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amateur radio

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QST

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devoted entirely to

AMATEUR RADIO

Editorials
Extending the Range of Ultra-High Frequency Amateur Stations
Ross A. Hull

Tailoring Tuned R.F. Transformers for Short-Wave Receivers
L. W. Hatry

Third Corps Area Asks Amateur Help
H. O. Bixby

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R. H. Cunningham, VK3ML

For the Experimenter

Spreading Out the Calibration Curve

Canada-U. S. A. Contact Contest

Amateurs Undertake Ocean Flight

Operating Notes

Correspondence Department

Standard Frequency Transmissions

Silent Keys

Hamads

QST's Index of Advertisers

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(see page 14 June QST)

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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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Address all general correspondence to the executive headquarters at West Hartford, Connecticut.
THE last half of August has seen 5-meter interest in New England whipped to fever heat. It all started when Ross Hull, of the QST staff, built a reflector antenna system at W1AL and aimed it at Boston. In the Boston area is a considerable number of 5-meter stations, most of whom know each other well and who have been in peaceful communication with each other over modest distances of ten to twenty miles. Into this tranquil local communication there suddenly projected itself, one night in middle August, a large and juicy R8 signal which claimed to originate in West Hartford, Connecticut. At first nobody would believe it; everybody thought it was a portable-mobile station — more particularly as they could work this station, and West Hartford was a hundred miles away! When finally the gang was convinced of the genuineness of the signal the wildest excitement broke out. And we'll say right now that the excitement on the West Hartford end of the circuit was just as wild as anybody's. The only fitting comparison we can make is to the period when hams first worked across the Atlantic. It was the only subject of conversation, everybody wanted to work the distant station, and the question on everybody's mind was "How do you do it?"

In the two weeks which have preceded this writing, W1AL has been in two-way communication every night and almost every day with some dozens of amateur stations spread over an arc from Fall River to the New Hampshire border at an average distance of a hundred miles. The fellows on the other end use their normal rigs, generally a pair of 245's on a doublet, and the signals at W1AL average R6 and 7.

To those of us who have worked with and boosted the ultra-highs through the jeers and sneers of the low-frequency brethren and the faint cheers of the growing u.h.f. gang, it has been tremendously encouraging and inspiring. There is of course nothing new whatever in the idea of using a beam antenna. But it would seem that in not long ago applying the idea to our ham 5-meter stations we overlooked a mighty valuable aid. From one way of looking at it, there is nothing amazing about the result. If a beam antenna gives a power gain of 20 and one has an input of 100 watts, the transmission has the strength of 2 kilowatts in a doublet, and a 2-kw. signal might very conceivably cover the distance. The really sweet thing about it is that reception similarly improves and that that same effective power gain is applied to the other fellow's signals.

At this writing no station in the Boston region has come on the air with a similar beam. We're not going to claim a single thing as to the adaptability of this system to general amateur work — not until we've had more experience. There may be something freaky in the location of W1AL, on a modest hill commanding the Connecticut Valley. Perhaps the weather has been freaky and is never to be duplicated. There may be a 5-meter "groove" between Boston and West Hartford. It may never happen at any other location or for any other amateur. Of course we don't actually believe it is that way but we'll do no general shouting until a few more beam stations get on the air and demonstrate the general usefulness of the reflectors. What we do know is that reflector systems hold out the most fascinating promise to the earnest workers in that most fascinating field, the ultra-high frequencies. QST this month presents some further comments on the subject, and we very much want to hear about the results of other hams. We amateurs are going to lick these ultra-highs before we are through with them, old sons!

K. B. W.

October, 1934
Extending the Range of Ultra-High-Frequency Amateur Stations

The Story of Some Extraordinary Results Obtained with Directive Antennas

By Ross A. Hull*

When Ross Hull walked into the office one morning recently and said he'd had four hours of solid QSO with 100-mile-distant Boston stations the night before on 5 meters, we said, "Oh yeah!" and turned to our morning mail: such ultra-high-freak DX, except with airplane altitudes for the apparatus, was simply one of those things we all dream about, but which everyone knows is impossible. Impossible, eh? Not on your directive antenna, it isn't! As we write this, three weeks of almost unbroken day and night QSO has been going on between West Hartford and the Boston area, ground stations at each end, and with signal strengths that make even strong men (on 80 meters) weep for sheer jealousy. Boyoboyoboy—consistent 100-mile work on "five" from backyard to backyard! And the nice thing about this directive antenna is not only that it dumps RB sigs into ordinary receivers at Boston, but that it enables swell reception here of ordinary non-directive-antenna transmissions from Boston, too.

Enough of this; read the article which follows, learn how to do it yourselves—and then do it! —EDITOR

ANTENNAS having well-defined directivity have been widely used for radio transmission and reception ever since Hertz revealed their effectiveness in his work prior to 1888. In the commercial world, directive antennas of all shapes and sizes have become almost universal, for the very good reason that they provide an inexpensive means of obtaining enormous increases of effective power in some one or more particular directions. On the lower amateur frequencies it has not been possible to exploit such antennas very fully because the necessary extensive space in which to erect them has rarely been available. It is fortunate that, on the ultra-high amateur frequencies, directive antennas can be installed in almost any location. The rather surprising observations to be related in this article make it clear that such systems will receive much more attention in the future than they have in the past.

Of course, directive antennas, even on the amateur ultra-high frequencies, have been used for a great many years. Many experimental investigations of their radiation have been made and they have been the subject of a great deal of discussion. Examples of prolonged amateur communication on the ultra-high frequencies with directive antenna systems are quite rare, though, and in all these years the surface of the whole subject has hardly been scratched.

IT WORKED AT FIRST CLICK

Our latent interest in directive arrays was tripped off during a recent visit to Provincetown, where we had an opportunity to marvel at the effectiveness of the directive arrays used by the New England Telephone Company on their ultra-high frequency circuit across Cape Cod Bay to Brant Rock. Immediately upon our return from the trip we gathered together some wire, insulators and rope and strung up a simple directive system across the veranda roof of a house, on the outskirts of West Hartford. From this particular location, with normal antennas, the greatest 56-mc. DX during the past three years has been communication with a mountain-top station thirty-five miles distant. We were justified, therefore, in obtaining a terrific thrill upon discovering that the use of the new directive array for transmission and reception immediately permitted two-way contact...
with many stations in the Boston area, 100-odd miles away. During the first few hours of operation (W1ANA doing the work) nine Boston-area amateurs were contacted, R8 to R9 reports being received. Even more surprising was the fact that a 45-degree lobe from the antenna permitted us to make entirely satisfactory contact with stations in Fall River.

The first night of operation over the one-hundred-mile path proved not to be completely typical of the performance to be expected, but in 24 days of operation since that time (with operators of the Headquarters staff taking "tricks" in charge) satisfactory two-way contact has been established on all except four days. Signals have been received from the Boston area without any break whatever.

AN ARRAY AT BOTH ENDS

All of this communication was made possible by the use of a directive array at one end of the path. Early in the proceedings we became mightily eager to go the whole hog—to investigate the possible performance of two such antenna systems, one at each end of the link. Negotiations were immediately opened with some of the Boston amateurs with this in view, and it is somewhat unfortunate to have to relate that, though several of them erected directive antennas, they did not immediately obtain a successful performance.

During the second and third weeks of these tests, W1HRX, located at Middletown, Mass., conducted prolonged experiments with his receiver. At his location it was impossible for him to hear our signals with a normal vertical antenna. Upon the installation of a temporary directive antenna he began to turn in reports of R8 and R9 signals. Three days ago he completed and successfully tuned a permanent directive array which was immediately effective—boosting his signals from zero to a value which reaches R9 on many occasions. Unbroken contact with this station has been maintained, day and night for the last three days.

The one other confirmation of the striking effectiveness of directive antennas in this work comes from W1ANA, located about 60 feet above sea level in the Connecticut River valley at Wethersfield. A simple four-wire array installed in his attic has permitted him to receive good signals from a group of Boston stations—signals entirely inaudible on a normal single antenna.

RELIABLE CONTACT VS. FREAKS

The sole aim in concentrating our attention on these contacts at distances of 100 miles and more has been to establish quite definitely that a good directive antenna can result in an almost unbelievable increase in range and that the increase is by no means a will-o'the-wisp. Ultra-high frequency signals have been heard over great ranges from time to time without the benefit of directive antennas. These examples of reception, however, represent abnormal and extremely rare conditions. The long-distance contacts under discussion belong in an entirely different category being, as they are, at least as reliable (if not more so) than contacts established over the same route on the lower frequencies. Indeed, we have had evenings of continuous contact with Boston (with R8 to R9 signals at both ends) on occasions when the Hartford 50-kw. broadcast station WTIC on 1040 kc. was fading below the limit of audibility in the northern city. As a final mention of the communication maintained, the log shows that during 25 days of operation, a total of 172 two-way contacts have been established with stations at distances of the order of 100 miles or greater. Experiments from time to time established that none of the signals from those stations was audible with a normal antenna in place of the directive systems—even when conditions were at their very best.

It is now high time that we quit talking of performance and turned our attention to the directive antenna itself.

A directive antenna does not give one something for nothing. However, it does concentrate the radiation from the transmitter in one or more directions and hence provides a great increase in effective power in those directions. For reception,
the effect is the reverse and one has, then, somewhat the equivalent of a very large and very effective hearing trumpet. It would be futile to attempt to outline the various practical types of directive antennas chiefly because the subject is such an extensive one and also because many very comprehensive treatments of the subject are available. We must be content, at this juncture, to describe the particular antenna with which we have had so much success, together with some minor variations of it. This system is of a perfectly conventional type and, though proportionately smaller, is exactly similar to the arrays used very widely in commercial work. We chose it from the many types possible because of its simplicity and because of the possibility it afforded for straightforward adjustment.

BUILDING THE ARRAY

Fig. 1 is intended to illustrate the first antenna erected for this program of experimental work. As will be seen, it consists of a box-like assembly of spreaders, reflectors, antennas, and feeders, approximately 25 by 8 by 4 feet, suspended on two main ropes which, in turn, are strung to two appropriate supports. In its first location, our antenna was supported between the branches of two trees, the antenna itself hanging about three feet above the metal roof of the veranda and approximately thirteen feet above ground. The first week of communication was run off with this antenna and with a transmitter having two Type 45 tubes feeding it. Since that time the antenna has been re-strung higher above ground in a spot clear of the trees and the transmitter power has been increased to 200 watts input. These changes have resulted in a perceptible though not very great increase in performance.

The ideal structure for the support of an antenna of this type is a rigid framework such as that used by W1HRX. In this way the relative positions of the antenna and reflectors are maintained accurately and no trouble is experienced from the antenna tossing around in the breezes. The simple scheme shown, however, proves to be thoroughly effective, provided the whole structure is made as light as possible. The spreaders in our own antenna are 5/8-inch square section pine with the exception of the outer members, which are one-inch square cross section. The wire used is No. 16 or 17 and the insulators are small and as light as possible. Too much emphasis can hardly be placed on the absolute necessity of adhering strictly to all dimensions, and of the extreme desirability of stretching all wire before cutting it to the desired length. When used for transmission, such an antenna must be operated in the immediate vicinity of the frequency for which it was designed. The failure of several individuals to obtain satisfaction from their directive arrays leads us to suspect that the adjustment of the system is considerably more critical than one might at first think.

TUNING THE SYSTEM

Providing the various reflector and antenna wires have been cut correctly and that their spacing is accurate, the next most important item is to make quite certain that the feeder is capable of being tuned. The length between the points at
which the main feeder joins the array and the antenna coil of the transmitter itself must be approximately some multiple of a half-wave long. A slight increase in this length will make it necessary to use series condensers for tuning the feeders, while a slightly shorter length will call for a parallel tuning condenser. Provision must be made for either parallel or series tuning and, hence, the exact length of the feeder might well be determined by cut-and-try method. The usual thermo-couple ammeter may be used to indicate maximum feeder current, although in low-powered installations this may become a little difficult since the feeder current of an array will be considerably less than the value obtained when feeding a simple antenna. In such cases, the usual rise of tube plate current may serve the purpose.

**PROVISION FOR RECEPTION**

Since the antenna is to be used both for transmission and reception, a double-pole-double-throw switch should be provided to change the feeder from transmitter to receiver. Then, since the feeder is to be tuned for reception also, either a series or a parallel tuning condenser should be provided at the receiving position. In our own installation the tuning condenser is connected across a single-turn coil which is inductively coupled to the grid coil of the receiver. Should the receiver be equipped with the conventional small series antenna coupling condenser, it is a good plan to provide a simple tuned circuit at the receiving end of the feeder, using bare wire for the coil of the tuned circuit. The antenna post of the receiver is then connected by means of a clip to some point on the coil. Experimental determination of the most desirable point is, of course, necessary.

In some locations it may be impossible to erect the array shown in Fig. 1. In this case the simple system shown in Fig. 2 could be used. Examination of the diagram will reveal that this system is merely the middle bay of the larger antenna—the outer reflectors and antennas having been removed. The effectiveness of the system is, of course, considerably reduced but it should nevertheless be well worth while.

**ARRAYS FOR TWO DIRECTIONS**

Both the systems described are capable of transmitting effectively in only one direction. Should transmission at high effectiveness be desired in a variety of directions, the only real solution would be to mount the array on some structure capable of rotation.\(^2\) It would seem, though, that in most instances there will be some one or two directions in which most DX activity is confined.

A very desirable type of bi-directional antenna which we intend to install at W1AL is that shown in Fig. 3. It consists of two groups of half-wave antennas, one above the other, and fed in exactly the same fashion as the array of Fig. 1. No reflectors are provided and the transmission effectiveness both fore and aft is probably equivalent to that of the uni-directional transmission of the present system.

As we have already mentioned, countless other types of directional antennas are available for this type of work. We restrict our description to one general type simply because it has shown itself to be so effective in this instance. We can foresee the probability that, in the early future, ultra-high frequency amateurs will be adorning the landscape with many weird and wonderful structures in designs not yet even visualized.

During the course of the activities undertaken at W1AL of great many interesting observations on transmission and reception phenomena were made—phenomena concerning which we can find no mention in the ultra-high frequency literature. An outline of these new-found transmission and reception phenomena is entirely beyond the scope of this article; but it is our hope to work up some of our observations for an early issue. In the meantime, we wish to express our gratitude to the following amateurs who showed splendid coöperation during contacts and tests with W1AL: WDBE, Lowell; GJZ, Fall River; VW, Fall River; GJZ, Weston; HRX, Middleton; DEK, North Waltham; BHJ, Nashua, N. H.; XW, Blue Hills; IHY, Chelsea; AFF, Lynn;

\(^{2}\) There are some hot ideas in John P. Shanklin's article, "A 14-Mc. Rotary Beam Antenna for Transmitting and Receiving," in July, 1934, QST.

**FIG. 2—A DIRECTIVE SYSTEM FOR RESTRICTED SPACE**

Using only four elements and occupying a space approximately 8 by 8 by 4 feet, this array should be capable of very definite gain in both transmission and reception. The dimensions of the antennas, reflectors and feeders will be in accordance with the table under Fig. 1.

**FIG. 3—AN ARRAY WHICH TRANSMITS EQUALLY WELL IN TWO DIRECTIONS**

Consisting of two rows of half-wave antennas, one above the other, this system should be capable of a somewhat similar order of gain to that obtained with the array of Fig. 1 but with the added advantage of transmission in the two directions at right angles to the plane of the array. Antenna and feeder dimensions from the table of Fig. 1 should be followed.
Tailoring Tuned R.F. Transformers for Short-Wave Receivers

A Design Method for Peak Performance

By L. W. Hatry*

Tuned r.f. transformers passing energy from a tube to a tube, or for that matter from an antenna to a tube, are always a problem for the amateur. He would like to obtain the practical optimum of amplification from the tube preceding the transformer, or the same effectiveness in feeding from antenna to tube. This practical optimum can be realized only when the primary has sufficient turns; that is, when the primary has better than the commonly accepted “somewhat fewer turns” than the secondary.

The words “practical optimum” mean nothing unless defined. So let us set down just what they mean. Considering the case of the regenerative detector following a tuned r.f. amplifier, optimum performance would mean the following things: Greatest selectivity against strong signals consistent with highest practical amplification, and smooth regeneration control with smallest tickler. Since, in general, highest amplification comes at an appreciable sacrifice of selectivity, this way of stating the first requisite is understandable. And since the price of oversize ticklers is squealing and regeneration-control detuning of signal, the smallest tickler is desirable.

All of which may give the impression that you will be told exactly the correct number of primary turns to wind for a 24 tube, a 58 tube, etc., and be handed an all-inclusive table of coil data. On the contrary, this is written with the intention of making that unnecessary—particularly since the practical optimum for one receiver may be an atrociously useless design for another. Physical layout and circuit details have a direct bearing on the design; and you can easily discover for your own receiver the proper number of primary turns.

The essential circuit to which this information applies is shown in Fig. 1. R.F.T is the transformer whose primary winding we are concerned with. We shall presume that the primary turns lie between the secondary turns, which is probably the most satisfactory and practical design for the homemade coil since d.c.c. wire on both windings gives effectively high conductor spacing and collodion or a similar “celluloid” binder will effectively moisture-proof what finally will be a quite good coil. If the primary and secondary are wound at the same time and of the same number of turns, removal of part of the primary will leave the surplus secondary space-wound.

Notice Fig. 2. Here the plate-cathode capacity of the r.f. tube is indicated in the way that it affects the coil. This capacity can resonate the primary winding. If the primary winding is large enough this resonance frequency will be within the range of the secondary’s tuning as determined by condenser C. Now if the primary is actually resonant within the tuning range of C, the detector tube either will not oscillate with any size of tickler or else will only oscillate above or below, or above and below, the primary’s resonant frequency. When the primary is so tuned it acts as an “absorption” circuit, wavemeter-wise. This absorption effect serves as a simple and effective guide to the “practical optimum” primary turns.

SECONDARY AND TICKLER PROCEDURE

Since QST, the Handbook and other sources contain ample coil data of a general nature, it can be assumed that you know the approximate size of the secondary or grid coil. If you are using three-winding transformer data, negligible secondary change will be necessary. If you are using antenna-to-detector coil data the secondaries will be too large; but turns are easy to remove—so what of that?

First, get the tickler sizes correct. As long as your coils are not intended individually to cover more than a 2-to-1 frequency or wavelength range (such as 10 to 20 meters, 3 to 6 kc., etc.), the following general instructions will be satisfactory. A range greater than 2-to-1 is hard to tune, will

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not give as smooth oscillation control and otherwise is somewhat unsatisfactory. But a smaller range per coil, such as for band-spread purposes, will make the instructions even more satisfactory.

The tickler can be adjusted with the r.f. tube out of its socket. The tickler should be just large enough to give strong oscillation when the secondary tuning condenser is at full capacity. If you seem to have just enough tickler to get oscillation, add about 25 percent more tickler. In a typical instance, with a 58, a 7-inch coil took a tickler of 2½ turns on a 1½-inch form for what might be termed an efficient setup; I mention this because the ½ turn in the example is the extra 25 percent. For detector tubes like the 24, whose screen-voltage adjustments are critical for best performance, the first desirable fact to learn is, what setting of the regeneration control is correct for this "just large enough" tickler? If a steady local signal such as a broadcast harmonic can be heard with the tube not oscillating, disconnect the tickler and connect the plate direct to the audio coupling as shown in Fig. 3. Then find the regeneration control setting that gives maximum volume. This found, wind the tickler just large enough to give oscillation at that setting of the regeneration control when the secondary tuning condenser is at full capacity.

It is not unlikely that the sole reason for the general acceptance of the variable-mu 35, 58, 51 or 6D6-78, as grid-leak regenerative detectors superior to the 24-77-57-6C6 type of tube has resulted because the effort was not made with the latter types to find and use the critical screen voltage required for greatest wallop. I believe that the straight screen-grid or non-variable-mu tubes are actually more sensitive for c.w. and appreciably more sensitive on "loudspeaker" signals—when the screen voltage is right.

Remember that the tickler should be slightly larger than necessary. Once so set up you will probably find that with the secondary tuning condenser at minimum (if the tuning range is 1.5:1 or 2:1 or more) the regeneration control can be turned up high enough to produce a squeal, an effect that should be impossible the other end of the tuning range. And now to adjust the primary.

THE PRIMARY TURNS

If you wound the primary as suggested, with as many turns as the secondary, connecting it to the r.f. tube and putting that tube into operation may prevent oscillation anywhere within the tuning range. However, even though you do get a little oscillation, the primary is too large; so remove 10 percent of its turns, from the "top" end. If anything, you should now get oscillation with the secondary tuning condenser set to maximum, or you should get it further down on the dial than was possible before. The game is to remove primary turns until the regeneration control setting and action is about the same at C1's minimum as at its maximum, and oscillation is uniformly smooth, without squeal, irrespective of control setting. This primary will then give as much amplification from the preceding tube as is satisfactorily practical; and it likewise will be doing least to spoil selectivity.

Having found, for any given frequency range, a satisfactory number of primary turns, the rest of the coils for this socket in this set will in general have the same ratio of primary to secondary turns. That is, if this coil has 10 primary and 15 secondary turns for one band, others may have 4 and 6, 20 and 30, etc., a continuous 2:3 or 1:1.5 ratio. However, if speed is not necessary and you have the patience for further adjustments, better have a few more turns than necessary in the primary of each transformer to start with and then tear down turns to get the thing just right.

The design of tuned transformers for a multi-stage tuned r.f. amplifier can be determined in exactly the same manner as above. The tickler used in developing the pattern coil can be omitted from others. Where maximum selectivity is of prime importance, the primary should be reduced until its effect upon regeneration (with the secondary tuning condenser at minimum) is small or nil. Note that "maximum selectivity" should be distinguished from the "optimum" described earlier in the article.

Coils so designed give what can be regarded as practical optimum all-around performance in shortwave receivers of the general type of Fig. 1. However, coils so made must give maximum r.f. amplification at the highest frequency to which they are tuned if they are reasonably good at that frequency. When the coils are made for a multi-stage amplifier this means that the amplifier will tend to have sensitivity that rises as the frequency increases. This also means that if the primary should be wound larger than the secondary and adjusted to affect oscillation at maximum tuning capacity, the sensitivity increase will be at the low end of the frequency range. If using this method of adjustment suggests design of coils with more uniform sensitivity throughout their tuning ranges, hop to it.

THE ANTENNA COIL

Since the antenna coils are also primaries, they can be designed in the same manner—the experi-
mental tickler being torn off afterward or not used, unless regeneration is to be a feature of the r.f. stage. They should be adjusted for a given antenna or feeder system. The primaries of the antenna transformers may be deliberately wound over-size so that they affect oscillation with the secondary tuning capacity at maximum. Thus in a receiver of the type of Fig. 1, the sensitivity will be higher at the input stage for the low-frequency end of a given tuning range and higher at the detector for the high-frequency end of the range. The final overall result will tend toward a more even general sensitivity for a given pair of coils.

The chap who runs his antenna direct to the detector r.f. (one-, two- and three-tube receivers) cannot easily surpass feeding the antenna through a small series condenser direct to the grid side of the tuned coil (Fig. 4). However, if he does this he obtains good results with small antennas and deliberately loses the benefits of large antennas. By designing coils on the general plan suggested


### Third Corps Area Asks Amateur Help

**Heavy Traffic Coming from C.C.C. Camps**

By H. O. Bixby*

The Third Corps Area Signal Officer has given the Army Amateurs of that corps area the job of keeping the men in the C.C.C. camps in touch with their homes by radio. The Third Corps Area consists of the states of Pennsylvania, Maryland and Virginia and the District of Columbia. All of the C.C.C. radio stations of those states, which normally operate on special army frequencies between 4300 kc. and 4650 kc. in the daytime, are being licensed as amateur stations for evening operation and will accept messages from the men in the camps at any time. This means that there will be 35 stations all originating traffic from upwards of 30,000 men. In addition to this it is planned to try to enlist the help of amateurs who live within reach of other C.C.C. camps not equipped with radio. In this way it is expected that there will be a large volume of worthwhile traffic originated during the next A.A.R.S. season which begins September 3d.

With these facts in mind, three transmitters are now in process of being installed at Third Corps Area Headquarters in Baltimore, to be used by the corps area net control station. One of them is a built-up job of 200 watts input and carefully adjusting the primaries to a given antenna he can, on the contrary, expect generally superior results in benefiting from a long antenna. When the antenna feeds the detector, the primary should be adjusted (with the antenna connected) to affect oscillation with the tuning condenser set to minimum for the same general reasons that that procedure was suggested for tube-to-tube r.f. transformers; to wit, smooth oscillation control plus good overall sensitivity with reliability of logging and ease of operation.

Or, if the antenna used and liked is a short one and primaries are adjusted for it, longer antennas will work quite well if brought down to about the same general electrical characteristic by means of a series antenna condenser of around 100 µfd. Remember in this connection that the antenna may have an electrical length producing vagaries not completely compensated by the series condenser. Such a length is most easily and practically recognized without carrying a set of data in the pocket or the mind. If the series condenser has to be adjusted to quarter capacity or less, lop off or add on wire.

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QST for
A-Cut Crystals

No. 1 development of the day to come out from behind the cloud of rumor is Bell Laboratories' new-cut quartz crystal having characteristics that give it a temperature-frequency coefficient of practically zero and, simultaneously, a greater power-handling capability. Although we had the essential dope some months ago, via those grapevine channels that reach A.R.R.L. Headquarters from almost every place, we couldn't talk about it. But now the lid is off, with the whole story in July Bell System Technical Journal's article, "Some Improvements in Quartz Crystal Circuit Elements," by F. R. Lack, G. W. Willard and I. E. Fair.

Briefly, starting from the Y cut, it is shown that with orientation of the cut about the X axis, plates are obtained at certain angles that have a simplified frequency spectrum (that is, practically single-frequency response); while at certain other angles the temperature-frequency coefficient becomes zero (that is, there is no change in frequency with temperature over a considerable range). With the angle of rotation about the X axis measured with reference to the Z axis, the single-response cuts come at plus 31 degrees and minus 60 degrees; while the zero-temperature coefficient cuts come at plus 35 degrees and minus 49 degrees. The plus 31-degree cut which gives the simplified frequency response is designated the "AC cut"; and the plus 35-degree (zero-temperature coefficient) cut is designated the "AT" cut.

Although the "plus" and "minus" sense of rotation is not explained in this paper, it is presumably the same as given in another interesting paper on crystal filters in the same issue of the Journal; namely, "A positive angle is a clockwise rotation of the principal axis for a right-handed crystal, when the electrically positive face (determined by squeeze) is up. For a left-handed crystal a positive angle is in a counter-clockwise direction."

The notable combination is the AT cut, since it has the zero temperature-frequency coefficient qualification and, at the same time, is very close to the ideal 31-degree value that gives the simplified frequency response. Hence it is this AT cut that has us all keyed up. While it still remains for crystal specialists to take care of the little matter of getting such crystals into the hands of amateurs (the cuts are obviously critical and require special equipment and skill), it is not difficult to foresee the potential benefits that will accrue to us with their availability. The zero temperature business means that we can have well-nigh perfectly fixed frequency, without the complexity of temperature-control gadgets; and the elimination of other modes of vibration, giving the crystal greater power-handling ability, means that crystals can be used to control larger oscillators without getting into trouble. The Bell Labs people casually mention running the power of experimental circuits up to 200 watts "without fracturing the crystal," and state that 50-watt oscillators "would appear to be practical" at 2000 kc.—which is right at the high end of the 160-meter band.

The AT cut is somewhat thinner than the usual Y cut from which it is derived, incidentally; 85 percent as thick, judged by data given for 1000-ke. AT and Y cuts. But, while fully as "active" as the Y cut, the AT cut is practically free of the coupled vibrations that not only give the Y cut its notorious double humps but also make it liable to fracture in operation. Crystals don't break up just because they are thin. They do so more because they try to go too many ways at once. And the new cut promises to whip this weakness.

New Receivers

No. 2 development coming over the horizon is new receivers. Manufacturers are ready to introduce new models especially designed for amateur duty. Superhetdominate, of course, with circuit and mechanical improvements their distinguishing characteristics. More input selectivity (two preselector stages in at least two jobs), improved tuning mechanisms and dials, slick plug-in and switching systems that give new operating convenience and adaptability, better i.f. circuits including crystal filters, automatic gain control particularly adapted for 'phone reception and new ideas in tone modulation for c.w. Not to be overlooked is some real progress in getting results with superhet sets that aren't just arm-chair diagrams but are working realities which give the super-regens a run for their money in sensitivity, without hissing like the snake pen at the zoo. An amateur development in this line is the one Ross Hull has in the works. He isn't quite satisfied with it yet, but we have played with it in action, have listened to 56-mc. Boston ham sags here in West Hartford, and are convinced it is the business. QST will have it soon.

—J. J. L.
A New Standard System of Reporting Signals

Use the R-S-T System!

By Arthur M. Braaten, W2BSR*

Most amateurs will agree fully with the author, after examining the reporting practices that have grown upon amateur radio, that it is high time for an improvement. In August QST KA1NA emphasized the need for change in our signal-report practice. We think W2BSR's R-S-T system answers a very definite need. In it we find no such glaring inconsistencies as in existing usages.

How about adopting the R-S-T system as A.R.R.L. standard practice? Put it into use in your station operation at once, just as explained herein. Talk up the new R-S-T reporting practice over the air. You and all amateurs will benefit. Logical and brief, you will find R-S-T increasingly satisfying as you keep using it. W1MK will use the R-S-T form effective September 27th.

—COMMUNICATIONS MANAGER

QSA3 R7 T5".

The above report translated literally is, "The strength of your signals is fairly good, readable, but with difficulty; good strong signals, copiable through QRM and QRN; nearly d.c. tone, good filter, but has key thumps, or back wave, etc." Very concise and definite, isn't it?

It is obvious that the method now used by amateurs for reporting or describing signals is little better than worthless. It is a makeshift arrangement, handed on unchanged from year to year, and the only possible reason for its continued use is that no one has taken the trouble to work out a better one. I should like to point out the inconsistencies and the limitations of the present method, which I feel should be abandoned immediately. In its stead I propose a new system which, in addition to being simple, will furnish the sender with a report on his signals which will have some meaning.

A glance at the so-called systems of audibility and readability will show how inconsistent they are. Each one contains both audibility and readability qualifications. If both codes are used there must necessarily be conflicts between them. How can any signal possibly be QSA3 and R7 at the same time? The one contradicts the other. Yet such reports are very commonly heard on the air.

The "QSA" code is being used to indicate readability. Now the exact meaning of QSA is "The strength of your signals is . . . ." Obviously there is something wrong here, twisting a code which is meant to indicate signal strength around to mean readability. There is no doubt that very little judgment was used in drawing up the "QSA" code when readability was injected into it.

The "R" code of audibility was introduced in QST, in 1925. It is supposed to be concerned only with the strength of the signal. However, it will be noticed that it is hopelessly tied up with readability also. Before the advent of the "QSA" code it was fairly satisfactory, but when the latter was introduced the trouble began. The "QSA" code was supposed to take the place of the older "R" code. However, someone conceived the bright idea of using both, forgetting of course to revise them, and we have been struggling along with them ever since. One of the main objections to the "R" code is that it really indicates audibility and not received signal strength. The sender is not concerned with how much amplification you are using to receive him. He wants to know how his signals are coming in, not how loud they are after coming out of your particular receiver. He should expect to receive the same report from a listener using a one-tube set as from one using a powerful superheterodyne. This is obviously impossible under the present definitions of the code. With sufficient amplification almost any signal that can be detected can be brought up to at least R5 (heard several feet from phones). To make the "R" code mean anything all mention of absolute audibility must be eliminated and the definitions made to apply only to received signal strength.

The so-called "T" system for tone is particularly obnoxious. There is actually no system to it. Many U. S. amateurs refrain from using it at all, although foreign amateurs use it a great deal. No time need be wasted in trying to point out its faults. One thing to bear in mind, however, is that a tone code should concern itself with tone, and tone only. No mention should be made of key clicks, back wave, etc. Also, no definite figures for frequency of modulation should be given, since amateurs have greatly different opinions on what the frequency of any given tone is.

About eight years ago the R.C.A. originated a system known as the "Traffic Frame Code." This code is now the standard for fixed, point to point, commercial stations and is used in practically all countries of the world. The reports are always sent in a given order, which is deter-

*Box 979, Riverhead, L. I., N. Y.
minded by the letters of the word "FRAME." These letters stand for the following:

F—Frequency, R—Relative strength, A—Amplitude variation, M—Musicality of note, E—Estimated readability. Each of these characteristics is divided into a scale increasing from 1 (poorest) to 9 (best). The definitions, while satisfactory for commercial work, are not at all suited to amateur practice. The system is of interest to us in that it shows the desirability of following a definite scheme in reporting signals. After several months of study of all available methods and codes a new system has been evolved especially for universal amateur use.

In amateur work the main characteristic of a signal in which we are interested is Readability. Next, in order, come signal strength and tone. Frequency and amplitude variation (fading) are not so important. By far the greater majority of stations on the air have stable signals and we may expect further improvement as time goes on. There is no need for a code for frequency. The reporting procedure should be as simple as possible consistent with accuracy. It is much easier to tell five senders that their frequency is bad than to tell ninety-five others that theirs is good. Also, since there are so many ways in which a frequency might vary, it is simpler and more accurate to say what the trouble actually is than to make up a code that adequately covers all possible types. Simply say, “swinging,” “chirps,” “idle radiation” (back wave), “clicks,” etc. Fading is something over which the sender has no control. It is generally of minor importance and can be taken care of in the readability part of the report, if necessary to do so.

In the new system codes are proposed for readability, signal strength, and tone. This is exactly what we have been accustomed to report. However, the new codes are thoroughly revised ones, for greater accuracy. First we shall start with readability. What we have been using for this characteristic appears fairly satisfactory. We shall not call it “QSA,” however. Such things as QRN, fading, etc., are taken care of in the readability part of the report.

Readability
1. Unreadable.
2. Barely readable—occasional words distinguishable.
3. Readable with considerable difficulty.
4. Readable with practically no difficulty.
5. Perfectly readable.

Next we take up signal strength. This takes the place of what we now call audibility. Care has been taken to avoid any mention of absolute audibility in this code, such as, “heard several feet from phones.” This is to make the report independent of the kind of receiver used. Since the method of estimating is aural, it is neither necessary nor advisable to have more than five classifications. Any more would make for confusion. A listener can soon determine how the strongest signals sound in his particular receiver. This will fix the top level of his scale. Signal strengths below this best value are then easily estimated by him. By this arrangement a sender is more likely to receive identical reports on his strength at a given place, regardless of the type of receiver used by the reporter.

Signal Strength
1. Faint—signals barely perceptible.
2. Weak signals.
3. Fairly good signals.
4. Good signals.
5. Very strong signals.

A perfect tone code is almost impossible to devise; there are so many widely different types of notes to be heard. Most of them, however, can be satisfactorily grouped into one of the nine classes. To be of any value the tone code must concern itself with tone only. No absolute values of frequency of modulation are given, because it is rare that several observers agree on the frequency of a given tone. It is believed that the following code will satisfactorily meet most amateur requirements. It is the corresponding part of the “Traffic Frame Code” revised for amateur practice.

Tone
1. Extremely rough, hissing note.
2. Very rough a.c. note—no trace of musicality.
4. Rather rough a.c. note—moderate musicality.
5. Musically modulated note.
8. Good d.c. note—just trace of ripple.

If the note appears to be crystal controlled simply add an X after the appropriate number.

The method of using the “RST” system is simplicity itself. The letters R-S-T determine the order of sending the report. In order that the system may become standard this sequence should never be deviated from. When desiring a report the sender should say, “QRK?”, or “RST?”. The answer may be somewhat like this.

“Ur RST 347X QRM.” This means, “You’re readable with difficulty; signal strength good; crystal controlled, near d.c. note—smooth ripple; interference.” Now look back at the report at the beginning of this paper. Which gives the better description? Another example might be, “RST 251 QRN.” This shows that although the signals are very strong, they are barely readable, because the extremely rough, hissing note is hard

(Continued on page 106)
To all A.R.R.L. Members residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain and West Gulf divisions of A.R.R.L.:

You are hereby notified that, in accordance with the constitution, an election is about to be held in each of the above-mentioned divisions to elect, for the 1935-1936 term, both an A.R.R.L. director and an alternate director. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. by a Board of Directors; Sec. 2 of Article IV, defining their eligibility; By-laws 10 to 20, providing for their nomination and election; and By-law 11, providing for the simultaneous election of an alternate director. Copy of the Constitution and by-laws will be mailed any member upon request.

Voting will take place between November 1 and December 20, 1934, on ballots which will be mailed from the headquarters office in the first week of November. The ballots for each division will list, in one column, the names of all eligible candidates nominated for the office of director by A.R.R.L. members residing in that division; and, in another column, all those similarly named for the office of alternate director. Each member will indicate his choice for each office.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one division have the right to nominate any member of the League residing in that division as a candidate for director therefrom, or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for the office of both director and alternate director. A separate petition must be filed for the nomination of each candidate, whether for director or for alternate director. The following form for nomination is suggested:

(Place and date)

Executive Committee
American Radio Relay League
West Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Division, hereby nominate as a candidate for director [or for alternate director, as the case may be] from this division for the 1935-1936 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus or literature. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the first day of November, 1934. There is no limit to the number of petitions that may be filed, but no member shall append his signature to more than one petition for the office of director and one petition for the office of alternate director.

Present directors from these divisions are as follows: Central, Mr. Loren G. Windom, W8GZ-W8ZG, Columbus, Ohio; Hudson, Mr. Bernard J. Fuld, W2BEG, New York City; New England, Mr. G. W. Bailey, WIKH, Weston, Mass.; Northwestern, Mr. Ralph J. Gibbons, W7KV-W7BIX, Portland, Oregon; Roanoke, Professor H. L. Caveness, W4DW, Raleigh, N. C.; Rocky Mountain, Mr. Russell J. Andrews, W9AAB, Denver, Colorado; West Gulf, Mr. Frank M. Corlett, W5ZC, Dallas, Texas.

These elections constitute an important part of the machinery of self-government in A.R.R.L. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choice. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

K. B. WARNER,
Secretary

August 1, 1934

Longhand

Our Rule 415 requires amateur applicants to execute examination papers in longhand, and a similar rule makes the same requirement of applicants for commercial licenses. Both the League and other groups have had occasion to make representations to the Commission on behalf of applicants who, because of blindness or other physical disability, are unable to execute the examination in longhand. The Commission has now ruled that in justifiable cases involving blind or physically disabled applicants, examining officers shall permit the copying of the code test and the answering of examination questions to be done on a typewriter or to be dictated. In such cases a certification must be made by a witness or by the examining officer that the contents
represent solely the applicant's efforts or dicta­tion, without outside assistance.

