.

As power amplifiers, the tubes give greatest output when the screen-grid voltage is maintained at the recommended values. Increasing the screen voltage beyond this only causes the tube to become unstable and exhibit the usual sign of grid emission—climbing plate current. Very nearly maximum output can be obtained with the suppressor grid tied directly to the cathode. A slight increase in output results when the suppressor is operated at a positive potential of 40 or 50 volts, but the increase does not seem to warrant the extra power supply complication unless a suitable tap already is available on the voltage divider. Screen voltage is preferably obtained from a voltage-divider tap, although a dropping resistor from the plate supply may be used. A 10-watt resistor of about 20,000 ohms is recommended as a series dropping resistor.

When using the tubes as doublers the screen voltage sometimes can be reduced with benefit. In one case cutting the screen voltage to half the rated maximum value left the power output unchanged but improved the plate efficiency, as evidenced by lower plate current. An output of 5 to 10 watts is to be expected from one of the tubes as a doubler.

Excitation requirements appear to be quite small and the plate efficiency high when the tubes are used as straight power amplifiers for c.w. work. In a test set-up one of them gave an output of 25 watts on 7 mc. with a d.c. plate input of slightly over 30 watts, the excitation being taken from a Tri-tet oscillator doubling from a 3.5-mc. crystal with only 250 volts and 15 ma. on the plate. Higher oscillator voltage gave no increase in output.

The tubes also can be worked successfully as controlled oscillators or oscillating amplifiers, locking in very readily when coupled to a weak crystal-controlled source. Ordinarily there will be a tendency toward self-oscillation in non-shielded circuits if particular care is not taken to prevent feedback external to the tube itself; this tendency can be used to advantage if the tube is to be used as a locked oscillator, since no particular provision need be made for intentional feedback.

One of the tubes used as a regenerative amplifier can easily be controlled on 14 mc. by a Tri-tet oscillator having its plate circuit tuned to the fourth harmonic of a 3.5-mc. crystal.

AS OSCILLATORS

The tubes may be used as electron-coupled oscillators, in which case they have the advantage over the 59 that the plate circuit may be tuned to the fundamental as well as a harmonic frequency. Experience with them indicates that tuning through resonance on the fundamental produces a considerable frequency change, at least in an unshielded circuit. Possibly thorough shielding would help to reduce such a frequency change. Frequency stability with respect to changes in plate-supply potentials (with the screen supply coming from a voltage divider across the plate supply) is excellent, however; changes in supply voltage of the order of 25% produce only a barely perceptible change in frequency. For maximum stability of this type it is necessary to find the optimum screen-to-plate voltage ratio, just as in the case of other electron-coupled oscillator tubes. A screen voltage of one-third the plate voltage is about optimum.

(Continued on page 66)
With the Affiliated Clubs

Greetings to the following clubs, affiliated with the A.R.R.L. on December 14, 1934:

Elkhart Amateur Radio Club, Elkhart, Indiana.

Hamfests Scheduled

... at Boston, Mass., February 2d

The annual hamfest under the auspices of the South Shore Amateur Radio Club and the Eastern Massachusetts Amateur Radio Association will be held at the Hotel Bradford, Boston, on Saturday, February 2d. Tickets, including admission and banquet, $2.00. Admission only, with chance at prizes, $.50. The general program will include speakers, stunts, contests, organization meetings, plenty of prizes and a real banquet. The following comprise the “committee in charge”: W1ZK, W1AKY, W1ASI, W1KH, W1HRF, W1SB. This team has turned out some gala affairs in the past... don’t fail to be at the Bradford on February 2d!

... at Cleveland, Ohio, February 2d

The Lakewood Radio Club will hold its third annual hamfest February 2d at 7:30 p.m. E.S.T. in the Lakewood Masonic Temple, corner of Andrews and Detroit Avenues, Lakewood (Cleveland), Ohio. Admission: $.99, which covers a full course dinner. Plenty of entertainment, good speakers, music by hams, hundreds of fine prizes, are some of the features offered by the “hamfest association” of the Lakewood Club. It behooves hams in the vicinity of Cleveland to plan to be present at this get-together. Anyone with “ham” in his (or her) blood is welcome!

... at Rochester, N. Y., February 9th

The Rochester Amateur Radio Association announces its annual hamfest. The date: February 9th, Saturday. The time: Contests start at 3:00 p.m., banquet at 7:30 p.m. The place: Columbus Civic Center, Lawn and Chestnut Streets, Rochester, N. Y. Speakers: W8CPC, Toastmaster; W1SZ, QST; W8CMP, Director, A.R.R.L. Atlantic Division; Bern O’Brien, WHEC; G2KB and all the regular Western New York gang. Tax: $1.50. General: Contests for everybody; a bowling tournament between Buffalo and Rochester. Prizes and a good time for all! It will be too good to miss!

... at Mountainside, N. J., February 16th

The annual dinner of the Central Jersey Radio Club will be held Saturday evening, February 16th, at the Mountainside Inn, located on New Jersey State Highway No. 29 near the center of Mountainside, N. J. In addition to the dinner there will be an entertainment and bowling. Admission will be $.50 to “paid-up” members and $1.50 to “non-paid-up” members and visitors. All amateurs are cordially invited to attend; a good time is promised! It is suggested that those planning to attend get in touch with Raymond Sutcliffe, W2DKA, 159 Belvidere Ave., Fanwood, N. J., or Robert Morris, W2LV, 22 Mountain View Rd., Millburn, N. J.

... at Wilmington, Delaware, March 2

The Delaware Amateur Radio Club is planning to hold its second annual banquet on Saturday evening, March 2d, in the Gold Ball Room of the Hotel duPont, Wilmington, Del. Complete details are expected for the next issue of QST.

Certificate for Club Winners in DX Competition

See complete details on the Seventh International Relay Competition elsewhere in this issue. Besides the Section Award, in each affiliated club group where three or more hams take part, A.R.R.L. will make a special certificate award, which will be given through the local affiliated club and countersigned by the club president or club activities manager as a permanent trophy to the local DX champion. Last year 21 affiliated clubs took advantage of the special Club Award and entered at least three members or prospective members. The number of A.R.R.L.-affiliated clubs has increased substantially until now there are more than 400 clubs on the active list of affiliates. Attention of all clubs is invited to the announcement of the March DX Contest so that local DX competitions may be sponsored by...
clubs. Club officers! Which of your club members can bring honors to your association by winning the award made by A.R.R.L. through your society? Ask your gang about it.

A GOOD SUGGESTION

W. F. Soules, W9DCM, President of the Minneapolis Radio Club, offers a fine idea: "We did not have a regular meeting place and could not afford to rent club rooms. Our club is sponsoring a division convention in the spring, so we arranged with a hotel for accommodations during that time. The convention will be held in the hotel, and the hotel will be the official hotel during the convention. We presented our plan to the hotel eight months ago and said we would hold our convention and banquet there, if they would provide a free meeting place for us for a year. Perhaps this idea may help other clubs looking for a meeting place. Even local banquets or ham-fests might be an inducement for the hotel to provide a meeting place."

PUBLIC SERVICE!

Members of the Hannibal (Mo.) Amateur Radio Club performed a noteworthy piece of public service when a snow storm in early December disrupted all communication between Hannibal and Brookfield, Mo. W9PYF and W9GBC, H.A.R.C. members, cooperated in maintaining contact with W9RTG, Brookfield, until normal communication channels were reopened. Traffic was handled for the Chicago, Burlington & Quincy Railroad, Southwestern Bell Telephone Co., and Western Union. The Hannibal Club, through its members and its station, W9KEM, aims to "be ready" when an emergency arises . . . not a bad aim for all clubs!

The Providence (R. I.) Radio Association elected the following officers for 1935: W1GTN, president; W1DSZ, vice-president; T. E. Fletcher, secretary; W1HRC, treasurer; W1AFO and W1BES, executive committee.

VISIT THE CLUBS

At A.R.R.L. headquarters there are recorded the addresses of the several hundred amateur radio clubs affiliated with the League, their places and times of meetings. Clubs are splendid places to get acquainted with other amateurs and to participate in interesting discussions on amateur radio. Why not drop in at your local club and "meet the gang"? Address the Communications Manager (enclosing 3¢ stamp, please) for data on affiliated Clubs in your vicinity.

FEWSWAY RADIO CLUB—W1ZO

How many amateurs believe in Santa Claus? The entire membership of the Fellsway Radio Club of Medford, Mass., does! At least it is convinced that Mr. Roger Sullivan, Medford, is that club's "Santa." It happened in the spring of 1932. An amateur went to Mr. Sullivan, who is a notary, to have his license sworn to. Though not an amateur himself, Mr. Sullivan was found to be very much interested in amateur radio and suggested that this amateur, who came to have his license fixed up, collect the representative amateurs in the surrounding area and form a club. Furthermore, he offered the club the use of an entire three-and-one-half-acre lot on one of the highest spots in Medford, and offered to erect a club house on any part of it that suited the mem-

AN ENVIABLE LOCATION—OVERLOOKING THE CITY!

Home of the Fellsway Radio Club (Medford, Mass.) and W1ZO, the club station. This club house consists of two rooms, an operating room (6 ft. x 18 ft.) and a lobby (12 ft. x 18 ft.); a separate building (8 ft. x 10 ft.) houses the fuel supply and chemical closet. Within two months a fine club house was erected, built for year 'round use (furniture and heating equipment were also supplied gratis!). Present transmitters include crystal-controlled fifty-watters on 7 mc., crystal-controlled RK-18 on 3.5 mc., and a 50-mc. rig. Both c.w. and 'phone are used. A thirty-foot mast on the main shack and a fifty-foot mast on a hill behind the shack provide the main antenna supports—and mighty satisfactory ones at that! An operator is on watch at W1ZO every evening except Sunday. A chief operator, elected each year, organizes the "watch list," runs contests within the club, and checks the operating procedure of all club operators. A technician, also elected, has complete charge of all equipment, supervises new construction and all major adjustments. This arrangement has worked out excellently and is recommended for clubs that operate a station. Present officers of the F.R.A.: W1HIW, president; W1AIW, vice-president; Roger Sullivan, trustee; W1BME, secretary-treasurer; W1FAX, chief operator; W1HMK, technician.

(Continued on page 70)
The Seventh International Relay Competition

March 9th—17th

A.R.R.L.'s Annual DX Contest—All the World (with W/VE)—Swap Self-Assigned Numbers in DX QSOs—New! 90-hour Total-Time Limit. Extra 500 to 8000 points will also be Added, Depending on Number Bands Used—Certificates for Winners

By F. E. Handy*

The A.R.R.L. invites you to take part with amateur operators everywhere in... the seventh international relay competition. Get on the air... any amateur frequency... March 9th-17th inclusive 1935. Contest is for most DX QSOs. Worldwide! Advance entry not required. Try your luck and report.

General Plan of Contest

Amateurs with the prefixes W and VE will be taking part in a QSO Party with stations in all parts of the world. When they effect DX QSOs, self-assigned serial numbers will be exchanged and noted in the contest report. From this record each station will submit its score. From the scores (which the Contest Committee will verify by cross-examination of logs) the winners will be determined for each locality, and certificates awarded.

Stations outside the U. S. and Canada will try to work as many W and VE stations as possible to exchange serial numbers. Stations in all localities need only take part on the dates announced and report results at the end of the tests to receive credit in QST, and be eligible for awards.

The main competition each operator must consider comes from operators in his immediate A.R.R.L. Section in the case of W and VE stations, and in the case of all other amateurs it comes from the individual operators in their country or locality using the same prefix. The W/VE awards are for the operator running up the best record for each Section.

New Credit for DX on all Bands

Indications are that DX is going to be extremely good on all bands this year. In addition to fine conditions on 7- and 14-mc. bands many 1750-ke. stations have received cards from "across the pond." HB9Y, G6RB, ON4AU, ON4JB, D4BAR, PA0FXU, PA0DC, PA0HR, PA0ASD, PA0LR, OE7EH, F8UT, D4BMJ and K6LHK have and are now working dozens of W/VE hams using the 3500-ke. band. F8VS, D4BMJ, HB9AQ, G6WY, OK1VA, CN8MN and G6BS have been heard by W9ABS, W8EUY and W2ABS. W1CEJ, VE3JT, W8AQ, W1DlJ, W1DBU, W1CJD, W1JDB, W1ABN, W2ABS, W3DUK, WSUW, W8KKG, W1APU, W8EUY, W2EZJ, VE3CT, VE3JW, VE8LC, W1UE, W9AEH, and W9NNZ have all worked one or more of the DX stations listed. Between December 10th and 25th W8EUY worked G6RB ten times and had 17 European QSOs. We suspect that VK's and ZL's can be worked at will from the west coast U. S. A., too, as soon as some of them make use of this band. Since we are anxious that all hams realize and make use of the fine DX characteristics of the low frequency bands when used over an "all dark" path, an extra contest credit, a bonus to be added to the score kept under the usual well known system, will be given for work on more frequency bands. This year we are introducing a fixed credit, to be added to scores (after multiplier), this 500 point credit to be doubled, each time DX contacts with your transmitter on an additional frequency band are completed. Thus, add 500, 1000, 2000, 4000 or 8000 points to the completed score for successful number exchanges indicated in the contest log on one, two, three, four, or five different amateur bands!

New Time Limit

Operate as much as you want to during the contest period, and report all your DX contacts. Keep track of the time you start and stop operating your station, however, and when you report, don't forget to include the "number of hours station operation in the contest" by totalling up these periods. Up to and including 90-hours' total contest operation there is no penalty, and nothing to be done when computing your score. Should you find that you operated a total of 100 hours (for example), your Grand Total Score should be...
multiplied by the fraction $\frac{6}{10}$ to give your "corrected score".

You can operate 6 hours per day, 12 hours each Saturday, and 16 hours each Sunday, working DX in the contest, and you will still have put in only 86 hours total. The 90-hour factor is designed to permit everyone to enjoy DX possibilities to the maximum throughout the whole 9-day period. This plan permits the average ham to plan for his working day, for meals, for 8 hours' daily sleep, etc. Cross examination of logs makes it certain that only working time is counted. This plan permits the average ham to plan for the elusive DX in the contest, and you will still have put in 86 hours, which is more than the 6 hours per day specified for "contest operating time".

THE CONTEST PERIOD

To avoid misunderstanding and possible confusion the exact local starting and ending time for our DX competition is given in the following table. These times are based on "Greenwich" time and should be computed for any part of the world from the Greenwich meridian. The contest runs from Saturday, March 9th, through Sunday, March 17th (until Monday, March 18th, G.T.).

<table>
<thead>
<tr>
<th>Time</th>
<th>Starts</th>
<th>Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenwich</td>
<td>March 9th 001 (12:01 a.m.)</td>
<td>March 17th 2359 (11:59 p.m.)</td>
</tr>
<tr>
<td>A.S.T.</td>
<td>8th 1201 p.m.</td>
<td>17th 7599 p.m.</td>
</tr>
<tr>
<td>E.S.T.</td>
<td>8th 701 p.m.</td>
<td>17th 6599 p.m.</td>
</tr>
<tr>
<td>C.S.T.</td>
<td>8th 601 p.m.</td>
<td>17th 5599 p.m.</td>
</tr>
<tr>
<td>M.S.T.</td>
<td>8th 501 p.m.</td>
<td>17th 4599 p.m.</td>
</tr>
<tr>
<td>P.S.T.</td>
<td>8th 401 p.m.</td>
<td>17th 3599 p.m.</td>
</tr>
</tbody>
</table>

AWARDS

Green-bordered certificates, a high-class lithographed job of striking appearance, will be awarded:
1. One in each remotely located country or territory—all hams using the same prefix compete for an award, and
2. In each of 64 A.R.R.L. Sections, mainland U.S. A. and Canada (see page 5, QST).

Since the certificate awards will be made to the operator of the highest scoring station in each country, this puts all operators using the same prefix in competition with each other—and similarly each A.R.R.L. section-boundary circumscribes a competing group. DX-transmission characteristics being the same for all operators in each award-area, the chances of being a winner depend on operating ability and stations and are equally fair to all. Shall we reserve one of these certificates for your station?

AFFILIATED CLUB PARTICIPATION

To encourage local participation, additional certificate awards (besides the A.R.R.L. Section awards) will be made through each club where three or more individual club members, or new local hams invited by such a club, take part. Reports must be made direct to A.R.R.L., West Hartford, mentioning the name of the club, to be eligible for the affiliated-club-award. There is nothing more fascinating than to plan local competitions and swap results in a friendly way with the ham-across-town as the operating goes along.

Entrants who mention their club will be eligible for both club and Section certificate awards.

SCORING

Both the W/VE station, and the station in the remote locality receive one point when the W or VE serial number is acknowledged by the station in the remote locality. Each operator, similarly, may add two points further when a six-figure number (to U. S. A./Canada) is acknowledged or OKed by a W/VE station.

A ruling of the A.R.R.L. Board of Directors permits stations of A.R.R.L.-QST staff members to participate in contests with the provision that the operators of such stations shall be ineligible to receive any League awards.
After all the individual points have been added together, this sum, in the case of W or VE participants, is to be multiplied by the number of countries or localities (prefixes) worked to give the score. In the same way, those taking part in other different countries (remote), multiply their total of points by the number of U. S. and Canadian districts (licensing areas) they have succeeded in contacting, to give the score. There are nine U. S. and five Canadian licensing areas making a possible multiplier of fourteen!

To this score is added the fixed credit (500, 1000, 2000, 4000, or 8000) depending on the number of different frequency bands used for your transmitter on which at least one DX QSO (number swap) is indicated in the log and can later be confirmed if necessary. This fixed credit is of course added last, after all multiplying of Sections or districts, and gives the Grand Total. Except for this frequency-band-credit, scoring is exactly the same as in past years. Only when the Grand Total required more than 90-hours contest operation will this be reduced proportionately in determining the final score.

All competitors are requested to submit their lists, even if they only show a small score. In so doing they are supporting claims made in logs from other stations, and they will receive full credit for their work in QST.

The summary of score must show all stations worked, and the operators “sine” for each QSO if there is more than one operator. Awards will be based on the station total and will be made to the individual operator making the largest part of this total.

THE SELF-ASSIGNED SERIAL NUMBERS

Any amateur station, anywhere, can take part without advance entry. Each operator taking part will assign himself a distinctive threenumeral group and use this throughout the contest as the first part of each number exchanged. Numbers exchanged will have six figures, the latter three taken from the first half of each number-combination received. To confirm your first contact, since no numbers will then have been received, the six-figure group sent will consist of the three numbers which identify you in each log, followed by three “naughts.”

“Handling” a serial number includes the transmission and receipt of radio acknowledgment (QSL) of same, and the entry of date, time and station call, and numbers as handled, for purposes of record. There is no objection in working the same station more than once in the contest period if three points have been earned by a full exchange during a QSO. If but one (or two) point(s) result(s) from a first contact with a station, you can complete the three points (maximum that can be secured with any one station) by working this amateur later in the contest period, and handling a serial number in the opposite direction.

PRACTICAL IDEAS

Bill Conklin, W9FM, points to the good operating of ZL’s in the last DX contest including in their CQs information on how they would tune their receivers in looking for replies. Bill asks, “Why not devise four abbreviations to indicate how one will tune after a call?” We are indebted to Art Bates, W9FO, for suggesting the following in answer to this manifest need:

EXAMPLE OF CONTEST LOG

<table>
<thead>
<tr>
<th>Date and Time</th>
<th>Station Worked</th>
<th>Country</th>
<th>Continent</th>
<th>Frequency</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 8th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:00 p.m.</td>
<td>G6RB</td>
<td>G. B.</td>
<td>Europe</td>
<td>3.5 mc.</td>
<td>545,000</td>
</tr>
<tr>
<td>E.S.T. (or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0002 G.T.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 9th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:28 p.m.</td>
<td>VK3WL</td>
<td>Aust.</td>
<td>Oceania</td>
<td>7 mc.</td>
<td>545,746</td>
</tr>
<tr>
<td>8:50 p.m.</td>
<td>ZL2CI</td>
<td>N. Z.</td>
<td>Oceania</td>
<td>7 mc.</td>
<td>545,386</td>
</tr>
<tr>
<td>11:50 p.m.</td>
<td>J2GX</td>
<td>Japan</td>
<td>Asia</td>
<td>14 mc.</td>
<td>545,586</td>
</tr>
<tr>
<td>March 9th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:05 a.m.</td>
<td>PY2BN</td>
<td>Brasil</td>
<td>So. America</td>
<td>7 mc.</td>
<td>545,505</td>
</tr>
<tr>
<td>E.S.T.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:10 a.m.</td>
<td>VK5PK</td>
<td>Aust.</td>
<td>Oceania</td>
<td>7 mc.</td>
<td>545,777</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>543</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td></td>
</tr>
<tr>
<td>Sent</td>
<td>765,000</td>
</tr>
<tr>
<td>Received</td>
<td>545,000</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td>3</td>
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<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

GRAND TOTAL SCORE 2,080

QST for
QML—Will start to listen in the middle of the band and tune toward the low frequency end.

It is unnecessary and undesirable to crowd our stations into the few kc. at the band edges. In this DX test try the above, you operators in remote localities. Use "MI" and "ML" tuning, and take your pick of the flock of answers you get! By using these signals properly stations at one end of the 20-meter band can readily get calls from stations working at the other end. More QSO's, less wasted time, shorter calls, and less QRM are all among the advantages.

The R-S-T system of signal reporting, adopted by A.R.R.L. because of its general popularity and increasingly widespread use among all amateurs, has proved a great time-saver in other A.R.R.L. contests at the same time it makes unusually complete reports possible. Use of R-S-T should make it easy to follow G6NJ's suggestion that all hams include full reports of signals along with their number exchanges in the DX contest.

W8DED, W9CPQ and several others would have us "prohibit the use of CQ for W/VE contestants" to do away with needless QRM. That's too big a thing to enforce, and not every amateur approves entirely. We urge the view that the smartest operators will refrain from sending unnecessary CQ's anyway (within W/VE) in their own best interest. We urge all remotely located DX stations to make it a point to increase their own use of CQ, and to refrain from answering any unrestrained, unintelligent, several-minute CQ-DX calls from W/VE's, giving preference instead to the keen operators who call individually.

REPORTING

Reports or summaries from participating stations must be received at A.R.R.L. Hdq. from all W/VE stations on or before noon April 23, 1935, to be counted in the results or to be considered in the awards. From all outlying localities, reports must be received on or before May 28, 1935. Play safe ... mail your report immediately at the end of the contest period to avoid delay and insure that your results are credited. Show your claimed-score in full, follow-

AWARD TO FOREIGN WINNERS

CONTTEST NOTES

You can't help but work a new bunch of stations, run up some new DX records for your station, get a new bunch of QSL-cards, have a whale of a lot of fun, and perhaps rate an A.R.R.L. award at the conclusion. Any neatly kept tabulation in the form given with this announcement will be an acceptable and welcome report. Any operator you work that doesn't know "what it's all about" can be referred to these pages of QST.

Results in previous relay competitions indicate that the majority of stations worked were raised, not by sending CQ, or testing on a half-dozen frequencies—but by first listening and locating foreign amateur stations, then going after them. No excuse for ten-minute CQ's. The stations in remote localities, not W/VE stations, are the ones using CQ most effectively. The planning of best use of frequencies and operating hours for most effective operation and real operating skill are necessary to successful DX-work.

Operators of all stations have equal opportunity insofar as this can be arranged in this contest. Much depends on the judgment of the individual operators in determining the times and frequencies of operation of each station as well as on operating ability itself. Low power apparatus succeeds as often as high power on 14,000 kc.

(CONtinued on page 88)
Band Switching in the Universal Exciter Unit

By F. G. Southworth,* W5EOW

After reading W2AOE's article on band switching in December 1934 QST, it occurred to me that some of the gang might be interested in the method of band switching in my rig. You see, when I devised it I wanted to really cover all of the most used bands, both c.w. and 'phone, without plug-in coils or any major operations on the rig. The set-up shown is the result. Of course it is only the exciter unit, the maximum power output needed being on the order of three watts with which to feed a pair of 46's in the final. This unit seems to be really worth the money for 20, 80 and two different spots in the 40-meter c.w. band, and for 160-, 80- and 20-meter 'phone band coverage—without the flip of a switch.

Fig. 1 shows the circuit of the unit. Three crystals are used, 1961-, 3526- and 7123-kc. These are shown in the order named as x, y and z. The tubes used are both 59's and it was found unnecessary to neutralize the second 59 even when using it as a straight amplifier. With the exception of the switching arrangement the circuit is orthodox. The coils are tapped but it will be noticed that in each case when only a portion of any coil is used the remainder is short circuited.

The switches are merely double-arm rotary switches mounted on small pieces of bakelite, fourteen switch points being used to give a seven-position switch. All three of these switches are controlled as a unit by a single quarter-inch bakelite rod. The layout of one of these switches is also shown in Fig. 1.

Coil A is wound for full use on the 1750-kc. band with taps for the 3500- and 7000-kg. bands. In the total coil and the tapped portions, slightly fewer turns were used than is usual in order that a high-C circuit would result.

Coil B is wound for low-c at 1750-kg. and tapped for low-c on 3500, 7000 and 14,000 kg.

Coil C is wound for low-c at 3500 kg. and tapped for low-c on 7000 and 14,000 kg.

The different switch positions are as follows:

No. 1—1961-kg. crystal, first 59 straight crystal oscillator, second 59 not used. Output, 160-meter 'phone band.

No. 2—1961-kg. crystal, first 59 Tri-tet crystal oscillator-doubler, second 59 straight r.f. amplifier. Output, 80-meter 'phone band.

No. 3—3526-kg. crystal, first 59 straight crystal oscillator, second 59 not used. Output, 20-meter c.w. band.

No. 4—3526-kg. crystal, first 59 Tri-tet crystal oscillator-doubler, second 59 straight amplifier. Output, 20-meter 'phone band.

No. 5—3526-kg. crystal, first 59 Tri-tet crystal oscillator-doubler, second 59 doubler. Output, 20-meter c.w. band.

No. 6—7123-kg. crystal, first 59 straight crystal oscillator, second 59 not used. Output, high-frequency end of 40-meter c.w. band.

No. 7—7123-kg. crystal, first 59 Tri-tet crystal oscillator-doubler, second 59 straight amplifier. Output, 20-meter 'phone band.

It will be noticed that in all but one case the second 59 is used as a straight r.f. amplifier; and, further, that in each of these cases the first 59 is used as a Tri-tet. This was done because the first 59 alone did not have the needed power output when used as a Tri-tet oscillator and doubler. The output in all cases, with the exception of the fifth position, is between 3 and 3.5 watts. Since greater output was not needed, and because of the ease of band changing, this unit has been found to give very satisfactory results.

Strays

Ship Excellence has the call KISS.

—Capt. Paul F. Johnson
Automatic Carrier Switching

Phone operators who have fairly good superhet receivers can, by the addition of a relay or two, easily fix up an automatic switching arrangement by means of which the transmitter is put on the air as soon as the other party to a QSO cuts off his carrier. A diagram of the scheme, suggested by Fred L. Seufert, W2AOG, is given in Fig. 1. The chief essential of the control circuit is the relay $R_{yi}$, which must be capable of operating on about .7 ma. and releasing on .5 ma. — in other words, remaining idle under normal detector plate current conditions when no carrier is being received, and operating as soon as a carrier of appreciable strength causes the detector plate current to rise. W2AOG finds a W.E. type B145 relay to be quite satisfactory.

The operation of the system is as follows: With the switch $Sw$ set at position 2, tune in a signal which causes the detector plate current to rise appreciably — say to 1 ma. Next set the switch in position 3; the power relay, $R_{y2}$, is now in the circuit but does not operate because the control-relay armature is held open. As soon as the received carrier goes off, however, the detector plate current drops and the relay armature is released, closing the contacts and actuating the power relay, thus putting the transmitter on the air. To cut off the transmitter, move the switch to position 2. When the other fellow's carrier comes on again, the switch can be moved to position 3 and the process repeated.

For complete manual operation, the switch is moved between positions 1 and 2.

Suppressor-Grid Keying

Although keying of the suppressor-grid in a pentode-type tube used as a power amplifier has been previously suggested in QST, the circuit of Fig. 2, suggested by Jim McEwen, W5EWC, has some features which are worthy of consideration from a practical standpoint, since no additional negative bias source is required for keying. Suppressor bias with the key open is secured from the drop across the grid leak caused by the flow of grid current when the tube is being excited. W5EWC writes as follows concerning the circuit:

"The grid bias on the amplifier must be high to make the most of this system, but experience shows that such bias is not in the least damaging to output and efficiency. The more scrupulous, who wish to use normal bias, may add a battery in series with $R_2$ for more negative bias on the suppressor. The 250,000-ohm resistor is used to keep from shorting the grid leak when keying; in effect it becomes part of the grid leak when the key is down. It must be high to keep the battery and grid leak from fighting about the control grid bias. Neither the negative nor positive potentials should be obtained from a power supply voltage divider, since that would make no load voltages high, resulting in bad sparking at the key; also, no relay is needed with this system.

"In my particular case, using an RK-20, a current of about 7 mils flows through the grid leak, the resistance of which is between 20,000 and 24,000 ohms, so that the bias, with the key up, on both control and suppressor grids is between 140 and 168 volts. With the key down the bias on the control grid is somewhat lower, while the positive suppressor bias is determined by the battery voltage. A switch is provided to place the suppressor at ground potential when desired, but better plate efficiency seems to be obtained with the positive potential.

"Since the keyed current is about 4 mils there is a minimum of sparking at the contacts of the..."
Automatic Microphone Battery Switch

L. A. Stafford, W2DIB, has a good suggestion for those fellows prone to forget to turn off the mike battery when the station goes off the air. The idea is shown diagrammatically in Fig. 3. A relay is arranged with its contacts in series with the microphone battery circuit and the winding in series with the plate supply for the modulator (if Class A) or the modulated amplifier. The battery circuit is thus automatically closed when the transmitter is in operation, but opens as soon as the plate supply is cut off.

The relay itself must be one which will operate on the plate current taken by the stage to which it is connected, and its characteristics naturally will vary with the type of transmitter in use. It is desirable that it should not introduce too much resistance in the circuit.

Washing Out the B.C. Interference

The following note from C. W. Roth, W9DOU, may prove of value in cases where keying interference is caused in nearby broadcast receivers—especially when investigation shows that the trouble is caused by overloading of the receiver:

"Here at W9DOU we had some trouble with slight clicks in our own broadcast receiver, and complete blocking of a neighbor's receiver. The description of the effect on our own set was that it was 'clicking,' but a careful check revealed that it was very slight blocking, fading the signals being received on the set when the key was pressed. Someone's seemingly foolish suggestion was followed, and a radio-frequency choke of the receiver type was connected in the antenna lead of the b.c. set, with the result that nothing was received. Next a choke consisting of No. 26 enamel wound solid for about 3 inches on a piece of broomstick was tried, connected as shown in Fig. 4, and the difficulty was cured. This was on 80 meters.

"Finally the neighbors got tired of having holes chopped in their programs so they spoke up, and investigation showed that the 160-meter transmitter was causing their trouble. Accordingly a choke was again wound on a broomstick with No. 26 enamel, but between four and five inches long; it was tried close to the receiver in the antenna lead and everything was jake.

"No investigation has been made to determine whether or not the length of the choke is critical, but it apparently is not, for other hams having..."
unknown to me. However its capacity is without
doubt close to that of the General Radio 558,
since the inductance which it tunes is the same as
that used in the frequency meter described in the
Handbook. The radio frequency choke is a 3 to
1 a.f. transformer with the primary and secondary
connected in series. Incidentally, it makes a
difference in the effective impedance which way
they are connected; I used an a.c. voltometer to
determine the right way. L2 is the pick-up coil,
and various sizes were tried here. As I use the
frequency meter only for 80-meter band a coil of
65 turns (I-inch diameter) seemed to give the best
results, but for other bands other sizes might
prove to be better.

From my experiments the size of the pick-up
coil doesn't seem to affect the frequency of the
oscillator; indeed, it is possible to tune this coil
with a variable condenser without affecting the
frequency. The coil or even the grid cap of the
tube may be touched with the hand without
causing enough change in frequency to throw the
oscillator off zero beat with either transmitter or
receiver, and plugging headphones in or out has
no apparent effect. The pick-up coil may be left
outside the frequency meter-monitor shield box in
order to obtain a good loud signal in the head-
phones.

—Lloyd L. Thornton, WSKDM

Matched-Impedance Coupling to the Zepp
(Continued from page 4)
the hand. After all adjustments have been com-
pleted, the connections should be made perma-
nent by soldering.

For the benefit of those amateurs who may
have to have an ammeter or a lamp in the center
of the antenna proper, the procedure for making
the above adjustments is similar but the field
strength indicator is not a necessity. The
procedure for adjusting is the same except that
the adjustments are made for maximum antenna
current, as indicated by the meter in the center
of the antenna, and for the condition of no stand-
ning waves on the feeders.

It may be of value to point out also that it is
not strictly necessary for the feeders to go out
from the quarter-wave section at right angles,
although this is advantageous when the line can
be so constructed. If the feeders make even an
acute angle with respect to the quarter-wave
section it seems to make little difference, as long
as the adjustments are made with the feeders in
this position.

OPERATING PROOF

It may be of interest to give a brief account of
some practical results obtained with an antenna
of this type. In order to determine whether or
not this antenna had any advantages over the
conventional Zeppelin arrangement with tuned
feeders, as far as radiation efficiency was con-
cerned, the following test was made:

The frequency used was in the 14-mc.
phone band, the radiator itself being cut to a length of
exactly 33 feet and mounted vertically on a 40-
foot wooden pole. The field strength indicator
was set up at quite a distance from the antenna,
and the antenna was arranged to be fed by means
of the conventional Zeppelin feeder arrangement
with series tuning. With the transmitter properly
loaded and the antenna brought into exact
resonance, the pick-up wire on the field strength
indicator was shortened until a reading of a little
less than half-scale was obtained. Without chang-
ing the adjustment of the field strength indicator
in any way, the new antenna coupling scheme was
tried out. With the same value of input to the
final stage and with everything else in proper
adjustment, it was found that the reading of the
field meter had increased by approximately 50%
over the value with the Zeppelin arrangement.

Upon comparing the two antennas, with the
cooperation of a distant receiving station, it was
found that the new antenna gave an increase in
audibility of from 2 to 3 points on the old R
scale. Needless to say, this amount of improve-
ment is worthwhile under any condition.

This antenna has been used with a great deal of
success by W3COT and W3VX on 50 mc. and by
the writer and W3IS on 14-mc. phone. It also
has been adopted by the RCA Victor Company
for use in their "Terra-Wave" transmitters op-
rating in the 7-8 meter police band. There is no
reason at all why this antenna cannot be con-
structed to give better operation on the lower
frequency bands as well, particularly when a
horizontal radiator is used. If the user wishes to
go to the trouble, it is possible to construct an
antenna of this type for multi-band operation—
provided he is willing to construct the quarter-
wave section so that its length and the position
of the feeders on it could be changed for each
band. All matched impedance systems, it should
be remembered, work best on only one frequency.

Strays

Have you ever met A. Ham, W6BLR?

—WSKBY

The Cover

The cover illustration this month shows some
of the radio antennas and wind velocity measur-
ing equipment at the Mount Washington, New
Hampshire, observatory. Since wind speeds of
anything up to 175 miles per hour are relatively
common, the antennas can hardly be strung up
in the usual ham way. We wonder that there is
a way of putting up antennas to stand a typical
Mount Washington draught.

February, 1935
Amateur Radio STATIONS

W9KJF, Indianapolis, Ind.

COMPACTNESS is the watchword at W9KJF, owned by Eugene Van Sickle, 1115 DeQuincy St., Indianapolis. The two main units shown in the photograph are two separate 'phone transmitters, each with built-in power supply, the one on the right even having the receiver on the same frame.

The set at the left is a 75-meter 'phone of fairly high-power output. Starting from a 160-meter crystal, a 59 Tri-tet doubling in its plate circuit is used to excite an 841 buffer stage, which in turn drives the final amplifier, a 203-A. This part of the set occupies the upper deck. The middle section houses a Class-B modulator using 830-B tubes with appropriate input and output transformers, and also a low-voltage power pack which supplies plate voltage for the 59 and grid bias for the 203-A. At the bottom is the main power supply which takes care of the modulator, modulated amplifier and the buffer stage. It uses 866-A rectifiers and a single-section filter consisting of a 10-henry choke and a 5-µfd. condenser.

The outfit at the right is a lower-power rig used for 160-, 75- and 20-meter 'phone. Its r.f. line-up includes a 59 Tri-tet, 59 neutralized buffer, and a pair of 10's in parallel, all in the upper deck. The middle shelf holds the speech amplifier, 59 Class-B modulator, and the single heavy-duty power supply which takes care of the whole set. The bottom section of this frame is occupied by the Patterson PR-10 receiver. That the small set gets out is proved by the fact that an R9 report on its signals has been received from Hawaii.

The aluminum box on the table between the two frames houses an electron-coupled frequency meter. On top of it is a microphone and mixing panel. Both carbon and crystal microphones are used, the former being preferred for its tone and the latter for its carrying qualities in QRM.

W8HWR, Utica, N. Y.

ANOTHER b.c. station operator who doesn't get enough of radio in working hours is Lawrence W. Briggs, owner of W8HWR. Like many others of the same profession, too, he seems to depend on c.w. for his amateur activities, since we see a couple of keys but no microphone on the operating table. Space has been left on the transmitter rack to take care of a future modulator, however.

The transmitter at W8HWR is crystal-controlled, having a 59 Tri-tet oscillator, a 46 buffer, and a pair of 510's in push-pull. The final stage is coupled to the antenna through a filter network of the type described by Collins in a past issue of QST. Two power supplies, one for the 59 and 46 and the other for the final stage, are mounted on the rack. Blank panels are provided for a Class-B modulator and the third power supply which will be required when the modulator is installed. At present the transmitter is used principally for c.w. work in the 3500-ke. band, with an input of about 60 watts. The antenna is 100 feet long, with 30-foot feeders. The receiver, at the left on the operating table, is a home-built outfit using a 58 untuned r.f. (Continued on page 72)
Devoted to the interests and activities of the
INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM  Vice-President: C. H. STEWART  Secretary: K. B. WARNER
Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

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<td>Nord Radio Relais Ltd.</td>
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Conducted by Clinton B. DeSoto

Peace:

Copy for this department is late this month. We've been getting out the semi-annual Calendar of the Union (the medium through which official I.A.R.U. business is conducted), and what with that and the effort to clean up tag ends of the year's activities, not to mention the holiday season—well, anyway, here it is, the day after New Year's Day, and these pages should have been at the printer's a week ago.

Notwithstanding, we're going to take the time to comment on a letter sent in here some time ago by Jerry Mathis of W3BES, and brought to mind again by conversations with a number of radio people, amateur and commercial. Here is the letter:

"I seldom spill any ink, but one of the things that really interests me most is international radio friendship. This sudden splurge is brought about by the FB picture of LU2CA's ether buster. I am in possession of a few intimate details regarding this station.

"The rig was thrown together by Atilio Alzona, LU1BW, who is a big shot with one of the large radio manufacturers and one of the best informed radio men in those parts. While in Philly on business LU1BW visited my humble shack quite a few times for skeds with LU2CA. We handled much interesting traffic with amazing ease. LU1BW knew no English and I no Spanish, so even in spite of an interpreter there was much arm-waving. I took him over to see W3BVX, who 'set them up,' and he was truly appreciative of the hospitality. . . .

"OM1AM also visited my shack when the Cuban mail was on strike, and QSO'ed his brother in Cuba.

"Most of the boys do not realize the possibilities of service we amateurs can render to the stranger within our gates, nor the pleasure of a job well done."

Now the activities described in the foregoing are not extraordinary. They are, in fact, relatively commonplace; the sort of thing that almost any of us has or can expect to have the opportunity to accomplish. The point is that such activities are accomplishments; that the international amity and goodwill that can be created by such simple acts is of important consequence not only to amateur radio but to the civilization of the world.

QST has carried many preachments on this
subject. In the past ten years what was once an aphorism has become a banality. But at the same time that which was true about the worth of amateur radio from the international standpoint then is ten times more true to-day; we’ve ten times as many amateurs, ten times as many countries in which amateurs are found, ten times as much activity—and ten times as much recognition.

Recently the old cry of the betterment of international understanding has been raised in connection with short-wave broadcasting. Throughout the world, broadcast receivers are being sold that predominantly have high-frequency tuning ranges as well as the standard broadcast ranges. Set manufacturers and high-frequency broadcasters, flushed with the lucrativity of this field, are shouting with wild abandon of the escape from locally nationalistic censorship, the broader international understanding, the better international relationships that will result from this craze.

This is largely poppycock. In the first place, everyone who knows the least thing about international broadcasting, especially on the European continent, knows that the most rigid censorship prevails with regard to broadcast material. When revolutions arise, one of the first strategic moves these days is to seize control of broadcasting and alter the policy of propaganda. Most short-wave broadcasters, when they present political news, are literally and exactly propagandists—nothing more. What gain to international amity and peace can arise from the banalities by politicians and governmentally-mouthed “commentators,” whether spouting national jingoism for intranational or spewing insincere and misleading blandishments for extra-national consumption? Of what more avail is it to hear one lie from a foreign broadcaster than to read another lie in your morning newspaper? No, the use of short-wave broadcasting as a medium for nationalistic propaganda (the only politico-social use to which it is now being put) won’t mean peace among nations or the building up of better international relationships.

But in amateur radio—the direct communication between two individuals, with no more censorship than that attending normal public conversation—removed from political influence and carried on solely as a personal social gesture—there lies a different destiny. It is yours to command.

And now, back to work.

General:

QSL information: The new address of the Reseau Belge, for QSL cards as well as all other services, is 312 rue Royale, Brussels, Belgium. The R.E.F., as the parent society, offers a QSL service for Morocco and all African colonies (CN and FMS) via the newly organized A.A.E.M., B.P. 50, Casablanca, Maroc.

Australian QSL cards can be sent via VK4US, 77 Moreton St., New Farm, Brisbane, Queensland, as well as to Box 1524V, G.P.O., Brisbane...

I.A.R.U. headquarters takes this opportunity of acknowledging, on behalf of staff members of the Union and the A.R.R.L., holiday greetings from many of its international friends...

Especially grateful are we for messages from S. G. Waite, Hon. See’y of the N.Z.A.R.T., and Harry Caldicott, VK2DA, traffic manager of the N.S.W. Division, W.I.A. Active Iraq stations have been reduced to two at the present time, according to Vernon Damron, WS1HGA. One is E. Goodwin, Y16GF, at Mosul; the other is L. A. C. Lewis, Y15GL, of the No. 1 A.C.C., R.A.F., Hainulti, Baghdad. ON4UF’s new QRA is L. Richard, Chateau, Belgium. Absolutely unique among the cities of the United States is Oshkosh, Wisconsin. Every licensed amateur in the city is WAG, as we are told by Erwin Rasmussen, W9FAY; a 100% WAG town; reminds us of Czechoslovakia when there were more WAG’s than licenses; FB! W9FAY says further. “Some 75 countries have been heard this year and over 50 worked. Not bad, considering that this isn’t a location that was any good for DX until this year. It seems to bear out the observations made in the I.A.R.U. News about characteristics varying in different locations. For years it was impossible to hear foreign signals; now contacts can be made with R9 reports on both ends, including R9 from Japan. The most unusual contact was made with UX3FU, the Russian icebreaker “Krasin’” off Wrangell Island, who has been contacted several times.”

Many in the world of amateur radio are mourning the passing way on November 22nd of Louis A. Era, ON4BC, after a long and painful illness. ON4BC is recalled by a great many old time amateurs as an outstanding DX man, having made friends the world over. In the later stages of his illness, when it was impossible for him to stay in his shack, he arranged his station for remote operation from his room; radio was his only hobby. Two days before his death he was still at his receiver. Amateurs in the Antwerp area, in particular, feel the loss of a very dear friend. (Thanks, ON4GW, ON4AC, W11Z.)

Special:

“QTC,” official organ of the South African Radio Relay League, in two months will have achieved the mature age (among amateur magazines) of seven years. That we have had occasion to admire its conduct, views, and progress in the past is demonstrated by the fact that on occasion we have taken the liberty of quoting from its columns in QST. The “QTC” of to-day is the

(Continued on page 78)
**Operating News**
Conducted by the Communications Department

F. E. Handy, Communications Manager
E. L. Battey, Asst. Communications Manager

**Illegal** operation, called "bootlegging" and the like, we immediately think of as of concern to the Federal Communications Commission. In the minutes of the F.C.C. we note with increasing frequency the names of persons denied amateur licenses and on whom are imposed the penalties as provided by law for violation—persons not eligible to become amateurs because they have been apprehended as mixed up in cases of unauthorized transmission. These things are as they should be. In the U.S.A. licenses are granted only to those qualified, and a fair examination system to determine the qualified is available to all on application. Let this mention of the subject be sufficient warning to all potential bootleggers of radio and others to realize that their disregard of the requirements and rights of others will not be tolerated, either by the F.C.C., or by an aroused amateur public opinion!

The average amateur becomes indignant when someone bootlegs his call. We have read letters from many such, sympathized, and given advice. We fear, however, that the average ham operator is much too tolerant, until his particular reputation hangs in the balance for some amateur's indiscretion! Let us each, here and now, do our part to help ourselves, the licensing authority, and better the whole amateur fraternity by adopting a non-compromising attitude toward those making up the really small percentage of "bootleggers" that our ingenuity will enable us to discover working in our midst—trying to pass as amateurs! This problem was cited in the January issue of the Amateur Transmitters Association (W. Pa.) News. We quote therefrom:

"You may know one person bootlegging on 160 meters: W6XV may know another on 40; W6DX may know a case on 80. Taken altogether we have knowledge of many cases. On these bands calls are borrowed, on 3-meters they are coined! Why is there a tendency to wink at non-licensed operation in this band? The unlicensed operators working there are not even, for the most part, interested in becoming amateurs. They just want the thrill of "personal broadcasting," having got a cheap transceiver, or followed these details given in "popular" magazines that get persons of six-year mental age on the air. Much periodicals rarely mention the legal requirements to obtain a license. The question is this, ARE WE TO TOLERATE OR CONDONE NON-AMATEUR AND BOOTLEG OPERATION IN OUR AMATEUR BANDS, SUCH CAUSING AN APPRECIABLE PORTION OF THE OFF-FREQUENCY OPERATION AND A GREAT DEAL OF QRM OF THE POOR SIGNAL VARIETY?"

One logical spot for action is in and through the Enforcement Committees of and mass action taken by the local amateur radio club, and there is a representative ham club in practically every large community. We fear that too many clubs are interested in their own welfare, and lack of qualifications make necessary, in our opinion, be solicited as non-compliance, stubbornness, and lack of qualifications may cause the manufacturers in their advertising, and the non-amateur editors, in their articles, to stress the necessity for licenses for any transmission work.

To individual club members we suggest that it is time to get busy and talk the subject out at the very next meeting. Pool all knowledge that can be contributed by various members regarding unlicensed operation in your locality! See that an enforcement program is worked out and started functioning. Make it a friendly helpful program to amateurs. Assist in solving problems by cooperation and technical advice. Advise non-amateurs how application forms for station and operator licenses may be procured—and how necessary such licenses are! After this information is known to non-licensed men there is not the slightest excuse for any illegal operation or evasion, and the cooperation of the local F.C.C. office should, in our opinion, be solicited as non-compliance, stubbornness, and lack of qualifications cause the enforcement Committees to do their part, interested in becoming amateurs. They just want the thrill of "personal broadcasting," having got a cheap transceiver, or followed these details given in 'popular' magazines that get persons of six-year mental age on the air. Much periodicals rarely mention the legal requirements to obtain a license. The question is this, ARE WE TO TOLERATE OR CONDONE NON-AMATEUR AND BOOTLEG OPERATION IN OUR AMATEUR BANDS, SUCH CAUSING AN APPRECIABLE PORTION OF THE OFF-FREQUENCY OPERATION AND A GREAT DEAL OF QRM OF THE POOR SIGNAL VARIETY?"

A tribute to the ingenuity and resourcefulness of radio amateurs! Working under handicaps seldom experienced in any kind of emergency, W7DIZ constructed an operative station from a salvaged receiver and salvaged parts, "door-knobs to wall telephone gear." We present this story as an outstanding example of amateur emergency work. This first hand account is by W7DIZ, first assistant keeper of the U.S. Lighthouse Station on Tillamook Rock, Oregon, and tells just how he established communication with the mainland during the severe and damaging storm of October 21, 1934.

**Amateur Radio Scores Again!**
By Henry Jenkins, W7DIZ

This record concerns the violent storm that swept the North Pacific, causing most severe damage to the light station on Tillamook Rock on October 21, 1934. At 10:00 p.m. on October 20th, the southeast wind was blowing, with light rain. During the night the wind increased to gale force and changed to southwest. About 3:00 a.m. on October 21st, seas were extremely high, sweeping the base of the Rock from southwest and spray coming over the Rock. At 8:30 a.m. I was awakened with a sudden jar. Water completely covered me, all my clothes and bedding completely wet. The seas at this time had started over the entire tower and pounded the window shutters of my room until the catch let go, opening them and flooding the room. The wind was
of wire I swiped from BC set for the grid coil. There were 20 turns of plate coil. As I had no means of controlling oscillation I put enough plate turns to keep it oscillating at all times. For antenna I used the condenser if it twisted two feet of insulated wire together, and the capacity of their separation by the insulation served as the series condenser, between the grid coil and the antenna. I used a tin-foil condenser made up for the grid condenser, but no grid leak. The grid condenser was made from two brass plates that I took off the door knob. I fastened one plate on the receiver base and the other was separated by a piece of bread wax paper.

Tuning was accomplished by showing one plate over the other with a pencil. Of insulants these parts were unknown but, due to past experience, I finally found the 3.5-mc. band. The first station I heard was W7RT in Seattle. Then I knew where I was and, tuning by shoving around with a pencil, found W7CXX working W7WR. I left the receiver tuned on W7CXX, and while I was transmitting I tuned my transmitter to his frequency by listening to him with my transmitter oscillating. At 6:50 p.m., October 23rd, I called W7CXX, and W7WR informed W7CXX someone was calling him, although W7WR could not tell who was calling, as the signals were so weak and chippy. A message informing the lighthouse superintendent of damage, etc., was the first traffic handled.

The Transmitter

When things around here got half dry, I immediately got two boards approximately 10 by 12 inches. Not having any tube sockets, I drilled holes in each board for sockets and I took a pair of 20 tubes out of the broadcast set and soldered leads on the prongs of the tubes. On the transmitter board I placed a tank inductance which I made out of some bell transformer wire. The wire was wound on the case from the regular NR6 batteries. After that I used the home made hand key. I sent my first four messages with my fingers breaking the connection on the "B" battery, but, later on I made out of some bell transformer wire. The wire was wound on the case from the regular NR6 batteries. After that I used the home made hand key. I sent my first four messages with my fingers breaking the connection on the "B" battery, but, later on I sent my first four messages with my fingers breaking the connection on the "B" battery, but, later on I found W7CXX working W7WR. I left the receiver tuned on W7CXX, and while I was transmitting I tuned my transmitter to his frequency by listening to him with my transmitter oscillating. At 6:50 p.m., October 23rd, I called W7CXX, and W7WR informed W7CXX someone was calling him, although W7WR could not tell who was calling, as the signals were so weak and chippy. A message informing the lighthouse superintendent of damage, etc., was the first traffic handled.

The Receiver

Not having a spark of anything to work with, the receiver was a crude affair. For the coil I found an old regular telephone receiver and used the shell as the form on which to wind the 3.5-mc. band coil, used 45 turns of wire I swiped from BC set for the grid coil. There were 20 turns of plate coil. As I had no means of controlling oscillation I put enough plate turns to keep it oscillating at all times. For antenna I used the condenser if it twisted two feet of insulated wire together, and the capacity of their separation by the insulation served as the series condenser, between the grid coil and the antenna. I used a tin-foil condenser made up for the grid condenser, but no grid leak. The grid condenser was made from two brass plates that I took off the door knob. I fastened one plate on the receiver base and the other was separated by a piece of bread wax paper.

Tuning was accomplished by showing one plate over the other with a pencil. Of insulants these parts were unknown but, due to past experience, I finally found the 3.5-mc. band. The first station I heard was W7RT in Seattle. Then I knew where I was and, tuning by shoving around with a pencil, found W7CXX working W7WR. I left the receiver tuned on W7CXX, and while I was transmitting I tuned my transmitter to his frequency by listening to him with my transmitter oscillating. At 6:50 p.m., October 23rd, I called W7CXX, and W7WR informed W7CXX someone was calling him, although W7WR could not tell who was calling, as the signals were so weak and chippy. A message informing the lighthouse superintendent of damage, etc., was the first traffic handled.

The "No-Guess" System

In line with the new "Q" signal suggested by W9FO to indicate over what portion of an amateur band you intend to cover the entire band: "EL", meaning "I am tuning over the entire band"; "ML", meaning "I am tuning over the entire band, starting at the high-frequency end and tuning towards the low-frequency end"; and "LI", meaning "I am tuning over the entire band, starting at the low-frequency end and tuning towards the high-frequency end". He suggests a similar system. His indications are the same as W9FO's except that the "Q" is left off: "FM" means I am tuning from the high-frequency end of the band to the middle of the band"; "MO" means "from the low-frequency end to the middle"; and "ML" means "from the middle to the high-frequency end"; and "ML" means "from the middle to the low-frequency end". He also suggests two additional indications, to show that you intend to cover the entire band: "EL", meaning "I am tuning over the entire band"; "ML", meaning "I am tuning over the entire band, starting at the high-frequency end and tuning towards the low-frequency end"; and "LI", meaning "I am tuning over the entire band, starting at the low-frequency end and tuning towards the high-frequency end". An example of the use of the various abbreviations: W9CQW W9CQD W9CQB W9CQK, indicating that W3DV will tune from the low end to the middle. The use of signals to show where you are going to tune should help reduce unnecessary calling and save every one's operating time.