**Financial Statement**

Because the League operates on a narrow margin of gain for the whole operating year, the summer quarters almost always show a loss. A small loss was recorded for the second quarter of this year, which also included the unusually expensive anniversary issue of QST. By instructions of the Board, the operating statement is here published for your information:

**STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED JUNE 30, 1934**

<table>
<thead>
<tr>
<th>REVENUES</th>
<th>EXPENSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising sales, QST</td>
<td>$13,933.96</td>
</tr>
<tr>
<td>Advertising sales, Handbook</td>
<td>612.00</td>
</tr>
<tr>
<td>Newdealer sales, QST</td>
<td>9,743.64</td>
</tr>
<tr>
<td>Handbook sales</td>
<td>6,635.24</td>
</tr>
<tr>
<td>Booklet sales</td>
<td>2,318.18</td>
</tr>
<tr>
<td>Membership dues</td>
<td>8,973.41</td>
</tr>
<tr>
<td>Membership supplies sales</td>
<td>1,906.37</td>
</tr>
<tr>
<td>Interest earned</td>
<td>267.52</td>
</tr>
<tr>
<td>Bad debts recovered</td>
<td>40.00</td>
</tr>
<tr>
<td>Cash discounts earned</td>
<td>226.85</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td><strong>$44,806.17</strong></td>
</tr>
</tbody>
</table>

**EXPENSES**

- Publication expenses, QST: $14,679.19
- Publication expenses, Handbook: 2,289.98
- Publication expenses, Booklets: 614.00
- Membership supplies expenses: 707.22
- Salaries: 17,303.32
- QST forwarding expenses: 816.30
- Telephone and telegraph: 608.66
- Postage: 1,974.49
- Office supplies and general expenses: 1,887.76
- Rent, light and heat: 817.53
- Traveling expenses: 1,339.05
- Depreciation of fixed assets: 293.01
- Communications Dept. field expenses: 136.86
- Headquarters station expenses: 103.77
- Federal tax on checks drawn: 7.18

**Total Expenses**: $43,311.82

**Net Loss from Operations**: $1,649.51

**Ordinances**

We have previously mentioned editorially that the so-called automobile receiver ordinance now being enacted by a number of cities and some states represents a possible obstacle to amateur mobile operation on the high frequencies. The intent of such measures is to prohibit shortwave receiver installations in automobiles unless a permit has been secured. From the amateur standpoint the difficulty is that in some cases, while the permit language is included in the measure, the permits are not being issued. Because the requirement of permits for such installations is, in itself, probably legal, it seems more profitable for us to seek a clear recognition of the obligation of city or state officials to issue permits to licensed amateurs, upon presentation of evidence of good character and the possession of an amateur license; the League, therefore, is concentrating its study on this feature. If necessary, a test suit may result and to this end an intensive study is being made of two state measures, in particular. In the meantime, amateurs will do much to help themselves if they will immediately report to Headquarters whenever pending measures of this kind are spotted, since it is often possible to modify these acts considerably during their period of formation, if prompt action is taken.

**Ultra-High Frequencies**

The frequencies above 110 mc., recently opened to amateur and experimental use through the efforts of the League, may be used for any type of emission—c.w. telegraphy (A-1), i.c.w. telegraphy (A-2), telephony (A-3), television and picture transmission (A-4).

**New Penalties**

Violations of the Radio Act of 1927 were punishable by fines up to $5000 or imprisonment up to five years, or both; violations of the regulations were punishable by a fine up to $500. Under the new Communications Act the penalty for violation of the provisions thereof may be a fine up to $10,000 and imprisonment up to two years, or both; and violations of F.C.C. regulations may be punished by a fine of up to $500 for every day of such offense. Careful note of these changes should be made by applicants going up for an amateur ticket. The rest of us might just as well be fined $10,000 as $5000.

About this new law: It won't hurt to have a copy around; you may be interested in reading it some time when the power is off. Address the Superintendent of Documents, Government Printing Office, Washington, D. C., sending 5¢ and asking for a copy of the Communications Act of 1934. He'll accept a nickel but no stamps.

**Telegram Division**

When the Federal Communications Commission, with its seven members, got down to the job of organizing itself, it split into three divisions, one each in charge of broadcasting, telegraph and telephone. Each division is in effect a miniature commission largely self-sufficient. Frequency allocations to services will be made only by the full Commission but otherwise the decisions of the divisions on their own matters will be final, subject only to appeal to the federal courts unless the full Commission first agrees to review a particular case. We are most interested

(Continued on page 108)
Amateur Radio in the Soviet Union

By John D. Kraus, W8JK*

Hams are hams the world over. The author of this article, a recent visitor to the U.S.S.R., describes his experiences visiting Russian members of the fraternity, tells of familiar ham spirit under conditions unfamiliar to the rest of us. Recently increasing contacts with U.S. stations make the story of timely interest in this part of the world.—EDITOR

At the present time there are about 500 amateurs in the entire Union licensed to use transmitters and, in addition, about 2000 registered short-wave receiving stations. The Soviet Union occupies more than one seventh of the land area of the earth and many of the amateurs are widely separated from each other, but one finds also that much activity is centered around such cities as Moscow and Leningrad.

The amateurs are a self-governing group; the “Central Bureau of the Short-Wave Section” (abbreviated C.B.S.K.W.) is at the head of their affairs and has its headquarters in Moscow. One finds in nearly every city or district of any size a "Society of the Friends of Radio" (abbreviated O.D.R.). The members include broadcast listeners and experimenters, but the societies have in most cases also a "Short-Wave Section" (S.K.W.), and it is in this section that the transmitting amateurs are active. Directly subordinated to the C.B.S.K.W. is a board made up of five amateurs which is known as the "Committee on Qualification." Among its duties are the working out of regulations and standards for the amateurs, the classifications of the amateurs into groups depending on their qualifications, the giving of license examinations, and the solution of technical discussions and questions arising between individual short-wave sections. Many of the regional districts also have such committees based on this model.

To secure a transmitting permit, one first obtains from the local Short-Wave Section (S.K.W.) of the Society of Friends of Radio (O.D.R.) a petition, which is then submitted to the regional organization of the S.K.W. After the amateur has been given a written examination and a code test by these regional organizations, they may issue a recommendation for a license. The recommendation is forwarded to the People’s Commissariat of Communication, which then issues the license. For 5- and 10-meter transmission the recommendations may be given out directly by the local organizations. Only amateurs who have reached the age of 18 years and are actively engaged in the S.K.W. are qualified to receive licenses. By special permission of the C.B.S.K.W., however, persons under 18 may be recommended.

The Soviet amateurs are licensed in three groups or categories. The amateurs in the third or beginning category must have a code speed of 10 words per minute (5 characters to the word), a knowledge of radio abbreviations and procedure, and a general practical understanding of radio technique. For workers in productive industry and members of the Communist party, the code speed requirement is reduced to 6 words per minute. Privileges include 20 watts in the antenna and operation on 5, 10, 40, and 80 meters. On 40 meters the time of operation is limited to between midnight and 8 a.m. Moscow time with a tone not less than 4. The other wavelengths have no such limitations. Only 6 percent of the amateurs are classified in this category.

The second or middle category amateur is required to show in the examination a more thorough understanding of radio technique and a knowledge of the fundamental units used in elec-

THE STATION OF ALEXANDER KAMALAGIN IN LENINGRAD, WHICH WAS VISITED BY THE AUTHOR

The call was U3EB before June 1st and is now U1AP. The transmitter is a 4-stage c.c. rig with 40 watts input to the final amplifier. Operation is on 40 and 20 meters.

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(Continued on page 98)
AUTUMN! The magic word that brings amateur radio out of its summer doldrums. “Are you going to the club meeting?” again becomes a common question among the fraternity as the active season for things radio makes its appearance. Meetings are being resumed and clubs are getting up more steam each day. May the affiliated bodies lead the way through a glorious fall-winter season.

Modesto Wouff-Hong Trophy
The Modesto (Calif.) Amateur Radio Club will once again award the Wouff-Hong Trophy to the best station in the Sixth District. This yearly award was originated several years ago by the old Modesto Radio Club, since reorganized under the new name. Work between October 1, 1933 and October 1, 1934 will be considered in the contest. The following points will be used in picking the “best station”: (1) DX miles per watt, max.--35%; (2) Traffic handled, total number of messages--25%; (3) Operating ability--20%; (4) Percentage of homemade apparatus--20%. Operators wishing to enter their stations should mail entries to C. E. Marsh, W6FFU, 127 Santa Rita Ave., Modesto, Calif., including description of station (photo, if one available), log covering station activities, Oct. 1, '33 to Oct. 1, '34, and QSL card covering DX claim. All entries must be received at W6FFU before November 1, 1934.

Annual Banquets Scheduled
The fifth annual hamfest-banquet of the Schenectady Amateur Radio Association to be held Saturday, October 6th, at the Masonic Temple, Scotia, N. Y., promises to be the biggest event ever held by that organization. Hamfest starts at 1:00 p.m. to continue all afternoon. Banquet at 6:30 p.m. Many valuable prizes will be available. The fee, including banquet, is $1.25 for advance registration, or $1.75 at the door. Reservations may be made through N. K. Eaton, W2DHS, 536 Thompson St., Schenectady, N. Y.

The Southern Tier Transmitting Amateurs (Pen Yan, N. Y.) will hold their annual banquet-hamfest, October 20th, at the Wagner Hotel. Good program and prizes offered. All hams invited. Registration open at 6:30 p.m. Price $1.50 at door, $1.25 in advance. Address all communications to Francis Orcutt, WSGWT, Secretary, S.T.T.A., 127 South Ave., Penn Yan, N. Y.

56 mc. in Pennsylvania
The Shamokin (Pa.) Radio Club is doing considerable work on 56 mc., utilizing the advantages offered by the state forest fire towers. The club is contemplating a 56-mc. relay across the state of Pennsylvania and would appreciate a word from clubs and individual amateurs interested in such an undertaking. Address communications to the Shamokin Radio Club, care of the secretary, Louis Graw, Shamokin, Pa.

28-mc. Test Results
The Metropolitan Amateur Radio Association,

MEMBERS PHILIPPINE AMATEUR RADIO ASSOCIATION,
JUNE 24, 1934, MEETING AT KAlJR
Back row, left to right: Lt. R. G. Meyer—KA1HR, KAlAN, KAIIC, KADL, KA1CS. Center row, left to right: Sgt. Minguez—KAlHR, J. H. McDonald, KAI0R, KAIL, KAI1GZ. Front row, left to right: KAI1GA, KAIL, KA1FR, KA1T5, KA1OP.

Melrose, Mass., reports results of its 28-mc. tests held on the last two Sundays in July and the first Sunday in August. The first Sunday was very active, but poor conditions slowed down results on the last two. W2TP, Leonia, N. J., was by far the highest scorer: 256 points! W9FM, Wheaton, Ill., rolled up 190 points for second high. Certificates go to each of the following, highest scorers in their respective districts: W1AV 27, W2TP 256, W4MR 24, W8FDA 12, W9FM 190, W8EIG 1. Others submitting scores: W1CTW 53 (not eligible for award, chairman of Contest Committee), W1FBV 9, W1BZG 2, W9GBJ 32, W9DRN 36, W9LWD 21. Much credit is due the M.A.R.A. for initiative in these 28-mc. tests.

Clubs on Job in Emergency
Members of the Houston (Texas) Amateur Radio Club and the Corpus Christi (Texas) Radio Club demonstrated during July the value of organized amateur radio.

(Continued on page 84)
A Pentode Output Transmitter With Six-Band Exciter

140-Watt C.W.—30-Watt Suppressor-Modulated 'Phone—Dual 53 Universal Excitation—Demountable Rack Construction

By James Millen, WIHRX*

The new medium power r.f. pentodes such as the RK-20, recently developed in accordance with suggestions of the technical staff of QST, make possible a very effective semi-portable, all-band crystal-controlled 'phone and c.w. transmitter. By utilization of relay rack construction, not only are attractive appearance, efficient lay-out, and compactness secured, but also there results semi-portability in that it becomes possible readily to disassemble the complete transmitter on short notice for transportation in several relatively small and lightweight units. In this manner, the transmitter illustrated herewith was taken on an extensive trip to the West Coast during the past summer, and in addition to being set up at several hamfests en route, was operated for nearly a month from the shack of W6GWX at South Pasadena, California.

As will be seen from the accompanying diagrams, the circuit culminates in a pair of RK-20

* 84 Autumn St., Malden, Mass.

1 J. J. Lamb, QST, May, 1934.
r.f. pentodes with suppressor-grid modulation. The transmitter is built up as five separate units, which, from top to bottom, are: First, the final output stage containing also a "pi" type output-filter; second, the modulator comprising the 56 speech stage, the 45 push-pull audio power stage, and the small 45-volt suppressor grid biasing battery. This battery is used to bias the suppressors at minus 45 volts for phone operation and is reversed to provide a positive bias of 45 volts for c.w. operation. Two small flashlight cells are also mounted on this modulator panel to take care of the single-button microphone of the Western Electric handset. The mike is plugged into the jack shown on the front of the panel.

Third, and directly beneath the modulator unit, is located the all-band exciter. This unit was built from the design developed a year or so ago by W1CTW and described by him at the different club meetings in and around Boston. Incidentally, a great many of these exciters are in use in this part of the country and have proven to be extremely practical. Two 53 tubes are used as the equivalent of four separate triodes. The 53's are used instead of single triodes not only to save space, but also because no single type triodes available have the desirable characteristics of the 53's for use either as crystal oscillators or doublers. The 53 has considerable power output, high mu, and very satisfactory cathodes. For use on 160-, 75-, 80-, and 40-meter bands, with an appropriate crystal, one section of the first 53 is used as a triode oscillator with its tuned plate circuit link-coupled directly to the RK-20 grid circuit without any intermediate buffer.

\[ L_1, L_2 - Grid and plate coils. See coil table. \]
\[ L_3, L_4 - Antenna coupler coils. See coil table. \]
\[ C_1 - Split-stator midget variable, 50-µfd. per section (National Type STD 50 or equivalent). \]
\[ C_2 - Split-stator transmitting condenser 100-µfd. per section, 3000-volt (National TMP 100 or equivalent). \]
\[ C_3, C_5, C_7, C_9 - 0.001-µfd. mica coupling condensers. \]
\[ C_6, C_8, C_{10}, C_{11} - 0.01-µfd. mica bypass condensers. \]
\[ R_2 - 50,000-ohm 2-watt metalized grid leak. \]
\[ RFC - Receiver-type r.f. choke (National Type 100 or equivalent). \]

\[ MA_1, MA_2 - Single-circuit closing jacks for 0-50 milliammeters. \]
stage. For operation on 20 meters with a 40-meter crystal, the other section of the first 53 used as a triode doubler, the output of which is then link-
ably more simplified arrangement, such as using the 53 push-pull unit as the output stage, is therefore preferable. Consequently, the transmitter is intended for full-output operation on the 10-, 20-, 40-, 80- and 160-meter bands.

The remaining two units, the fourth and fifth, are the power supplies. Three in all are used. The transmitter, made up on rather short notice, was assembled from standard equipment wherever possible. The 1000-volt supply for the final stage, for instance, is one of the standard Acme-Delta AD-60 units, which has been re-mounted on a relay rack panel along with the two a.c. switches (rectifier filament transformer and high-voltage transformer). The other power supply unit is a special National double AGS receiver pack which consists of two separate 200-volt supplies with individual type 80 rectifiers. One side takes care of the exciter, while the other takes care of the modulator, 2½-volt filament supplies being included. In order to conserve coupled to the grid circuit of the final stage. Similarly for 10 meters, a second doubling is resorted to in the first section of the second 53. It was originally planned to take the doubled output from the remaining side of the second 53 for 5-meter operation, with a 40-meter crystal, but on trial it was found that the excitation secured on 56 mc. was insufficient to drive the final stage. Consequently a buffer stage was built employing a single 53 as a neutralized push-pull 56-mc. buffer. While several local stations were worked with this arrangement, the output was still small in comparison with that obtained on all lower frequencies. For present day 56-megacycle operation a consider-

ILLUSTRATING THE FIVE TYPES OF COIL CONSTRUCTION USED

Winding data are given in the tables.

EXCITER COIL DATA

Main coils L5, L6, L10 and L12 are wound on ½-inch diameter standard plug-in coil forms (5-pin) except L12 for 56 mc., which is a self-supporting winding of No. 10 wire, ¼" in diameter. Link windings L5, L7, L9 and L11 are each 2 turns of same wire as main winding, wound between ground-end turns of latter. Pin and socket connections are the same for each coil and stage so that coils are interchangeable to give proper combinations with different crystals. Specifications for the main windings are as follows:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1.75</th>
<th>3.5</th>
<th>7</th>
<th>14</th>
<th>28</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Turns</td>
<td>50</td>
<td>35</td>
<td>20</td>
<td>10</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Tab Turns*</td>
<td>20</td>
<td>13</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wire Size</td>
<td>No. 28</td>
<td>No. 22</td>
<td>No. 16</td>
<td>No. 16</td>
<td>No. 14</td>
<td>No. 10</td>
</tr>
<tr>
<td>Length**</td>
<td>1½&quot;</td>
<td>1⅛&quot;</td>
<td>6&quot;</td>
<td>¼&quot;</td>
<td>½&quot;</td>
<td>1½&quot;</td>
</tr>
</tbody>
</table>

* Excitation tap turns are counted from ground end of coil.

** The turns are spaced to occupy the winding length given.

A photo shows the group of coils as used for the 5-, 10-, 20- and 75-meter bands, the table giving the necessary specifications. The antenna filter coils shown were found to be just about right for use with either a Zepp or doublet antenna. All of these coils have GR plugs, the jacks being mounted on strips of Vietron. Similar strips with

PLAN VIEW OF THE EXCITER UNIT SHOWING IN DETAIL THE ARRANGEMENT OF THE COMPONENTS

Two 53 tubes do the work of four triodes in the crystal oscillator (left) and three doubler stages. The coils in place are for 56-mc. output from a 7-mc. crystal.

rack space, the two milliammeters for the exciter unit, instead of being mounted on a separate meter panel, are mounted as shown on this power pack panel.
G.R. plugs and jacks are also used for the link coupling terminals.

In operating the transmitter on the lower frequency bands, it is necessary either to remove the unused exciter doubler coils or to detune the unused circuits. The amount of excitation is controlled by varying the coupling between the link and the grid coil of the RK-20's.

Even though full data already have been given in QST on the use of the RK-20,3 with the necessary cautions regarding overloading, it may be well to repeat again that for 'phone operation with the suppressors biased at 45 volts negative, the combined plate current of the two tubes under load should not exceed 110 ma. The carrier output for 100% modulated 'phone operation is then 30 to 40 watts. For c.w. operation with the suppressor grids biased at 45 volts positive, the combined plate current should not be over 200 ma., with carrier output approximately 140 watts.

The transmitter was only completed last June a few hours before leaving on a trip to the West Coast, but nevertheless was "test operated" on all of the bands. During the few minutes we were on 10-meter 'phone, W4KR heard us and sent back a QSA 5 Rs report on 20 meters via WSCPC-W1SZ. At this same time a cathode-ray oscilloscope check was made on percent modulation and the fixed resistor (R7) placed permanently across the mike transformer to hold the gain down to a level that would prevent overmodulation.

While in California, we were visited by a great many amateurs who, having learned of the RK-20 through QST, were most anxious to see the

(Continued on page 108)

Coming Conventions

Delta Division Convention
October 13th and 14th—Memphis, Tenn.

THE two colonels may continue unabated their argument concerning the respective merits of crushed and uncrushed mint in the concoction of seasonably superb mint juleps; the ol' Mississipp', lazy after a long, dry summer, may forget its greedy arrogance and keep away from yo' door; the yella gals and the black boys may pursue their love making uninterrupted under the harvest moon . . . but all these things will fade into misty insignificance down in Memphis, near the Old South, when the Delta Division of the A.R.R.L. holds its 1934 annual convention at the Hotel Gayoso—a name rich in significance by itself alone. If you want a taste of the true Southern hospitality, if you want to attend a convention of real hams, send your $2.00 for advance registration at once to J. C. Flippin, W4VT, Convention Manager, 3222 Choctaw Ave., Memphis, Tenn. It will cost you $2.50 if you wait until the convention, and $1.50 for the ladies—but whatever you pay, it will be a small detail in contrast to the wonderful time you're going to have.

Kansas State Convention
(Midwest Division)
October 13th and 14th—Topeka, Kansas

A T: The Hotel Jayhawk.
By: The Kaw Valley Radio Club.
Out of: The Sunflower State.
Booked by: John H. Amis, W9CET, 915 Lincoln, Topeka.
Track fast, weather clear . . . and a rousing good time for all. Be there!

West Gulf Division Convention
October 26th and 27th—San Antonio, Texas

If Saint Anthony of Padua, patron saint of those things which are lost, is prone to watch more carefully over regions settled in his name than over others, his particular attention should be called to the Hotel St. Anthony in historic San Antonio during the last week end of October—for there's no telling what may or may not happen when a couple of hundred or more enthusiastic amateurs congregate there for the annual West Gulf Division convention. And they are going to congregate. The spectacular program which is being arranged, as well as the sterling good time which is being guaranteed, have already attracted promises of attendance from nines, sixes, and even eights—and of course the entire fifth district. If you plan to attend—and, by all means, you should—send in your reservation with the $3.50 convention fee, now, to H. W. Wallace, Secretary, San Antonio Radio Club, 1415 W. Rosewood Ave., San Antonio, Texas. Even if you don't get to anything else, you can't afford to miss that Boiled Owl party (for hams only) on Friday night!

Pacific Division Convention, 1934
November 10th and 11th—Fresno, Calif.

NEAR Fresno, Calif., is located the world's largest winery, we are told. We hope it's also one of the most substantially built, for this November it is going to have to survive a visit from what gives every indication of being the Pacific Division's most successful convention; a trip to it is to be one of the features of the program which the San Joaquin gang has generated for the hundreds of hams who will congregate at the Hotel Fresno. Among them will be such well known amateurs as Frank C. Jones, Jim Warner, Ralph Heintz, Charles Perrine, Don Wallace, Norris Hawkins, A. L. Budlong from A.R.R.L. Hq., Pacific Division Director S. G. Culver—and hundreds and hundreds of West Coast amateurs. If you intend to be one of them (and, incidentally, make yourself eligible for a special "reservation" prize) you'd better send in your reservation and the $3.00 convention fee now to C. L. Kirkpatrick, W6DWE, P. O. Box 739, Fresno, Calif. You can't afford to miss the stellar program of technical features and general good time that has been arranged. From the opening address Friday morning by Mayor Leymel to the awarding of the Modesto Wouff Hong trophy at the banquet Saturday night, you're assured of a bang-up good time—a real Pacific Division convention!

Southeastern Division Convention
Battle House, Mobile, Alabama
October 19th-20th

THOSE at the Birmingham convention last year saw the determined effort made by the Mobile delegation for the 1934 convention. They meant business. Publicity now being released promises well for the convention at Mobile. Make proper note of the dates above and accept this announcement as a cordial invitation to be at the convention. Watch the publicity to be mailed (Continued on page 38)
Applying the Tri-Tet Principle to Frequency Multipliers

A 14-mc. Transmitter With a Single Stage "Double-Doubler"

By Frank M. Davis, W9FVM-W5CR*

Quite frequently a circuit which we call new really is only a modification of some older basic circuit resulting from an attempt to improve its performance or characteristics. The circuit described in this article is just such a development.

The output of the Tri-tet oscillator is rich in harmonics. We know that a tube can give more output when used as an amplifier than when used as an oscillator, assuming the same input in each case. In view of these two facts, why not separately excite the Tri-tet oscillator? It ought to make a swell doubler, and perhaps it would even quadruple with good efficiency!

We sketched the circuit (Fig. 1) in order to examine it critically. Remembering that the Tri-tet circuit operates much as a triode oscillator and a tetrode amplifier, it was considered possible to quadruple with the circuit by doubling in the triode part, then doubling again in the tetrode part. Thus we have not a quadrupler, but a "double-doubler" circuit, or, speaking the alphabetical language of the New Deal, a "T.T.-D.D." amplifier circuit. Such we have dubbed it.

We set up the circuit in experimental form and played with it for a while. After the circuit constants were determined and we became familiar with its operation, it was found to answer in an unexpected but very satisfactory manner the problem of getting enough excitation from two stages for a medium-power Class-C amplifier on 14 mc.

The crystal oscillator on 3.5 mc. can be of the pentode type, well known for its kindness to crystals even when used with fairly high plate voltages.

THE "DOUBLE-DOUBLER"

The circuit is similar to that of a Tri-tet with separate excitation substituted for the crystal, except that in the Tri-tet oscillator the cathode tank circuit is tuned to a considerably higher frequency than that of the crystal and acts as an excitation control for the oscillator portion of the circuit.

The operation of the double-doubler might be explained by considering that the cathode, control grid and screen grid of a tetrode tube act as a conventional triode doubler, and these three elements, together with the plate of the tube, then act as a tetrode doubler. The triode anode (the screen grid) is grounded with respect to radio frequency, so that electron coupling prevails between the triode and tetrode parts.

The tubes used are 59's. One tube alone is satisfactory, but two tubes in parallel divide the load and increase the output slightly over that obtainable with one tube. The tubes are used as tetrodes, with the Nos. 2 and 3 grids tied together. No work has been done with other types of tubes, although any tetrode, preferably of the heater type, should work satisfactorily.

The voltage on the screen grids is much lower than might be expected. For maximum output this voltage is between 40 and 50 volts. If it is obtained by means of a series resistance, the plate current will rise to dangerous values when either tank circuit is tuned off resonance. This gives a nice resonance dip, but the voltage divider method of obtaining the voltage is much more desirable from the standpoint of tube life. With the resistances shown at $R_4$ and $R_7$ in the complete exciter circuit, Fig. 2, the plate current of the tubes is limited to a safe value. The grid leak for this stage gives a negative grid bias of between 150 and 200 volts, which seems to be about right for maximum output. It varies with excitation, of course.

The plate voltage to be used depends on the excitation demanded by the following stage. With 300 volts on the oscillator and d.d. stages there is ample excitation for a pair of 10's. This excitation can be almost doubled by raising the
plate voltage to 400 volts. The d.d. plate current is not high, being only 60 to 70 milliamperes for the two tubes in parallel, so that voltages as high as 500 or 550 might be safe, with a corresponding increase in output. The higher plate voltage has not been tried, but judging from the operation at 300 and at 400 volts, the output on 14 mc. with 500 to 550 volts on the plate possibly would be sufficient to excite a 203-A.

The excitation lead to the d.d. grids should be taken directly from the plate of the oscillator tube. If it is tapped down on the coil, self-oscillation is almost certain to occur with the tapped portion of the oscillator plate coil furnishing the resonant grid circuit. The d.d. stage then oscillates on 14 mc. in a manner similar to the TNT circuit. A careful choice of coupling condenser capacity must be made to get sufficient output without overloading the oscillator. Probably inductive or link coupling would be desirable, but capacitive coupling is satisfactory if the above precautions are observed.

The tuning of cathode tank circuit, $L_1C_1$, is not critical. In fact, it need scarcely be touched for QSV anywhere in the 14-mc. band, so that it need not be controlled from the panel at all. However, a shorting switch across $L_1$ is necessary for 7-mc. operation, and in this transmitter $C_5$ is mounted on the panel and used as a shorting switch by means of a bent corner on one of the rotor plates. Also, we know that regardless of the location of the controls we'll be turning them, so we might as well put them all on the front panel where they will be convenient.

One point which seems very important is that the filaments of the 59's must be tied solidly to ground through large by-pass condensers. Without this by-passing operation is erratic and the output much reduced.

**A Complete Transmitter**

After the experimental work was finished, a complete transmitter, to be used chiefly for 14-mc. phone and c.w., was built up around the double-doubler. Thanks to the new circuit, the number of stages could be reduced to three with a certainty of plenty of excitation. This provided a welcome change from the unwieldy oscillator-doubler-doubler-buffer-final amplifier outfit previously used.

The transmitter uses a 59 pentode oscillator on 3.5 mc., a pair of 59's in parallel in the d.d. stage, and a pair of 10's in push-pull in the final amplifier. The oscillator tube might as well be a 47 or 2A5, since either is practically equivalent to a 59 pentode-connected. It is probably needless to mention that to use the 59 as a pentode oscillator the No. 3 grid must be connected to the cathode. A mounting for two crystals is used, with a s.p.d.t. switch to change from one to the other.

There is nothing unconventional about the push-pull final amplifier. Split-stator condensers are used in both plate and grid tank circuits.

**FIG. 2—AN EXCITER UNIT FOR 7- AND 14-MC. WORK USING A 3.5-MC. CRYSTAL**

- $C_1$ = 50 µfd.
- $C_2$ = 75 µfd.
- $C_3$ = 300 µfd. (see text).
- $C_4$ = 100 µfd.
- $C_5$, $C_6$, $C_7$, $C_8$ = 0.002 µfd.
- $C_9$, $C_{10}$ = 0.01 µfd.
- $R_1$ = 40,000 ohms, 2 watt.
- $R_2$ = 12,500 ohms, 2 watt.
- $R_3$ = 10,000 ohms, 10 watt.
- $R_4$ = 30,000 ohms, 2 watt.
- $R_5$ = 50,000 ohms, 2 watt.
- RFC = National No. 100 or similar.
- $L_1$ = 25 turns No. 16 d.c.c., coil diameter 1¾ inches.
- $L_2$ = 13 turns No. 10 d.c.c., coil diameter 1¾ inches.
- $L_3$ = 5 turns No. 16 d.c.c., coil diameter 1¾ inches, for 14 and 7 mc.; for 3.5 mc., 20 turns same with neutralizing winding of 10 turns No. 22 d.c.c. inside the coil.

Although the amplifier is series fed, r.f. chokes are used both in the high-voltage lead and in the bias lead to avoid grounding the taps on the coils, which might upset the circuit balance. In fact, if
the chokes are known to be good, parallel feed may be used with the bias fed through the choke to the grid of one tube, and the high voltage through another choke to the plate of one tube, thus avoiding any taps on the coils. No noticeable unbalance will be caused if chokes of low distributed capacity are used. Again, it should be pointed out that identical chokes in the plate and grid circuits of a stage may cause low-frequency self-oscilation. Normal input to this stage is about 150 watts.

Link coupling is used and recommended between the d.d. stage and the final amplifier, with two turns in each coupling coil. Coupling to the d.d. tank is variable, with the coupling coil mounted on a slotted bakelite strip which in turn is mounted on a stand-off insulator. The grid tank of the final amplifier, L1 in Fig. 3, is wound in two identical sections spaced about 3½-inch apart on a ½-inch diameter 5-prong tube base type coil form. The two-turn link coupling coil is wound between halves of the grid coil. This split coil construction was used solely for reasons of symmetry, since the split-stator condensers take care of the circuit balance.

With one exception, all the tuning condensers are made as small as possible to cover the required frequency range. This is done for the same reason that band-spread condensers are used in receivers—to spread the band and to give non-critical tuning. The one exception to the rule is the d.d. output tank condenser, Cs. It was desired to cover two bands with the same coil and condenser, so this condenser tunes to 14 mc. at about 15 and to 7 mc. at about 95 on a 100-division dial. Plates were removed from the condenser, originally 500 µµfd., until the desired spread was obtained.

The coils in the oscillator and d.d. stages are of the popular self-supporting type, doped and stuck to bakelite strips carrying G.R.-type plugs. They plug into jacks mounted in stand-off insulators. The transmitter is keyed in the positive lead to the d.d. stage, making it necessary to use fixed bias on the final stage. This method of keying is used to prevent emission of a backwave. With the key up only the oscillator tube operates, and since the oscillator is on 3.5 mc., break-in operation is possible within a few kilocycles of the operating frequency on 14 mc. A switch is provided to open the primary circuits of the plate transformer when it is desired to cut the oscillator also.

For 7-mc. operation the cathode tank is shorted out by means of the shorting condenser, Cn, and the circuit functions as a straight doubler.

It is necessary to use a few tricks to get 3.5-mc. operation. With the parallel 59's operating as straight amplifiers quite a bit of r.f. excitation feeds through the grid-plate capacitance, so that the tubes must be neutralized. A simple method of neutralization is to wind a few turns inside the 3.5-mc. coil at Ls and connect it through a small neutralizing condenser to the grids of the tubes. This neutralizing condenser is permanently mounted with one terminal connected to the grids. The other terminal is left unused unless operating on 3.5 mc., in which case it is connected to a flexible lead from the neutralizing winding on the coil. The cathode tank circuit is shorted, of course.

The power source for the transmitter is located in the bottom section of the rack. Two separate power supplies are provided, giving 300 to 400 volts for the exciter stages and 600 to 750 volts for the final stage. Variation in voltage is by means of taps on the transformer primaries. Since the usual power supply circuits are used, no diagram of this part of the transmitter is given.

---

ASSEMBLY DETAILS

The transmitter is rack and panel mounted, with uprights of 3/4-by-13/4-inch stock. The overall height is 27 inches, the width 15 inches and the depth 9 inches. The baseboards, which are of 3/4-inch soft pine, are carried on ordinary 5-by-7-inch shelf brackets mounted on the uprights. The front corners of the baseboards are sawed out to fit around the uprights so that the baseboard can fit up against the panel. The frame is assembled with long wood screws in drilled holes, and the entire assembly is strong and rigid. All the tuning condensers are mounted on the baseboards, and nothing is mounted on the panel except the meter.

The two tuning condensers for the antenna matching network are carried on a dummy panel mounted on the back of the uprights at the top. Extension shafts are used to extend through to the dials on the front panel. The coils in this tuning unit are of the same type as used in the exciter stages. The antenna connections are made to stand-off insulators mounted on the top crosspiece of the frame.

There should be no question about the operation of any part of the transmitter except the double-doubler itself. Each of the two tank circuits in this stage will cause a pronounced dip in plate current when tuned through resonance, so that the stage may be tuned by plate milliammeter in the usual fashion.

Perhaps the old warning about hitting the wrong harmonic should be sounded again. Be very sure that the cathode tank is actually on 7 mc and the plate tank is on 14 mc. The third harmonic is very easy to hit by mistake, and the output is about the same. Incidentally, there is absolutely no 7-mc. output from the stage if both the plate tank and the cathode tank are tuned to that frequency. For 7-mc. operation it is necessary to short the cathode tank as described above, or at least to detune it considerably. The best policy is to short it completely.

The Tri-tet double-doubler principle can be used in many different applications besides the one illustrated in this article. For example, a 3.5-mc. oscillator followed by two d.d. stages might provide 56-mc. excitation for a transmitter on that band. A Tri-tet doubling in its plate circuit followed by a d.d. should make a nice exciter for a 28-mc. transmitter. Time has not permitted experimenting with these applications, but the indications are that they would be practicable and useful.

Southeastern Division Convention
(Continued from page 28)

to all licensed amateurs in the division for details of the program. It will be worthwhile. A.R.R.L. headquarters will have a representative and it is hoped that Lieut. John L. Reinartz, W1QP, the well known amateur and consulting engineer, will be present with some interesting demonstrations. We are glad to announce an initiation in the Royal Order of the Wouff Hong. Just write M. J. McDermott, Sec'y Mobile Amateur Radio Club, 54 S. Franklin St., Mobile, Ala.

Strays

Foreigners still address cards to "SWL, United States." These cards should be sent directly to the individual listeners, for our QSL Bureau cannot handle these.

Are foreign calls self-assigned with a knowledge of the English language and a bit of humor? To wit: ON4MAD, ON4ACE, F8PUP, F8P1Z, F8PEP, etc.

More DX Scores

Missing from the scores in the DX Contest report in Sept. QST were the following:

Austria—OE

Denmark (OZ)

Sweden (OM)

OE1JZ (2) . . . . 12

OE27B (2) . . . . 36

OE5UR (2) . . . . 36

OE5WB (1) . . . . 4

NORTH AMERICA

Canal Zone—NY/K5

Mexico—(X)

NY1AB (14) . . . . 25418

XiAA (14) . . . . 22722

KB5F (12) . . . . 42120

X1AM (15) . . . . 11849

QST for
The Melbourne Centenary International DX Contest

Four Week-Ends October 1934—Contact VK's on All Bands

By R. H. Cunningham, VK3ML*

The Victorian (VK3) Division of the Wireless Institute of Australia is staging a worldwide DX contest. Every VK station will be on the air and will be there to provide another "kick" to ham radio—to provide something different. On this special occasion the W.I.A. feels that it would like to contribute to the world's major DX contests as an endeavour to return to those who have sponsored for many years thrills and fun for its own members.

The idea of this contest is simple. During the four week-ends in October, 1934, all hams are invited to contact as many VK stations as possible on all bands. What a chance for those hams who have not contacted VK to date! This is where we hope to return some hospitality that we have been sitting back and enjoying. The B.E.R.U. and A.R.R.L. Tests have helped many a low-powered VK ham and made his first foreign contact. Australia ranks about third in the world order of the number of active stations, and can therefore provide your QRP stations with DX.

The scoring will be one point for every 1000 miles of QSO. The grand total is to be multiplied by the number of VK Districts worked. An exchange of serial numbers and signal strength reports must be made between participating stations before points can be claimed.

The familiar A.R.R.L. system of making up and handling serial numbers will be used. Each participating station allot's himself three figures, anything between 111 and 999. These figures form half the six-figure serial number that he exchanges he will receive a similar number, say, 000. For example, 453,000 may be a station's serial number. Then this combination is given to the next contact, and so on throughout the test. Always retaining the first three figures, adding the second and transmitting them in that order. For example, VK4AB assigns himself 674 and has received from his foreign contact 234,678. VK4AB then gives to his next QSO 674,234. If he in turn receives, say, 975,532, his next number to be sent would be 674,976 and so on. U.S., Canadian, and other stations do exactly the same as VK4AB has done, and both participants enter the received and sent serial numbers in their logs.

Naturally the distant stations will be most sought after because of the points per 1000 miles basis. This puts the WI's and 2's on a similar footing as W6, etc., in fact, it makes the contest fair to stations in all parts of the world.

Priceless Centenary Certificates are waiting to be awarded. They only appear once in a hundred years! Each country participating will be awarded a certificate to its winner, and special awards will be made to the winner in each licensing area of U.S.A. and Canada, as well as to each of the British Isles.

In our moments of enthusiasm and dreams we have not forgotten the countless number of S.W.L.'s in the world, and have therefore opened up a separate contest for their benefit. The awards, scores and rules that follow hold good for both receiving and transmitting contests.

Contest Rules and Conditions

1. There shall be two contests:
   (a) Transmitting.
   (b) Receiving.

2. The Wireless Institute of Australia Centenary Contest Committee's ruling will be binding in case of any dispute.

3. The nature of the contest requires the world to work Australia.

4. The contest is to be held from 0001 GT Saturday, October 6th, till Sunday, October 7th, 1934, at 2359 GT, and will be continued over the four week-ends in October at the times stated above on each occasion. The dates of the other week-ends are October 13-14, October 20-21, and October 27-28, 1934.

5. The contest is open to all licensed transmitting amateurs and receiving stations in any part of the world. Unlicensed ship and expedition stations are not permitted to enter the contest. Financial members of the W.I.A. and its affiliated societies only will be eligible for an award in VK.

6. Only one licensed operator is permitted to operate any one station under the owner's call sign. Should two or more operators operate any particular station, each will be considered a competitor, and must enter under his own call sign and submit, in his log, the contacts established by him. This debars persons from entering who have not a ham license.

7. Each entry must be signed by each competitor as a declaration of the above statement.

8. Each participant will assign himself a serial number of three figures as detailed in the contest description. When two or more operators work the one station each of them will allow himself a separate number.

9. All amateur frequency bands may be used.

* Manager Centenary Contest Committee.
Log: Melbourne Centenary International DX Contest, 1934

Name ...........................................

Address ...........................................

Callsign ...........................................