A QSO of 7 hours and 40 minutes duration is claimed by W9CQW and W9CQP on 1.75-mc. "Phone. The QSO, starting at about 20 p.m. and ending at 6 a.m., was passed from two-way to five-way. Anyone causing QRM, was promptly taken into the QSO. Stations worked were W9PTR, W9PP, W9MN, W9KYY, W9NXA, W9PHB, W9NL, W9BPM, W9MEY, W9PVM.
Beginners, QRM and Restrictions

By James O. Wood *

MUCH is said about beginners these days in conjunction with QRM on various popular DX bands. The Old-Timer has perhaps forgotten the day he went into the R.I.'s office, drew a diagram of a simple crystal detector and spark or possibly a one-tube receiver and Hartley, read a bit of code, was almost invariably handed an amateur ticket; he did his own share of pestering those who were before him until he got enough actual operating experience to qualify as one of the gang. I have a weak feeling towards the beginner, for well I remember my first few contacts and punishments which was due more to nervousness than to lack of practice.

Those of you hollering for restriction of beginners on certain amateur bands, stop a moment and think back some years ago. Would you care to have been restricted to a certain band probably with a bunch of beginners as new and nervous as yourself? Is that a recommended method of teaching? No. Modern methods of teaching put the weaker students amid the well trained and experienced. Rightly so, "example" is a good method of teaching. The average beginner is no lid. He usually knows as much theory before he gets his ticket as some of you knew in five or six years of experience! Granted there might be more available information today than a few years ago. There is information available for higher knowledge of amateur radio which is not taken advantage of by a great many of the old-timers who spend their time working DX and complaining of QRM. Beginners have to learn a good part of all you knew from years of hammering before they get a ticket. Why then any restriction to one band? A month or two of mingling with a few good operators will make the newcomer almost your equal in amateur operating technique. Restrictions are not necessary. Restrictions are not the solution to our QRM problem.

Are you an old-timer? If so you probably have $200 worth of high-power transmitting gear. But is not your receiver in the same class as the one you started in with back in the "good old days"? Many old-timers have to blush slightly when confronted with that question. It is much easier to get a high-power transmitter working and on the air than it is to build a good receiver. With such an outfit you have the right to holler about restrictions and QRM when you have not met present conditions with an up-to-the-minute receiver? Most of us who are honest admit that the time is here when some form of superhet is essential for selectivity. Yet we hang to our old stand-by, the T.R.F. set, because its sensitivity is good and very cost low. If you are unable because of lack of funds to own a good receiver you should make the best of it until the time that you get the prevailing con- campion with equipment suitable to cope with conditions. Until that time be friendly and tolerant of the beginner who only represents a small part of the QRM after all.

Bring your receiver up to date. Use any form of "superhet" the simplest if necessary. It will be superior to any of the common T.R.F. jobs now in use, at least in selectivity. Most of you can have a super if you make the same effort that you make towards an increase in your transmitter (part at a time). The $-tube "S.S." simplified version is certainly not too expensive for the DX man and the Old-Timer who has many times its cost sunk in a high-power transmitter. Made even of the cheapest parts, it outplays the T.R.F. job especially in eliminating QRM, yes, even the local high-power stations. It is a real receiver worthy of every bit of effort necessary to get it going. It is easy to convert your present T.R.F. job! After you have met conditions with such a receiver, I dare say talk of QRM and restrictions of different kinds will be issued on the part of those really fair-minded and willing to admit that possibly some of the trouble was on their end.

So, gang, lay off the yelping about beginners, QRM and restrictions and get busy. Forget that contemplated increase in power this coming year. The money spent for a 1935 receiver that will discriminate between two signals a few kilocycles apart will prove an excellent investment. Better DX will be possible. You will be able to read weak DX successfully. Better feeling in amateur radio will result.

**1.75-mc. DX Tests**

Data on "100-meter" DX test plans has been received via GSWU and WIDMB: United States and Canadian hams are to call on the hour and half hourly for a fifteen-minute period calling "CQ-G," beginning at midnight and ending at 2:00 a.m. E.S.T. Saturday and Sunday mornings during February and March. The British stations will transmit during our listening periods, or from the quarter hour to the three quarter hour to the hour. British stations will call "Test USA" and will be between 1715 and 1800 hrs.

**1935 R.E.F. Cup Contest**

On the occasion of the 10th anniversary of the formation of the "Revue des Émetteurs Français" and its acceptance as a member-society of the I.A.R.U., the R.E.F. announces an International Contest, known as the "R.E.F. Cup Contest."

Points will be scored for each contact established with an amateur station located in France, its colonies or its protectorates (all F and CN prefixes). All contacts may be established by means of telegraphy or telephony on any of the amateur frequency bands. Only one contact with a specific French competitor will be permitted to count. Competitors will be required to exchange a five-letter code word chosen by themselves; this code must be exchanged for each contact. One point will be scored for each complete contact.

The competitor scoring the greatest number of points in his country will be awarded a commemorative diploma and a free subscription to "Radio-R.E.F." for a period of three months. The competitor scoring the greatest number of points in the world will receive a special diploma and a year's subscription to "Radio-R.E.F."

The contest will start at 0000 Greenwich, Sunday, March 24th, and will conclude at 2400 Greenwich, Sunday, March 31st. Entries must reach R.E.F., 17 Rue Mayet, Paris 6, not later than Sunday, May 19, 1935. The report should cover the following information: Name, address, call sign, input, and total score. For each contact show: Date, Greenwich time, call, codes, frequency band. A short description of the competitor's station is also required. Acceptance of these rules is the only stipulation; the R.E.F. Committee's decision must be accepted as final in all cases of dispute.

WeBBY's uncle lay seriously hurt as a result of a wreck in an auto race. Wishing to get a message to the hospital in New York, he called "CQ Urgent East," VP5PA in Port Maria, Jamaica, answered, and relayed the message to the Jamaica Hospital, Long Island—all in a matter of minutes!

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* Winter Street, Milis, Mass.

February, 1935
BRASS POUNDERS’ LEAGUE

(Nov. 16th–Dec. 15th)

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MORE-THAN-ONE-OPERATOR STATIONS

W9EUD 245 1085 1330
W9NED 415 941 1356
W9RGN 971 741 1712
W9KED 711 159 869
W9QED 185 59 244
W9FED 69 101 168
W9JED 27 85 112
W9KED 65 75 140
W9KED 18 94 112
W9JED 106 102 208
W9KED 65 116 181
W9KED 46 126 172
ACED 207 129 336
W9ZED 7 14 21

A.A.R.S. STATIONS

Call | Opry | Del. | Total |
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<td>60</td>
<td>2337</td>
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<tr>
<td>W9WYD</td>
<td>2377</td>
<td>60</td>
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MORE-THAN-ONE-OPERATOR STATIONS

WLM (W3CXL) 621 422 1043
WQY (W8EQW) 355 169 524
WQY (W8EQW) 425 169 594
WQY (W8EQW) 476 176 652

A total of 656 or more, or just 100 or more deliveries will put you in line for a place in the B.P.L.

O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in October QST (page 49):

W2GNK, W6FQY/KG, W6FHW, W9AXH, W9QIL, VE1EP, VE1GL

Briefs

"It's rumored about town" that W2FHS of Clifton, N. J., after two years of trying to get his YL interested in ham radio (without results), will finally win his point as the YL's initials are H.A.K. and W2FHS are L.G.M. so, the Mrs. will be a H.A.M. !

Chicago Dance and Hamfest

Amateurs of the Chicago Area will participate in the annual Spring Dance and Hamfest under the auspices of the Midwest Radio Club. March 30th. Program includes prizes, dancing and entertainment. Prizes will range from fifty-watters to complete sets. Admission is fifty cents. YLs, OWs, etc., invited. The place: the Congress Hotel, Chicago. Interest is high in this coming affair. Plans are under way to charter a special car or bus to bring about fifty hams from Fort Wayne, Ind. ! Plan now to take in this dance-hamfest.

The Oldest Ham

Believed to be the oldest ham is Mr. C. R. Stedman, Sr., W6CAB, Denver, Colo. W6CAB is 77 years old and has been on the air for four years. He maintains a regular schedule with his son, W7AEQ, Helena, Mont. The next oldest Mr. C. J. McQuire, W7NE, Lebanon, Wash., who in a few months past 70.

The Haywire Net

The "Haywire Net" is a group of 3,9-mc. radiotelephone operators organized for the purpose of rectifying irregularities in the operation of stations within the 3.9 to 4-mc. band. In general, its operation is directed toward the criticism of over-modulated, lopsided and distorted signals, improper carriers, off-band operation, in fact any violation of the radio regulations, with a view to improving radiotelephone operating conditions. The "net" consists of the following members: W0FZ, W3CKD, W3BJG, W3CR, W3WQ, W3AC, W3CKR, W9DD3, W2BO, W2CGY, W2ADW, W3AM, W3SJ.

Bachelors’ Club

From the Illinois Bulletin we learn that traffic men in that section of the country have formed a "Bachelors' Club." The only requirement is that a member be single and desire to remain that way. In order that none of the membership slip into the marital yoke, it is planned to impose a severe penalty on those who do. Members to date are W9DOU, W3MN, W9QVL, W9LEZ, W9ACL, W9HSK, W9KJY and W9FRK and W8FTW. Those interested and possessing all the necessary qualifications should write or radio W9KJY, Glen Ellyn, Ill., or any of the amateurs listed.

W6LBI worked W6GH2, an XYL. The next night he worked her OM, W6CRF! He wonders if CRF was checking up on him.

W9KEI suggests: If QRM is known to be on your frequency, sign your call at intervals during a QSO—it helps the other fellow keep track of your signals.

A game of checkers was played via 3.9-mc. radiophone between L. J. Ryan, W9CNS and Frank Miksa of Aurora, Ill. Mr. Miksa was at W6EDW, station of Harold Nelson. W9CNS won the game.

K8COK held a QSO of two hours and five minutes with MX2B in Manchuria. The QSO was carried on in Japanese, both operators transforming Japanese phonetics into Continental Morse.

The Royal Order of Acorns

1.75-mc. 'phone operators in Illinois have organized a club known as the "Royal Order of Acorns." Membership is about thirty so far, W9KXE is "The Coconut" (president), W9RFG, "Waldorf" (vice-president), W9NOV, "Chestnut" (secretary). The aims of the club are to help beginners and act as official observing stations. The "order" is about to impose a severe penalty on those who do not keep their stations within the 3.9 to 4-mc. band. In general, its operation is directed toward the criticism of over-modulated, lopsided and distorted signals, improper carriers, off-band operation, in fact any violation of the radio regulations, with a view to improving radiotelephone operating conditions. The "net" consists of the following members: W0FZ, W3CKD, W3BJG, W3CR, W3WQ, W3AC, W3CKR, W9DD3, W2BO, W2CGY, W2ADW, W3AM, W3SJ

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Howard Seefred, W6EA, announces the arrival on December 20, 1934, of an eight-pound baby daughter. Mrs. W6EA is the sister of W7CY.

QST for
June 22 and 23, 1934 were two big days in Orlando, Florida: the Florida State Amateur Radio Convention was in progress! The afterlopner was opened with a program by the "Knights of the Kiloeycle." Talks were given on the A.A.R.S. and the Naval Reserve. W4PL was crowned "King of Lies" after telling the tallest one. 56-mc. tests from plane to ground were very successful; W4ACZ and W4CAM did the operating. Various stunts and contests were held; in an elaborate trial W4AQU was convicted of "home-wrecking" and was sentenced to "four lashes." The banquet was attended by seventy-five hams, YLs and WAs. W4DLW, Capt. Glee Cob, M.C., was the "head man" of the show, and much credit for the success of the convention is due him. The gang is looking forward to "another!"

**DX Briefs**

3.5-mc. Trans-Ocean Work!

Trans-Atlantic contacts on "nifty meters" are becoming a common occurrence with a return of conditions similar to those in 1924-25. Many amateurs in eastern and central states report contacts with Europeans. Among the signals "across the pond" are those of CN8MN, CT1KR, D4BAR, D4BDR, D4BMJ, D4BIF, FM1X, G8UT, G8UTQ, G8UTQ, G8YQ, HB9AQ, HB9Y, HRW, I8UIJ, OK1VA, ON4AU, ON4JB, PA9ASD, PA9DC, PA9ER, PA9LX, PA9LXU, PA9QG, CT1KR, V04K, ES1F, OR5F, OR5QH. Some of the "W" and "YF" gang who have worked or heard these are: W1ABN, AP1U, BD7BIK, CD7DU, DJ8F, ES8GO, G0CJX, JK2, MR, SK7, TE, US8, VZ8BS, ADO, AZL, CAV, AUP, BDN, BII, BDY, BKL, CJD, DBU, DIJ, EAF, ELK, EZJ, FXC, W3DUK, PA9ZL, PA9LR, PA9U, ON4DG, CT1KR, V04K, ES1F, OR5F, OR5QH. Some of the "W" and "YF" gang who have worked or heard these are: W1ABN, AP1U, BD7BIK, CD7DU, DJ8F, ES8GO, G0CJX, JK2, MR, SK7, TE, US8, VZ8BS.

DXVF on 3.9-mc. "Phone"!

FXVP, Port-du-Chameau, France, announces that he will call United States amateurs on 3.9-mc. "phone" (during January and February) every Tuesday and Friday at 2400 Greenwich. Here is an opportunity for trans-ocean "phone" work on 3.9 mc. Who will be first to work FXVP?

1.75-mc. "Phone Heard in England"

W1HUI, Cromwell, Conn., has received a report on his "100-meter" "phone" signals from GB3I. Before the winter is over there should be considerable two-way trans-Atlantic work on "100" as well as "75-meter" "phone." Let's hear about it.

7 and 14 mc.

Using a single 01A with less than three watts input on 14 mc., W7RT worked several W9's, W9's, a W8 and K6LK. W3QQ's 7-mc. schedules with VK6HG are still flourishing Tuesdays, Thursdays and Saturdays at 7:45 a.m. E.S.T., W8LW, Pittsburgh, Pa., on December 19, 24, at 4:55 p.m. E.S.T., worked VK7J on 7 mc. "J" QSO's are not "usual" at that time of day on 7 mc. W8KLU, Morgantown, W. Va., was VKO four ZL's and five VK's all in one morning (Dec. 6th) on 7 mc.

Word of an earthquake in Honduras in early December afforded an excellent chance to test the Detroit Police/Amateur Radio affiliation (see Nov. 1935). Short time after word had been received, WSSS, WSSHU, W8IFE, W8WA, W8KNT, W8LZV, Mrs. W8DYH, W8BNU, W8FTPW, W8FEE, W8CO and others had been notified of the chance for QRR work; although nothing definite developed, it was a good drill and proved that the Detroit police/amateur tie-up works! HRIAA was on the job, ready to cooperate in Honduras.

**P.A.R.A. Ready for Typhoons**

At the October meeting of the Philippine Amateur Radio Association, Father Depperman of the Weather Bureau made a request that amateurs assist the bureau in gathering data when typhoons are in the P.I. area. He explained that the data necessary would be barometer readings, direction of wind and velocity of wind. President Grove of the P.A.R.A. appointed a committee of three, KAIAX, IL, Bums KAIHR, and KAIAN to meet with Father Depperman and give him a list of amateur stations in the P.I., their locations and power. From this list stations that should report during the typhoon season are being selected. An extensive "Weather Net" is being organized.

28-mc. Band Opening Up

The 28-mc. band shows signs of opening up to DX. W4AJY, Alabama, on December 23rd and 30th, worked W6CAL, San Francisco, between 1:00 and 2:20 p.m. C.S.T. WICUN, New Hampshire, worked W5WQ, Louisiana, at 11:30 a.m. and 9:40 p.m. on December 9, and W6CAL, Illinois, on 28 mc. at noon on Christmas day. Signals were strong. ON4AU, Belgium, worked VE3PT. W6CAL is on 28 mc. each Sunday. ON4AU is on daily from 8:30 to 9:30 a.m. E.S.T. W1CIF spends many Sundays on the band. W6QGS has worked W6JR. W6BY worked the following during December: WM4R, W6JR, W6DGW, W8CAL, W9GKE, W9DII. Among other stations active on 28 mc. are VE2AC, W9GBM, W4TZ, W1ZB, W8SS, W8ACN.

W2GTV claims the DX record in using VE3JW's "human voltmeter." He got across 1350 volts and went "half way to heaven!"

56-mc. Experiments

On December 9, 1934, W2GFD and two other members of the Colonial City Radio Club (Kingston, N. Y.) traveled to the top of Overlook Mountain. The altimeter reading was 3150 feet above sea level, temperature zero in the morning, four below in the afternoon. A 56-mc. directional array was in operation by 11:20 a.m. Stations worked were W9WC, new Phone Activities Manager, Illinois A.R.R.L. Section, announces definite hours during which contacts will be made for DX work only. The schedule is: Daily from 11:00 p.m. to 2:00 a.m. C.S.T. Contacts can also be arranged between 9:30 a.m. and 12:00 noon. Any frequency may be used.

VK DX Contest Results

Word reaches us by radio via VK3RJ-VK2EL-W1SZ that final scores in the VK DX contest have not yet been compiled. VK3ML, who is in charge of contest results expects to have the VK scores compiled, the first official leaders, in order of unchecked scores are VK3GQ, VK3MR, VR2XU and VK3JQ. VK3GQ's claimed score is over 103,000! A QSL card received by W5FM shows that VE3QO used only a 50 mc.-doubler and a 10 final in the VK contest! Yet he worked quite a few DX stations.
ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below: 

(Continued from a previous page, excepting petitions for Section Manager, the name of the present incumbent of this term of office.) 

This notice supersedes previous notices.

In cases where no valid nominating petitions have been received declaring the presence of members residing in the different Sections, in response to our previous notices, the closing date for receipt of nominating petitions is set ahead to the dates given herein.

In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filling of proper vacancies or the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the date specified.

Nominating petitions must be filed with him on or before the closing date specified, and the closing date for receipt of nominations at A.R.R.L. Headquarters is hereinafter specified as noon, March 1, 1935.

In Canadian Sections nominating petitions for Section Managers can be presented to General Manager, Alex Mac, 169 Queen Ave., St. Lambert, Quebec. To be valid such nominations must be filed with him on or before the closing date named.

If you are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two year term of office is about to be held in your Section in accordance with the provisions of By-Laws, 5, 6, 7, and 8.

2. The election will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballot mailed from Headquarters will have the names of the eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing date specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following is suggested:

(Place and date)

Communications Manager, A.R.R.L.

New York City, Conn.

We, the undersigned members of the A.R.R.L. residing in the Section of the... Division hereby nominate... as candidate for... Manager for this Section for the next two-year term of office.

(Place and date)
QRA. The Tri-County Radio Club has been organized at Glenfalls: DRZ pres., G.P. vice-pres., L.U.J. secretary. MVJ-MYE: new calls. The Fort Stanwix Club raised initiation fee from $1.00 to $2.50. JLB, BRH, VV: has rig on 1762 kcs. AZP: trip swears activity this month. B.P. is working plenty of European stations on 3.5-mc. c.w. JJT, R.M.: is a high traffic man for the month; he is planning a three months' trip to New Mexico this next summer. GWY and DDS (R.M.) are busy with traffic. Oneida Amateur Radio Transmitting Assn. has been organizing. GOU pres., DDS secretary. BWY has daily schedule with Syracuse. MBY, new ham, has gone in for traffic.

AYD is working plenty DX. KMG has new receiver.

FYP is laying for "4" on 14 mc. AQE had fine SS scores with low power. EBR built entire station. AAR has new PR-12. GZM is busy with A.A.R.S. BR is rebuilding final in M.O.P.A. EWP uses 211's in final. D2F has new transmitter. GWT reports DX FB. LGR is going on "phone exclusive. AKX is still using a 10 final. FTC uses 211's in final, grid bias modulated. DUE was back in Glen Falls for the holidays and is now in Hartford, Conn., for the winter. HWR has been dabling with 56 mc. AWX has been in hospital with broken ankle and has loaned final to some game. KKA has new SW3. The Mohawk Valley Club members are still looking toward I.O.O.F. Temple on Morgan Street, AFM is on again. EOA has trouble with rig. GPS is building new 3.5-mc. phone. BHW is engaged to be married. CHER: phone

Traffic: W6JTT 606 GWY 158 DDS 131 BWY 39 MBY 39 AYD 32 AW2 22 EUY 15 KMC 15 FYF 14 BQJ-BRW 12 AQE-EBR 11 AAR 7 GZM 6 LIJU-IBR-EWP-DVE 4 GWX-LGR 3 AKX 1 KJW 1 DVA 43

WESTERN PENNSYLVANIA—SCM, C. G. Grossarth, W5CUG—GFU is still leading the way: "Han" is using c.w. c.on. KWA visited 38N and 38ND. FCV comes through with nice total. ADY has been appointed D.N. for Peninsula. 38ND r.d. DWA, visited GUF. EZT is newly appointed O.R.S. IUY is active with A.A.R.S. work. LQO started radio club at Sewickley High School. UK reports the passing of SLDP of Glenville, Pa. We extend our sympathies to his family. KQQ wants a 1 or 2 MFD 10,000 volt filter condenser! KOB handled most of his on 7 mc. AXD says FKQ put his finger under the gun barrel to see if it was loaded. Who loaded the gun? OSA is trying new antennas. GJM says BRK is building 14-mc. c.w. with a new for receiver. GSH says GMU will soon be on high power. IO1 is rebuilding and IOH wants higher power. AYA is playing with 86 mc. KNB is new O.R.S. 38ND V. CUG visited 302 VA 223 (WLM2 221) ADY 194 CUJ 157 EZT 99 IUY 84 LQG 76 KQQ 26 KOB 83 AXD 15 CQA 14 GJM 12 FRU 11 LIG 7 JZZ-GSH 6 IJO 4 AYA 2 KNB 5 KXY 1 UK 36 KNB 9.

CENTRAL DIVISION

ILLINOIS—SCM, Fred L. Hinds, W9WWR-W9APY—R.M.: KJY, ILH, FRU. Winner of the first Illinois QSO Contest is KJY with 80 points. His prize is a 14-mc. antenna. Coupling coil. Second place was given by ILH with 52 points. There are 34 ham stations in Waukegan, among which are TEG and TEG. NN has a direct outlet for AKX for west and Oriental traffic. NUP has been on 86 mc. PCI is to increase power with a 50-watter. KEH made 57,310 points in 8s. CUIF has been on 1.75 mc. DRN is now W.A.C. LIV has a 50-watter in final. GSB tried 56 mc. and worked across the street to OBE. FTX was in an auto accident, but everything is OK now. KJX is back from O.C.C. New bug and monitor at SKF. CJK is working hard on Truck Lines. 1.75 mc. is line at DBO. REB is applying for O.R.S. WO is working with 56 mc. MOW is working plenty of DX on 56 mc. with phone. KRE is in Blaine, Oregon, signing W7 from C.C.C. DOU has been 5 years in A.A.R.S. MRQ rebuilt. New rig at FFJ and EZV. ACU works duplex QSOs on 1.75-mc. and 3.9-mc. phone. MCC took only 20 minutes to relay a message from 6FYK to 4CUY in Miami. There were three stops in the relay, and K4A had a band in it. Transmitter trouble at HUX. KEZ worked NYLA with two times in a row. He set his feet high with 30V. He put a "45 P.F., T.N.T. on 1.75 mc. to get some occupants for the "dead space" on that band. DDO scored 4000 points in 8s. ICN says Trunk Line "J" is going well. NZK is calibrating his three meters to be-in-a class at Junior High School in Wheaton. NQG dedicated his new shack with a party. KA received 13 foreign QSL cards in one day. HI PLR and RBE are going after daylight traffic. IYA says he won't miss the next Illinois QSO party. LFV has high on calls of 35 time. He will use 3SF at Cold Point, Pa. PTW is building high-power rig. RLH QRM's the neighbors with his phone. ATA sent his first report as O.P.S. The 1.75-mc. 'phones have a club of the air called. The Royal Order of Acme.' and meets every Saturday night at 12:20 a.m. C.S.T. KKE is "The Coconut" (secy.). SHP is "WALnut" (vice-pres.), and NOV is "The Chestnut" (secy.). Aims of club are to help new beginners and get as O.O. stations. SRC and SQY are reporting again. HUM is a marvellous piano player. KKD gang in Logan square district of Chicago is rebuilding. COW says local 14-mc. 'phone QSOs are now had for the first time in three years. NRK is working on new rig GLX worked a G on 2.5 mc. three mornings last month. MIN is DRS. FYZ says the "Illinois" Bulletin is an FB sheet. AIU, Egyptian Radio Club, is coming well. New vibroplex at OXG. OLA and RHA are on 'phone. FYE can make an RCE20 blank. KPE found and fixed its trouble with 'phone. Its A.A.R.S. WRO one morning on 7 mc. STG says the local boys are talking about organizing a club. AND made 29,835 in SS. CKM is recovering from an appendicitis operation. New hams in Rockford, TEP and TST. AAR and EXN are on again. Mr. Geo. Lorentzen, 2342 So. Homan Ave., Chicagio, who is doing experimental 'phone work, would like to hear from 'phone hams in vicinity of Chicago.


INDIANA—SCM, A. L. Braun, W9TS—9FQ Chief R.M.—IRX is working plenty of DX. AEB is at new QRA. HISP is now O.P.S. RE and DET are rebuilding. ARK is spending winter in Fla. AXE plans new 240-ft. ant. AEB is on 60 mc. MQV is giving 1.75 mc. a try. HUO keeps traffic schedules on c.w. SDP is on 7 mc. HPQ has trouble with new rig. EGO worked a 1.75 on 21 watts. UVX is doing radio for F.E.R.A. DFE worked OM1, K6, VZ, 2L for DX this month. TE is building new rack and panel. Please note new QRA of 9FE is 5211 Brookville Rd. Send reports there. More O.R.S.s are needed; send in applications to-day.

Traffic: W9JR 286 DET 30 HSF 7 RE 2 AXH 4 AEB 72 MQV 1 HUO 114 SDP 10 HFX 35 HUF 20 EQG 318 HUY 3 DPF 37 TE 62.

KENTUCKY—SCM, G. W. Moosburger, W9AUI—BWJ is getting around to ham work again. CDA is showing the way to the rest of the boys. FYD says school and work at Police Station keep him busy. PAG reports O.R.S. with pair 'lO's. OX is again on the air. CDA is fathering new rig at Centre College along with GGB. KCGZ goes Army as regular. KOK reports late account accident. SDG has rig on 1702 kc. PLM is selling lots of DX on 3.5 mc. ERY sez: "My name is O.R.S. C.D.A. at present. I am also known as "Radio Club, kerewhether my application," BAZ, back from southern trip swears activity and at Xe S.C.E. We elected him Alternate, didn't we? FGK buys a new ranch. MN also wants O.R.S. C.D.A. to open up for January. Bere, I will have my application." HUO, secretary of A.R.U., is still building that 'phone. Old Mae West reports 2 times in a row. EOM sez 50% 'phone 50% c.w. All
O.R.S. failing to report two times in succession this year are to be automatically cancelled. Kentucky parties continue, see your bulletin, 73.

Traffic: W9EOM 10 AHR 53 OMW-AR U20 CNE 132 18 VPI 1 126 F8T 74 LZB 56 BZS 1062 H90 106 PLM 26 KOX 18 GGR 3 EDQ 32 SDV 24 SEC 5 CIM 12 PXX 1 ACD 30 HAX 17 CDA 166 OX 16 PAX 5.

MICHIGAN--SCM, Kenneth F. Conroy, WBYD-CO: Director-Consultant, new officers at M.C.R.C.: COW pres., LV vice-pres., LTH secy., and GTZ money-man. D.A.R.A. announces election of AKN pres., CAT vice-pres., and CSR secy.-treas. CAT suggests that the Bug used by our former S.C.M., the late SLS inactivity is an inciting factor to let the leading man use it for one month. The bug is the property of the D.A.R.A.-awaiting formal action from the D.A.R.A. Executive Board. What do you think? DPE (charge of C.C.C./Amateur coördination) reports following men lined up with Bell, tel. connection with various C.C.C. camps: 9HMM, SLDS, KOX, AEO, GOV, 9803, PSK, PDE. MORE help needed? KNP recuperated from Thanksgiving feast and under from Christmas feast! M.J. made a real score in S8 with 10 watts. EDO gets new rig and ham radio gets the air! EGI QRT's as to E. Mich. R.M. with DVC filling the shoes. BMG had to quit as W. Michigan R.M. and DVB fills his shoes. MUW is new reporter. FFW makes B.P.L. and then runs an inverted speech. EVF experiments with 3.5 me. JO tours the state with FPG. Inglewood, Calif., is going to try Police/Ham affiliation as Detroit's. Detroit had good drill on Honda Quake, IWM's receiver was christened "AC HUM Special." BTP says he is dedicated to this new book, "How to Get Along with the Women," to AII and FRW. IKZ still plugs for more O.P.S. Men whose primary interest is radio-telephone work are invited to join up. By the way--Doctor W8CPC, head of JIU 6 FEE-IFI-KYS-LTT 5 BRS 4 JCS 6 NQ 4 GSP 3 secy. Marquette C.R.A., reports cooperation with Isle Royale. AYO's s.s. super perks great. DED reports EGI-SS 2 EGI-JZD 1 W9PCU 105 ADY 101 OZM 87 EGX 30 EKT-JO 16 GRS-HRC 15 KEV 3 MAE 2 EGF 49 RHM 36 CE 9 CWR-HSQ 4 PJZ-XY 2.

OHIO--SCM, Robert P. Irvine, WSCIO--GSO has radio telephone second and radiotelephone first. HCS has plenty of schedules. LUS works traffic with six watts input. ETE is now WOC and has total of 17,200 points in S8 using pair of 33's with 180 volts of "B" battery. LCY handles traffic for Oberlin College students to folks back home. BZB is now A.A.R.S. UW worked HB9Y on 3.5 me. QST for 1953 shows support for "ATN" by radio. LEM is rebuilding. EJT just left because of sickness. BBF says A.A.R.S. takes most of his time. New Lakewood hams: MMX, MGY, MWC and MWE. L2K will be O.R.S. soon. AQ worked five Europeans on S8 and is operating as W9PCU 3.5 me. KWJ worked ON4CJJ. BCM is experimenting with R20's and 2-53's in Tri-tet. BKE's auto license tag is 10 CQ. ITR is new O.R.S.; ditto M. IC. IFO handled all traffic on phone, ISK was in S8. AMP got back on after being sick. HCL moved to Warren from Wheeling, W. Va. KEV and PJZ are new reporters. MAE is going after "Plea" power record. D20 has new 'phone. KVD is experimenting with inverted speech. EVF has new Junior Op. LAU is always open for a good rag-chew. GUL is experimenting with 36-me. 'phone. DME has trouble due to visitors filling up his shack so he can't get to transmitter. KLP reports new East Liverpool ham: MFG. RN leads the State with only three schedules. AQ is the winner. AEO's s.s. super great. MI used to be a ham and "seven three" percentage of 85. Very well done, OM, and let's see who is the winner next month. Trunk Line "L" is completed through Cleveland and working well. New O.P.S.: HMS at Cincinnati. AQ. Wadsorth, is now O.B.S. A hamfest given by the Buckeye Short Wave Radio Club at Akron was held Dec. 18th, and was well attended by about 200. Among those present was Lt. Sam Townsend, U.S.N.R., of NIO-SEW, who gave a splendid talk on U.S.N.R. activities. The Cleveland Wireless A.A.R.S. hold its opening meeting with a big feed. Among those present was 4LW of Signal Mt. A hamfest was given by Hams Limited of which 5EX is a member. We extend our sincere sympathy to 5EX in the loss of his brother. DND because a Radiotelephone First Operator on Dec. 19th. NAB is new call and license for an old ham--Dont Slig, Bellefontaine.

Traffic: W9FAT 652 AEQ 485 DVC 292 GSO 269 CIO 265 (WLIE 98) LUS 244 IET 186 LOY 147 BZB 110 UW 102 (WHLY 370) DVL 94 HGE 72 ATN 71 LEM 69 PO 64 HMM 68 BDY 47 BBH 45 (WLEA 190) BON 45 LEE 44 LAU 44 AQ 38 WKJ 18 BSM 18 FKE-BKE 15 TTR-MQC 14 IFP 11 LDT 10 ISX 8 HKX 6 AMF-HCL 5 KEV 3 MAE 2 EEE 2.

WISCONSIN--SCM, Harold H. Kurth, W9FSE--IQW starts climb for high traffic in Wisconsin. HSIR finds T. L. operation interesting. Radio Club at men's dorms on Campus of Univ. of Wis. --"QWK" pres. OXFP finds skating a detriment to traffic work. SHN uses 20 watt·V for DX. AKT pounds brass at N.C.R., station. ELPY broke crystal trying to grind it down. HDP took Class "A" exam. SIF sends first report. BZS is going on 14 me. HTZ let license expire. 5EX is new ham. HFL was appointed Alternate Control in N.C.R. AHI has the urge to get back. IFP is building 1.75-me. 'phone. CFP, HFL, and SIF are experimenting with inverted speech. A.A.R.S. holds a hamfest at BAX. FAA is back after long absence. PFQ is on at last. JDP and NAV are experiment- ing with 'phone. The S.C.M. thanks all the fellows for Christmas cards and greetings. NPU and CUI, operators at WIBA, work 'phone exclusively.

Traffic: W9PCW 419 W9K 90 BGO 91 ODX 85 QRM 22 SHN 18 KGL-BDP 3.

DAKOTA DIVISION

SOUTH DAKOTA--SCM, Myg Shotron, W9FFI--HHW and OQV make B.P.L. HHW was pair of '04a's final. OQV is new R.M. Please send a list of your schedules to him. GTG is handling C.C.C. traffic from Hill City. ABO is trying Collins Coupler. CN/C at Chester is handling C.C.C. traffic. CY worked a K6 on 3.5 me.
Mississippi—SCM, J. H. Weems, Jr., W5CWQ

Traffic: W6JW 37 0QV 679 GTG 326 HBY 101 FOQ 34 ALG 39 P1 7Y 16 CFU 6 BLZ 7.

NORTHERN MINNESOTA—SCM, Robert S. Harberger, W8JE—OMI is nominated for S.C.M. BMX has worked all continents. JIN is on 14-mc. 'phone. IGZ has 5 watts on 14 mc. LAY blew tubes in entire transmission. "L" is on 3.5 me. and will remain. RGZ made 10-tube s.s. super. PFE at Brookings comes to us from N. Dak.

Traffic: W551GZ 29 RJF 17 JIE 10 OMI 4 OOO 53.

SOUTHERN MINNESOTA—SCM, Francis C. Kramer, W8DEI—EPK worked 63 Sections in SS. BN is Section's most consistent traffic station. DEI operates 1N besides his own rig. DVI, and RIG are new O.R.S. GFA has new rig with '10 final. HCC built A.S. CWQ works good schedules. CJO has club receiver working F.B. ST still at sea. ST for they may help to better our Section. BID 16 KC 18 EDY 19 CXQ 25 EDZ 28 BZR 40 CMQ 27 BCA 28 AEP 138 HO 33 (WLRJ 11) APM 344 (WLRH 188) BBT 9 CDC 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, R. E. Haight, W2LU—Happy New Year. Let us make 1935 a record year for E.N.Y. R.M. BZZ ends 1934 breaking all records with big total. EGP joins Trunk Line "L" with schedules with SCIO and CJO. 'Phone DX on 14 mc. is L. WJL. WJL made 56-mc. station WHC is building c.c. rig. TLG works the world. WJL is on 3.5 mc. and British Colonies stamp collections; write him for any. A big time was had at DBQ's annual six weeks' fishing trip to Fla. BNY is doing relay work on 3.5 mc. FXC worked HB9Y on 3.5 me. ACY got 8200 SS points on 3.5 mc. HBGY on 3.5 me. ACY got 8200 SS points on 3.5 mc. AYV was held down by heavy rain. F.E. is making rack and panel. CVT is working on 14-me. phone. R.M. BZZ is on 3.5 me. CW is on 3.5 me. GNI worked CT3, G, ON for OX. FXC worked HB9Y on 3.5 me. DXQ 56 me. HJX is on 3.5 me. EVJ is on 3.9-mc. 'phone. QRL Mexico. Oil-Burner QRM is bad at GTE. JEQ is on 3.9-mc. 'phone. IJN is on 3.9 mc. 'phone. BJORQ is on with pair '45's. EKV worked first European.


DELTA DIVISION

LOUISIANA—SCM, W. J. Wilkinson, Jr., W5WDW—1 HR is a new O.P.S. DVP schedules 6EGX. BPL is new O.R.S. O.R.S. DVP built new O.R.S. PPE at Brookings comes to us from N. Dak. O.R.S. DVP is on 3.5 me. DK had problems with 14-mc. 'phone. SNW has B.C.L. troubles. DGE is back on the air. DXW is fooling with 'phone. DJW is on 3.9-me. 'phone. TOG is an active station. And reports its members are receiving much publicity in the daily paper. Mpls. World-Chamberlain airport has installed 56-mc. ham equipment. Mpls. Club is extremely active, and reports its members are being prepared to be taken for a grand and glorious ride. Send in those traffic reports now, folks, and let's show the Arkansas boys that they're not the only traffic handling section in the Delta Division!

Traffic: W4GZ 40 FZ 36 15 10 JM 10 53.

NEW YORK CITY AND LONG ISLAND—SCM, Ed. L. Baumann, W2AZV—In a past report it was stated that ICNA is now HQB; it should have read HQB. BNY is now O.P.S. in Brooklyn. HDG, HTI, HWS sends first reports. HLD is adding crystal. GCC is looking for U. S. and British Colonies stamp collections; write him if you have any. A big time was had at DBQ's annual Christmas hamfest. BRB has worked 3/4 miles on 75 mc. MIL and DTP are both working at radio. CGO is a full radio and electrical business. BGO received card from England, heard on 3.9-me. 'phone. BSR works the J's. CSY is on 3.9-me. 'phone. US schedules SMAH regularly. DOG works at Radio City. HBO reports the TUBORO Radio Club: 3MB, wpr .; LG, voice bad. BCG, speech and DVP schedules 6EGX. DXQ 56 me. HJX is on 3.5 me. EVJ is on 3.9-mc. 'phone. BJORQ is on with pair '45's. EKV worked first European.

Traffic: W2BZB 433 EGF 221 FOQ 105 BJX 39 DDN 33 UL 19 ATM 15 GPB-GNI 9 DSH 7 FXO 5 ACY 4 GP 3 ESO-DC-COLL 2 CBM 1 LLU 151.

February, 1935
sew.; HDG, trens. CHK reports BMB out for O.R.S. AJY contemplates 61 final. DXX has 300 Watts into 842 final, FO, the resistor man, uses 211 final, EVA had 558C as visitor. AZV has L402, DHCP, resulted with 541 final; worked every state on 3.5 mc. GEI of the Crystal League reports: ATB's ant. was cut by BCL's; GND is experimenting with all bands; GMI is trying to get super to prl. GEI worked K5AM. EYQ is trying 3.9-mc. 'phones. HDG out for DX. DUF found a new use for ham radio; a friend of his lost the QRA of his YL in Phila., so they raised a Philadelphia station that looked up the QRA and all was OK again. EAR has Class "A" thru the Radio Club of Philadelphia for 1955: TI, pres.; BKP, secy.; AZV, trens.; B. Schalk, vice-pres. EYS enjoyed the SS. GDF gets out F.B. on 3.5 mc. with pair of 801's. SF was married Dec. 1st and is going to make the Mrs. a ham.

Traffic: W5SCK 516 EYQ 315 ELR 253 (WNJL 51)
RGO 110 FDQ 889B 8999 (WNBL 47) E5K 68 AV8 58 CYX 35 GEI 29 FF 28 BMB 20 GDF 20 EYS 22 FF 48 US 24 BPF 14 BYL 10 ADW 10 BKP 10 CP 10 DJP-
ALZ-CIT-WK 9 DXX 8 EAR 7 AOV-BKK 6 ATU 4 DUF 6 BTF 4 KK 4 BNY 2 GSF-BPA 3 FCO-3SO-LG 1 AA 6 HDG 3 HDP 1 LFV 1 CSS 2 2 ZVT-AOC-FS 1 ASG-EBO 2 EVA-FLD 1.

NORTHERN NEW JERSEY—Acting SCM, Charles J., adds W5ZV to -5ZV—keeps up his record traffic work. CGQ is rebuilding. SETX operates daily on 3550 kc. GGW increased power. TOP is building pair 46's in par. for operation on 3.5 mc. DCP, new O.B.S., transmits on Mon., Wed., and Fri., at 10:30 p.m., Sundays at 11:30 a.m. HMM reports new Tri-tet c.c. transmitter. MKG reports. TBD local schedules. PWW is handling nice bunch of 'phone traffic. FAM schedules is getting new license in Wichita. W.A.R.C. adopted new constitution. Also is giving courses to every new ham. CVN is getting Class "A" license. GML shows activity. LVZ is having trials and tribulations with B.C.L.'s. I.KD has rig on 1.76 mc. RDW has two new sky hooks after others blew down. PGL is on again. QFQ is busy with the cops building 9-meter transmitters and receivers. W.A.R.C. had an at Topeka Convention. B6X got a new bottle. BDB is selling out.


MISSOURI—SCM, C. R. Carnaby, W6PTJ-JPT—JWI reports new Tri-tet c.c. transmitter. CGQ reports lots of traffic from TL. "B." BMA reports LBP won K.C. QSL contest. AJL is building c.c. rig for SRE. NNZ is trying DX on 3.5—G6RB and KTQ. RCG plays checkers on 'phone. BB in M. with DIC on Petersburg. KEI is trying "bl-in" for traffic. ASV reports OSL in Calif. attending college—schedule with him every Tues. TDB is new Joplin ham. MLR is interested in O.R.S. HUG is getting ready for 500-mc. work. KJP uses Tri-tet with pair 46's. OLC applies for O.R.S. JAP renewal O.R.S. KEF uses suppressor grid mod. MZF had lots of fun in SS. GBJ is trying 23 mc. a lot. St. Joseph Amateur Radio Club recently organized with N15, pres.; BLU, vice-pres.; LAC, treas.; LCG, secy.; KVP, reporter. Sedalia amateurs organized Sedalia Amateur Radio Club Dec. 19th with LVA, pres., and OWQ, secy. More men are needed to complete Missouri State Net!


NEW ENGLAND DIVISION

Connecticut—SCM, Frederick Ellis, Jr., WICTI—AK and UE B.P.L. on delivery. GME hang on to the Banner. DBU works traffic on 14 mc. with LA's. CVL cancels schedules with the reorganization of the League. Club secretaries, please give the S.C.M. dope on your club activities. Thanks. The Kansas O.R.S. Round Table is holding every Sunday morning beginning at 9:30 a.m. Get in; gang! IOL in charge. IEL bemoans the fact that there has been too much "bl-in" for traffic recently. News: AJY has new rig. OGY is getting rig started. TBR and TCT are new calls. BEQ has new speech amplifier on 'phone. DMPF is to be on 14 mc. 'phone. SDVQ is getting new license in Wichita. W.A.R.C. adopted new constitution. Also is given courses to every new ham. CVN is getting Class "A" license. GML shows activity. LVZ is having trials and tribulations with B.C.L.'s. I.KD has rig on 1.76 mc. RDW has two new sky hooks after others blew down. PGL is on again. QFQ is busy with the cops building 9-meter transmitters and receivers. W.A.R.C. had an at Topeka Convention. B6X got a new bottle. BDB is selling out.

tious and hobbies (outside of radio) in these reports.

Let's have the dope, gang, if you are interested. Clayt is Plant Manager at WTTIC, and his hobby is hunting and fishing. Milt Mix, relief op at WTTIC, has installed 115R in Arvon. GEM needs Canadian traffic for schedule with VE9UB. W9XZ's DX has improved and is now using Reinaert's antenna system. This year's officers of Yale Radio Club are: pres., DBP; secy., 3DKT. DL: X has toll8 and hobbies (outside is Plant Manager at WTIC, and his hobby is hunting with 35 watts input. GTW is joining D.A.S.D. IJD has new ham in Middletown. TS raised power to 500 watts input. IGR in Branford operates on 3.5 mc. Reports from those trying to win the C.B.A. Traffic Banner now is new ham in Middletown. TS raised power to 500 watts input. !GR in Branford operates on 3.5 me. Reports Let's have the dope, gang, if you are interested. Clayt sends first report. FNG is building c.c. portable. JDF of his time to traffic work. EZR has new ALC receiver. ABC takes control on Trunk Line. GOJ has nice daily schedules. FIB gets out well on 3.5 me. HMW is busy on Trunk Line schedules. DHH plans to work on final. WLEEI entertained the 73 Club with a Christmas tree party. ALO has peach of a signal. IKC gets out fine c;GM

Traffic:

Traffic: W7MIX 349 UE 248 JCD 227 GME 130 DBU 97 CVL 89 (WLQG 46) 1YP 97 BDI 61 AMG 60 FLO 40 CTI 25 BHM 30 NE 16 APX 14 HPI 13 DOW 12 DBP 12 GKM 11 YU 9 HXZ-DJL 8 APX 6 CEJ 5 HXZ 2 HZE-B6S-BNB 1.

MAINE—SCM, John W. Singleton, VCDX—O-R has been appointed Alt. S.C.C. for Maine A.A.R.S. CEP is building 500-watt headset for W3AGM. WLGB plans on work on four bands. EFA is installing 212D in locked amplifier. HB has been giving me a tryout. CEP is alternate control on Trunk Line. GOJ has nice daily schedules. HM8 raises power to 500 watts to traffic work. EFA has new a.c. receiver. IYW is new Lewiston ham. BNO renewed O.R.S. HSE sends first report. FNG is building c.e. portable. IJP gets out well on 3.5 mc. 1MM is old 1U1 now located in Bangor. IDN has 1.75-mc. 'phone nearly ready. HUX is on 3362 kc. IEB is converting to c.e. CDX has 212 in final. WlVEY entertained the 73 Club with a Christmas treeparty. ALO has peach of a signal. IKC gets out fine c;GM

Traffic: W1OR 83 CRP 73 DBH 73 EFA 63 BTG 63 CE6 58 GQJ 47 IBM 33 CDX 45 ERB 35 EAF—BNC 25 HZE 18 FNQ 9 HUX—IT 1.

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen WsLIS—A$ is connected to 35 mc. HK worked his 43th state in SS. WY worked to his twin for first time in SS. EVJ scored 24,000 in SS. BMW is on 1.75 mc. DFS will be leaving for Palmer club on the 17th of Jan. 3562 kc. is active 011 all bands. CFX is on 56 mc. with Army Net. ANS is experimenting on duplex traffic soon. CEL is leaving for warmer climate in May. Things are under way for New Hampshire Convention which will be held here in Manchester some time here in April, under the direction of N. H. Section State Committee, consisting of HPM, FTJ, GMH, AVH and APK.

Traffic: W1ERQ 665 DMD 651 FFL 258 (WLQG 109) IJ8 97 GOG 97 CB 90 DDM 98 B8 87 HU8 3155 COM 2 IDY 3 GEY 1 BGL 2.

RHODE ISLAND—SCM, Albert J. King, W1QR—COG has now 10-watt rig. CAB has trouble on 14 mc. on new QRA. HRO has been inactive due to sickness in family. JMY has schedules on 7 me. GKE has had trouble with '46s antennas. HJI has fine 'phone on 1.75 mc. UN has been getting here off '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year. WRESTLING WITH TIMES—SCM, Percy C. Noble, W1VBW/WLQ—ASY worked all Ve districts in SS. OAF is building 500-watt rig. HUZ is busy with attack of la grippe! BWY is busy sending O.R.S.'s. APL is hustling the ether with 200 watts input, AWY is trying to entice the S.C.M. into 56-mc. work. ADF sends code on Sun., Mon., Wed. and Fri., 7:15 p.m.; 1785 kc. RF is building two-way jobs for police circles. CFX plans on 3.9 mc. for winter. LM is active 011 56 me. AKN works in conjunction with '10 in final. The S.C.M. wishes the gang a very happy new year.
traffic honors. TU is back on the air. BIZ let his operator license expire. HVE reports these new Great Falls stations: EBO, EOD, ETD, ETA and EMW. AOD says 14 me. is good. AQN gets out F.B. with new rig. CRH is lining up early to have his station ready. BDJ will soon be on the air with power. AHP is working at KFBB. CEG is making room for a '32 in his shack. BOZ and BMX returned from C.C.G. camp for Christmas vacation. DSN was home from the Navy for Christmas vacation. BSU did high school band and BDJ will soon be on five months' absence. BJZ does lots of experimenting. EPM and DIF of Billings visited Roundup gang. ESI and EPM have new rigs. DJW plans on installing a new 56 mc. rig in B.C. 'phone. BIC added Class "B" mod. to rig. EDJ applied for A.A.R.S. AAT and COX is on back 3.5 me. after five months' vacation. Thanks for all the reports. Please keep them coming, gang.

Traffic: WTAAT 4 AQD 43 ASQ 158 BVE 8 BDS 7 EDJ 27 (ASQ 100 Oct.-Nov.).

OREGON—SCM, Frank L. Black, WA7MPF—R.M., UJ, heads traffic list. 52 stations reported to the S.C.M. this month. Portland gang is going strong on 56 me., the following being heard nightly: DZL, DDU, VS, AXJ, BIC and FMP. Portland City Police now have DXL on the air by the first of the year. COB, OP on the General Sherman, takes new job with Mackay Radio Station KEK. DIS and ENU have doubled power to 100 watts. R.B. has doubled the antenna on Arizona Street and is still not too late to win one of the many worthwhile prizes under the very simple rules. For all the dope see QST.

Traffic: W7U4 341 AXL 105 CXX 118 DUE 87 D7G (77 WLV 47) WR 46 BUB 39 CTT 26 BRE 20 DP 19 AMF 24 KL 12 DIS 8 ENU 8 AHE-DAY-DBY 2 EBU 1 BW 50.

WASHINGTON—SCM, Stanley J. Belliveau, W7AYO—ETW is new Everett ham. DGY made 5300 pts. in SS. EHEU is new reporter. ACS wants some stations to test with on 25 mc. Washington Section announces a six months' progressive contest. Started December 16th, but still not too late to win one of the many worthwhile prizes under the very simple rules. For all the dope see the December issue of the Brasspounder. Remember to send in a report and get a copy of the monthly issue. Remember Washington Section QSO Party, the third Sunday of every month, 8 a.m.-8 p.m.


PACIFIC DIVISION

HAWAII—SCM, A. O. Adams, KG6WQ—QSI raises coffee. COG is awaiting transformer. EWA, EQW, LEX, KTF, AGA, KPP, STF, JRN, LC and DV have lots of fun on 56 mc. 'phone. JPT has new Comet Pro. KBP has trouble with rig. KJP has ten in final. EQW is awaiting new ZBO. 6AOB and EQW stood by for tidal wave that never showed up. ETP has YLs. HVE is doing nice traffic work. JFP and MV are going H.H. EDJ and CBI are rebuilding.

Traffic: KG6WQ 1381 (WVQQ 1048) JPT 403 IBW 96 G6J 129 4BS 9 2CQ 2 AEP-4 AEW 3 AEB-CJN 2 AUP-CDD-UBE-JNA-IKA-ABU-71 (AZI 42 Oct.-Nov.).

Range. ATM was visitor at AAX. GGO works F.B. DX. JLV is on 14 mc. BYR is on 14-me. 'phone every Sunday. KGS is experimenting with low angle radiation. KWO's ears are peeled for DX. KLIW announces new 2nd operator. AF now uses circuit a la Grammer in Jan. '34. Several other VE's on visit to Vancouver, B. C. The Nev. Amateur Radio Assn. held F.B. Hamfest Jan. 12th, 1935, in Reno. The N.C.R. units of Reno and Elko are holding rife practices. BEU is on 39 me. portable. BIC added Class "B" mod. to rig. 'phone. BIC is still not too late to win one of the many worthwhile prizes under the very simple rules. For all the dope see QST.

Traffic: W6GXY 328 AJP 60 LOD 20 UO 22 GQG 12.

LOS ANGELES—SCM, Howell C. Brown, W6BPU—Ed Taylor, W6GNN, CRM. Two make B.P.L.: ETL, CVF. New hams: LOR, LPR, LPG, CVF is rebuilding rack and panel. GXM had 12-hour shift during street car strike. IGX is now O.B.S. AM has 171-ft. tower with eight antennas. IBE says Trunt "D" is working F.B. KBI is rebuilding. DEF is moving station to larger quarters. DEF will be on the air by the first of the year. COB, OP on the General Sherman, takes new job with Mackay Radio Station KEK. DIS and ENU have doubled power to 100 watts. R.B. has doubled the antenna on Arizona Street and is still not too late to win one of the many worthwhile prizes under the very simple rules. For all the dope see QST.