Operating at ________________________________

Station ............................................

Transmitter ....................................

Input to P.A. ....................................

Receiver ........................................

Type of Aerial ...................................

<table>
<thead>
<tr>
<th>Date</th>
<th>Time G.T.</th>
<th>Band in kc.</th>
<th>Station Worked</th>
<th>Serial Numbers</th>
<th>Signal Report</th>
<th>Distance Estimated (Miles)</th>
<th>Points Claimed</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

To be multiplied by ____________________

Grand Total .................................

The following is a description of my Station:

I hereby certify that I have operated during this contest in accordance with the rules laid down, have adhered rigidly to the regulations governing amateur radio in my country, and that the score and the points set out above are true and proper.

10. Only one contact with a specific station on each of the bands during each week-end will be permitted.

11. Contacts may be repeated on each of the succeeding week-ends with the same stations in accordance with rule 10.

12. Each contact must be accompanied with an exchange of serial numbers and signal strength reports using the T QSA and R systems.

13. Scoring: One point will be scored by each contacting station for every 1000 miles between the capital cities of the States of the competing stations, measured by a Great Circle Line. The points claimed are to be entered on the entry form.

14. Australian Stations will multiply their total score by the number of countries worked, and the stations outside VK by the number of Australian Districts contacted, there being eight all told, viz., VK2, 3, 4, 5, 6, 7, 8 and 9.

15. No prior entry need be made for this contest, but each contestant is to submit a log at the conclusion of the test showing: Date, time (in GT), band, station worked, in and out signal strength reports, in and out serial numbers, distance between stations, and the points claimed for each QSO.

16. Entries from VK stations must reach the Wireless Institute of Australia (Victorian Division), Kelvin Hall, Collins Place, Melbourne, Victoria, not later than December 1, 1934. Foreign entries will be received up till January 31, 1935.

17. The awards for all winning competitors will consist of a special attractive Melbourne Centenary Contest Certificate. The station returning the highest total in any country will also be awarded a Centenary Certificate. The official organ of the W.I.A., "Amateur Radio," will award a separate trophy for the outstanding station description accompanying a log. This is open to all competitors, foreign or VK.

18. A special prize will be given to the first, second and third VK stations returning the three highest scores. The contestant in each VK Division who returns the highest total for his District will also be awarded a Centenary Certificate. The winning VK receiving station will be awarded a handsome cup providing he is a member of the W.I.A. or Societies affiliated with it.

RECEIVING CONTEST

1. The rules for the receiving contest are the same as for the transmitting contest, but it is open to members of any recognized Short Wave Listeners' Society in the world. No transmitting station is allowed to compete in the receiving contest.

2. Only one operator is permitted to operate only one receiver.

3. The dates, scoring of points, and logging of stations once on each band per week-end are subject to the same rules for the transmitting contest.

4. To count for points, the call sign of the station being called, and the strength and tone of the calling station, together with the serial number and signal strength report sent by the calling station, must be entered in the log.

5. The above items must be filled in before points can be claimed, that is, it is not sufficient to log a station calling CQ or TEST. Verification of reception must be made in accordance with the conditions in rules 3 above.

6. VK receiving stations cannot include VK transmitting calls in their logs, only foreign. Foreign stations will enter up VK station heard only.

7. The awards in the receiving contest will be similar for the winners in the transmitting contest. The winning VK receiving station will be awarded a handsome cup providing he is a member of the W.I.A. or Societies affiliated with it.

8. Receiving logs are to be similar to transmitting logs.

QST for
Single-Tube Head Amplifier for Condenser Microphone

The single-tube condenser-microphone head amplifier shown in Fig. 1 has been used with success by R. G. Sceli of Hartford. The gain is at least equivalent to that obtainable from the usual cascaded resistance-coupled 30's, a large voltage step-up being secured through the use of a 32 screen-grid tube. A novel feature of the circuit is the output coupling device, which is simply a single-button microphone transformer reversed so that the secondary is connected in the plate circuit and the primary used as an output winding to work into a low-impedance line. To avoid having the plate current flow through the secondary, with a consequent reduction in inductance, the plate voltage is fed to the tube through a 250,000-ohm resistor, the transformer being coupled to the plate through a 0.1-µfd. condenser. The 1-volt drop across a 16-ohm resistor in series with the filament of the tube is utilized as grid bias.

An amplifier of this type offers savings in both space and cost.

Link-Coupled TNT Amplifiers

Nearly everyone who has tried link-coupling between stages, and between the transmitter output and the antenna tuning unit, is aware of its advantages over other methods of coupling.

The only real disadvantage, as I see it, is the necessity for added tuning controls and the expense for extra variable condensers. Why not a TNT amplifier instead of t.p.t.g.? The TNT oscillators seemed to work as well as t.p.t.g. rigs so why wouldn't the same reasoning apply to a neutralized amplifier? If it worked the only disadvantage to link-coupling would be overcome. I tried it on my rig and it sure did "perk." I got every bit as much excitation, the note seemed to improve and neutralization was more complete. What's more, there is no more apparatus used than with capacity coupling.

The TNT grid coil from an old self-controlled job was connected in place of the tuned condenser-coil combination and while it is doubtful if the coil was the proper size for the tube used, the rig performed perfectly. I have not as yet had time to experiment with different coil sizes but what little I have done has assured me that my new rig will be link-coupled throughout with TNT amplifiers in every stage.

—Tom J. Boland W0AJP

5-Meter Antenna for the Car

Needling a method of supporting a 56-mc. vertical antenna on a car so that the antenna would be readily demountable and not mar the car in any way, I devised the scheme diagrammed in Fig. 2. It worked very successfully, so I am passing it on.
to any of the five-meter gang who may be in the same predicament. The car window is cranked all the way down, the upper (sharpened) end of the flat wood piece is fitted in the groove where the glass usually goes, and the window is then cranked up into the groove in the lower end of the wood piece. For the antenna itself, a lath or bamboo flower stake supporting a wire would work just as well as the rod and stand-off combination, which is not very strong in a wind. I use a 46-inch rod with six-foot feeders spaced two inches, a combination which works out well for mobile operation where trees are low over the streets. A small battery clip grounds the odd feeder to the metal rain gutter around the roof of the car.

--- Edgar V. Seeler, Jr., W3BBZ, W1BDF

Key-Thump Kinks

The diagram of Fig. 3, showing the arrangement used to eliminate key clicks and thumps at W1AUN, is submitted in the hope that it may be of help to other amateurs who are bothered by the same trouble. It has taken a long period of experimenting here with all sorts of arrangements to find that the trouble was being caused by the high-frequency surges getting into the 110-volt supply line, and being wired to most of the neighboring BCL sets, causing anything from an ordinary click to complete blocking of the receivers.

In common with the average operator, I was very much against any arrangement which would decrease the power of my transmitter, but the circuit shown in Fig. 3 had not the slightest noticeable effect on the efficiency.

The parts were obtained from an old "B" eliminator, except for the condenser and resistance across the key. \( C_1 \) and \( C_2 \) are simply the condenser block from the eliminator, and \( L_1 \) and \( L_2 \) are the chokes. The 110-volt line to the power transformers should be run in BX cable with the metal covering grounded.

One thing seems to be very important in regard to the key connections. The wires from the key to \( L_1 \) and \( L_2 \) must be as short as possible. Wires only a foot long will radiate enough energy to be heard in a neighboring BCL set. Shielded cable with the shield grounded may be of help although I have not tried it. However, by locating the chokes directly at the key, and with the parts arranged as in the diagram, no interference, except for slight harmonics, is caused in a nine-tube superheterodyne located in the same house and having its aerial connected to the same pole as my transmitting antenna.

--- Gordon Wiley, W1AUN

Boosting the Plate Voltage

Many power transformers, particularly those used with low-power transmitters, have unused filament windings. By connecting such a filament winding in series with the primary winding so that the voltage drop across the filament winding bucks that of the primary winding, the turns ratio is increased and a higher output voltage results.

To determine the proper connections, place an a.c. voltmeter across the secondary high-voltage winding and note voltage, then place one of the filament windings in series with the primary winding and note the change in voltage. If it increases the connection is correct, if not reverse the filament connections. More than one may be connected in series and then placed in series with the primary. If excessive heating is noted, it is advisable to cut out one or more bucking windings to prevent damage to the transformer.

I have used this kink for some time. The transformer in question normally supplied 1300 volts a.c. at 200 ma., and since placing one 2½ and one 7½-volt winding in series with the primary, the voltage increased to 1500 volts with the same load current without heating.

--- Dean C. Logan, W2GKZ

Battery Grid Bias

There are certain grid bias requirements, such as in Class-B audio and Class-B linear amplifiers, demanding a constant voltage which can be most satisfactorily and easily met by the use of battery bias. Batteries are also much used for biasing Class-A and Class-C amplifiers.

One difficulty often experienced with the use of

\(^1\) Undoubtedly the fault of the receiver, not the transmitter. --- Ed.

\(^2\) If a high-range a.c. voltmeter is not available the high-voltage winding of the transformer may be connected to the 110-volt line and the voltage across what is normally the primary measured by a filament voltmeter. --- Ed.
bias batteries is the effect of the grid current. This current, flowing through the battery in a reverse direction, has a charging action which often results in very erratic battery voltage and short battery life. The circuit shown in Fig. 4 will correct this condition. The resistor in shunt with the bias battery eliminates the charging component by compensation. In operation, all tuning and neutralizing adjustments are made with the switch $S$ open. Then, after closing the switch, the resistor $R$ is adjusted so that the milliammeter reads zero.

Under these conditions the grid bias is definitely fixed at the open-circuit voltage of the bias battery and is not subject to fluctuations because of charging. Since no current is drawn from the battery its voltage will remain constant except for the slow decline due to aging. Of course, the switch should only be closed during periods of operation.

To determine the value of resistance needed, divide the battery voltage by grid current (in amperes) and for the wattage multiply the same two factors.

---

L. S. Fox, W2AHB

Easily Made High-Voltage Switch

In the construction of many amateur transmitters there is a need for a high voltage switch that costs little yet will not have high distributed capacity or a tendency to break down at crucial moments.

The switch illustrated (Fig. 5) was made for use in a 50-watt transmitter as a wave changer. It seems to have all these desirable qualities and no faults. It is made of bakelite discs held to a shaft with collars salvaged from a defunct radio receiver. The frame is made of bakelite and the side contacts are jack springs. The end contacts in the base of the frame are spring buttons made to hold doors shut. The contact elements are brass strips that cover one half the periphery of the bakelite discs. These are annealed, bent, and bolted on.

This type of switch is not only simple in construction, but can be made to handle any number of circuits within reason at any ordinary current. The switch illustrated handles 10 amps. on one of the discs without heating.

---

Ronald L. Ives, 33 Laurel Pl.,
Upper Montclair, N. J.

Partial Application of Crystal-Lock System

Since the publication of my article on “Low Cost Crystal Control for High Power” in June 1934 QST, I have received numerous letters indicating an extensive interest in this type of crystal control. Since link coupling is fast becoming universal in its application another phase of the crystal-lock system is worthy of consideration.

In the present-day link coupling system, in which the grid circuit is tuned, it is seen that the final amplifier can readily be converted to a self-excited t.p.t.g. unit by de-neutralizing the amplifier merely by rotating the neutralizing condenser. If the final amplifier is of husky proportions and the doubler or pre-amplifier stage is of modest output power, a distressing condition may exist. This distressing condition is none other than insufficient excitation to the final amplifier. The transmitter can be converted to a partial lock-crystal system without any change at all except changes in adjustment. By partially de-neutralizing the final stage feeble regeneration will set up, which may not be enough to let the unit oscillate by its own excitation, but will be enough to furnish the added excitation required for increased output power. The coupling from the previous doubler or amplifier stage and stages farther back, including the crystal stage, can all be decreased, as little power is required of these units in crystal lock stages. Two 212-D’s are used in push-pull at W5VU at present instead of the single 212-D that was in use when the article was published.
sent to QST and the same 112 crystal oscillator and 46 doubler unit shown in QST is in use.

It will probably be found that the whole transmitter will function better as the tubes in the preliminary stages will have a chance to "cool off" and operate somewhere near their intended operating conditions. Incidentally, this should cut down the number of trips to the tube store.

—Durward J. Tucker, W3VU

Governing the Wind Generator

In connection with wind-driven battery chargers such as were described in QST for March 1934, John Scott, VE4EN, offers a suggestion for making the mill automatically turn itself out of the wind when the charging rate becomes too high. The essentials of his arrangement are shown in Fig. 6. In brief, the hub of the impeller is offset from the line of the tailpiece and pivoting point—the amount of offset is actually 8 inches, as shown—and the tail is provided with a separate pivot.

FIG. 6—RIG FOR AUTOMATICALLY TURNING THE IMPELLER OF A WIND-DRIVEN BATTERY CHARGER OUT OF A HIGH WIND

Under normal conditions the line of the tailpiece is at right angles to that of the impeller, being held that way by the tension of the spring pulling the assembly back so that the tailpiece rests against the stop. If the wind becomes too high, however, the impeller tends to turn itself out of the wind, pulling against the spring as it does so. By adjusting the tension of the spring the maximum charging rate can be regulated. VE4EN's rig starts to kick out at about an 8-amp. rate, never going above 12 or 14 amps. even with high winds. The tail should be of fairly good size—VE4EN's is 14 by 20 inches and is set on an arm 3 feet long.

Notes on 14-mc. C.C. Transmitters

From QSO's on the 3.9-mc. 'phone band I find that many hams are having trouble in making crystal controlled rigs work on 14 mc. This was the case at W8HCR, and about three months were wasted in trying to obtain sufficient excitation to a pair of 10's in push-pull on 14 mc. The following points seem to cover the main sources of trouble.

1. In using Type 46 or 47 tubes as doublers, high plate voltage seems to be necessary and desirable. The 47 is used the same as a 46, with the two grids tied together. A plate voltage of 500 to 600 volts is desirable and is safe if the grid bias is kept high on these tubes.

2. Do not use automatic grid bias of the grid leak type on these tubes at plate voltages above 400 volts. If a fixed grid bias of between 50 and 150 volts is used, depending on the plate voltage and the output needed, there is no danger of the grids going positive under any normal load. This fixed bias may be obtained from batteries or from an "C" bias eliminator with a low resistance voltage divider (not over 20,000 ohms for a 250-volt supply).

3. Neutralizing seems to make no appreciable difference in the operation of the frequency doublers. When using the 46's neutralizing is easy and the tubes may then be run as straight buffers at any time. However, 47's are difficult to neutralize and are usually run as doublers only.

4. Capacity coupling between stages is used, the condenser being connected directly to the plate end of the preceding tank coil. Capacity values can be from 40 µfd. to 100 µfd. for coupling between the oscillator and the doubler stages. The capacity for coupling from the second doubler to the 210's in the Class-C amplifier may range from 100 µfd. to 500 µfd.

5. No series radio frequency chokes were found necessary in the plate supply leads. These leads were each by-passed to the filament center-tap with a 0.002-µfd. condenser.

6. Shielding between stages was found to be absolutely necessary and was the point that had been causing practically all the trouble. Without shielding, the tuning of the second doubler and final amplifier was extremely critical, and regeneration was being set up in such a way as to counteract a large part of the excitation voltage which was being impressed on the Class-C stage. As a consequence the final amplifier would not load up and the doublers ran extremely hot. The shielding as used consisted of galvanized sheet iron baffles between stages with a height great enough to extend above all apparatus in each stage. Also, a galvanized iron sheet was placed on the sub-base and all parts mounted on top of this. No shielding was needed in front or back of the stages and none on top. The shielding was insu-

*Neutralizing accomplished by feeding r.f. voltage from the plate circuit back to the grid often increases the efficiency of a doubler stage by introducing some beneficial regeneration, although there is no tendency toward oscillation. This effect seems to be more pronounced with low- or medium-µ tubes, however, than with high-µ tubes which inherently are good doublers.—Ed.
lated from all equipment and connected at one spot to the negative "B" lead. This cleared up all the trouble and each stage tuned up easily on 14 mc. as on 3.9 mc., and sufficient excitation was obtained to drive the final 210's in the modulated stage.

In conclusion I wish to state that the information on shielding and plate voltages was given me by W8DLD and came at a time when it had seemed to be impossible to make the transmitter work properly. I am passing this information along to the rest of the hams in hopes that it may help someone else who has been having the same troubles.

—Weldon B. Sanger, W8HCR

(Continued on page 88)

Spreading Out the Calibration Curve

A Handy Kink for Increasing the Readability of Graphs

As we have pointed out before in QST, the accuracy with which frequency measurements are made depends to a large extent upon such purely mechanical things as precise reading of dials and calibration charts, as well as upon the goodness of the frequency meter itself. The use of a large sheet of cross-section paper and a large curve to make precise reading possible has therefore been recommended. But it is sometimes inconvenient to have to unfold a large curve sheet every time one wishes to take a reading, besides the difficulty of following accurately the lines from the margins to the curve without resorting to the use of a rule.

A scheme called to our attention recently by one of our readers overcomes both of these objections nicely and makes it possible to fit a large curve into a small space as well as increase the ease of reading. It is best explained by reference to Figs. 1 and 2. In Fig. 1 we have a sample calibration curve occupying a 5 by 7 inch space on a sheet of ordinary cross-section paper, which has 20 lines to the inch. To avoid confusion only the lines spaced an inch apart are shown in the drawing. The calibration is assumed to cover the 3500-ke. band. This size of curve is easy to handle, but is difficult to read precisely because each dial division occupies only one-twentieth of an inch on the chart, and the nearest one can read is about a half division. The same is true of the frequency readings — the limit of precise reading is only about five kilocycles.

In Fig. 2 the curve has been split into several sections, and the spacing has been doubled for both the dial and frequency readings, without increasing the size of the sheet. Each dial division now occupies a tenth of an inch, and the frequency can be read to 2½ kilocycles as easily as to five in Fig. 1. Besides this the chart is more easily followed because the values of ordinates and abscissas are plotted right on the curve.

The idea can of course be applied to any size of curve, and the sections may be chosen for the greatest convenience in use. For instance, the first section might include the phone band only, or might be drawn so that all of the 7- or 14-mc. harmonics would be on a single section.

In connection with plotting curves, it is a good idea to use a needle and make a small prick in the paper at the plotted points rather than to plot with a pencil. The advantages are obvious. The needle may be mounted in a wooden handle if many curves are to be drawn. Needless to say, the curve itself should be drawn with a hard pencil sharpened to a fine point or with a fine-pointed ruling pen, since a thick line is hard to read.

—G. G.
Canada—U.S.A. Contact Contest
October 12th (6 p.m., Friday) to October 14th (Midnight, Sunday)

For several months plans have been discussed for holding another W/VE QSO Party. Canadian amateurs now propose to make this an annual activity, and cordially invite hams in every one of the 69 Sections of A.R.R.L.'s Field Organization to take part in three big evenings of operating fun and competition. All W and all VE hams may take part, using any amateur frequency band. This will give many W's a chance to work all VE districts for the first time. It will be interesting to see what U. S. ham can work most Canadian stations in the period of the tests—and which Canadian station will work most stations and Sections in the U.S.A. likewise. Each contact counts one point, with extra credit for a message exchange in proof of "real solid" contact. This is a splendid opportunity to make new station records and get acquainted with our neighbors at the same time we have operating fun.

A Committee of Canadian amateurs acts as sponsor of these 1934 tests. The Canadian General Manager heartily endorses the enterprise. An A.R.R.L. Certificate of Merit, like that represented herewith, will be awarded the winning station in each Section, this signed for the Award Committee and by the C.G.M. himself. The Utah-Carter Radio Corporation of Toronto is, in addition, presenting a cup to the leading Canadian station. Here are the simple rules for the W/VE QSO Contest.

Dates: Starts—Friday, October 12th, 6 p.m. local time.
Ends—Sunday, October 14th, midnight, local time.
Duration—54 hours. Frequencies—Any or all amateur bands may be used.
Object: Each VE will work as many W stations as possible, in as many United States A.R.R.L. Sections (see list p. 5 QST) as possible.
Each W will work as many VE stations in as many VE Sections as possible.

Scoring: Each Canada/USA or USA/Canada QSO counts one point.
Handling of any amateur traffic regardless of number of messages, an additional two points.
Maximum points for one QSO is three points.
VE stations multiply number of points by number of United States A.R.R.L. Sections worked.
W stations multiply number of points by number of VE A.R.R.L. Sections worked, and multiply final score by nine (there being nine times as many U.S.A. Sections).

Power and Operator Handicap: Every station using less than 50 watts input to the final stage may multiply his score by 1 1/2. If there is more than one operator at a station, the operator having the highest score will be the score for that station.

Form for reports to VE3AZ on W/VE Contest showing how scores are computed.
Amateur Radio STATIONS

W6RJ-WLVB, Oakland, Calif.

W6RJ’s history dates back to 1925, when J. H. MacLafferty, Jr., opened up with a 5-watter in the Armstrong circuit, fed from a chen rectifier and hitched to an inverted “L” antenna made of four strands of twisted copper ribbon. International DX was coming into its own around that time, and “Mac” was the first Sixth District ham to hear G2SZ, one of the famous calls of those days. Branching out a bit on his own, the following year 6RJ put in a 50-watter with a plate supply which unquestionably was d.c.—it consisted of a 1200-volt bank of wet “B” batteries! With this rig plenty of DX was worked, and its signals were reported from England and Italy, among other countries more commonly reached by California stations.

Although the intervening years have seen a good many changes, the transmitter still uses a “50-watter,” now a VT4B (UV-211). The 1934 rig, which is concealed behind the panel at the left in the photograph, is a four-stage crystal affair having a 47 oscillator, 46 doubler, 10 buffer, and of course the VT4B. Link coupling is used between the last two stages, with the final running at an input of 250 watts. Separate power supplies are used for each stage. A low-power emergency set, using a 46 in the high-C’ Hartley circuit, battery operated, is kept underneath the operating table ready to go should the regular power mains fail. An SW-3 takes care of reception. The gadget in the aluminum case in front of the window is a frequency-meter-monitor.

“Mac” is one of those fellows who gets his chief kick out of ham radio by taking an active part in organized activities; W6RJ signs WLVB on 3497.5 and 6990 kc. as Alternate Corps Area Net Control Station, Ninth Corps Area, A.A.R.S., and is Radio Aide for that Corps Area, which means a lot of bulletin writing and correspondence handling in addition to activity on the air. He is also Route Manager for the A.R.R.L. East Bay Section. W6RJ was a participant in the radio work with the Dole and Southern Cross Pacific flights, and during the Long Beach earthquake not long ago organized an emergency set-up among the Army-Amateur stations in his Corps Area, a job which won him a letter of commendation from the Chief Signal Officer.

W8GQ, Utica, N. Y.

HARRY H. LOTT, former W2ARX and now owner of W8GQ, is another of the gang whose first acquaintance with radio was made in the days during and just after the War. Running from spark through c.w. (the first c.w. transmitter used an Audiotron, no less!) more and more power was used until finally a high-power holiday was declared and the transmitter shown in the station photograph was built. This is an all-210 outfit, using one tube as a crystal oscil-
operated at low voltage and the crystal is temperature-controlled, both factors contributing to the stability of the transmitter.

The rack on which the transmitter and power supplies are mounted is built from steel channel to standard relay-rack measurements. The panels are ½-inch steel sheet, with 18-gauge steel sub-panels. Aluminum paint on the rack accounts for the light color. Power supplies, of which there are two, one of 350 volts for the first two stages and the other delivering 750 volts for the last two, are mounted behind the bottom panel. The panel above it is a spare on which it is intended to build a modulator. The thermometer for the crystal oven can be seen on the lowermost of the r.f. panels.

Receiving equipment includes a home-made detector and two-step short-wave receiver using Western Electric 264-A tubes, a Kennedy long-wave receiver with audio amplifier, and a frequency meter.

W2BJ will be glad to arrange daytime skeds with other traffic handlers.

W2BJ, Brooklyn, N. Y.

A LTHOUGH W2BJ is less than three years old, its owner, Ray Farwell, of 1269 E. 94th St., Brooklyn, dates his ham experience back to the early post-war spark era. With the lifting of the ban on radio operation first a spark coil and then a ½-kw. spark were in operation under the call 2BDJ. Ham work had to be abandoned soon after because of extensive travelling and it was not until November, 1931, that the urge to come back became so irresistible that a 10-Hartley transmitter and an SW-3 receiver were put on the air.

The station has been enlarged since, until now the transmitter is a crystal outfit using a 47 oscillator, a pair of 10's as a power doubler, and a 511 final stage. The r.f. part of the transmitter is built into a cabinet of ½-inch aluminum; the power supplies are on a separate rack. There are three of these, a 350-volt supply for the oscillator, 800-volt supply for the doubler, and a 1500-volt supply for the amplifier. Inputs up to 650 watts have been used on the amplifier. Practically all work is done on 7000 kc. except during July and August, when a portable 11-mc. transmitter is used at Rockaway Point, L. I. A Hammarlund Crystal Pro is used for receiving.

W2BJ likes his DX, although rag-chewing and traffic handling are indulged in frequently. Up to the early part of this year some 55 countries and five continents had been worked; we imagine quite a few more must have been added to the list since.

**Amateurs Undertake Ocean Flight**

F O R years we have been looking forward to the time when amateurs would have a chance to show the feasibility of contacts via amateur radio with an airplane on a long flight. As we go to press just such a project is under way.

**RADIO EQUIPMENT ON KHMZA**

Transmitter is at the left and receiver at the right, directly in back of pilot’s seat. Trailing antenna reel may be seen at front center. Operator’s position is across aisle from the equipment.

KHMZA is owned and piloted by Dr. Richard Light, a prominent New Haven surgeon. Radio operation and navigation is at the hands of Robert F. Wilson, recently graduated from Yale University. The plane is a Wasp-powered Bellanca equipped with pontoons.

Leaving New Haven, Conn., on August 20th, KHMZA docked at Nova Scotia for the first leg of a flight which will be made in easy stages over Labrador, Greenland, Iceland and Europe, lasting through October.

The radio equipment includes a 60-watt c.w. and modulated-c.w. Westinghouse transmitter which will tune to the assigned frequencies of 3120, 5515, 8340 and 12,480 kc. The receiver is an all-band Lear superheterodyne. Complete shielding and bonding allows excellent reception on all frequencies. Either trailing or fixed

(Continued on page 80)
I.A.R.U. NEWS

Devoted to the interests and activities of the INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM
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Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

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Canadian Radio Relay League
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Canadian Radio Relay League
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Canadian Radio Relay League
Liga Podmoskovskiy Amaterek Vysilatel
Deutscher Amateur Send- und Empfangs-

Conducted by Clinton B. DeSoto

General:
The world will be looking toward VK3 during October, engaging in the Melbourne Centenary International DX Contest, not to mention the widely publicized "Centenary Air Races" from England to Melbourne. One hundred years ago this month the city of Melbourne, now capital of Victoria and second city in Australia in age and size, was founded. Full details of the Centenary DX Contest elsewhere in this issue of QST . . . . . Jacques Mahieu, ON4AF, claims the first phone contact between Europe and Hawaii, having worked K6COG with an R7 report . . . . . The U.R.E.'s new official organ, which they are publishing independently, is prospering; write Apartado 262, Madrid, for details . . . . . Henry Sasaki, WGCXW, reports European DX to be coming through fairly consistently on the European West Coast for the first time in several years . . . . In about four months he had 180 QSO's with about 90 stations in 17 different countries, on both 7 and 14 mc. . . . . Federal QSL Bureau of the W.I.A. is Geo. W. Luxon, VK5RX, 8 Brook Street, Miteham, S. Australia . . . . The new address for Hungary is the National Union of Hungarian Short-Wave Amateurs, VIII, Mestyas-
tér 6, Budapest, Hungary . . . . The official bureau for all Roumania remains in the hands of Lieut. ing. F. Dinescu, Ecole Polytechnique, Bucarest, Roumania . . . . The British Empire has finally declared the change of prefix for the Fiji Islands from VP1 to VP2 to be official . . . . . . F. Fleming, of Suva, reports that all Fiji stations will now use VP2 . . . . . . ONK-4, a special license Belgian station, was recently QSO the United States on 3.5 mc, with but 4 watts input to a crystal oscillator . . . . . The S.A.R.R.L. recently elected Major K. B. Warner, Secretary of the I.A.R.U., an honorary life member . . . . Last July 11th VK5HG reached his 10,000th QSO . . . . . It was with W2CC, with whom he has had more than 800 contacts on a four-days-a-week sked VK5HG works 9 or 10 W stations daily on 14 mc. just before sunset in Australia . . . . . Add H. Tscherning Petersen, OZ7Z, to the list of English-speaking and hospitable Danish hams . . . . . Add Frank Gow, WIAF, to the growing list of TBTOC qualificants (Three-Band Transoceanic Club) . . . . His first work was with that ubiquitous TBTOC'er, PAOIC, although he has since repeated the performance with HB9Y . . . . . Next month this department will present the official I.A.R.U. WAC map of the world, dividing all the world into continental areas and showing just where each spot you work is located in the continental distribution . . . . .

Amateur Radio in Switzerland

By Rudolph Stuber, HB9T, Traffic Manager USKA

Before the war, only a very small number of experimenters, chiefly watchmakers, were owners of receiving licenses, working with entirely homemade sets: Mr. Ess (now HB9AE) of Basle belongs to those pre-war hams who know the spark-coil. All licenses were cancelled and the wireless apparatus confiscated in 1914. There was not the slightest sign of activity until 1920, when a few amateurs began to try the first commercial French vacuum tubes. Mr. Roegen (now HB9AN) belongs to the pioneers participating in the transatlantic tests of 1923, picking up a cou-
ple of U. S. stations. Transmission was still strictly forbidden in Switzerland. Nevertheless, a few amateurs began to work secretly.

In 1925 the Post & Telegraph Department of our government issued the first regulations governing amateur and experimental transmission. But the regulations were so severe and the fees so high that no amateurs applied for licenses that year. The result was the confiscation of several amateur stations by the authorities; it was also the end of the first Swiss Amateur Transmitter's Society, of which Dr. Merz was president.

The first licensed amateur in Switzerland was Mr. Dogler of Zürich (HB9A), who, in 1926, began to work with the calls EH9XA and EH9XD, and who established the first two-way contacts with 23 countries. Then followed Mr. Wüst (HB9C) and Mr. Schneeberger (HB9G), both in Lausanne. In 1929 Mr. Dogler and Mr. Schneeberger founded the U.S.K.A., and Mr. Dogler was elected first president of this organization.

Thanks to the U.S.K.A. ham radio made rapid progress. The Union has now about 200 members, of which 50 are transmitters, the rest being registered receiving amateurs or experimenters. We are glad to note that actually all Swiss transmitting amateurs are members of the U.S.K.A.

We are now on very good terms with the postal authorities, cooperating with them as much as possible. Every serious amateur can now get a license in Switzerland. The applicants are required to pass an examination on theoretical subjects and knowledge of the regulations, and be able to copy and send code at 10 w.p.m. The license fee is fixed at francs 40.- per annum, or about $13.

The highest input to be used is fixed at 50 watts. Crystal controlled. A great and fine task for our amateurs is the study of the propagation of wireless transmissions in our mountainous country. Regular traffic and relay tests are held, chiefly on the 3.5-mc. band and not seldom 50% of all transmitting stations are participating. Our DX stars (HB9J, HB9Q and HB9Y) are chiefly working on the 14-mc. band. The following hams are members of the WAC Club: HB9G, HB9J, HB8S, HB9U, HB9X and HB9AK.

In conclusion, may we add that we are always very pleased to meet and entertain hams from abroad. Those who intend visiting our country should not forget to drop us a line, in order that we may arrange a "Swiss Hamfest."

Jess Cordova of world-famed EAR96-EA4AO has recently married, which may account for the fact that EA4AO has really not fired up in old-time form.

Believe it or rip, Notley, we've just filled an order for log-books from an SWL in England named Mr. X. Y. Zzygy, a name that comes about as far down the alphabet as any we ever heard!

Why is it that Spanish amateurs have the highest percentage of futuristic QSL cards as well as the most elaborate designs?

Special Notice!

When sending remittance to us, please send personal check, money order, bank draft or registered letter. We cannot assume responsibility for currency which has been sent in ordinary mail and lost in transit. You alone take the risk when sending cash through the mails. This matter is of sufficient importance to call to your attention, and your strict adherence to this request will always be to your advantage. Resolve to do it at all times.

and contains useful information and traffic news. Besides, in the two leading Wireless Papers of Switzerland (one French and one German), a special page is placed at our disposal for a popular review of amateur work and news of general interest.

We should like to point out that the U.S.K.A. refuses absolutely to support unlicensed Swiss stations and to forward cards for them, etc. Cooperating with the government, we have been successful in stopping several unlicensed transmissions, several amateurs having been condemned, and this policy will be continued. The official list of calls is published in each issue of the "Call Book."

Swiss amateurs have been making efforts to improve their apparatus. Most stations are crystal controlled. A great and fine task for our amateurs is the study of the propagation of wireless transmissions in our mountainous country. Regular traffic and relay tests are held, chiefly on the 3.5-mc. band and not seldom 50% of all transmitting stations are participating. Our DX stars (HB9J, HB9Q and HB9Y) are chiefly working on the 14-mc. band. The following hams are members of the WAC Club: HB9G, HB9J, HB8S, HB9U, HB9X and HB9AK.

In conclusion, may we add that we are always very pleased to meet and entertain hams from abroad. Those who intend visiting our country should not forget to drop us a line, in order that we may arrange a "Swiss Hamfest."

Jess Cordova of world-famed EAR96-EA4AO has recently married, which may account for the fact that EA4AO has really not fired up in old-time form.

Believe it or rip, Notley, we've just filled an order for log-books from an SWL in England named Mr. X. Y. Zzygy, a name that comes about as far down the alphabet as any we ever heard!

Why is it that Spanish amateurs have the highest percentage of futuristic QSL cards as well as the most elaborate designs?

Special Notice!

When sending remittance to us, please send personal check, money order, bank draft or registered letter. We cannot assume responsibility for currency which has been sent in ordinary mail and lost in transit. You alone take the risk when sending cash through the mails. This matter is of sufficient importance to call to your attention, and your strict adherence to this request will always be to your advantage. Resolve to do it at all times.
THE R-S-T system represents, to our mind, the newest advance in amateur radio operating. After careful examination we have no hesitancy in recommending that you try the R-S-T system. If you approve it, and use it, it will be accepted as A.R.R.L. standard practice.

The letters R-S-T themselves determine the order of sending the report. The technique is an amateur method of indicating Readability, Signal Strength, and Tone in the added in X to indicate that the steadiness or other characteristics of the signal seem to indicate it is crystal-controlled. Fully explained elsewhere in this issue, we commend the new standard system of giving amateur signal reports to your attention. By using the letters R-S-T with the reports you give, there can be no confusion with reports in terms of QSA- and R-definition. Logical and brief, you will find R-S-T increasingly satisfying as you keep using it. Use the new system. Yours for RST559!

Mt. Crillon Expedition

The expedition to Mt. Crillon, Alaska, returned to the states in mid-August after a most successful summer. The mountain was climbed twice and several aerial photographic flights were run off without difficulty. The scientific study of the geology of the region and of the movements of glaciers was also satisfactorily accomplished.

The radio equipment worked under the portable call W1CVF BT K7, with David Putnam, W1CVF, as operator. Some two hundred messages were handled during the six weeks the base camp was occupied. All outside communication was on 3553 kcs. Schedules were maintained with K7PQ and VE5GT. A fine route via W7XO and W2GOX got messages east in short order. K7VH and K7EBR also assisted in moving traffic. W6CXW, Long Beach, Calif., reports CIPIGB's signals consistent during June and July, and has had a couple of QSO's with the expedition.

WANTED—STATIONS TO SEND CODE PRACTICE

The A.R.R.L.'s program of code practice on the 1715-kc. band is at this season being revised for the coming active radio season. Stations that engaged in the work last season are being requested to furnish a new schedule for publication in QST. There are great possibilities to this 1715-kc code practice work, and it is one of the most worthwhile of amateur endeavors. Any amateur working in this band wishing to volunteer regular schedules of code practice is invited to get in touch with A.R.R.L. Headquarters, so that his schedule may appear in QST and also be distributed by mail to those interested. Helpful hints relative to the sending of code lessons are furnished all volunteers by A.R.R.L.

56-14-mc. Relay

A novel two-band relay took place on August 4th when W1SOOT operating from a plane in New Jersey worked two-way with W9USA. World's Fair. W3COT using a 56-mc. transceiver in the plane was picked up at W3ZX and relayed to W9USA on 14 mc. W9USA's signals were similarly relayed through W3ZX to W3COT via the same route. After signing with W9USA, CM2RA was raised and, with W3ZX again doing the relaying, an excellent QSO ensued between W3COT in the plane and CM2RA in Cuba.

56-mc. Possibilities

"In a bit of spare time I have picked out some possible long DX shots for 56 mc. I believe that from Mt. Rogers, Va., at 3717 ft., one could shoot to Short Mtn. in Cannon County, Tennessee—a distance of about 270 miles with practically unobstructed view. Another good shot would be from Lookout Mtn., Chattanooga, Tenn., to Clinch Mtn. at Burke Garden, Va., about the same distance. We are in heaven here in Greeneville, Tenn., for 56 mc. work; the Smoky Mts. Pack with 6000 foot peaks rising out of the valley has good trails and roads. Many high peaks are accessible by motor: White Top, 5520 ft., just south of Rogers in Virginia; Roan Mtn., 6513 ft., on North Carolina line; Mitchell, 6954 ft., highest in East; Pisgah, 5749 ft.; and Cumberland Gap Pinnacle, which has a great, sweeping view from only 3000 ft. Only
12 miles east we have Cold Spring Mt., 4880 ft., having an excellent outlook. The Coast & Geodetic Survey maps showing its triangulation stations are a great thing for 56-mc men. Any two stations shown joined by a line on these maps are visible to each other. Many are good distances apart, 50 and even 70 miles, which is something in the line of kicks and adventure. The Survey will furnish information as to the location of triangulation stations. I hope to work out more possible DX locations.

If I am successful in interesting some fellow who will cooperate, I feel we can go a long way in delving into the mysteries of our 56-mc band.

--Herrick Brown, W2ZZ-ABR

The following contributions by Mr. R. H. Votaw, W7WY, and Mr. Donald P. Love, W2BJX, win C.D. article contest prizes for this month. Your articles on any phase of amateur communication activity are likewise solicited and may win you a bound Handbook, six logs, or equivalent credit applied toward other A.R.R.L. supplies. Let us have your article, and mark it "For the C.D. Contest," please.

R. E. H.

Station Appearance

R. H. Votaw, W7WY*

Although at first glance station appearance and "communicating efficiency" may not appear to be very closely related, a little thought on the matter will prove the contrary. The old nudge which states that "beauty is only skin deep" cannot well be applied to the modern amateur station. A glance into any station will usually reveal instantly the merits of the operator. Efficient communications work necessitates a neat, well-equipped station.

Plenty of operating room is highly desirable, with space for a station log, call book, traffic file, QSLs, etc. A station bulkhead furnishes an excellent means of providing ample operating space. A large sheet of veneer tacked to the side of the table, directly in front of the operator, serves this purpose admirably. It is an ideal place to post station certificates, and in conjunction with a few shelf brackets can be constructed so as to furnish a place for many of the station necessities that would otherwise occupy the table.

It is an impossibility to conduct an experimental laboratory and an efficient operating station on the same table. Too often the operator glances at the clock to find it is time for a schedule, but the key is buried under several feet of miscellaneous apparatus, or part of his power supply is connected to the experimental rig. If a traffic handler is interested in the experimental field, he should arrange to carry on his experimentation in such a manner that it is not necessary to molest his regular outlet.

Station appearance also has a great deal to do with the opinion the visiting amateur forms of the operator of the station. Many operators of low-power stations which are kept in good order are more highly esteemed by their fellow-amateurs than the high-power lads who reply to your summons on the door by telling you that you'll have to climb the fire escape and enter through the window, since it is impossible to get the door open because of apparatus on the floor.

I vividly recall a visit paid to a certain station en route to a convention several years ago. The operator of the station was not at home, and we were greeted at the door by his father—a jolly old Irishman who evidently imbued quite freely of the flowing bowl. He informed us that his son was not at home, but we could look at his outfit, and remarked, "Sure, an' I'll sell ye the whole outfit for the price of a gallon of moonshine!"

After leaving the station, we decided that the old fellow would have to stay thirsty for some time to come if the sale of the station was the only means of purchasing his moonshine! The operating table was buried under scraps of wire, year-old newspapers and letters, and various ordinary sundries. The station was evidently primarily designed for a rack-and-pinion job, but the panel was missing. The tank coil and tube were harnessed together, but were not self-supporting—they supported one another. They occupied the highest portion of the "rack"—a shelf several feet from the floor. A mess of wires (largely assorted to, alas, the absence of insulation) leaped out on all sides of the shelf and cascaded downward in a manner that threatened electrocution of the operator, should he make a pass at the key. A rheostat was suspended approximately midway between the shelf and the floor. Several fixed resistors jutted out at crazy angles from the maze of wire. The batteries resided on the floor—the final shelf of the rack.

Needless to say, the members of our party did not hold a very high opinion of the operator of such a station.

Surely such an important thing as station appearance is deserving of more time and consideration than many of the amateurs give it.

Accuracy

By Donald P. Love, W2BJX*

The handling of free message traffic for the public via amateur radio stations is an extremely important public service, and a service that could be and should be appreciated and used much more than it is now. And, through club news in local newspapers, radio broadcast programs featuring amateur radio, and by word of mouth, this amateur public service brought to the attention of the public more and more.

But, if we hams would have our message handling looked upon as being a really valuable public service, performed by conscientious amateurs who really take this activity seriously, we must pay more attention to accuracy in relaying such traffic.

Volumes could be and probably have been written on this subject: nevertheless it is of such paramount importance that it can well bear repetition. In a lifetime of skilled endeavor, be it typing or operating a machine in a factory or writing shorthand or sending code— or handling messages—speed is important, but accuracy is far more important. 25 wpm sending is FB—if the receiving operator can copy 25 solid, but if he can't copy that speed solid, then it's his duty to request QRS, rather than do as so many do—come back with "R OK FB SOLID," and then guess at the words missed. It is very possible for the "guessing" operator to totally misinterpret such parts as has happened to me on several occasions, and consequently "fill in" words that will give the message an entirely different meaning from that intended by the sender. For example, such words as "form," "address," "clear," "route," "relay," "check," "state," and innumerable others, have several meanings—they can be either nouns or verbs—and can carry totally incorrect meanings and make a message misleading or completely unintelligible if wrongly interpreted through guesswork on the part of the receiving operator.

Everyone admires the really good fast operator—the fellow who can send evenly spaced, easily copiable material at 30 per, and who can also copy solid at the same speed. But the pseudo "speed artist" who tries to "make an impression" on his fellow hams by always coming back with an "R," whether he actually copied solid, or merely got half of it and guessed at the rest—he's the fellow who gives amateur traffic work a black eye, and he's the reason why many people consider it "kid stuff" and refuse to take it seriously.

I know one ham that I used to clear traffic through frequently—until one day, after I had given him several messages ("QSG all" by his request), I happened to listen to him later, while he was giving some of this same traffic

*O.R.S., 129 Winfield Avenue, Poughkeepsie, N.Y.
to one of his sketches. I was absolutely amazed and disgusted at the errors he had made in copying the traffic I had given him—errors in numbers, dates, addresses, texts! Here was bitter disillusionment for me. I always considered him one of the best and most dependable operators on the air. But never again will I have confidence in his "OK" to a string of messages.

Such carelessness is inexcusable. We who are O.R.S., or R.M., are seriously engaged in rendering a valuable service to the public through free traffic relaying, and we naturally expect people to take our endeavors seriously.

But—how can we expect to commumcate the public's respect if, in relaying those messages which they entrust to us, we twist and garble them so they are unrecognizable and unlistenable to the recipient?

What impression of amateur radio relay work do you suppose the addressee who gets a badly garbled message receives when it is delivered? Do you wonder why I say accuracy—ACCURACY—accuracy is something we are expected to command the public's respect for. And how can we expect to command the public's respect for something we can't fulfill?

A Boat Trip and 56 mc.

THIS is an account of a boat trip taken in early July by a group of 56-mc. hounds. The gang: Chief, Al Sise, WIAAF, Brookline; Skipper, Chas. Welch, Amesbury; Chat, Chas. Best, W1WYR, Newburyport; Wes Wheeler, W1WQ, Newburyport, all in Massachusetts. The outfit: Double-button mike, pre-amplifier with 135 volts, 37, 41 into pair of 2A3's; modulating P.P. T.P.T.G. 45's with pair of 300-volt motors turning up the R.F. The boat: Revamped Coast Guard double-ender, 24 feet long with small cabin forward in which the outfit was stored, powered by Chevrie motor.

We got underway by 9:00 a.m. on the fourth and headed down river from Amesbury, Mass. W1WQ with his duffle was picked up at Newburyport. During the first portion of the voyage up the coast after passing Newburyport, we worked Prof. Pickard, WIFUR, Seabrook Beach, N. H. WIAAF went ashore with our rig and publicocked and he and WIFUR made minor alterations on it.

About noon of the next day we pulled anchor again and headed for Cape Porpoise, Maine. All afternoon and evening we took measurements of W1XAY, WIFUR and W1XW. About sundown we picked up Cape Porpoise Light and came into a neat little harbor as you'd ever wish to see. We tanked up both ourselves and the boat with the best the port had to offer and hit the hay.

We arrived at Portland about 4:30 a.m. the following morning, and headed for Cushing Island and the whole affair was the fact that "Doc" Terry was held in high esteem by the office for his accurate relaying. "Doc" Terry was held in high esteem by the office for his accurate relaying. We did, with the assistance of considerable "air publicity" from W3CBK of Mohnton, Pa.

October, 1934
Invitation, and Announcement of A.R.R.L. ORS/OPS October Activities

B. A.R.R.L. organization has two types of appointments. The Official Relay Station appointment for the telegraphing amateur interested in handling traffic and in maintaining a high degree of operating proficiency and accuracy... the Official Phone Station appointment especially for voice operated stations, for every ham who normally uses his mike more than his key, who takes pride in maintaining a superior type 'phone station, with the highest standards of apparatus adjustment, with a really good signal, and high operating ideals.

Non-O.R.S. who have active stations and handle messages accurately, and move them speedily and reliably are cordially invited to apply to the proper S.C.M. for appointment. Non-O.P.S. working voice stations, avoiding over-modulation, and living up to the Amateur’s Code of fraternalism and cooperation are similarly invited to inquire regarding the ‘phone appointment. Traffic interest is not required of O.P.S. Activity reports are welcomed from all. The proper Section Manager who has full authority in making these field organization appointments (see address, page 5 this QST) will be glad to see that application forms are sent you, and arrangements with Route Managers or Phone Activity Managers made to get proper endorsement-recommendation on each application.

S.C.M.'s solicit activity reports from all amateurs, whether holding special appointments or not. But if you have a really good station, why not apply for O.R.S. or O.P.S. appointments? These stations are widely known for their excellence. You will enjoy QSO's with skilled operators.

Announcement to O.R.S. and O.P.S.: October 20th and 21st again brings opportunity for testing station performance, making new friendships and QSOs, for two-way radio work (general operation) between key stations and real operators. Mark those dates, and look for full details in the O.R.S. and O.P.S. bulletins to be mailed you from the A.R.R.L. Headquarters in October. All newly appointed stations will also receive full details by mail. Be on hand for some real operating. Watch the scores mount above previous records. Don’t miss this fun. Typical comments from July logs: "Sure had an enjoyable time. Give us your log! We heard you coming thru in gpite of conditions..." 

"I love phone work. Got a message he had collected in the party for me. QSO’s my very good friend W4PL 30 minutes. We are better friends than ever. Enjoyed the party..." W4.

"Seemed good to renew contacts...W6." "A grand party and I enjoyed it, except I couldn’t be on all I wanted to... W2. "A suggestion to lift the crown from the QSO King, allow his signal time his signal is heard! —W8. 

"Heat, and neighbors with antique electric fans (1), and we fell asleep at the switches, too, but sure enjoyed ourselves and had a great time...W8." "These parties sure are a great thing. Keep up the good work...V6.

A.R.R.L. Phone Organization Notes

National 'phone organization is gaining momentum with the appointment of A.R.R.L. Phone Activity Managers in each Section. At this writing new certificates are being issued. The newly formed 'Phone Managers will recommend qualified voice stations for Official Phone Station appointment, make tests and station inspections in their territory, etc. If you have a good 'phone, drop a line to your S.O.M. or to A.R.R.L. for application blanks in their territory, etc. If you have a good ‘phone, drop a line to your S.O.M. or to A.R.R.L. for application blanks

All new O.P.S. appointees will soon receive the October 'phone bulletin issued by A.R.R.L. Headquarters. The next period of O.P.S. activities is scheduled for October 20th/21st. Every station holding Official Phone Station appointment on that date is invited to take part...enjoyable operating assured.

JULY O.P.S. PARTY SCORES

Summer 'phone parties were handpicked by temperatures running above 100° F. in many cases, so that participation for the first time dropped, and July scores were decimated (compared to April operations). W2CJU retained for the Virginia Section the honors of highest scoring. The "high ten" scores were as follows:

W2CJU (Va.) 66 (5 QSOs in 82 Sec., 4 3rd)
W2LHD (Va.) 63 (3, 3 sec., 1 2nd)
W2RH (Va.) 56 (1 Mich., 2 QSOs, 3 2nd)
W4YV (N. C.) 62 (5, 2 sec., 3 3rd)
W8QQX (III.) 45 (3 in 3 Sec.)
W8HXX (III.) 45 (1, 1)
W7AHZ (Ore.) 22 (4, 1, 1)
W6AE 5 (Mech. 1, 1)

Official Relay Station Progress

Eighty-nine active stations have qualified for Official Relay Station appointment in the last three months, a gain of interest sure to be reflected in the October 20th/21st activities. In spite of hot weather during the July Party, the scores and participation were quite high. Newly appointed "reliables" now included in the roster of O.R.S. are as follows:

W1CRA W3BAY W3EWH W9RCG W9WIM
W1FXA W3BUD W3EWN W9WAD W9YTV
W1FPO W3E0U W7HBO W9WMM W9KPY
W2RYF W3CN Y7JY W9CCW W7HPT
W1CVL W3G6U W7DOY W9AUX W9LBB
W1GFN W4BJT W7ATM W9CHR W9LDH
W2FQG W4B6V W7A2X W9C7J W9LAM
W2DRF W4BMR W7ATF W9DPO W9LML
W2D0F W5ELI W8CXX W9HBC W9L6H
W2PMD W5R6N W8C5U W9HVL W9MD6
W29GW W5R6R W8C2W W9HVL W9MD6
W24BS W6ASF W62NP W9MCC W9MUL
W3BER W6B6R W8CP E9WAT W9MUN
W3DKO W6BN W8ANZ W9HAT W9NDM
W3ECO W6BCN W9GSW W9FDF W9KLE
W6EDE W6HIM W9HPL W9LAL
W6D0G W6L6D W9L6F W9MRW
W6DML W6ZBZ W9DRO W9XO

As usual, there were hundreds of O.R.S. in on the July Party. Conditions were none too good. Many stacks were uncomfortably hot, and QRN was bothersome in some sections. But the usual enthusiasm prevailed, as evidenced by scores of letters with the reports, which are more numerous than we can give in full. The 12 highest scorers for this period were:

W8AUD 14,070 91 QSOs, 34 Sec. 910 input watts
W3EKY 10,560 76 34 370
W3EKY 10,501 78 34 380
W4HRC 10,260 68 30 390
W4NC 10,144 62 30 380
W3DFP 10,231 68 30 380
W9D6E 9,977 57 29 300
W9KJ 8,932 57 29 400
W9AQ 8,410 66 29 300
W9EB 8,490 53 24 34
W9TGE 6,480 53 24 34
W9ADE 6,400 54 25

Dakota Hamfest—October 13th–14th

The radio clubs of Miller and Pierre, South Dakota, announce a two-day hamfest for the hams of South Dakota and neighboring states to be held in Pierre, Saturday and Sunday, October 13th and 14th. Many known speakers will be featured, including the state governor. A novelty of the hamfest will be a Buffalo Hunt. It is planned to divide the gang into groups in trucks to hunt the buffalo, reporting the wind to the Base Station on "snake butte." 56-mc. rigs will be used throughout. A banquet and presentation of prizes will close the hamfest Sunday night. All amateurs are invited to attend. Hamfest headquarters will be the Senate Chamber, State Capitol, Pierre, S.D. Dak.
A.R.R.L. Official Broadcasting Stations

Current information on expeditions, special tests and activities, new F.C.C. regulations concerning amateur operator and station licensing, DX conditions or new records on 28-mc, or u.h. frequencies, etc., is sent regularly (new information each week) in the following A.R.R.L. Official Broadcasting Stations. This information is addressed "to all amateurs." The list is revised to include only active appointees. The operators of these stations render amateur radio a distinct service. You will find stations in your own district, and neighboring districts in the list. Make a practice of listening to the "QST" sent from these stations. Report results to these stations when you hear them, so the operators will know their transmissions are successfully received by you and your work appreciated and successful.

W1ABG/BYK, W1APE, W1AQG, W1ASL, W1ASY, W1AUY, W1BWY, W1BZO, W1CBG, W1CCX, W1DOK, W1EAm, W1EBM, W1EF, W1GCQ/JS, W1IKX, W1ISG, W1ISK, W1WY, W1WR, W1ZS/GOG, W1DUS, W1E0B, W1GZL.

W2AZY, W2BLU, W2BZZ, W2CHK, W2DIT, W2FF, W2SN, W2UL.


W7AFC, W7AGQ, W7AVM, W7AVP, W7BVE, W7CMC, W7CHW, W7FLL, W7L, W7BLN, W7DPW.

W8AEEQ, W8AFM, W8AXW, W8AXC, W8AXY, W8DON, W8BQJ, W8CPP, W8CHM, W8CVP, W8CVP, W8DEDW, W8DLG, W8DEW, W8DZ, W8FEZ, W8ICCS, W8ID, W8IGA, W8JKW, W8KMT, W8SS, W8UX, W8WE, W8WF, W8CHC, W8WT,


CM2WZ, CM3YR.

VE2HK, VE3A, VE3GT, VE4BO, VE4MW, VE5AC.

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Trunk Lines

Reorganization of the A.R.R.L. Traffic Trunk Lines for the 1934-35 season is at this time under way. New plans for the system this season promise to better the service offered. Vacancies in the trunk line set-up occur from time to time and must be filled promptly by other reliable traffic men, file with the Communications Department.

October, 1934

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W3AKT heard G6VP calling "test" on 14-mc. C.W. W3AKT copied G6VP and sent the dope to W3LD via 1.75-mc. phone along with dope on G6VP's QRK; W3LD sent QRK to G6VP. In other words, W3LD worked G6VP 3000 miles distant and didn't hear him.

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Conditions for 1.75-mc. phone work have been improving of late. On August 27th between 1:30 and 5:30 a.m. E.S.T. W3EOZ, Bryn Mawr, Pa., and W3EFS, Philadelphia, each worked all U. S. districts.

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WIMK

Addressed transmissions to amateurs are sent simultaneously on two frequencies, by automatic, from the Headquarters station, WIMK, on the following schedule:

<table>
<thead>
<tr>
<th>Days</th>
<th>Times E.S.T.</th>
<th>Frequencies</th>
</tr>
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<tbody>
<tr>
<td>Sunday</td>
<td>8:30 p.m.</td>
<td>13 3825-7150 kcs.</td>
</tr>
<tr>
<td>Monday</td>
<td>8:30 p.m.</td>
<td>22 3825-7150 kcs.</td>
</tr>
<tr>
<td>Tuesday</td>
<td>8:30 p.m.</td>
<td>22 3825-7150 kcs.</td>
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<td>Wednesday</td>
<td>8:30 p.m.</td>
<td>13 3825-7150 kcs.</td>
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<td>Thursday</td>
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<tr>
<td>Friday</td>
<td>8:30 p.m.</td>
<td>22 3825-7150 kcs.</td>
</tr>
<tr>
<td>Saturday</td>
<td>8:30 p.m.</td>
<td>22 3825-7150 kcs.</td>
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Briefs

W6BLZ recently made a trip to the Orient on the S.S. President Lincoln. At Hong Kong he met Clyde DeVinnas, W6OJ, well-known movie photographer, who was on his way to Indo China where he will operate on 7mc. with F.P. WR1AS. W6BLZ also met V56AO, KBOAZ, R5CRU and K6DYQ.

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PORT INDIAN RIVER CARNIVAL

The Port Indian River Carnival is a yearly event staged by Sea Scouts at Port Indian, Pa., on the Schuylkill River. The program consists only of swimming and boat races.

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W3AKT heard G6VP calling "test" on 14-mc. C.W. W3AKT copied G6VP and sent the dope to W3LD via 1.75-mc. phone along with dope on G6VP's QRK; W3LD sent QRK to G6VP. In other words, W3LD worked G6VP 3000 miles distant and didn't hear him.
assistant, W3ECD was operator at the judges' stand, Norris Long assisting. A portable outfit was used on a float in the middle of the river and was operated by W3ERN, assisted by Hideo Takeuchi. At the turning buoy one quarter mile up the river, another outfit was operated by W3BFJ with the assistance of Louis Dewees.

Edgar Klingeman, W3ECD, was in charge of all radio communication at the carnival, as well as being operator of the control station at the judges' stand, W3BFR. The control station operated on 60.5 mc. and all others used 56.5 mc. Thus duplicate operation with any of the other stations was possible. No station was on unless called by the control station. None of the other stations communicated with each other (to cause unnecessary QRM), and the whole communication enterprise went over without a hitch. The public was greatly impressed by this demonstration of amateur radio.

On January 26, '34, the following stations were in a six-way QSO on 25-mc. c.w.: W9DFY, W9MDL, W4BBT, W4EGX, W9EUI, W5AVX, W5BDX; also, on January 31st: W9DFY, W7CCR, W3AII, W5BDX had a four-way; and on February 3rd: W9DFY, W7CCR, W4BJA, W3EEW, W6UT, W5BDX, a six-way.

The new official Department of Commerce list of World Short-Wave Radiophone Stations is now available from the Bureau of Foreign and Domestic Commerce, Washington, D.C., at any district office of the Bureau. Price is 25¢ per copy. The list contains information on approximately 2400 stations, arranged by frequencies. Distances from the United States to foreign stations may be readily ascertained by means of a novel chart and tables. Special identification used by some of the better-known stations is also provided. The list contains 112 pages, including two maps, and is believed to be one of the most complete logs of short-wave stations ever published.

M. L. Peterson, W5FMX, spent, during August, two weeks at Boy Scout Camp Russell, White Lake, in the Adirondacks, where he set up W5FMX and maintained daily schedules with W8FLJ, Richfield Springs, N. Y. A total of 74 messages originated at W5FMX, all but one of these going to W8JSD. The other was a message for Amsterdam, N. Y., which was moved directly to W8HJSX, Amsterdam, after a plain CQ (not directional) from W5FMX!

W4AYY, Johnson City, Tenn., read in his local newspaper that an uncle of his had fallen out of a hotel window in Baltimore, Md. To relieve the worries of an anxious family, he turned to amateur radio. With the assistance of W3BYA, he raised W3EOU in Baltimore and told the operator there, R. N. Fox, what he had read. Fox called the newspaper there, secured the necessary details, and then called the hotel, where he learned that the injuries were not serious. This information was transmitted back to W4AYY, the whole incident taking only forty-five minutes.

A good time was had by Southern California hams at their annual camp and picnic during July at Oceanside. Many portable sets were present. The rigs were set up on the beach, tents furnishing the housing facilities. Portable W8AM was one of the rigs in operation. The following were located that station: W6HL, W6HQ, W6CM, W6BF, W6GDTE, W6JF, W6PIW, W6HJW, W6AM, K5AFA, W6UT, W6CFW, W5EH, W6FIN, W6KRI and W6XAP in. In all about 300 hams visited the "doings." Many stayed the full four days. C.W. men brought the "phone" on ast hat, 7-8.

"KA" of W5BFF-W5QGM did some great gilder-meet traffic work, distributing a bunch of messages via 3.5- and 1.7-mc. band sides. The Elmira Radio Amateur Association also handled all the local meet-communication efficiently on 56 mc. duplex "phone". Results were 100%. In spite of the fact that the meet (July 11th-24th) split the message-month, new records for making the B.P.L. entirely on phone, and also on 56 mc. were established by all three portable stations— W5AU che, W9FX, 459; and W9QM, 5701.

"AUTOMATIC" MESSAGE CHECKING

In connection with the matter of "checking" traffic in message-relaying, some point out that this takes time and trouble. When receiving on a "mill" one can make a practice of copying ten words to the line, or if copying with pencil, five words to the line, double spacing alternate lines so the number of groups of ten words each can be counted. This greatly simplifies the verifications of the check, and saves much time.

Another idea on the value of QSL cards, by W9HIH: "QSLs are useful to refer to as a verification of results with various hookups of equipment at different times. They are not 'just wall paper.'"

"War QSO W8—last week and enjoying the conversation, when W1—, with the rarest kind of an r.r.c. sig, began CQing. QRX'ed ten minutes...finally had to quit! After three nights of copying calls of these fellows who should be on Mars, I counted them. On two bands there were forty-six r.r.c. notes. Every time I hear one of these birds I wish for a "disintegrator." Can't someone fix these rigs, or do we have to declare a boycott on all rotten notes? Why not refuse to answer anyone with an r.r.c. note—maybe that would save—how?"—W9DFT-EXD

WAC AT LAST

At last, RCA Communications has WAC!! If you don't believe it, listen for station WAC (New Brunswick, N. J.) on 13,900 kc., or see page 228 of the Spring call book, III.

DA4AJL, working on 7060 and 14,120 kc. with only 8 watts input, requests reports on reception of his signals—especially from North America. Address QSLs to Kruzwellegroupe, Berlin-Schoneberg, Eberast. 92.

Harry Wells (ex-PMZ), operator at OA4U, Carnegie Institute Magnetic Observatory, Huanecayo, Peru, advises that his Washington office is preparing a special plate for OA4U QSL cards; all QSOs will be acknowledged when these cards are received at Huanecayo.

W5BDX, Enid, Okla., claims 2368 QSOs in a period of one year, March 10, 1932 to March 10, 1933. W1YU, Yale University, has made 4019 QSOs in 19 months of operation. Who can better these records?

Stations in the Gulf Coast Radio Storm Net held a 7-mc. QSO Party Sunday, April 23rd, from 8-11 p.m. C.S.T. This party demonstrated the success with which daylight 7-mc. schedules may be maintained. It is expected that these QSO Parties will be held every Sunday, Galveston members of the Storm Net are on watch for other nets every other day at 12.30 p.m. C.S.T., on 7 mc. The G.C.R.S.W. was organized to handle emergency communication, the following stations being in the lineup: W4OA, ASV, MS, BPL, AFV, ANI, AWO, W5CGO, MS, JB, BKV, AYF, BD, ABE, AOX, BTK, CPA, CPM, CWV, BZU, AMZ, AVO, BI, DQ.

A 48-hour watch was held at W2BXJ recently from 9 p.m. Friday to 9 p.m. Sunday. Three operators (W2BWX, W2DUE and W2AQQ) worked in "shifts" and reported the following results: All U.S. districts worked twice within the 48-hour period, no QSOs being duplicated; 22 states and 7 countries QSOed; a total of 100 stations worked; the greatest DX worked made a 40 "miles per watt" average, and an average of 0.29 "watts per mile"; the maximum cost (not including deterioration of parts) for the 48-hour of operating was figured at $1.50—and the operators say it was worth many times that in enjoyment.
Dakota Division QSO Party

The First Annual QSO Party for Dakota Division amateurs will be held from Friday, Sept. 28th at 6:00 p.m. C.S.T. until Sunday, Sept. 30th at Midnight, C.S.T.

Qualifications: Only stations in the Dakota Division who send in their final scores will be eligible for prizes.

Objective: To work as many stations as possible in the division.

Scoring: Five points may be counted for each QSO with other Dakota Division stations. Each additional Dakota station heard and not worked may be counted one point. Total points may be multiplied by the number of Dakota Sections worked.

Calling procedure: CQ DAK CQ DAK CQ DAK DE W9...

Frequency: Any frequency may be used although 3.5 mc. should prove most satisfactory. Either 'phone or n.w. may be used.

Prizes: Grand prize is an H.F. Ammeter. Winner in each Section receives an A.R.R.L. Handbook.

Turn in Score: At conclusion of the party tabulate results, listing stations worked and heard, and mail to your S.C.M.

—Francis C. Kramer, W9DEI, S.C.M. So. Minn.

ELECTION RESULTS

To all A.R.R.L. Members residing in the Sections listed below: the following gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office. This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are about to be held. 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 vetting of new petitions for Section Manager. The name of the present incumbent continues to hold his official position and receive his salary for a two-year term of office.

In the Southern Texas Section of the Southwestern Division, Mr. Frank L. P. Jones, W5CRM, and Mr. Roy B. Handy, W5ABZ, were nominated. Mr. Jones received 198 votes and Mr. Handy received 100 votes. Mr. P. Jones's term of office began August 8, 1934.

In the Mississippi Section of the Delta Division, Mr. H. Weese, Jr., W5CWQ and Mr. L. A. Wolfe, W5AQW, were nominated. Mr. Weese received 32 votes and Mr. Wolfe received 12 votes. Mr. Weese's term of office began September 6, 1934.

STATION ACTIVITIES

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Jack Wagen- seller, W3GS—3CL and SCVS B.P.L. 3BY joined O.R.S. nanc- AQR and 81 WT are renewing schedules. 3CBH worked 35 countries in four months. EPU broke four neon bulbs, two '10's, one 60 and one resistor! COZ's roof spilled a ton of water on the works, 8DPY is portable at C.C.C. camp in Reading. 3BOP sent local news to NF who was on vacation. EJ handled lot of N.Q. traffic. AQW is away on a ship. DPU handled lot of 103rd Cavalry Camp traffic. ECM is conducting code practice. DYX drove 3000 miles on trip to SUSA. ADE is rebuilding. ALX and EYX visited 1M5 and S56A. Why do they call AHR "Steamboat Bill"? AZT had RSM's up in a plane testing a transceiver, and on a vertical bank BSM lost the transceiver. Your S.C.M. is on 56, 14 and 3.5 mc. from new QRA.

Traffic: W6QUS 272 AQN 38 CHR 9 7BS 8 7EK 2 COZ 4 407 EZ 205 BOP 14 HF 2 DPU 74 ECM 3.

W81WT 16 CVS 643 DPY 42 ASW 9.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, E. L. Hudson, W3RAK—W3CSQ, R.M.; W3DWT, Chief R.M. EOU works remote control; changes freq. by remote control. BWT made trip to eastern shore. DU1K is new O.R.S. DML is joining A.A.R.S. BGT is building power supply for PFA. DTO is rebuilding receiver. CDG is rebuilding rig. CDQ is doing some 56 mc. work. BAI is not using Alaska as radio ops. 114E is rebuilding. JAC has been nailing on motorcycle. CQK made trip with his wife to N.Y.C. ASC has been touring around on eastern shore with his family. CRB blow three filter condensers in one week. CIZ gets out fine with Tri-tet. EK3 is building 1 ICW telephone and c.w. rig. CWV has been visiting hams in New England. BR5 popped his '08A. EIK, new ham, is joining A.R.R.L.

Traffic: W8EQU 866 BND 545 BWT 514 DU6K 66 DML 58 DAK 27 3GI 31 EOU QRTSO 4 CDG 2 EH/5 OZ 10 CRB 2 CIZ 73 DRE 1 EJF 36.

SOUTHERN NEW JERSEY—SCM, Gennay M. Riger, W3QL—The Southern N.J.R.A. and Greater Camden A.N. held annual field day. ZX with C0T worked 8USA; one station was in airplane flying around Camden, the other was operated via 56 mc. remote, using 14 mc. through ZK to

October, 1934

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Chi, S.J.R.A. held 56-mc. hunt; won by ZN/COT, second by ERU-JJJ. LGR tested portable rigs. EBR was visited by Chi. S.J.R.A. held 56-mc. hunt; won by ZX/COT, second by ERU-JJJ. LUJ 41 GPS 30 :B;WP 29 GWT 27 ‘J 24 BQJ 22 KBS 21 USA and SUD. LHH is now a W6. GSB is right across the street from OBS. ESG is out for traffic honors. DXers: PNE, IKQ, OVS, DLO.

Traffic: W9HPG 208 DOU 197 (WLT 37) CRC 159 CGY 104 DOB 75 HUM 77 LW 69 IEP 39 KEE 36 CUH 34 USA 27 EMN 25 AFN 22 HZA 12 BDO 13 CEO 10 CKG 9 GKE-JTP 8 FYG 7 NDO-WG 3 ACU 2 FO 3 IKQ-NDB-WR 2 PNE 1.

INDIANA—SCM, Arthur L. Braun, W9TE-HML learned a lot on N.R. cruise. MQY has new transmitter. EQQ has low-power 1.7-mc. phone. IPQ is organizing local club. AXH has new phone. Activities Mgr. DET plans e.q. rig. HUO is getting ready for A.A.R.S. net schedules. GPS is rebuilding. PEG has new receiver. PEF is experimenting on 50 mc. HUV is giving 28 mc. a try. FYQ uses N prefix in N.R. work. PQL worked Wams bale at 9USA. CHA is reinstated O.R.S., O.B.S., R.M. RE has a new oscilloscope. OXM moved to Indianapolis. CVQ likes Tri-tet. AUV has 32 kW has runs 500 watts into an ‘03A. LMD is proud of new VL jr. op. MDU has

Traffic: W9HML 23 MQY 13 EQQ 10 IPQ 8 AXH 6 DET 10 JOQ 1 PEG 2 PEF 6 FQL 1 CHA 3 JTG 2 (WLT 50). The beautiful.

CENTRAL DIVISION

ILLINOIS—SCM, F. J. Hinds, W9ADY-WF—Mr. and Mrs. SYD have gone for a well-deserved vacation. Michigan Nines: MLW, 8DYH has access to a new S.C.M. Orl is now in Owensboro. CDA has a new tri-tet. HAX is afraid he will have to leave KY. ALD is building an RX-30 tri-tet. Someone is using HUB’s call on 3880 kc.; this same point.e also uses ZL3C X


Traffic: W9HML 23 MQY 13 EQQ 10 IPQ 8 AXH 6 DET 10 JOQ 1 PEG 2 PEF 6 FQL 1 CHA 3 JTG 2 (WLT 50). The beautiful.

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Arkansas—SCM, H. E. Volte, WSAB—DTT applied for new license. ECM has Class-A license. CPV has 66-foot zep in 30-foot space. CQT is on 3570 ke. DYT moved from Paris to Russellville. BML has new panel job. DRY is on 3780 ke. CVO rebuilt into 100-watt job. DRW has home grown receiver. DYT is awaiting new tube for final. DHR reported by radio. DLN is located at Wynne. EIP got R8 from VK5. VZ is lining up full schedules. CZG/DVI received SWL cards from OE. EID is on with type '10. OVZ is on 3748 kc. ABL was awarded 50¢ for years subscription to QRZ, new ham sheet. Don't forget the Dakota Div. QSO party, Sept. 28th, 29th and 30th.

Traffic: W9DEI 42 GUX 32 RAU 18 BN-BDL 14 RKG 6 D6 4 PCS BNN 1. NORTHERN MINNESOTA—SCM, Robert C. Harshberger, WSJFE—TJ has '03A. BVI worked 10 ZL—VK's one a.m. RJF is going to 9USA. RAG is QRL Scout. CQMP, 10U is at VQO Fort Snelling. OMD is getting set for Army Net. PJG is 1.7-mc. 'phone. PUB's power is 50 watts. SJY is new in Buffalo. SJZ is new in Howard Lake. AEL-4CND is back in Brainerd. LFO has 400 watts on 1.7 mc. JIE uses 800's P.P. on 7 mc.; '03A on 400 watts. 'phone, JIEF, 1.7 mc. is QRL police radio. BPN reports. ST, CJO and EDY will soon have c.c. rig going. BTZ has '04A on 7 mc. RAB plans on attending U. of Kansas. EGJ visited hams on way home for vacation. RBW, ADQ and RAB are being used for field-strength meter with FMA works 50 mc. IOG is at Fort Snelling. PFA is new Mpls. ham. DMO moved to Hokah from LaCrosse. OAK and AIR had FB time at St. Cloud meeting. ECC is having AG5X overhauled. 9USA will attend U. of Minn. conference where PFA was QSO FM5BG. ANU is now in New Ulm. LEN is on after summer at the lake. IDF works at Carleton. KDI and PCS will attend U. of Wis. extension. SJH is new Northfield ham. Send 50¢ for years subscription to QRZ, new ham sheet. Don't forget the Dakota Div. QSO party, Sept. 28th, 29th and 30th.

Traffic: W9DEI 42 GUX 32 RAU 18 BN-BDL 14 RKG 6 D6 4 PCS BNN 1. DELTA DIVISION

Ohio—SCM, Robert P. Irvine, W8CJ—LCY leads state with BON a close second. The Lakewood Radio Club is sponsoring activities at National Air Races this year; three weeks will keep the judges informed. The Lakewood Radio Club has received a certificate of appreciation from the U.S. Navy at Wilmingon.

Dist. No. 1: DVL got married July 28th. FGC is hot after U.S.A. BKF went on N.C. cruise. Dist. No. 2: EMF returned from new AGS. RSP works DMHG on 14 mc. IQG has 150 volt pack. OXP has c.c. rig. KJF has W.A.C. PQU has new '03A. NSM reports JDP relayed message from Costa Rica to N.Y.C. in 3/4 hour. BIB is in Calif. on vacation. SKEX is new Earl Claire ham. DNV, JNU and KJF have Class-A tickets. RKP, NRP and RSA have new antennas. NMK had trouble with P.C.C. on bad note. BYX is operating portable at lake. OTL is building a baby portable.

Traffic: W9BNB 69 EQC 18 KZJ 7 APC 30 LCY 61 WE 15 BMK 1 DGC 4 BKE 10 JIN 7 GSO 1 OIO 25 (W1LC 118) GUL 8 AQ 44. WISCONSIN—Acting SCM, Carl F. Thomas, WSFLR—LFR is at lake. This report prepared by ATO, SDR visits 9USA. DNT joins W9HGS. QPQ has new AGS. RSP works DMHG on 14 mc. IQG has 150 volt pack. OXP has c.c. rig. KJF has W.A.C. PQU has new '03A. NSM reports JDP relayed message from Costa Rica to N.Y.C. in 3/4 hour. BIB is in Calif. on vacation. SKEX is new Earl Claire ham. DNV, JNU and KJF have Class-A tickets. RKP, NRP and RSA have new antennas. NMK had trouble with P.C.C. on bad note. BYX is operating portable at lake. OTL is building a baby portable.

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MIDWEST DIVISION

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Fred A. Elks, Jr., WICTZ—CVT, wins C.B.A. traffic banner, which has been held by DOW since its inception. CTC handled lot of traffic at New Haven Scout Camp at Winsted. DOW reports Bristol Radio Club had joint outing with Waterbury Radio Club at Northfield. Aug. 6th. GKM can handle Canadian and Mass. traffic. EFA is up to his eyebrows in work at WTC. BQS says a radio club is forming in New Britain. IBT visited Radio Bugs Club (HTH) in Devon. EFA testing a portable with .01 watts input worked W1 and W2. EDF is now David J. J. Smith, G. E. Wrong, at Camp Gruber, Okla. Hebert honored Tri-city Amateur Radio Club by being their guest on Sept. 4th. 9ACL will act as SCM during LEZ's absence from Iowa; he has been transferred to Nashville. TKE of Iowa is also in charge of N.C.S. of N.N.. SCM has new R.F. is working on home station. EFA increases power. HAM is forming traffic net. ABE says Aussies easy to QSO. LEZ was visited by 3DZF. NTW is building super. DBW attended hamfest in Wyoming. HPA has new rack. FQC is active in A.A.R.S. QSO is commercial operator. HMQ has new Rig. GTP is touring east coast. IZD moved to Illinois. BMW and JXO scheduled Boy Scout camp. JEB says, "Wanna buy a transformer?" LYA is on 1.7-mc. phone. PDB and OZW are new Dubuque hams. KMI is rebuilding. LCE is on 3.9-mc. phone. MOC operates portable. s-BQ wishes schedules.


KANSAS—SCM, O. J. Spetter, W9FLQ—6KG, C.W. R. 9 EMS, Phone ActivitiesMgr. 1OR has moved to Tulsa, Okla. RIZ has rack and panel. N-1 (CXT) is setting the pace in traffic handling at Fort Riley. ISJ is new at Haysworth at Broken Bow, Nebr. K.V.R.C. State A.R.F. C. Welcomes several new members. Hotel Kansas, Oct. 13th and 14th. Depression Fee $1.98.

Traffic: W9NI 3294 KG 1341 PB 760 FRC 504 AFG 299 WAB 258 DZI 248 FG3 223 GWN 216 OKE 103 ETO 130 KXV 112 PKD 54 KFG 41 DJQ 39 IQJ 32 IOL 29 RIZ 23 GQ 19 7.

MISSOURI—SCM, R. C. Cannady, W9EGY—JW1 was with N.G. two weeks. CJR is busy with campaign. AJJ continues Army schedules. AAN is trying 3.9-mc. phone. GQH is trying 28 mc. DEN is interested in net for North Central Missouri. JAP is rebuilding with '09A final. EYQ built new receiver. LCG took Class A exam. 1AC is getting pair of 551's. NIS wound a 1-kw transformer. JAXG is active on 7-mc. phone. RIZ is a new Cityham. KEF attended Hannibal hamfest. ARE got new rig on. Heinrich, K. L. Baurum, W2AZV-HBK reports from Parshall, N.D. BQS and OPP took radiotelephone exam. HPA has new Rig. GTP is touring east coast. IZD moved to Illinois. BMW and JXO scheduled Boy Scout camp. JEB says, "Wanna buy a transformer?" LYA is on 1.7-mc. phone. PDB and OZW are new Dubuque hams. KMI is rebuilding. LCE is on 3.9-mc. phone. MOC operates portable. s-BQ wishes schedules.