SANTA CLARA VALLEY—SCM, Chas. J. Camp, W6BMW—JTL complains of 3.5-mc. QRM. BSC has 13 transmitting antennas and beams. UP says AF now uses circuit a la Grammer in Jan. '34. QST. TIB has new G.E. receiver. S.C.M. would appreciate non-member reports as well as member reports. 73, gang, and Prosperous 1936. New hams: LOR, LPR, LPG. CVF is rebuilding rack and panel. BMW put up new tower and radiating system.

Traffic: W6JTL 1 BSO 9 AZC 64 LLW 12 LFQ 124 BMH 32. YG 91.

EAST BAY—SCM, P. W. Dann, W6WZ—RJ is still QRL Army Net. EJA is still keeping schedules with KA. New club at Richmond is coming along F.B. HHM is QRL traffic nets. HHN worked 80 sections in SS. AF now uses circuit a la Grammer in Jan. '34. QST. TIB has new G.E. receiver. S.C.M. would appreciate non-member reports as well as member reports. 73, gang, and Prosperous Happy New Year.

Traffic: W6RJ 218 EJA 129 HBM 37 HN 33 YM 16 AF 5 ZQX.

SAN FRANCISCO—SCM, Byron Goodman, W6CAL—2G B.P.L. 's. IFRY's station was unfortunately destroyed by fire. LIE is on T.L. "B" and handling IFRY's T.L. "P." JXX worked R.H.'s schedule by remote control over 56 mc. circuit. NK is U.S.N.R. control. JNC sends holiday greetings to gang from Petaluma. JUV has 56-me. itch. JDG says final working 76.5% efficient. GPB has antenamats. JPA is looking for W4 on 3.5 mc. HJF is coasting on 56 mc. 'phone. JFF already has bad antenna on Arizona Street and is still not too late to win one of the many worthwhile prizes under the very simple rules. For all the dope see QST.
congrats on new Jr. op. CWR is rebuilding into metal cabinet.


SACRAMENTO VALLEY—SCM, Geo. W. Luddington, W6DVE—I am sorry to have to tell the gang that I cannot accept another term as S.C.M. Please nominate your favorite amateur and send the dope to F. E. Handy before the closing date, Feb. 1, 1955. KQH has a pair of RIIC 1925 is going to 1.75-mc. phone. RCA has '52. IMV has '0A. John and Bill of BYB have radio store in Oak Park. Nice card from EFM.

Traffic: W6DVE 45 (WLYD 6) GY 22 CGJ 18 DVE 9 FRP 3.

ARIZONA—SCM, Ernesto Mendoza, W6BF—QC—KOL has e.c. HXG wars east coast doubling on '01A's. IQY made 20,000 points in SS. KOK has new high sep antenna. CQG is QRL B.C. station KGRA. FGG is going . . .

February, 1955 57
'phone. CFV likes "Va. Ham." CNY has high-power 'phone. DRK is on air from CAH. DWE is experimenting. ELA is laid up with bum foot. EXO is on 7000 kc. EUL is active in A.A.R.S. UVA made 11,460 points in 88. ECF is weak. A pair of 88's, "B-E-H," enjoy SS. "B-E-H" is 100% c.w. AAI is new Chief R.M.; visited S.C.M. DZW is building rack and panel rig. FJ controls A.A.R.S. Net. 2 p.m., Sundays. CPN likes 14 mc. CQW transferred to BW (WVQM). EVO is on 7 mc. EVN applied for A.A.R.S. CQF is on WA2PC. Meeting in Richmond, Y.M.C.A. of: U. of V., first and third Fridays, Madison Hall: Lynchburg, Tues., Y.M.C.A.; Petersburg, Y.M.C.A., Thursday. New calls: FAP, FAT, FBW, Dan­ rie S.J., F'B, F'B, Lynchburg; DIZ, Portsmouth; Edit­ Norfolk, Norfolk Club has code class every night. BIG wins Sunday 'Phone Net. EAP has new 100% mod. Jr. oper. EOO is on 7 and 14 mc. ELJ is building 830 am­ plifier. DAM is on 7270 kc. COO is 100% c.w. CGR is ex­ perimenting on 56 mc. CQV works DX on 14 mc. HAN is still world's best O.O. AFQ is on 14-me. 'phone. ASD is on 3990-ke. 'phone. BTR has trouble with Tri-tet, RZ has bad power leak QRM. CA works on 3.5, 7 and 14 mc. CMT is rebuilding. MQ is building high-solidity R.C. set. BRT is on 3320 kc. DIT; sends a lot of power to "Va. Ham." EMX is on 3530 kc. FBD has 47-901-03A rig. EBEK reports. EEN is active in U.S.N.R. ENJ wants Virginia schedules.

MIDWEST

West Virginia—SCM, C. S. Hoffmann, WSHD— KKG worked HDBY on 3.5 mc. and 365U on 14 mc. ELJ and HD are QRL W. A.A.R.S. Net. PGB offers crystal to W. Va. O.R.S., making highest score in January O.R.S. contest. CDE moved to Richlands. Bluefield Amateur Radio Club is again active. HCL visited Wheeling. 59-me. tests are conducted at West Va. Univ., using calls DJK-TI; EJU will be used on 14 mc. EPN worked 36 states in two months. AKQ moved to Lumber­ port; applies for A.A.R.S. ANU, FQB. BTW, HOW report being home over Christmas holidays. LSK is on 7270 kc. and IID are QRL W. Va. A.A.R.S. Net. FQB offers "phone call. which is shortly after 6:30 p.m. daily. The Net sta­ tions on the W. Va. A.A.R.S. Net will listen for A.A.R.S. ANU, FQB, BTV, BOW 6EEM. JVB gets R9 in N.Y.C. with 2 watts output on 14 mc.

SOUTHWESTERN DIVISION

Utah—WYOMING—SCM, Art W. Clark, W6QCC— Utah: QFR is on test schedule with RF6AP. KKBG has better luck with K6DV. BSE does nice job as D.N.O.S. A.A.R.S. Unit One, Utah. DPO moved to Phoenix, Ariz. AFN works at O'Laughlin Radio. KOP is chasing bugs out of transmitter. BW moved to Boulder, Utah. A.K, 1.75-mc. 'phone and keeps schedule with 5DVI, ex­ clusively. JBY gets R9 in N.Y.C. with 2 watts output on 14 mc. HVU has new rig with c.c. DTB is getting used to married life. Better results as JYD with pair of 9's in final, LOH is Moroni, Utah, call for KVC of Chester. DGR is working hard to keep TL "L" going. This marks the end of a splendid year of activity in Utah and Wy­oming. Your S.C.M. is more than pleased and wishes all of you a successful 1935, Wyoming Assistant S.C.M., T. J. Rigby, W7COH—Sheridan: 7ARK was QRL with Prize Cattle at International Livestock Show in Chicago.

CSE is disturbing the ether from coast to coast on CCC's new 1.75-mc. 'phone as CCC is busy with radio service. DCO is on 7 mc. CPI is on 3.5- and 1.75-mc. voice. EKR

COLORADO—SCM, T. R. Becker, WB6YTO— In Memoriam

Forrest LaVern Severs (W9BYK), who passed away on his birthday, Dec. 23, 1934. We have lost one of the finest amateurs we have ever been privileged to have in our midst. Forrest LaVern Severs (W9BYK), who passed away on his birthday, Dec. 23, 1934. Words cannot express the depth of our loss. LaVern was one of the most ambitious amateurs in this section. To his wife, daughter, and brother we express our deepest heart-felt sympathy. His voice will be sadly missed on the 3.9-mc. band. His crystal 3997 kc. is silent.

has new QRA. ACB is QRL at the P.O. MS handles KA traffic.

Traffic: W4KR 52 DAO 8 QK 4 ACB 6 CDE 32 AWD 24 COG 7 VR 7 CITZ 15 MS 388.

GEORGIA-SOUTH CAROLINA-CUBA ISLE-OF-PINES-PORTO RICO-VIRGIN ISLANDS-SCM.

B.L. Stewart, W4CE-AZT is working on types of modulation. DEP is on 3.8 mc. BBV moved to Gainesville, Ga. BCN is building a new 1.75-mc. 'phone. DGD is new in Marion, S. C. CWY is new O.R.S. ANK is holding the rig and moving to new QRA. The Key City ham. AIR spent the month between shifts dismantling the rig and moving to new QRA. The Key Clickers are drawing up plans for State Convention in the Spring. Route Managers and S.O.M.'s of Oklahoma and N. Texas have a round table QSO every other Sunday a.m. YOUR S.C.M. WILL BE THERE AT THE COMMUNITY BALM TO HIGHEST TRAFFIC REPORTING STATION IN THE SECTION FOR THE FIRST SIX MONTHS OF 1935. LET'S HAVE MORE AND BETTER TRAFFIC REPORTS, WHO WILL WIN THE CRYSTAL?

Traffic: W5CZE 833 CUX 272 AMT 225 BKH 201 ASF 171 BAR 155 BJG 106 BUW 56 DDW 51 BLG 41 DSM 29 CVA 22 DTC-ASQ 18 ASW 8 KZ 7 LR 2 AJF.

SOUTHERN TEXAS—SCM, Bradford A. Beard, WS2ZD—YH is A.A.R.S. BEF worked VP4. CWV is to be O.R.S. BKO is exp. with 56 mc. BBV is new O.R.S. N.M.R. is on 74 mc. phone. BBX is moving in house with rig. MN has BK 18's in final. CPQ uses pair of 825's. GE has nut-main-band-exiter unit. DGD is new in Camden, S. C. EY is formerly working building new amplifier. ANK holds down eastern end of regular meetings. In Gainesville, Ga., the "Queen City Radio Club" of Columbia reports plans for a new club headquarters. ACH uses 801 final. BAT is new O.B.S. CXE is building new trunk and let's make 1935 a bigger and better year. Nominations for 8.C.M. are in order, so make sure your man's name will be on the ballot. A UL will not be a candidate. AUL is doing fine work on Trunk Line "I," the trans-Canada Route. WK has been trying to locate a L missing on the north woods for CFB, CFJ. SR blew bottles, TL is piling up the DX on 14 mc. EX has new Class B rig on 14 mc. FOG is new O.R.S. BL and DB are on 3.9-mc. c.w. BB 7 has turned phone man, maybe. EEW is still candidate for O.R.S. AUC has 1-KW rig. Active: EKL.

Traffic: W5QW 709 (WJL 756) MN 630 BFA 145 YH 64 BEF 57 CWV 21 BHO-YV 20 DWN 10 BB 8 ADZ 7 JJ 6 DPX 4 BYW 6 PF-BAYM-2BU 1.

ONTARIO DIVISION

MARITIME—SCM, A. M. Crowell, VEIDQ—Nova Scotia; QL is high traffic man. EP snagged AUlAK. FG made high score in SS contest. AQ schedules VOSAW. BT is piling up the DX on 14 mc. EX has new B rig on 14 mc. FOG is new O.R.S. BL and DB are on 3.9-mc. c.w. BB 7 uses 'phone and c.w. BY is investigating all bands. HO and GZ are new men. DB got his W.A.C. DM is rebuilding. FG is new B rig. D17 is helping in c.q. FG is changing QRA. FI says he'll get him an 830. AB is new phone. DL is building new o.c. CW is QRL in Toronto. BR and FL, new O.R.S., hold out at least end of Dec. in the closing Trans-Canada R.M. 711 is a good DX station. Girls are piling up the DX on 14 mc. Phone. GR rebuilt his 1.75-mc. 'phone. The Newfoundland Amateur Radio Association has been organized with VOSAW, pres.; VOSZ, vice-pres., and VOSI, secy.-trea. FT is starting New Year right by rebuilding completely.

AZ, JI, and JO—latest QSOs. NX awaits the R.I. for unlimited phone license. RO, Ontario O.O., reports there are still some VE3 notes that could be improved. QK is advertising for TM on Trunk 22. JT handled HF this month with one eye, and under doctor's orders not to write. BC was heard on 3.5 mc. SG has been QRL Signal Corps. The S.C.M. would like to hear from every one, whether traffic handlers or not. The SCM wishes to thank the many VE3s who sent Christmas Greetings, and is pleased to report dozens of VE3's turning crystal control each month.

Traffic: VE8T 205 JT 209 GG 123 WX 106 RK 104 WX 71 QC 70 GP 27 DJ 29 MX 12 ABN 6 TP 5 NX 4 ACS 3 AX 1 MB 10. VE9AL 41.

QUEBEC DIVISION

QUEBEC—SCM, J. A. Robertson, VE2GA—The Montreal Amateur Radio Club is having a good season. Film of A.R.R.L. Headquarters much appreciated. 2AP's film of 22 of the local amateurs in action in their respective shackels had Hollywood's best beaten to a frazzle—at least so the gang thought. Congrats, M.A.R.C. Wanted to know when the C.G.M. does with all the "Hi-Power" transformers he wins, and has he insured them against burglary? EK is new O.P.S. HK, our R.M., wants complete list of your schedules. Please comply, gang. DR did well in SS contest. CG is the ladies' man. CW and KG are still together. HG suggests the receiver is the receiver. HF is new O.R.S. BU visits VE23K and VE2SG. BT finds Collins System big improvement. FG likes rag-chewing. BG sure puts out a wallop.

Traffic: VE4CM 187 MH 77 MN 53 QS 28 PM 14 LI 4 EL 12 PW 4 QZ 2 GA 22 PW 35.

Cdnal Zone: K5AF/W2AL reports a total of 247 messages handled during the Nov.-Dec. month.

All-Canadian QSO Contest

The Canadian Tire Corporation, Ltd., announces final rules for the All-Canadian QSO Contest under its auspices to be held from 1201 a.m. E.S.T., February 9th to 1159 p.m. E.S.T., February 19th. An unusually long list of prizes will be awarded and will include filter condensers, transformers, tubes of various types, loud speakers, microphones, chokes, resistors, shielded cable, headphones, crystal holders, meters, relays, soldering irons and other useful pieces of radio apparatus, all worth working for! The rules follow:

(1) The contest is open only to licensed amateurs in Canada.

(2) No more than one operator can operate the station for which points are to be scored.

(3) The stations are divided into two classifications: those using 50 watts input or less, and those using more than 50 watts.

(4) Stations using less than 50 watts are to multiply their scores by 1.5.

(5) Operators who have not cleared their operating periods to be silent hour restrictions or who are at business 40 hours per week, are to multiply their scores by 2.

(6) Scoring is as follows: QSO's in the same district but outside the city or town in which the competitor resides, count 5 points. QSO's in adjoining district count 10 points. QSO's two districts away count 20 points. QSO's three districts away count 30 points.

(7) A copy of the station log is to be sent in and will be checked for time of QSO with the contacted station's log. To avoid confusion, please use standard A.R.R.L. log set-up and be sure to mark the time belt in which you are located.

(8) Two groups of prizes will be donated: one for the 'phone stations, and one for the C.W. group. 'Phone-C.W. contacts are encouraged and can be scored.

All logs must be mailed before midnight, February 28, 1935. Mail logs to Canadian Tire Corp., Ltd., attention Mr. T. Leech, 625-637 Yonge St., Toronto, Ontario.
L' Envoi

818 Southport St., Elmira, N. Y.

Editor, QST:

Most of us have read of Warren Eaton's last flight over Biscayne Bay—the last flight of that smiling man who that day shared the controls with the Dark Angel. We, and you, who knew him, will always remember his generosity and sacrifice, and be proud to have served with him.

Few, outside of the Elmira gang, realize just how much Warren meant to amateur radio. Though not an amateur himself, but intending to be this summer, it was he who gave the Elmira club its big break in the First Annual Soaring Contest. His understanding and far vision saw the tremendous value of amateur radio in the gliding field. It was he who smoothed away the difficulties as they arose, and kept enthusiasm at the constructive level when things went wrong.

Prior to the last meet, Warren flew to Washington to make personal application for us, and obtained the special experimental licenses necessary for our equipment. Warren's interest in equipping gliders with radio was the initial cause of the ultra-high-frequency experiments of the Elmira club. He was one of the first to use radio to communicate with the ground from his Franklin glider in which we installed radio. Not one out of the thousands who saw him will ever forget that man riding the winds and the clouds, with such a superb faith in himself and his Maker, nor the clear, calm voice coming down to them from out of the heavens, unfolding a new world.

The Elmira gang will never forget him.

—T. J. Sweeney, W2JU

Lisbon

Delegation of the United States of America,
December 18, 1934

Dear Mr. Maxim:

As chairman of the delegation of the United States to the Third Meeting of the International Radio Consulting Committee which convened in Portugal, September 22 to October 10, I have the honor of bringing to your attention the highly meritorious services of your organization's representatives in that meeting.

Mr. Warner's wide experience in the problems before the conference and his skill in discussion were of the greatest value to the American delegation as well as to the conference as a whole. He labored indefatigably throughout the meeting and was especially helpful on the committee which dealt with organization problems.

Mr. Lamb contributed extensive technical experience and many practical ideas of value in the committee discussions. He was distinguished by zeal for reaching correct solutions and for genuine advancement of the radio art.

Your organization's representatives were concerned primarily with the representation of amateur interests, in which they were highly effective. In addition, however, they cooperated fully with the delegation of our government. Their collaboration and that of the American company representatives with the government delegation was of considerable mutual benefit. An advance draft of the delegation's report has recently been put in the hands of your representatives.


PRESIDENT'S NOTE.—Over K.B.W.'s objection, I have insisted that this letter be published in QST. It means a lot to all of us. Our representatives looked after our interests and inspired the respect of those whom they had to convince of the justice of our cause. To sell your ideas to a delegation, and have the boss of the delegation come back and give you a pat on the back for doing it, is to do a fine job. Warner and Jim Lamb deserve the thanks of every one of us.

HIRAM PERCY MAXIM

On 7-mc. 'Phone

241 Kelso Rd., Columbus, Ohio

Editor, QST:

. . . The Latin American countries have been accusing us of imperialism for some time, and may or may not be justified in that, but now comes a ham, a W5, and tries to dictate to them what bands they shall use for 'phone, with entire disregard of the fact that the radio regulations of a foreign country are just none of his business. As an American, I resent his attitude. If I were a resident of Mexico I would resent it even more. He assumes that the hams in all countries should be subject to our U. S. regulations.

W5AAQ is misinformed on two points. First, it is not "generally conceded" that 40 meters is
reserved for c.w. In support of this see QST for August, 1934, p. 420, and the report of the ARRL, one American mission in Africa, and New Zealand, seven specifically authorize 'phone on all bands (including 7 mc.), two forbid all 'phone, one limits 'phone to 180 and 80 meters (but the whole of these bands are permitted), and three give no information. In addition Australia and all South American countries permit 'phone on 7 mc., if not on all bands. From which it is seen that, of the major countries of the world, the U.S. and Canada are practically the only ones which permit 'phone on all bands. If we wish to keep the 7 mc. band as the 'phone band, we will have to get a deal for both 'phone and c.w. 'The objective of the A.R.R.L. Board of Directors in making recommendations for 'phone band allocations has ever been to equitably distribute facilities according to occupancy and utilization. Time lag in effecting revision of regulations has inevitably crept in, of course, but on the latest available surveys, has always been the goal.

PREFACE: Analysis of work during six emergencies during 1934 shows 'phone used principally in two, c.w. used principally in two, and 'phone-c.w. used 50-50 in the remaining two.

2850 W. 19th Ave., San Francisco, Calif.
Editor, QST:

As a ham and a League member of fourteen years standing may I call attention to the change in the relative distribution of 'phone and c.w. throughout our frequency assignments? This change has been in progress for the last four years. This shift toward increased 'phone activity has not only included most of the new men entering the field but also a surprising number of old time brassy operators.

As one who remembers an all-too-short taste of 40-meter 'phone some years ago when, for a few short months, we could do about as we pleased, I offer for consideration the suggestion that holders of Class A licenses be allowed to operate 'phones in the 50 kc. between 7075 kc. and 7125 kc.

A recent unofficial, though quite authoritative, band occupancy check on the 7-mc. band showed that the portion of the spectrum between 7075 and 7125 kc. contained less than one sixtieth of the total stations observed in the band. As this 50 kc. portion of the band is one sixth of the total band it is seen that it contains only about 10% of the number of c.w. stations that it would contain if all the 7-mc. stations were evenly distributed over the entire 300 kc.

One explanation of this lack of c.w. stations may be the fact that crystals oscillating or doubling into this particular 50 kc. are useless for 14-mc. c.w. work as they would double into the 14-mc. 'phone band.

In my humble opinion, the recent growth in numbers and knowledge of the average Class A 'phone man justifies our requesting this territory for joint 'phone and c.w. use. Allocation of this particular portion of the 7-mc. band to 'phone would cause the minimum of change for the present 14-mc. 'phone man as he already has a crystal that either oscillates or doubles into this territory.

I quite well appreciate that this suggestion will probably start another war, the like of which has not been seen since the old spark vs. c.w. days. Nevertheless, I think that progress and equity both justify giving the Class A 'phone man the opportunity to taste some of the year round 7-mc. DX that has kept our mouths watering for years.

I must emphasize that I do not subscribe to the idea that c.w. is doomed. I have heard many ill-advised statements recently to the general effect that some day we will all use 'phone exclusively. I have pounded my share of brass in the past and will continue to do it in the future but I have a great desire to get on the 14-mc. 'phone band and record graphs of my voice and if it will ever be done at all it will have to be done on 7 mc. as Europe and 14 mc. 'phone and I just won't click from my particular location.

R. B. Jeffrey, WSGDC

EOBROWN'S NOTE.--At 7 mc., 50 kc. represents 16% of the band. Recent official band occupancy checks show between 14% and 18% of the occupancy of the 7-mc. band to be between 7075 and 7125 kc., indicating approximately normal occupancy of this region. In fact, the only spot at which occupancy drops appreciably is in the center of the band, DX men displaying a congenital tendency to congregate near the edges; even here, occupancy averages 75% of the maximum.

222 W. 83rd St., New York, N. Y.
Editor, QST:

Last month VE5EU suggested that the A.R.R.L. ask for more 'phone frequencies. He specified these frequencies as 3800-4200 kc. ... the c.w. band is crowded and there is plenty of QRM; so why make such a situation any worse? ... My suggestion is that if the amateurs are going to ask the League to get them more frequencies, they should ask for a new 'phone band. This band would be situated somewhere between 7300 kc. and 3000 kc. and controlled by the Federal Communications Commission. In other words, a 'phone band extended from the high frequency end of the
ALTHOUGH in many respects the art of radio communication is more highly developed in this country than in other parts of the world, we cannot afford to ignore the new developments in equipment and technique that originate abroad. For example, to England and Holland must be credited the pioneer work on audio pentodes and magnetic phonograph pickups. In Germany multi-scale dials mechanically tied-in with wave-changing switches were quite common before appearing on American "All-Wave" Receivers. In Germany also, large high-sensitivity cathode ray tubes were first made available to the general public. And, of course, the work of the Curies of France with crystals paved the way for the modern crystal-control of transmitters and the crystal-filters for our Single Signal receivers.

We do not intend to belittle American research. In our opinion, each important foreign development can be matched by an even more important American development. Furthermore it has generally been necessary to redesign and otherwise perfect foreign developments before they became suitable to our advanced communication practice, and often only the fundamental idea could be salvaged. The audio pentodes now available in this country are certainly radically different in performance from their early English ancestors. The same is true of our phonograph pickups, our commercial cathode ray tubes and high-percentage-Steatite dielectrics. The National Steatite-body American-made insulators are hardly comparable in either appearance, accuracy or low-loss characteristics with the original samples submitted by the European inventor.

During the past year or so, at least two European laboratories have developed materials of great promise. These materials are ceramics quite similar in appearance to Steatite, but for them the European developers claim a dielectric constant very closely approaching 100 (Air=1, Steatite=5, Mica=16), and in addition high dielectric strength and low losses. A good material of this type would obviously be extremely useful. A small disc of such material, metal-coated on both sides, would provide a high voltage, non-inductive condenser that would be ideally suited to such purposes as plate blocking, R.F. bypass, etc. Such condensers are now available in the German retail market, and one type is illustrated above.

Unfortunately, however, tests made in our laboratories on samples so far submitted have not borne out the statements of the European developers and manufacturers, and the condensers are quite disappointing. For this reason we do not feel that we are justified in placing such units on the market at the present time. There is a practical difficulty, also; the new material is reputed to require a firing temperature of 3100° C., which is beyond the capabilities of most of the American kilns, which are commonly gas or oil fired, and designed to operate at about 1400° C. The European process is reported to employ electric arc kilns, which are of course capable of producing the high temperature.

As mentioned above, condensers of this new type are already available on the German market, and we consequently felt that our comments regarding the new material might be of general interest. We have been following its development for over a year, and sincerely hoped that the new product would be suitable for production here by this time. As it is we must look to the future. There is certainly a need for such a material in radio engineering practice, and we also hope to be the ones to make it available to the American radio industry; — but only after we are thoroughly convinced the material has the proper technical merit and we are able to secure the facilities for manufacture in this country from American made or mined materials.

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  x 19”. Overall size 21½” wide
  39” high. Price . . . . . . $11.45

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Value that will astonish you — available in kit form.
Descriptive Literature on Request.

CARDWELL CONDENSERS

<table>
<thead>
<tr>
<th>Tank Condensers</th>
<th>Neut. Condensers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
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<td>220</td>
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<td>147-B</td>
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<tr>
<td>T-199</td>
<td>330</td>
</tr>
<tr>
<td>T-183</td>
<td>110</td>
</tr>
</tbody>
</table>

OUTSTANDING!!
GROSS CRYSTAL HOLDER

WHITE CERAMIC commerci­
al type crystal holder — priced
at less than ordinary holders.
Adjustable pressure, dust proof,
no tools required to open. Takes
crystal to 1¾” square. Flaps
standard ¾” spacing.
Most efficient job yet. . . . . . $1.00

GROSS RADIO, INC., 51 VESEY ST., N. Y. CITY

40 meter c.w. band. There is no 'phone in that whole area
of ham activity, and it seems to me that this section of the
radio spectrum would be an ideal spot for a 'phone band.
I don't think this is a great deal to ask for, and if it were
granted it would be a great relief from the QRM on the
other bands.

—Nathaniel E. Margolis, W6FDR

1008 W. 8th St., Coffeyville, Kans.

Editor, QST:

One thing offers a serious menace to our 40-meter
band, that is the Mexican 'phone problem. Cannot some
plan be worked out with their government whereby the
'phones are barred from the 7 mc. . . . or at least concentrated
at one end instead of spilling the DX in the whole band as
now. There is no part of the band that is not being hurt.

—Charles A. Fine, W9CW

CQ DX? ND

Acton House, Felton, Northumberland, England

Editor, QST:

In November QST, page 60, I have just read a letter from
VE3IG, with the wording "CQ DX," and as my experience
is the exact opposite of his perhaps he may be interested to
hear the views of a real low-power Q station. I have
VE3IG says his transmitter "having less than 100 watts
input may be said to be in the low-powered class," and his
own experience has shown "that the low-powered ham has
much greater chances of contacting foreign DX than calling
'Q DX' than by calling an individual station."