NEBRASKA—SCM, S. C. Wallace, W9FFM—FWM and EWO returned from U.S.N.R. Cruise on Canadian Lakes. RVZ is to return to work on the radio in 56 me. 57 hams attended C.B.A. Annual Banquet, Aug. 10th. E. L. Battev spoke on Work of Communications Dept. FIO explained about A.A.R.S. and AMG put in good word for Navy. Among real old-timers present were ex-IBN and 1FW, who gave the meeting some spiring looks on amateur radio. Several lucky amateurs carried home prizes. IDD is call of Bulkeley Radio Club, Hartford. Hal of MK was at N.G. camp for two weeks. W1GTC was at N.G. camp. AVT is radio operator on the Yacht Owengo, KMG.

Traffic: W9MK 306 CVL 398 (WGLI 59) AMG
NORTHERN DIVISION

IDAHO—SCM, Don Oberhing, WTAVP—BRU has Class B outfit. BMF is grinding crystals. CHT worked 13 VKs. EPU is new Wendell ham. New A.A.R.S.; DEB, DOH, W7ASA working on new station. CFX is on 14 mc. DAW has new transmitter. AIS, AY, ATN spent day in Boise visiting hams. DQG is leaving for eastern school. CSP attended N.W. Division Convention, RNJ, DZQ took vacation in Wy, and Mont. DSL is working on new rig. CKY moved to Butte, Mont. GL is preparing for busy winter of A.A.R.S. activity. EMN is going after O.R.S. GU has 150 watts input. Idaho hams attending Jenny Lake hamfest; BRU, BMF, AVP, ACP, BZJ, GL, DAW, BAA, DM, KX, AJ, ACD, BNJ, DZQ, EHP, BEE, CHV, BAU, ENO, DEB, HBE, BZJ. AY is leaving for visit in Calif. HJR operated portable for visit in Madison, Neb. ZB worked Europe with portable at Stamp. New officers of World Wide News, Amateur Radio Assn.; pres., JB; vice-pres., Clyde Ills.; secy., FSD; treas., BGY; activities report, APL; member-at-large, EVZ.

WASHINGTON—SCM, Percy C. Noble, W1WVR—DVT is new chief E.L. JOB works ship, GMTB, who was on $6,000 a year, has Comet Pro. EKM enters Andover Academy this fall. GIL visited several NW's. DDK was reported QSA5 R8 in Scotland on 3.5 mc. BVQ is back from New Haven. FQA is active on 50 mc. GZQ sends first report. HJO, portable operator in Madison, Neb. ZB worked Europe with portable at camp. New officers of Western Mass. Amateur Radio Assn.; pres., JB; vice-pres., Clyde Ills.; secy., FSD; treas., BGY; activities report, APL; member-at-large, EVZ.

Traffic: W7EOB 168 BVR 79 (WLG 220) GUO 60
EMF 35 GZL 18 AJD 15 US 8 R8 8 DK 6 ARH
COI 5 BNJ 4 BQR 9 HWY 5 JPV 38 DIG 12.

BUFFALO—SCM, John P. Burke, W1AEP
W1FFL/WLGB does very good job delivering messages. CCM installed $45 modulator. UN is most consistent traffic man in this state. AUY has 1.7-mc. rig. FPZ has received his 50 mc. AYN has caught all the trout in the state. IDY has his rig working in Pelham, IGI is new Nashua ham. HQR has 50 mc. rig at N.G. camp at Rye. AHO has Pickard receiver. HTO has new 3.5-mc. rig. GRT sends fine report. HJL visited World’s Fair. CFT will be on 1.7-mc. phone in Rochester. ERB is back with high total. DUB is pushing traffic through ERQ. GEY expects to join the Benedicta. FGC broke his arm on 50-mc. expedition. DMD is DXing on 14 mc. HVO and HOU have been rebuilding. AUY has new 50 mc. rig. AVG works for Ford. HZQ is working on Cream business. The SCM is visiting as many hams as he can.

Traffic: W1ERG 371 (WLG 108) FFL 133 UN 76
GHT 40 CCM-ECI 2 HJ 10 JEP-APX 4 DKD 1.

RHODE ISLAND—SCM, Albert J. King, W1QOR—BCK is new ham from Orton, Me. ASZ is recovering from accident. AKK moved to Newport. HYK is new O.R.S. GTN is experimenting with e.e. IEG is giving him OM, GTN, a hard battle for traffic honors. HRC has e.e. frequency meter.

Traffic: W1AISZ 16 HRC II QR 10 GTN 8

VERMONT—SCM, Harry Page, W1ATF—Vt. R.M., BIP, visited DQG, EJF and TJ. GAE broke his ’10, but is on with ‘16. GNP pressures traffic on 3847 kc. GXP

visited St. Maurice gang. Ex-SCM BD attended Governor’s Day celebration at V.N.G. Camp Wilson. BIP, TJ, and ATF spent a pleasant morning at GQT’s FB shack. In the afternoon we all joined the V.N.G. Field expedition, whose members have found one of their own interests in charge of field equipment. The boys successfully demonstrated communication with the army portable. The power supplies for the transmitters are hand-driven dynamos, while GYD and BZJ’s guardmen—were there ready to keep the ether stirred up.

Traffic: W1GAE 39 GNF 6 ATP 4 BIP 23.

PACIFIC DIVISION

HAWAII—SCM, A. O. Adams, K6EQW—CWW and IDK spent vacation in HU. ABP and JNN were visitors at EWO. JNS moved to HU. W4E1 is awaiting new receiver. LBB is on three months’ vacation. DHW and GBV are returning to mainland. FEQ expects to leave soon. KKA is rebuilding. HRR, KJV, KPV, and KRY are on 14 mc. CW has been working with her husband, AJA, who is working on the coast. JPT received dipolreport from F.C.C. Glover of W4EL, one of the first c.e. stations in the south, will soon be signing L5.

Traffic: W1GAE 39 GNF 6 ATP 4 BIP 23.
Traffic: **K6EQW 3105 JPT 883 FAB 367 LBB 290 GBN 151 BZI 83 CRU 46 JRO 38 CGK 13 PFF 12 EMD 10 CIB 19**

**LOS ANGELES—SCM, Howell C. Brown, W6BPU—** This report prepared by Edward P. Stropiec, W6AUB. AZU is all trans-pacific traffic. EZZ reports on vacation near Vancouver, B.C. IIK reports LED new ham at San Francisco near a new ham radio store in San Pedro. EBT has mobile 50-mc. set in car. FLO is traffic chairman F.V.R.C. KBW blew 50-watter. IUL joined C.C.C. KBW is working lots of DX. EK is looking forward to traffic reports in next month. Remember the deadline is the 50th. FB. DBF has new rig with Collins. HDC uses Collins for transportation to Santa Barbara; has rock on C.A. 2A5 crystal tube. TH is at Camp Mill Creek. EUV is working lots of DX. FB. DBF has new rig with Collins. HDC uses Collins equipment. Active on 56 mc.: JDV, AGJ, JCW, HBB, IUZ, NX, BB. DSG 3 GVI-IXS-GSL-BVZ-VO-KPU-JRX-HEW-C,TI resumed P.I. and Orient schedules, Sept. 10th. EJA has new O.B.S. BMS, K6EWQ is fixing up radio-equipped shack for week-end. FYD has new c.c. rig. GBI sports new 55-foot poles. JYJ is on 1.7-mc. 'phone. JRQ got his doubler working. JTE has Collins rig on 7 mc. FB. sold his equipment to HPP. KFQ/KEK have new Collins equipment. Active on 56 mc.: JDV, AGJ, JCW, KC, KG, EQK, FYQ, HBB, IUZ, NX, HB. Traffic: W6DBB 53 JHI 10 BMW 7.

**EAST BAY—SCM, P. W. Dunn, W62XJ—** RJ is still high traffic man! JTE handled all his on 56 mc.1 GHD resumed P. I. and Orient schedules, Sept. 10th. EJA has quite a DX record. HKZ has new Gammon on 7 mc. ZK was heard in Moscow, Russia, with a single 1.7 mc. 'phone. JTE finished his third panel transmitter. CJS got GE going on 56 mc. 9FL of Chicago was recent visitor at CJS's HRN received Expedition Certificate; is also new O.B.S. kms. EDR, EMD, and CZQ, all old-timers, are getting ready for the active season. KWE is constructing a 'phone rig with Class "B" modulation. CI, a real old-timer, is building a very FB transmitter. Traffic: W6RJ 510 (WVLK 26) 1TH 197 GED 102 AKB/ALR 71 EJA 49 ZX 40 FS 39 CIZ 36 CGU 22 HBF 17 BWE 19.

**SAN FRANCISCO—SCM, Byron Goodman, W6CAL—** Acting SCM, Art Holmes, W6JAL—RE is going on 1.7 mc. 'phone. JG received R9 from R3 with 46 final. JPA has new QRA. CIS keeps one schedule. EKQ is changing rig. BIP is QRL servicing work. JAI is QRL A.R.A. secy work. KMB has trouble with rig. KQX is working on boat. DQZ is celebrating a raise. IPH is filter trouble. We ask the help of every local ham in building up new schedules. JPA is putting 500 volts on single 62. CCF is rebuilding.

**ARIZONA—SCM, Ernest Mendoza, W6BPF—** AEK/IKJ had schedules with transient camp, N.G. camp, Boy Scout camp, and Camp Moquir. QC completes fifth month on N.G. patrol duty. KOL changed antenna to single-wire hertz. FIP returned from Deuce Beach. W6Y is in charge of Flagstaff Radio Club. GQST is 800-watt FM Co. engineer for southern Arizona. GQST used portable of ALU at Flagstaff N.G. encampment. IUZ bought receiver from IQY. LET is new Phoenix ham. LAB is at Broom Park. HAF, near a new ham radio store in Santa Fe, has new Collins antenna system. W6X finds DX FB. DBF has new rig with Collins. HDC uses Collins equipment. Active on 3830 kc., and welcomes a call from '805. AZM handled traffic for last month. Remember the deadline is the 50th. TXQ is on 1.7 mc. 'phone. AZY is on 1.7 mc. 'phone. "Breakfast Club." KGL has 48 final on 1.7 mc. 'phone. 'FZQ increases power with P.P.'s 60's in final! BFA keeps daily schedule with N.G. club at Parker. GBN has list of QSO's interrupted by choo-choo coming by his telegraph station-water tower! Clubs are going strong in Phoenix, Flagstaff and Cottonwood. Tucson will soon organize another.

Traffic: **W6AEK/IKJ 274 EL 17 QC 49 KOL 15 FIP 5 IQY 3 GFK 1**

**PHILIPPINES—SCM, Newton E. Thompson, KAIAX—** Next meeting P.A.R.S. at 18X, Clarkfield, 85 miles from Manila. INA is putting in on 14-mc. 'phone. We ask the help of every local ham in building up new schedules. JPA is putting 500 volts on single 62. CCF is rebuilding.

Traffic: **W6CDN 170 BHF 137 EFK 06 QFT 04 AXN 14 BOW 13 EOP-CNQ 12 BAM 3 BLZ 1**

**SAN JACOQUIN VALLEY—SCM, G. H. Lavender, W6DNZ—** HYQ reports Fresno Convention is going to be best ever held in the Division. Don't forget the dates: November 10th and 11th at Fresno. FYM handled traffic for Mt. Crillon Expedition in Alaska. EXH has new Tri-tet. KGO is chief traffic man for third district A.A.R.S. Traffic: W6DZN 55 FTM 45 EXH 39 KGO 41 HYQ 32.

**ROANOKE DIVISION**

**NORTH CAROLINA—SCM, G. H. Wright, Jr., W4AV—** The S.C.M. wants the gang to know that ASTM is back on air. ASH is putting in on 1.7 mc. 'phone. Under construction and the S.C.M. hopes to get in on some 'phone net activity. CGH has new receiver. ALR visited the World's Fair. New calls: CYY, CXD, CXQ and DCL, who returned from Port Arthur Radio School. CXX gets out FB with pair of 45's. Lightning hit AGE's rig. DQ burned out filament supply. CIP and AER are doing excellent work with Boy Scout Amateur Radio work. SBAL, of Syracuse, N.Y., is temporarily located. One S.C.M. has held traffic for the last month and received a copy of our 7-page news bulletin—Hamflash.

Traffic: **W6EZG 1050 DDO 62 RH 27 JTG 33 JPA 30 CIS 20 EKQ 21 HIP 21 DIZ 1 FVJ 109 JAI 14 KBF 10 EQK 8 DQZ-DPI 1**

**SACRAMENTO VALLEY—SCM, George L. Woodington, W6DVE—** Reports EOA shorted out by lightning at一夜. High voltage is going on. W6GAC has trouble with rig. AQK has trouble with rig. KQX is working on boat. DQZ is celebrating a raise. IPH is filter trouble. We ask the help of every local ham in building up new schedules. JPA is putting 500 volts on single 62. CCF is rebuilding.

Traffic: **W6CCJ 11 GZ 10 W6GAC 17**

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ing new ant. DBI_. Roanoke Convention Chairman. BTR shot power transformer, former. BAD is D.N.C., A.A.R.S. 5th dist. ASK has '47, RK20, '32s, line up. EAP keys crystal stage. EQQ is in charge of new c.e. 50-watt rig. Operator has new rig to 3650 kc. EFP and EYO send first reports. 2GIZ is operator at EPIL. BEB is on 1.7 mc. FJ gave 56 mc. demonstration at camp. CNY is going to Central Div. Convention. CPN gives WM has c.e. 10 mc. Staunton Club and nearby hams cooperating with Glider meet at Great Meadows, Va., Sept. "Bob," Virginia Section Comm. Mgr., forced to resign at end of present term of office due to pressure of business. Major Hawthorne, ex-EFF, is back at Washn. Capt. "BN," CXM, is in P. L. Murray, BAI, took flight to Alaska with Army planes. See you at Roanoke Div. Convention, Roanoke, Oct. 8th-9th. BNR, BSM and Allen are three hams at WPHE. OPB made message to So. America. CIU, new station, call G9, on 4080 kcs. GBF, with 750 watts input, schedules GBF daily. HWT built new '52 c.c. set. HGA is on 1.75 mc. 'phone. CSE had grand time at WlMU. ARK got his first call. KOZ is looking for 50 watts. CVD worked P.I. CPB moved to Billings, Mont. Sheridan needs filter condensers. OW is working on new 'phone. NY1A, Balboa, C. Z., reports 122 messages handled July-August; schedule still kept with W1KK. K5AF upholds the A.A.R.S. in C. Z.; traffic 431.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING—SCM, Art W. Clark, W4QGQ—Utah; 6HU visited CNX. FRN rebuilt to 50 tri-tet. JYD had to go back to '46s P.P. BTX finished season at Yellowstone Park. GQM is on with 250w. KDI is building c.c. DTC erected 5.3 mc. antenna 66 ft. high. LCB is new registered; 10 from Utah, 21 from Wyoming. 6DWH spent vacation in Amarillo. DXA is A.A.R.S. OXS is in all O.P.S. parties. UVA worked traffic. W4CTA 2 VR 14 COG 3 ACB 7 AGS 62 AXP 10 CDE 10 MS 14.

SOUTHERN DIVISION

TENNESSEE-SOM, Glen E. Talbutt, W5AUL—Tennessee—Chief R.M.; W5SP, P.A.M. CPB is high traffic man. ARS goes on Navy cruise. BJF had big time at Guard camp. CMS is putting in '12. BXY is going to reorganize for southern part. Reports two stations on regularly. HLC is trying to get more power. K5AF upholds the A.A.R.S. in C. Z.; traffic 431.
**CANADA**

**MARITIME—SCM, A. M. Crowell, VE1DQ—Nova Scotia**

Maritime SCM, A. M. Crowell, VE1DQ—Nova Scotia Section. The Halifax Amateur Radio Club is arranging for complete amateur booth at Nova Scotia Provincial Exhibition. EP QSO’d his 60th country, RH, brother stationed to EP, has contacted 20 countries. GH says visitors are hard on equipment. GC is proud father of 3, EW uses 112A and 130B, GH needs only 3 for W.A.C. BY (the R.I. to you) visited Lunenburg gang. GL installed e.c. DQ is held up for parts. FT has been working 3’s on 7 mc. HI is e.c. on 7 mc. HI, BZ and PT are experimenting with 56 mc. NJF is looking for DX QSO’s. JK applies for O.P.S. LX goes in for DX QSO’s awaiting Manitoba and Saskatchewan. DQ and AE work VK’s and others.

Traffic: VE1GFL 5 FT 3 V0SW 11.

**ONTARIO DIVISION**

**ONTARIO—SCM, S. B. Trainer, Jr., VE3GT—New R.M.**

New R.M. QK again leads in traffic with Newfoundland SCM C. C. Anger, VE3C, and AE visited 760 frustrations. GB is looking for DX QSO’s. JK applies for O.P.S. LX has new highpower rig. AC is getting married. LH is back; ZL, VW plan to be. MX is moving to Tulsa.

Traffic: VE3CEZ 265 ASF 101 BQZ 80 AMT 52 DTC 20 EHP 17 BAK 9 AVR 2.

**SOUTHERN TEXAS—SCM. Bradford A. Beard, W5ADZ—Keeps FB A.A.R.S. schedules. BFA is building new portable, BDH, BYV, BDT work 56 mc. BYF is new County Attorney. EBU was appointed O.P.S. DFX. Phone Activities: AE is having an emergency transmitter on during storm. EYV is on 3.5 mc. with 45 P.P. PAO reports for Ft. Clark gang. AMI is at new QRA. Portable 91GX was appointed O.P.S. BJO requests O.P.S. DPA, Houston Club, has 300-watt 7-mc. rig, and has under emergency grid, 1.7 mc. TXF. Don’t forget A.B.R.L. West Gulf Division Convention at San Antonio, Oct. 26th and 27th.

I wish to thank the Section membership for electing me SCM. Please send all reports, etc., to SADZ, 3020 Southend, Houston.

Traffic: W5GW 111 MN 150 SFA 45 DWN 38 BED 16 ADZ 13 HHO 3 AXO-ERU 2.

**NEW MEXICO—SCM, Dan W. Do Lay, W5DUI—DLG is new O.B.S. DZV has new crystal. DVF is preparing for winter. DU is looking for 1-KW pot for plate transformer. AQ took commercial exam.

Traffic: W5DGL 32 DZY 1.

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Traffic: W5DGL 32 DZY 1.
One Kilowatt—More . . .

47 W. Fairview Ave., Dover, N. J.
Editor, QST:

QST has been here a week now, and it seems that every time I open it Mr. Csak's letter on power reduction stares me in the face. The idea itself is nothing new. Throughout all history, ham and otherwise, the lowly have been seeking to bring the powerful down to their own level. Hence to-day we have Communism, Socialism, and Mr. Csak's letter.

From his letter one might imagine a real problem existed. On 3.5 and 7 mc. evenings I will admit that QRM is pretty bad, but stations are still working other stations. I maintain that if all stations above one hundred watts were brought down to that level the reduction in QRM would not be worth noticing. This is because the number of stations using high power is not too great, and the QRM producing capabilities of a one-kilowatt transmitter are not as great as one might be lead to believe. A one-kilowatt transmitter in our hands having a clean signal and no key impacts is most decidedly not the nuisance the S.I.A.R.A. seems to consider it.

. . . It seems that low-power transmitters and simple receivers are still serving. Folk still write to QST about the emptiness of the high-frequency end of forty. Ten-meter 'phone is still free from QRM, 1.7-mc. c.w. is rare, and I have found it as dependable as 90, using a 7-mc. Zepp on both bands. During the early morning hours, 2-mc. 'phone and all c.w. bands are decently clear and don't clog up too much during the day. Simple T.R.F. receivers are still serving to put stations up toward the top of the B.P.L. If these things are true, then where is the need for power reduction?

We can still work low-power stations during the evening with the worst kind of receivers. Surely a ham who can afford a kilowatt can afford an S.S. receiver, whose sensitivity, being accompanied by decent selectivity, may well be used to drag in those weak, fleapowered signals. On my receiver 3.5-mc. 'phone seems one unholy mess evenings, but I realize there are other times of the day when I could work there, and also that a good super or S.S. set would probably make the band workable.

Rather than ask for reduction to 100 watts I would suggest that you ask for an increase to ten thousand watts for all non-modulated amateur signals. From this one might gather that my power is 999.99 watts. I have never used over a hundred watts, but I recognize that the greatest traffic work, the most consistent DX, and the finest operating are usually the spawn of high power.

—L. Lyon Cook, W3BDH

220 Tennyson Ave., Highland Park, Mich.
Editor, QST:

. . . Am I regusted? Why a bunch of supposedly intelligent amateurs, pulling for ham radio, should propose more restrictions on the ham is a mystery. A hundred watts! It's mutiny; that's what it is. Did you guys ever stop to think how much apparatus such a regulation as that would junk? How much it would curtail the manufacture of parts?

. . . The first thing you know we'll be using our monitors for QSO . . .

—C. R. Funk, W8GW.

Editor, QST:

. . . The only way to work if high power gets the best of you is to move to the center of the band, for there is plenty of room for all in our bands. If you doubt this statement, read W6BXR's letter in QST for July, and if still in doubt tune over the bands and find out for yourself. Why not let the high-powered stations fight it out on the edges and let the low-powered stations QSY, if they so desire, until they can compete with the others?

Let's cut out the crying about more frequencies and less power and go to work and enjoy what we have . . .

—E. A. Whitnah, W3RYD

77 Washington Ave., West Hazleton, Penna.
Editor, QST:

Anyone proposing or "fostering" or fathering any further amateur regs should be shot at sunrise, if not the day before. All this country needs is rigid and straightforward enforcement of existing regs! Why can't these doggoned "Associations" attend to their own biz and dues collecting?

And if you have time, please tell Lieut. Redgrave (page 55, same issue) for me his "SCRAM" system would be just so much more QRM from the States for the KA's. Anyway, there ain't any more "musical" sigs since I kissed my ole rotary
Editor, QST:

That bunch out on Long Island kinda griped me about limiting things to 100 watts . . . At N.R.C., Chicago, where I work, there are 60 or more of us, and very few who are not hams, and I haven't run into one yet that sympathizes with their proposal . . .

-J. R. Miller, WB6CP

112 W. Webb St., Calumet City, Ill.

Editor, QST:

I am writing concerning this low-power question. I am in hearty agreement with Mr. Casak's letter in August QST.

I have been thinking for some time that the amateur power limit should be 100 watts instead of the present 1 kw. If others can get out successfully with limitations, why can't we? By looking through the amateur regulations of the world as shown in the I.A.R.U. section of August QST, it is evident that many foreign countries are limited to 50 watts input and quite a few are allowed but 10 watts. I do not think it would be much of a handicap to the American ham if he were limited to 100 watts input. For quite some time I have been running my crystal transmitter at inputs less than 100 watts and have attained quite a respectable DX record, and so far I have no desire to increase my power. I think if some of these fellows would invest their jack in a hundred-foot pole instead of high-power equipment, they would get out just as well and with less upkeep into consideration, in some cases it probably would be much cheaper in the long run to erect one of these rotary-directional antennas as shown in a recent QST.

I don't think that anyone will say that the Portuguese come through any more consistently than the Spaniards, although their allowed power is six times greater than the latter's. That is just an example. What are we going to do when all U. S. hams are using a kilowatt? Certainly the government isn't going to allow us any more power, so why not do something about it now before it gets too late? I'd just as soon copy an R6 sig through an R7 one as an R8 through an R9.

-David Scott, W8DLIM

Perhaps You're Right, OM

Kennedy, Ala.

Editor, QST:

Please, please don't let it start again. We had it a few years ago and we are right where we were before it started. I guess some want it, and some don't want it, and some are indifferent—personally, I don't believe I can wade through the pro's and con's that we will have to listen to all over again. It must be the heat—that is the only thing I can think of that would cause a revival of the high-power holiday. Yea, that's what I mean, the revival of the Schnell high-power holiday. You know—it broke out in the August issue of QST. Yes, I know, it came from a different section of the country, and had its face lifted; but no sir, you can't fool me—it's the same old holiday, in the same "Correspondence" section.

Again, maybe it's the heat (heat seeming to be the main factor back of it all) that makes me think I can't stand it again. So please, Mr. Editor, regarding the power question, let's don't discuss it. Thanks.

-M. H. Grasce, W1AG

Restricting Beginners

Brownburg, Ind.

Editor, QST:

In regard to your editorial in the July issue of QST on the subject of restricting beginners to a certain portion of the amateur spectrum, I would like to comment:

Having received my license two days ago, I can certainly classify myself as a beginner in ham radio, although I have followed it from the receiving end for several years. I am ready and willing to be restricted as to frequency for a period of a year, as I believe it would be an advantage to me right now as well as later after the year was up. Most of the "old-timers" would get out of the "tenderfoot" band to avoid QRM, and so we raw hams would know where to find each other on the air. As most of us start with low power, we would not be drowned out so often by 0.09-kw. sigs at about 35 w.p.m. The band would be a meeting place for us to work out our problems and prepare to join the "great fraternity" on the other bands at the end of our probation. However, I hope I would not be restricted to the 160-meter band, as I have never been able to hear much c.w. activity on it out here.

Perhaps six months would be long enough, but a year would be all right if the restrictions were not too severe and the band too narrow.

Wonder what some of the other neophytes think of the idea?

-L. B. Polk, WS6FG

(Continued on page 68)
It is fortunate for the science of H.F. communication that amateurs are experimenters. Many important improvements are due to their investigations, and they have won the thorough respect of the commercial organizations. Realizing their value, we endeavor to try out every new scheme as it is presented, and we have a well-equipped laboratory for that purpose. Unfortunately, the last two or three published schemes we have seen have been unsound and poorly engineered. This would be none of our business except that they were plans for "improving" FB-7 receivers, and rather than have some receivers spoiled, we are using this space to tell the amateur to steer clear of them. We promise to let you know if we run across any good suggestions.

We are going to explain our views on two controversial subjects while we are about it: — external power packs and plug-in coils. The reason why we use them is because they are better. Most amateurs have found this out, but for those who haven't; we will give reasons: —

As we see it, there are four points in favor of external packs, and one against them. To begin with, the noise and hum level is always lower. If you are using a short wave receiver with a built-in power supply, try disconnecting it and using an external supply. The hum level and noise level will be reduced very materially. (Note: Wire pack back again afterwards. See first paragraph above.)

We have tried this on a number of commercial sets, as well as trying internal supplies on our own receivers, and the hum and noise level is always higher with built-in pack.

Furthermore, we claim greater flexibility. In many National sets, it is possible to convert to battery operation for portable use by simply changing tubes and leaving the pack at home. Similarly, one power supply will suffice for more than one receiver. And finally, an external pack saves space on the operating table. The only disadvantage is that the receiver is not wholly self-contained. What of it?

Our views on the question of plug-in coils versus coil switching are also based on experience with both types, our first coil-switch receiver having been built three years ago. We have found that image frequencies, noise and selectivity are greatly affected by the size of the coil shields as well as the type and size of coil, and further that it is very difficult to obtain optimum proportions in a coil-switch layout. The new HRO receiver has seven sets of plug-in coils, with four coils in each set. If these same twenty-eight coils were all built into the receiver, it would require a prohibitive amount of space and very long leads. The usual solution is to sacrifice the ideal proportions of the plug-in coil when designing for switching, with a corresponding degradation of performance.

There are other difficulties, of course, such as absorption losses due to idle coils. We have found a solution to this problem, however, as well as other details, and our coil switch equipment has given very creditable performance. But at the present state of the art, we definitely consider such sets as primarily short-wave broadcast receivers, and sell them as such.

And top-notch High Frequency Amateur equipment should use plug-in coils and external packs.

JAMES MILLEN
VARYING LINE VOLTAGE

THE VARIAC

An adjustable transformer by means of which the supply voltage can be varied continuously from zero—better than a rheostat or potentiometer—high efficiency—no heating—output voltage independent of load—compensates for varying supply voltages.

**TYPE 200-B**

Particularly useful for controlling filament and plate-supply voltages—direct, simple and effective method for continuously reducing plate power—dial calibrated in output voltage—maximum current, one ampere—either breadboard or panel mounted—
Price $8.50

**TYPE 200-C**

A larger unit rated at 5 amperes—on 115-volt circuit gives output voltages from zero to 130 volts—for high power plate-supply control—filament supply—compensates for low line voltage—dial calibrated—Type 200-CM with mounting case, cord, plug and outlet $16.50—Type 200-CU (illustrated), without case, for panel or baseboard mounting $14.00.

**TYPE 100**

A still larger model furnishing output voltages from zero to line—rated at 2 kva at line voltage—
Type 100-K (for 115 volt line) $40.00.

Order direct—sent prepaid anywhere in U. S. and Canada if cash accompanies order.

GENERAL RADIO COMPANY
Cambridge A 30 State Street Massachusetts

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**On the Other Hand**

The Glades, Minot, Mass.

Editor, QST:

If beginners in amateur radio were segregated in certain portions of the bands, the beneficial influences of communication with seasoned amateurs would be denied them. Through numerous contacts with skilled, courteous operators, the beginner rapidly picks up the operating technique and the "sense of cooperation and amateur ethic" that distinguishes his older brother.

Why not start us off on the right foot?

—Clifford Nelson, WI1DA


Editor, QST:

Since when have we, as an amateur organization, become so greedy of our hobby that we cannot give the aspiring newcomer a chance? Let him enjoy himself even as we do. Having operated in the U. S. Navy for five years before entering amateur radio, I may not have been exactly inexperienced, but I was far from an old-timer, and even now my ticket is only one year old! but I can understand how I would have felt had I been restricted to one of the lower frequency bands for even a short period of time. Why not give the beginner a chance because who, if not they, will be called the old-timers of tomorrow?

True, other nations limit their beginners to restricted operation, but which nation is foremost in its knowledge and development of amateur radio? We must have knowledge and power—but without experience, how can we hope to obtain this knowledge? Why not think of the present beginner as you would have been thought of when you were struggling with your first blooper, trying to figure out why the darned thing wouldn’t work? Great names and accomplishments are coming from those "lids," whose weak and wobbly signals may blanket our pet DX QSO. But there is DX enough for everyone, so why not try a little patience and understanding?

There is a thrill in DX, even for the old-timer. You had your thrills when you started, so why not give the fellows, who look to you as a model, a chance to enjoy it also? Inconvenient, perhaps, but try a little patience and understanding. It helps you as much as the other fellow.

—Monte L. Porter, W7DZX

(Continued from page 60)

U. S. Naval Air Station, Pensacola, Fla.

Editor, QST:

...Regarding the proposal to put on probation beginners "without previous experience," it would seem that

...
The publication of a complete manual of controls has been attempted often but never before accomplished. Now Yaxley meets the need with an illustrated book of more than 100 pages that is both complete and more definitely helpful than any authority. Along with other invaluable information it lists the 30 new Yaxley Replacement Volume Controls that will service 98% of the 3200 set models now in existence. It shows, for example, how 4 Yaxley controls will cover 1398 models—how a single control will service 618 different models. Mail the coupon now for this indispensable book.

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Division of P. R. Mallory & Co., Incorporated
Indianapolis, Indiana

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Address ___________________________
My Jobber's name is ___________________________

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

63
NATIONAL RADIO PRODUCTS

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*(Does not sell direct to amateur. Sells only to Movie Studios, Colleges, etc.)

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MARYLAND
Radio Electric Service Corp., 303 W. Baltimore St., Baltimore

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H. Jappe Co., 46 Cornhill, Boston
T. F. Cushing, 349 Worthington St., Springfield
Springfield Radio Co., 397-99 Dwight St., Springfield

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Radio Laboratories, 1518 Grand Ave., Kansas City

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MICHIGAN
Radio Specialties Co., 171 E. Jefferson Ave., Detroit

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Wholesale Radio Service Co., 100 Sixth Ave., New York City
Leeds Radio Co., 45 Vesey Street, New York City
Sun Radio Co., 227 Fulton St., New York City
Dymac Radio Corp., 359 Capen Blvd., Buffalo
Maurice Schwartz & Son, 710-712 Broadway, Schenectady
Roy C. Stage, 265 Erie Blvd. West, Syracuse

OHIO
Northern Ohio Laboratories, 2073 West 85th St., Cleveland
Burns Radio Co., 140 East Third St., Dayton
Hughes-Peterson Electric Co., 178 North Third St., Columbus

OKLAHOMA
Southern Sales Co., 130 West Third St., Oklahoma City

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Wedel Co. Inc., 1207 S. W. Washington St., Portland

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P. I. Burks & Co., 911 W. Broadway, Louisville

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M & H Sporting Goods Co., 512 Market St., Philadelphia
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Radio Electric Service Co., N. E. Cor. 7th & Arch Sts., Philadelphia
Radio Electric Service Co., 1024 Hamilton St., Allentown
Cameron Radio Co., 663 Grant St., Pittsburgh

RHODE ISLAND
W. H. Edwards & Co., 32 Broadway, Providence

TEXAS
Straus-Frank Co., Travis at Calhoun, Houston
Straus-Frank Co., 301-307 S. Flores St., San Antonio
Amateur Supply Co., 1808 St. Louis Ave., Fort Worth
Western Battery & Magneto Co., 618 Montana St., El Paso

VIRGINIA
Hudson Radio Supply Co., 27th & Marshall Sts., Richmond
Newport Radio Service Co., Newport and 35th, Norfolk

WASHINGTON
Wedel Co. Inc., 520 Second Ave., Seattle
Spokane Radio Co., 611 First Ave., Spokane

WISCONSIN
Radio Parts Co., 332 W. State St., Milwaukee

DISTRICT OF COLUMBIA
National Electrical Supply Co., 1328 New York Ave., N. W., Washington

It is obviously impractical to list in a general catalog all of the radio products of our manufacture. Should you not find listed such apparatus as will fully meet your particular requirements, we invite you to write direct to our Engineering Department.

64 Say You Saw It in QST — It Identifies You and Helps QST
FOLLOWING the precedent established last year, we are again presenting our new catalog in the pages of QST. We have found that practically all members of the A.R.R.L. desire copies, and to save inconvenience and delay, we are describing our 1934-1935 products in this direct manner. Additional copies of the catalog may be had for the asking at any time.

JAMES MILLEN
The New National Ganged Condenser is designed to overcome the defects which are so evident when ordinary ganged condensers are used in High Frequency Receivers. For such work, extremely low loss electrical design must be obtained, plus a mechanical rigidity and accuracy of control that is not approached in Broadcast Receiver construction.

To meet these requirements, an entirely new design has been evolved. The drive, at the midpoint of the rotor, is of the worm-gear type with a ratio of 20-1. Heavy springs are used to preload the drive and the worm bearings, insuring permanent freedom from backlash. The condenser sections, of unusually rigid construction, are mounted directly on the gear housing and do not touch the receiver chassis at any point. By this means, distortion of the chassis cannot affect the condenser adjustment and calibration.

The rotor shaft of $\frac{3}{8}$" diameter steel rod, is supported in four bearings. Two bearings are in the center for rigid gear support. Additional bronze bearings at each end provide radial support as well as taking end thrust, and are insulated from the frame to eliminate electrical noise.

The rotor plates are of the 180 Degree straight-frequency-line type, and each rotor section is individually insulated, connection being made through a multi-fingered brush. The stators have four-point support. Insulation is Isolantite.

The Micrometer Dial mounts directly on a support projecting from the gear housing, and does not touch the panel at any point. The condenser is thus protected from misalignment and warping of the panel. The dial has fifty divisions, and makes ten revolutions in covering the tuning range. Consequently the condenser setting may be read directly to one part in 500. The dial is numbered every ten divisions. The numbers rotate with the divisions in the conventional manner, but are automatically changed every revolution by a mechanism within the dial.

The materials and workmanship are first class in every respect. The worm-gears and steel worm are hobbed and accurately fitted. All working parts are accurately machined, and the assembly is carefully aligned. In every detail the unit has been designed with quality, rather than price, as the first consideration.

The type PW Condenser is listed below with either 1, 2, 3 or 4 sections. Though primarily a multi-gang design, the single section unit is offered as being particularly suited to precision frequency-meters and laboratory equipment.

<table>
<thead>
<tr>
<th>PW-1, Single section</th>
<th>List price $13.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW-2, Two section</td>
<td>List price $17.00</td>
</tr>
<tr>
<td>PW-3, Three section</td>
<td>List price $20.50</td>
</tr>
<tr>
<td>PW-4, Four section</td>
<td>List price $24.00</td>
</tr>
</tbody>
</table>

Above prices include dial, which is not sold separately.
"VK" DIAL

Full Vision Dial, Type VK, has become well known through its use on SW-58 and FB-7 Receivers. The long seven-inch scale permits accurate logging, and the travelling pointer remains vertical at all times. Ratio is 10 to 1. It is available with either 2, 3 or 4 scale.

List Price, each $4.50

"N" & "NW" DIALS

Precision Dials, Type N, have engine divided scales and verniers of solid German Silver. The Verniers are flush, eliminating errors from parallax.

The four-inch Type N dial (Fig. 3) employs a smooth and powerful planetary mechanism with a 5 to 1 ratio. It is available with either 2, 3, 4 or 5 scale.

List Price, each $6.75

The six-inch Type NW dial (Fig. 2) has a variable ratio drive that is unusually powerful at all settings. It is recommended for use on large transmitters and precision instruments. Available with either 2, 3, 4 or 5 scale.

List Price, each $15.00

"A" DIAL

The original "Velvet Vernier" Dial, Type A, is still an unchallenged favorite for general purpose use. It is exceptionally smooth and entirely free from backlash. The mechanism is contained within the bakelite knob and shell. Ratio 5 to 1. Available with either 2, 4 or 5 scale in 4" diameter. Available with 2 scale in 3 3/8" diameter.

List Price, each $3.00

"B", "BM", & "BX" DIALS

"Velvet Vernier" Dial, Type B (Fig. 7) provides a compact variable-ratio drive that is smooth and trouble free. The mechanism is inclosed in a black bakelite case, the dial being read through a window. Available with 1 or 5 scales.

List Price, each $2.75

The Type BX Dial (Fig. 6) is mechanically identical to the Type B Dial, but is equipped with an etched dial scale and vernier reading to 1/10 division. Available with 5 scale only.

List Price, each $3.50

The Type BM Dial (Fig. 5) is a smaller version of the Type B Dial for use where space is limited. It is similar to the Type B Dial in appearance and mechanism, but does not have the variable-ratio device. Available with 1 or 5 scales.

List Price, each $2.50

"H" DIAL

Projection Drum Dial, Type H, employs the proved and popular non-conducting cord drive with spring take-up. The dial scale is optically projected on a ground-glass screen, considerably enlarged. Parallax is entirely absent. Condenser shaft must be parallel to panel. Available with either 2, 3 or 4 scale.

List Price, each $5.50

DIAL SCALES

The above dials are available with one or more of the following scales.

<table>
<thead>
<tr>
<th>Scale Type</th>
<th>Divisions</th>
<th>Degrees Rotation</th>
<th>Direction of condenser</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-100-0</td>
<td>180°</td>
<td>Either</td>
</tr>
<tr>
<td>2</td>
<td>0-100</td>
<td>180°</td>
<td>Counter Clockwise</td>
</tr>
<tr>
<td>3</td>
<td>100-0</td>
<td>180°</td>
<td>Clockwise</td>
</tr>
<tr>
<td>4</td>
<td>150-0</td>
<td>970°</td>
<td>Counter Clockwise</td>
</tr>
<tr>
<td>5</td>
<td>200-0</td>
<td>360°</td>
<td>Counter Clockwise</td>
</tr>
</tbody>
</table>

National Dials are licensed under Federal Telegraph and RCA patents, and are protected by National Patents.
NATIONAL Transmitting CONDENSERS

TMS \{Low Power, Compact, Inexpensive\}

Type TMS is a new condenser designed for transmitter use in low power stages. It is compact, rigid, and dependable. Provision has been made for mounting either on the panel, on the chassis, or on two stand-off insulators.