I entirely disagree with VE3IG. With an input never
exceeding 5 to 10 watts at my station it has been my expe­
rience that by far the most of my DX contacts have been
made by calling an individual DX station, and not by
calling "Test DX" myself. In this case I am not ranking
East Coast U.S.A. stations as DX but am meaning VK,
W6, ZS, VE4, CM, CX, PY, etc., on the 14-mc. band.
None of these was raised by "Test DX" call. But, after all,
even if everyone thought alike we should all be waiting in vain
for the other stations "CQ DX" call! And, as VE3IG
remarked, "What is poison in one call may be duck soup in
another!" I think I can claim a right to disagree with
VE3IG, as I have worked 76 countries and WAC and WBE
with an input never exceeding 10 watts. I hope other low­
power enthusiasts will reply to VE3IG and give us their views.

—Barbara Dunn, G6YL

Puzzle: Find the Swish

R.F.D. No. 1, Oak Harbor, Ohio

Editor, QST:

I built one of the 5-meter receivers for which you fur­
nished the plot.
In experimenting with it I connected a piece of wire about
8¾ feet long to the set for an aerial. It didn't work so I took
it off and was tuning over the dial without using any aerial.
About 30 on the dial I heard a gentle swish swish repeated
slowly. Not knowing what attention went over to R9, just like that.
None of these was raised by "Test DX" call. But, after all,
even if everyone thought alike we should all be waiting in vain
for the other stations "CQ DX" call! And, as VE3IG
remarked, "What is poison in one call may be duck soup in
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with an input never exceeding 10 watts. I hope other low­
power enthusiasts will reply to VE3IG and give us their views.

—Barbara Dunn, G6YL

Cutting, W8KQZ

Say You Saw It in QST — It Identifies You and Helps QST
The "CW-25" transmitter kit due to its low cost makes it possible for anyone to own a modern crystal-controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the most inexperienced operator to take the set on the air, for real results. The "CW-25" is supplied with a hybrid finished sturdy metal chassis under which all parts are mounted, making the wiring and components dust-proof. A plug-in crystal holder is furnished with the kit. Only one milliammeter is required for tuning the transmitter and each stage is provided with a jack for this purpose. The "CW-25" uses one 47 as crystal oscillator, one 46 as buffer or doubler and two 40's in the amplifier stage, set of three coils supplied with kit for 20, 40, 80 or 160 band. Additional coils 75c each.

Complete kit, less tubes and crystal.................. $13.95

GROSS C.C. TRANSMITTER—OUTPUT 25-30 WATTS

The "CW-25" transmitter kit due to its low cost makes it possible for anyone to own a modern crystal-controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the most inexperienced operator to wire and put the set on the air, for real results. The "CW-25" is supplied with a hybrid finished sturdy metal chassis under which all parts are mounted, making the wiring and components dust-proof. A plug-in crystal holder is furnished with the kit. Only one milliammeter is required for tuning the transmitter and each stage is provided with a jack for this purpose. The "CW-25" uses one 47 as crystal oscillator, one 46 as buffer or doubler and two 40's in the amplifier stage, set of three coils supplied with kit for 20, 40, 80 or 160 band. Additional coils 75c each.

Complete kit, less tubes and crystal.................. $13.95

Nickel Silver Name Plates

Black background with silver lettering and border, size 1/4" x 1/4". Following markings:

Gain Speech Doublor
Buffer Modulator Class-B
Amplifier Class C Filaments
Stand-By Plates Grid
Oscillator Neutralizer Crystal
Microphone Antenna Plate

10c each 6 for 50c

EXTRA SPECIAL!!!

GROSS Cased 30 H. 350 MA CHoke
Limited quantity, special price..............$3.95

Thorl. Choke 15 H 250 MA.........$2.95
Gross Cased 30 H 125 MA.........$3.95
Gross Cased 30 H 200 MA.........$1.94

UNIVERSAL ANTENNA COUPLING SYSTEM INDUCTANCES
Wound on threaded double-X natural bakelite tubing, can easily be turned, with clip supplied, ea. ........................... $1.00
(Use one coil for single-wire feed and two coils for two-wire systems)

Low C 40-80-150 Meter Amplifier Coils
(See transmitter by GRAMMER page 46 May QST) Plug-in, wound on threaded natural bakelite tubing, will tune with 50 or 60 mmf. condenser, any size, each ........................... $1.50

200 WATT VITREOUS RESISTORS

Values. Variations Slip:

1000 ohms.......................... $0.99
2500 ohms......................... $1.05
5000 ohms......................... $1.05
10,000 ohms....................... $1.20
15,000 ohms....................... $1.29
25,000 ohms....................... $1.35
35,000 ohms....................... $1.44
50,000 ohms....................... $1.49
80,000 ohms....................... $1.59
100,000 ohms..................... $1.65

Hoyt Milliammeters and Voltmeters

Perfectly damped meters at a price. These are not to be confused with the usual inexpensive meters. 90° mounting angle, flange 2¼" diameter, supplied in the following sizes: 10 ma, 25 ma, 50 ma, 100 ma, 150 ma, 250 ma, 300 ma, 4 v. ac, 10 v. ac, 15 v. ac, 10 v. dc. Price each $1.30, 3 for .................. $3.60

EIMAC TUBES

Complete with self contained power supply, tubes and speaker.............$69.50
PEAK Pre-Selector and Pre-Amplifier 14-200 meters. Less tubes.............$19.80

NEW!! RAYTHEON RK-93
The new small addition of the RK-20 (fn stock)

RAYTHEON RK-20
The New RF Pentode Power Amplifier Tube in stock.................. $15.00
(see page 14 June QST)

SPECIAL TUBES!!

510-A. Tube Thoriated Tungsten Filament Grid Plate—Incoloy Base................ $4.45
210 Tube—Thoriated Tungsten Filament Special.................. $1.15
½ and 1 watt Neon Bulbs.............. $0.29

The "EAGLE" Three-Tube Short-Wave Receiver

"Band Spread" over any portion of the tuning range—only finest material used throughout. Employe one 32 R.F., one 32 detector and one 33 Pentode Audio—15 to 200 meters—four coils, supplied. The "EAGLE" is economical—two 40's in the amplifier stage, the MAC KEY the perfect semi-Automatic and Straight Key. (Circular on request)

The MAC KEY $10.50

The "EAGLE" completely wired and tested........ $11.95 Three tubes tested in your receiver.................. $3.00

20% DEPOSIT WITH ALL C. O. D. ORDERS. REMIT BY M. O. INCLUDE POSTAGE Cable Address: GROSSINC.

GROSS RADIO, INC., 51 VESEY STREET, NEW YORK CITY

Say You Saw It in QST—It Identifies You and Helps QST

65
To
OUR READERS
who are not
A.R.R.L. Members

YOU should become a member of the League! That you are interested in amateur radio is shown by your reading of QST. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have QST delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership.

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U.S.A.

I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3.00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, $1.25 of which is for a subscription to QST for the same period. Please begin my subscription with the ........ issue. Mail my Certificate of Membership and send QST to the following name and address.

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of QST?

Thanks

Ahoy! the Guard!

U.S.S. Louisville, San Francisco, Calif.

Editor, QST:

How about putting locks on the QST covers? If I'm not on deck when the mail comes out, I'm apt to be reading my copy over the shoulders of the rest of the gang. H! It's an FB mag and I'll always get mine if I have to call out the guard of the day.

—C. G. Shipman

Split Phase

Editor, QST:

WONET complained of the bad a.c. hum from his kitten. Perhaps he would find, upon some experimentation, that it is commutator ripple instead of hum. If this is the case, he can overcome the trouble by installing a split phase motor, though it would be wise to consult kitty first.

—Charles W. Sigler, Jr.

Operating Notes on the New Pentodes

(Continued from page 81)

As Tri-tet oscillators with the output circuit tuned to a harmonic the tubes perform in about the same way as 59's. The plate circuit may also be tuned to the frequency of the crystal, however. From our experience their performance when worked in this way is a good deal like that of an ordinary pentode oscillator. As resonance is approached from the high-frequency side the plate current decreases until a minimum point is reached, the output then being maximum. Further increase in tuning capacity causes a sharp rise and then oscillations cease. The cathode circuit should have the same constants as recommended for the 59. In general, it will be found that the fundamental output will be increased by tuning the cathode circuit far off on the high-frequency side of resonance, the maximum point coming when the cathode circuit is tuned almost to the second harmonic of the crystal. This point also gives low r.f. voltage across the crystal. When the output circuit is tuned to the second harmonic the cathode circuit should be tuned about midway between the second harmonic and the fundamental for maximum output and low crystal voltage. The cathode tuning for maximum output in either case is rather broad, and a condenser setting giving the least crystal voltage, as indicated by a neon lamp touched to the control grid of the tube, should be used. A grid leak of 50,000 ohms seems to be satisfactory.

—G. G.

MNI TNX, FELLERS

The Headquarters Staff acknowledges with deep appreciation approximately one bushel of holiday greeting cards and messages from hams all over the world. They added greatly to our Christmas cheer. Many thanks, gang, and much Happy DX to you!

K. B. W.
The Improved

LYNCH
RESISTOR

The Most Important Advance in Resistors in more than 10 Years

AFTER more than five years of exhaustive laboratory work and many months of proving in actual service in the field, we are pleased to present a resistor with marked advantages ... and, at no advance in prices.

Born at dazzling yellow heat, this new ceramic composition possesses the rugged dependability of Gibraltar. Extruded to exacting specification, its uniform texture ensures far greater current-carrying capacity and permanent, noiseless accuracy.

Absolutely guaranteed against open-circuiting or change in resistance value. . . . Moisture-repellent!

We invite you to demonstrate for yourself the great superiority of these Triple-tested Resistors. Connect them into circuit, overload them heavily, as we have done for hours, days, weeks! Then make your own measurements for accuracy; noiselessness.

If, after your own tests you are dissatisfied, return the resistors to your jobber, or to us and your money will be cheerfully refunded.

Ask your jobber also for our new low prices on Lynch "Bluejackets" and "Selectohms" — the wirewound resistors with a reputation.

LYNCH MANUFACTURING CO. INC.
R. A. Sayres, Pres., C. G. Culln, Vice-Pres., L. R. Beardslee, Sec.-Treas.
405 LEXINGTON AVENUE NEW YORK, N. Y.

Laboratory and Factory, Cranford, N. J.

Say You Saw It in QST — It Identifies You and Helps QST
THE IMPROVED CATHODE-RAY OSCILLOSCOPE

Linear sweep model for broadcast stations and advanced amateurs, physics labs., etc.

- Controlled linear sweep.
- Controlled external sweep.
- Freq. locking device for sweep frequency.
- Picture centering adjustments.
- Wide range focus adjustments.
- Complete component shielding.
- Unit is self-contained and includes batteries and 110V-60 cycle power supply.
- Tubs RCA 906--885--234--281--280.
- This instrument embodies all features ordinarily contained in only the highest priced Cathode Ray equipment.

Completely Equipped Ready to Use
F.O.B. Newark — $97.50

Literature now available

R.F. Reactors

As announced last month we now offer for sale a complete line of R.F. REACTORS.

<table>
<thead>
<tr>
<th>Type</th>
<th>Suggested</th>
<th>Operating</th>
<th>Band — mc.</th>
<th>Inductance Value — pf.</th>
<th>DC Ohms</th>
<th>DC Current — amps.</th>
<th>Price</th>
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<tbody>
<tr>
<td>RFR-1</td>
<td>1.7—3.5</td>
<td>4 to 14.4</td>
<td>90</td>
<td>70 to 70</td>
<td>3.5</td>
<td>3.5</td>
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<tr>
<td>RFR-2</td>
<td>3.5</td>
<td>90</td>
<td></td>
<td>30</td>
<td>7.0</td>
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<td>$1.99</td>
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<tr>
<td>RFR-3</td>
<td>7.0</td>
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<td></td>
<td></td>
<td>7.5</td>
<td>7.5</td>
<td>$7.50</td>
</tr>
</tbody>
</table>

Compare these values — With your tank inductance. With the DC resistance of the R.F. chokes you are now using. With the CURRENT rating of your present RF Chokes. These units are practically indestructible: impervious to moisture, oxidation and heat.

Fitted with mounting brackets and terminal screws.

WE INVITE INQUIRIES FROM RADIO MANUFACTURERS AND DISTRIBUTORS

TUBES

210
15W
Large Plate

$1.15

866
1000 hr.
Guarantee
New Construction

$1.35

We are specializing in transmitter construction to customers' orders and specifications. Write for quotation on your favorite transmitter.

Special code classes for beginners. No charge. Telephone for appointment.

KALTMAN & ROMANDER
26 Court St.
Newark, N. J.

Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
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</thead>
<tbody>
<tr>
<td>Feb. 1</td>
<td>A</td>
<td>W6XK</td>
</tr>
<tr>
<td>Feb. 8</td>
<td>B</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Feb. 13</td>
<td>C</td>
<td>W9XAN</td>
</tr>
<tr>
<td>Feb. 15</td>
<td>B</td>
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<td>Mar. 1</td>
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<td>W6XK</td>
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<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
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STANDARD FREQUENCY SCHEDULES

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<tr>
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<td>3500 7000</td>
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<td>8:08</td>
<td>3600 7100</td>
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<tr>
<td>8:16</td>
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<tr>
<td>8:24</td>
<td>3800 7300</td>
</tr>
<tr>
<td>8:40</td>
<td>4000</td>
</tr>
<tr>
<td>Time</td>
<td>Sched. and Frequency (kc.)</td>
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<tr>
<td>(p.m.)</td>
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<td>7:16</td>
<td></td>
</tr>
<tr>
<td>7:24</td>
<td></td>
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</tbody>
</table>

The time specified in the schedules is local standard time at the transmitting station. W9XAN uses Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes divided as follows:
2 minutes—QST QST QST de (station call letters).
3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XK is "M."
1 minute—Statement of frequency in kilocycles and announcement of next frequency.
2 minutes—Time allowed to change to next frequency.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

New Schedules for WWV

BEGINNING February 1 and continuing each Tuesday and Friday thereafter (except legal holidays), the National Bureau of Standards station WWV will transmit on three frequencies as follows: noon to 1:00 p.m., E.S.T., 15,000 kc.; 1:15 to 2:15 p.m., 10,000 kc.; 2:30 to 3:30 p.m., 5000 kc. These emissions are accurate to better than 1 part in five million at all times and are readily useful for calibrating amateur-band frequency meters by harmonics from an auxiliary 100-kc. oscillator, as described in previous QST articles (June and October, 1933; February, 1934).

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It has been reported by W8KSJ that Adolph Czajka in Chicago has been interested in amateur radio for several years, in spite of his handicap of being deaf and mute. He has built himself a tape recorder by which he watches incoming signals, and sends SWL cards to hams all over the world.
WE QUOTE from a letter received from a Ham (he happens to be a physician as well) who found a simple solution after having had difficulty with a multi-band transmitter:

"After rechecking the entire job and finding nothing wrong I felt that loss must be occurring in the oscillator, so hit upon the idea of replacing an inexpensive capacity in the plate circuit of the 89 with a small CARDWELL I happened to have on the shelf". As Ripley says, "believe it or not" the excitation grids in the grid of the RK 20 just doubled without any other change whatsoever.

"I consider this a tribute to the low loss construction of your product and believe that it is a good reminder to brother Hams that it pays to use good parts, particularly when operating in the higher frequencies".

"I am glad that I had a CARDWELL on the shelf".

MORAL:

To avoid trouble take the Doctor's advice, don't leave CARDWELL on shelves — yours or anybody else's — use 'em.

Send for Literature
HERE is another Triplett achievement—an exclusive Triplett development that is being received enthusiastically by engineers, experimentors and instrument users, everywhere, because it offers these outstanding advantages:

1. Maximum scale length;
2. Minimum mounting space;
3. Spacious scale reading opening;
4. Symmetrically designed Bakelite case.

This 4-Square instrument makes it possible to secure the same scale length that is offered only with a 5-inch instrument—yet it uses one inch less panel space. This important advantage makes it easier to read the scale and adds a new note of modernity to the complete unit.

The 4-Square Instrument is 4 inches to the side. It requires only a 2-¼” mounting hole... has 3-½” and 2-¼” AC scale length and is furnished with a spade or knife-edge pointer. It may be used wherever electrical measurements are required. Supplied in all popular ranges for: Voltmeters, AC and DC... Millivoltmeters... Ammeters, AC, DC and RF... Microammmeters... and Milliammeters, AC and DC.

See Your Jobber
WRITE FOR FREE LITERATURE

The Triplett Electrical Instrument Co.
118 Main Street
Bluffton, Ohio, U. S. A.

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
</table>

Getting Coöperation from the Antenna Systems
(Continued from page 38)

\( \lambda/2 \) in length and the layout should be arranged accordingly. Losses on this type of feed line for lengths up to several thousand feet are practically negligible for frequencies upwards to 20 mc., the efficiency greatly exceeding that possible with the "Zepp" or other resonant feed lines of equal length.

A word of caution with regard to feed lines: Be sure the wire is of the proper size and the spacing correct. For a 600-ohm impedance the spacing should be 75 times the diameter of the wire when the line is designed for use with the various antenna-to-line impedance matching systems that presume this impedance.

In conclusion, the author believes that the suggestions outlined in this article represent new fields for thought in the construction and operation of our more simple types of antenna systems. A specific discussion of any one type has been avoided in the desire to cover as much ground as possible in a practical manner and references have therefore been added freely—in connection with which the bibliography on page 21, January 1934 QST, is well worth reviewing.

A little thought with regard to the height, compass direction, length, feed line, feed-line terminations at antenna and transmitter, and tuning of our antenna, will go a long way toward making that 200-watt station perform like a 1000-watt installation.

Some foul-souled varmint up and climbed my 35-foot antenna pole and swiped the end insulator (price 10¢) of the 66-foot antenna. The villainous blackguard also stretched said skywire fully six feet in his attempt to dislodge feeders and all off the housetop. Would you suggest a Retty'snitch?

—W9IUO

With the Affiliated Clubs
(Continued from page 55)

MISCELLANY

The Montreal Amateur Radio Club in early December held a very successful hamfest with a record attendance of 150... one of the interesting features was the showing of a movie film taken by VE2AP, wherein twenty-two of the local amateurs are shown in action... Lansdowne (Pa.) Radio Association officers for 1934-35 term: W3BQP, president; Jess Ehley, vice-president; W3BHIK, recording secretary; W3EOI, corresponding secretary; W3ASD, W3DQA, W3AV and Hank Nichols, directors... The November '34 meeting of the Jackson (Mich.) Amateur Radio Association was held in the form of a hamfest for the University of Michigan Radio Club, local amateurs and members... a talk on frequency measurements by Mr. W. G. Marburger of Western State Normal, contests, prize distribution and "eats" helped make the evening the enjoyable one it was... The Providence (R. I.) Radio Association's new...
These A.C. solenoid relays are ideal for remote control of transmitters, for control of crystal ovens, and for any general remote control application except for keying. These relays will not operate in keying service.

The maximum contact rating is 10 amperes at 220 volts. The relay coils are wound for 115 volts 60 cycle alternating current. Relays for other voltages can be supplied on special order. Use coupon below when ordering.

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Poles</th>
<th>Normal</th>
<th>Circuit Diagram</th>
<th>Price Open</th>
<th>Price In Cab.</th>
<th>Type No.</th>
<th>Poles</th>
<th>Normal</th>
<th>Circuit Diagram</th>
<th>Price Open</th>
<th>Price In Cab.</th>
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</thead>
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<td>1</td>
<td>Open</td>
<td><img src="A107" alt="Circuit Diagram" /></td>
<td>$3.50</td>
<td>$4.50</td>
<td>A177</td>
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<td>5.00</td>
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<td><img src="A247" alt="Circuit Diagram" /></td>
<td>6.50</td>
<td>7.50</td>
</tr>
</tbody>
</table>

**Radiostat**—A stepless graphite compression rheostat for primary of 550 watt filament or plate supply transformer. Range 4 to 150 ohms. 
Price $6.50

**ORDER BLANK—MAIL WITH REMITTANCE TO**


Enclosed find money order for $ for which please send me, shipping charges prepaid, the following items:

Name: 
Address: 

Say You Saw It in QST — It Identifies You and Helps QST
Thank You!
You have waited most patiently
We can now make prompt delivery of this fine receiver
The New PR-12
PATTERTON
All-Wave Radio

PR-12 (6.5-560)

ADDED FEATURES NOT PREVIOUSLY DISCLOSED
3 Stages I. F. Amplification
Accurate Logging Band Spread
15 inches on 75 Meter Band

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(absolutely nothing else to Buy!)
PR-12 Crackle cabinet $83.70 PR-12 Crackle cabinet $89.70
PR-12 Console without crystal 101.70 PR-12 Console with crystal ... 107.70

Chassis also available
SHIPPED PREPAID If Full Purchase Price Accompanies Your Order

OUR NEW
100 WATT PHONE C.W. XMITTER

Many exclusive “MARINE” features • Power Output (con-
servative rating) 100 WATTS PHONE and C.W. • 20-
40-75 and 160 meter bands • CRYSTAL CONTROLLED
FREQUENCY • PERMANENT NEUTRALIZATION •
BUILT-IN BIAS SUPPLY • HIGH-FIDELITY AUDIO
CHANNEL • Input Designed for Crystal Microphone

VISUAL DISTORTION INDICATOR
MODULATION PERCENTAGE INDICATOR

Self Contained Antenna Matching Network
CABINET DIMENSIONS
(Baked wrinkled enamel finish — with rear door)
60” high 19½” wide 15” deep

ONE YEAR UNCONDITIONAL GUARANTEE
Send stamp for descriptive folder with detailed information
and photographs. You will be astonished at what we are offering
at such an extremely moderate price.

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W2GOT—W3GRQ
163-18 JAMAICA AVENUE JAMAICA, NEW YORK
Telephone Jamaica 6-2915, Night (long distance) Laurelton 7-1240
Cable Address: “ELECMARINE NEW YORK”

station has been assigned the call W1INM. ... The Iowa-Illinois Amateur Radio Club is now
located in its own club rooms on the fourth floor of the Eisfield Bldg., Burlington, Iowa ... in
order to make the club membership 100% A.R.R.L. those members with the wherewithal
loan to the less fortunate, enabling them to main-
tain League membership, paying back whatever
they can in monthly installments. ... The 73
Radio Club, Wilton, Maine, had a “Christmas”
motion, Christmas tree, Santa and all ... after
the “presents” were distributed contests were
held: Liars, CQ Whistling, Cracker Eating and
Radiogram ... the radiogram contest was
unique ... the first initial in the name of every
one present was put down in order and the one
who could make up the best radiogram from
words starting with these letters won the prize.

... The Heart of America Radio Club, Kansas
City, Mo., is installing 1-kw. rig in new club
house. ... The Southern Missouri Association
of Radio Amateurs is planning on sponsoring a
state convention at Joplin, Mo., in 1935 in con-
nection with the Ozark Radio Club. ... The
Sunrise Radio Club of Long Island installed the
following officers at a dinner-dance on December
5th: W2ANL, president; W2CJJY, vice-president;
W2DKR, secretary; W2HDG, treasurer ... this
class meets at Jamaica, N. Y., Y.M.C.A.
first, third and fifth Friday evenings ... visitors
welcome. ... A newy club paper is issued its
members by the Union County Amateur Radio
Association, Inc., of Elizabeth, N. J. ... 228-
me. activity is interesting members of the
U.C.A.R.A. these days. ... “Loudspeaker,”
monthly publication of the Northern Nassau
Wireless Association, continues to make its
appearance with W2DUA as editor, W2GZS,
W2AYJ, W2DPQ, staff representatives, and
W2DXO, staff artist. ...
These two inductors cover all of the amateur bands to 10 meters and have current-carrying capacity for the highest power amateur transmitter. Plus-in wound with heavy plated copper tubing—mounted in rigid supporting frame—glazed porcelain insulation—outside of mounting ribs notched for extra coupling coil—supplied with copper clips formed to fit the tubing—three Jumbo-type G-R plugs supplied with each coil.

Specifications

<table>
<thead>
<tr>
<th>TYPE 679-A</th>
<th>TYPE 679-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns</td>
<td>12</td>
</tr>
<tr>
<td>Number of sections</td>
<td>3</td>
</tr>
<tr>
<td>Inductance</td>
<td>10 µh</td>
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<tr>
<td>Clips supplied</td>
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<td>Outside diameter of coil</td>
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<td>Height, over-all</td>
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<tr>
<td>Depth, over-all</td>
<td>6½ in.</td>
</tr>
<tr>
<td>Price</td>
<td>$7.50</td>
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</tbody>
</table>

Type 680-J Jack Base for use with the Type 679 Inductors, with three Jumbo Jacks, mounting holes and holes for four additional jacks. Dimensions 7¼ inches long, 2¼ inches wide, 1 inch thick.

Type 680-J Jack Base $1.25

Order direct from this advertisement, sending cash with order and we will ship prepaid anywhere in the U.S. and Canada.

Write for our Amateur Bulletin No. 936-Q describing the complete line of General Radio experimental and amateur accessories.

GENERAL RADIO COMPANY
30 State Street
Cambridge A, Massachusetts

BOUND VOLUME XVIII of QST
(1934 Series)

We have now a limited number of copies of Bound Volume XVIII of QST. Vol. XVIII comprises the entire 1934 series of QST. This volume is made up of two books or sections, each containing six issues of QST. This volume is handsomely bound in red cloth and with gold imprint. The complete volume is priced at $5.00, postpaid. Better act quickly—only a few copies available.

QST
38 LA SALLE ROAD
WEST HARTFORD, CONNECTICUT

The new National Crystal Holder possesses a number of desirable features. The crystal is held in a vertical position, which permits it to vibrate more freely. Crystals may be changed very readily, making it feasible to use the holder with different crystals as required. The cover is of metal and is used for protection and shielding only. It is not used for clamping the crystal or plates. The body of the holder is molded R-39, and has two prongs on the base for connections. When ordering specify whether for transmitting or resonator (single-signal) crystals. Type CH, without crystal.

List Price, $2.50

Say You Saw It in QST—it identifies you and helps QST
Another New Outstanding
Gross Value—GROSS CB-100

A 100-Watt Radiophone and C.W. Transmitter completely housed in an entirely enclosed floor rack of ingenious design. All units are fully accessible through the removable front sets, for coil changing, antenna network adjustments, etc. Incorporates everything from microphone jack to impedance matching antenna network.

- R.F. Line Up
  - 47 crystal oscillator, two 45's buffer, 03-A amplifier.
- Frequency Coverage
  - 1.7, 3.5, 7 and 14 MC Bands.
- Power Supplies
  - 1050 and 1200 volts at 400 MA choke input, 8 mid Pyronal condenser used and 400 volts at 300 MA.
- Speech Amplifier
  - Special four stage high gain speech amplifier. Self contained from microphone jack to gain control.
- Modulator
  - Two 80's are used in the Class B, Modulator. 100% modulation.
- Antenna Unit
  - Impedance matching network supplied for use with any type of antenna available.
- Operating Controls
  - Terminations provided for operating all switches from operating table.
- Size
  - 60" high, 19½" wide, 16" deep.