Front bearing is conical, rear bearing radial with single-ball thrust. Insulation is Steatite-Isolantite. Voltage ratings listed are conservative.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Peak V</th>
<th>Length</th>
<th>Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Mmf</td>
<td>1000 v</td>
<td>23/4&quot;</td>
<td>10</td>
<td>TMS-100</td>
<td>$2.25</td>
</tr>
<tr>
<td>150 Mmf</td>
<td>1000 v</td>
<td>23/4&quot;</td>
<td>14</td>
<td>TMS-150</td>
<td>$2.50</td>
</tr>
<tr>
<td>250 Mmf</td>
<td>1000 v</td>
<td>23/4&quot;</td>
<td>23</td>
<td>TMS-250</td>
<td>$2.75</td>
</tr>
<tr>
<td>50-50</td>
<td>1000 v</td>
<td>23/4&quot;</td>
<td>5-5</td>
<td>TMS-50D</td>
<td>$3.50</td>
</tr>
<tr>
<td>100-100</td>
<td>1000 v</td>
<td>23/4&quot;</td>
<td>9-9</td>
<td>TMS-100D</td>
<td>$4.25</td>
</tr>
</tbody>
</table>

FOR OSCILLATORS, BUFFERS, DOUBLERS, ETC.

FOR LOW C, TYPE 210 AMPLIFIERS

TMC \{Moderate Power, Compact\}

Also of new design, the TMC is designed for use in the power stages of transmitters, where peak voltages do not exceed 3000. The frame is extremely rigid and arranged for mounting on panel, chassis or stand-off insulators. The plates are aluminum, with buffed edges. The front bearing is conical, rear bearing radial with single-ball thrust. Insulation is Steatite-Isolantite, located outside of the concentrated electrostatic field. The stator in the split stator model is supported at both ends.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Peak V</th>
<th>Length</th>
<th>Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Mmf</td>
<td>2000 v</td>
<td>23/4&quot;</td>
<td>8</td>
<td>TMSA-35</td>
<td>$2.75</td>
</tr>
<tr>
<td>50 Mmf</td>
<td>2000 v</td>
<td>23/4&quot;</td>
<td>11</td>
<td>TMSA-50</td>
<td>$3.00</td>
</tr>
</tbody>
</table>

FOR RK-18, RK-20, RCA-800, 830, 203A, 210, ETC.

Air Gap = .077"
**NATIONAL Transmitting CONDENSERS**

**TM (Standard, General Purpose)**

Type TM is widely used by leading commercial communication companies and government departments for moderate power transmitters. The rotor and stator plates have rounded edges (milled and polished). Insulation is Isolantite. Front bearing is conical, rear bearing radial with single-ball thrust.

The front plate is drilled and tapped for mounting a standard "A" dial, as illustrated. The dial is not regularly furnished, but will be supplied at an additional List Price of $3.00.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Peak V</th>
<th>Length</th>
<th>Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>3000 v</td>
<td>3½&quot;</td>
<td>11</td>
<td>TM 100</td>
<td>$4.50</td>
</tr>
<tr>
<td>150</td>
<td>3000 v</td>
<td>4½&quot;</td>
<td>17</td>
<td>TM 150</td>
<td>5.00</td>
</tr>
<tr>
<td>230</td>
<td>3000 v</td>
<td>4½½&quot;</td>
<td>23</td>
<td>TM 230</td>
<td>9.00</td>
</tr>
<tr>
<td>50</td>
<td>6000 v</td>
<td>4½½&quot;</td>
<td>12</td>
<td>TM 50A</td>
<td>6.00</td>
</tr>
<tr>
<td>100</td>
<td>6000 v</td>
<td>6½&quot;</td>
<td>23</td>
<td>TM 100A</td>
<td>10.00</td>
</tr>
<tr>
<td>150</td>
<td>6000 v</td>
<td>9½½&quot;</td>
<td>35</td>
<td>TM 150A</td>
<td>14.00</td>
</tr>
<tr>
<td>100-100</td>
<td>6000 v</td>
<td>12½½&quot;</td>
<td>46</td>
<td>TMP 100A</td>
<td>16.00</td>
</tr>
</tbody>
</table>

**TMU (Heavy Duty)**

Type TMU is designed for higher powers than the standard TM Condenser. Rotor and Stator plates are of thick aluminum plate, with milled and polished edges. Insulation is Micalex. The rotor contact is through a heavy laminated brush having a contact area ½" x ½". The frame is particularly rigid, being composed of sand-cast aluminum end plates and heavy tie-bars.

Front bearing conical, rear bearing radial, with single-ball thrust.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Peak V</th>
<th>Length</th>
<th>Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>For 849, 860, 852, 861, 204A, etc.</td>
<td>50</td>
<td>7500 v</td>
<td>6½½&quot;</td>
<td>TMU 50A</td>
<td>$29.50</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>7500 v</td>
<td>11½&quot;</td>
<td>TMU 150A</td>
<td>31.50</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>7500 v</td>
<td>14½½&quot;</td>
<td>TMU 250A</td>
<td>33.50</td>
</tr>
</tbody>
</table>

Special Sizes, and Higher Voltage Ratings, can be supplied on special order. Correspondence necessary.

NATIONAL COMPANY, INC., MALDEN, MASS.
NATIONAL Receiving CONDENSERS

SE 270° Straight-Line-Frequency

The well known Type SE Midget Condenser has 270° Straight-Line-Frequency Plates. The plates and frame are of aluminum. Insulation is Steatite. The rotor has two bearings in all models, the front bearing being insulated to prevent noise from ground currents in the frame. The rotor contact is through a quiet constant impedance pigtail.

The SEU-15, SEU-20 and SEU-25 condensers have thick plates with rounded and polished edges, and are suitable for high voltages. The SEU-25 is illustrated below. The other SE models do not have polished edges on the plates.

<table>
<thead>
<tr>
<th>Cap</th>
<th>Air Gap</th>
<th>No. Plates</th>
<th>Length</th>
<th>Cat. No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>.055&quot;</td>
<td>6</td>
<td>2¼&quot;</td>
<td>SEU 15</td>
<td>$2.50</td>
</tr>
<tr>
<td>20</td>
<td>.055&quot;</td>
<td>8</td>
<td>2¼&quot;</td>
<td>SEU 20</td>
<td>2.75</td>
</tr>
<tr>
<td>25</td>
<td>.055&quot;</td>
<td>9</td>
<td>2¼&quot;</td>
<td>SEU 25</td>
<td>2.75</td>
</tr>
<tr>
<td>50</td>
<td>.026&quot;</td>
<td>11</td>
<td>2¼&quot;</td>
<td>SE 50</td>
<td>3.00</td>
</tr>
<tr>
<td>75</td>
<td>.026&quot;</td>
<td>15</td>
<td>2¼&quot;</td>
<td>SE 75</td>
<td>3.25</td>
</tr>
<tr>
<td>100</td>
<td>.026&quot;</td>
<td>20</td>
<td>2¼&quot;</td>
<td>SE 100</td>
<td>3.50</td>
</tr>
<tr>
<td>150</td>
<td>.026&quot;</td>
<td>29</td>
<td>2¾&quot;</td>
<td>SE 150</td>
<td>3.75</td>
</tr>
<tr>
<td>200</td>
<td>.018&quot;</td>
<td>27</td>
<td>2¼&quot;</td>
<td>SEH 200</td>
<td>3.75</td>
</tr>
<tr>
<td>250</td>
<td>.018&quot;</td>
<td>32</td>
<td>2¾&quot;</td>
<td>SEH 250</td>
<td>4.00</td>
</tr>
<tr>
<td>300</td>
<td>.018&quot;</td>
<td>39</td>
<td>2¾&quot;</td>
<td>SEH 300</td>
<td>4.00</td>
</tr>
<tr>
<td>335</td>
<td>.018&quot;</td>
<td>43</td>
<td>2¾&quot;</td>
<td>SEH 335</td>
<td>4.25</td>
</tr>
</tbody>
</table>

ST 180° Straight-Line-Wavelength

The ST Condenser is very similar to the SE Condensers described above, but has 180° Straight-Line-Wavelength plates. Also, the use of 180° plates permits a more compact frame with less overall height. In all other details, the two condensers are identical.

A single bearing model is also available in the smaller sizes, in which overall length is reduced to a minimum. The split-stator model is illustrated; the single stator models have a frame similar to the SE condenser illustrated above.

<table>
<thead>
<tr>
<th>Cap</th>
<th>Air Gap</th>
<th>No. Plates</th>
<th>Length</th>
<th>Cat. No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Single Bearing Models

<table>
<thead>
<tr>
<th>Cap</th>
<th>Air Gap</th>
<th>No. Plates</th>
<th>Length</th>
<th>Cat. No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>.018&quot;</td>
<td>3</td>
<td>1¾&quot;</td>
<td>STHS 15</td>
<td>$1.40</td>
</tr>
<tr>
<td>25</td>
<td>.018&quot;</td>
<td>4</td>
<td>1¾&quot;</td>
<td>STHS 25</td>
<td>1.50</td>
</tr>
<tr>
<td>50</td>
<td>.018&quot;</td>
<td>7</td>
<td>1¾&quot;</td>
<td>STHS 50</td>
<td>1.60</td>
</tr>
</tbody>
</table>

Double Bearing Models

<table>
<thead>
<tr>
<th>Cap</th>
<th>Air Gap</th>
<th>No. Plates</th>
<th>Length</th>
<th>Cat. No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>.026&quot;</td>
<td>9</td>
<td>2¼&quot;</td>
<td>ST 35</td>
<td>1.50</td>
</tr>
<tr>
<td>50</td>
<td>.026&quot;</td>
<td>11</td>
<td>2¼&quot;</td>
<td>ST 50</td>
<td>1.80</td>
</tr>
<tr>
<td>75</td>
<td>.026&quot;</td>
<td>15</td>
<td>2¼&quot;</td>
<td>ST 75</td>
<td>2.00</td>
</tr>
<tr>
<td>100</td>
<td>.026&quot;</td>
<td>20</td>
<td>2¼&quot;</td>
<td>ST 100</td>
<td>2.25</td>
</tr>
<tr>
<td>140</td>
<td>.026&quot;</td>
<td>28</td>
<td>2¾&quot;</td>
<td>ST 140</td>
<td>2.50</td>
</tr>
<tr>
<td>150</td>
<td>.026&quot;</td>
<td>29</td>
<td>2¾&quot;</td>
<td>ST 150</td>
<td>2.50</td>
</tr>
<tr>
<td>200</td>
<td>.018&quot;</td>
<td>27</td>
<td>2¼&quot;</td>
<td>STH 200</td>
<td>2.75</td>
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<tr>
<td>250</td>
<td>.018&quot;</td>
<td>32</td>
<td>2¾&quot;</td>
<td>STH 250</td>
<td>3.00</td>
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<tr>
<td>300</td>
<td>.018&quot;</td>
<td>39</td>
<td>2¾&quot;</td>
<td>STH 300</td>
<td>3.25</td>
</tr>
<tr>
<td>335</td>
<td>.018&quot;</td>
<td>43</td>
<td>2¾&quot;</td>
<td>STH 335</td>
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</tr>
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</table>

Split-Stator Double Bearing Models

<table>
<thead>
<tr>
<th>Cap</th>
<th>Air Gap</th>
<th>No. Plates</th>
<th>Length</th>
<th>Cat. No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-50</td>
<td>.026&quot;</td>
<td>11-11</td>
<td>2¾&quot;</td>
<td>STD 50</td>
<td>3.50</td>
</tr>
<tr>
<td>100-100</td>
<td>.018&quot;</td>
<td>14-14</td>
<td>2¾&quot;</td>
<td>STHD 100</td>
<td>4.50</td>
</tr>
</tbody>
</table>

NATIONAL COMPANY, INC., MALDEN, MASS.
NEUTRALIZING CONDENSERS

STN (Fig. 1) A compact, rigid, and efficient condenser particularly suitable for neutralizing 245, 247, 210 and similar tubes in amplifier, buffer or doubler stages. Very low minimum capacity. Isolantite insulation. Maximum capacity 18 mmf. Peak voltage breakdown — 3000v. List Price, $2.00

TMN (Fig. 2) A heavy duty neutralizing condenser having a peak voltage rating of 6000 volts. Suitable for use with 203A, 852, 204A and similar tubes. Maximum capacity 50 mmf. List Price, $6.00

NC 800 (Fig. 3) A high voltage neutralizing condenser. Particularly suitable for use with the RCA-800. Both plates are insulated from ground on Isolantite pillars. List Price, $3.00

PADDING CONDENSERS

National Air-Dielectric Padding Condensers (Fig. 4) are extremely compact, and have very low temperature coefficient. The aluminum shield is 1 1/4" dia. by 1 1/2" high.

A very small mica Padding Condenser (Fig. 7) is also available, mounted on Steatite and designed to be supported by circuit wiring. Maximum Capacity is 30 mmf., and overall dimensions are 13/16" long x 9/16" wide, x 1/2" high.

W75 (75 Mmf. Air) List Price $2.25
W100 (100 Mmf. Air) List Price 2.50
M30 (30 Mmf. Mica) List Price .35

GENERAL PURPOSE

EM (Fig. 5.) National EM Condensers have high electrical efficiency, and calibrations may be relied on. Insulation is Isolantite, and Peak Voltage Rating is 1000 volts. Plate Shape is SLW.

<table>
<thead>
<tr>
<th>Capacity No. of Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>EM 150</td>
<td>$3.00</td>
</tr>
<tr>
<td>250</td>
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<td>1000</td>
<td>EM 1000</td>
<td>5.50</td>
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Split-Stator Models

<table>
<thead>
<tr>
<th>Capacity</th>
<th>No. of Plates</th>
<th>Cat. Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>350-350</td>
<td>18-18</td>
<td>EMP-350</td>
<td>5.00</td>
</tr>
</tbody>
</table>

FREQUENCY METER CONDENSER

A special purpose condenser designed for amateur frequency meters and monitors. On the 80 or 160 meter bands the special rotor provides a spread of 80 divisions (on a 100 division dial). Minimum Capacity is 40 mmf., Maximum 75 mmf. Not illustrated, but same frame as EM.

Type 40-75 List Price $5.50

I.F. TRANSFORMERS

In the better H.F. Receivers, it has become standard practice to tune I.F. Transformers with air condensers. National units (Fig. 6) employ Steatite Insulation, Aluminum Plates, and Litz-wound Coils. Adjustments are on top of shield, knob tuning on Oscillators. Two models, 450-550 K.C. or 175 K.C.

List Price, Transformers or Oscillators, $5.00
NATIONAL High Frequency RECEIVERS

TYPE HRO AMATEUR RECEIVER

In designing this new receiver National has attempted to meet every requirement of the most advanced amateur. It embodies every feature which we have found to be desirable in such a receiver.

Its circuit is notable in the use of two preselector stages, giving remarkable image-frequency suppression, and weak signal response. The first R.F. stage has been designed to provide maximum gain to minimize effects of Thermal Agitation, and provide highest Signal-to-Noise Ratio. The two high-gain I.F. stages employ Litz-wound coils and are tuned with air condensers. As would be expected, the usable sensitivity and selectivity are remarkable.

As a further aid when operating under adverse conditions, a Lambda-Single-Signal crystal filter precedes the I.F. amplifier. All controls are brought out to the front panel.

Other circuit details include automatic or manual volume control (with panel switch), and a vacuum tube voltmeter indicating carrier intensities directly in R. Units. A neon lamp is wired across the input circuit, automatically shunting the terminals whenever excessive voltages are picked up by the antenna, such as may occur during transmission, heavy static, etc. In addition to protecting the receiver, this device eliminates blocking and permits quick come-back when operating on the break-in system. A phone jack is, of course, provided on the front panel, as well as a Send-Receive switch for cutting B Volume during transmission.

Most notable among the mechanical details is the use of a new precision four-gang condenser with worm drive tuning, providing a ratio of 20-1. Due to preloading of the gears, backlash is entirely absent. The micrometer dial has fifty divisions and revolves ten times in covering the tuning range, thus reading direct to 1 part in 500. Quarter divisions may be easily estimated. Every tenth division is numbered, the figures being changed automatically as the dial is rotated. The condenser and dial are described more fully on Page Two of this catalog.

The HRO Receivers employ plug-in coils rather than coil switching. This is because we have found that, other things being equal, much better performance is obtained with plug-in coils. The principal reason for this is the necessity for crowding coils into a small space, without well-proportioned individual shielding, when the switch is employed. This increases image frequencies and signal-to-noise ratio, and tends to introduce dead spots. These difficulties are not insuperable of course, and we have designed a new coil switch, as well as a new receiver employing it, which we believe represents the highest development in this type of equipment. This receiver though in many other respects similar to the HRO, is not listed in this catalog, as we consider it a Short Wave Broadcast Set, rather than preferred equipment for amateur use. Our choice of plug-in coils for the HRO Amateur Receivers is based on definite engineering experience with both types of receiver, as well as on the expressed preference of a number of amateurs. A description of the named plug-in coils used in the HRO will be found on the opposite page.

The HRO has been designed to employ an external power supply, as many amateurs already possess suitable power supplies. However, an HRO Receiver with built-in power supply is also available and listed below, for those who prefer to sacrifice performance to convenience.

Tubes required for 2 volt HRO: Four 58, Three 57, One 287, One 9A5. Power Supply requires 1 Type 280.

Tubes required for 6 volt HRO: Four 6D6, Three 6C6, One 6B7, One 42. Power Supply (for AC operation) requires 1 Type 280.

HRO Receiver, 2 volt or 6 volt A.C. model, complete with coils, as described above, but without tubes, speaker or power supply.
List Price, $233.00

HRO-S Receiver (2 volt), with built-in power supply, 115v. 60 cycle, complete with coils, as described above, but without tubes, or speaker.
List Price, $257.50

HRO-P Panel for Relay Rack Mounting, leatherette finish, engraved and machined to fit over the regular front panel of the HRO.
List Price, $20.00

NATIONAL COMPANY, INC., MALDEN, MASS.

PAGE EIGHT
NATIONAL High Frequency RECEIVERS

OUTSTANDING FEATURES:

- Nine Tubes, not including rectifier.
- Two Preselector Stages.
- Single Signal (Crystal Filter) standard equipment.
- Ganged Plug-in Coils, with each coil individually shielded.
- Strictly single-control Tuning.
- Calibration for each range mounted on coil.
- Four gang Precision Condenser, with preloaded worm-drive tuning, 20-1 ratio.
- Micrometer Dial, spreading tuning over 500 divisions, numbered every 10 divisions, direct reading.
- Automatic or Manual Volume Control.
- Vacuum Tube Voltmeter with Instrument calibrated in R scale of carrier intensity.
- Electron Coupled, air padded oscillators.
- Two I.F. stages with Litz-wound coils, air condenser tuned.
- Beat Frequency Oscillator for "Offset" C.W. Tuning.
- Phone Jack on Panel.
- 2½ Volt AC and 6 Volt AC or Battery models.
- Relay Rack Mounting available.
- Built-in Power Supply available.

GANGED PLUG-IN COILS

Each of four coil units in the HRO ganged plug-in assembly has an individual aluminum shield, and is mounted on an aluminum panel, on which is framed the calibration curve for the range covered. The assembly is illustrated above.

Due to special features in the design of both the tuning condenser and the coils, it has been found possible to combine Calibrated full band-spread on the 20, 40, 80 and 160 meter amateur bands with continuous coverage of all frequencies from 1.7 M.C. to 30 M.C. Special band-spread coils are not required.

A complete set of coils for the range from 1.7 M.C. to 30 M.C. is supplied as standard equipment with each receiver.

Two additional sets of coils covering the broadcast band (550-900 K.C. and 900-1700 K.C., respectively) are available at extra cost.

List Price, each $20.00

POWER SUPPLY

The 2 volt HRO Receiver is designed to operate from the FB-7 power supply, Type 5897. Similarly, the 6 volt HRO operates from the AGS Power Supply, or from the Type 5886 (SRR Power unit). Amateurs already owning any of these power supplies may employ them without alteration. Types 5887 and 5880 may also be used if available, but are not recommended. For general description of National Power supplies, see Page 14.

Power Supply Unit, Type 5897, for 2½ Volt HRO Receiver, 115V, 60 cycle, list price, $24.50
Power Supply Unit, Type 5886, for 6 Volt HRO Receiver, 115V, 60 cycle, less tubes, list price, $24.50

NATIONAL COMPANY, INC., MALDEN, MASS.
"AGS" and "AGSX" Communication Type RECEIVERS

A professional receiver in which considerations of price are entirely subordinate to those of performance and reliability, the AGS has been designed in cooperation with the Airways Division of the U. S. Department of Commerce, to provide high usable sensitivity and selectivity, easy operation, and permanent frequency calibration.

Particularly important is its unusual preselector circuit, which is largely responsible for its exceptionally high signal-to-noise ratio and almost complete image suppression.

Both AGS and AGSX employ nine tubes in a superheterodyne circuit, comprising a preselector stage of tuned R.F. amplification; a first detector; a high frequency oscillator; two stages of high-gain I.F. amplification; I.F. power detector; and Pentode output with provision for either phones or loudspeaker. Details typical of its electrical refinements are the use of electron-coupled air-padded oscillators, air-dielectric tuning condensers in I.F. amplifier, single dial tuning, automatic or manual volume control, C.W. beat-frequency oscillator and calibrated band-spreading.

The AGSX illustrated above offers a still further refinement in the use of a Single Signal Crystal Filter circuit with front-of-panel controls. With this device, selectivity is measured in cycles rather than kilocycles, almost completely eliminating interference from unwanted signals, and greatly reducing static.

The mechanical construction of the AGS receivers is particularly rugged, heavy aluminum plate being used throughout. All parts are designed for continuous duty under commercial operating conditions, and are easily accessible for inspection. The standard models are designed for Relay Rack mounting and have a heavy aluminum dust cover and shield. (Not illustrated). A shielded walnut cabinet for table use will be supplied on special order at a slightly higher price.

A booklet describing this receiver in detail will be mailed on request.

Tubes required: Three 236, One 237, One 89, One 77, Three 78. Power Supply requires One 280.

AGS Receiver for relay rack mounting, complete with coils (1500–20,000 k.c.), but without tubes, speaker, or power supply. List Price, $265.00

AGSX Receiver, as above, but with Single Signal Filter built in. List Price, $295.00

GRSPL-6 Power Supply, relay rack mounting, for one AGS or AGSX receiver. List Price, $49.50

GRDPL-6 Power Supply, relay rack mounting, for two AGS or AGSX receivers. List Price, $79.50

Speakers, Relay Racks, Power Supplies, etc., are described on Page 14, in detail.
PLUG-IN COILS

The coils employed in the FB-7 receiver plug in through the front panel. The windings are on accurately threaded R-39 forms, and are protected from damage by an outside sleeve of special bakelite. The grounded metal handle is designed to complete the shielding when the coil is plugged in.

Coils are available in the ranges listed below at a list price of $10.00 per pair. Unwound coil forms (Symbol XR-39) are listed on page 16.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>AB-20</td>
<td>50 meter band spread</td>
</tr>
<tr>
<td>AB-40</td>
<td>40 meter band spread</td>
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<tr>
<td>AB-80</td>
<td>80 meter band spread</td>
</tr>
<tr>
<td>AB-160</td>
<td>160 meter band spread</td>
</tr>
<tr>
<td>FB A</td>
<td>19500 to 11400 KC</td>
</tr>
<tr>
<td>FB B</td>
<td>11700 to 7000 KC</td>
</tr>
<tr>
<td>FB C</td>
<td>7300 to 4000 KC</td>
</tr>
<tr>
<td>FB D</td>
<td>4900 to 2400 KC</td>
</tr>
<tr>
<td>FB E</td>
<td>3500 to 1500 KC</td>
</tr>
<tr>
<td>FB F</td>
<td>1500 to 900 KC</td>
</tr>
</tbody>
</table>

Tubes required. 2-volt type: one 56, one 57, two 58's, one 59, two 24's. 6-volt type: one 37, one 77, two 78's, one 89, two 36's. Power supply requires one type 80 rectifier.

FB7-A, with air tuned I.F. transformers, without coils, speaker or power supply.         List Price, $62.50
FBX-A, as above, but with single-signal (crystal filter) unit, without coils, speaker or power supply. List Price, $86.50
5887 AB Power Supply for 2-volt FB receivers, 115-volt 60 cycles, less tube. List Price, $24.50
5897 AB Power Supply for 2-volt FB receivers, high voltage for maximum audio power, 115-volt, 60 cycles, less tube. List Price, $26.50

TYPE 5880 Power Supply may also be used if available.

FB-7 AMATEUR RECEIVER

The FB-7, designed primarily for the experienced amateur operator, is a seven tube receiver having exceptional sensitivity, selectivity, stability and other characteristics essential in order to contend with the crowded conditions of the amateur C.W. and phone bands. Ample sensitivity and selectivity are assured through the use of a circuit employing two stages of high-gain air-tuned I.F. amplification (six tuned circuits). Individual filtering of all circuits, including the electron-coupled oscillators, together with thorough shielding, results in unusual stability. There is no pulling-in or blocking by strong local signals, and frequency drift in both high frequency and beat oscillators has been eliminated. Variation of the volume control has no appreciable effect on the pitch of C.W. signals, even at 14 mc.

A Single-Signal (crystal filter) unit is available, and may be added to the receiver at any time. With this device, selectivity is measured in cycles rather than kilocycles, almost completely eliminating interference from unwanted signals and greatly reducing static.

Every effort has been made to promote ease of operation. Tuning is strictly single-control, and calibration is permanent. The coils plug-in from the front of the panel without disturbing shielding. Tuning curves are mounted on the front panel. Switches for the C.W. oscillator, and for cutting B voltages during transmission are conveniently located. A phone jack is located in the second detector output circuit.

NATIONAL COMPANY, INC., MALDEN, MASS.
NATIONAL Five Meter RECEIVERS

SRR 56 MC Super-Regenerator RECEIVER

Type SRR is a compact and efficient three-tube receiver designed primarily for use on 56 MC, though the use of plug-in coils enables it to be used on the 10, 20, 40, 80, and 160 meter bands. Exceptionally high sensitivity is obtained through the use of a special electron-coupled detector. The 56 MC band is spread over 50 dial divisions, and regeneration is constant over the entire scale. The interruption frequency oscillator is coupled to the screen grid of the detector, effectively isolating it from the audio circuits, and giving the optimum super-regenerative action. A phone jack is connected to the detector output by means of an impedance matching transformer. The 89 pentode provides ample power for loud-speaker operation.

The receiver requires a 6-volt (D.C. or A.C.) filament supply, and a 135 volt B supply, which may be obtained from B batteries or from the power supply listed below. Tubes required: one 36, one 37, and one 89.

Type SRR receiver, with 56-60 MC coil, but without tubes, speaker, or power supply.

List Price, $32.50

Type 5886 Power Supply, 115 volt, 60 cycle, for operating SRR receiver, less tube.

10, 20 or 40 meter coils. List Price, each $1.25

80 or 160 meter coils.

List Price, each $1.75

HFC 56 MC CONVERTER

Type HFC Converter is designed for use on the 28 and 56 MC bands, which are spread over 90 dial divisions. A regenerative detector results in high gain and high conversion efficiency. This, and other features, result in exceptional weak signal response, greatly improve signal-to-noise ratio, and definitely eliminate image frequencies. Isolantite insulation is used throughout the HF circuits except the coil forms, which are moulded R-39.

The output of the first detector is coupled through a high gain I.F. Transformer to a low impedance output coupling tube which insures efficient signal transfer to the antenna circuit of the B.C. Receiver, which should be of the TRF Type. Tubes required: two 24's, one 27 or two 36, one 37.

135 Volts B supply is required, which may be obtained from B batteries or from any of the National Power Units. A filament supply of either 2½ Volts (AC) or 6 Volts (AC or DC) depending on tubes used, is also required.

Type HFC Converter, with both 28 and 56 MC coils, but without tubes or power supply.

List Price, $39.50

TR 56 MC TRANSCEIVER

The National Transceiver, as the name implies, is a combination receiver and transmitter designed primarily for portable use on the 56 mc. band. Two tubes are employed, a Type 30 and a Type 33. When used as a receiver, the Type 30 functions as a self-blocking superregenerative detector, transformer coupled to the 33 used as an audio amplifier. When used as a transmitter, the Type 30 tube functions as an oscillator and the Type 33 as a modulator.

The Transceiver is made in two models, the Type TRW, illustrated, self-contained in a wooden carrying case with compartments for the various batteries, hand-set, etc., and a compact model, Type TRM consisting of the Transceiver unit proper mounted in a metal case with a three foot cable for connection to external batteries.

Provision is made for using either a single wire antenna, or any of the various doublet or Zepp types. The recommended system is the Pickard Antenna, which however requires a coupling transformer between feeders and antenna, such as the TRP listed below.

A booklet describing the Transceiver will be sent upon request.

Type TRW, in quartered oak case, as illustrated, but without tubes, batteries or hand-set.

List Price, $67.50

Type TRM Transceiver in compact metal box without tubes, batteries or hand-set.

List Price, $45.00

Type TRP Coupling Unit for Pickard Antenna.

List Price, $3.75

NATIONAL COMPANY, INC., MALDEN, MASS.
**SW-3 High Frequency RECEIVER**

The SW-3 Receivers employ a circuit consisting of one R.F. stage transformer coupled to a regenerative detector and one stage of impedance coupled audio. This circuit, as incorporated in the SW-3, with thorough shielding, grooved R-39 coil forms, Isoalternite insulated condensers and tube sockets, etc., provides maximum sensitivity and flexibility with the smallest number of tubes and the least auxiliary equipment. The single tuning dial operates a precisely adjusted two gang condenser; the regeneration control is smooth and noiseless, with no backlash or fringe howl; the volume control is calibrated from one to nine in steps corresponding to the R scale, and is connected in the antenna input circuit — the features all contribute to the efficiency and ease of operation so essential to equipment of this type.

The receiver especially suitable for installations where space is limited as in semi-portable or mobile stations, on yachts, etc.

**General Coverage Coils**

<table>
<thead>
<tr>
<th>Number Range Per Pair</th>
<th>Catalog list Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 or 60 9 to 15. meters</td>
<td>5.00</td>
</tr>
<tr>
<td>11 or 61 13.5 to 25. meters</td>
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</tr>
<tr>
<td>12 or 62 27 to 41. meters</td>
<td>5.00</td>
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<td>13 or 63 40. to 70. meters</td>
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<td>14 or 64 65. to 115. meters</td>
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<tr>
<td>15 or 65 115. to 200. meters</td>
<td>5.00</td>
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<tr>
<td>16 or 66 200. to 300. meters</td>
<td>5.00</td>
</tr>
<tr>
<td>17 or 67 300. to 500. meters</td>
<td>5.00</td>
</tr>
</tbody>
</table>

Five additional sets of coils are available to cover up to 3000 meters.

**Band Spread Coils**

<table>
<thead>
<tr>
<th>Number Range Per Pair</th>
<th>Catalog list Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A or 60A 10 meter band</td>
<td>5.00</td>
</tr>
<tr>
<td>11A or 61A 20 meter band</td>
<td>5.00</td>
</tr>
<tr>
<td>13A or 63A 40 meter band</td>
<td>5.00</td>
</tr>
<tr>
<td>14A or 64A 80 meter band</td>
<td>5.00</td>
</tr>
<tr>
<td>15A or 65A 160 meter band</td>
<td>5.00</td>
</tr>
</tbody>
</table>

**PRESELECTOR**

The National Preselector has thoroughly demonstrated its utility for use with either superheterodyne or TRF Receivers. Although originally designed for use with the FB-7, it is equally effective with the SW-3 or receivers of other makes. It is not recommended for use with the AGS or HRO, as these receivers have very efficient preselectors built in.

The use of the preselector provides additional selectivity as well as additional gain and weak signal response. In Superheterodynes, there is a corresponding reduction in image-frequencies.

The power supply requirements are not particularly critical and may be in general obtained from the receiver with which the preselector is used. The tube may be either a 58 or 78 depending on whether a 2½ or 6 Volt filament is more convenient. Plug-in coils are available in the same ranges as listed for the FB-7.

Type PSK Preselector, without coils or tube, List Price, $19.00

**CATHODE RAY OSCILLOSCOPE**

Providing an instantaneous graphic picture of the actual operating conditions in transmitter circuits, the Cathode Ray Oscilloscope gives important information not readily obtainable by other means. Percentage Modulation, Signal Distortion and Peak Voltages, for instance, are indicated directly, and results are easily interpreted.

The Cathode Ray Tube is the 3-inch diameter RCA-906. No linear sweep device is provided, as it has been found more desirable to use an audio signal from the transmitter for this purpose. The resulting "trapezoid pattern" may be interpreted more readily, and percentage modulation more easily circulated, than with a linear sweep. However, the linear sweep may be added at any time if it is found necessary for special work.

The unit is entirely self-contained, the power supply and control devices being built-in.

Tubes required: One RCA-906 and one 80.

A booklet describing the Cathode Ray Oscilloscope will be mailed on request.

Type CRO Cathode Ray Oscilloscope, without tubes, List Price, $29.50
RELAY RACK UNITS

Rack-Panel Units permit the assembly of complete equipment to suit individual requirements. In the illustration at the left, a set-up is shown which is frequently used in Airport Installations. Unit 3 is the Type AGS Receiver described on page 10. A brief description of the other units follows.

1. This Monitor Speaker Panel employs a dynamic speaker of the permanent magnet type, requiring no power supply. The speaker is mounted on a standard panel (8¾" x 19″) and is provided with an impedance matching transformer and connecting cord.

   Monitor Speaker Panel, Type RFS.

   List Price, $30.00

2. This small panel (5¼" x 19″) carries receptacles for the twelve idle coils of the set of fifteen required for the National AGS Receiver.

   Coil Rack, Type CRP.

   List Price, $15.00

3. This Type SBC Receiver is the well-known National SW58 arranged for rack-panel mounting, with front panel coil changing. Circuit details are essentially the same as for the Standard SW58, described in special catalog. Briefly, the receiver has two tuned circuits, using type 58 tubes as R.F. and Detector, a 227 as first audio, and a pair of 245's as final audio stage. Because of the definitely superior signal-to-noise ratio, many hundred receivers of this type are in use by the principal American Continent Air Lines.

   Type SBC Receiver, with four sets of coils (13½ to 115 Meters).

   List Price, $120.00

Additional coils available to 2000 Meters

4. Rack mounted packs either single or double and for either 2½ volt or 6 volt tubes.

   Type GRSPU. Single.

   List Price, $49.50

   Type GRDPU. Double.

   List Price, $79.50

5. This rack, built to Government Specifications and drilled and tapped to receive standard panels of all sizes, is of steel, finished in black gloss Duco.

   Relay Rack, Type RR.

   List Price, $65.00

6. Additional coils available to 2000 Meters

   Type LRR.

   List Price, $22.50

LIGHT WEIGHT RACK

A knockdown, lightweight rack, designed especially for amateur station use is now available. This rack can be "cut down" for bench mounting if desired. Not illustrated.

Type LRR.

List Price, $22.50

POWER UNITS

National Power Units have exceedingly low inherent hum, employing a double section filter using good quality chokes and ample condenser capacity. The power transformer has an electrostatic shield between the primary and other windings in order to isolate line disturbances. A special R.F. filter is a feature of all National Power Packs designed for short wave use, and is one of several factors contributing to the complete elimination of so-called "tunable hums" frequently encountered in short wave reception.

Power units for National Receivers are equipped with a receptacle for plugging in the power cable from the set (Fig. 5 and Fig. 8) and have filament windings specially wound to compensate for voltage drop in the power cable. Proper filament voltage is extremely important, and unless the above power supplies are used, filament voltage should be carefully checked at the socket terminals. For convenience these power supplies are listed with the receivers they are designed for. National also supplies a general purpose power unit (Fig. 7). This unit provides four B voltages, the three intermediate taps being adjustable. Voltages are as follows: 22-45V for detector, 45-90V for R.F., 90-135V for A.F., and 180 Volts (35 M.A.) for power tube.

Type 3580, without 80 rectifier tube.

List Price, $16.50
R. F. CHOKES

R-152 and R-154 (Fig. 1). These two universal transmitter chokes have windings of the honeycomb type, divided in five sections, and are rated to carry 0.6 amperes continuously. Inductance 4 m.h., D.C. resistance 10 ohms. The R-152 is designed to give maximum impedance in the 160 meter band, and the R-154 in the 40 meter band. R-152 or R-154, List Price, $2.25

R-100 (Fig. 2). Isolantite mounting, continuous universal winding in four sections. For pigtail connections or standard resistor mountings. Inductance 2 1/2 m.h.; distributed capacity, 1 mmf.; D.C. resistance 50 ohms; Current rating, 125 M.A. For low powered transmitters and high frequency receivers. List Price, $1.75

R-90 (Fig. 3). Has proper value for all by-passing work on screen-grid or plate circuits of screen-grid tubes and between detector and first audio, in accordance with best practice. Multisection winding adapts this choke for short-wave as well as broadcast work. D.C. resistance, 350 ohms. Inductance, 90 millihenries. Fits standard grid-leak mount. List price, without mounting, $1.25

R-201 (Fig. 4). A two-section honeycomb-wound choke in R-39 case, suitable for output circuit of second detector in H.F. receivers (475 KC Intermediate Frequency). Inductance, approximately 12 m.h., D.C. resistance approximately 120 ohms. List Price, $1.25

CLASS B INPUT TRANSFORMER (Fig. 5). Designed for coupling two 45's in push-pull to a pair of 210's or 46's working Class B. The transformer has excellent frequency characteristics. Primary Inductance, 20 henries. Primary Resistance (total), 150 ohms. Secondary Resistance (total), 200 ohms. Type Bl. List Price, $6.50

CLASS B OUTPUT TRANSFORMER (Fig. 5). Designed for coupling a Class B amplifier employing 210's or 46's to various load impedances. The secondary is not designed to carry R.F. amplifier plate current. Insulated for 5000 volts. Primary Inductance, 20 henries. Primary Resistance (total), 115 ohms. Type BO. List Price, $8.50

AUDIO TRANSFORMERS (Fig. 6). Type P-50 is a high quality input or interstage audio transformer. It employs a nickel-steel alloy core and special windings, giving unusually fine frequency characteristics. The secondary is center-tapped. Turns ratio is 4 to 1. Type P-50. List Price, $9.50

Output Transformer, Type P-10, is for coupling push-pull output tubes to speaker. Turns ratio is 5 to 3. Type P-10. List Price, $5.50

SCREEN GRID DETECTOR COUPLING UNIT (Fig. 6). This impedance coupling unit, when employed to couple the output of a screen grid detector to an audio amplifier tube, will give from two to three times as much amplification as resistance coupling. Plate choke, 700 henries. Coupling condenser, .01 mfd. Grid leak, 250,000 ohms. Type S-101. List Price, $5.50

FILAMENT TRANSFORMER (Fig. 7). A compact filament transformer having excellent regulation with a single secondary winding, 2½ volts at 10 amperes. Type CFL. List Price, $3.00

POWER TRANSFORMER (Fig. 8). A general purpose transformer conservatively rated at 100 watts. Center-tapped High Voltage Secondary, 400 volts per side, 125 M.A. Center-tapped Heater Voltage Secondary, 2½ volts at 10 amps. Center-tapped 245 or 247 Secondary, 2½ volts at 3 amps. Rectifier Filament Secondary, 5 volts at 2 amps. Type VSA. List Price, $10.00
LOW-LOSS SOCKETS

RECEIVING SOCKETS. National Receiving Sockets are available in either Insolantite or Steatite, to fit all standard receiving tubes. The special coil sockets for National 6-pin coils are square with four mounting holes. Tube sockets are as illustrated.