Descriptive Literature Sent Upon Request
GROSS RADIO, INC.
51 Vesey Street • NEW YORK CITY

Grinding and Finishing Quartz Crystal Plates

(Continued from page 98)

unintentionally and to grind the edges faster than the center.

The first operation in grinding a rough blank is to finish one face as a reference. If the blank is thicker at one edge than at the other, it is necessary to grind approximately one-half of this wedging from that reference face before finishing it. This removal of more material along one edge than along another of the same face is accomplished by pressing with the finger more on the thicker edge while grinding. A fairly coarse grade of carborundum such as No. 200 may be used for rapid grinding. To finish the reference face, a finer grade such as No. 600 should be used and a somewhat thinner mud made of it. This grinding should be carefully done so that the finished face will be as flat as possible, the above mentioned precautions against rolling the blank and grinding the edges lower than the center being especially important.

Knowing whether the blank is an "X-cut" or a "Y-cut," the approximate thickness to which it must be ground can be found by referring to the curves or the formulas of Fig. 1. The next operation is to grind the blank (on the unfinished face) to approximately that thickness, stopping when its thinnest part is within five one-thousandths of an inch of the desired final thickness. In doing this, a fairly coarse grade of carborundum may be used, and the grinding may be done without any special care, except to see that it all be done on the unfinished face.

To finish this second face, after the plate has been ground to approximately the correct thickness, requires a duplication of the efforts above described, to finish the reference face. Careful measurement of the blank after each short period of grinding is necessary to determine that it is being ground to the point at which it is exactly the same thickness throughout. When this condition is reached the faces are parallel and the second of the four requirements of a good oscillator has, we hope, been met.

There are a number of ways to check whether a face of a blank is perfectly flat. The first is to measure the thickness of the blank at many points over its entire area and see if this thickness varies. If it does, and this variation is not regular from one edge to another, then there are definite high or low spots on at least one face and that face will need more grinding to level it off. In case any doubt exists as to which side has these high or low spots, each side may be tested by covering it with pencil marks and then rubbing it carefully on a clean flat surface of glass. The pencil marks will be worn off on the high spots, leaving the low spots still covered. By grinding this side carefully in a thin mixture of fine carborundum, the progress of the job of bringing the high spots down to the same thickness as the lows may be watched, as the pencil marks on the low spots will last until that part of the face starts to be ground away.

Too much emphasis may not be placed on the
YOU CAN DEPEND ON
G-E
Pyranol Capacitors

THEY’RE inexpensive, too, and scientifically designed. Years of experience in manufacturing capacitors for leading broadcast and short-wave communication stations and the government are built into them. Big, cumbersome capacitors need no longer use valuable space in your transmitter. Nor do you have to worry about fire—Pyranol won’t burn. You can use more voltage—G-E Pyranol capacitors will stand the ripple, in addition to the rated d-c. voltage. They make possible better signals and have longer life. Get them from your dealer. Radio Department, General Electric, Schenectady, N. Y.

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Recognized Standard in Radio Instruction Since 1909

28 Mc.

Ten Meter Amateur-Band-Spread coils, utilizing the design principles developed for the HRO, are now available for both the FB and AGS receivers. The serial number of the receiver should be given when ordering the AGS or AGSX coils. Purchases should be made through your regular National distributor.

NATIONAL COMPANY, INC.
MALDEN, MASS.
"Where were you on the night of December 13th?" Silent ... silent as a door knob ... .

Here's a tip, Inspector ... call a good serviceman and have him bring along some Centralabs ... chances are that's all your Superfodyne needs to make it tell all it knows.

For a mere handful of Centralab Radiohm Replacement parts will service almost every known make of radio ... and make it perk better than before.

RADIOHMS RESISTORS SUPPRESSORS

The new patented RADIOHM

The Sturdy Fixed RESISTOR

Centralab
Division of Globe Union Mfg. Co.
MILWAUKEE

necessity of having a smooth and flat surface on which to grind. The process of grinding on the plate of glass wears away the glass as well as the quartz; therefore, unless the grinding is done uniformly over a large surface, the face of the glass will wear away into hollows which in turn will wear the quartz into convex surfaces instead of flat surfaces as desired. Because of this it is advisable to use different plates of glass for rough and finish grinding, and especially one which is not suspected of being dished when taking out hollows and high spots.

To remove nicks, chips, sharp corners, etc., from the edge of the plate, it is held upright between the fingers and ground on these edges in coarse and then in fine grinding compound. It is also good practice to put a slight bevel around all of the edges of the plate by holding it at an angle and grinding in a similar manner. This will remove small irregularities and chips which might not otherwise be noticed. The corners of the blank may also be rounded slightly and beveled, all for the same purpose.

If the crystal still refuses to oscillate after it has been ground to the same thickness throughout and the edges have been ground and beveled to eliminate trouble from that source, then the trouble still remains in the grinding of the blank or in the original crystal itself. In thin crystals it is not uncommon that the pressure which is applied to the top center while grinding actually causes excessive grinding of the center of the under face so the top face is "high" in the center by the same amount the plate will be bowl-shaped instead of flat and so will not be a good oscillator. This condition can be found by the same method as was previously mentioned for determining which side contained certain known high or low spots, and can be corrected by careful light grinding in fine compound.

Sometimes a crystal will be a good oscillator, but instead of controlling the transmitter on one particular frequency it can be made to operate on any one of two, three, or more different frequencies fairly close together. This "twin frequency" effect may be due to any one of several causes. If the blank is slightly wedge-shaped instead of being the same thickness throughout this will sometimes happen; or if there are two or more definite local areas of uniform thickness but of different thickness from each other. This second condition is called "stepping," and is sometimes brought about purposely so that the crystal can be used to control on any one of the frequencies as determined by the different thicknesses, independent of the others. Twin-frequencies which are caused by either one of these conditions are eliminated by further grinding to eliminate the cause.

Other twin-frequencies are sometimes caused by mechanical coupling effects peculiar to the crystal itself. These may be eliminated by a careful grinding of the edges of the blank in the same manner as was used to remove nicks. A careful truing up of each edge, to straighten it and to take out any curving or bulging, may also be all that is necessary for this. Such slight edge grind-
Accurate lapping, careful calibration and sturdy mounting of Bliley BC 3 Crystals give you outstanding performance that's well worth their initial cost. These outstanding features make Bliley Crystals less expensive in the long run—compare them and see the difference.

Powerful special size X-cut
Mounted in specially designed Bakelite holder
Locks transmitter on one single frequency
Calibration, accurate to within 0.03%
Frequency drift under 23 cycles / million °C
Ideal for direct control of the RK20
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Our new catalog G-6 describes complete line of Bliley Crystals; A-cut, Single Signal, Standard Frequency, and General Communication Frequencies between 20Kc and 15Mc. Write for your copy today, Bliley Crystals are stocked by all progressive distributors; order from them.

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Send us your Photo and $1.50 for 100 SPECIAL "HAM-STAMPS" SENT POSTPAID
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New CRYSTAL MICROPHONES
From "MICROPHONE HEADQUARTERS"
Shure Crystal Microphones are more than just "good microphones"...for they contain that full measure of performance and reliability which is the result of years of experience in microphone development.

The Model 70H is a diaphragm-type crystal microphone, with the new, exclusive Shure "cantilever" action — and is designed for mounting either directly on stands, or in existing carbon microphone rings. Heavy cast-metal chromium plated case of distinctively modern bevel-edge design. Furnished complete with EF "close-fitting" ring and screws, and four "Quick-way" hooks—also seven feet of special shielded, rubber-jacketed cable.

List Price ................ $22.50
Shure Crystal Hand Microphones also available.

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Say You Saw It in QST — It Identifies You and Helps QST
In the January, 1920, issue of QST there appeared an editorial requesting suggestions for the design of an A.R.R.L. emblem—a device whereby every amateur could know his brother amateur when they met, an insignia he could wear proudly wherever he went. There was need for such a device. The postwar boom of amateur radio brought thousands of new amateurs on the air, many of whom were neighbors but did not know each other. In the July, 1920, issue the design was announced—the familiar diamond that greets you at the top of this page—adopted by the Board of Directors at its annual meeting. It met with universal acceptance and use. For fourteen years it has been the unchallenged emblem of amateur radio, found wherever amateurs gathered, a symbol of the traditional greatness of that thing which we call Amateur Spirit—treasured, revered, idealized.

Do You Wear the A.R.R.L. EMBLEM?

The League Emblem, in heavy rolled gold and black enamel, is available in either pin or button type.

There are three special colors for Communications Department appointees...

- Red background for the SCM
- Blue background for the ORS
- Green background for the RM

Red and green available in pin type only; blue may be had in either pin or button style. All Emblems priced the same

$1.00 POSTPAID

American Radio Relay League West Hartford, Connecticut
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The illustration shows each binder with a yearly mark. This marking is not stamped on the binder. Simply cut the year label from a calendar, or paste on a piece of paper, marking it in your own handwriting.

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enhance the appearance of your station
facilitate your reference work
preserve the records of the advancement of the radio art

YOU NEED

QST Binders

One for this year's issues and one for each of the accumulated year's issues that you have. It will accommodate twelve issues of QST and a yearly index. The QST Binder is covered in deep maroon cloth. It is cleverly designed to take each issue as received and hold it firmly without mutilation. It permits the removal of any desired issue without disturbing the rest of the file.

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$1.50 POSTPAID

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Radio Servicing
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U. S. A. NEW ORLEANS, LA.

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The NEW
Lynch
HARM BANDS
RECEIVER COUPLER IS GUARANTEED TO

- Reduce Interference
- Increase Signal Strength
- Outperform Anything Else Regardless of Location
- Give Satisfaction or Money Back

 Designed for use with the famous Lynch Giant-Killer Cable Transmission line. Works satisfactorily with any two-way line and makes changes in the receiver circuitry unnecessary. Send 50 cents for free ham antenna bulletin for latest dope on better aerials for all bands.

ARTHUR H. LYNCH, Inc., 227 Fulton St., N. Y.
PIONEER OF NOISE-REDUCING AERIALS

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STANDARD SETS AND PARTS
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Our reliability gives us the privilege of representing the following leading manufacturers:

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W2KR
1920

Canadian Representative
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CEDAR RAPIDS, IOWA

The Crystal Microphone is the ideal instrument for amateur stations. No field current, no adjustments, no delicate parts. New diaphragm damping is exclusive Turner feature. Fully guaranteed. The Turner Type G Crystal Microphone (Brush Patents) lists at $20.00. Discount to amateurs, 40%. New list price effective Feb. 1, $22.50. Descriptive circular on request.

Radio Amateurs! There are good profit possibilities selling, installing, and operating public address systems. Write for complete details.

THE TURNER COMPANY
CEDAR RAPIDS, IOWA

STEATITE COIL FORM: Though lower in price than standard R-39 forms, the Steatite form illustrated above offers a highly efficient support for tuning coils in receivers, doublers, etc. It is available with four, five or six prongs to fit standard tube sockets, and is drilled for leads. The winding surface is unglazed, to provide a tooth for cement. Catalog Symbol XR-20.

List Price $ .35   Usual Discounts Apply

NATIONAL COMPANY, INC.
MALDEN, MASS.

grounded plane’s actual location come over the system. Breaking camp in ten minutes the expedition headed over ice-covered roads, for the location designated. After the well-travelled roads were left to start up a wood road at the base of the mountain, snow impeded progress. But at 9:15 a cabin at the end of the road closest to the wreck was reached. Four miles northeast a plane circled continuously. Straining eyes watched until it released a flare—the signal agreed to mark the exact location of the crack-up. Immediately all hands turned out to convert the cabin as the base for radio traffic, and within fifteen minutes the portable was in operation.

State troopers and other parties soon arrived at the cabin. Searching parties left on foot while the operators took tricks during the night. Heavy winds and snow waist-deep with the sub-zero temperature made progress through the thickly wooded mountain very difficult. Not until 11:00 p.m. did a searching party reach the wrecked plane—fifty hours since the forced landing. All during the night a vigil was kept at GE1000.

After dawn a relay of planes flew between Albany and the accident, at which time radio traffic became really heavy. Operation continued throughout the morning until two parties could be seen returning slowly down the mountain with the injured fliers. During the afternoon operations were continued to help direct various searching parties back to civilization. The station was no longer needed so packing was in order and the return trip started immediately, as some of the operators had not slept for 36 hours and others had not eaten for 26. Excitement provided the necessary stimulant.

Chalk up another case of amateurs stepping into the breach and helping in an emergency.

What the League Is Doing
(Continued from page 87)

figures are in agreement with the statement frequently made in previous election reports in QST, that between 80% and 85% of the ballots were cast by licensed amateurs.

The percent of ballots returned was 47.4 in the Central, 47.8 in the Hudson and New England, 45.5 in the Northwestern and 61.8 in the West Gulf Division.

We might look for a minute at this 18.1% who relied upon prior membership for their voting right. This is a figure which will be steadily reduced with the passage of time. There was only about six months between the amending of the by-law and the casting of these ballots. As every amateur knows, there is a heavy turnover in amateur radio, every year seeing thousands of fellows dropping out as they get married, go away to college, get new jobs, or have something happen to them that prevents their continuation—but thousands of new fellows each year enter the game. Many of this 18.1% are old-timers not at the moment in possession of a license, and numerous of them doubtless will continue their membership indefinitely, but on the other hand it is certain that with the passage of time the bulk
RADIogram

The radiogram blank has been revamped to allow for that much needed room for the body of the message and to facilitate copying of messages. 7 1/2 x 8 1/2 sheet padded 100 sheets to the pad.

35c each 3 for $1.00

MESSAGE FILE

The F. C. C. requires amateurs to keep messages handled for a period of one year. The message file has been designed to facilitate compliance with that regulation. An expanding file of thirteen compartments (one for each month and one for extra papers), it provides for more messages per month than the average station will handle. On the face of the FILE, space is provided for a complete and accurate record of traffic handled. It will accommodate a year's traffic. For a practical and convenient solution of the regulation, you can't beat it.

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The most comprehensive and helpful treatise on antennas since Auntie came back into prominence! Map o'creation, with all the foreign and American short-waves charted . . . call letters and kilocycles, too! Complete diagrams and illustrations of latest CORWICO Antenna jobs and how to install 'em. Really, this is one of the outstanding bits of technical literature for 1934-5. Be sure to write for your copy . . . QUICK.

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All the latest Nationally Advertised Parts and Kits in stock at all times
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Regenerative Preselector — Preamplifier Predates and Modernizes Your PRESENT Receiver

Here's What PEAK Gives:

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2. Increase in Sensitivity
3. Reduction of Noise
4. Considerable increase in selectivity
5. Reduction of Noise to Signal Ratio
OTHER FEATURES: Built-in coils covering 14-200 M, in 3 steps; low resistance, low capacity, silvered Band Selector Switch; 2 HI-Q Gain stages for high output tubes; smooth, electron-coupled regeneration; self contained amplifier supply; heavy gauge blank crystal finished cabinet and cabinet.

EASTERN RADIO SPECIALTY CO.
Manufacturers of P.E.A.K Products
1545 Broadway, Dept. Q-24, New York, N. Y.

110-120 V. ac 50-60 Cycles

Say You Saw It in QST — It Identifies You and Helps QST 81
Impedance-Matching Networks

Pi-Section Impedance-Matching Networks provide convenient and efficient means for coupling transmitter output to transmission line or feeders. Poorly designed networks, however, may be even less efficient than conventional coupling systems.

New Johnson Edgewise-Copper Inductors have been specially designed for amateur impedance-matching networks. They are efficient, compact, sturdy and convenient. With the proper Johnson Type "D" Condensers, they make an ideal output circuit.

Write today for Bulletin 120—it gives valuable data on Impedance-Matching Networks.

(As illustrated above, Johnson No. 204 Handle-Pointers and Scales may be directly attached to Type "D" Condensers even when no panel is employed. Bulletin 950 tells about these Handle-Pointers.)

Available from Authorized Johnson Distributors

E. F. JOHNSON COMPANY
Manufacturers of Radio Transmitting Equipment
WASECA, MINNESOTA, U.S.A.

HIPOWER CRYSTALS

Now available at your dealer
Accept no other
HIPOWER "A" CUT HANDLES 300% MORE POWER
HIPOWER "A" CUT in 1700-3500 Kc. Bands $3.90
HIPower "X" CUT in 1700-3500 Kc. Bands $2.35
HIPower "Y" CUT in 1700-3500 Kc. Bands $1.35
within 10 Kc. or choice of dealers stock

You cannot buy a better crystal than HIPower at any price!

TYPE M molded bakelite holder plugs in tube socket................. $1.00

FREE plug-in mounting with each holder

If your dealer cannot supply you order direct and enclose dealer's name

For complete data on "A" cut and other HIPower crystals, write for Bulletin E. Broadcast crystals supplied with less than 15 cycle drift per million, per °C.

HIPower Crystal Co.
3007 No. Luna Ave., Chicago, Ill., Tel. AVE. 5170

of these men not now actively engaged under license will lose their interest and let their memberships lapse. Their numbers will be steadily decimated until finally they virtually disappear from our list, and we prophesy that in this year's elections this 18.1% will show a sharp reduction.

It is ridiculous to suggest that our League doesn't want as a member any person who is not at the moment a licensed amateur. Why not? We do want our affairs controlled by licensed amateurs and we want all the efforts of the League devoted to the improving of amateur radio, never otherwise. We have that assured by the present system that puts the determination of our policies in the hands of elected directors, themselves amateurs, which is a system that makes it positive that A.R.R.L. will always be a ham outfit. If ex-amateurs and future amateurs and even plain non-amateurs want to join the League without the right to vote, even a million of them, that's just swell. Their financial support helps the League to do a bigger and better job for amateur radio, and the fact that the directors are amateurs chosen by the licensed membership assures the course of the League as an organization devoted purely to the interests of the licensed amateur.

'Phone-C.W. Contest

(Continued from page 20)

swap QSL's and become more understanding of the problems of our fellow amateurs. Whether you enter a 'phone station, or a telegraph station, give the QSO party your attention. Start a sheet listing your QSO's. Send in your score, large or small, so your work can receive full credit in QST. The previous contest of this type was most successful, 'phone scores running higher than c.w. scores. 'Phone participants clicked off the QSO's rapidly, finding dozens of telegraph ops literally "standing in line" to QSO. We think every ham entering will have some good QSO's and a swell time. Try it!

It is suggested that operators exchange and confirm the name of their A.R.R.L. Section* during the QSO, especially where a state is split into one or more A.R.R.L. Sections so this cannot be ascertained from the call book. Two contest periods (different week-ends) have been provided. If you can make both of 'em do so, but if not your report on work during any part of the time provided will be acceptable. Of course QSO's must all be within the days and hours specified to count for points.

To take part: Get on the air on any of the bands assigned by F.C.C. to your type of operation. If you use voice, work all the telegraph stations you can. If you pound brass, work all the 'phone stations you can. Only stations located in the 69 A.R.R.L. Sections count points in the score. Within ten days of the close of the contest's second period, mail your results to A.R.R.L., 38 LaSalle Road, West Hartford, Conn., so the QST report will give your results.

--P. E. H.
International Transformers

You can depend on INTERNATIONAL plate transformers to provide 100% satisfactory service under the most severe operating conditions. These transformers are especially designed for I-W, amplifier, or modulator plate supply service. Rugged construction, correct electrical design, convenient mounting provisions, ample insulation, and the appearance of much more expensive units combined to make INTERNATIONAL transformers as great a value as has ever been offered on the amateur trade. The models listed below will deliver 300 M.A. for C.W. or 250 M.A. for amplifier or modulator plate supplies.

Model 2000 — 1000 and 750 volts each side of C.T. $5.95
Model 3000 — 1500, 1000 and 750 volts each side of C.T. $8.95
Model 3000 — Overall size 7½" x 3¼" x 3¼" $14.95

866's H.D. 2.5 Volts, 5 Amps $1.19
866 Fil. Trans. 2.5 Volts, 12 Amps $1.25

Baldwin Type C Phones $2.50

Ohmite 200 watt Bleeders $1.50
100 Ohm to 100,000 $10.50


Model 2000-1000 and 750 volt, each side of C.T. $8.95
Model 3000-1000 and 750 volt, each side of C.T. $14.95
Model 3000 — Overall size 7½" x 3¼" x 3¼" $14.95

6 Volt — 6.5 Amps Trans. $2.10
For 203A tubes $2.50

The Mac-Key
A perfect Semi Automatic Key.

P e a k Pre Selector.
Real Signal Hop $19.80
Two stages of pre-selection.
Ask the man that owns One.

Mail orders filled to any place in the U. S. Send check or money order — include postage. Prompt service.

Foreign Friends: We cannot ship C.O.D. Please send money order or draft, including shipping charges.

SEND FOR YOUR COPY TODAY

Every amateur and shortwave fan should have a copy of this new catalog showing Na-Ald quality products. See the new VICTRON parts. Cuffs, Forms, Plugs, Connectors, Cases, Switches, Dials, Knobs, Cables, Test Accessories, etc.

ALDEN PRODUCTS CO.
715 Centre St.
Brockton, Mass.

NA-AI

TRIMM FEATHERWEIGHT HEADSETS

are not low in price, but it is a significant fact that they are being purchased in increasing numbers. The proved performance and sound engineering design of these phones get and keep satisfied users. Ask your dealer for the Special 24,000 ohm impedance phone for "Ham's."

TRIMM RADIO MFG. CO.
1528 Armitage Ave., Chicago, Ill.

Your Opportunity to Secure New
Western Electric-Crocker Wheeler
Synchronous Motors

New 92 pole, 78.2 r.p.m. non-gearred reproducer motors as used by broadcasting stations, for high fidelity reproduction. These motors are ideal for making recording equipment for voice or signals. The speed is constant and there are no gears to introduce variations. The power is ample to make records of any type on aluminum and other recording discs. Weight 60 lbs.

Price, in original cartons, complete with blueprint •••• $6.00

LE ROY M. E. CLAUSING, 5509½ Lincoln Avenue, Chicago, Illinois

Say You Saw It in QST — It Identifies You and Helps QST
The New LOW-LOSS 72 OHM
TYPE EO-1 TWISTED-PAIR
FEEDER CABLE
(Designed by Robert C. Graham, E. E., W8LUQ, and
described by him in the January QST.)

A scientifically designed twisted-pair feeder system
for matched-impedance doublet type TRANSMITTING
ANTENNAE.

Increased Efficiency—Duplex Operation—Effectively
Reduces ORM to RCI Receivers—Greater DX—
Ability to Withstand High Power—Accurately Matches
impedance at Center of Half-Wave Hertz Antennae—
Low-Loss Construction. (Dielectric constant of rubber
compound insulation = 2.7)—Untuned Line, Therefore
May Be of Any Desired Length—Easily Installed.

NET PRICES TO RADIO AMATEURS

<table>
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<th>Length (feet)</th>
<th>Price per foot</th>
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<td>$.05</td>
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<td>300</td>
<td>$.045</td>
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Shipping weight per 100 feet, 7½ pounds.
20% deposit is required with all C.O.D. orders.
Remit by Certified Check or M.O. Include postage.

Write for Circular

RUSSELL A. GRAY (W8AAC)
HOMER, NEW YORK

QST—QST—QST
DE
M & H—Eastern Ham Hdqtrs.
ANNOUNCING
OWING TO THE TREMENDOUS INCREASE
IN BUSINESS IN OUR HAM DEPT., WE
HAVE ADDED TO OUR STAFF OF
EXPERIENCED RADIO & SOUND ENGINEERS
—3 of the best trained Amateurs in the business
—with long years of standing as ARDEN HAMS.

W3PB—W3BES—W3BSC
When in trouble or in doubt don’t fail to write in;
let these boys iron out your problems.

EASTERN HEADQUARTERS for the
PATTERSON P-R-12 RECEIVER
if in the district come in and listen in on this revolutionary
ham receiver. The talk of HAMLAND.

DON’T MISS OUR BIG 1935 HAM CATALOG—
fill out this coupon for your copy

<table>
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<td>City</td>
<td>State</td>
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The 1934 Pacific Division Convention

Q Fresno! Here we come!” filled the ether
from all directions as the incoming hams
worked the five-meter station on top of the
Pacific Southwest Building in Fresno the night
before the 15th Annual Pacific Division Convention.
Hams rolled in from every direction
until the final registration reached 584.
The entire second floor of the Fresno hotel was given
over to displays, committee rooms, contest rooms,
and organizations such as the U.S.N.R. and
A.A.R.S.
First thing Saturday morning
there were code sending and receiving contests.
At 11:00 the convention was officially
opened by Chairman Ralph A. Jack at a general
meeting in the White Theatre, Mayor Leymel of
Fresno and Director Culver giving addresses of
welcome. Frank Jones opened the afternoon
session with an ultra high frequency talk, later
winning the Heinitz 54-meter contest.
At 2 p.m. everyone was taken out to the Santa
Lucia, said to be the world’s largest winery, where
samples were given out; the flavor of the trip
seemed to suit everyone.
The afternoon
featured technical talks by Jack McCullough and
Clayton Bane.

Saturday evening a Convention Frolic was
held at the White Theatre.
Jim Warner told
of his experiences as radio operator on the Southern
Cross Flight to Australia.
Tumbling and dance numbers, a part of the Headquarters’
movie, and club stunts continued the program.
Breakfast Sunday morning found 48 Naval
Reservists in one group, S.C.M.’s, O.R.S.
and R.M.’s in another; later, a 56 mc. contest was run
off.
Technical talks by Charles Perrine, Don
Wallace, and a Multi-Arc Rectifier demonstration
by George Becker were features of the morning
program.

The official A.R.R.L. meeting was held early
Sunday afternoon, Director S. G. Culver presiding
and A. L. Budlong representing League headquar
ters.
Resolutions were passed concerning
the creation of a new Southwest Division, the
issuance of WAC certificates, expansion of the
7-mc. band, and changing the 1-kw. power limit
from an input basis to an output rather than an input basis.
Following the open forum, Norris Hawkins spoke
on “Class B Prime Modulation.” At 6:30
p.m. all delegates assembled in the auditorium of
the San Joaquin Power Building for the banquet.
With Clyde Anderson, W6FFP, as toast
master, short talks were given by A. L. Budlong,
S. G. Culver, and Bernard H. Linden.
Los Angeles was selected as the site of the 1935
convention.
Prizes of unprecedented value
were given away, the climax being reached with
the presentation of a complete 75 watt ‘phone station.
Convention highlights: The entertainment pro
vided for OW’s and YL’s; they were given a
theatre party, sight-seeing tour, and a card party,
along with many prizes.
The great number
of mobile 56 mc. outfits in operation.
The consolation prize of a live duck, at the banquet.

84 Say You Saw It in QST — It Identifies You and Helps QST
PERFECTION OF PERFORMANCE
IS ATTAINED ONLY BY CAREFUL ATTENTION TO EACH MANUFACTURING DETAIL

The electrodes used in Premier Crystal Holders are typical of our strict adherence to minute details. A crystal ground flat and perfect in every other respect is worthless unless used between electrodes that STAY FLAT.

To make an electrode stay flat is not as easy as it sounds. Strains in the metal, possibly caused while the blanks are being stamped out, often produces distortions the bad effects of which do not become evident for weeks or even months. Ultimately, the twisting of the plates, even though very slight, causes destruction of the crystal through arcing, reduces the output, shifts frequency and sometimes destroys the crystal entirely by fracturing it. It took much longer to overcome these difficulties than it takes to tell about them. Brass would not behave and was discarded. We developed a nickel silver alloy which is specially heat treated to relieve the surface stress and aged by a unique process.

Determination of the correct thickness of the electrodes and the extraordinary pains taken to produce them, enable us to offer permanently flat and perfect electrodes. This important detail, in addition to many others, brings to the amateur, Crystals and Crystal Holders much nearer perfection than have ever before been produced.

Write for Bulletin 103 describing sixteen types of new Isolantite holders, “AT”-cut crystals, etc.

PREMIER CRYSTAL LABORATORIES, INC.
53 PARK ROW, NEW YORK, N. Y.

LOOK at your modulation
with a CLOGH-BRENGLE
Cathode Ray Oscilloscope

Get the most from your smitter. Check modulation, filters, etc., with this low cost, easy-to-use equipment. Write for full particulars.

Write Today

The CLOGH-BRENGLE Co.
1130-J W. Austin Ave., Chicago, U.S.A.

LEARN RADIO
70% Placement Last Three Years

At the oldest, largest and best equipped privately owned radio operating school in the East, Western Electric and RCA tube transmitters; 180 licensed graduates placed in past three years in broadcasting, shipping, police radio, aviation, service work, etc. Course prepares for all U. S. Government Telegraph and Telephone licenses. Send for 48-page catalog. Investigate. New classes every six weeks from Sept. 10th. Open all year around.

MASS. RADIO SCHOOL, 18 Boylston St., BOSTON
ONE OF AMERICA'S LEADING RADIO SCHOOLS

A REAL NEW DEAL FOR
ALL U.S.A. HAMS!

$7.50 TO $10.00 DOWN
PUTS THESE SETS
IN YOUR STATIONS
10 MONTHS TO PAY BALANCE

MCMURDO SILVER 5C
PATTERSON PR12
PFANSTIEHL S.S.

WRITE-WIRE-CALL-PHONE
for technical bulletins on these sets and dope on our "painless" payment plan

All amateur parts in stock

WILCOX RADIO SALES
(W9DDE-W9CRT-W9APY-W9WR)
506 S. Wabash Avenue Chicago
WEBster 4101
EIMAC

TRANSMITTING TUBES ARE HUSKY AND EFFICIENT

Use EIMAC's in your new rig and put yourself up among the leaders in the forthcoming International DX Contest.

With two 150T's in the final you can obtain a high plate efficiency without exceeding reasonable values of negative bias, grid excitation and plate voltage. This minimizes harmonic generation and concentrates your signal on the fundamental frequency. Why spread it over four or more harmonics?

Get that efficient kilowatt input with only 2500 volts on the plates of two 150T's. Twice cut-off bias is plenty.

TYPE 150T — Net price $24.50

at leading dealers

Note: New price of 50T, $13.50

"COMPARE AND REFLECT"

EITEL-McCULLOUGH, INC.

SAN BRUNO, CALIFORNIA, U.S.A.

New Quiet Volume Controls and Resistors for Every Amateur Purpose

Write Dept. Q for Catalog.

ELECTRAD

PRECISION CRYSTALS

'X' and 'AT' cut crystals one inch square carefully grounded for frequency stability and maximum output. Be sure of your transmitter frequency -- use PRECISION CRYSTALS. Guaranteed to be the highest quality obtainable.

'X' cut PRECISION Crystals carefully ground for maximum power supplied to your specified frequency accurate to 0.1% and calibrated to within 0.01% are priced as follows: 1750 and 3500 kc. bands — $1.00 each. 7000 kc. band — $1.50. Add $1.00 to above prices if plug-in, dustproof holder is desired. Jacks to plug holder into — $1.15 pair.

The 'AT' cut crystal recently developed has a temperature coefficient of practically zero and will handle more power than ordinary crystals. 'AT' cut crystals ground to your specified frequency accurate to 0.1% and calibrated to within 0.01% are priced as follows: 1750 and 3500 kc. bands — $6.00 each. 7000 kc. band — $9.00. Crystal holder — $1.00. Jacks for holder $1.15 pair.

Crystals and ovens for commercial use quoted on at your request. When ordering our product you are assured of the finest obtainable. Now in our sixth year of business.

PRECISION PIEZO SERVICE

427 Asia Street

Baton Rouge, La.

... The fellows who carefully stalked five bottles of wine for 15 minutes at the winery, only to find that they could have had them simply by asking for them ... The generally amiable time at the open forum, and the hilarity when Don Wallace asked for a vote on his high power motion (perennial) only to find it had already been passed ... The formal presentation ceremony in Room 716 at which "Bud" was presented with 45 pounds of Santa Clara prunes by the San Jose gang (yes, he got 'em home, too! — see photo). ... Those canes!

— W6FPW+ A.L.B.

International Relay Competition

(Continued from page 37)

The contest offers a special incentive to W/VE amateurs to qualify for membership in the WAC Club. We wonder how many W/VE's will work all continents in the nine days of our contest? Of course many more will complete QSO's with continents most difficult to work, which operation supplementing present achievements will put them in line for "WAC"!

Stations using 14 mc. for the first time are cautioned to use care to keep in the band—slight tuning capacity changes, antenna changes, etc., can change frequency over very wide limits—interference with A.T. and T's 14,440-kc. channel (GBW) from off-frequency amateur operation will be decidedly out of order. We don't want to be obliged to make disqualifications again on these grounds this year!

Both public opinion and government regulations have ruled against "prehistoric" signals, "ac" and unduly broad notes, so we hope there will be "none such." Good notes and stable frequencies should make your work in this contest more successful and enjoyable. A.R.R.L. Official Observers are requested to put in all time possible notifying amateur stations observed off-frequency or with improper-type signals, operating during the contest period. Observers' reports should be sent in through S.C.M.s at the conclusion of the contest.

Stations with good d.c. notes and real frequency stability will have the "edge" over those with poorly adjusted or otherwise inadequate equipment. But more than station equipment will be required to win! Most effective use of the available operation hours, intelligent choice of the different amateur bands, and a high degree of operating proficiency will take one a long way toward superlative results in this contest—or in any amateur radio work for that matter. The
Super SKYRIDER

"has everything"

Acclaimed by Prominent Short-Wave Authorities and Amateurs Everywhere!

FEATURES:
- Built-in Power Pack and Speaker
- 4 Short-wave Bands
- Exceptionally wide band-spread, spreading actually 7½ on 40 meter band
- Pre-selection
- No Plug-in Coils
- Less than 3 Microvolts Sensitivity
- 3 Watts Power Output in the Speaker
- Tone Control

"Remarkable enunciation, making it ideal for phone, as well as c.w. ... Sensitivity and band-spread superior to my set I've seen ... The Super SKYRIDER certainly has it!"

R. S. KRUSE
Technical editor of R/9, and for years technical editor of Q.S.T., says:
"General operation very good ... Valuable special features ... The set is mechanically solid ... Unlike many short-wave receivers the Super SKYRIDER does not permit c.w. tones to change every time any control is touched."

REX MUNGER
Genuine old timer among amateurs and sales engineer Lew Bonn and Co., Minneapolis, Minn.
"Congratulations. Yesterday we received first Super SKYRIDER. Took it home and tried it on couple of QSO's on 75 meter phone band. To say I was pleased with performance is putting it mildly. Consider the Super SKYRIDER as fine a performing set as I have ever run across."

These unsolicited testimonials, and many others like them, from such famous personalities as Lt. Com. R.H. G. Matthews (famous "Matty" of W9ZN), and T. P. Jordan of Syracuse, can mean but one thing—the Super SKYRIDER is at the very peak of short wave receivers. Write for particulars.

ROBERT HERTZBERG
Editor of Short Wave Radio, formerly technical editor of Radio News, says in the Dec. 29th issue of the New York Sun:
"This receiver is recommended for its simplicity and utter reliability. It requires no delicate internal adjustments or balancing, and in the hands of the patient operator it will bring in most everything worth hearing on the short waves."

W. J. Halligan, Pres.
the hallicrafters, inc.
3001-C Southport Ave.
Chicago, U. S. A.

ACR-136
AMATEUR RECEIVER

A 7-Tube Super with a range from 540 to 18,000 kc. Band change switch on front panel. Built-in coils. Airplane dial calibrated for positive logging. It has Stand-by switch, Best frequency on-off switch, Dual ratio tuning and all other necessary controls. Built-in Power supply and 5-inch Dynamic Speaker. Supplied complete with tubes.

NET PRICE $69.50 COMPLETE
Write for our new 1935 catalog
CAMERADIO
603 GRANT ST.
PITTSBURGH • PA.

Versatility

Aerovox Condensers and Resistors meet your transmission and reception needs. For instance:

- Oil-Filled Condensers ... aluminum container, round or rectangular ... genuine high-tension insulators ... generous safety factor ... and new low prices (e.g. 2 mfd. 2000 v. $6.50 list; your cost, $3.90).
- Mica Condensers ... wide variety ... quality design, materials, workmanship at mass-production prices.
- Resistors ... adjustable and fixed wire-wound vitreous enamel ... carbon ... faylite ... grid leak ... holders.

Free Data write for copy of 1935 Catalog covering entire Aerovox line. Also sample copy of monthly Research Worker.

AEREOVox
CORPORATION
73 Washington Street • • • Brooklyn, N. Y.
...Exacting

We guarantee our Crystals to be ground to an Accuracy of BETTER than .03%. ... BUT ... No Crystal ever leaves our Laboratories unless it is ground to an Accuracy of BETTER than .01% of your specified frequency in order to meet OUR OWN Specifications.

AMATEURS

Crystals are supplied to within 5KC of your specified frequency in either 80 or 160 meter band, $15.00 each unmounted. Calibration supplied accurate to Better than .03%.

"THE CRYSTAL SPECIALISTS" Send for Booklet and Price List

Scientific RADIO SERVICE
124 Jackson Avenue, University Park
Hyattsville, Maryland, Q-2-35

28 and 56 M.C.
TWIN-TRIODE
• TRANSCIEVERS
• DUPLEX UNIT TRANSMITTER-RECEIVERS

TRANSCIEVERS, each employing push-pull oscillator, Class B modulator, 19, 53 or 6A6 tubes, 10" x 7" x 5".

COMBINATION - TRANSMITTER-RECEIVER UNITS, each with push-pull oscillator, Class B modulator transmitter and separate receiver employing r.f. stage. Built-in dynamic speaker, 10" x 14" x 5", 19, 53 or 6A6 tubes.

$22.50 and $26.50

Bullets on Request

RADIO TRANSCEIVER LABORATORIES
8427 105th Street
Richmond Hill, N. Y.

A.C. Electric Generating Plants

ONAN ALTERNATING CURRENT ELECTRIC PLANTS furnish the same current as city service — 110 volt, 60 cycle, A.C. Operate Radios, Water Systems, Refrigerators, all household appliances. Size 300 to 50,000 Watts

Operate on Gasoline, Gas or Distillate. No battery used except to start engine. Ideal for places remote from electric service. For Public Address, Sound Amplification, Portable Lighting and Standby Equipment.

$995

Also a complete line of D.C. Models

D. W. ONAN & SONS
458 Royalston Ave., Minneapolis, Minn.

Say You Saw It in QST — It Identifies You and Helps QST
**ACME-Delta**

**COMPLETE POWER SUPPLIES REALLY HANDLE CLASS B1**

(As used by James Millen. See Oct. '34 QST)

AD-60

Standard Input 115 V., 60 Cycle, A.C.

<table>
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<th>Cat. No.</th>
<th>D.C.</th>
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<th>Reg. %</th>
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<tr>
<td>AD63</td>
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<td>0.40</td>
<td>2-65A</td>
<td>0.15</td>
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</table>

*Note: No filter included for 500 Volt tap. Auxiliary filter required—two AD44 Chokes and one 2 x 8 mfd. Electrolytic Condenser. List prices are less taxes and subject to change without notice. Authorized distributors extend 40% discount to amateurs and experimenters. We also sell components. Send for Bulletin DL-48-13. Also DL-48-34 on Class B Amplifiers.*

**Raytheon Manufacturing Co.**

**ELECTRICAL EQUIPMENT DIVISION**

190 Willow Street, Waltham, Massachusetts

Successor to Delta Manufacturing Co.

**Littelfuses**

- **INSTRUMENT LITTELFUSES**, for meters, 100 amp. up.
- **HI-VOLT. LITTELFUSES** for transmitters, etc., 1,000, 3,000 & 10,000 volt ranges, 1½ amp. up.
- **NEON VOLTAGE FUSES & Indicators (Tatteleites)**, 100, 250, 500, 1,000 & 2,000 volt ratings.
- **AIRCRAFT FUSES, AUTO FUSES, FUSE MOUNTINGS**, etc. Get new Cat. No. 6.

Littelfuse Labs., 4509 Ravenswood Ave., Chicago, Ill.

**BE A GOOD RADIO OPERATOR**

Learn to Send and Read Code at Home with

**Instructograph Code Teacher**

Experienced Operators, Amateurs and Beginners say there’s no better way to get regular, systematic code practice necessary to become a good operator, than with Instructograph. Send real code just as an expert operator would — it is available day or night, and costs less than most methods. Complete Book of Instruction explains each step as clearly as an instructor would do. Machines, Tapes and Book of Instruction for sale or rent. Cash or terms as low as $3 per month, Special for three months rental. Rental applied on purchase price if desired. Rent for month. If Instructograph meets your requirements, buy it. If not, send it back. Send postcard for full details. No obligation.

INSTRUCTOGRAPH COMPANY, Dept. Q-14

912 Lakeside Place

Chicago, Illinois

**THE HAM’S DREAM COME TRUE**

**THE TYPE 9 MICA X-MITTING CONDENSER**

Constructed of the finest selected mica and foil—moulded at a predetermined pressure, which insures constant and accurate capacity. Ideal as high current blocking (plate to grid) unit—also as by-pass for R.F. around any device.

**LOOK TO C-D IN 1935!**

Free for asking—Catalogue No. 126

**CORNELL-DUBILIER CORPORATION**

4973 BRONX BOULEVARD

NEW YORK

**DID YOU GET YOUR "CUT" BACK OR GET A REAL RAISE?**

Radio business is GOOD ... and if you’re not getting anywhere it’s your own fault! There’s quite a difference between “just getting along” and working toward a goal! The foremost engineers in the country will tell you that TECHNICAL TRAINING is necessary for those who want the big jobs and the salaries that go with them.

CREI WILL HELP YOU GET AHEAD

The man who isn’t capable of better performance than his job requires, will never get a chance at more important duties. CREI is no “diploma mill.” Each student receives individual, conscientious instruction, in either the home study or residence courses.

Write Now — for Free 44-Page Illustrated Booklet

**CAPITOL ENGINEERING**

14th and Park Road, N. W.

Dept. Q-2

Washington, D. C.

Say You Saw It in QST — It Identifies You and Helps QST
CRYS~ALS: Guaranteed excellent oscillators, 160 or 80 meters, your approximate frequency $1.15 postpaid. Crystal Maker's blanks 1"-65¢, dozen $5.00. Irregular shapes 25¢. Improved crystal, approved Rockwell Co., silvered electrodes, plugs into G.R. or tube socket mountings, any position, 75¢, Fisher Laboratory, 4222 Norwood, San Diego, Cal. 31. 47 South St., Louisville, Ky.

QSLs, samples, 2143 Indiana Ave., Columbus, Ohio.


CRYS~ALS, guaranteed excellent oscillators, 80—160 meters, your approximate frequency, $1. W8FLIS, 4433 North Kilbourn, Chicago.

Best offer takes Gross Eagle bandspread receiver, tubes, complete. Paul Loser, St. Marys, Penn.

QSLs by Maleco, Franklin in country. Free samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

QSLs, ACGS, 6 sets coils, tubes, supply power second audio stage, choke condenser output, used about 100 hours. $24. John Lodge, 61 Norwood Ave., Upper Montclair, N. J.


SALE—60 watt output xmitter with tritk exciter, monitor, SW-6 receiver with 4 sets coils, W8RAF, Partinburg, Minn.


QSLs, New, attractive cuts. W6FZQ, Box 1804, Phoenix, Arizona.


QSLs, 75¢ a 100. Two colors. W8DGH, 1816 5th Ave., N., Minneapolis, Minn.

FOR sale. Latest 1935 model Postal receiver, also two stages of fifty Webster amplifier. Glenn Watt, Chanute, Kansas.


SWAP—Getrafex 4.5 32 x4 R.B. camera, very lightly used, for FB7, what have you? W8RD, Grand Rapids, Mich.


FOR rental and sold call letters of Oddf. 7x10 card. Special 30¢ postpaid. W5DTM, El Paso, Texas.


CONNECTICUT hams: time payments on National, Hammond, Elmer, receivers, etc. Test equipment for servicemen. Write for terms. Hatty & Young, Hartford.

QSLs, free samples. Printer, Corwith, Iowa.

QSLs, free, special time offer 20¢. $1. W8SSN, 1827 Cone, Tulsa, Okla.

NEW $45 six fifty five meter DeForest H, five dollars. McShaffrey, Monessen, Pa.

SELL two hundred watt rack and panel complete, $85. Harrison, Brockings, S. Dak.

QSLs, free samples. 208As and 854s, new. Amateur Service, Fairview, N. J.

CRYS~ALS, guaranteed. 160—80 meter, less than 1", X or Y, plus or minus ten kilocycles, $1.35. Plus or minus two kilo­cycles, 1", Blank, $2.50. Blanks and ends five for $1; oscillating 85d, Gringing instructions 25¢, Holder, $1. Speedy service. Wm. Them, W8FNN, 4021 Davis Ave., Cheviot, Ohio.

QSLs, card and 30¢, 600 watt power, filament, class B, special transformers, etc. Test equipment for servicemen. Wm. Them, W8FNN, 4021 Davis Ave., Cheviot, Ohio.


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QSLs, free, special time offer 20¢. W8SSN, 1827 Cone, Tulsa, Okla.
PREPAID—Patterson PR-12 Crackle cabinet complete, $82.00; With crystal $87.90—Console $99.65; With crystal $105.55. Sargent 8-34 Complete $49.50 · Marine model (15 to 1500 meters) $67.50. Patterson Pre-Selector $17.64; Peak $19.80. All shipped prepaid. Our honest to goodness 100 watt phone cw transmitter now ready. See our display ads this issue. L. I. Marine & Electric Co., 163-18 Jamaica Avenue, Jamaica, N. Y.

CRYSTALS: A-cut, new type crystals insuring maximum power capacity, and minimum frequency drift, supplied in 80-160 meter bands within 5 kc. $5.00. Power ground X-cut crystals 80-160 meters supplied within 25 kc. $1.75; 50-meters 25 kc. $3.00; 60 kc. $3.75; 40-500 kc. filter crystals $3.00. 100 kc. standard frequency bars $7.50. Commercial prices on request. Insure satisfactory operation of your transmitter by using these better crystals. Gentry Laboratories, 803 W. Maple, Independence, Mo.

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Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe source of advice and counsel on what equipment.

**Patronize the dealer nearest you—**

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Say You Saw It in QST — It Identifies You and Helps QST
Is Your Best Friend

you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

You can have confidence in him

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**LOS ANGELES, CALIFORNIA**
Pacific Radio Exchange, Inc.
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Most completely diversified stock of amateur equipment in the West

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Complete Stock

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Complete stock of standard Ham & BCL parts
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"If it’s radio we have it"

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101 Queen Street, West
Canada’s foremost radio supply house

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Washington’s largest distributor of radio parts

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"Advertising for QST is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

Quoted from QST's advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League's technical staff.

For Your Convenience

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INDIANAPOLIS, INDIANA
Cable Address—Pelmallo

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Indianapolis, Indiana

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As a legitimate authorized service man, I am interested in securing a copy of your Mallory Service and Replacement Manual which I understand is free. Please send this to me quickly without charge.

Name
Address: __________________________ (City) (State)

My Jobber is __________________________

Say You Saw It in QST—It Identifies You and Helps QST

95
Here's the First New Unit

On a standard 7 x 19" rack panel, back of panel depth 8". A 247 crystal oscillator operating on 1.7 mc; 3.5 mc; and 7.0 mc drives an 841 buffer doubler giving ample excitation for 2-RK 20's on 4 bands on six frequencies. As illustrated, switches provide means for changing crystals and the amount of inductance in the circuits from the front panel. Link or capacity coupling to the next stage is provided. At last excitation where you want it when you want it in 10 seconds.

Type 4X exciter, less tubes and crystals $25

LEEDS Racks, Panels and Bases are designed for the maximum amount of convenience in construction, appearance and flexibility.

We are rounding out our constructional line advertised last month with new types of brackets, made of 16 gauge steel with dull black finish. They are ideal for fastening panels to bases or demi bases where heavy apparatus is employed. 4" high, 3 1/2" deep, 1/2" bend for mounting pair; 7 1/2" high, 9 1/2" deep, 1/2" bend for mounting pair.

Here are four antenna impedance networks made in the LEEDS convenient manner, standard 4 x 9 panels are employed, front of panel switching with positive low resistance connections to the network coils, eliminate unstable back of panel clip adjustments. All controls are where you want them, out in front. Antenna Meters? Wait until you see our new meter panel next month.

Type AIM-1 for transmitter employing 20's - 40's, etc. using single wire feed antenna for 1.7; 3.5; 7.0 and 14.0 mc operation $12.50

Type AIM-2 for transmitter employing 65-A's - 94-A's, 85-A's using similar antennas for 4 band use $21.50

Type AIM-3 for transmitter employing 201-A's, 40's, etc. using two wire feed antenna for 3.5; 7.0 and 14.0 and 28 mc operation $18.50

Type AIM-4 (illustrated) for transmitter employing modulated 201-A's; 85-A's using two wire feed antennas for 4.5; 9.0; 14.0 and 28 mc operation. Deduct $1.50 from above prices if 4" bakelite dials are substituted for the General Radio 4" dials illustrated.

Here are four manufacturers folders and our own bulletin B-73 all for a thin dime. Send for yours today.

Yes sir! After all these years transmitters by LEEDS will be available by the time this reaches you. Convenient operation on the four popular amateur bands is the keynote of our unique designs. Quality parts, high efficiency and reasonable prices.

SPECIAL CRYSTAL OFFER!

Carrying our regular guarantee of 100% satisfaction, 3 mounted crystals, one 1.7, one 3.5 and one 7.0 mc priced at $10 when purchased with our 4-X unit — you pick the frequencies, AT cut crystals — your choice of frequency in the 1.7 and 3.5 mc bands, unmounted $4.50

7 mc band..................$6.50

Socket type crystal holder $1.00

LOW LOSS COILS

You can easily "roll your own" coils with our new "air wound" inductance used in our 4-X exciter as illustrated above. Coil diameter 2" employing No. 16 DCC wire. It is available in two styles — close wound, 16 turns per inch and space wound, 9 turns per inch. 20" length $2.85, by the linear inch ...... .15c

Frost lightweight phones, 20,000 ohm impedance...

The New General Radio
3¾" dial now in stock. We are using them on our new Excitor unit. Each...

Frost lightweight phones, 20,000 ohm impedance...

NATIONAL statite lead through bushings for lowest losses. Type WXS-1 (small size) $36c

Type WXS-2 $48c

General Radio form No. 677-U..................$3.50

Vesey Street New York City

Frost lightweight phones, 20,000 ohm impedance...

3½" dial now in stock. We are using them on our new Excitor unit. Each...

NATIONAL GROUL FORMS

XR-10A Steatite; 3/16" x 5"; 26 turns $1.50 List, Special............$1.00

XR-12A Steatite; 3⁄4" x 5 1/4"; 28 turns $3.25 List, Special............$2.75

The New RCA ACR-136

In stock, a real ham superhet receiver, plus broadcast reception. A descriptive bulletin is yours for the asking on this remarkable receiver. Price, complete $69.50

Nothing else to buy

LEEDS - The Home of Radios

LEADS THE FIELD

World Wide Service to Amateurs

45 Vesey Street

New York City

Cable Address, "RADLEEDS"
SINGLE SIGNAL

The completely shielded single signal unit has a front-panel selectivity control with sufficient range for phone reception, as well as a front-panel phasing control for heterodyne elimination. The crystal is of a new type, virtually eliminating side peaks. The holder, also new, mounts the crystal vertically, permitting free oscillation. And when turned "off," the unit becomes a conventional I.F. coupling unit which contributes its full share to the remarkable overall selectivity of the HRO.

WORM DRIVE TUNING

The HRO employs the new PW precision condenser with worm-drive tuning. Smoother and more sensitive than a friction drive, it permits swift, accurate tuning and precise calibration. The micrometer dial has an effective scale length of twelve feet, direct-reading to one part in 500. The electrical characteristics are of the same high order, each of the four sections having low-loss Steatite stator insulation, insulated rotors and individual non-inductive rotor contacts.

GANGED PLUG-IN COILS

CALIBRATED BAND-SPREAD

The plug-in coils of the HRO are ganged for easy handling, and individually shielded for stability. Used as general coverage coils, each range includes two amateur bands and the spectrum between. By a simple switching device, the same coils are changed to band spread the respective amateur bands, spreading them over a uniform span of 400 divisions. All ranges are accurately calibrated at the factory.

HIGH PERFORMANCE CIRCUIT

The nine-tube circuit employed in the HRO is remarkable for level gain from 1.7 to 30 mc. Two stages of tuned R.F. amplification preceding the tuned detector provide the notable signal-to-image ratio of 1000 to 1 at 14 mc., as well as exceptional usable sensitivity. The HRO is designed for either double or single wire antenna. Other features include separate audio and R.F. gain control, A.V.C., Beat Frequency Oscillator, Signal Strength Meter, Phone Jack and B-voltage switch.
NOW $4.50

DESIGNED ESPECIALLY FOR THE AMATEUR

* THE NEW RCA 801 *

The RCA 801 is a new transmitting tube of improved design and construction. Interchangeable with the type 10 in amateur transmitters, the RCA 801 is capable of considerably greater plate dissipation and output and is rated at 600 maximum plate volts. Incorporating many advanced features of design, the RCA 801 may be operated under maximum rated conditions of input at frequencies up to and including 60 megacycles. For details and technical information on the RCA 801, or other RCA types, see your RCA de Forest Distributor, or write to:

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