List Price, $0.60
List Price, $0.75

50 WATT SOCKET. An unusual socket — it cannot break down by arcing from contacts to metal shell, for there is no shell, nor will it arc downward from tube prongs to chassis, for the socket has a solid base. One piece, all Steatite, with positive electrical contacts.

Type XC-50. List Price, $3.50

GRID GRIPS. This convenient little Grid-Grip is the most simple method of attaching a wire to the metal top-cap terminal of multi-element tubes. Easy to operate, never works loose, makes continuous electrical contact. Eliminates possibility of loosening cap on tube when removing lead. Made in two sizes.

Type 24 — to fit broadcast set tubes.
List Price, $0.05

Type 12 — to fit large type tubes, such as 872.
List Price, $0.10

5 METER COIL. Consisting of a heavy copper air-spaced winding and mounted on a Steatite base, this coil is specifically designed for 5-meter transmitters, receivers or transceivers. They are usually used in pairs.

Type XR-9, complete, per coil. List Price, $0.45

LOW FREQUENCY OSCILLATOR COIL. Two separate inductances, closely coupled, in an aluminum shield. It is used in the SRR and other super-regenerative receivers for the interruption-frequency oscillator.

Type OSR. List Price, $1.50

MIDGET COIL FORM. Made of low-loss R-39, these small coil forms are designed with excellent form factor, contributing to high efficiency in H. F. circuits. Diameter, 1"; Length, 1½"; Wall thickness, 1/16". They are available with 4 prongs, or plain.

Type XR-1, four prongs.
List Price, $0.50

Type XR-9, without prongs.
List Price, $0.35

LOW-LOSS COIL FORMS

TRANSISTOR COIL FORMS. In addition to the three low-loss Steatite coil forms listed below, National offers two low-price forms for use where high efficiency is not essential. Though not comparable to Steatite, these less expensive forms are not to be confused with ordinary porcelain forms.

XR-10, Steatite, 20 or 40 meter.
List Price, $3.75

XR-11, Steatite, 80 meter.
List Price, $6.60

XR-12, Steatite, 160 meter.
List Price, $8.00

XR-11A, Low-Loss Ceramic, same dimensions as XR-11.
List Price, $1.50

XR-12A, Low-Loss Ceramic, same dimensions as XR-12.
List Price, $2.25

RECEIVER COIL FORM. These well-known R-39 forms are machinable, permitting the experimenter to groove and drill them to suit individual requirements. They are available in 4-, 5- and 6-prong types, and plug into the sockets shown on this page. Length, 2¾"; Dia. 1½".

XR-4, XR-5, or XR-6. List Price, $0.75

PLUG-IN COIL FORMS. These R-39 coil forms, originally used in the FB-7, are designed for plugging-in through the front panel of a receiver, monitor, etc. A padding condenser mounts inside the coil, and a special bakelite sleeve protects the winding. The coil shield listed is bolted to the back of the panel, and supports the Insolantite socket.

XR-39A Coil Form, Air Tuned. List Price, $4.75
List Price, $4.75

XR-39M Coil Form, Mica Tuned.
List Price, $3.65
List Price, $3.65

XCS Coil Shield and Socket.
List Price, $1.75
List Price, $1.75

COIL FORM. This Steatite Choke Coil Form is ideally suited for small choke coils and precision resistors. The winding is divided in four sections by partitions. A slot is provided for lead-through from section, and to the terminals.

Type XT-8. List Price, $0.50

NATIONAL COMPANY, INC., MALDEN, MASS.

PAGE SIXTEEN
SHAFT COUPLINGS

The small coupling illustrated at the left has Steatite insulation, providing high electrical efficiency when used to isolate circuits. Type TX-9. List Price, $1.00

The small coupling illustrated at the right is well known and liked for its small size and freedom from backlash. Insulation is canvas bakelite. Type TX-10. List Price, $.55

NATIONAL COIL DOPE

National Coil Dope is a special R.F. lacquer, specially prepared to give low power factor. It may be used as a cement for holding windings in position without spoiling the low-loss features of the coil support. It provides a tough, protective film, seals surface pores, and gives a moisture-repellent surface. The Coil Dope is applied with a brush, and dries in air without baking. Per can.

List Price, $6.00

List Price, $5.00

CODE PRACTICE OSCILLATOR

This small audio oscillator is suitable for either code practice, or as an audio signal source for ICW on the Ultra High Frequency Bands. Being a real oscillator, the tone is excellent, and is much more satisfactory than "squealers." A type 30 tube is used, and four flashlight cells in the case provide the necessary filament and plate current. Type CPO, without battery or tubes. List Price, $1.50

TUBE AND COIL SHIELDS

Aluminum shields for experimental and custom set work.

<table>
<thead>
<tr>
<th>Catalog Symbol</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>J30 Coil Shield, 2½&quot; dia., 3¾&quot; high — square flange at bottom 2¾&quot;</td>
<td>$ .35</td>
</tr>
<tr>
<td>B30 Coil Shield, 3&quot; dia., 3½&quot; high</td>
<td>.35</td>
</tr>
<tr>
<td>B30 Coil Shield, as above with mounting base</td>
<td>.50</td>
</tr>
<tr>
<td>TS Tube Shield with Top Cap and Bottom Mounting Plate</td>
<td>.40</td>
</tr>
<tr>
<td>T58 Tube Shield with Top Cap and Bottom Mounting Plate (For dome-top tubes such as the 57, 58, 77, 78, etc.)</td>
<td>.40</td>
</tr>
</tbody>
</table>

VICTRON

A synthetic material, possesses almost incredible electrical properties. Its Loss Factor (0.2) is one-eighth that of "Low Loss" Hard Rubber, and one-nineteenth that of the usual R.F. Insulators. Its Power Factor is .06%-.08%, compared to .09%-.20% for Steatite. In color it is a transparent amber. It may be readily drilled or sawed. Being non-hydroscopic, it is suitable for outdoor use. Its Tensile Strength is about 6,500 lbs. per sq. in.

The ease with which Victron sheet can be machined makes it an ideal material for the experimenter. Standard sheets are 6" x 12". Victron, 3⁄16" thick, per sheet, List Price, $6.00. Victron, ¼" thick, per sheet, List Price, $5.00

CRYSTAL HOLDER

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

STANDARD CABINETS

National Receiver cabinets for use in constructing special equipment are illustrated above. Left to right, are the cabinets regularly used for the SRR and FB-7 receivers, the PSK Preselector, and the SW-3 receiver. Available plain or with panels and sub-bases punched for standard assemblies. List prices include sub-base and bottom cover:

<table>
<thead>
<tr>
<th>Type</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-SRR</td>
<td>$3.50</td>
</tr>
<tr>
<td>C-FB7</td>
<td>$7.00</td>
</tr>
<tr>
<td>C-PSK</td>
<td>$6.00</td>
</tr>
<tr>
<td>C-SW3</td>
<td>$5.50</td>
</tr>
</tbody>
</table>

NATIONAL COMPANY, INC., MALDEN, MASS.
H. F. DIELECTRICS

STAND-OFF INSULATOR. This well-known little insulator is now offered in two lengths. Long and slender, the larger model is shaped for extreme electrical efficiency. It is an excellent core for H.F. solenoid chokes. (Isolantite)

Type GS-1 (L=1¾")... List Price, $ .25
Type GS-2 (L=2¾")... List Price, $ .35

STAND-OFF INSULATOR. Metal mounted like the smaller units, these heavy Isolantite stand-offs combine electrical efficiency with strength and convenience. The insulator is ¾" diameter and is available in two lengths.

Type GS-3 (L=2½")... List Price, $ .80
Type GS-4 (L=4½")... List Price, $1.00

STAND-OFF INSULATOR. This popular style of insulator is offered in three sizes, all of low-loss Steatite. The smallest model is tapped 8-32 each end, the larger 10-24.

Type GS-5 (A=½", B=1¼", C=1")... List Price, $ .25
Type GS-6 (A=¾", B=2", C=1¾")... List Price, $ .35
Type GS-7 (A=¾", B=3", C=1¾")... List Price, $ .65

STAND-OFF INSULATOR. Another small insulator suitable for a variety of applications. Being made of Steatite, it is eminently suited for Low Loss H.F. circuits. It is available in a special model with a jack for mounting plug-in inductances.

GS-8... List Price, $ .25
GS-9 (with jack)... List Price, $ .35

HIGH VOLTAGE SHAFT COUPLING. Isolantite insulated, rugged, and free from backlash, this coupling is made in three lengths, bored for ¾" or ½" shafts. Leakage path is 2¾" less than over-all length.

Type TX-3 (L=3½")... List Price, $7.00
Type TX-5 (L=5")... List Price, $7.75
Type TX-7 (L=7½")... List Price, $8.50

NATIONAL COMPANY, INC., MALDEN, MASS.
SPREADER. Conventional in design, unusual in efficiency, these Steatite spreaders will more than justify their slight extra cost. They are at present available only in the six inch length.

Type AA-3 ......... List Price, $ .30

STRAIN INSULATOR. This aircraft-type insulator, in spite of its short leakage path, has a variety of uses in small portable, mobile and police installations. Being loaded in compression, the insulator provides great mechanical strength.

Type AA-5 ......... List Price, $ .20

ANTENNA INSULATOR. This insulator is particularly suited for general use by the amateur. Its length provides ample leakage path, while its cross-section provides ample strength for all but the heaviest loads. The use of Steatite assures excellent electrical performance.

Type AA-6 ......... List Price, $ .25

ANTENNA INSULATOR. Designed for sustaining heavy loads, this insulator combines great strength with low losses. The Steatite bar is ¾" diameter and has a leakage path of 8¼". The fittings are of bronze. The weight of the complete insulator is approximately one pound.

Type AA-7 ......... List Price, $5.00

HIGH VOLTAGE SHAFT COUPLING. Also isolantite insulated, but smaller than the models described opposite this coupling possesses their excellent design features. For ¼" shafts only. Leakage path ¾" less than over-all length.

Type TX-1 (L=1¾") .... List Price, $1.00
Type TX-2 (L=3¼") .... List Price, $1.10

NATIONAL COMPANY, INC., MALDEN, MASS.
H.F. BUSHING. This small Steatite bushing has a variety of uses in transmitter construction, not only as a neat and efficient means of bringing H.F. leads through partitions, but as a support for coils, etc. Each pair of cones includes suitable metal fittings.

Type XS-1 (A=1", B=1 1/16")
per pair .................. List Price, $ .60

Type XS-2 (A=1 1/2", B=1 3/16")
per pair .................. List Price, $ .80

H.F. BUSHING. Larger in size than the bushings described above, and shaped to conform to the lines of electrical stress, these Steatite insulators are suitable for higher H.F. voltages. Prices are per pair, with metal fittings.

Type XS-3 (A=2 3/4", B=2 5/16")
List Price, $ 3.30

Type XS-4 (A=3 3/4", B=2 25/32")
List Price, $ 6.00

H.F. BUSHING. A heavy bowl-type lead-in, suitable for large transmitters, this Steatite insulator provides a waterproof joint for antenna lead-in purposes. Leakage Path 3 1/4".

Type XS-5 each ........ List Price, $ 7.50

Type XS-5, with fittings, per pair
List Price, $15.50

H.F. BUSHING. A small, inexpensive Steatite bushing that has a variety of uses in H.F. Transmitters. Convenient as well as efficient, they give a professional appearance to amateur equipment.

Type XS-6 ........ List Price, each, $ .10

TRANSPOSITION BLOCK. In addition to the popular AA-1 Victron Block, National now offers a smaller Steatite Block. Both are light in weight, both are highly efficient. The Victron Block AA-1 separates feeders 1 1/2", the Steatite Block, AA-2, provides 1" separation.

Type AA-1 ............. List Price, $ .35

Type AA-2 ............. List Price, $ .20
ALL ESSENTIAL PARTS OF YOUR STATION EQUIPMENT

LOG BOOKS - MESSAGE CARDS - STATIONERY - MESSAGE BLANKS

Amateur Radio Station Log

Book with heavy paper covers, 8½ x 10¾. Contains 39 log pages, like above, and 39 blank pages for miscellaneous notes. Also list of Q signs, message number sheet and sheet of cross-section paper. 40c each or 3 for $1.00. Postpaid.

Amateur Radio Station Log

Neatest, simplest way to deliver a message to a near-by town. On U. S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each, postpaid.

American Radio Relay League

West Hartford
Connecticut

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8½ x 7¼. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for $1.00.

Say You Saw It in QST — It Identifies You and Helps QST
To ENHANCE the appearance of your station, to facilitate your reference work, and to preserve the records of the advancement of the radio art, you need a BINDER. You need 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 doth. 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.

**NOTE**

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.

*A GOOD INVESTMENT AT* $1.50 POSTPAID

**AMERICAN RADIO RELAY LEAGUE**

West Hartford, Connecticut

(Continued from page 88)

this would be just another piece of legislation that could be more properly taken care of by education. An “inexperienced beginner” would be difficult to define. It is assumed that such a person would be one without previous experience in construction, adjustment and operation of transmitting apparatus. But to be absolutely fair, personalities must be considered. For instance, what about the amateur who, we will say, is an electrician of sorts, meticulous as to his construction work, careful in knowing the “how and why” of adjusting his transmitter before “blasting the ether” and, above all, blessed with a mature gift of consideration for other people? Compare him with another new amateur, maybe a very young fellow carried away, as most of us have been at one time or another, by the thrill of “getting on” in one fashion or another. Both are without previous experience as far as radio is actually concerned. It is evident that the proposed legislation, though intended for the latter, would also include the former amateur and most certainly work an injustice on him and dampen the enthusiasm of a promising good “ham.”

Lieut. J. P. Mullen, Jr., W4CMJ

The New England Division Convention

I KE CREASER said that this year’s convention was to be a WOW—and it was. May 4th and 5th, 1934, will go down in the annals of New England Division conventions. From early Friday morning till the wee small hours of Sunday there were no idle moments. With a cordial welcome by Percy C. Noble, W1BVR, who introduced Mayor Martens of the city of Springfield, and a response by OM Hebert, A.R.R.L. fieldman, the program was well launched.

The Communications Department was well represented by F. E. Handy and its field force, reports of section activities being made by "Hewie" Hewinson, W1ASY, Western Massachusetts; Joe Mullins, W1ASJ, Eastern Massachusetts; J. H. Izart, W8AUY, acting for New Hampshire; and A. Izzo, W1EMQ, acting for Vermont. A guest who came a long way was Bob Eubank, W3AAJ, SCM, for Virginia, who gave a good talk.

The 'phone group under the direction of Col. Boyden, W1SL, had two meetings during the convention and organized the New England Division Radiophone Association. The Navy was well represented by Ensign Green, U.S.N.R., W1ASU; and the Army had that good friend of the Army-Amateur Net, Major Platt of the 1st Corps Area.

Nothing was left desired in the technical program with such well-known names as Lieut. John Reinartz, W1QP, whose talk on cathode ray tubes kept the delegates at attention for over an hour. "Five-Meter Problems" was well covered by W. C. Ellsworth, W1BZC, of the Westinghouse Co. Mr. H. N. Harmon, from the same company, spoke on "Antennas." Filter Condenser Network was well covered by William Allsion, WIFFK, of the Sprague Products Co. Bob Chapman, W1QV, understands "Interference Elimination," and his lecture must have been of assistance to those who have such trouble.

One of the unusual features of the convention was a sea food dinner on Friday night which kept the delegates together and enabled everyone to enjoy the evening’s entertainment, consisting of a skit by the New London Radio Club; Liars’
Ten Years Ago . . .  

passing the government amateur operator license examination was little more than a formality. Ten rather simple stock questions were asked, and the questions were always the same. You passed your code test — or, more often, swore that you could if called on to prove it — and that was that.

To-day . . .  

things are mighty different. When you step up for that examination (and you have to step up; there’s no getting out of it, unless you’re in the remote wide stretches and even then the exam is just as hard) you may be asked any ten of a group of hundreds of questions — all different, and all difficult. You have to know your stuff to get an amateur license these days. Requirements have been stiffened; the art has broadened, branched out, increased in complexity. Amateur radio of today is a far more complicated and involved affair than it was ten years ago; you have to be able to keep up, if you expect to join the race.

Now . . .  

There’s only one sure way to guarantee yourself that 1934 speed. There’s only one sure way to insure yourself the knowledge, the ability, the technique required to pass that stringent present-day license examination. That sure way is to use the A.R.R.L.’s complete Course of Study for the Would-Be-Amateur:

**HOW TO BECOME A RADIO AMATEUR**
(No. 8 in the series entitled The Radio Amateur's Library)
A necessity for the fellow who wishes to get started right.

25c postpaid

**THE RADIO AMATEUR'S LICENSE MANUAL**
(No. 9 in the series entitled The Radio Amateur's Library)
Complete dope on license procedure, with questions and answers.

25c postpaid

(No stamps, please)

**THE AMERICAN RADIO RELAY LEAGUE**
WEST HARTFORD
CONNECTICUT
THE IMPROVED CATHODE-RAY OSCILLOSCOPE

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

- Controlled linear sweep 0-150,000 C.P.S.
- Controlled external sweep.
- Freq. locking device for sweep frequency.
- Picture centering adjustments.
- Complete component shielding.
- Unit is self contained and includes batteries and 110V-60 cycle power supply.

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

Bliley Crystals — New Reduced Prices

BC-3 mounted crystal in holder, 80- and 40-meter band ........ $3.95
RK-20's in stock ........................................... $15.00

SPECIAL THORDARSON Filter Choke

250 MA-12H. 110 ohms. .................................. $2.75

TUBES

to fit the depression pocketbook of the amateur fraternity: These tubes are first class products and carry our absolute guarantee for 90 days.

281 .......... $1.00 866 HD ...... $1.35
281 Mercury .. 1.00 203A & 211 ........ $1.15
210 — 15W ... 1.15 Graphite Anode 8.75

PLATE TRANSFORMER — two 7½ and two 2½ volt fi. windings — 750-750-160 mills ........................................ $3.50

DUPLEX POWER SUPPLY

1100v. 250 ma., 550v. 250ma. ........................................................................ $35.00

Uses four 83's in a bridge rectifier — completely filtered in both voltage legs.

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

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

KALTMAN & ROMANDER

62 Court St. Newark, N. J.

Contest, won by W1BDW and W1ACV, and the initiation in the R.O.W.H. under the very efficient master of ceremonies, C. R. Reid, and his degree team, W1EVZ, W1BGB, W1GBZ, W1EBH and Jesse Richardson. The YL's and XYL's were well looked after by Mrs. Ellsworth with shopping tours and theatre parties.

Several manufacturers had very fine displays. The five-meter set kept perfect contact with the station on top of Wilbraham Mountain. Every state in New England was well represented, with Massachusetts and Connecticut having the largest delegations. New York, Pennsylvania, Virginia, and Canada also had a number of delegates. The "ham" coming the greatest distance was ZL1FQ, who enjoyed himself hugely.

At the banquet, Director Bailey, in his capacity of toastmaster, was in his glory in introducing the guests of honor, consisting of Hon. Mayor Martinez, President Maxim, Sec'y Warner, the latter two receiving quite an ovation; Major Platt, Lieut. Reinartz; Ensign Green and Director Fuld from the Hudson Division. There is no doubt that the large attendance was due to the fine advance publicity work of Walter Deane, W1SB, who made use of the Yankee Net Work and many newspapers.

But we must not forget the two clubs, which sponsored this convention—The Springfield Radio Association and The Western Massachusetts Amateur Radio Association, and the convention committee: W1BVP, W1APL, W1DJB, W1CCH, W1BVR, W1ASY and the chairman, W1BSJ, to whom a big vote of thanks goes. On to Worcester in 1935!

— A. A. H.

Experimenters' Section

(Continued from page 39)

Metering Individual Tubes in Push-Pull Circuits

Most users of push-pull radio-frequency amplifiers, while knowing that to obtain maximum efficiency their circuits should be symmetrical, cannot tell whether or not the circuits actually are balanced because the conventional push-pull circuit does not permit measuring the plate and grid currents of the individual tubes.

The circuit of Fig. 7, in use at my station for some time past, provides a quite satisfactory method for determining whether or not balance
FRED H. SCHNELL
Former Traffic Manager, A. R. R. L., owner of W9UZ, and
famous radio pioneer, says

"This GRUNOW Licks 'Em All for World Reception

"It gets foreign stations other sets miss — makes world reception easier than ever before. It’s a real professional’s set.

"I’ve spent my life in radio development. I know what every well-known radio can do. And this Grunow licks them all. Designed and engineered correctly, it’s in a class by itself — at the top."

You’re right, Mr. Schnell! Leading radio engineers and amateurs are buying this amazing new Grunow for their own use — because it has the real professional features that experts know you have to have for real results.

The Signal Beacon (beat oscillator station finder) — the sensitive tuned r.f. pre-amplifier operating on all four wave bands — the two-speed split-hair tuning control — the built-in double-doublet antenna circuit with automatic antenna selector — these are just a few of the professional features that make this Grunow the choice of men who really know radio.

Hear and tune the Grunow yourself. You’ll get a real kick out of its performance, and you’ll be delighted at its price. Do it today.

Grunow All-Wave Model 750. A real go-getter with complete coverage from 550 to 21,700 kc. Has Signal Beacon beat oscillator, tuned r.f. pre-amplifier on all wave-bands, and all other Grunow advancements. One of 16 wonderful new Grunow models.

Grunow
ALL-WAVE RADIO
PRODUCT OF GENERAL HOUSEHOLD UTILITIES CO.
2650 N. Crawford Ave., Chicago
Say You Saw It in QST — It Identifies You and Helps QST
is being obtained, as well as indicating the operation of both tubes. It is necessary that both grid and plate coils be split, which offers no particular constructional difficulties. In capacity-coupled circuits individual grid-current measurements are quite simple, since the ordinary arrangement calls for separate grid chokes. A single meter can be used for all measurements if an appropriate plug-and-jack system is installed.

— F. J. Homsher, W3AXR

Editor's Note.—Despite the fact that series feed is used in both plate and grid circuits, the r.f. chokes shown in the d.c. leads in W3AXR’s diagram should not be omitted. The full tank current flows through the mica condensers inserted in the centers of the coils, and the chokes are needed to prevent power-supply or other connected apparatus from trying to act as part of the r.f. tank. This was discussed by Charles S. Lindl in the Experimenters’ Section in October, 1932, QST.

Amateurs Undertake Ocean Flight

(Continued from page 48)

antennas may be used for transmission. Signals of maximum strength have been heard from KHMZA on 5515 kc., well up to 1000 miles. As contact with U.S.A. will be hoped for at all times, look for KHMZA on the higher assigned frequencies or close to the 14-me. band. An Omniscript with disc sending, “VVVVV DE KHMZA KHMZA KHMZA” will be used while in flight so amateurs can follow the plane at all times. This will be interrupted for the first 15 minutes of every hour when contacts with amateurs will be made. From time to time Wilson will send back word of those amateur stations with the best and most consistent signals. Direct schedules will be kept with these stations if possible.

Dr. Light, U. S. Army-trained pilot, expresses great hope for amateur contact as a method of communication. In every sense this flight is strictly amateur, with no commercial affiliations of any nature. Bob Wilson will be remembered by many who have contacted WLYU in the past four years. An excellent operator on land; the conditions should not be altered, as Wilson has his “bug” fashioned to the ship in a mighty comfortable position.

As this is written KHMZA is at London, England. Schedules are being arranged with G2BM and G2ZQ among others so that word of their progress will come back to the States via ham channels. The 8340-ke. frequency has proved most effective to date.

As the flight progresses Official Broadcasts will carry the latest news as well as calls of stations putting the best signals out to KHMZA. Send all reports to A.R.R.L.

— C. C. R.
PROPHECY NUMBER ONE—CLANG!!

We certainly "rang the bell" when we predicted the 1935 season would be rack and panel. The immediate widespread acceptance of our new line of modern constructional accessories certainly proves that amateur gear will be "dressed up" as never before. All the dope is in our B-73 bulletin.

PROPHECY NUMBER TWO?

The transmitter of tomorrow will be screen grid throughout.

WHAT PRICE MODULATION

Grid? Plate? Screen? Suppressor?

Class B Heising modulation is the most economical for any given power output. Both the final cost and operating cost are lower than with any other type of grid. That's why we designed our DBS speech amplifier ($12.25) to drive our DB 46 M (25 watts at $10.25) or our DB 210 M (50 watts at $12.25) and our FB 800 M ($100 with 800's—190 watts with 830's at $22.50).

LEEDS BASES AND DEMI-BASES

can be readily bolted together to form a wide combination of chassis sizes. The cost is surprisingly low. 8" x 8½" x 2". 85c 10" x 8½" x 2½". 65c

Full size bases

4" x 17" x 2". 75c 8" x 17" x 2". $1.00 10" x 17" x 2". $1.20

EVERYBODY'S TALKING ABOUT

our new S-A Super Regenerative receiver, described in June QST. $13.75 brings you one of the most sensitive super regenerators on the market—tuning to 40! $9.75 brings you the complete kit, including drilled cabinet and sub chassis.

SYLVANIA GRAPHITE ANODE TUBES IN STOCK

American Type E.L.

Double button carbon microphone; List $10. Special . . . . . . . . . . . . . . . $4.95

TRIPLETT METERS AND SERVICE EQUIPMENT

We carry the complete line of this high grade, low cost precision apparatus.

MAGNET WIRE

All sizes from No. 14 to No. 58 in enamel, double cotton, or double silk on 25c spools. Prices on larger quantities are yours for the asking.

WE CAN'T IMPROVE OUR SERVICE

SO WE ARE INCREASING ITS SCOPE

Those "thin dime" are rolling in, increasing numbers and of course they are rolling right out again as postage on twenty-five bulletin from the country's foremost manufacturers, together with our own B-73 folders and discount sheet. If you want information on the specialized equipment you need for that new rig, the encyclopedia of parts contains the most complete, accurate, detailed information on short wave equipment obtainable anywhere.

FLECHTBEIM

The complete line of high and low voltage condensers at a special discount of 50% off list.

PRICE REDUCTION ON OUR

Type 1-E Power Supply for SW-38, freqmeters, etc.

Now only... $6.50

LEEDS MP-1 three rack mounting position mixer. A quality unit that makes possible the simultaneous retransmission of two incoming phone signals, and the operators voice at any desired level...

LEEDS KP-1 rack mounting combination tone generator for MCW and vacuum tube operated relay circuit for automatic retransmission of CW telegraph signals...

ACME-Delta)

We are New York distributors. A complete stock of their line constantly on our shelves at 40% and 25% from list price.

HARD DRAWN ANTENNA WIRE

#12 tinned copper wire, 100 ft . . . 55c

#10 tinned copper wire, 100 ft . . . .85c

#12 phosphor bronze wire, 100 ft... 75c

#10 phosphor bronze wire, 100 ft... $1.25

Other lengths in proportion

LEADS the procession.

World-wide service to amateurs.

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

91
The boys on the service benches all over the land are "eatin' 'em up." No wonder... for CENTRALAB Replacement Controls are doing a keen job... and (ahem) in many cases making the original old fashioned control look like six cents in comparison. For these replacement units represent the last word in Volume Control efficiency.

The CENTRALAB patented non-rubbing contact eliminates wear and insures both mechanical and electrical smoothness of operation.

Canada—U. S. A. Contact Contest

(Continued from page 40)

PRIZES: A.R.R.L. Certificates of Merit will be awarded to the leader in each of the 69 A.R.R.L. Sections in the U.S.A. and Canada. In addition, the Utah-Carter Cup will be presented to the leading VE. The VE/W Contest Committee members will not be eligible for prizes, but may aid W stations in obtaining a higher score.

GENERAL CALL: CQ VE/W CQ VE/W CQ VE/W DE W/VE ------ W/VE ------ W/VE ------ (repeated not more than 3 x 3) K.

REPORTING FORM: Copies of logs must be received by the Contest Committee not later than midnight October 31, 1934, except in case of K6, K7 and KA.

Take part! Address your log-report to: L. W. Mitchell, VE3AZ, Chairman VE/W Contest Committee, Room 704, Northern Ontario Building, Toronto, Ont.

The form given is suggested for a contest log to be sent to VE3AZ at the end of the contest. Six vertical columns are ruled on 8" X 11" paper, as shown.

If you forget to get the name of the Section during a QSO, this can be recorded after the contest by examining the call book, the operating news in QST, etc. At the end, compute the score. Total the sixth column. Check the number of different VE or W Sections worked. Multiply the claimed score by the number of such Sections in the "other" country in which a station was contacted. To get scores on the same basis, U.S. participants will multiply their result by nine (for there are nine times as many U.S.A. Sections to be worked). Multiply again by the power handicap (1½), if you used less than 50 watts. If your station had more than one operator, submit separate logs.

Reports should be submitted as soon as possible after the contest is over. Messages handled should be kept on file for call if necessary in the case of winners, but it is not necessary to send them in—the simple tabulation or list of QSOs and computation of points claimed is sufficient. Send your report, large or small to VE3AZ.

Third C. A. Asks Amateur Help

(Continued from page 10)

upon their merits as shown by their application blanks, those who appear to be the best qualified for the job being chosen first. Fast operating although desirable is not essential. Reliability is the thing that will count the most.

Mr. E. D. Hartman, W3OK, of Bethlehem, Pa., has been appointed civilian radio aide of the corps area and has been engaged for the summer to organize the nets and have everything ready for a big start at the beginning of the season.

Any amateur in the corps area who is interested

Centralab
RADIOHOM

Central Radio Laboratories
MILWAUKEE
Filament voltage must be maintained accurately if you are to get long, efficient service from transmitting tubes. Your best safeguard is to use only a voltmeter of known dependability... and thus remove all uncertainty over voltage measurements. Here a Weston Voltmeter should be used... just as Westons should be used for all transmission needs. It is risking too much to use instruments below the proved Weston standard... Weston Electrical Instrument Corporation, 602 Frelinghuysen Avenue, Newark, New Jersey.

WESTON
Radio Instruments
THERE is a Triplett Precision Measuring instrument for every radio purpose. Their advanced design, precision construction and many exclusive features represent the master achievement of some of today’s most prominent instrument engineers. Prove their greater worth by a competitive test... learn why, more and more, they are being regarded as the yardstick of fine instrument performance... as today’s modern precision measuring instruments.

Triplett makes a Precision Measuring Instrument for every radio purpose, including Thermo-Couple Ammeters (High Frequency), Universal A.C.-D.C. Meters (Copper Oxide), Portable Instruments, A.C. and D.C. Panel Instruments. These instruments are made in several sizes: 3", 3½", 5¼". They are obtainable in these types of cases: Wide flange, projection, portable—metal and Bakelite.

The metal dials of these meters are enameled permanently white with black figures. The contrast makes for easiest-reading scales. The finest sapphire jewel bearings are used. The aluminum needle and other parts are ribbed and made unusually strong throughout. The moving coil is light in weight. The scales are extra long, uniform and easy to read. All have zero adjustments.

THE TRIPLETT ELECTRICAL INSTRUMENT COMPANY
90 Main Street, Bluffton, Ohio

Mail Today For Details!

The storm and hurricane season usually opens up on the Texas Gulf Coast about June and lasts through September. In preparation for this, the Houston Amateur Radio Club built and installed a complete station in their club quarters with the call W5DPA. The station was in operation just two days before the first serious storm, which broke down the coast near Corpus Christi in the early morning hours of July 25th, bringing down telephone lines and nearly all power lines in that section. The club secretary was roused from his slumbers by a local newspaper requesting information from the outside. W5DPA staff operators, W5ADZ and W5EI, promptly fired up the rig and succeeded in raising W5MS in Corpus Christi, right in the center of the storm area. W5ABA, Kingsville, was also looked and gave the dope from that point. All communications was on 7 mc. over about 300 miles. A reporter from each of the local newspapers was assigned to the club, and several extra editions were published, the bulk of news being furnished by W5DPA. As well as press and storm reports, many personal messages were handled. Others cooperating in the operation of W5DPA were W5BHO, W5BKW, Jim Jeffries and Bob Salter. Following the closing of W5DPA about 5:00 p.m., W5BHO went on the air at his home station and worked portable WSGDF, who was marooned at Refugio with water three feet deep in the main street and no power to go on. WSGDF, with typical ham initiative, had “borrowed” fifty storage batteries from stalled cars, thus getting on the air! Contact between W5BHO and WSGDF was maintained until midnight, many important messages being handled.

At Corpus Christi, members of the club there maintained constant communication with many gulf coast and inland towns in addition to work with Houston. Among those on the job were W5AQK, W5BXX, W5MS, W5BEY and W5DVK (at Portland). These stations were kept on the air in spite of the fact that all antennas were swept away by the high winds.

Miscellany

In thinking of club doings getting under way again, we recall that some organizations carried out a summer program of outdoor activities, thus keeping the boys peped up and club-conscious.
HAZARDOUS flights into the Stratosphere are necessary to establish accuracy or fallacy of certain long debated theories or to discover, if possible, the existence of hitherto unsuspected phenomena.

One needs but to look about him and inquire into past performances, however, to discover a reason for the popularity enjoyed by Cardwell condensers.

Month by month and year after year as the radio art progresses, the good Cardwell finds added recognition for its efficiency and dependability. Stick to the time-proven Cardwell!

CARDWELL "STANDARD" MODELS FOR RECEIVERS and MEDIUM POWER TRANSMITTERS
CARDWELL MIDWAY "FEATHERWEIGHT" CONDENSERS, RECEIVING, and TRANSMITTING
CARDWELL 16-B TRANSMITTING CONDENSERS FOR LARGER TRANSMITTERS
CARDWELL HIGH VOLTAGE CONDENSERS FOR COMMERCIAL RADIO-TELEGRAPH and BROADCASTING STATIONS
CARDWELL S-2244 OIL DIELECTRIC FIXED CONDENSERS FOR HIGH FREQUENCY FURNACES and TUBE BOMBARDERS

Send for literature

** NOTICE: Increased manufacturing and material costs have made unavoidable increases in the list prices of MIDWAY and TRIM-AIR condensers. Therefore, effective Oct. 1, 1934, the list prices of MIDWAY and TRIM-AIR condensers will be advanced 10% over present list prices. This is the first increase in list prices ever made by Cardwell — reductions have been the rule — and other models remain, at sacrifice to us, at the reduced list prices of two years or more ago. **

THE ALLEN D. CARDWELL M'F'G. CORP.
83 Prospect Street, Brooklyn, N.Y.

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Say You Saw It in QST — It Identifies You and Helps QST
RAYTHEON TUBES for the NEW TRANSMITTER

RK-20
RF POWER PENTODE
Suppressor grid or plate modulation.
No neutralization required.
Requires only one watt R.F. or 0.2 watt audio input.
R.F. Output — 50 Watts.
AMATEUR NET PRICE — $15.00

RK-18
HIGH MU, HIGH MUTUAL TRIODE
R.F. oscillator or amplifier or Class B modulator.
Low capacities.
R.F. Output — 40 Watts.
Class B Audio Output — 100 Watts (2 tubes)
AMATEUR NET PRICE — $10.95

RK-19
FULL WAVE HIGH VACUUM RECTIFIER
For the 1000 volt D.C. power supply.
Low voltage drop.
Free from R.F. noise.
AMATEUR NET PRICE — $7.50

RK-24
NEW 2 VOLT-0.12 AMPERE TRIODE
For the portable 5-meter transmitter or transceiver.
High output with low filament drain.
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Also Raytheon Types RK-15, RK-16, RK-17 and R-866A
Ask your dealer or write for characteristic data

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San Francisco — Chicago — Newton, Mass.

Field days were most popular. The Lakewood (Ohio) Radio Club held a successful one, the week-end July 21st-22nd. Eighteen hams and a proportionate amount of fun. A 1.75-mc. phone and 7-mc. c.w. outfit were used between sporting events. The annual meeting and hamfest of Philippine Amateur Radio Association was held at KAIJR, June 24th. See photo. There were also many YLs and YFs present. A passing thought: Why not 56-mc. phone for club QSO parties? Or 160-meters? QSO parties between meeting dates preserve the fraternal touch and they’re ultra-enjoyable when the contacts are your club brothers. Common aims and common interests. Money. There’s a common interest. Dues. There’s a common aim. We aim to pay them, and the club treasurer aims that we will. Speaking of money, raffles are good money-makers and we recently heard of cake and candy sales, dances, parties, well-managed hamfests, all bring silver to the club treasury sometimes.

The Cleveland Heights Amateur Radio Club is pushing 56-mc. experimentation. W8IJP, parked in front of a cemetery, worked two-way with W8DKK. Many dead spots were reported. We bet there were! This Cleveland Club is interested in exchanging notes with other clubs on experimentation along any lines. Good dope. Clubs should keep better contact between each other. What one doesn’t think of another will. We have long harbored a big question: How many clubs have their own club houses? Their own stations? Please give us the answers for these columns. South Jersey Radio Association held another 56-mc. station hunt mid-August. Two hidden stations to locate, then an outing and ‘fest at the shore. It was great sport.

Mr. P. H. Herndon, Jr., from F.C.C. office, Sixth Licensing District, visited Nashville Amateur Radio Club, gave talk and answered questions. R. L’s are always interesting club speakers but busy men. A drive for more licensed amateur members has been started by Bluffton (Ohio) Amateur Short Wave Radio Club. They spend half hour each meeting teaching code. Several prospects are already making progress.

The second annual Inland Empire Hamfest held June 9th-10th by the Radio Operators’ Club, Spokane, Wash., was very successful with registration of 182. The Connecticut Brasspounders Association annual banquet fulfilled the expectations of all for a “very FB” affair. We understand the clubs of the San Francisco area are considering a federation. Much like the successful Southern California group. The Tri-City Amateur Radio Club (Davenport, Iowa) helped a sizeable bunch of their members join A.R.R.L. by advancing money on deferred payment plan. The money was proceeds of a hamfest. The Wichita (Kansas) Amateur Radio Club is fast heading for the 100% mark in members who are also A.R.R.L. members. Clubs can do much for amateurs locally by...
Chapter I outlines the story of Amateur Radio — its start, its difficulties, its accomplishments; of the formation of the League to protect and preserve the rights of amateurs. Chapter II explains in detail how to get started in this finest of hobbies. Chapters III & IV, in simple language, explain electrical and radio fundamentals. Chapter V is devoted entirely to receivers. It contains circuits with complete constructional details and makes comparisons of the various circuits. It is full of constructional tips. Chapter VI recognizes monitors and frequency meters as essential parts of the equipment and tells how to make various types; how to calibrate them, and how to use them properly. Chapter VII covers transmitters, the most important part of a station. Self-excited and crystal-controlled; what ones to build, how to build them, how to tune them, and countless other helpful things, are all here. Chapter VIII, headed "Radiotelephony," covers the particular problems of 'phone transmitters and their operation, thoroughly and completely. Different types of modulators and amplifiers are shown and attention called to their various advantages. Chapter IX, written by pioneers in the Ultra-high Frequency field, points out the unusual circumstances to be found and gives the necessary information to build complete transmitters and receivers for use on frequencies of 30 megacycles and up. Chapter X treats of the vital subject of power supplies. Largely upon your power supply depends the quality of your note. Here you will find power supplies designed especially to meet your particular needs. Chapter XI tells you how to prevent and cure various types of interference. It considers broadcast reception interference, and suggests the best keying methods. Chapter XII, on antennas, is packed with useful suggestions of how to best meet this frequently bothersome problem. The best of transmitters cannot make up for a poor antenna. The solution to your antenna difficulties will be found in these pages. Chapter XIII suggests various station arrangements both for the fellow who has plenty of room and the fellow whose space is limited. Chapter XIV explains the workings of the League's Communications Department. It tells of its aims and purposes; of its extensive field organization and how you may take part in all its activities. Chapter XV gives full instructions on the best operating procedure. From the calling of a station to the keeping of a log, it is all covered. Chapter XVI tells how messages should be handled, the correct form, and the restrictions governing message handling. In addition to these chapters there is an appendix full of useful data such as international prefixes, list of "Q" signals, commonly used abbreviations, and many useful charts and tables. In wealth of information (260 pages) and its 224 illustrations, the HANDBOOK is a big book.

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THE AMERICAN RADIO RELAY LEAGUE
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Harvey offers for your approval

Type HF-3 Receiver

A three tube non-radiating unit employing the latest tubes in an efficient circuit. Additional plug-in coils permit full coverage from 5 to 10 meters. Filament requirements — 6.3 volts AC or DC.

5-10 Meter Transmitters

Type MO-71 with 2-3 watts output and Type MO-45 with 9-10 watts output. Both types are class B modulated and extremely stable in operation. Either unit wired and tested for 56 MC. complete with tubes. $29.50

RR-20 Power Amplifier as described in QST for August. complete with two tested tubes and coils for one band, $69.50

Transceivers for 56 MC. work 2-volt, $18.75. 6-volt, $17.95

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Universal model "G"

A completely assembled, ready-to-use condenser microphone unit — All A.C. operated — Nothing to add — No batteries or battery expense; yet guaranteed as silent as batteries. Just plug into 110 v. A.C. 50-60 cycle socket and be assured of trouble free, full-satisfaction performance — 2 stage amplifier with No. 230 tubes — barometric adjustment — temperature compensator — shielded diaphragm — Frequency response 70 to 7,000 cycles — Engineered by Universal to guarantee maximum results at the lowest price consistent with Universal standards.

Dealers Net Cash $49.39

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issuing a ham news sheet. . . . We are interested in compiling a list of club bulletins. . . . Does your club have one? . . . Activities Managers: Why not line up your clubs for intra-club competition in national contests this season? . . . It adds interest. . . . Secretaries: Let us hear from you soon with some good dope on your clubs. . . .

Visit the Clubs

One good feature of the majority of ham clubs is that they don’t require a visiting ham to produce a long list of credentials before entering the club portals. By and large, any ham is welcome at any ham club, so don’t be bashful about dropping around to your local society. Clubs are splendid places to get acquainted with other amateurs and to participate in interesting discussions on amateur radio. At headquarters we have recorded the addresses of the several hundred amateur radio clubs affiliated with A.R.R.L., their places and times of meeting. Do you want to be put in touch with a club in your vicinity? Would you like to attend a club meeting in another city you are visiting? Address the Communications Manager (enclosing 3¢ stamp, please) for data on Affiliated Clubs in your vicinity.

— E. L. B.

Amateur Radio in the U. S. S. R.

(Continued from page 98)

trical work. Code speed must be 16 words per minute, but this is reduced to 10 in the case of workers in productive industry and party members. Operation may be on 5, 10, 40, 80, and 160 meters with 40 watts in the antenna. By special permission of the C.B.S.K.W., 20 meters may also be used. There are no time or power supply limitations. This category contains about four fifths of the amateurs of the Soviet Union.

The examination for the first or highest category requires, in addition to the material demanded for the second category, a more fundamental knowledge of tube operation, tube characteristics and parameters, and the use and operation of quartz crystals. Included are also questions on electric motors, dynamo machinery, and even on the internal combustion engine. An amateur applying for a telephone license has additional questions on modulation and microphones. A note in the examination program requests that the examiners refrain from giving catch questions—not a bad idea on any exam. The first category, which takes in about 14 percent of the amateurs, carries privileges of operation on 5, 10, 20, 40, 80, and 160 meters and the use of up to 100 watts in the antenna. Time of work is unlimited. Further, these amateurs acquire the right to take part in polar and other scientific expeditions of All-Union importance and the right of teaching in all courses organized by the Society of Friends of Radio. These societies hold regular meetings during the winter.
Starting with raw Brazilian quartz of the highest quality obtainable, Bliley's modern manufacturing methods produce the finest crystals possible. Over 20 separate inspection tests insure perfect operation of every crystal that leaves the Bliley plant.

That's the reason why Bliley crystals are backed with a guarantee of satisfaction. That's the reason, too, why thousands of amateurs all over the world depend on Bliley Crystals for frequency stability and high power output.

Type BC3 mounted crystals in the 3.5 and 7.0 Mc bands having a precision of .03% supplied within 10 Kcs or any frequency from distributor's stock, $3.95 — to exact specified Kc at slight additional cost. Bliley Crystals are sold by all progressive distributors of amateur equipment. If our distributor doesn't have your choice in stock, he can get it for you quickly, order from him. Bliley Electric Company, 208 Union Station Building, Erie, Pa.

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Both systems have noise-reducing properties on wave lengths from 5 to 600 meters impossible of attainment by other systems. No tricky spreading, cumbersome metal tubing or masts. Installation is simplicity itself. One system is a complete kit; the other can be used with any existing aerial. INVESTIGATE

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If you're wise you'll get your SPEED where the champions got theirs and prepare for that Amateur or Commercial Ticket the CANDLER SCIENTIFIC WAY. It's EASY and INTERESTING.

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See page 116

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A Plug-in, dustproof holder included with each amateur band crystal purchased. PRECISION Crystals are of the highest quality obtainable. Only after they have undergone a most rigid test and check up to the requirements of an A1 crystal are they sent out to you with our guarantee of the finest obtainable.

PRECISION Crystals are X cut, one inch square from the finest quality of Brazilian quartz and carefully ground for maximum power output. They will be supplied to your specified frequency accurate to 0.1% and calibrated accurate to within 0.3%. It will pay you to buy these quality crystals. 1750 and 3500 kc. bands—$4.50 ea., 7000 kc. band $5.00. (Above prices include holder illustrated.) Holder alone—$1.50. Jacks to plug holder into—.15 pair. (The holder will plug into a 3 prong tube socket when the springs are removed from the plugs.)

Crystals and covers for commercial use quoted on your request. When ordering our product you are assured of the finest obtainable. Now in our 5th year of business.

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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.

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"Your present NATIONAL or HAMMARLUND will be accepted as a partial payment"

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PATTERSON—RME9—COLLINS TRANSMITTERS—ROSS JUPITER—McMURDO SILVER 5C—RCA DEFOREST—THORDARSON—GROSS and Many Others

Send for complete details at once, stating your needs

DELWARE RADIO SALES COMPANY
405 Delaware Avenue Established 1920 Wilmington, Delaware

IN STOCK

the new PATTERTON PR-12
latest 12 tube S.S. amateur receiver with all latest features at a very low price. Write for full information.

AND

the new NATIONAL HRO
10 tube S.S. amateur receiver with revolutionary improvements shown pages 71 and 72 of this QST at 40% off the list prices.

TRADE IN YOUR RECEIVER ON THE LATEST MODEL
Also all other National, Comet Pro, RME9D, Silver, and Skydive receivers and all other amateur apparatus at the lowest wholesale prices. We buy, sell, trade used apparatus in good condition, too.

Every inquiry and order is personally attended to by Robert Henry, W9ARA; an active amateur for ten years; an E.E. from M. I. T.; and owner of Henry Radio Company selling amateur apparatus for six years. Your orders are valued and appreciated. Write for any information.

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Radio Operating
Radio Servicing—
Prepare for the new Government Radio Operating license examinations; Radio Operator, Marine and Broadcasting, Also Radio Amateur Telegraph and Telephone. Resident courses.

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A TRANSMITTER-RECEIVER—
FOR THE 56-60 MC BAND

WITH SPACE FOR ALL BATTERIES INCLUDING 150 VOLTS FOR "B" SUPPLY

Another new Haigis Circuit — Well designed, — Ruggedly Built — Carefully Tested — Leather Carrying Handle — Card holders for field notes or log. Uses a 30 and a 33.

COMPLETE INSTRUCTIONS
$13.50 NET

TYPE AM DELUXE MODEL
with all its additional features — capable of supplying 100 amp. to Antenna — As previously advertised in QST.

$19.20 NET

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MAPLE SHADE, N. J.
THE NEW ELECTRAD CATALOG includes the latest developments in Resistors and a remarkable new replacement Volume Control, built on a radically improved engineering principle.

A copy FREE FOR THE ASKING

Write Department Q-10

---

LOOK!!!

We will let these bargains do the talking for us

Thordarson 216 Transformer
2-7½ volt @ 2½ amper. 1-3 volt @ 1 ½ amper. 250-500 VA. @ 23 lbs. $1.95
Thordarson T2220
115 volt 7½ volt @ 4.7 amper. $1.95
Thordarson T1999 choke
20 H. @ 150 MA. $1.25
Chicago Transformer
2½ volt @ 10 amper. for 866's. $0.95
Thordarson T2099 choke
Double 25 H. @ 150 MA. each. $1.10
Thordarson T2624E
730 V. C.T. @ 100 MA. 2½ V. @ 3 amper. 2½ V. @ 9 amper. 5 V. @ 2 amper. Static shield... $2.45
Thordarson T3053B
245-345 @ 105 MA. 2½ Volt @ 12 amper. 5 Volt @ 2 amper. $1.95
15 Watt 210 Transmitting tubes @ $0.75
Corps. of America 2 mfd. @ 500 volt. Nov. 3 A $2.49
R. C. A. 800 Tube $10.00
R. C. A. 866A Tube $5.00
R. K. 29 $15.00
Sylvania $30B $10.00

These are examples of what we can furnish you. We also carry a complete line of standard brand parts. All merchandise carried in stock. No Substitutions! Four hour service! Write for new fall catalogue.

NEWARK ELECTRIC COMPANY
226 W. Madison Street
Chicago, Illinois

Dept. O John Wallace, Technical Adviser

---

Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Frequency</th>
<th>Date</th>
<th>Schedule</th>
<th>Frequency</th>
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<tr>
<td>Oct. 3</td>
<td>BB</td>
<td>W9XAN</td>
<td>A</td>
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<td>Oct. 5</td>
<td>BB</td>
<td>W6XK</td>
<td>Nov. 3</td>
<td>BX</td>
<td>W6XK</td>
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<td>BX</td>
<td>W6XK</td>
<td>Nov. 4</td>
<td>C</td>
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<td>C</td>
<td>W6XK</td>
<td>Nov. 16</td>
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<td>W6XK</td>
<td>B</td>
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<td>Nov. 21</td>
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<td>Nov. 28</td>
<td>BB</td>
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<td>BB</td>
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<td>A</td>
<td>W9XAN</td>
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Standard Frequency Schedules

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<th>Time (p.m.)</th>
<th>Freq. (kc.)</th>
<th>Time (p.m.)</th>
<th>Freq. (kc.)</th>
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<tr>
<td>3:00</td>
<td>7000</td>
<td>4:00</td>
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<tr>
<td>3:08</td>
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<tr>
<td>3:16</td>
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<td>3:24</td>
<td>7300</td>
<td>4:24</td>
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<tr>
<td>3:32</td>
<td>7400</td>
<td>4:32</td>
<td>7400</td>
</tr>
</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.

WWV 5000-KC. Transmissions

The 5000-kc. transmissions of the Bureau of Standards' station, WWV, are given every Tuesday continuously from 12:00 noon to 2:00 p.m., and from 10:00 p.m. to midnight, E.S.T. These transmissions are accurate to ½ cycle (one in ten million).

Silent Keys

It is with deep regret that we record the passing of these amateurs:
Frederick E. Foggin, W1DAI, Melrose, Mass.
Mrs. Eva G. Hines, W0JZT, Aurora, III.
John Riddoch, W2BOQ, Pleasantville, N. Y.
THE RADIO SHACK

PURE DC WITH

PYRANOL TRANSMITTING CONDENSERS

2 MFD-2000 V.

THE RADIO SHACK

$2.50

TRIAD TUBES

210 ............. $1.25
231 ............. 1.25
250 ............. 1.55
83 ............. .55
46 ............. .60
841 ............. 2.50
SYLVANIA 210 .... 5.75

5-METER SPECIALS

Audio Trans. with mike winding ......... $1.20
Output Trans. .................................... .90
4P D.T. Switch ................................. .84
SICKLES 5-Meter KIT ......................... 1.20
KENYON K.R. 79 and 79M, each .... 1.50

Blyley Mtd. Xtal. ....................... $3.95
New Low Price. . ................. 1.75
866’s H.D. .................... $1.69
2½ V-12 Amp TRANSFORMER ... $1.25
for 866’s........................... V.T. 203A .......... $9.00

TRIAD TUBES

210 ............. $1.25
231 ............. 1.25
250 ............. 1.55
83 ............. .55
46 ............. .60
841 ............. 2.50
SYLVANIA 210 .... 5.75

HAMS — Broadcast Stations and Laboratories, note: these will not be available for long.

TRIAD TUBES

210 ............. $1.25
231 ............. 1.25
250 ............. 1.55
83 ............. .55
46 ............. .60
841 ............. 2.50
SYLVANIA 210 .... 5.75

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83 ............. .55
46 ............. .60
841 ............. 2.50
SYLVANIA 210 .... 5.75

HAMS — Broadcast Stations and Laboratories, note: these will not be available for long.
GET READY FOR FALL!

Put new pep into your "rig" before the big transmitting season starts!

When things start humming this fall, you will want to join the ranks of amateurs using the new THORDARSON Super Power Equipment. Whether you are planning to use a full kilowatt of power or a tiny transceiver for five-meter work, you will find the new fall THORDARSON line is more than complete—it introduces many important innovations in transformer equipment that will give you more distance per watt and more watts per dollar.

JUST OUT!
The new fall 1934 THORDARSON Catalog No. 343-A is now ready. It shows an even more complete line of Transmitting Plate, Filament, and Audio (Class A and B) Transformers. Ask your jobber or mail the coupon today for your FREE copy.

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Thirty-two pages of worth while data! Contains circuit diagrams for modern, complete transmitters employing newest tubes in improved circuits. Mail 10c in stamps for your copy FREE from your jobber with an order for THORDARSON Transformers, or send coupon below for full details of the new complete line of THORDARSON Public Address and Sound Amplifier Equipment.

NEW SOUND EQUIPMENT

Write for FREE Fall Catalog

THORDARSON
ELECTRICAL MFG. COMPANY
500 W. Huron St. Dept. B Chicago, Illinois

Please send the following new THORDARSON Literature:
□ FALL 1934 Transmitting Catalog No. 343-A (FREE)
□ THORDARSON Transmitting Guide No. 344 (10c enclosed)
□ New FALL Receiver Replacement Transformer Catalog No. 344-A (FREE)
□ Sound Amplifier Equipment Catalog No. 345-A (FREE)

Name ____________________________
Address ____________________________

A New System of Reports
(Continued from page 19)
to copy through atmospherics. If fading is bad a report can be sent thus, "Ur RST 3 5/2 8." This shows that the signal fades from "very strong" down to "weak," making reading difficult, despite a good d.c. note. After the system has become well established the sending of "RST" before the numerals can be dispensed with, if desired. However, until such time, the sending of "RST" before the numerals is strongly urged, so that the listener may know what

Ultra High Frequencies
(Continued from page 15)
CKV, Lowell; GMT, Newton; FZU, Fall River; DPW, Maynard; AIP, Fall River; HMA, Brockton; IFC, Worcester; DEI, Natick; KII, Weston; ZJ, Worcester; DPP, Concord; FEM, Danvers; IFB, Lawrence; AKE, Lowell; DDM, Framingham; XZ, Seabrook, N. H.; ACH, West Newton; BME, Medford; ZO, Medford; HTR, East Walpole; EAQ, Beverly. We also express our thanks to W1GUY and W1HDQ of Springfield, who spent many hours testing and observing on our behalf.

A PLEA FOR HELP

Now, all of this work is fine in its own way, but it is taking place, at present, in only one locality. What we want and want pronto, are enough fellows to duplicate these antennas so that we can begin to get observations over wide areas. How about some of you 50-me. enthusiasts in other parts of the country getting into this so that we can begin to go places. We are getting results in our part of the country and getting them sufficiently consistently to lead to a strong suspicion that the rest of the gang can do similarly. Cleveland to Columbus is about the same distance; so is Columbus-Cincinnati, and Pittsburgh-Cleveland, and scores of other cities we can think of. For all we know, the range is actually much greater than our 130-odd mile maximum; Boston is as far away as our beam goes before it hits the Atlantic. We have no reason for thinking that the signals are not good for another 50, 100 or 200 miles more. That's where cooperation from you, gang, is needed. Get going and find out just what all this means and what we can do about it. And how about beginning to work up some inter-city trunk lines and maybe even a trans-con! It may be impossible, but we should at least find out. A flock of directive antennas with some real effort and reports of all work being sent in here to Headquarters will enable us to get at the bottom of the matter in short order. We've always said that we hams have the advantage in such experimental work because of the great number of stations we can enlist in a given project. Here's one that offers all sorts of possibilities. Get going, gang!

3 As we go to press, an R6 report is received from W1EWN at Portland, Me.—200 miles or so.—Editor.
MID-WEST RADIO MART offers you FREE WORLD'S LARGEST SHORT-WAVE CATALOG

Get this complete listing of every worth while short-wave part and receiver, including full data on NATIONAL, HAMMARLUND, RCA DEFOREST, THORDARSON, RAYTHEON, WESTON, ELECTRAD, AEROVOX, and countless others.

Be sure to see the hundreds of remarkable values it offers before buying your fall equipment!

MID-WEST RADIO MART
520 S. State St., Chicago, Ill.

Rush me a copy of the big MID-WEST RADIO MART Short-Wave Equipment Catalog with the public address supplement.

Name
Address

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; 160 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 40-page catalog. Investigate. New classes every six weeks from Sept. 19th. Open all year around.

MASS. RADIO SCHOOL, 18 Boylston St., BOSTON

ONE OF AMERICA'S LEADING RADIO SCHOOLS

CANADIAN AMATEURS
Have you received your 1934-35 Catalogue of HAMMOND Transmitting and Receiving Equipment?
IF NOT, WRITE TODAY — IT'S FREE.

Over 400 Stock Items
Mic. Line and Interstage Audios, Class "B" Inputs and Outputs, Plate and Filament Transformers, Input and Filter Chokes, Replacement Transformers, Wirewound Resistors, R. F. Chokes, Racks, Panels, etc.

MADE IN CANADA
HAMMOND MANUFACTURING CO.
GUELPH, ONTARIO, CANADA

WIRELESS and TELEGRAPH INSTRUMENTS
Signal Wireless Keys and Wireless Practice Sets and Telegraph Instruments are built to scientific specifications — and are used by amateurs and commercial operators the world over. Lasting quality. Low prices. Send for circular showing the complete Signal line.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan

EXCELLENT
• PRECISION
• STABILITY
• ACCURACY

Wide acceptance of the Micrometer Frequency Meter dictates three new frequency ranges, plus the original amateur-band model. For any freqmeter application, investigate the MFM.

LAMPKIN LABORATORIES
146 W. McMillan St. Cincinnati, Ohio

YOU Can Learn the CODE at Home—Pass Any Code Test — Talk with Real 'Hams' at 30 W.P.M.

Use INSTRUCTOGRAPH for Best Results. Code students everywhere disappointed in trying to learn the code from a Short Wave receiver, have turned to the Instructograph with pleasing results. It is almost beyond belief how quickly you learn the code and pick up SPEED this EASY, NATURAL way. Better than a personal Instructor. No experience necessary. Instructions accompanying Instructograph make it EASY for beginners. TERMS AS LOW AS $2 PER MONTH. Rent it a month. Be convinced that the quickest, easiest way to learn the code and become a real operator is with the Instructograph. Rental may be applied on purchase price if desired. Send postcard for details NOW! No obligation.

INSTRUCTOGRAPH COMPANY
912 Lakeside Place Dept. Q-10 CHICAGO, ILL.
system is being used, and also to firmly establish the proper sequence in the sender's mind.

From the expressed opinions of many radio men and from experience gained in contacts with over six hundred different foreign amateur stations, it is my belief and hope that this new system will be favorably received by amateurs all over the world as a standard method of reporting signals. I wish to acknowledge appreciation to Mr. G. S. Wickizer, W2DOG, for many helpful suggestions during the preparation of this paper.

What the League Is Doing

(Continued from page 81)

in the telegraph division, because it has jurisdiction over all matters relating to record communication by wire, radio or cable, and to it has been assigned authority over the fixed service, the mobile service, amateurs, and almost all the others that the old F.R.C. grouped as "services other than broadcasting." Amateur radio, even though it may be telephony, operates under this division. Commissioner Irvin Stewart, formerly of the Department of State, is chairman of the telegraph division, the other members being Commissioners G. H. Payne and E. O. Sykes, the latter an ex-officio member in his status of chairman of the full Commission. Dr. C. B. Jolliffe has been named as chief engineer, and Lieut. E. K. Jett, long in charge of F.R.C. services other than broadcasting, has been renamed as assistant chief engineer for the telegraph division. Thus our affairs continue largely in the hands of those who have known us well. Commission organization is not yet complete at this writing; there is to be a division director and it is probable that an assistant general counsel will be assigned exclusively to this division. The Commission has reaffirmed all existing radio regulations as its own, and these days is devoting most of its attention to a study of the rates charged by commercial services.

A Pentode Output Transmitter

(Continued from page 87)

rig with the new tubes. The feature that seemed to cause the most interest was the extremely low excitation required by these tubes—that they could be fully excited with but 10 mils grid current for the pair!

The transmitter is now back home again, continuing its semiportable role on the 20-meter phone band on a farm just north of Boston—where the a.c. supply is from a small gasoline engine driven generator.

Strays

The velocity microphone operates to best advantage when held about eighteen inches from the mouth and when the operator is speaking in an ordinary tone of voice. If the mike is close to the mouth, lip noises become too prominent.
In 3 to 7 months we train you to secure Commercial Telegraph Second-class, and Radiotelephone First-class government licenses. Course consists of Wireless Code, Radiophone, Microphone-Studio Technique, Service, Police, and Aeronautical Radio. We are authorized to teach RCA texts. At completion of course you receive practical studio technique experience in our commercial broadcast studio located in administration building, and experience as an operator on K-P-A-C (500-Watt Commercial transmitter located on the campus and owned and operated by the college), and WPA, 4000-Watt Commercial Wireless Station. Return coupon for details.

PORT ARTHUR COLLEGE
Port Arthur (world-known port) Texas

HAVE YOU SEEN OUR NEW
All-Wave Aerial Kit?
PORCELAIN PRODUCTS, INC., Findlay, Ohio

There's More than Efficiency
in TRIMM FEATHERWEIGHT
HEADSETS
The scientifically designed cap and the lightweight feature allow the phones to be worn "on the ear" for hours without fatigue.
Your Jobber can supply you.
TRIMM RADIO MFG. CO.
The Pacemakers in Headphone Development
1528 Armitage Ave.
Chicago, U. S. A.

NEW... BETTER
JOHNSON THRU-PANEL INSULATORS
Unusually high mechanical strength and freedom from breakage. High insulation value and long leakage path. Low Absorption, highly-vitrified glazed porcelain. Suitable for radio frequency and high voltage low frequency insulation. Millied nuts and nickel plated hardware.

STAND-OFF INSULATORS ORIGINATED by JOHNSON
There's a JOHNSON Stand-Off Insulator for every purpose — with the high quality that reflects our 10 years of experience in their manufacture and development. Full range of Sizes and Types. These and other JOHNSON products are available from your regular Distributor.
E. F. JOHNSON COMPANY
Manufacturers of Radio Transmitting Equipment
WASECA, MINNESOTA, U.S.A.
HAM-ADS

(1) Advertising shall pertain to radio and shall be of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capitulation, be made other than what would apply to make one add insertion stand out from the others.

(3) Closing date for HAM-ADS is the 25th of the second month preceding publication date.

(4) A special rate of 75¢ per word will apply to advertising with approval of our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League, advertising of bona fide surplus equipment owned, used and for sale by an individual or organization having equipment for exchange or special equipment, if by a member of the American Radio Relay League, to the rate.

(5) No cash or contract discount or agency commission will be allowed.

(6) No endorsements or recommendations are made by or for any product or agency named in the classified columns.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade of the characters or the products advertised.
SELL: National SW3, 20, 40, 80, coils, power pack, speaker; Westinghouse mg. 500V, 200 mil; perfect 203A; new 211D; runs on offer on all or any part. W3GCT, 2 S. Hanover Ave., Margate City, N. J.

TRANSMITTERS manufactured to order. Transmitters reconstructed. Holmes C. Miller, Box 105, Palo Alto, Calif.

FOR sale—1 kw. transformer, 2000, 2500, 3000 each side, $1. 500 watt 1100-1500 each side $7. 15 henry 500 mil choke, $10. Westinghouse 500V, 200 mils; perfect 203A; new 211D.

CRYSTALS—unconditionally guaranteed. 80-100. 1” x 1” within three kilocycles, $1.95. Standard holders, 75¢. W2DBQ, 1104 Lincoln Place, Brooklyn, N. Y.


CRYSTALS: approximately 1”, 80 or 100 meter band, $1.25; near specified frequency, 99.8% accurate. Dust proof holders, $1. Holmes C. Miller, Box 105, Palo Alto, Calif.

QSTs for sale. November 1927 to October 1933, 72 consecutive issues. Make offer. W6CRC.

TRANSMITTERS manufactured to order. Transmitters reconstituted. A. Lukach, 35 East 84 St., New York City.

RECEIVERS, Patterson, National, Hammarlund. Lyon-Wyatt Radio, Wichita, Kansas.

LATEST standard air-tuned Hammarlund Pro, also Scott DeLuxe both receivers practically new and complete. First class in every respect. Write Glenn Watt, Chanute, Kans.

SELL: 450 watt 75 or 160 meters phone. 8/H final, 03A class in every respect. Write Glenn Watt, Chanute, Kans.

ED WILCOX now offers
McMurdo-Silver's famous 5C
SINGLE SIGNAL SUPER

"In my opinion, McMurdo-Silver’s 5C Professional Single Signal Super is away out in front of all competition. It’s the choice of many who have tried them all. I offer the 5C on the most interesting easy TIME PAYMENTS you ever heard of. Write me at once for complete technical details of the 5C ... and for particulars of my time payment offer for Chicago Amateurs. Hurry!"

WILCOX RADIO SALES
506 S. Webash Ave. Phone Webster 4101 Chicago, U.S.A.

Say You Saw It in QST — It Identifies You and Helps QST
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 to purchase.

 Patronize the dealer nearest you—

**ALLENTOWN, PENNSYLVANIA**
Radio Electric Service Co.
1024 Hamilton Street
Complete stocks transmitting equipment

**Baltimore, Maryland**
Radio Electric Service Co.
303 W. Baltimore Street
Everything for the amateur

**BOSTON, MASSACHUSETTS**
Nutter & Cross Inc.
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All OMs, OWs, and YLs welcome—W1HRF

**BROCKTON, MASSACHUSETTS**
Ware Radio Supply Company
913 Centre Street
Hammarlund, Sylvania, Ohmite, Raytheon, Triplett Meters

**BUFFALO, NEW YORK**
Dymac Radio
359 Capen Blvd.—Tel. Univ. 9380
Complete Stock Amateur Parts—Standard Discounts—WBAWK

**BUFFALO, NEW YORK**
Kronson Service Company
143 East Genesee Street
Western New York’s largest wholesale distributors—W8EHF

**CHARLOTTE, MICHIGAN**
General Engineering Corporation
Everything for the Transmitting Station

**CHICAGO, ILLINOIS**
Allied Radio Corporation
833 West Jackson Blvd.
Complete standard lines always in stock—W9NRV—W9RZI

**CHICAGO, ILLINOIS**
Chicago Radio Apparatus Company
415 South Dearborn Street (Est. 1921)
"CHI-RAD" Operating W9RA and W9PS—Amateurs since 1909

**CHICAGO, ILLINOIS**
Mid-West Radio Mart
520 S. State Street
All standard lines carried in stock

**CHICAGO, ILLINOIS**
Newark Electric Company
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Chicago’s oldest radio parts store—established 1921
John T. Wallace, Technical Adviser

**CLEVELAND, OHIO**
Northern Ohio Laboratories
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Wholesale Distrib. for National, Hammarlund, Thordarson, Cardwell

**CLEVELAND, OHIO**
Radio Servicemen’s Supply Co.
906 Prospect Street
Wholesale Distributors catering to Amateurs, Dealers, Servicemen

**DENVER, COLORADO**
Inter-State Radio & Supply Co.
1639 Tremont Place
Amateur Radio Headquarters in the Rocky Mountain Region

**DETROIT, MICHIGAN**
Radio Equipment Sales Co.
14036 Woodward Avenue, Highland Park
A complete stock of amateur, shortwave and service parts

**DETROIT, MICHIGAN**
Radio Specialties Company
171 E. Jefferson Avenue
Ham Supplies—National & Hammarlund Sets and Parts

**DETROIT, MICHIGAN**
Serlin
1419 Broadway
Detroit’s Pioneer Radio Merchants

**ERIE, PENNSYLVANIA**
Jordan Radio Laboratory
1019 East Fifth Street
Amateur, service parts, including Bitley, National, Raytheon. W8CXG

**HARTFORD, CONNECTICUT**
Radio Inspection Service Company
227 Asylum Street
Yes, we’ll take your old set in trade

**HOUSTON, TEXAS**
Straus-Frank Company
Distributors for nationally advertised amateur products
RCA-DeForest transmitting tubes

**JACKSONVILLE, FLORIDA**
Glover Weiss Co.
Radio Headquarters for Southeast
Distributors: RCA Victor, Stromberg-Carlson, Standard Ham Lines

This advertisement is paid for by the firms listed above. Qualified dealers

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

<table>
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<tr>
<th>KANSAS CITY, MISSOURI</th>
<th>ST. PAUL, MINNESOTA</th>
</tr>
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<tr>
<td>Burstein-Applebee Company</td>
<td>Lew Bonn Company</td>
</tr>
<tr>
<td>1012-14 McGee Street</td>
<td>2484 University Avenue</td>
</tr>
<tr>
<td>&quot;Specialists&quot; in supplies for the Amateur and Servicemen</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
</tr>
<tr>
<td>Radio Laboratories</td>
<td>Radio Wholesaler</td>
</tr>
<tr>
<td>1515 Grand Avenue</td>
<td>Complete Stock</td>
</tr>
<tr>
<td>Amateur Headquarters — Complete Stock — Quality Parts</td>
<td></td>
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<tr>
<th>MANCHESTER, NEW HAMPSHIRE</th>
<th>SAN ANTONIO, TEXAS</th>
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<tr>
<td>Radio Service Lab. of N. H.</td>
<td>Strauss-Frank Company</td>
</tr>
<tr>
<td>1008 Elm Street — Tel. 218-W</td>
<td>Distributors for nationally advertised amateur products</td>
</tr>
<tr>
<td>Branches — Portland, Me. and Barre, Vt.</td>
<td>RCA-DeForest transmitting tubes</td>
</tr>
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<tr>
<th>MILWAUKEE, WISCONSIN</th>
<th>SAN FRANCISCO, CALIFORNIA</th>
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<tbody>
<tr>
<td>Radio Parts Company, Inc.</td>
<td>Offenbach Electric Company, Ltd.</td>
</tr>
<tr>
<td>332 West State Street</td>
<td>1452 Market Street</td>
</tr>
<tr>
<td>Complete stock Nationally Known products</td>
<td>&quot;The House of a Million Radio Parts&quot;</td>
</tr>
</tbody>
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<thead>
<tr>
<th>NEWARK, NEW JERSEY</th>
<th>SPRINGFIELD, MASSACHUSETTS</th>
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</thead>
<tbody>
<tr>
<td>Kaltman &amp; Romander</td>
<td>T. F. Cushing</td>
</tr>
<tr>
<td>62 Court Street</td>
<td>349 Worthington Street</td>
</tr>
<tr>
<td>Drop in for an over-counter QSO</td>
<td>An amateur, endeavoring to sell good parts</td>
</tr>
</tbody>
</table>

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<tr>
<th>PEORIA, ILLINOIS</th>
<th>SYRACUSE, NEW YORK</th>
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</thead>
<tbody>
<tr>
<td>Klaus Radio &amp; Electric Co.</td>
<td>Roy C. Stage, W8IGF</td>
</tr>
<tr>
<td>707 Main Street</td>
<td>Complete stock of standard Ham &amp; BCL parts</td>
</tr>
<tr>
<td>Amateur Radio Department</td>
<td>Standard Discounts. Free technical service</td>
</tr>
</tbody>
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<thead>
<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>TORONTO, CANADA</th>
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</thead>
<tbody>
<tr>
<td>Freeland Radio Supply Co.</td>
<td>A &amp; A Radio Service Supply</td>
</tr>
<tr>
<td>5 N. 7th Street</td>
<td>101 Queen Street, West</td>
</tr>
<tr>
<td>&quot;If it's radio we hav' it&quot;</td>
<td>Canada's foremost radio supply house</td>
</tr>
</tbody>
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<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>TORONTO, CANADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Electric Service Co., Inc.</td>
<td>Wholesale Radio Company, Limited</td>
</tr>
<tr>
<td>N. E. Cor. Seventh &amp; Arch Sts.</td>
<td>1133-39 Bay Street</td>
</tr>
<tr>
<td>All nationally advertised lines in stock</td>
<td>Canada's Largest Amateur Supply House</td>
</tr>
</tbody>
</table>

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<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>TRENTON, NEW JERSEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eugene G. Wile</td>
<td>American Radio Co.</td>
</tr>
<tr>
<td>10 S. Tenth Street</td>
<td>5 N. Broad Street</td>
</tr>
<tr>
<td>Complete Stock of Quality Merchandise</td>
<td>Central Jersey's leading radio parts store</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>PROVIDENCE, RHODE ISLAND</th>
<th>WASHINGTON, D. C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 Broadway, Room 23</td>
<td>816 F Street, N.W.</td>
</tr>
<tr>
<td>Amateur Equipment — National, Hammarlund, RCA Tubes</td>
<td>Washington's largest distributor of radio parts</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>ST. LOUIS, MISSOURI</th>
<th>ZANESVILLE, OHIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walter Ashe Radio Company</td>
<td>Thompson Battery &amp; Radio Service</td>
</tr>
<tr>
<td>1100 Pine Street</td>
<td>128 Main Street</td>
</tr>
<tr>
<td>W9FIS in charge of the oldest and largest parts store in St. Louis</td>
<td>Distributor radio equipment for amateurs and servicemen</td>
</tr>
</tbody>
</table>

Say You Saw It in QST — It Identifies You and Helps QST
You Are Protected When You Buy From QST Advertisers

"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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Sylvania Type
211-C Graphite Anode Transmitting Tube.

Dear Mr. Rice:

You were interested in knowing that you of the Sylvania type 211-C carbon cathode transmitting tube with 1,000,000 hour life, hereinafter called the tube, was the only type of tube available to us at the time the order was placed.

We are interested in your report of the test results obtained with 1,000,000 hour life Sylvania Anode and 211-C type tubes in operation in the radio station 1040 WSM of the American Airlines System.

As a result of our tests of these tubes we are confident that they will meet our requirements and we will order this type of tube for replacement purposes when necessary.

Yours very truly,

[Signature]

Sylvania Graphite Anode transmitting tubes have earned high confidence in what might be termed "one of the most grueling jobs a radio tube is subjected to"—the intermittent operating conditions of airway ground station traffic.

Time has proven Sylvania superiority—not only in airway communications, but in all other fields where transmitting vacuum tubes are employed. Broadcasters and amateurs the world over are vociferously demanding the highly enduring tube service that only Sylvania Graphite Anodes can give.

Everyone should keep in step with this modern trend in transmitting tubes. The next time you order, specify Sylvania.
YOU DEPEND ON A.R.R.L. FOR YOUR AMATEUR RADIO
DO YOU SUPPORT THE LEAGUE WITH YOUR MEMBERSHIP?

For More Than Twenty Years
the A.R.R.L. has been the organized body of amateur radio, its representative in this country and abroad, its champion against attack by foreign government and American commercial, its leader in technical progress.

You Owe Your Amateur Radio of Today to A.R.R.L.

HAD IT NOT BEEN FOR THE LEAGUE

► amateur radio would never have reopened after the World War
► the swarming influx of broadcasters in 1922 and 1923 would have killed it off by legislation
► recent international conferences would have virtually wiped amateur radio from the face of the earth.

The A.R.R.L. could not have achieved these successes without the loyal support of the active amateurs of this country — without the presence of their names on its membership rolls.

YOUR name should be there. Without it, we lose your tangible support. Without it, you lessen our ability to act most effectively in the protection of your hobby.

► JOIN THE LEAGUE!

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 ..................................................
Street or Box ........................................
City and State .....................................

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

TWO STAGES PRESELECTION
TWO AIR-TUNED I.F. STAGES
CALIBRATED BAND-SPREAD
AUTOMATIC VOLUME CONTROL
FOUR-GANG CONDENSER
MICROMETER DIAL
SINGLE-SIGNAL FILTER
ET CETERA

"Et Cetera" is a big phrase, and includes many obvious essentials such as single-control tuning and C. W. beat frequency oscillator, as well as luxuries such as a Vacuum Tube Voltmeter for indicating carrier intensities and an additional model with built-in power supply (for the very few amateurs who prefer it). The National General Catalogue, bound into this magazine, describes the HRO in detail.

NATIONAL COMPANY, INC.
MIGHTY OAKS FROM LITTLE ACORNS GROW...

New RCA-955 (Acorn Type) FOR ULTRA-HIGH FREQUENCIES

At last a detector, amplifier, oscillator tube for the 110-megacycle band and higher frequencies.

The new RCA-955 is an extremely small triode, having very low interelectrode capacitances and lead inductances, suitable for operation at frequencies up to 600 megacycles.

Although small in size, the RCA-955 is rated for a maximum plate voltage of 180 volts. It will amplify, detect, and oscillate at frequencies not practical with conventional tubes.

The RCA-955 opens up new possibilities for the amateur in the ultra-high frequency bands and provides a needed tool for the exploration and practical application of these bands. Amateurs will find it useful in both low-power transmitters and in receivers, for either fixed, portable, or mobile stations. The RCA-955 is now available through your RCA deForest Distributor. Amateurs

Net Price—$3.75, connecting clips included. For complete technical information, write to: