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*Published by The American Radio Relay League*



DECEMBER  
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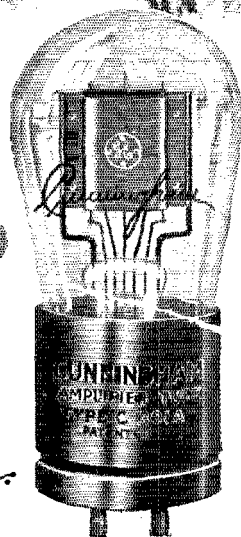
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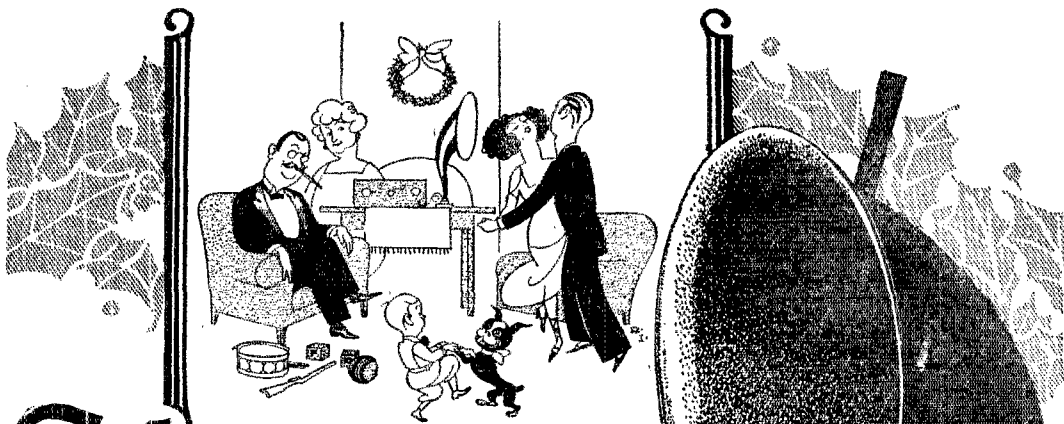
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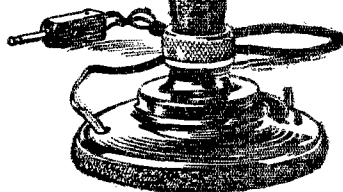


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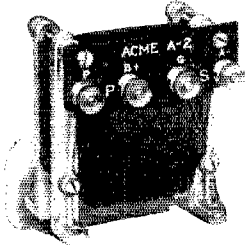
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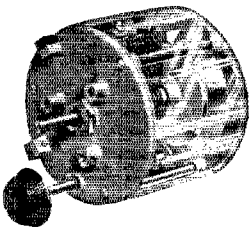
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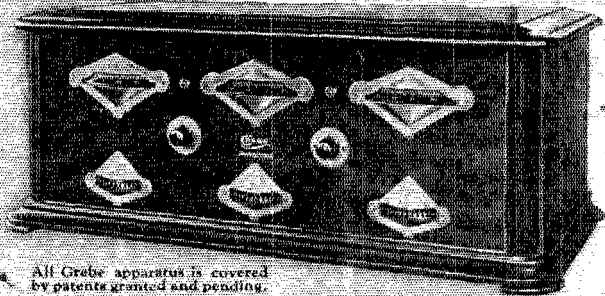
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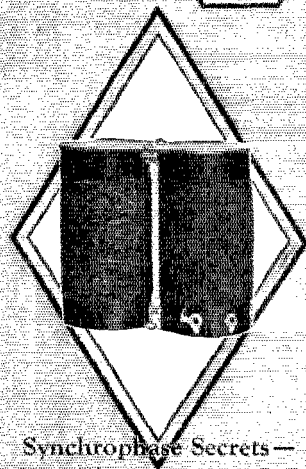
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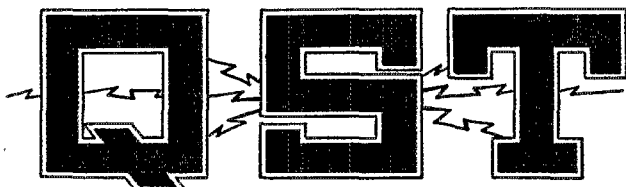


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# THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a national non-commercial association of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, for orderly operating, and for the practical improvement of short-wave two-way radio telegraphic communication.

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 America and has a history of glorious achievement as the standard bearer in amateur affairs.

Inquiries regarding membership are solicited. Ownership of a transmitting station, while very desirable, is not a prerequisite to membership; a bona-fide interest in amateur radio is the only essential. Correspondence should be addressed to the Secretary.

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# EDITORIALS

## de AMERICAN RADIO RELAY LEAGUE



### New Problems.

THE recent Washington conference went on record as favoring the discontinuance of the amateur spark. In fact it made no provision whatever for the continuation of the said spark. The Department of Commerce as far as is possible will follow the recommendations of the conference. Ergo, there should be no sparks.

The Department does not feel that it should issue an order cancelling the licenses of all amateurs possessing spark equipment, first because the 1912 law really permits their possession, and second because the situation is taking care of itself. Less than 1% of A.R.R.L. operation is now on spark; we do not believe there are a hundred active spark stations in the country. There ought not to be any. The day of the spark is past. We have said so many times in these columns, and we repeat it. The spark is selfish, and in these days of congested services there is no place for it whatever!

The conference also recommended a lowering of the minimum decrement for all spark transmitters, and their maximum limit of .1 is probably unattainable by the average station on amateur waves. That, if it were acted upon, would also put the quietus on O.M. Spark.

Bearing all these things in mind the Department of Commerce feels, and has asked us to so say, that the amateur should evince a spirit of co-operation with the Department in return for favors shown him, and get rid of the spark. We heartily second the motion. The A.R.R.L. here and now calls for the complete and immediate abolition of the amateur spark. Its day is done; let it begone. This is a civilized age and we have no place for decrement today. The Editors of *QST* have owned and operated sparks that were their joy and pride, sparks as good as most of them, and nobody knows better than we the romance and fascination of the old rotary. But its name is Mud today and out it must go, 100%.

Won't the few remaining spark-pushers please take note that they are in decidedly poor form, standing in the way of progress, losing friends at every turn, and keeping themselves completely out of the possibilities of modern DX ham radio? Junk the dern things today, O.M., and get a bottle perking tonight!

### Exit the Spark

THE decisions of the recent national radio conference create new problems for us amateurs. Broadcasting has been extended downwards until it comes right down to meet us at 200 meters. The waves below 150 meters have been carefully cut into little slices and doled out to the various claimants, so that now the whole territory is staked out and soon we will have neighbors on both sides of all our bands. Thus it becomes of paramount importance that we stay within our appointed fences. If we slop over now it is no longer the simple little matter of merely not being where we belong, with no trouble caused. Instead, we will be where somebody else wants to be, and we're certain to be pounced on in short order.

We have been given these short-wave bands more or less on trial. We have them for a year. We have had them so short a while that no one could say with any positiveness that we could not stay where we belong. If our record is black when the next Conference rolls around, we shall not fare as well. Relay broadcasting for station interconnection has been given the exclusive use of five bands of short waves. If the "bugs" in this service can be removed it is undoubtedly destined to become a most potent factor in broadcasting. The companies interested in it are not too happy at seeing us amateurs on short waves, for they fear we will interfere with them. Woe to us if we do. We can get plenty of DX without having a phone station rebroadcast us. We have plenty of territory now, and the expansion of our second band from 75-80 to 75-85.6 meters is particularly helpful. Let us all make sure that we never emit a signal outside of our authorized bands.

Prospectively we shall have a new set of amateur regulations very soon. We expect they will result in a new form of station license, under which we will all be authorized to work in any or all of our bands without special permit for each band. We expect that all transmitters will be required to use loose-coupled circuits, and that is certainly very much to be desired. That will go further than anything else we know to minimize harmonics, key-clicks and modulation ripples; the tubes will run cooler, and the filament transformers won't be so liable

to depart this life suddenly. With other services immediately adjoining ours and with B.C.L.'s fishing for low-power DX right down to 200 meters, it is essential that we adopt this. In a few months we hope it will be considered just as bad form to show a conductively-coupled transmitter circuit as it is to talk about a fixed spark-gap in the antenna circuit.

It is rather probable that under the new regulations the use of "raw A.C." on the plates will be prohibited during quiet hours, even on the short waves. If this occurs it will be because the Bunav believes our chances of interfering are too great if we have a completely-interrupted plate supply and they will want us to utilize some method whereby both sides of the cycle are employed, which means either a rectifier or a tube on each half of the cycle, preferably the latter. More about this later.

In the business of finding short waves for all the services that wanted them, our special-station band of 105 to 110 meters was lost to us and probably will be cancelled on existing licenses shortly. In this modern day there does not seem to be any particular reason for "specials" and we fear their day is done. If this is the case, however, we expect that existing stations will be permitted to keep their old "Z" calls as mementos of days that were.

Our representatives at the Washington conference were able to show that to a huge extent we amateurs are a self-governing body. Therein lay one of our chief claims to recognition. Let us keep up the good work by doing exactly what is expected of

us in the obeying of the anticipated new regulations.

## QSO Our Field Man

**W**HEN these lines are printed our A.R.R.L. Treasurer, Mr. Arthur A. Hebert, will be on his way back to Hartford on a twelve-thousand-mile trip that for two months has occupied him in the business of establishing contact with many of those portions of our League never before visited by a representative from Headquarters. It is a fine thing, such a trip as this, and we are glad that our A.R.R.L. is able to do it. We have become a big organization now, with nearly eighteen thousand members, and it is quite a problem to maintain adequate contact between Headquarters and the gang. There is a reason for everything in our affairs, and our Board of Directors, in wisely authorizing Mr. Hebert's trip, realized that every little misunderstanding that can occur in our organization is attributable to insufficient contact and interchange of ideas.

This trip of Mr. Hebert's is bound to be a splendid thing for the League, not only in the messages he can carry to our members everywhere he goes but in the data he can bring back to our Board, whereby they will be able the more intelligently to administer League affairs. We hope this may prove to be only the first of many such extensive contact missions, and that in the near future a Headquarters representative will have succeeded in getting QSO every town of size in the country.

## Last Call for Hoover Cup Entries

**T**HE last of the Department of Commerce Trophies, now authorized by Secretary Hoover will be awarded under the auspices of the A.R.R.L. to 1924's best U. S. amateur station in which the bulk of the apparatus is home-made. This is the last call for entries.

Because of the manifest impossibility of filing by January 1st an entry which contains a station log thru December 31st, the closing date has been extended to February 1st.

The rules governing the contest have been published so often that it seems unnecessary to do it again. See November 1923 *QST*. But if any amateur is unfamiliar with the rules and needs further light, write A.R.R.L. Headquarters and instructions will be supplied immediately.

This cup is worth competing for. Its possession is a big honor. The judges cannot make an intelligent award unless de-

scriptions of stations are filed with them. Overcome your modesty, fellows, and get your entries in by Feb. 1.

## Three More Cups Offered!

**I**N the January *QST* announcement will be made of three additional cups for A.R.R.L. work this winter. There will be one each for the 5, 20 and 40 meter wave bands. Competition is limited to American Radio Relay League membership.

By all means take advantage of the December and January tests to become acquainted with the extreme low wavelengths.

## Old Timers Attention!

We mean old timers—long before anyone had ever thought of a vacuum tube receiver. Please take a look at the note on page— and do whatever you can for us.

# Superheterodyne Transformers

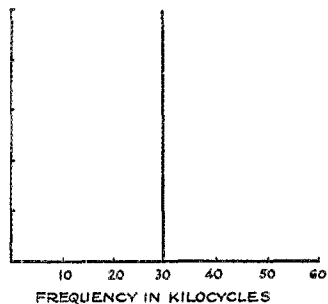
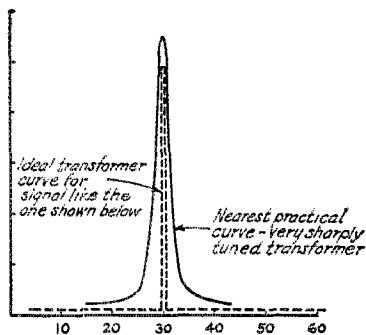
**A**IR-CORE transformers have been so much discussed in our series of super-heterodyne articles that they need not be taken up in detail here. The information may be found in the June, July and August issues.

We have gotten to thinking that all radio circuits should be tuned as sharply as possible. This is not so. Why it is not so can best be shown by a brief discussion.

Looking at Fig. 1 we see the "spectrums" of some radio signals *after* they have been heterodyned to 30,000 cycles, which is frequently called 30 kilocycles. Putting it

the signal to 30 kilocycles. What the wavelength of these signals was originally does not matter now—they have been transferred to the region in which super-heterodyne amplifiers work, and that is where we are going to discuss them.

First let us take the continuous-wave ("C.W.") signal in Fig. 1. This may be

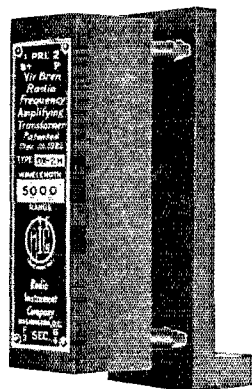


SPECTRUM OF CW. STATION (i.e. TUBE STATION WITH BATTERY SUPPLY) WHEN KEY IS HELD DOWN

FIG. 1

FIG. 1. FREQUENCY-SPECTRUM AND TRANSFORMER CURVES FOR C.W. WORK.

differently, these signals have been run through the frequency changer (oscillator and 1st detector) of a super-heterodyne receiver, so as to shift the carrier-wave of



RADIO INSTRUMENT CO. DX-2H. Peak at 3300 meters.

the carrier wave of a radiophone station (when nothing is being said into the microphone), or else it can be the carrier of a radio-telegraph station in which the key is being held down.

Evidently this is a single frequency and can be amplified perfectly well by the sharpest possible transformer. If we can equip our intermediate-frequency amplifier with a tremendously sharp amplifier this signal will be properly amplified *without* amplifying any interfering signals at the same time. This seems like a very beautiful state of affairs, and we wonder why it will not be best to equip *all* super-heterodynes with just such transformers.

As a matter of fact it is *not* best to use such transformers in all super-heterodynes—for several good reasons.

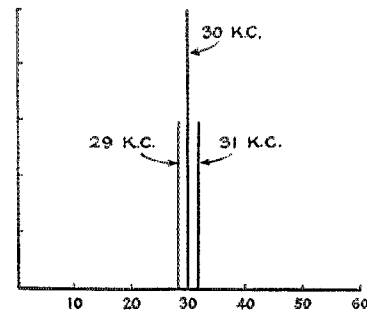
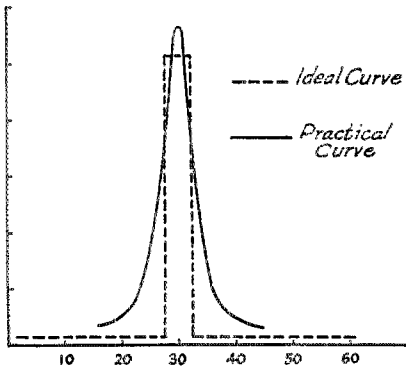
First of all—very sharply tuned transformers must be adjustable, it is simply out of the question to build them exactly matching. This is a complication.

Secondly—such transformers require special circuit-tricks to keep the whole system from oscillating.

Thirdly—and this is by far the best reason—such transformers will distort most signals most unmercifully, although perfectly OK on C.W.

**Why Sharpness Distorts**

Suppose that a 1000-cycle note is sent into the microphone of the radiophone station. If the station does not happen to be equipped for radiophone work, we can get the same effect (nearly) by using a 1000-cycle buzzer to break up the transmitted



SPECTRUM OF A TUBE SIGNAL WITH 1000 CYCLE MODULATION  
FIG. 2

FIG. 2. FREQUENCY-SPECTRUM AND TRANSFORMER CURVES FOR I.C.W. WORK.

wave. In either case the effect is that we add two "side frequencies" to the original "carrier wave". Since the transmitted note is 1000 cycles, we will find these "side frequencies" just 1000 cycles to either side of the carrier; in other words, they will be at 29,000 and 31,000 cycles, as shown in Fig. 2. Thus the whole spectrum consists of a trio of frequencies at 29,000, 30,000, and 31,000 cycles. To amplify this set of frequencies properly the transformer must be "flat topped" all the way across this region. It would not do at all to use the sharp transformer of Fig. 1, because it would totally fail to amplify the "side bands". Therefore nothing but the C.W. carrier at 30 k.c. would come through.

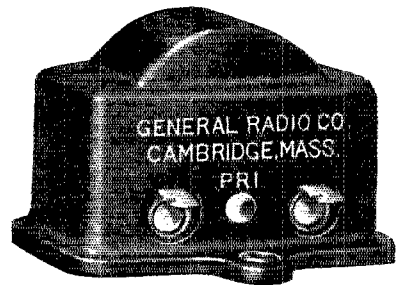
**Radiophone Distortion**

The thing is even more complex if one goes to radiophone work. Here we again have a "carrier" at 30 k.c., but this time



BRANSTON R-91.  
Peak at 5300 meters.

we are not adding a single tone. We are adding all the notes of an orchestra, including some very high notes from the piccolo and violin. Some of these notes run as high as 3,000 cycles, and their third harmonics run to 9,000 cycles. Thus the "spectrum" will consist of the "carrier" at 30,000 cycles plus two side bands 9,000 cycles wide on either side, as shown in Fig. 3. The whole thing now reaches from 21,000 cycles to 39,000 cycles—and even then we have not taken care of the higher harmonics that exist in the original tone. However, the harmonics that run above 10,000 cycles are hardly worth worrying about—most people do not hear them any too well. However, to get good reproduction of everything up to a 3,000-cycle tone



GENERAL RADIO CO. TYPE 271.  
Peak at 9000 meters.

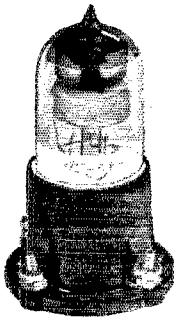
and the third harmonic of the same will require a transformer that has a "flat top" curve 18,000 cycles wide.

**The Ideal Transformer**

Of course the ideal transformer, from the standpoint of interference, would be one that just took in the side bands of the different signals (Figs. 1, 2 and 3), and then would cut off perfectly square right outside of the bands. Such curves have been sketched and labeled "ideal transformer curves". Please note that "ideal" is here meant to apply to the matter of freedom from distortion and minimization of interference only, otherwise we will wander off into a dismal jungle of confusing facts and near-facts. Let us therefore not discuss too many things at once.

**The Practical Transformer**

Unfortunately such "square cornered" curves do not happen where we are thinking of such a simple thing as a transformer. They can be made to happen (almost) when we use a filter chain, but that's a bit expensive and hardly a manufacturing proposition. The practical curve is always more or less in the nature of a hill, sloping off to both sides. Perhaps the hill is narrow, perhaps the top is broad—but in any case there are sloping shoulders that take in a lot of territory to either side. To make a transformer with such a curve work distortionlessly (or almost so at least), we must make it so wide at the top that it

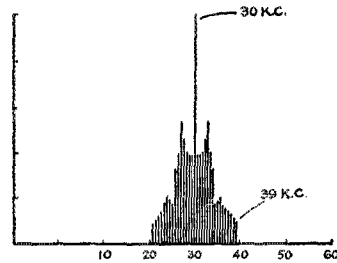
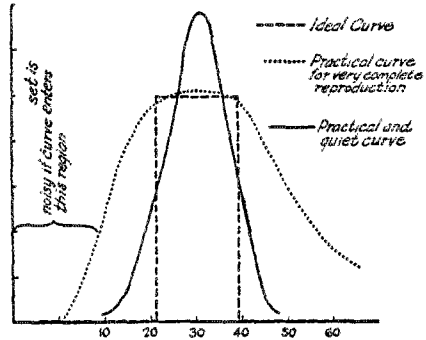


R.T. ST. JAMES AIR-CORE TRANSFORMER IN VACUUM. Peak at 1200 meters.

completely takes in our "ideal" curve before the two slopes start. Then we will have to put up with the interfering signals and noises that sneak in because of these wide slopes.

Now the important point is this: For C.W. we can make the curve exceedingly sharp, so that it comes rather close to the ideal curve; but for phone work we need a curve that is "broad as all outdoors" so that we take in a horrifying amount of

territory (18,000 cycles across the top and the slopes added to that). In some of the transformers now on the market the curves are so fearfully broad that they run down below 10,000 cycles and keep right on amplifying. In other words, they run into



SPECTRUM OF SAMPLE RADIOPHONE SIGNAL

FIG. 3

FIG. 3. FREQUENCY-SPECTRUM AND TRANSFORMER CURVES FOR RADIOPHONE WORK. ASSUMING THAT ORCHESTRA MUSIC IS TO BE HANDLED. FOR SPEECH ONLY THE CURVES OF FIG. 2 ARE OK.

the audio range and become audio amplifiers. The result is a super-heterodyne that is beastly noisy. Perhaps this will be better understood from Fig. 4, reproduced from our June issue.

However, do not for a moment consider getting rid of this difficulty by purchasing a transformer that is too sharp at the top of the peak and secures quietness by butchering off the audio end and the sidebands at the same stroke. The "ideal practical" transformer (as nearly as we have it now) is somewhere between. It is equipped with a curve with plenty of width, but it "drops dead" before getting into the audio region. To design such a transformer is no job for a "soldering copper engineer". The thing requires basic understanding of transformers. That is why the good super-heterodyne

transformers are being designed by men with an engineering education back of them, a laboratory before them, and an

very few schools which confer the degree. The man who signs himself as belonging to the radio engineering department of a commercial firm or a school is generally all right, but the self-styled "Radio Engineer"—but why continue, it is a dying tribe.)

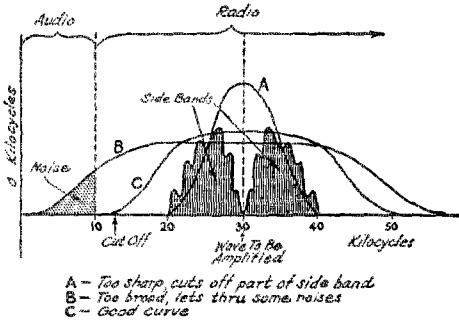
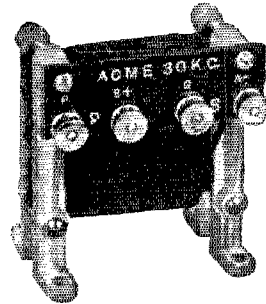


FIG. 4. EFFECT OF DIFFERENT WIDTHS OF CURVE WHEN WORKING WITH RADIOPHONE SIGNALS. REPRODUCED FROM PAGE 12, JUNE QST.

honest purpose. The super-heterodyne can be given a vote of thanks for having made the way exceeding rough for many of the numerous tribe of "radio engineers" who cropped up from nowhere these two years since. (Parenthetically—most of the men

Transformer Curves

So far we have talked as if all transformers worked at 30 kilocycles, i.e. 30,000



THE ACME "30 KILOCYCLE" TRANSFORMER. Peak at 7100 meters.

cycles at the shorter wave than does a perfectly feasible to work at a higher frequency (lower wave) with excellent results. The advantages of a 30 kilocycle transformer as compared with a 60 kilocycle (60,000 cycle) transformer were very thoroughly discussed in "A Study of Superheterodyne Amplification," in our October issue. If you care to think of it that way, these are transformers that work at 10,000 and 5,000 meters. The thing can be done at still lower wave-lengths—for instance, 1,500 meters.

Which of these is best? That can be argued about pretty extensively, and the argument is not profitable. Better refer to the article just mentioned.

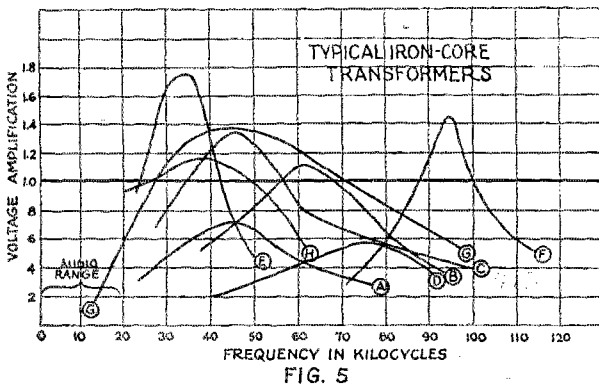


FIG. 5. TYPICAL IRON-CORE TRANSFORMERS. These curves were obtained by measurement in several laboratories and represent transformers now on the market. No attempt has been made to make these curves correspond with the photographs shown in this same article. The curves are believed to be reliable as most of them were checked by at least two laboratories. Therefore the best transformers will be those having their peaks and say, nine k. c. either side of their peaks, as high as possible and the balance of the curve as low as possible. Passable, though not really good, quality may be obtained with a high-amplification band only 4 k. c. wide.

The Shape of the Curves

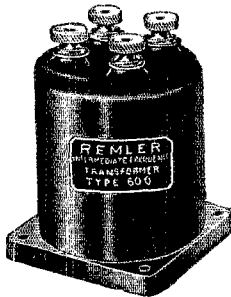
If the curves of different transformers are drawn on a wavelength scale they will not tell us anything very useful, because the short-wave transformers (1,500 meters or 200 k.c.) will seem to be very much sharper than the long-wave ones (10,000 meters or 30 k.c.), for the reason that a hundred meters will represent many more cycles at the shorter wave than does a

today calling themselves "Radio Engineer" have no right to the title, there being but

hundred meters will represent many more cycles at the shorter wave than does a

hundred meters at the higher wave. For instance—there are 12,500 cycles between 1,500 meters and 1,600 meters, but there

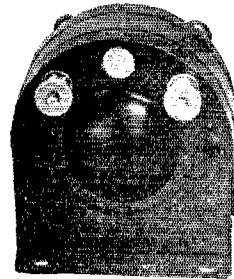
one can get along very decently with a transformer that is half as good at 3,000 cycles from the peak as it is at the peak.



REMLER TYPE 600  
Peak at 6700 meters.

**Transformer Construction**

It is a useful thing to have transformers shielded by metal cases; it prevents needless trouble between stages—provided the job has been well done. Sometimes metal cases are not necessary, because the core



GENERAL ELECTRIC CO. UV-1716.  
Peak at 7000 meters.

are only 2,700 cycles between 10,000 meters and 11,000 meters. Therefore curves that show the wavelength covered by transformers are not particularly easy to compare. It would be a mighty good thing if the makers of the things would stop furnishing these confusing curves and instead give us curves that talk in frequencies. Then we can see directly and at once if the particular transformer will cover the required territory without taking in a lot of valueless real estate in the way of additional signals that are not wanted. The

construction provides a shield, or perhaps the maker prefers to space the transformers well apart. In one make of super-heterodyne the various stages even use the same core.

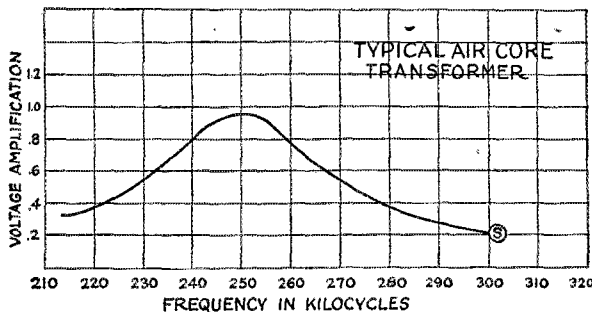


FIG. 6 REPRESENTATIVE AIR-CORE TRANSFORMER showing that air-core transformers are not particularly different from the iron-core variety. This particular transformer works at fairly high frequencies but similar curves are obtained with larger transformers. Sharper curves require careful construction to secure uniformity.

curves in this article have been drawn in this way.

It will be noticed that some of the transformers do not comply with the idea of covering an 18,000-cycle band. This does not necessarily mean that they are poor;

Certainly though, one can demand solid construction, good terminals, plain marking of the connections and moisture-proofing of the windings. The transformers pictured in this article come up to these requirements with a good deal of uniformity.

## Antipodes Linked by Amateur Radio

New Zealand and British Amateurs Work 12,000 Miles—All Records Smashed—N. Z. Showing the World

**G**ET ready for a shock, gang. The laurels in this little old game of amateur radio no longer belong to America. We're barely in it. A whole string of new records have been hung up during the months of September and October by the busy amateurs of New Zealand and it will probably be a long time before we can even up the score.

All amateur DX records were broken into smithereens on October 19th when z4AA, Frank D. Bell, of Palmerston South, N. Z., was in communication with Mill Hill School, London, g2SZ, for ninety minutes. And on Oct. 25th z4AG, Ralph Slade, of Dunedin, N. Z., worked British 2NM, Gerald Marcuse! We make the distance right at 11,900 miles. It is staggering! We amateurs have been extending our distances regularly but few among us dared to expect that the uttermost ends of the earth would be linked by ham radio so quickly. These two places are practically opposite each other on the globe. Unless somebody can arrange to get into communication with a ship diametrically opposite his station, on the other side of the earth, carefully arranging to achieve the world's maximum of 12,500 miles, it is very doubtful if this record will ever be exceeded. It is a record of which any commercial stations on the globe, of whatever power, might well be proud. We congratulate these stations with all our heart—it is positively wonderful!

Fragmentary logs also indicate that z4AA probably was in communication on Oct. 21st with g2KF, Partridge of London, who was the first Britisher to work America. This is as yet unconfirmed.

American amateurs have been busy the past few weeks too, of course, and some splendid communication with New Zealand has resulted, distances being achieved that would cause us to swell with pride were they not so greatly exceeded by the N. Z.-England communication. On Oct. 13th 1SF of Short Beach, Conn., was in good QSO with Ivan O'Meara, z2AC of Gisbourne, N. Z., the chap who first worked Argentine CB8, for an hour and twenty minutes. Thus 1SF is the first eastcoast American to work New Zealand and his record greatly exceeds the work that won the Boomerang, reported in our last issue, being around 9,000 miles. Then on Oct. 17th 3BHV in Washington worked z4AG, Dunedin, for the same length of time, with good signals, tak-

ing a message for Hartford Hq. filed there by u2AOS who recently visited N. Z. On the same date 6BFW, Orange, Cal., also worked z4AG for the same length of time, and on the 18th 1KC in Northampton, Mass., worked both 4AG and 2AC, while on the 20th 5DW in Greenville, Tex., speared z4AA for another 45 minutes. 6CGW should be credited with working 4AG as well as 4AA on that eventful night of Sept. 21st when contact was first established, and 6BCP of San Pedro, Calif., winner of the boomerang, worked 4AA again on Sept. 25th. Thus in one brief paragraph must we dismiss many glorious achievements.

New Zealand signals are now almost commonplace thruout the U. S. and Canada. They are being heard in Europe too. French 8FJ, in LeBlancat, writes us that he is regularly hearing N. Z., 1AC, 2AC, 4AA and 4AG, and Australian 3BM, 3BD, and 3BQ. Incidentally he has 760 different U. S. and Canadian amateurs to his credit. Wake up, fellows. Maybe we started amateur DX but we're not in it with these chaps.

Why do we so freely hand the laurels to New Zealand when our own American members have participated in most of this DX? Read on, gang, you haven't heard the half of it.

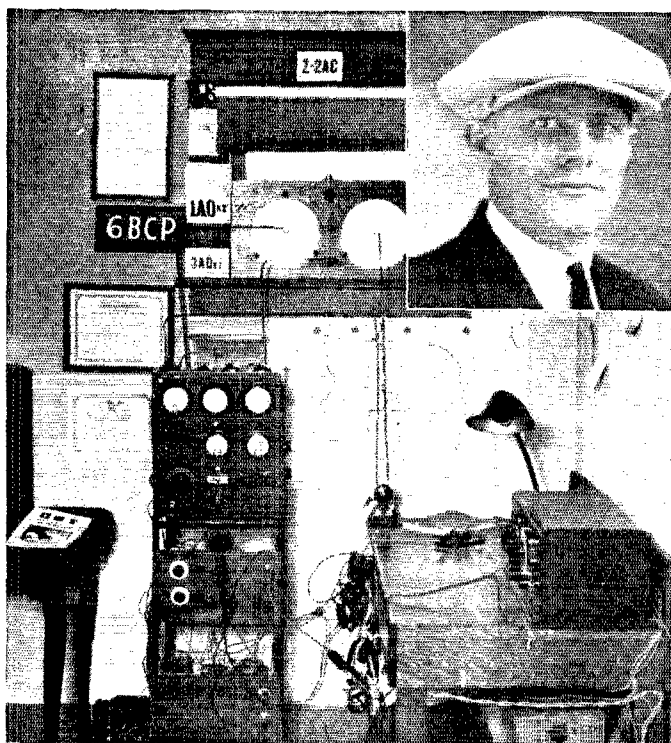
R.Y. ("Jack") Orbell, z3AA, recently sailed from New Zealand for England on the S. S. "Port Curtis", going east across the South Pacific via Cape Horn, up via Montevideo, and thence across the Atlantic to England. He has on board a short-wave ham set with two U.V. 202's, input 50 watts, signing 3AA and using "x" for his intermediate. Latest reports up to this writing show that New Zealand amateurs have kept in touch with him *every* night since he left home, handling messages and testing. The last reported distance was 6,200 miles, near Montevideo. 3AA reports z2AC, 4AA, 4AG and 4AK nice at 5,600 miles; he worked Jack Davis of Sydney, whose input is 15 watts, at 4,750 miles, and z3AL, 12 watts input, at 4,600 miles; and 4AG got to him 5,400 miles on *voice*. For a night of real N. Z. DX, try to tie this: On Sept. 21st when 6BCP and 6CGW worked z4AA, z2AC worked voice 5600 miles to x3AA, turned around and duplicated his one-time world's record by hooking up again with Argentine CB8, and then connected CB8 and 3AA. On Sept. 24th, the night when 4AA clicked again a few minutes with 6BCP, z2AC worked x3AA at



6,200 miles, CB8 again at 6,400 miles, and DBZ, another Argentinian, at the same distance. We don't know anything about such monotonous DX with such powers in this country. Why, if the New Zealanders can follow x3AA across the Atlantic to England they will have succeeded in working around the world in both directions, for the

cept 6BCP, who used Zeh Bouck's redesigned Roberts circuit from August "Radio Broadcast", having one stage of radio.

Mr. Chas. E. Biele of u2AOS, operating aboard GDWQ, writes us from New Zealand, where he has visited almost every prominent amateur station. He says the fellows are the finest amateurs he has met in the world, and they have shown



**6 BCP, WINNER OF THE BOOMERANG.** The transmitter is a master oscillator, using one five-watter as oscillator and four as amplifiers, supplied at 575 volts from a generator. Coupled Hartley circuit. This set puts 4.2 amperes at 150 meters in a 4-wire inverted-L flat-top aerial 55 feet long and 42 feet high; cage lead-in. Roberts receiver, per 2PI in August "Radio Broadcast." Note the Pyrex dishes used for lead-in insulators.

g2SZ-z4AA communication apparently occurred over a line east from Greenwich!

Put all this work down as another short-wave demonstration. 4AG was on 90 meters, 4AA on 92, 2AC about 85, and x3AA around 120 meters. 1SF used a fifty on 77 meters, 3BHV the same on 78 meters. British 2SZ is a short-wave station too, and his input for the world's record was just 230 watts! Put this work down to the credit of low-loss tuners, too. The New Zealanders have junked their r.f. as a body, and their standard is the "1BGF low-losser" (see February 1924 QST). All the stations on which we have report used low-loss autodynes ex-

him the time of his life. Their radio conditions are marvelous, unheard of distances being achieved in that part of the world on practically no power. Which reminds us of our recent editorial on N. Z.—us for there someday!

Anybody willing to outfit a floating short-wave ham station under the Stars and Stripes and send it to the Antipodes of good U. S. stations, please communicate with A.R.R.L. Headquarters. There's a mathematical possibility of exceeding this British-New Zealand DX record by 600 miles and a chance in a million of doing it.

—K.B.W.

# The Third National Radio Conference

Amateur Bands Definitely Confirmed, with Some Extensions and Slight Shifting  
All Short Waves Now Allocated

**T**HE Conference has allocated to amateurs substantially the same frequency bands that are now in use, with some minor changes in their location. The temporary allocation of waves below 150 meters made by the Department to the amateurs some months ago is given definite approval with some slight changes in the bands. The net result of this is to give to amateurs an increase over what they had at the end of the Conference a year ago, and to allow them a much greater area for operation."

So reads the report of the Third National Radio Conference, which convened in Washington on October 8th and by remarkably efficient operation concluded on Oct. 10th. It was a large and representative gathering of about eighty members, from every branch of radio and from every part of the country. Its sessions in the main were characterized by a marked spirit of cooperation. We feel sure it must be counted on every hand as a most successful conference, for it was able to devise ways for the betterment of all phases of radio.

## The High Spots

The Conference report is a bulky document and we have space here to mention only its major recommendations. At that, however, we must point out that the status of the Conference was advisory to the Department of Commerce and that the recommendations can not be considered as effective unless adopted by the Department.

Broadcasting of course occupied the center of the stage. The 300-meter marine wave was abandoned, and with the recent abandonment of 450 m., the way was open to assign the whole band 200 to 545 meters exclusively for broadcasting. A new zoning plan was worked out, creating 30 additional broadcasting channels, or a total of 100. A new classification of stations was established: Class 1, 545 to 280 m., the same as old Class B, the best stations (the old Class C wavelength of 360 meters was wiped out, its stations going into whichever of the new class they fit); Class 2, 275 to 214 m., made up of old Class A and some from Class C; Class 3, 211 to 205 m., 5 channels, for all broadcasting stations of less than 100 watts power. Allocation of a specific wavelength to each station is being done by a committee consisting of the Supervisors of Radio.

The 600-meter marine wave is to be used hereafter for calling and distress only, the working waves being 660, 730 and 875 m.,

as well as the already-allocated wave of 706. The band from 1579 to 2500 m. was also assigned for various marine services.

It was believed that nationwide broadcasting by interconnection of stations deserved every encouragement and stimulation and to that end the Conference recommended the appointment of a continuing committee to work out necessary plans for its accomplishment. Higher power for all broadcasting was considered desirable, to increase the reliability of the service, and the Department is preparing regulations under which this will be possible. There was a big argument over so-called "super-power" broadcasting, 25 to 50 k.w.; the Conference declined to recommend authorizing unlimited power but did recommend experiments along this line, under careful regulation which will require, among other things, that such stations be located sufficiently far from centers of population to avoid abnormal interference.

The Conference assigned all the wavelengths from 0 to 3158 meters. Those in which our readers are particularly interested are as follows:

0.0 to 4.7 meters,	Beam transmission
4.7 " 5.3 "	Amateur
5.3 " 16.7 "	Beam transmission
16.7 " 18.7 "	Public service and mobile
18.7 " 21.2 "	Amateur
21.2 " 25.8 "	Public service
25.8 " 27.3 "	Relay broadcasting, excl.
27.3 " 30.0 "	Public service
30.0 " 33.8 "	Relay broadcasting, excl.
33.8 " 37.5 "	Public service and mobile
37.5 " 42.8 "	Amateur and army mobile
42.8 " 51.7 "	Public service
51.7 " 54.5 "	Relay broadcasting, excl.
54.5 " 60.0 "	Public service
60.0 " 66.7 "	Relay broadcasting, excl.
66.7 " 75.0 "	Public service and mobile
75.0 " 85.6 "	Amateur and army mobile
85.6 " 103.8 "	Public service
103.8 " 109.2 "	Relay broadcasting, excl.
109.2 " 120 "	Mobile
120 " 137 "	Aircraft, exclusive
137 " 150 "	Point-to-point, non-excl.
150 " 200 "	Amateur
200 " 545 "	Phone broadcasting, excl.

These allocations are designed to hold for one year—the Conferences probably will be annual affairs. Government departments are authorized to work in the waves below 150 meters "with due regard to the authorized use thereof by other legitimate services." The "Z" band from 105 to 110 m. was lost. About the Army's sharing of our short-wave bands, see the statement by Maj. Bender elsewhere in this issue. "Public service" in this allocation means toll telegraphy; the day has arrived when we may expect to hear trans-ocean commercial traffic on the short waves; in fact the Radio

Corporation is equipping all of its high-power long-wave stations with a short-wave auxiliary station and WGH, Tucker-ton, is already at work. These stations will work chiefly in the band 85.6-103.5. There are also six Canadian commercials now under construction for operation in this range.

It will be noted that the amateur bands have been altered slightly, so that the harmonics of each band fall within the successively lower wavelength bands. This same scheme was applied to the other short-wave allocations too, and was proposed by Dr. A. N. Goldsmith, who was the leading genius of Sub-Committee No. 1 on allocations. As John V. L. Hogan put the motto of that sub-committee, "Everybody must eat his own mush". It goes without saying that it is a splendid idea.

The amateur representative on the Conference was our A.R.R.L. president, H. P. Maxim, with C. H. Stewart, our vice-president, as advisor and K. B. Warner, League secretary, as alternate to Mr. Maxim. At the opening session Secretary of Commerce Hoover charged the Conference with the duty of taking adequate care of the amateur. At the first hearings Mr. Maxim presented a brief on behalf of the amateurs, asking that they be permitted to retain their present bands, and Mr. Hoover again commented favorably upon their work. It was in this atmosphere that the amateur allocations were made, an atmosphere in which the undoubted disapproval of certain commercial interests was necessarily subdued. Such was the course of amateur fortune at this conference. Appreciation must also be expressed to Prof. A. E. Kennelly, Dr. A. N. Goldsmith, and Prof. C. M. Jansky, Jr., for very valuable services to the amateur.

### The Amateur Sub-Committee

In charge of amateur details there was a sub-committee with Mr. Maxim as its chairman and Third District Supervisor Cadmus as its secretary, the other members being Prof. Jansky; A. H. Halloran, editor of "Radio"; A. H. Lynch and "Zeh Bouck" of "Radio Broadcast;" Dr. C. B. Jolliffe of Bustands; P. C. Oscanyon, representing the Second District Executive Council; E. H. Armstrong; and Messrs. Stewart and Warner of A.R.R.L. Most of the membership of the Washington Radio Club was in attendance at the meetings, too.

This sub-committee recommended the compulsory use of loosely-coupled transmitters on all amateur waves; the free use of all amateur waves under one station license; the confinement of phone and out-right 1CW to the band 170-180 meters; and the confirmation of the system of intermediates established unofficially by the A.R.R.L. No definite action has yet been taken on these recommendations.

The Conference made no provision whatever for the continuance of the amateur spark, and it is expected that the ham spark will speedily be done away with. (See Editorial in this issue.)

### New Regulations

In order to put the Conference's recommendations into effect, new regulations are being issued by the Bureau of Navigation and we may expect a complete set of new amateur regulations soon. We had hoped we might have the news for this issue but it is not available at this writing. Watch next *QST* for the dope.

—K. B. W.

## The Army-Amateur Joint Bands

By Major L. B. Bender, Signal Corps, U.S.A.

THE recent action of the Third National Radio Conference in recommending the allocation of the same frequency bands above 3000 kilocycles for amateur stations and mobile stations of the Army is a distinct innovation in the field of radio regulation. It is also notable that this recommendation was made with entire concurrence on the part of the amateur and Army representatives present and without opposition from any source. Lest there be some misapprehension on the part of amateurs concerning the possible effect on them of this agreement, the opportunity is welcomed to outline for *QST* the present situ-

ation and the future plans of the Army for operations in these bands.

Since 1920 the Army has had several hundred portable field sets of low power operation between 3950 and 4050 kilocycles. Recently many of these have been modified to work in the band between 4550 and 4650 kilocycles. These sets employ a loop antenna for both the transmitting and receiving, and the transmitting energy is derived wholly from dry batteries. Due to the low power input and the small antenna of low efficiency, the operating range of these sets does not exceed five miles. That range is quite sufficient, however, for the

purpose intended and it serves a very important military need.

The success attained with these sets has led to the development of similar sets working in other frequency bands and for other purposes. The quantity production of this design may not appear within a year but these are the sets with which the amateurs are to share their bands. Although the design must cover bands not allocated for military use in order to obtain the required number of channels for a field army, the actual peace-time use will be limited so far as possible to the bands so allocated. In national emergency we count on the public consent to use army bands necessary to meet the emergency. The amateur has practically nothing to fear in the way of interference from these army sets in his band. As already pointed out, the range of the sets is so limited that only those amateurs located near training camps or posts of the Army will ever hear them. Then again, the use of these sets will normally be in the daylight hours when amateurs are not nearly so active as after dark. The Army operators are probably subject by this arrangement to more interference from amateurs than they will cause, but the Army is willing to take a chance on that in the belief that a certain amount of in-

terference is a real benefit to military training and that it will never be really troublesome.

It is unfortunate in a way that the low power of the Army equipment makes it impractical in all but isolated cases to interchange traffic between Army and amateur stations. Such an arrangement might be a valuable aid to training. But there will at least be some gain in the arrangement which puts the amateurs and the Army in the same bands. The experience each obtains in high frequency apparatus and its vagaries is most useful when an emergency comes and the amateurs find themselves converted into Army operators over night. They will then feel much more at home than if their training had been in fields widely different from the military field.

There is no reason apparent why the proposed scheme should not work out to the entire satisfaction of both classes concerned. It is something of a satisfaction to be set down among our amateur friends who composed so large a share of our radio operators during the last war and it will be our ambition to so conduct our operations with respect to the amateurs that any future emergency will find them equally eager to join their talents with us in the common cause.

## The Conference, in Relation to Amateur Activities

By A. E. Kennelley

Professor of Electrical Engineering at Harvard University

**T**HE National Radio Conference convened by the Secretary of Commerce at Washington during October was notable in various ways. Its attendance was large and representative; it received more widespread and active public attention than preceding conferences of the kind; it has been the first conference to recommend the allotment of wave lengths shorter than one hundred meters.

The activities of the radio amateur received particular attention. Not only were five bands, comprising collectively a range of 12 megacycles per second, allotted to amateur operation; but in his opening speech Secretary Hoover referred to the importance of the amateur's work and the desirability of having that work preserved and encouraged within its own proper limits. Indeed the Secretary's remarks were so justly appreciative of the best activities of the amateur that one might almost suppose that during his leisure moments he was a radio amateur himself, and entered into the realm of international morse-code good fellowship, with the happy exuberance of the Knights of "73", all the world over.

The bands of frequency apportioned to

American amateurs by the conference do not differ markedly from those which had just previously been assigned to them; but they have in detail certain new, interesting and important properties. The new bands are shown in the Table.

It will be observed that except for a small departure in the first entry in the first column, the new frequencies assigned are in simple binary relation. That is, the band ratios after the first are all 1.143, and with the same exception, the frequencies limiting one band are the octaves of those in the band preceding. Those of the lowest line are the double octaves. In other words, if we consider the first band as extending from 1.75 to 2.0 megacycs, plus a guard range of from 1.5 to 1.75 megacycs, then all the even harmonics of the first band belonging to the series 2, 4, 8, and 32, are found in the other bands. Similar distributions of even harmonics were allotted to the other services in wavelengths below 150 meters. As one member of the conference expressed the matter colloquially, each service should be charged with the duty of consuming its own harmonic excrescences. If an amateur working in the range between

1.75 and 2.0 megacycs unwittingly emits octave harmonics up to the 32d, he will only thereby disturb fellow amateurs and not other services, such as aircraft, public service, of broadcast relays. Reciprocally, if any of these services develop accidental harmonics, they may disturb their own friends, but not the amateurs.

It is evident for the first time that the amateurs are no longer the exclusive occupants of the short-wave marginal region, as they were at preceding conferences. They now receive band allotments that are

cessfully at night across the seas, with but little antenna power?

If we cannot as yet find an answer to this question at the bottom of the ladder, we may attempt to find one at the top.

There is now good reason to believe that a conducting layer exists in the upper air, say at an elevation of 80 km. Its possible existence seems to have been first published,\* 1902. If that conducting layer is sharply defined; so that there is a sudden transition from a lower insulating to an upper conducting region, then that layer

Frequency in Megacycles Per Second					Wave Length in Meters		
From	To	Range	Ratio	Octaves	From	To	Range
1.5	2.0	0.5	1.333	0.415	200.0	150.0	50.0
3.5	4.0	0.5	1.143	0.193	85.6	75.0	10.6
7.0	8.0	1.0	1.143	0.193	42.8	37.5	5.3
14.0	16.0	2.0	1.143	0.193	21.4	18.7	2.7
56.0	64.0	8.0	1.143	0.193	5.3	4.7	0.6
		12.0		1.187			69.2

diverted in between those belonging to various other claimants. It thus devolves upon the amateurs to develop and occupy these bands, if their claims are to be strengthened at future conferences. Already, as QST has shown, the amateurs have made abundant use of the 80-meter band, good use of the 40-meter band, and some use of the 20-meter band. It will in future be desirable to expand all of these activities, and to open up for occupation the 5-meter band, which happens to be in the neighborhood of that first revealed by the experimental researches of Heinrich Hertz.

It is generally admitted that the present rapid development of radio engineering between the orders of say 6.3 and 7.0 megacycs, (from  $10^{10}$  to  $10^7$  cys., or from 150 to 30 meters in wavelength) is largely due to the successful development of that range by the amateurs, in transoceanic work, and this in the face of the apparent dictates of experience. It has long been claimed, as a result of experience with waves of different frequencies over long distances, that the absorption of energy increased approximately as the square root of the frequency exponentially; so that, other things being equal, low-frequency waves always had the advantage; while high-frequency waves were progressively handicapped by attenuation. The well known Austin-Cohen formula is but a formulated statement of that idea, and it has been satisfactorily checked in a great many cases. So far as we know, although we are still sadly deficient in precise measurements, the absorption of 100-meter waves by surfaces of land and sea is greater than that of 1000-meter waves, and yet greater than that of 10,000-meter waves. If that is so, why are 100-meter waves able to carry messages suc-

cessfully at night across the seas, with but little antenna power? Such waves should then expand in nearly flat circles like an expanding cart wheel, instead of in three dimensions like an enlarging soap bubble. The two-dimensional cart-wheel expansion would greatly conserve the energy in the wave. If, however, the transition from insulation to conduction in the upper air is not sudden, but gradual, the losses of energy near the hazy boundary might be as great or even greater than the effect of simple expansion in an endless insulating sky. During daylight hours the ionising action of sunlight may be supposed to muddy the upper air over a wide range of levels, and interfere with the formation of a sharp transition. At night, however, with this ionising disturbance removed, and neutralization being at work, the opportunity for the formation of a sharp boundary of conduction would be greater, and the long radio signal ranges of the night time may be attributable to such tranquility. Perhaps the greater volume activity of the high-frequency waves may enable them to cut for themselves a sharper conducting boundary surface in the upper air than the long waves of lower frequency. If so, they might be able to carry further in spite of a greater tendency to undergo absorption over the surfaces of earth and sea.

This is only one of the many and debatable questions which today cannot be answered, but which the work of amateurs may be able to find an answer for in the future.

\*"On the Elevation of the Electrically-Conducting Strata of the Earth's Atmosphere," *Electrical World and Engineer*, N. Y., March 15, 1902, p. 473. See also "*L'Onde Electrique*", June, 1923, p. 350.

# A Set That Works From 40 to 200 Meters

By M. W. Goldberg, 9APW

I AM enclosing an unimposing photo of the 4-coil transmitting inductance used at this station for transmission at short waves with fairly uniform efficiency.\*

The lowest coil is a 5-turn grid coil which is wound 2" from the lower end of the 3½" tube, ⅜" above this is a 9-turn plate coil and 1½" above that is the 13-turn antenna coil. ⅜" above the antenna coil is a second plate coil, also having 9 turns. All coils are wound in the same direction and connected as in the diagram.

The grid-tuning condenser has a capacity of 500 µfds. For the 40-95 meter range it is connected across the grid coil only but for the 100-200 meter range the clip is moved up, connecting the condenser across both the grid coil and the lower plate coil.

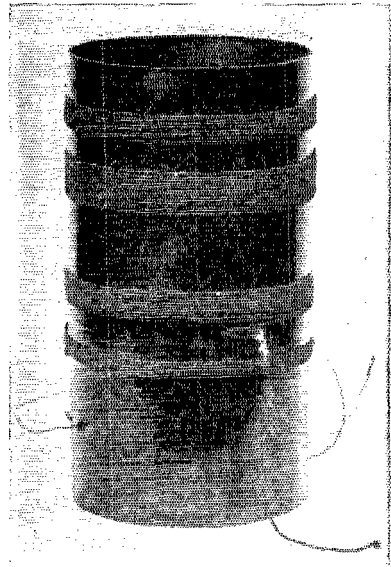
The circuit operates smoothly over a wide range of wavelengths as is shown by the following half-power antenna currents.

170 meters	2.0 amperes
140 meters	1.72 amperes
100 meters	1.38 amperes
70 meters	1.24 amperes

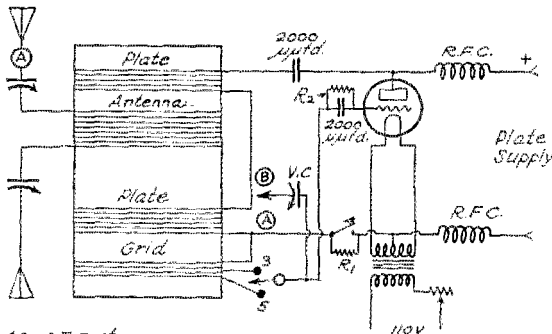
For powers up to 250 watts (input) 60-strand No. 33 wire works FB. (For heaven's sake don't make the mistake of thinking this means "Litzendraht" which is useless below 200 meters.—Tech. Ed.)

Notice the high resistance, R, across the

is here. Key clicks are present because the transmitter either starts or stops oscillat-



The Helix at 9APW-9ZG Used on powers as high as 250 watts input.



40-95 meters  
Grid clip on 3rd grid turn  
V.C. clip at A, tuning 3 turns of grid.  
R<sub>1</sub> - Keying resistance - see text

95-200 meters  
Grid clip on 5th grid turn  
V.C. clip at B, tuning 5 grid turns and also lower plate coil.  
R<sub>2</sub> - 5000-10,000 ohm grid leak.

key. I believe this is really the whole solution to the key click problem. At least it

\*Altho it has 4 coils this is not the usual "4 coil Meissner" set. It is much nearer the 2 coil Meissner because a single antenna coil is used and coupled to both the plate and the grid.

in suddenly. By inserting a very high resistance across the key contacts the set is ALWAYS oscillating weakly and therefore never stops oscillating. Sparking at the key is negligible, and the contacts can be set very close together without arcing, making sending much easier and smoother.

Use ten times as many ohms resistance here as volts for the plate supply. That is, if 1000 volts is used, use 10,000 ohms across the key. If 1500 volts is used, use 15,000 ohms across the key. In any case if the antenna goes up to more than 10% of the full value when the key is up compared to what it is when the key is down, the remedy is to add resistance across the key until the desired effect is obtained. The wave is really a compensated one, for the

difference at this station between the frequency with key up and down is about 10,000 cycles; in other words, just at the upper edge of audibility. The more resis-

tance that is inserted the further are the two waves apart, but in any case they are never more than a meter or two, different. The tone is easier to read because the current does not have to build up through the filter from practically zero value, and the absence of key clicks sharpens up the wave and cuts out interference locally.

I use RC grid leaks in series at this station and they certainly fill the bill. Little as I am on the air it is always QSB FB, etc. without my ever asking for a QRK report. Many have also remarked on the clean sending which is always due to the above.

## Low Loss Loops ???

By William W. Harper\*

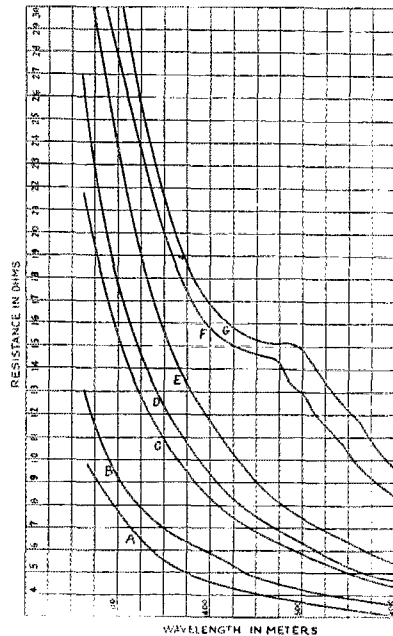
**F**OR many years we have known about the absorption losses caused by poor dielectrics in the field of an inductance coil or loop antenna, as well as the losses introduced by eddy currents in metallic objects. Even so, a great many of us continue to violate the principles of good design, but not without paying the penalty. In order to emphasize the nature and magnitude of the losses caused by various materials the following data will be presented. These data are the result of an experiment conducted with a small loop antenna, in which a series of measurements of the high frequency resistance of the loop were made under various conditions. The results of each individual measurement are shown in the family of curves presented herewith.

The Curve A shows the high frequency resistance of the loop when carefully supported on the measuring table in such a way as to be as far as possible from all objects which might tend to increase its resistance. The loop used was specially constructed with the idea of keeping the resistance and distributed capacity at a minimum. The *least possible* amount of dielectric and metal was used in its construction. It will be seen from Curve A that the resistance increases from 3 ohms at 600 meters to approximately 9.9 ohms at 267 meters.

After completing the measurement represented by Curve A, a piece of heavy leather was placed along one side of the loop. The area of the leather was equal to that of the loop. Another resistance measurement was made and the results plotted in Curve B. A measurable increase in resistance is noticeable due to the dielectric absorption in the leather. These curves were carefully checked in each measurement.

In the next measurement, represented by the Curve C, a piece of dry well-seasoned wood was placed adjacent to one side of the loop. The leather used in the first experiment was fastened to this piece of wood so

that it had the same position in respect to the loop as it had when Curve B was taken. A considerable increase in resistance is observable due to the presence of the wood. The wood used was about half an inch thick and equal in area to the loop. This



**HOW THE RESISTANCES CHANGE**  
Showing that a good loop isn't the end of the story

means that we must be somewhat particular as to the kind of wood we use in our apparatus and especially it is advisable to make sure that it is not so situated in respect to inductances that we get appreciable dielectric absorption.

In making Curve D, a piece of one-eighth inch bakelite equal in area to wood and leather was also placed along side the loop. This caused another slight but measurable

\* Consulting Laboratorian, Member Experimenters Section.

increase in resistance. It should be noted that the initial resistance of 3 ohms at 600 meters has now reached a value of 4.5 ohms.

A box was now made out of the same kind of wood as used in the previous measurements, which was also covered with the previously mentioned leather and a bakelite panel included in the box construction. The loop under test was then placed in the lid of this box. A curve was then made while the lid of the box was open, thus supporting the loop a good distance away from the lower part of the box. This is the curve E and it will be seen that the R.F. resistance is very noticeably increased by the additional dielectric absorption.

There was a good reason for keeping the box open; the parts of a portable receiving set had been placed in the lower part of the box (not connected together) and the idea was to keep the loop several feet away from these things to make sure that they had no effect.

In curve F we see the tremendous effect of closing the cover of the box. In doing this we bring the metal parts of the receiver in close relationship to the field of the loop. The irregularities in the curve are due to eddy current losses in the various metal objects in the set.

In the last curve, designated by G, the receiver was completely wired and filament and plate batteries were placed in the box. The increase in resistance due to additional eddy current losses in the wiring and the battery shells is obvious.

The increase in resistance at 600 meters caused by these various complications is equal to approximately 6.5 ohms as shown by the various curves.

No observations were taken as to the increase in the distributed capacity, but it may be safely predicted that it was also considerably increased.

#### Conclusions

After we take great care to make an efficient loop antenna we should take equal care to eliminate all objects from its field which are likely to cause a loss of energy. This same thing applies to the coils in the set. Some experimenters, and manufacturers as well, design wonderfully efficient loops and then ruin their efficiency by putting them in some position where the energy absorption and losses are maximum. Others have designed low loss (?) coils and then placed a tuning condenser inside and coinciding with the axis of the coil so as to make a neat job, regardless of what it will cost them in ohms. Still others try to evade the well-known dielectric absorption which is found to excess in certain laminated phenol fibres. At least it is evident that we will absolutely have to be more careful in the design of some of our appa-

ratus, even though the constituent elements may be of the low loss type. Ambitious experimenters should confine their work to the development of some kind of "moulded air" which certainly should have very little loss and would be great for loop and coil supports. How about Pyrex for this kind of work?

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## Attention

### Old-Time Commercial Men

**W**ERE you one of the many who liked the full-page set of photos of LPZ in our May issue?

Good—we thought you were the man.

Several members have asked for pages of those old spark and arc stations that did the real pioneering—in the days when we called it "wireless telegraphy", used the Morse code, and tho't a magnetic detector was about the final thing in sensitivity. It sounds good—if we can get the pictures.

The men that have them are probably out of the brass-pounding game these days, and we don't know just where to find them. Therefore any advice will be greatly appreciated by the Technical Editor.

P. S.—The pioneering wasn't all done on the Atlantic Coast, Gulf Coast and Pacific stations are especially desired.

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## WWV and 6XBM Schedules

**D**ETAILS of the standard-wave transmissions are given on page 51 of the November issue, to which please refer.

### Schedule of Frequencies in Kilocycles

(Approximate wave lengths in meters in parentheses)

Time*	Dec. 5	Dec. 19
10:00 to 10:08 p. m.	300 (1000)	550 (545)
10:12 to 10:20 p. m.	315 (952)	650 (461)
10:24 to 10:32 p. m.	345 (869)	750 (400)
10:36 to 10:44 p. m.	375 (800)	833 (360)
10:48 to 10:56 p. m.	425 (705)	1000 (300)
11:00 to 11:08 p. m.	500 (600)	1200 (250)
11:12 to 11:20 p. m.	600 (500)	1350 (222)
11:24 to 11:32 p. m.	666 (450)	1500 (200)

We had hoped that this month's schedules would include much more short waves like those of November 5th.

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\* Eastern standard time for WWV, Washington, D. C.  
Pacific standard time for 6XBM, Stanford University, California



# The New Sodian D-21 Detector

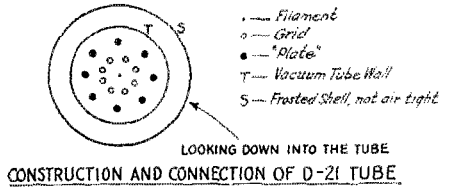
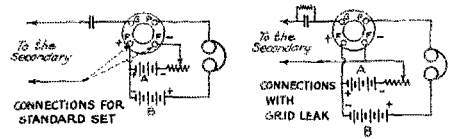
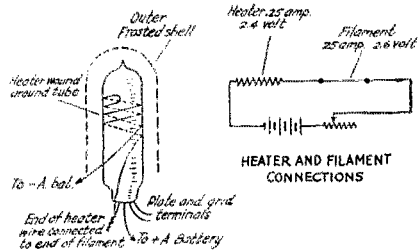
**T**HE sodion tubes are intended for detection only. Both the S-13 of last year and the D-21 of this year depend on the presence of sodium for their sensitivity. Other metals, such as potassium, caesium or rubidium can be made to serve the same purpose, but sodium is comparatively cheap and easy to secure.

This scheme serves the same purpose as the small amount of gas which is left in the usual "soft detector" tube. However the action is said to be quite different and the tube curves do not have the "kinks" which provide the sensitivity of the gas tube.

In other ways the two tubes are not at all alike. The S-13 was a non-oscillating tube, with a non-standard base, also it was so designed that it required slight changes in the wiring standard receiving sets.

The new D-21 has a standard base, can be made to oscillate smoothly and easily,

ture being important. The inner glass shell is the vacuum tube proper—it is sealed in the usual fashion and contains the grid, filament and plate. Also the "heater" is wrapped around it. All four of these things are different from the devices found in the more common varieties of tubes. The filament is of tantalum instead of the usual



THE NEW D-21 TUBE COMPARED WITH THE OLD S-13 TUBE

The base of the D-21 is of standard size. The frosted shell of the D-21 has been made larger than that of the old tube so as to provide a better grip when putting the tube into the socket. The actual vacuum tube inside is of about the same size as that of the old S-13.

and is so designed that no wiring changes are needed—it can be substituted for a "gas tube" or "hard tube" without any ceremony.

### Construction

The photographs show the internal "machinery" of the D-21. The tube itself is quite small but is surrounded by a frosted glass shell (not airtight) which shields the tube itself from draughts, steady temper-

ture, although tungsten will work equally well. The heater is connected in series with the filament and serves to warm up the tube so as to keep up the best temperature for tube operation. This is necessary because the tube contains sodium vapor, as previously stated. When the tube is turned on the filament at once glows bright yellow, the heater warms up more gradually and after a minute or so the tube is in operating condition. The frosted glass outer shell then prevents sudden changes of temperature. The grid is made of wires spot-welded together into a tiny "squirrel cage". The "plate" is not a plate at all, but a larger squirrel cage of the same sort, located so that its wires come between those of the grid. This is shown in one of the diagrams.

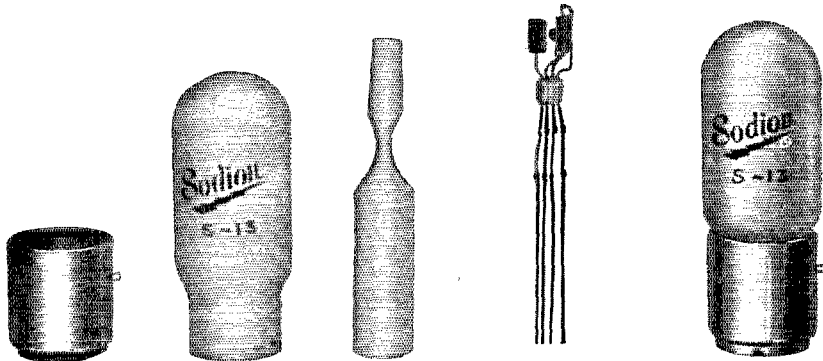
By changing the size and number of wires in the squirrel cages, also by changing the diameters of these cages, it is pos-

sible to get almost any desired grid and plate impedance. The present dimensions are chosen so as to agree with standard practice.

### Operation

The D-21 tube can be used as a non-regenerative detector, as a regenerative de-

tage, the UV-199 choking up entirely while the D-21 stayed clear but did not give as strong signals as the UV-201-A. On the whole the honors were with the D-21, it was most sensitive where sensitivity was most needed—one on weak signals, also the adjustments were entirely uncritical.



THE S-13 TUBE OF LAST YEAR

1—The small base 2—The frosted outer shell, not airtight but merely cemented to the base and acting as a protective covering for the tube itself. 3—The tube itself before the "works" are put inside. 4—The metal parts of the tube. These are sealed into the tube (3) after which the tube is evacuated and sealed. The "heater" wire is then wrapped around the tube and connected in series with the filament. Next the tube is fitted into the base, the 4 wires connected to the terminal pins and the frosted outer shell put into place. 5—The finished S-13 tube after assembly.

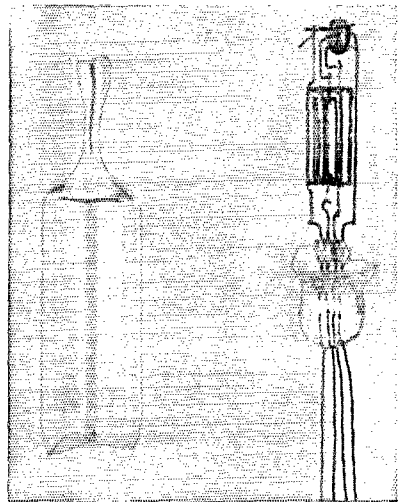
detector and as an oscillating detector. Since the tube is pumped to a "hard" vacuum there is no need for critical adjustment of the plate and filament voltages.

Three tubes were secured at the factory and given some rough tests in different receiving sets. Of course these tests were pretty crude—they consisted of listening and making notes. However it is interesting to find that tests made at different places by four different men check up very well indeed.

Two of the tubes worked best without a grid leak, the third one worked just a trifle better with a 2.5 megohm leak. The difference between the tubes was surprisingly small and one report will answer for all three.

### In a Superheterodyne

When used in the first detector socket of a superheterodyne receiver for telephone work they showed very fine sensitivity. On very weak signals they proved very much better than any one of six UV-199 tubes and a trifle better than any one of three UV-201-A tubes. A "soft" tube was not handy for comparison, therefore this test was not particularly complete. When strong signals were being received the UV-201-A tubes seemed to have the advan-

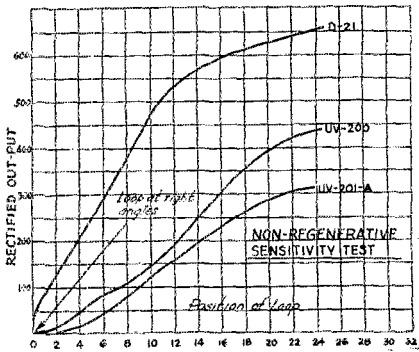


THE METAL PARTS OF THE D-21 TUBE

The straight tantalum filament runs thru the centre of the assembly. Around this is the grid, made in squirrel-cage shape of fine wires spot-welded together electrically. These two elements are surrounded by a larger squirrel-cage with its bars opposite the gaps in the grid; this larger squirrel-cage takes the place of the plate in the standard types of tubes.

**In a Tuned R.F. Set**

The tube was next tried in a set using two stages of tuned R.F. amplification



**SENSITIVITY TEST OF THE D-21 TUBE IN A NON-REGENERATIVE LOOP SET**

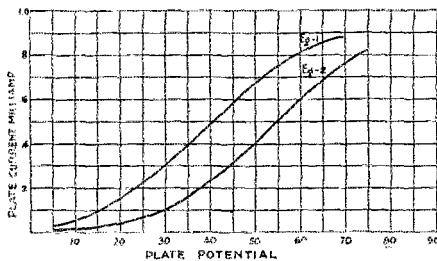
The method is described in the article. Referring to the lower (horizontal) scale of the curve, when the loop is in the position "0", it is at right angles to the line of transmission; therefore it is collecting only a very little energy from the passing ether wave and this very little is due only to accidental antenna effect. For practical purposes we can say that in this position the loop collects no energy. Going to the right along the scale the larger figures indicate that the loop has been turned thru a greater and greater angle, approaching the line of transmission. Unfortunately the scale on the loop was an arbitrary one and did not indicate angles directly. However the divisions were even.

ahead of the detector. The report on this test is quoted:

"Slightly better than a UV-200 as a detector, with either 22.5 or 45 volts on plate. Seemed fairly non-critical as to both A and B voltages.

"On weak signals very little difference between the Sodian and a 200 was noted. On moderate signals, using loud speaker, the Sodian gave roughly an aural increase of 15 or 20%. On loud signals the Sodian still held the lead.

"Quite a difference in the tone reproduction was noted. The Sodian gave a deeper



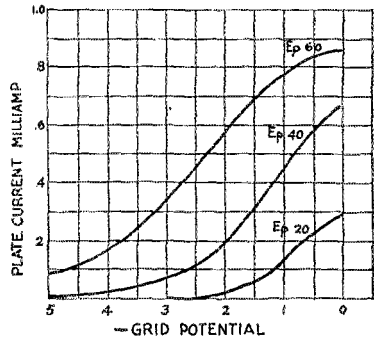
tone or timbre than the UV-200. Of the two the Sodian gave much the better tone.

"Another peculiarity was noticed. On tuning KDKA exactly to resonance, the 200 was almost as good as the Sodian; on throwing one circuit (primary or secondary) slightly out of resonance, the Sodian was greatly superior to the 200. Did not have chance to test on higher waves to see if this still held good. (Note—all these tests made on radiophone broadcasts at usual wavelengths.—Tech. Ed.)

"In comparison with a uniform UV-201-A, used as a detector the Sodian was superior at all points. The sodion was tried in both radio and audio frequency circuits (i. e., it was tried in the amplifier sockets of the same set, both before and behind the detector.—Tech. Ed.) but was no good.

"Also tried it in short wave set as an oscillating detector but couldn't make it oscillate even with urgent persuasion."

The D-21 was next tried in the detector socket of an ordinary regenerative receiver. When working non-oscillating it gave results similar to those in superheterodyne. Weak signals could be heard very nicely,



although three specially picked UV-201-A tubes ignored them entirely. When strong phone signals were received the D-21 dropped behind the UV-201-A.

As an audio amplifier the D-21 was a failure.

When an attempt was made to receive C.W. signals with the D-21 acting as an oscillating detector the results were most disappointing. Few signals were heard and these were weak. The UV-201-A and the UV-199 "had all the delegates" in this field.

**Summary of unofficial tests:**

It will be seen from these tests that the general effect was to make the D-21 seem an excellent device for use as a detector in non-oscillating radiophone reception, giving the best performance on weak signals but acting very well indeed on strong signals. As an amplifier (R.F. or A.F.) it was not a success, nor was it particularly encouraging as a C.W. detector.

### Laboratory Tests

Some laboratory tests at the factory gave the following interesting results: An oscillator was set up so as to transmit a weak modulated signal. This signal was received some distance away on a loop receiver equipped with a tube detector (non-regenerative circuit), two stage audio amplifier and tube rectifier. The output of the rectifier was measured as an indication of the output of the detector. This performance was repeated with the loop set at different angles to the line of transmission, thus changing the input to the detector and giving an idea of the change in sensitivity when different signal strengths are being dealt with. The results for various tubes are given.

### Miscellaneous Notes

The grid return should be made to the "F" terminal of the socket if a grid leak is being used. This means that the return is really being made to the negative terminal of the heater.

In many receiving sets the return is not made to the "F" of the detector socket, but to the "+F" instead. The change in the wiring is simple, but it can be avoided by

taking out the grid leak and operating with the grid condenser only. The return can then be made to any point on the filament circuit.

The tests above were made on three tubes which came direct from the factory. We do not know where the tubes may be bought on the general market, hence were unable to make the test otherwise. However, the tubes were not "hand picked", they were simply taken from the regular production. The curves shown in this article were also made at the factory on regular production tubes with the bases in place and the heater connected. Therefore the drop through the heater should be added to the grid biases which are indicated.

The measured value of the mutual conductance was 260 micromhos, the plate impedance 51,000 ohms, and the voltage amplification 22.36. For the sake of comparison, a typical UV-201-A will measure as follows: Mutual conductance varying from 200 to 750 micromhos with a plate voltage range of 80 to 20, plate impedance 10,000 to 30,000 ohms, with same plate voltage change. The voltage amplification will be fairly steady at 8.

## A Quick Coil Test

THE main excuse for this story is to show how easily one can get an idea of the goodness of a coil, and how entirely unnecessary it is to have any elaborate equipment for doing it.

We began by wondering how important it was to use the proper material for a coil form, assuming that there was going to be something in the way of a tube to wind on.

This was after supper and we didn't have time to think of making real resistance

coils that tuned from 125 to 270 meters when we used a condenser with a maximum capacity of 500  $\mu$ fd. 180 meters would give a fair idea of the action of the coils clear through the range.

The first candidate was a coil having 24 turns of No. 18 D.C.C. wire wound on a tube  $3\frac{1}{8}$  inches in diameter. This tube was of bakelite (or perhaps it was formica) and was about  $1/16$ -inch thick. The wire was spaced by its own width, which made the coil  $2\frac{1}{2}$  inches long. With very careful tuning, we were not able to get a secondary current of over .26 ampere.

A glass tube was next tried and turned out to be just a shade poorer, as the best current was only .25 ampere. The tuning was exactly the same, resonance being secured with the condenser at 43 on a scale of 100 divisions.

Next, the winding was taken off the bakelite tube and a layer of corrugated paper from a vacuum tube package wrapped on before replacing the wire. Since this made the coil somewhat larger in diameter, the number of turns was slightly reduced to get the same tuning as before. The length of wire was almost exactly the same. The current was .3 ampere.

Finally a self-supporting coil was tried and a current of .33 ampere obtained.

(Concluded on page 65)

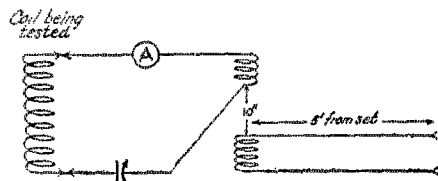


FIG. 1 All wiring to be left alone during tests. Make no changes except connecting different coils and turning variable condenser by means of long wooden handle.

measurements. Therefore, we connected up the apparatus shown in Figure 1; the driver being nothing but the usual transmitting set run at low power, and working on 180 meters. The reason for sticking on 180 meters, was that we were curious about

## A New Hornless Loud Speaker

**W**HY do loud speakers have horns? What purpose do they serve? A complete answer to that question is not easy, because the horn does a number of things at once. One of them can be explained as follows:

The business of a loud speaker is to make sounds that can be heard all through the room—in other words, the loud speaker is expected to vibrate all the air in the room. There is a great deal of this air, but it only needs to be vibrated through a small distance. Right here is the important part of the problem, that we wish to vibrate a *large* amount of air through a *very small* distance.

Down in the base of the usual loud speaker is the *small* diaphragm which moves through a *rather large* distance.

It will be seen that the sort of vibration manufactured by the diaphragm isn't just the thing we wanted, and some sort of a conversion device is needed.

Very well—that's where the horn comes in. One can push into the small end of a horn an energetic (high amplitude) vibration such as the diaphragm manufactures. This vibration will travel the length of the horn and come out of the large end in different form. It comes out as a vibration covering a much larger space (the mouth of the horn being larger than the entering end), but at the same time we have converted the vibration into one with lower amplitude, i.e. with the air particles surging back and forth through lesser distance. This sort of vibration may now be sent into the air of the room, and will be fairly effective in vibrating all parts of it with about the same intensity, which is what we started out to do. For this particular purpose we can look at the horn as providing a sort of elastic coupling between the *small* diaphragm and the *large* mass of air.\*

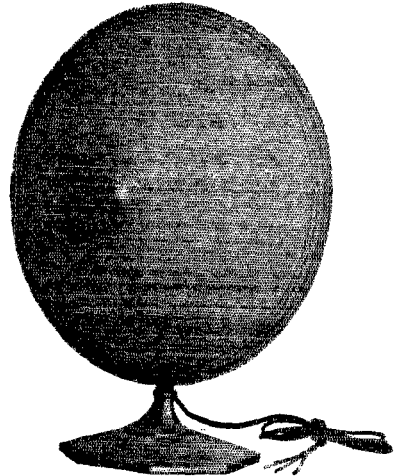
In general the horns that do *this particular* thing best are very large and accordingly very inconvenient for household use.

Of course that isn't all there is to the design of a horn, because the horn has other things to do. For instance, it acts as a resonance chamber and tends to strengthen certain notes. This isn't altogether a misfortune, because a skillful designer can use these peaks to even out distortions that originated at the diaphragm. In some horn-type loud speakers this has been done quite skillfully so that very good reproduction is secured.

### The Type 540-AW Loud Speaker

Another way of going about the whole thing to avoid the use of a horn altogether. From what has been said before it will be seen that this can be done by the use of a *very large* diaphragm, moving through a *very small* distance. This has been done in the new Western electric hornless loud speaker, type 540-AW, which is shown in the photographs.

The laboratory work on this speaker was done at the Western Electric laboratories, which previously have produced the well-known 10-D horn and 7-A amplifier, also the public address systems which many of our readers have heard, and finally the entire equipment of most of the well-known broadcast stations. (No, that statement

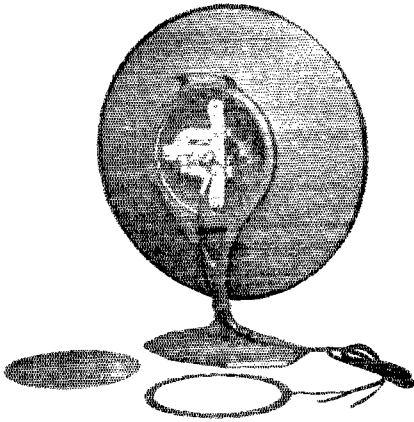


wasn't written at 463 West Street; the Tech. Ed. originated it right here, just because the excellent work of the "WE" doesn't seem to be noticed as much as it should be.)

The construction of the 540-AW loud

\* If one is electrically inclined the thing may be made clearer by looking at it in another fashion. Suppose we consider the air column in the horn as a transmission net-work connecting the high-impedance input device (diaphragm) with the low-impedance load (air of the room). It is then evident that we need a graduated network to make such a transition, each mesh having a lesser impedance than the last and the number of meshes being large so that the difference between successive meshes will be small and reflection will be avoided. The analogy is a very long horn tapering from a small inlet to a very wide mouth.

speaker can be best understood by inspection of the photograph which shows it partly dis-assembled. The projector consists of two 18-inch cones, having their bases cemented together. The point of one cone has been cut away to leave a circular opening, the edges of which are secured to the supporting frame as shown. Ordinarily the opening is covered by the screen (shown lying on the table) so as to permit air to enter and leave as the projector vibrates. The electro-magnetic driving device is sup-



ported just inside the opening, and its driving rod is connected to the apex of the cone at the point where the metal star is seen in the photo. This rod pulls the point of the cone in and out, thereby causing both cones to vibrate. The distance between the grating and the point of the cone is about 5 inches, the whole affair stands about 18 inches high.

The impedance of the windings on the reproducer is about 10,000 ohms at average voice frequencies, thus permitting connection to the output of ordinary amplifiers.

#### Peculiarities of the Hornless Type

It seems that some of the sound must come from the outer surfaces of the cones and some from the circular opening. The result is a very large source of sound which transmits about equally well in all directions. This causes a peculiar effect as follows.

In one demonstration two Western Electric loud speakers were compared. One of them was the well-known 10-D horn, the other was this new 540-AW. The amplifier was the same for both, and it was a very excellent amplifier. When the 10-D horn was in use there was never the least doubt which way it was turned, the "stream of sound" was pretty definite. The volume

was distinctly more than enough. The hornless 540-AW was at first a distinct disappointment, with the same input it was not as loud. However, a moment's attention showed that there was no directional effect that could be noticed, the sound was equally strong on all sides, it was impossible to locate the horn by ear. As a proof of this we ran onto a peculiar stunt. With the 540-AW reproducing an orchestra we closed our eyes and walked around the room trying to locate the loud speaker by ear. We didn't succeed, but our imaginations did. Our imaginations remembered that orchestras are usually in front, therefore this invisible orchestra always *seemed* to be in front of us, and not at all in the direction of the loud speaker.

Of course this non-directional effect means that the sound will not be as strong in any given direction, hence the new horn may be less satisfactory than the old one where signal strength is low. With ordinary signals the new device should have advantages, and for very strong signals it can be made to produce an overpowering volume of sound that the horn type could not have accomplished without distortion of a very bad sort.

In another demonstration the 540-AW speaker was compared with a cheap horn-type loud speaker, the input to both horns being from a rather *poor* amplifier. Curiously enough, the cheap speaker sounded better than the 540-AW. The reason was that the bad amplifier was manufacturing a lot of high-pitched harmonics that had nothing to do with the original music. The 540-AW faithfully reproduced the resultant mess, but the cheap horn was dead to all things at high pitches, hence it chopped off the harmonics and actually produced something that sounded a little like music. However, the same horn was utterly lost if it had been asked to reproduce violin music, nor was it any better off when asked to reproduce low notes. It was simply a case of two distortions accidentally making partial correction for each other—although the result was still bad enough.

However, one must admit that this last stunt doesn't have anything in particular to do with the presence or absence of horns—it simply points out the fact that it is now up to the amplifiers to become as good as *some* of the loud speakers have already become.

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We learn that the home-made filter condenser described on page 47 of August QST and credited to an Australian magazine was originated by Dr. A. E. Banks, 6XN, and first published in "Radio" a year or so ago. This note is published to place credit where it is due.

## The Weld in the Vacuum Tube\*

**T**HE simple vacuum tube is the result of the most painstaking and detailed investigation. Its size, its gas content (or rather lack of gas content), the size and location of the wires, the kind of metals to be used, even the method of sealing the wires where they pass through the glass—each problem has been given the most careful scrutiny.

For instance: it is necessary for wires to pass through glass, yet no air leak is permissible, no matter how small it may be. There must be an air-tight seal.

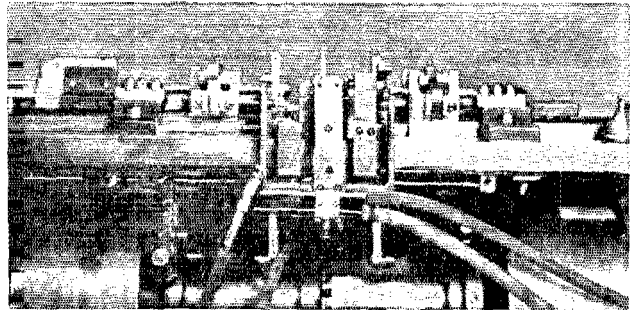
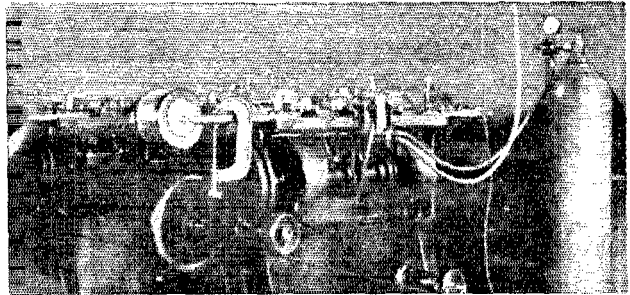
That isn't all. The seal must *stay* tight although the tube is heated and cooled many times when used in radio work. Therefore some kind of wire must be used that will not only make a tight joint in the first place, but will stand many heatings and coolings without cracking out. Platinum wires can be sealed into glass and will stay tight, but platinum is a very expensive metal. In spite of this platinum was formerly used in the following manner. Copper wire was used outside the tube and nickel wire inside, the two being connected by a very short piece of platinum located in the glass "mash" where the seal was required.

Even the short pieces of platinum became too expensive, so a new material and new methods were sought. Fig. 1. shows how the thing is done today. The wires inside the tube are made of nickel as before. Where one of them is to be brought through the glass it is welded to a length of copper-clad-steel which can be brought through the glass where it will make an air tight joint. The same piece of copper-clad wire is used to make the external connections. Where one of the nickel wires inside the tube is to be supported (but not brought outside the tube) it is welded to a short piece of the copper-clad wire which is embedded in the glass but not continued through it. Contact wires go through, support wires do not. In any case the joint between the nickel wire and the copper-clad wire is embedded in the glass to make the whole thing rigid.

Beginning at the left of Fig. 1, we have in turn, plate contact wire, grid support, filament contact, filament support, grid contact, and plate support.

So far so good, but how are the small nickel and copper-clad wires to be welded together? Here is where the welding flame gave another illustration of its almost infinite versatility.

It is important that the nickel and copper clad steel wires be neatly joined. This not only makes it easier to mold the glass about them but decreases the tendency to-



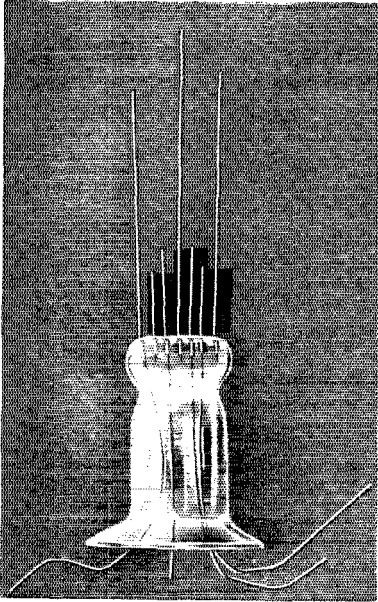
The Machine that welds the nickel and copper-clad wires together. The upper picture shows the machine as a whole, the lower one shows a close-up of the welding head. The operation of the machine is explained in the text.

ward air bubbles and leaks. Many methods of making the joint have been tried but welding by machine has been most successful.

The machine pictured in Figs. 2 and 3 was designed by E. F. Volkmer and Sons, 799 Greenwich St., New York City, Automatic Machine Designers. Its fundamentals may be briefly described as follows: A spool of the nickel wire is mounted at one

\* Courtesy Union Carbide Co.

end of the machine while the copper-clad wire is mounted at the other. These wires travel toward the center of the machine from the respective spools passing through the same type of mechanism, so it will be sufficient to describe the course of one wire. As the wire leaves the spool it passes



The two-part wires welded together and sealed into the "mash" of a receiving vacuum tube. Note that the connecting wires continue thru the mash and come out at the bottom of the stem, where they will later be connected to the contact pins. The support-wires do not continue thru as they are provided with but a very short length of the copper-clad wire.

around the spring tension sheave shown on the side of the machine in Fig. 2. This sheave maintains a constant tension on the wire, irrespective of the amount that has been taken from the spool. The wire then passes between two rolls which by gripping the wire snugly compensate for the pull of the tension sheave. Next, the wire passes through a set of rolls mounted horizontally to straighten it in a horizontal plane; then through a set mounted vertically to straighten it in a vertical plane. From these, it passes between clamp jaws controlled by a cam on the mainshaft.

Next the wire passes through a hole slightly larger than its own diameter on the inside of which is a small shear jaw; that is, the arrangement is very similar to a cigar cutter. Further on is a second set of clamps, and, finally, the welding tip is located in the center of the machine.

As to the operation of the machine; the

outer set of clamps opens, slides outward, closes on the wires, and slides inward, drawing the wires toward the center until the ends are within about  $\frac{1}{4}$  in. of each other. Then, these outer clamps let go, the inner set of clamps grips the wires, and the tip swings so that the flame impinges on the ends of the wire. Next, the shears clip off the wire, and the inner clamps butt the two pieces together in the flame, the tip moves away and the welded wire drops into a pan—a perfectly and neatly welded product.

One may have gained the idea that this process is slow. Not so, however. The output of one machine is 1000 wires an hour.

The machine is a very cleverly worked out affair, but the quality of its work is dependent upon the welding flame. This is constant and positive. The tip from which it emerges is very simple: not much more than a brass rod tapered at one end and drilled out for a portion of its length to form a straight hole, then tapered to a small hole at the flame end. The mixed gases are piped to this tip from a blowpipe secured to the machine as shown in Fig. 3. That is all there is of it, but it does the work.

Some of the welds made by this process are illustrated in the tubes in your set. Note their neatness. Better tubes are made with these wires at less cost.

This has gas welding benefited the radio enthusiast.



Do You Remember This Fellow?



# A Short Wave Wavemeter

By F. Dawson Bliley, 8GU

**J**UST as no amateur station has in the past been complete without a wavemeter covering the 150 to 200 meter band so today no station is complete without a wavemeter that will cover the 20, 40 and 80 meter bands.

Every short wave station should really have a meter that will cover all amateur waves. This would call for a range of 5 meters to 200 meters, but that is not practical and I will describe a meter which will cover the region from 20 to 220. (A wavemeter for the 4 and 5 meter waves is described elsewhere in this issue.—Ed.)

It must first be understood that you have a wavemeter at hand which will cover the old 150 to 220 meter band and which was carefully calibrated from WWV or otherwise so that you can really depend upon it. The whole idea of this article is to show how the calibration which you already have on this meter can be transferred to a lower wavelength.

## Construction

The construction of the special wavemeter will be described first, the way of calibrating it a bit later on.

The inductance should be 5" in diameter and wound with 13 turns of No. 14 S.C. wire on a tube that has been lightly varnished and baked. A "Mother's Oats" box will do the trick.

This coil is provided with taps at the 7th and 3rd turns.

This coil is to be used with a condenser having a capacity of 500  $\mu$ fd and a dial or scale with 100 divisions. This scale will be used from 10 degrees to 80 degrees only and if the coil is tapped as described it will have the following ranges:

- 13 turns—80-220 meters
- 7 turns—35-90 meters
- 3 turns—17-40 meters

The connections to be used are shown in Figure 1.

## Harmonic Calibration

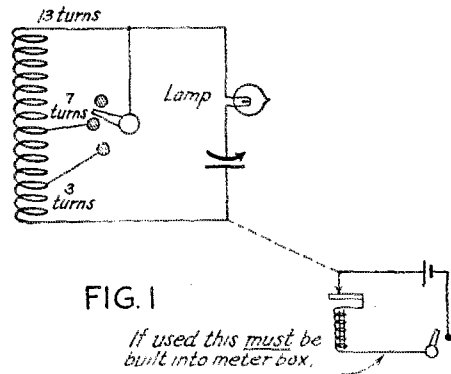
This method is not hard to understand and, of the various methods of calibrating a wavemeter (other than that of direct fundamental calibrations), is the most accurate.

In this method two oscillators are necessary. The receiver can be used as one and your transmitter as the other. Various circuits can be used but the Hartley seems best because of its simplicity. Care should be taken that the antenna and counterpoise are disconnected so that no harmonics other than those wanted will be created. The circuit shown in Fig. 3 may be used

for both of your oscillators. Be sure that they both have a large wavelength range or you will be unable to use this method.

The following is an example of the method:

Tune the transmitter (oscillator) to 220 meters and check with your regular wavemeter. (Do this very carefully). Now with your receiver oscillating and with



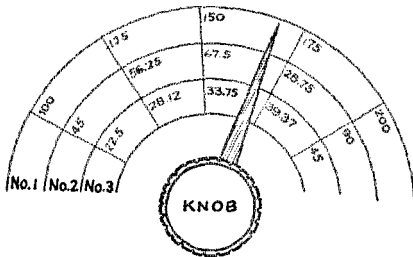
the phones on listen carefully at 110 meters for the 2nd harmonic and on 73-1/3 meters for the 3rd harmonic. (Warning—In all of this work you are likely to find a strong beat note at the 2/3 wavelength, which in this case is 146.66 meters. This point is perfectly good and reliable and may be used but do not mistake it for the 110 meter or 1/2 wave point.—Tech. Ed.)

Now that you have located these two harmonics, tune the receiver to zero beat on the 110 meter (or 1/2 wave) harmonic and then use the well known "click" method to locate this point on your new wavemeter, setting the switch on point 3 for the purpose. Put down the scale reading and the wavelength, then tune the receiver down to the third harmonic at 73-1/3 meters; again set for zero beat and then find this point on your wavemeter by the click method, this time setting the switch on point 2. To check up the process tune the oscillator to 110 meters and listen for the second harmonic with the receiver set on 220 meters. Go over this until you have these first points right because everything depends upon them. Now leave the oscillator at 110 meters and tune the receiver down to zero beat at 55 and locate this point on the wavemeter with the switch on point 2. Again reverse the process on 55 meters and

check that. All the way through be careful to avoid the 2/3rds wave the appearance of which is described in another article in this issue.

In like manner all of the waves can be calibrated. Start at 180 meters and listen for harmonics on 90 and 60 meters and so on.

Now this is all very easy but how are we going to get the waves between 110 and 150 meters? This also is easy. Example: to locate the 140 meter point tune the oscillator to 1½ times that wavelength or



The scale on the meter at 8GU  
This will not fit your wavemeter.

FIG. 2

210 meters. Use your old wavemeter to make sure that you are on 210 meters. The second harmonic will now be on 150 meters and the third harmonic on 70 meters. This is a combination in which the 2/3 wave may be used to advantage in locating the 140 meter point. When you are sure the oscillator is set on 210 meters, find this point with the receiver, then tune down carefully and look for the 2/3 wavelength. At 140 meters you should get a beat note because the 2nd harmonic of the receiver (70 meters) will beat on the 3rd harmonic (70 meters) of the oscillator. Make sure that you really have this adjustment and that you have not accidentally gone by it to the half wave at 105 meters. It should not be hard to recognize the difference as you already have some calibrations up to 110 meters.

**Arithmetical Calibrations**

If the oscillator fails to work on very short waves an arithmetical method may be used to great advantage. This method is accurate enough, there is no reason why it should not be almost as accurate as the harmonics method.

You will note in Fig. 2 a set of calibrations but this will not fit your wavemeter. These calibrations are given as an example only. Yours may be very much different.

In Fig. 2 it will be noticed that on my wavemeter 90 meters on scale 2 is opposite 200 meters on scale 3. Since the ends of

the condenser scale are not being used, curves are uniform enough so that it is safe to say that if 90 is opposite 200 then 45 will be opposite 100. This same system can be extended to other points. The idea can be illustrated by showing examples of the work done on the meter at 8GU, remembering that the same figures will not fit your meter. Example: we have a 125 meter point on scale 3 and wish to know what wave is opposite this on scale 2. Putting it differently, we wish to know what wave the meter tunes to with the pointer at 125 on scale 3 but with the coil switch set on point 2.

By using the system just described we find that

$$100 : 125 = 45 : X \text{ (X is the wave to be found)}$$

multiplying this out we find that X = 56.25 meters.

This value was then marked on the wave-meter dial as shown in Fig. 3.

Another example: to find what wave on scale 3 comes opposite 28 on scale 1. We already know that 100 is opposite 22.5 so we write

$$100 : X = 22.5 : 28$$

multiplying this out we have X = 124.44.

Still another example: to find what wave on scale 2 comes opposite 28 on scale 1. We know that 45 falls opposite 22.5, therefore

$$45 : X = 22.5 : 28$$

multiplying this out we have that X = 56.

This can be continued until all the waves wanted are obtained from a few "worker" waves.

By combining the two methods errors can be caught, making sure that one has used the correct harmonic.

**Hints**

The "click" method may make some

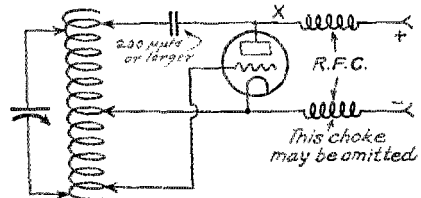


FIG. 3 OSCILLATOR

R.F.C. As described by Ballantine for waves above 30 meters. Below that add another choke at X. This should be one layer No. 32 or smaller wound full length of an ordinary porcelain wiring tube.

trouble on waves below 20 meters. In this event it is best to use a buzzer which

should be made a part of the wavemeter before calibrations are started. It is a nice job to calibrate the wavemeter twice. The buzzer circuit should be composed of a buzzer, small flashlight cells, and a switch connected in series. Connect this arrangement to the wavemeter by one wire only.

### Concerning the Two-Thirds Waves

The scheme of using the two-thirds waves was suggested to the technical editor by a League member several weeks ago. It has proven very useful although the editor must admit having made the error of informing our correspondents that there was no beat-note at the two-thirds wave. This is incorrect. There is a beat-note there and the reason for it is explained in our article on 4 to 5 meter work.

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## Southern Minnesota Convention

Reported by 9ZT.

THE Southern Minnesota Radio Association Convention was held Saturday, Sept. 13th, 1924, at Sleepy Eye, Minn. These conventions have been held regularly during the past four years, and through the great interest and energetic efforts of the members of this Association, the convention has always turned out to be one of the most interesting of the year.

The Standard Opera House at Sleepy Eye served as a meeting place for the convention, and members showed up from all over Southern Minnesota. Others came from the Twin Cities and from the Northern part of the state.

The convention opened with registration at 8:30 in the morning. Some of the members were a little late in arriving, due to the fact that an all-night watch had been kept station 9AWM, the station of L. V. Berkner that gained fame last year in the Hartford-Honolulu relay. Needless to say, the convention gang enjoyed operation of this fine station.

At 9:30 A. M. the program started with short talks from each of the principle station-owners present.

Mr. E. F. Johnson, Waseca, Minn., gave a talk on a new type of primary control for filament and plate transformer which will raise and lower the voltage secured from these devices.

At noon the Convention Banquet was held. Some very humorous and enlightening speeches by various members, made our dinner most excellent. Perhaps the event of the day was the award of the Cup for the best all around amateur station in Southern Minnesota. This Cup was presented to radio station 9EGG. 9EGG is located on a farm, and has operated under

difficulties during the past year. He uses Ford spark coils for his power supply, and even with this equipment, has been talking with all Districts. Recently, he communicated with the Canadian Arctic Expedition which was 100 miles north east of the magnetic north pole.

The code contest was held at the Banquet and, by process of elimination, there remained three of the men copying. 9DSW, 9EGG, and 9BBF, ran off with the honors in the first contest. In the elimination contest, 9BBF easily took first place with a beautiful copy at 31 words per minute.

In the afternoon, the Division Manager acted as Chairman of the discussion which embraced the latest A.R.R.L. news, S.M.R.A. news, and operating standards. A full discussion of the methods of handling messages took place, and different ways to help along the delivery of messages. This was followed by a technical discussion under the direction of the Division Manager, which lasted throughout the remainder of the afternoon. At the end of the discussion, the convention was declared officially closed, and the delegates went to the various radio stations in Sleepy Eye and New Ulm to spend the remainder of the night in communicating over the most excellent stations to be found in that territory.

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## Rules Governing the A.R.R.L. Information Service

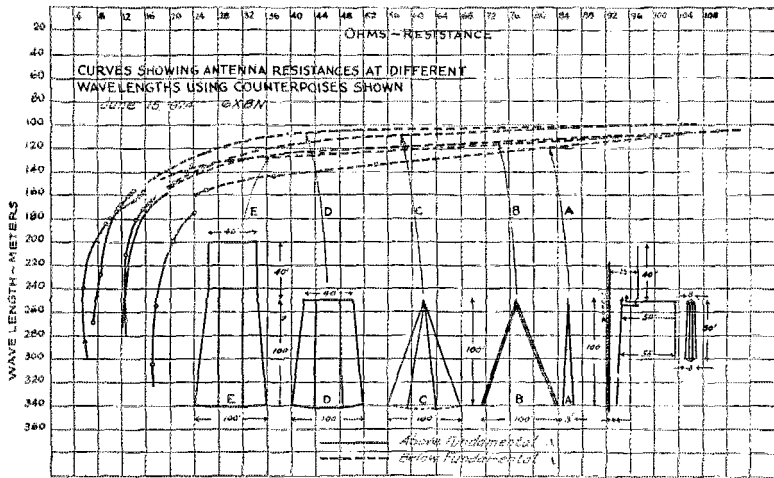
1. Before writing, search your files of QST. The answer is probably there.
2. Do not ask for comparisons between advertised products.
3. Be reasonable in the number and kind of questions you ask.
4. Put your questions in the following form:
  - A. A *Standard Business Size* stamped, self-addressed envelope MUST be enclosed. No stamp required from foreign countries.
  - B. Write with typewriter or legible ink on one side of sheet only.
  - C. Make diagrams on separate sheets and fasten ALL sheets together.
  - D. Number each paragraph and put only one question in a paragraph.
  - E. Keep a copy of your letter and diagrams.
  - F. Put your name and address (NOT merely call letters) on each sheet.
5. Address all questions to Information Service, American Radio Relay League, 1045 Main Street, Hartford, Conn.
6. Please remember Rome was not built in a day.

# A Counterpoise Investigation

By Gaston B. Ashe, 6XBN

I AM showing herewith a set of curves giving a summary of the results obtained in some counterpoise work. I believe the curves are self-explanatory. The same antenna was used in all cases and only the size and shape of the counterpoise changed. The measurements were between 100 and 300 meters as shown.

fundamental and a Weston No. 425 Thermo-Galvanometer was employed. Scale deflection was reduced to mills in each case. Four different readings were taken at each wave using different values of maximum scale deflection, each mounted separately and the average taken. It was found that the value  $R_x$  rarely varied by more than .2



Considerable thought has been exercised in perfecting the apparatus for making these measurements so that accurate results were obtained and could be duplicated at any time. The resistance board, Fig. 1, proved very satisfactory where the resistance to be measured was less than 30 ohms but for 100 meters, where 150 ohms was found in several instances, another method was necessary.

The most satisfactory method was by the use of the formulae

$$R_x = \frac{R I_2}{I_1 - I_2} - R_m$$

where—

- $R_x$  = Antenna resistance.
- $R$  = Known non-inductive resistance (20 ohms).
- $I_1$  = Galvanometer reading (mills) with  $R$  shorted.
- $I_2$  = Galvanometer reading (mills) with  $R$  not shorted.
- $R_m$  = Resistance of Galvanometer.

The resistance  $R$  was measured on a wheatstone bridge to within .01 of an ohm. A series condenser was used below the

of an ohm, indicating a degree of accuracy of better than 2% in the region of the fundamental.

A sketch of the apparatus is enclosed on a separate sheet.

These experiments are being continued and at a later date I hope to have sufficient data on hand to permit the building of

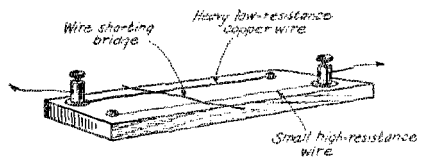


FIG. 1

BOARD USED TO MAKE RESISTANCE MEASUREMENTS BY THE METHOD OF ADDED SERIES RESISTANCES

To increase the resistance the wire shorting bridge is slid to the left. To lower the resistance it is slid to the right. Neither movement produces the troublesome Ljung effect of ordinary resistances.

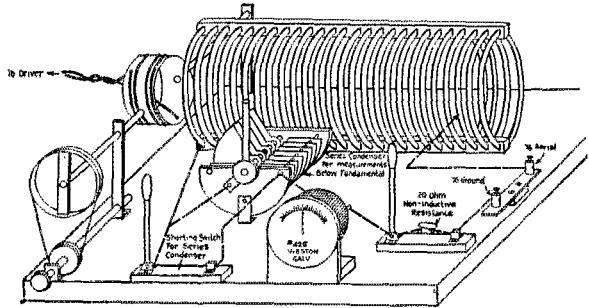
radiating systems with predetermined characteristics and also to find the most efficient antenna for a given wave.

Results from actual transmission tests at this station indicate that as the wave is reduced the signal strength increases until about 125 meters is reached and decreases below that point. I believe that it is not efficient to work more than 25% below the fundamental as the curves show that the resistance rises very rapidly below that point and it is very difficult to put the power into the antenna. Of course it is realized that the lower waves carry better than the higher to which I believe is more due the success of last winter's trans-Atlantic tests than to the fact that the antenna was worked so far below the fundamental. I am attempting to design the most efficient antenna for 100 meters. Any information on the subject will be greatly appreciated.

The resistance measurements show that something peculiar happens to the resistance right at the fundamental. It flattens off very suddenly and seems to drop a bit. I noted that Mr.

Pierce's radiation resistance curves flatten off. It might be possible that they decrease for a meter or two below the fundamental.

When the series condenser is cut in the curves start on a lower plane instead of an upper as you would think they should due to losses in the condenser.



The Resistance-Measuring Layout

I trust that these results will be interesting either to you or the readers of QST, either in whole or in part.

## Where Has Interference Gone?

THIS is not a Pollyanna story of "wonderful futures" and "unguessed marvels". Everyone of you have read enough such rubbish to last for six ordinary lifetimes. This time let us talk about the remarkable things that are right here and doing business at this moment. After all, isn't progress most interesting when you can reach out and put your finger on it?

### The Old-Fashioned Boiler Shop

In every corner of the world ship operators are handling commercial traffic. They are copying through a chaos of interference, partly through skill, partly by sheer bull-headed concentration with the assistance of crimson and magenta phrases studded with crash words. Of course, sometimes the interference lets up and only five signals are heard at the same time, which makes matters considerably easier.

The commercial man is not especially happy about this situation, but is inclined to regard it as a dog regards fleas—an infernal nuisance but not to be avoided. The

engineer for the commercial company would like to throw out the sparks and put in vacuum tube transmitters, but is held back by a Board of Direction which entertains the peculiar notion that the stations should be made to pay dividends.

FLOOR PLAN OF THE RADIO SHOW AT SPRINGFIELD, MASS

RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	AMERICAN RADIO RELAY LEAGUE 10 WATT TRANSMITTER	RECEIVING SETS
AISLE				
RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS
AISLE				
RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS
AISLE				
RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS	RECEIVING SETS
AISLE				

Map showing location of different exhibits at the Springfield Radio Show. Some other things in the hall created savage interference but the amateur radio set was not even heard by any receiver in the hall, because they were all modern broadcast tuners and could not be interfered with by a modern 30 meter transmitter.

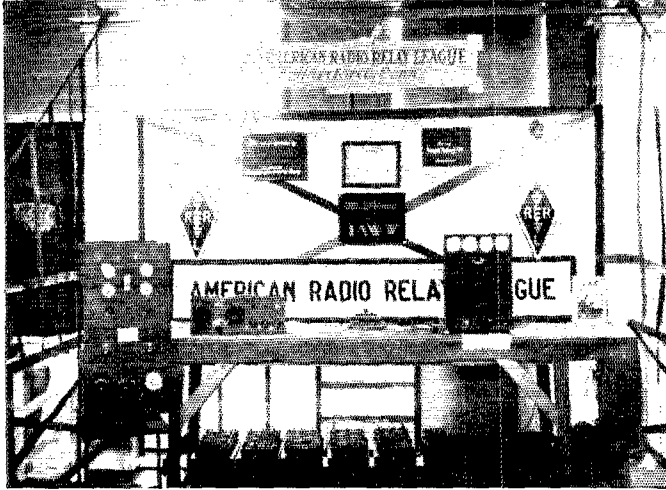
### The New-Fashioned Fire Bottle

Mr. Citizen Radio is not so. He has no Board of Directors unless he is married, and even then the Mrs. may be a radio nut

herself. Therefore Mr. and Mrs. Citizen Radio throw out the old equipment every few months and purchase a nice new shiny receiver or transmitter.

That's why the vacuum tube receiver first became popular among non-profes-

in radio to come out right. We even think that WBZ will sharpen up that horrible broad wave and take out the commutator ripple, that NAT will fix that dizzy key they use to send Chinese with, and sometimes we even think the time will come



THE A.R.R.L. BOOTH AND STATION 1AWW

This is not the regular 1AWW but a special station built for the occasion and operated under special permit from Supervisor Kolster. The booth was the center of much interest on the part of both amateurs and broadcast listeners. The Springfield Radio Association co-operated with the Assistant Division Manager and with City Manager Roger Houghton in the making of the installation and in operating the station.

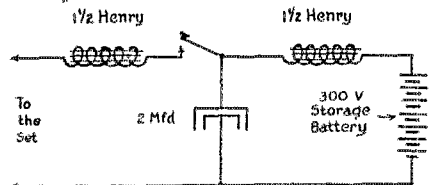
sionals; that's why the vacuum tube transmitter today is universal amongst amateurs—but a long way from universal commercially.

Free spending for apparatus helps development, for the radio game can climb only with the aid of mounds of obsolete apparatus. Fortunately these stepping stones are being provided—see the piles of mouldering single-circuit "tuners"; the direct-coupled vacuum tube sending sets and the crusty old spark sets?

Have we said that we are getting on?

A couple of years ago the citizen's radio man was fighting the same sort of hash that the commercial man is up against today. Because of the things we have just talked about Mr. Citizen Radio man is just about out of the woods today. He can receive his broadcast unadulterated (unless he lives too near a commercial or broadcast station) or he can work his amateur "fire bottle" transmitter in the cheerful certainty that he isn't manufacturing interference for anyone. Sounds unreasonable, doesn't it? Sounds like one of these things that happen in the novels about 1924. But it isn't, it is right here today. Honestly, this seems remarkable to us. It seems so remarkable that we now expect everything

when all amateurs will be compelled to send the continental code decently and readably.



### 1AWW KEYING SYSTEM

#### THE KEYING SYSTEM WHICH MADE THE STUNT POSSIBLE

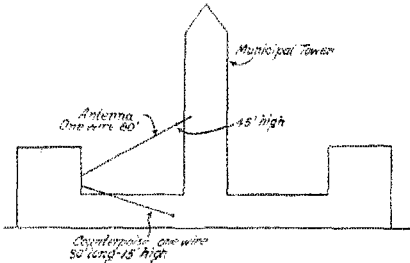
No keying thump with this arrangement. Just such an arrangement was shown in Figure 2H, page 30 of July 1923 QST. We even recommended it strongly but nobody seems to have paid the least attention to it.

Of course, all this is just effervescence, but there's a reason for it.

At the Springfield (Massachusetts) Electrical and Radio Show just such a combination was in operation. No special tricks were used, the transmitter being simply a *good modern* amateur transmitter and the receivers being *good modern* broadcast tuners.

**Making Good**

Can you imagine a transmitter set right down in the middle of a roomfull of receivers? Certainly you can, and you can probably imagine a riot to go along with the scene. But can you imagine all this equipment in operation without *any sign whatever* of interference? Well, the thing is possible today, although we didn't believe it was two years ago.



IAWW ANTENNA SYSTEM

**THE RADIATING SYSTEM**

Although surrounded on three sides by concrete and granite buildings with steel frames and reinforcements this system proved very effective.

The transmitter was in the booth operated for the American Radio Relay League by the Springfield Radio Association. The show was primarily a broadcast show, therefore everybody's first thought was that it would be best not to transmit. In the next instant, however, it was realized that with the modern 80 meter transmitter the thing would be practical and desirable.

**Working Fast**

No transmitter was available and one had to be built in a hurry. In a trifle over eight hours Isaiah Creaser, 1BSJ; T. F. Cushing, 1AWW; and Ralph Gross, 1BLU, constructed the transmitter. In accordance with modern practice, inductive coupling was used. With direct coupling the whole thing would have been impossible. A one-wire antenna and a one-wire counterpoise were hurriedly installed and the station put into operation. The transmitter only used a pair of little UV-202 tubes, and the antenna current was about a quarter of an ampere. With the old 200 meter sparks this would have represented a few miles of range only. With this 80 meter C.W. transmitter 3MQ at Allentown, Pennsylvania, was worked ten minutes after the set was connected; in broad daylight.

During the week the transmitter was in continual operation from 1:00 P.M. until 11:00 P. M. each day, stopping only long enough to change operators. During the week there were many radio conversations and 133 radiograms were handled, the

farthest station worked being 5RU at Tuscaloosa, Alabama. The distance is about 1000 miles. Two and three hundred

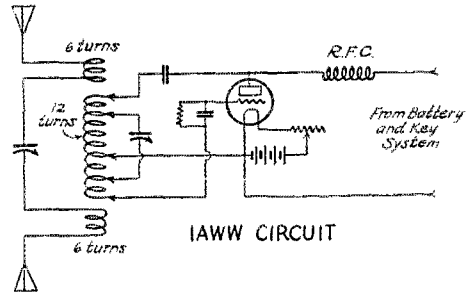
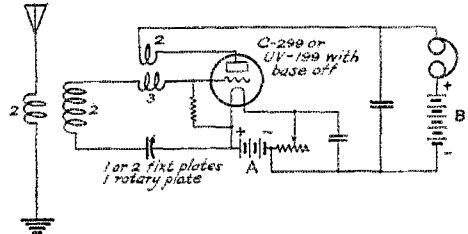
We, the following Exhibitors, certify that the 10 watt transmitting station installed and operated by the American Radio Relay League at the Springfield Electrical and Radio Show during the week of October 27th to November 1st, 1924, caused absolutely no interference, nor were we able to hear this transmitter while it was in operation.

McLean Radio Co., 288 Main St.—A. S. McLean.  
 Springfield Radio Co., 323 Main St.—J. Reich.  
 R. E. Demarest Co., 480 Main St.—J. J. Crowley.  
 Whitall Radio Co., 225 Worthington St.—E. Pinney.  
 Carlisle Hardware Co., 326 Main St.—AL Baker.  
 J. M. Bess Co., 280 Main St.—Gary Fortune.  
 Radio Development Co., 535 Main St.—A. Roal Sully.  
 The Radio Shop, 276 Worthington St.—E. H. Hathaway,  
 by E. H. M.  
 Springfield Radio Show, J. P. McMahon, Gen. Mgr.  
 Wermore & Savate Co., c/a L. Hutchins.  
 Elbie Electric Company, 429 State St.—J. A. Block.  
 The Tuohy Company, 145 State St.  
 Zenith Radio Corp., Chicago, Ill.—Wm. J. Gaynor.  
 Adaskin Furniture Co.—R. W. Wagner.

miles communication during daylight was the regulation thing.

All this was in the midst of a dozen broadcast receiving sets, some not more than 20 feet away. Not a one of these receiving sets was able to determine when the station was in operation.

Think of the contrast between that and the great smudge of interference created



**THE COUPLED HARTLEY CIRCUIT USED**

Two UV-202 tubes were used in parallel. With an input of 125 millamperes at 300 volts this set put 250 millamperes into the antenna at 77 meters.

by older types of transmitters. Think also of the difference in the broadcast receivers that were able to tune out a near-by station as compared with those of a couple of years ago which merely received but did not tune at all. Truly, we are progressing after all.

## The 1924 Trip of the C. G. S. "Arctic"\*

By Wm. Choat, c3CO, the Operator

**T**HREE days before the "Arctic" left Quebec the transmitting equipment was given tests and communication carried on with a number of amateurs in Canada and United States, while tied up at the wharf. The equipment in use has been previously described in this publication.

Sailing from Quebec on July 5th, communication was maintained by the 600- and 2100-meters, as well as the short wave, sets. Shortly after passing the Straits of Belle Isle, some heavy weather was encountered and a very important long, code message was put through from the "Arctic" to c9AL, c1AR, c2CG and 3AFP. Cooperation between these amateur stations in assisting each other was fine business as all of them could be heard on board the "Arctic" confirming different portions of the message to each other. This message would not have been put through until a considerable time later by commercial channels.

During the time that the "Arctic" was proceeding up the Labrador Coast and over to Greenland, messages were sent back through the Danish revenue cutter, "Islands Falk", which was stationed off the

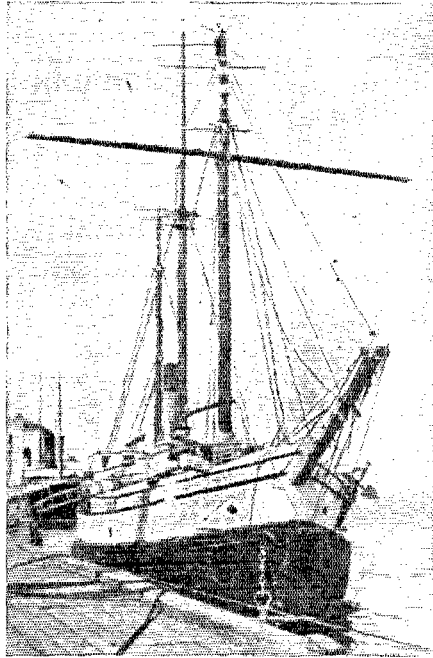
lower Greenland coast, this ship being in communication with the Louisberg station in Nova Scotia on 2100 meters.

When Ponds Inlet, which is situated at the north end of Baffin Land, was reached, communication with the outside was cut off, probably due to the high mountains which surrounded the ship while anchored there. However, amateur signals were still copied at this place although there was

continuous daylight. Continuing north from Ponds Inlet, the ship reached Etah on August 11th and found the "Bowdoin" had left five days previously and was proceeding down the Greenland coast. All the way up the "Arctic" had been calling the Bowdoin at approximately midnight, on waves about 175 meters but was unable to get in communication with Mix.

On August 13th we headed southward and arrived at Dundas Harbour, North Devon Island, on August 17th. Here the "Arctic" anchored for nine days, while the police post was built and the Government cache made. While anchored here numerous amateurs were copied, including Canadian 3CO, my own station.

On August 26th we left Dundas Harbour and that evening communication was established with Canadian 4FV, of Regina, Saskatchewan, thus breaking the three weeks' silence. One message was sent through this station advising of the welfare and position of the "Arctic" and all those on board. This was daylight communication as far as the "Arctic" was concerned. The next evening in Eclipse Sound, a few miles south of Dundas Harbour, the following stations were worked: c4FV, u8CDC, c3VH and c3CO. Work was nearly completed this night when the power supply failed, much to the op's consternation, until the second dynamo was run up.



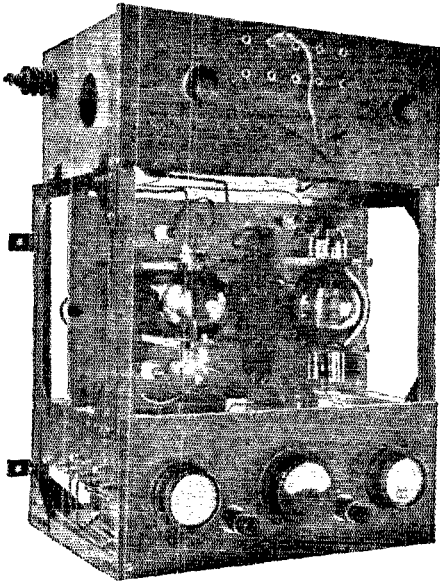
THE "ARCTIC" AT DOCK

Operator William Choate may be seen at the top of the foremast, although his cheerful grin is a bit hard to make out.

\*As reported in our July issue, the Canadian Government Steamer "Arctic", under the Northwest Territories Branch of the Department of the Interior, this year carried a short-wave radio installation in addition to her regular equipment, a crack Canadian amateur, Bill Choat of 3CO, Toronto, being selected as operator. The "Arctic" goes into the far North each summer, establishing and servicing Canadian government police stations, and carrying a "circuit judge" who administers justice at the various posts. In past trips great difficulty has been experienced in maintaining communication through the Arctic daylight on commercial wavelengths. This is an account of the successful communication maintained this year via amateur stations.—H. for.



On the following evening while anchored at Ponds Inlet again, a message was sent to c4DQ and communication was carried on with u7GR. From Ponds Inlet the "Arctic"



THE 2200 METER TRANSMITTER OF THE ARCTIC

Antenna terminal bushing is shown at the upper left side of the set. On the control panel at the top of the set will be seen two knobs and a pair of cords. The left cord is labeled "Reaction" (which we call feedback), the right one "Variometer". The variometer is probably in series with the antenna. The upper row of jacks connects to taps on the antenna inductance, the lower row of jacks represents plate taps.

The small tube at the left is a Marconi "MT1" and the other one is an "MT4".

The meters—left to right—are plate milliammeter, antenna ammeter and filament voltmeter.

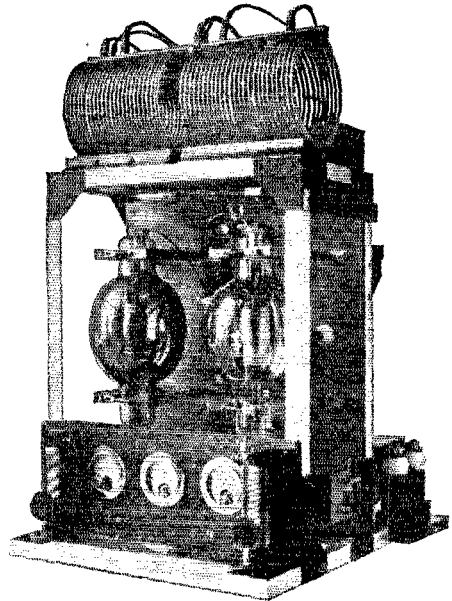
proceeded to Albert Harbour where ballast was taken on board and the engines overhauled. While here the "Bowdoin" was worked, she being then at Godhavn, Greenland.

Albert Harbour was left at midnight September 3rd, and the following day communication was carried on with c3GG, Timmins, Ontario, one message being sent under great difficulties. No more traffic was sent until we neared the southern coast of Baffin Land, when on September 9th four messages, one very important, were relayed through WNP, who was then stationed at Indian Harbour. WNP was at this time QSO 1RV. Two days later the Hudson Bay boat, "Nascopie", which was then anchored in Cumberland Gulf, was worked on the 2100-meter C. W. set. From the time the "Arctic" passed Hudson Strait on its homeward journey till Belle Isle was

reached, very few amateurs were copied and those that were heard were fading very rapidly, although at this time about eight hours darkness was being experienced. There seems to be something funny about communication while off the Labrador Coast.

From the time Belle Isle was reached till the ship docked at Quebec on September 24th, nightly communication was carried on with amateurs in several parts of Canada and United States. The record two-way communication was made when g2NM in Surrey, England, received and OK'd a message from the "Arctic", which was then off the coast of Anticosti Island in the Gulf of St. Lawrence. The signals of c1AR were terrific when in the Gulf.

Extremely valuable work was done by Mr. Harrison at 3AFP of Ottawa, Ontario,



THE 100-150 METER SET OF THE "ARCTIC".

Two 1-k.w. tubes are supplied with 480-cycles at 10,000 volts. Antenna tuning inductance above the tubes, with indicating meters on a bakelite panel across the bottom. Plate transformer, etc., are mounted behind the tube panel. This is the set that did the work.

who delivered messages from the "Arctic" direct to the Department. During the whole trip the CW telegraph signals from the experimental set at KDKA, operating under the call 8XS, were received and from the time that Belle Isle was passed on the way up till the "Arctic" returned, these

signals were of almost unvarying strength no matter whether the boat was landlocked or not. However, great difficulty was experienced in trying to copy the short waves (68 meters) when the ship was rolling to any extent.

The conclusions which I have come to from this trip amount mainly to the fact that the short waves are greatly preferable to the commercial wave lengths for ship-to-



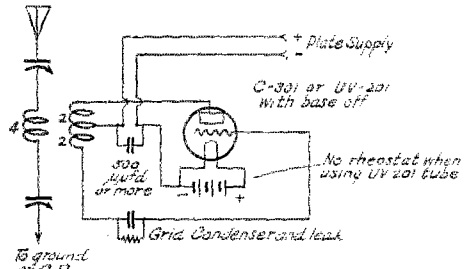
"BOISTEROUS BILL", c3CO.

shore communication provided this is not carried to an extreme. Great difficulty was experienced in copying waves below 100 meters in any kind of a heavy sea owing to the rapid changes of capacity caused by the rolling of the vessel. The waves between 125 and 150 meters seem to work out the best for this work but no doubt some means of combating this change of capacity would enable shorter waves to be used satisfactorily. Strangely enough few stations were heard below 100 meters, although a watch was kept as low as 60 meters. Some trouble was experienced due to the salt water grounding portions of the electric light circuits of the ship when heavy seas were coming over, with corresponding noises in the receiver.

An official report will be issued by the Radio Branch of the Department of Marine in due course.

### 9APW's 5-Meter Equipment

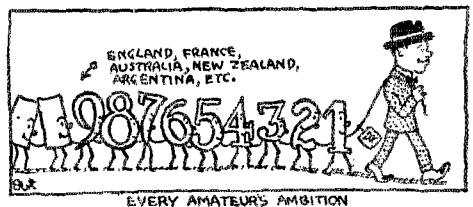
**A** HA! 7 days after the last moment we did get the material. The transmitter is built like the one constructed by Beekley of IAEL and de-



scribed in QST for October. It tunes by the same scheme, moving the tops of the helix turns to and fro. Pretty crude? Perhaps. But what else are you going to do—shift the plate and grid inside the tube? The tube itself is a UV-201 (not UV-201-A), which can be obtained from anyone who is tired of supplying an ampere where a quarter amp. will do. In St. Paul the current price of used UV-201 tubes is \$1 (American), or dos pesos. In the set at 9APW-9ZG the plate supply is from a storage battery, hence no radio chokes are needed. If any other plate supply is used, be sure to use very effective chokes—see the October issue.

The receiver tunes by means of a variable grid condenser, somewhat as in the other receivers suggested here. The diagram explains the circuit, and the proper number of turns is marked opposite each coil. As there are only very few turns in each coil, it doesn't matter particularly just how they are wound. The ones at 9APW started out to be spider-webs, but 2 turns doesn't make much of a web. The variable condenser can be almost anything that comes handy, provided you are willing to tear out all but 3 plates and perhaps to cut down the rotary plate somewhat.

Has it occurred to you how tremendously easy all this is as compared to the big stuff we formerly had to use on 200 meters?



## Experimenters Section

**T**HIS month the space of this section will be given over to the 20 meter and 5 meter tests, because that is the most important thing to be done.

By this time all members of the Experimenters Sections have gotten their bearings in the 20 meter region, having had the tests of November 22 and 30 to work on. There should now be a good supply of wavemeters, tuners and transmitters for the 20 meter band.

The December and January tests are for all A.R.R.L. members, and the members of the section are asked to help other A.R.R.L. men in every way possible.

### Why the Tests?

As stated elsewhere in this issue, the 20 and 5 meter bands are being ignored by entirely too many amateurs. There is far too much of this thing of "letting George do it first." Exactly that same attitude delayed the 100 meter work for six months and exactly that same attitude was what probably lost us the region below 150 meters in the first place.

These tests are designed to cure that state of affairs and to give all of us "the courage to make mistakes" on the new waves.

### What Circuit and Apparatus?

Even today we get letters that ask "What circuit shall I use on —meters." Use your own pet circuit—just cut the thing down to the right size and use it. For details see the following articles:

Antenna Series Condensers, p. 21, March *QST*.

Loose Coupled Transmitting Circuits, p. 11, April *QST*.

Meissner Transmitters, p. 18, May *QST*.

Calibrated Oscillators, p. 54, July *QST*.

These articles were written for 200 meter work but will fit the present job. However the following articles were written for short-wave work.

Tuner That's Different, p. 42 August *QST*.

3rd Harmonic Transmission, p. 12 August *QST*.

20-40-80 Meter Work, p. 9 Sept. *QST*.

Short-Wave Wavemeters, p. 24 Sept. *QST*.

Tuner (cut down for 20 M.), p. 48 Sept *QST*.

5 Meter sending set, p. 13 October *QST*.

5 Meter wavemeter, p. 13 October *QST*.

5 Meter antennas, p. 13 October *QST*.

5 Meter receivers, p. 13 October *QST*.

Short-wave super-regenerators, p. 32 October *QST*.

Short-wave antennas, p. 31 Nov. *QST*.

Practical Short-wave sets, p. 44 Nov. *QST*.

Short-wave Wavemeters, p. 31. This issue.

Just one more suggestion—Goldberg of 9APW was going to write us a story about a 5 meter tuner but he hasn't gotten to it, so the idea is shown in the Figure. No explanation is needed except that the variable condensers can be "high loss" with very little bad effect, because they are *series* condensers. The size of the plates, the spacing and the coils are all up to you, that's where the fun comes in. But it's better to start with a "debased" C-299 tube, as explained in the 5 meter article mentioned above.

(Note—we almost forgot that there's an 8 meter tuner in the "Amateur Builder" section this month.)

### The Schedule

The tests are so arranged that all stations in the "Atlantic Intercolonial Time Belt" send first, then the stations in the "Eastern Standard Time Belt", then the ones in Central Time Belt, etc. However, all times are given in Pacific Standard—figure out the correction for your own location and send accordingly.

In each test send as follows—

"QST QST QST u (your own call *three* times only) 20 meter test."

Repeat this during your test period. It is best to send slowly and clearly (fading is often bad at 20 meters—and there is no telling what it will be at 5 meters). Above all—make many *short* calls; don't copy those idiots that sign for ten minutes at a stretch.

### Evening of December 13—20 Meters

#### Pacific Std. Time.

(Figure your own time from this.)

All stations in Atlantic 10:00 to  
Intercolonial Time Belt send 10:15 P. M.

All stations in Eastern Std. 10:15 to  
Time Belt send 10:30 P. M.

All stations in Central Std. 10:30 to  
Time Belt send 10:45 P. M.

All Stations in Mountain Std. 10:45 to  
Time Belt send 11:00 P. M.

All stations in Pacific Std. 11:00 to  
Time Belt send 11:15 P. M.

Daylight Test, December 21-20 Meters  
Pacific Std. Time

(Figure your own time from this)

All stations in Atlantic	
Intercolonial	Noon to
Time Belt send	12:15 P. M.
All stations in Eastern	
Standard Time	12:15 to
Belt send	12:30 P. M.
All stations in Central	
Standard Time	12:30 to
Belt send	12:45 P. M.
All stations in Mountain	
Std Time	12:45 to
Belt send	1:00 P. M.
All stations in Pacific	
Std. Time	1:00 to
Belt send	1:15 P. M.

Evening of December 27—5 Meters

Send exactly as on night of December 13—  
but use 5 meters.

Daylight Test of January 4—5 Meters  
Send exactly as on December 27—but use 5  
Meters.

**Reports**

Please make your log as complete as possible and mail it to "Experimenter's Section, A.R.R.L., 1045 Main St., Hartford, Conn." The report will be *absolutely wasted* unless you date it so we can tell one test from the other. Also *please* don't mix a lot of other things into the same letter, we don't have time to sort them out. Unless your log is mailed promptly after each test, it can not be used in the QST report.

**Concerning Other "X Section" Affairs**

The tests take up the room this month. For information on this section please see the last issue of QST, page 35. *Please* write any letters as requested there.

Application for membership is explained at the same place.

**How About This?**

E. F. JOHNSON  
RADIO SUPPLIES  
WASECA, MINN.

July 8, 1924.

Experimenter's Section, A.R.R.L.  
Gentlemen:

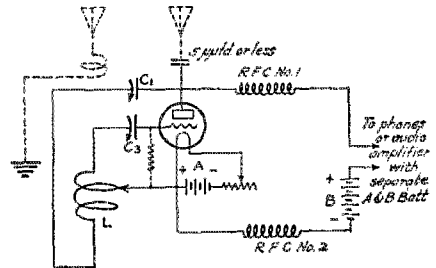
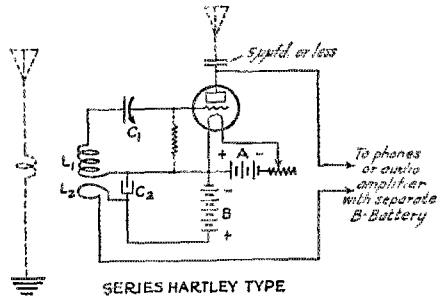
We are very much interested in putting on the market a transmitting inductance which will meet the needs of present conditions in amateur transmission. There is but one prominent make now available, and in our business we receive a great many requests for them. However, even this is not made in sufficient quantities to supply the demand, and it is not entirely suited to various desirable uses.

The writer will be interested in co-

operating with the Experimenter's Section and receiving whatever data is now available in order that the best possible instrument may be put at the disposal of the amateurs.

Very truly yours,

E. F. JOHNSON, A.R.R.L.



SERIES HARTLEY TYPE

SHUNT FEED HARTLEY TYPE

**SUGGESTED 5-METER TUNERS**

**Notes:—**

A 4-foot antenna may be tied to the plate as shown. The very small condenser may not be strictly necessary but if used it can be made of two wires as shown on page 9, Fig. 2, Sept. QST. If the antenna is coupled to the coil as the diagram shows keep the coupling very loose—coils at least 10" apart.

A grid leak may be used if necessary—connect as shown, not across the condenser.

The tuning condensers should have long insulating controlling handles. Ordinary variables are far too large. Suggestion—two very small plates set half an inch apart for the grid circuit, two regulation plates set at usual distance for C3. Metal end plates don't fit this job—the capacity is away too high.

The shunt-feed circuit is probably best. For ideas on building it with very short leads see the 4-5 meter transmitter on page 13, October QST.

To find out if a set of this sort is working, make two and listen for beat notes with one of them.

C1—Tuning condenser. Maximum capacity 10 micromicrofarads.

C2—Bypass condenser. Any very compact condenser of 200 micromicrofarads or more.

L1—Grid coil. Two 3-inch turns or one larger turn.

L2—Plate coil (tickler). One turn 2 or 3 inches diameter.

L3—Continuous helix of 2 or 3 small turns.

C3—Same as in series-feed circuit.

C4—Plate stopping condenser used as regeneration control. Capacity of 50 micromicrofarads about right.

R.F.C.—One layer No. 36 D.C.C. (or other very small wire) wound on common wooden pencil or porcelain wiring tube.

## The Bigbill Installation

**T**HIS story should have appeared before—but we have been hoping and hoping for some pictures of the transmitter, also for a bit of news about the voyage. However—they may come later, so here's the first part of the story.

The Bigbill was built at Chicago and named after ex-mayor William Hale ("Big Bill") Thompson. She left Chicago for a two-year trip into southern seas.

Of course she carried a short-wave transmitter; can you imagine an exploration outfit getting out of Chicago without knowledge of the Zenith outfit? Naturally also the operator was an A.R.R.L. man, E. C. Page of 9BP-9XBF. The construction and installation of the set were due to F. J. Marco, (9ZA) of the Bremer-Tully staff; R. H. G. Mathews of 9ZN, Chicago Radio and Zenith Radio Corporation; and W. E. Schweitzer of 9AAW-9XBD-9ZW.

Does this sound like another Bowdoin story? Have patience, it will now become radically different.

### The Trip Down

Of course the Bigbill could have gone to sea via the St. Lawrence river—but she wanted to go south and not north. Therefore Captain A. J. Duken took her out via the Chicago Ship canal and the Illinois river into the Mississippi. Now here the yarn begins—the ship canal has suffered from lack of use, the Illinois river also isn't in the best navigable condition. Even the little Bigbill had Satan's own time getting through, and once had to be dragged over a mudbar by a steel cable and a locomotive. Once she got into the Mississippi it was possible to proceed by towing behind one of the War Department's big steel tow-boats that run on the Mississippi-Warrior route. Since the tow-boats were always shepherding a big herd of barges, the Bigbill had to take potluck, and frequently got

into arguments with bars and other obstructions. A hectic trip resulted, and the outfit reached New Orleans by the hardest sort of work.

The set was aboard and ready for installation, but the actual installation had just begun when Bigbill left Chicago. The set had previously been tested at 9XN, the Research Division of the Chicago Radio Laboratory at 4829 S. Kedzie Avenue. With the temporary antenna and had ground used there it was not reasonable to expect brilliant results. However, the antenna current was 1.5 amperes at 90 meters, 2.0 amperes at 110 meters, and rose as the wave went up. The test was a brief one, but stations at Tacoma, Washington, and Hartford, Connecticut, were worked easily enuf. Everyone was therefore confident that the set was good.

On the trip down Schweitzer and Marco and Page worked furiously to get the radio set into place. When Memphis was reached the set was in action and making a great splash in the ether. Before New Orleans was reached all states had been worked and "WHU"

was beginning to be a familiar call.

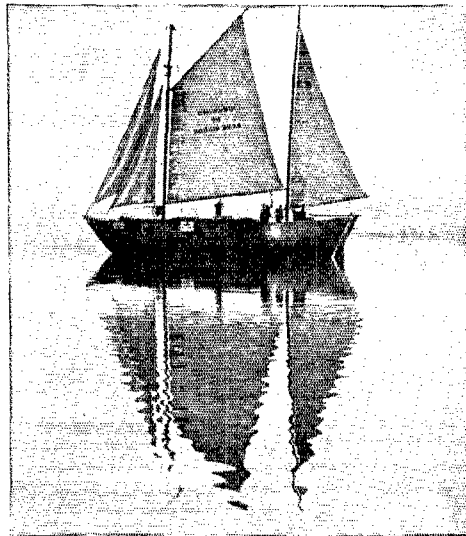
Good contact was established with Chicago via 9AAW, which was being operated by Ritchie Schweitzer.

At New Orleans the rest of the radio gang left for home, and the Bigbill headed down the river for the Panama Canal and the southern Pacific Ocean.

Where she is at this writing we do not know, but we understand that radio contact with 9AAW-9ZW has been excellent, using some wave near 80 meters.

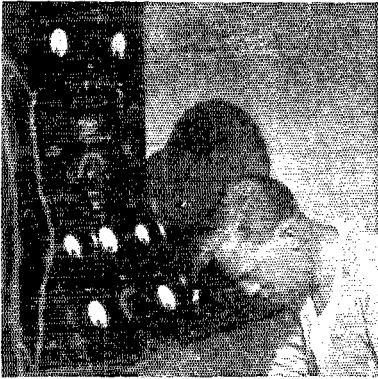
### The Radio Installation

The Transmitter consists of two panels. The upper, or radio-frequency panel, is vertical. The lower panel is brought out at a slant somewhat after the fashion of



THE "BIGBILL", WHU

the panel in a Zenith receiver. Jewell meters are provided throughout for all circuits. There are two antenna ammeters, one with a range of 0-8 amperes and the



WHU's Zenith Transmitter with Schweitzer on the Right and the Top Two Inches of Marco Showing in the Center Foreground.

other with a range of 0-3 amperes. The reason for two ammeters is found in the very great wavelength range of the set—80-700 meters.

Two UV-203-A tubes are operated in parallel in a plain Hartley circuit. The plate supply is obtained from a 1500 volt dynamotor which operates on the ship's 32 volt storage battery. The battery is charged by a Delco generator.

Quoting from a letter by R. H. G. Mathews:—"Copper busbar wiring is used throughout, and special attention has been

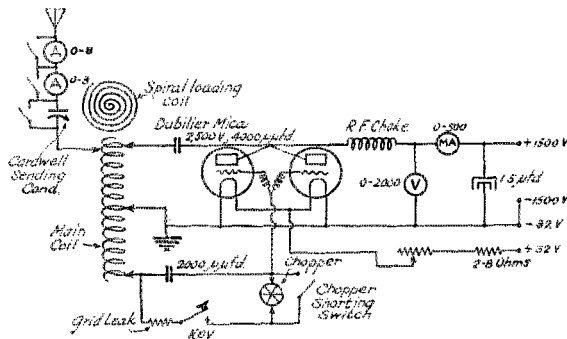
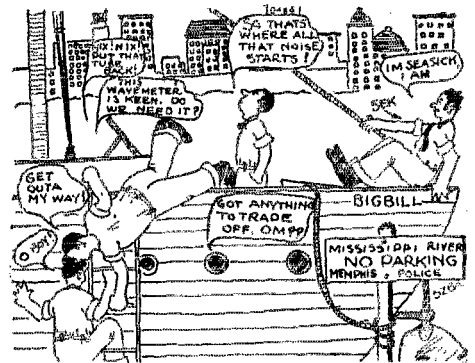
given the construction of the set in order to make it sturdy as well as efficient. The dielectric losses have been minimized by proper design and construction. Porcelain supports are used whenever possible, and if porcelain is not available hard rubber is used. No bakelite or moulded material of any kind is found in the set. A loading inductance is provided to bring the wave of the set up to 700 meters to allow communication with commercial ship and land stations when amateur stations are not available.

A complete set of spares has been included with the equipment; including spare rheostats, antenna wire, tubes, condensers, and even a spare key.

The ground consists of a two-foot copper strip running completely around the hull below the water line.

### The Tuners

The tuner is of the low-loss type and was built in the Chicago Radio Laboratory,



NOTES - The small grid chokes are of 30 turns No. 28 D.C.C. on a 1" wooden core. The set is provided with a battery volt meter and motor ammeter which are not shown in the diagram.

### THE CIRCUIT OF THE TRANSMITTER

If you copy it be sure to make yours inductive'y coupled as you don't have the special license carried by WHU.

Research Department, by K. E. Hassel, who wrote the first article on low-loss tuners which appeared in QST last January. This tuner embodies all the latest developments in low-loss construction and has a wave-length range of 50-200 meters.

A second tuner is provided, this being a standard Zenith 3-R, having a wave-length range of 200-800 meters.

### Antenna

The antenna is a four-wire aerial, 68 feet above the waterline, with wires spaced 3 feet apart. The wire is No. 10 gold plated and the leadin is composed of four strand

of this same gold-plated wire soldered at intervals of a foot, the wire not being twisted but brought straight down parallel through the porcelain insulator. The gold-plated wire, of course, is used to eliminate corrosion.

### Burgess Helps

A two-year battery supply has been provided by the Burgess Battery Company with special attention paid to the conditions under which the set will operate, regarding temperature, moisture, etc. Inasmuch as the receiving set uses three "B" batteries and a "C" battery, a number of sets of batteries have been provided and sealed in evacuated metal containers which will be packed below the waterline of the ship in as cool a spot as possible.

### A.R.R.L. Affiliation

As manager of the Central Division, Mathews issued an O.R.S. certificate to the ship. Accordingly the Central Division now has a station somewhere west of Panama. Probably this set will shortly be the "farthest south" station of A.R.R.L.

"Each month a report of the traffic



Some of the Gang who had to do with the installation of WHU. Left to Right they are: E. A. Beane, 9th District Supervisor; R. H. G. Mathews, 9ZN; F. J. Marco, 9ZA; W. E. Schweitzer, 9AAW. Hiding behind Marco is E. C. Page, 9BP, the A.R.R.L. operator of WHU; and at the far Right is William Hale Thompson, the man for whom the "Bigbill" is named.

handled will be sent to the superintendent of District No. 7, state of Illinois. This will be included in the regular traffic report of the Central Division."

Watch for WHU on 110 meters and on 80 meters.

## Fifth Canadian District Convention

By Fred Elliott, c5HB

TO the accompaniment of tin whistle, CQ's cat calls and much blowing of automobile horns, the First Canadian 5th, District Convention opened Sept. 20, 1924, at Vancouver, B. C. Quite a number of the gang turned out for the morning session in spite of the weather QRM and it was a happy bunch who met in the B. C. R. A. club rooms at 10:00 A. M. to start the most eventful days in the 5th District's history. After all hands had registered everybody was loaded into cars owned by various local hams and the whole procession headed for the Point Grey Govt. Station VAB where Mr. Mellish, the operator on duty, showed the visitors over the station.

The afternoon was spent in visiting 5GO, 5GF, 5HB, 5HG and 5CN; all local Ham stations.

At 6:00 the whole gang assembled at the B.C.R.A. club rooms and paraded up to the Grosvenor Hotel where the banquet was held. The first couple of courses were the "Quiet" hours but then things began to get warmed up and soon a smoke screen gradually enveloped the gang. The Host being a Scotchman and naturally prepared for anything started a sort of vacuum pump outfit that sucked the smoke up through the roof and cleared the atmosphere sufficiently to see from one end of the table to the other.

The program was opened by a performance by 5HB and 5CN, piano and saxophone respectively. Mr. McGoughan of the Northern Electric Company, gave a talk on "Low Loss Condenser Construction" and passed one around for exhibit (he eventually got it back). Next followed a talk by 5BJ on "Wartime Radio Communication". Next on the list was a code jamming contest; 50 words straight and 50 jammed. Sender 5GF, Jammer 5BJ, Winner 5GO, 2nd 5AN, 3rd 5AK. Mr. Edgar, Australian 5AP, representing the Wireless Institute of Australia, then gave a talk on ham activities down under.

A diagram drawing contest was won by 5EJ 1st, and 5AS 2nd. The banquet finally broke up at 10:30, the whole gang singing "God Save the King" and cheering for the A.R.R.L.

The very successful staging and costumes of the R.O.W.H. Initiation was a big surprise for most of the gang had rather expected it to be a very amateur affair. Thanks to 5GF and 5GO who both worked like Trojans, the whole affair went off beautifully. The costumes were splendid, everyone knew his part and there was no hesitation. The only regret of those present was that the setting was not good

enough for the rest of the affair. The parts were taken by the following MO, 5GF; MM, 5AK; PA, 5AN; I.K.I.A, 5CN; OM, 5HG; O.D.O., Vic Wallace; QRM, 5BA; QRN, 5HH; R.I., 5HB; F, 5BJ; C, 5BF; MC, 5GO.

While enough soberness was drifted into the R.O.W.H., initiation to give everyone something to think about, and while we don't admit it possible to have a better bunch than the 5th Canadian District Hams, still if any improvement is possible the necessary inspiration was supplied by the R.O.W.H.

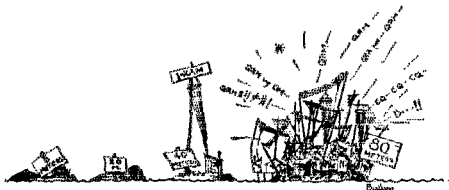
### A New Kind of Short Wave Tests

Exploring the 20 and 5 meter bands in December

**E**VERY amateur transmitter in America seems to have found the 80 meter band—alho there may be 5 or 6 exceptions. The 40 meter band is settling up more slowly, but the pioneers are doing splendid daylight work on that band.

But at 20 and 5 meters—dead silence!

What's the idea? QST has given out every single bit of information anybody



needs to get down on these waves within 48 hours—and nobody seems to give a whoop. That same thing happened when the pioneer 100 meter work was being done by 1HX, 3ALN, 1XA, 3XM, 9ZN and 8XK. Everybody sat around and croaked "It can't be done". But those 6 stations went ahead and DID IT!

One show of that sort is more than enuf. Let's wake up and show some signs of knowing that we have these lower wavelengths.

\*\*\*\*\*

Just this once let's hold a *new sort of test, one in which we don't sit back and wait for someone else to do it first but all try together and at the same time.*

The tests come in December, the story is told in the Experimenters Section of this issue of QST.

Now please:—

- 1—Read the plans for the tests in the Experimenters Section.
- 2—Get into the test whether you belong to

the section or not.

3—Report *exactly in the form requested.*  
Thanks.

—S. K.

### More Low Power Work

**T**HIS is a continuance of the station efficiency contest, the first data on which was run in the May, QST. These are all summer incidents and, for that reason, should be all the more interesting. Practically all of the work was done at night.

Transmitting Station	Receiving Station
9RQ, Lilse, Ill.	c3GG
9BFI, Minneapolis, Minn.	9BNF
7AIB, Port Angeles, Wash.	c5BF
3AIH, Audubon, N. J.	1BQE
g5BV, Wilmerton Pk., Eng.	9CVR
8BPG, Portland, Mich.	8BFB
9CDV, E. Grand Forks, Minn.	7GR
8DOE, Fairgrove, Mich.	6BUR

Date	Communication Distance			Plate		Miles per Watt
	Miles	Tube	Voltage	Current Amperes	Input Watts	
May	700	201-A	50	?	?	?
5/7	170	202	100	.002	.2	\$50
5/31	100	202	70	?	?	?
June	208	?	41	.002	.08	2600
June	4100	?	?	?	.25	124
July	20	201-A	5	?	?	12,731
Sept.	1300	203	200	.008	1.5	940
July	2000	201-A	?	?	8	250

The excellent work shown above should be a reproach to those hams that need inputs of 1000 watts and all kinds of exciting antenna currents. In most of the cases above, the antenna current could not be measured on the instruments in the possession of the station owners.

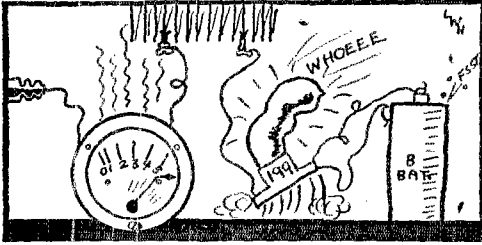
The record of g5BV deserves special mention on two counts: he was using a temporary antenna only 18 feet high at one end and 35 feet high at the other; and his antenna current was .65 ampere. 8DOE deserves some sort of an explanation in that he used a spark coil plate supply and the input to the spark-coil itself was eighty watts. Because of the inductive transfer and heating at the contacts of his vibrator, his actual input to the tube would be, most likely, much lower; however, we don't know that wattage definitely.

The record of 8BPG deserves special mention also. It shows what this low power business can degenerate into. Someone is going to get a 199 oscillating on one volt B battery and work his friend two blocks away, and then we will have a mile per watt record that would take a certified accountant five minutes to merely think of. Not that 8BPG does not deserve



credit for doing what he did—he does. He might have made an error, however, for he figured the plate current from the rated value of 1600 ohms plate impedance for the tube; which is a perfectly reasonable assumption. Even if he erred as badly as 100% his miles-per-watt figures would drop to 6000 odd miles; and that itself is a very respectable figure.

Not enough really low power work is being reported upon, and not enough of



that reported follows the form-outline given in *QST* of last November. We are still interested in these low-power accomplishments and would like to receive reports of this sort of work in which the person accomplishing the DX was using an inductively coupled transmitter; however, this is not necessary.

—L. W. H.

## Quien Sabe—But Play Safe!

ONCE we knew for sure that sets below 150 meters were supposed to use inductive coupling.

The last conference has got things all upset—licenses have even been granted for capacity-coupled sets.

It seems as if it is up to the individual Supervisors of Radio to say what they will approve.

As soon as we know something definite we will tell you about it in *QST*. Meanwhile, we strongly suspect that the new rules are going to call for inductive coupling on all waves and at all times. Better play safe and put in that sort of a set now.



## TRANSMITTING HINTS

### Removing Tube Bases

When removing tube bases for short wave work it is a good idea to begin by heating the pegs and then "flipping" the solder out of them. After that the base may be heated to soften the cement in the fashion that we have described before.

If you start to take off the base without unsoldering the pegs first the tube may be seriously damaged.

### Fitting the Antenna to the Set

Everybody seems to be nursing the idea that the antenna which will be good for a couple of UV-204 tubes will be absolutely useless when a single UV-202 is used.

As far as the Editor of this column is concerned that is simply nonsense.

If an antenna is efficient when a kilowatt is being put into it then it will also be efficient when 10 watts are being put into it. On the other hand if it is rotten when 10 watts are put into it then it will keep right on being rotten when 1000 watts are put into it.

The way to decide what antenna you are going to want is to forget all about the set and consider these three things:

1. The space in which the antenna must be erected.
2. The wavelength on which you wish to work.
3. The strains the weather will put on the system.

### Your Space

Let us begin by being honest and admitting that there is little use in talking antenna theory when the actual antenna absolutely *must* be built to fit the space. The rules for making the best use of your space are simple yet 95% of all amateur antennas ignore them thoroughly. Here they are, listed briefly; think them over to fit your own particular job.

a. Keep the antenna in the clear, 10 feet away from houses, trees and guy wire. If you have to cut 10 feet off to do that, *go ahead and cut off the 10 feet.*

b. Other things being equal, height is likely to prove more useful than length.

c. The counterpoise needs just as much attention as the antenna. Put it where the wires can be of the same length and can be kept decently clear of things. Whether the counterpoise happens to come under the antenna or not isn't the main thing at all.

### Your Wavelength

Our ideas on the proper size of antenna for a given wavelength are shifting rather

frequently these days. In general they are shifting toward the idea of using a big fundamental. It is possible to go much further than this. At 1XAQ a 400-meter antenna has been worked at 12 meters with fair results.

### Weather Effects

To reduce the wind and ice load it is desirable to use few wires and space them rather widely. In the Editor's estimation the small cage is a complete fizzle from the standpoint of getting top capacity but it is a glorious success from the standpoint of providing plenty of wires for the wind and ice to work on. In most cases a two-wire L on spreaders 3 feet long will be as good or better. This is said with the full realization that an argument will start at once. This is all right—arguments are harmless when the claims are not backed by careful tests.

From the standpoint of steadiness in windy weather that antenna is best which can be most firmly secured in place. This bars wide spreaders and it also bars large cages. The Editor's choice would be for a three- or four-wire flat top but two would not make him particularly unhappy. The fewer wires there are the easier it is to make them behave themselves. A single one would be ideal but of course the top capacity is lower then. In any case the downlead should have all of its wires spaced within an inch or two of each other. If there are more than two of them this will result in a small cage. Most downleads are far too large; they thrash around unmercifully in the wind and they add capacity where it is not wanted.

### Corrosion

Corrosion of antenna wires is not serious unless stranded wires are used or unless badly soldered joints are made. In any ordinary amateur antenna there is no excuse whatever for stranded wires, especially not for bronze or braided wires. Copper or copper-clad will always give the best account of themselves.

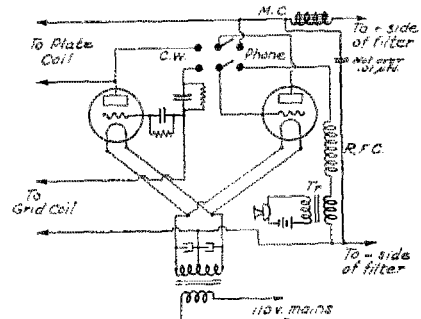
In addition to this it is possible to make first-class joints in the solid wire, which simply cannot be done in the braided wires and is very difficult in the bronze ones without destroying their strength.

It seems as if it has been said enough thousands of times so that it would be remembered but even today one sees antennas that have unsoldered joints or else joints that are green with the corrosion occasioned by acid soldering compounds. If you *must* use soldering paste or acid instead of rosin, then at least scrub the joints thoroughly with alcohol afterward.

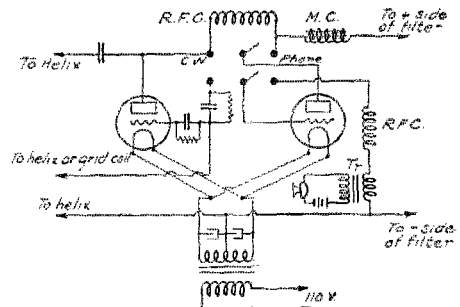
Well, that's that; now get down your copy of Ballantine and dig out the rest of it. It is all there.

### Switching To Phone

There seems to be all sorts of grief connected with the transfer switch in a phone-C.W. set. About 20 times a month this connection has to be explained.



**SERIES FEED MEISSNER**



**SHUNT-FEED HARTLEY**

Switching from C.W. to phone with Heising plate modulation

R.F.C.—Radio Chokes—see Ballantine for description  
M.C.—6 to 10 Henry modulation choke—see Ballantine  
or page 21 of Aug. 1923 QST.  
Tr—Modulation Transformer.

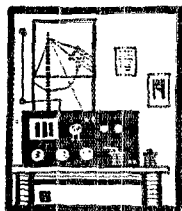
We have printed it several times before. It has been in Ballantine all the time, and here it is once more.

### The Rotten Location

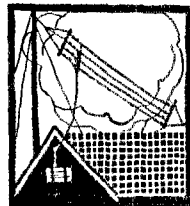
If your scenery is full of tin roofs, wires and trees the station may still be good for something.

To understand what really can be done in intelligent work under bad conditions read again the description of 1XAH on page 50 of July QST.

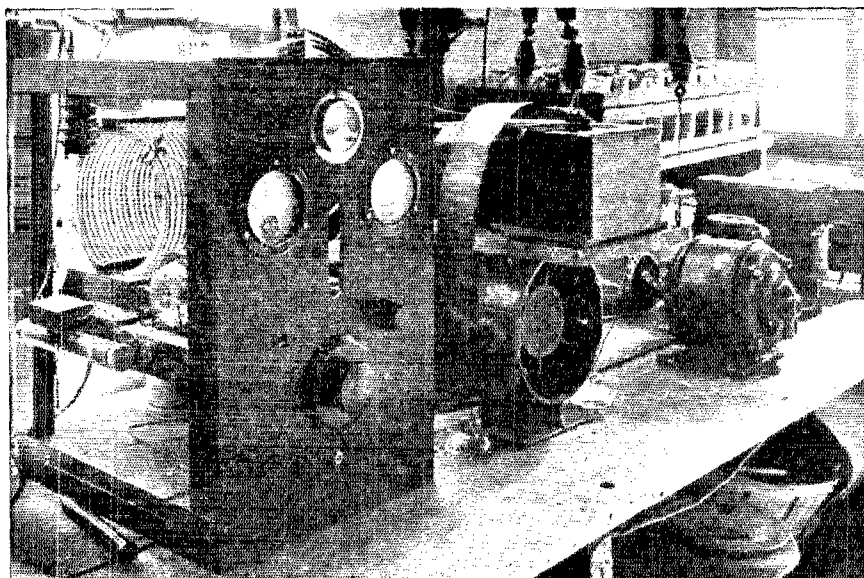
In addition to that read Ballantine on antenna designs for bad locations.



# Amateur Radio Stations



## 4IO Atlanta, Georgia



4IO is the Station of Jimmie Morris of 58 Frederica St., Atlanta, Georgia. It has been in operation since 1922 when it started out with spark and a "Spark Forever" slogan. Since then it has passed through the usual C.W. stages and is using a 250-watt tube at the present.

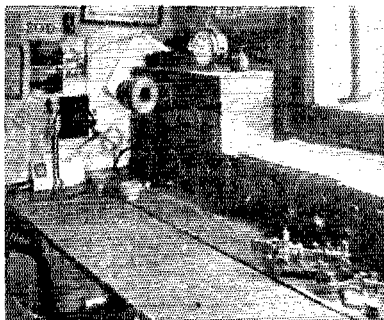
Not so long ago a brand new tower went up and was promptly blown down. Following closely upon that, another storm came by and lightning lingered upon the old mast knocking every insulator out of the guys. Fortunately they were put in in the old manner, being porcelain eggs, and the pole did not fall for the guys merely hooked upon each other. However, the lightning wandered into transmitter and blew out the stopping condenser and knocked the grid leak off the set but did not injure the tube. It also touched upon the receiver, ruined the detec-

tor tube, skipped the tube in the first step and blew out the one in the second.

The antenna is a 6-wire fan some 85 feet high at the free end and 41 at the low end. The counterpoise is one of 28 wires, 50 feet long, and 30 feet wide and is directly underneath the antenna. By winter a new 100-foot tower will have been installed. A great deal of care in insulating the antenna was taken. The lead-in insulation of the antenna and the counterpoise consist of two large glass plates. The insulation of the antenna and counterpoise proper consists of Ohio Brass porcelain and glass.

The receiver is a "double decker." It has a honeycomb receiver in the upper part for reception of the long waves and a short-wave tuner in the lower part similar to the one used at 1MO. The end of the tube control cabinet and of the receiver cabinet are cut

out to allow connections to be made without the use of binding posts on the panel. For



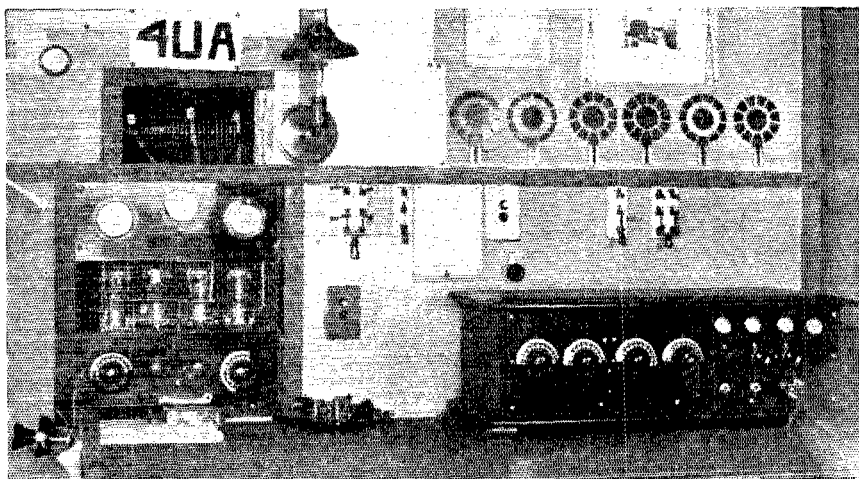
the longer wave arrangement binding posts are used on the receiver panel and in the

detector two-step are anti-capacity switches for changing from one set to the other.

The transmitter photograph shows clearly the old spark transmitter which is kept in condition in case of emergencies. The C.W. set uses the four coil Messner arrangement with a 250-watt tube. A 96 jar rectifier is used to deliver 3000 volts to the plate of the tube and an antenna current of 3.5 amperes is obtained on a wave of 78 meters. The present transmitter was preceded by a "5-watter", a "50-watter" and a transmitter using a single 201 tube with 1000 volts on the plate. 410 has been heard all over the U. S., in Europe and so on. It has been in communication with the foreign stations with comparatively little difficulty.

The insulators in the air are tied to wires that support the condenser in the spark above the Rotary gap and thus make the leads short as is necessary.

## 4UA Dundee, Florida



4UA is the Station of Eugene Hummer at Dundee, Fla. It is in a special radio shack which has an additional small closet or extra room attached. Thus the transmitter, as can be seen in the photograph, is flush with the wall of the shack with the works sticking back through the wall into the closet and all batteries and auxiliary apparatus are also kept there out of sight. This certainly makes a neat arrangement.

The transmitter is made for use with four five-watt tubes but, due to power limitations, is generally operated using two. It

use the inductively coupled Colpitts circuit. A thirty jar chemical rectifier with power transformer supplies the plates.

The receiver uses removable spiderweb coils and has two-steps of audio-amplification in the same cabinet. Because of the changeable coils it covers the various wave bands very effectively.

The switches on the wall control everything from the transmitter to the battery charger so that the operator doesn't have to leave his seat to accomplish most of the ordinary tasks about the station. Unfortunately 4UA doesn't have an automatic

broom, so elbow grease does its part in keeping the station so very neat.

With the possible increase in power supply, the station will have a fifty-watt tube and very soon there will be a new antenna using two lattice towers 75 feet high. We have no description of the present antenna.

4UA works rather regularly and has accomplished good DX over the country. Mr. Hummer says he is always ready for traffic and keeps it moving.

#### Note

With this month we inaugurate a new policy which may or may not be liked. If it is not liked tell us so that we may know whether or not the majority want the department run as heretofore. This policy consists of only one thing: we will no longer use photographs of transmitters that do not use inductively coupled transmitters because we believe we have advanced to the point where the conductively coupled set is passé. Sufficient reasons for this have been given in various technical articles.

We would like to publish descriptions of those stations you would like to see. Therefore, suppose that you send in the calls of some amateurs whose stations you would particularly like to see in this department. Particularly would we like to publish descriptions of good, inexpensively built, stations using only one or two five-watt tubes. If an obviously efficient and neatly constructed "five-watt" station description were received at headquarters we would be overjoyed.

The photographs should preferably be taken by a professional photographer because snap-shots generally fail to show up well. The photographs need not be larger than 4 by 6" or thereabouts. The prints must be on glossy paper. Please state definitely, when you send the description in, whether or not you expect the photographs back. Please don't send us a description and then send it to another magazine. If we publish it, don't you think that we deserve to have a "scoop" on it?

In sending in your station description, be certain to mention those things that are possibly unique about the construction and those things that are original. The other fellows are always interested in little ideas or "tricks" about doing different things.

*This is important.* The order in which stations are run in this department has no bearing on the importance of the station except in exceptional cases. They are usually arranged the way they fit in best or because of the appeal to the eye of the photographs. This very definitely is not a measure of the worth of the station itself, as you can see immediately. So don't feel bad if your station is run second or third. If

various amateurs must take the order in which these descriptions are run to heart, then we will print only one station description at a time and avoid any trouble.

## BOOK REVIEWS

"Storage Batteries," by George Wood Vinal, Physicist, Bureau of Standards. Published by John Wiley & Sons, Inc., New York. Price \$4.50.

Once in a very long while I get a book that makes me want to use all the pleasant adjectives in the dictionary. Such a book is "Storage Batteries". The book is beautifully illustrated, clearly printed and, above all, the text is written by a man who is an undoubted authority in his field and who has the rare gift of saying things clearly and understandably.

And what a lot he does manage to say in this book! It is of interest to anyone who has any connection whatever with storage batteries. The title page says "A General Treatise on the Physics and Chemistry of Secondary Batteries and Their Engineering Applications", but that is far from all that is talked about. To this one should add "And a World of Clearly Put Information Useful to Anyone Owning, Using, or Repairing Storage Batteries".

The Westinghouse Electric and Manufacturing Company at East Pittsburg, Pa., has just issued a most interesting little booklet called "Westinghouse Fabrics and Papers for Insulating Purposes". Those who have not read a book of this kind will be greatly surprised at the large variety of such materials. For anyone using insulating materials it is a good idea to write for a copy of the booklet and get up-to-date on an interesting subject.

"Resistors and their Practical Applications in Radio Reception", Daven Radio Corporation, Newark, N. J. Limited distribution.

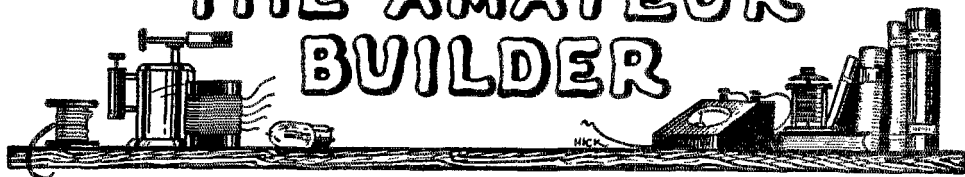
Despite the formidable title this is a booklet of 16 pages. However these pages are interesting, one would be sure of that as soon as one knows the author to be "Zeh Bouck". Bouck has the gift of the trenchant pen and says things with the least possible wasted language. Therefore the subject of resistance-coupled amplifiers is here presented with a directness that is heaven-sent relief from all the "blah" that other publications have printed about the same thing in the past 6 months.

"A Quantitative Study of Regeneration by Inductive Feedback", by C. B. Joliffe and J. A. Rodman, both of the Radio Section, Bureau of Standards. Also known as "Scientific Paper of the Bureau of Standards No. 487" can be obtained from Government Printing Office, Washington for 10c.

The title explains this work better than a review could. The vacuum tube student will find the work interesting, for it is well presented. However we wish the conclusions had been qualified a bit—surely Ballantine has now convinced the radio world that

(Concluded on Page 59)

# THE AMATEUR BUILDER



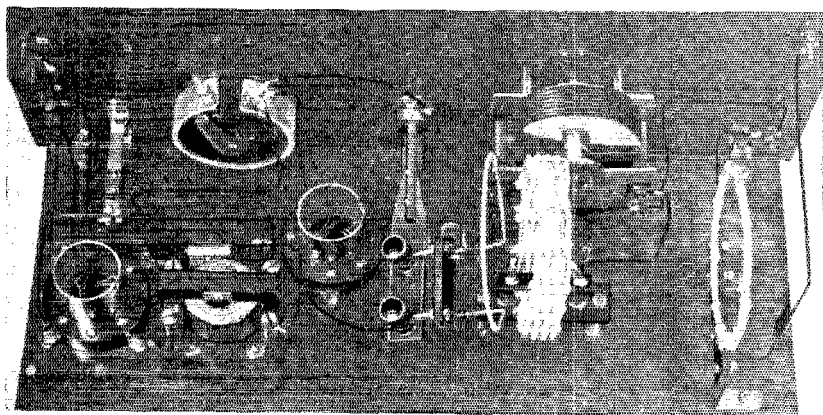
## A Well Designed Tuner

By H. P. Corwin, 2BRC and E. C. Homer, 9UN

It may seem superfluous to contribute another article on a low loss tuner but we believe that there are some ideas in this particular one that will be of use to the gang, now that we have various short wave bands. We have such a multiplicity of wavelengths that it becomes necessary either to have several receivers or to arrange the coils so that they can be removed easily. If we use removable coils some form of coil mounting is needed in which

magnet wire to avoid corrosion and the need of dope for protection from dampness. The winding jig was rigidly made by bolting  $\frac{1}{4}$  brass rod into a brass base, but something that will serve as well is the well-known board with a circle of nails; fifteen pins being used in this case on a  $3\frac{1}{2}$ " circle.

The following table shows the range in wavelength of the various coils we use with the set and which are shunted by a Hammarlund 380  $\mu$ fd variable condenser.



there must be a minimum of losses and the contact must be positive.

For mounting the coils so that they may be changed with facility, the scheme shown, using cord-tip coil terminals and Carter "Imp" jacks, provides a good wiping contact and makes for rapid coil changing. The coil terminals are made by slipping a fone-cord tip over a 6-32 machine screw and soldering it in place. Another simpler and cheaper mounting consists of a couple of binding posts on a strip of hard rubber separated about  $1\frac{1}{2}$  inches. Then the coil itself can have hook tips as in Fig. 6 for the ordinary binding post or, for types like Eby, simply straight ends to slip in the binding post hole.

All of the coils for the short wave bands are wound with No. 16 Cotenamyl insulated

Other good makes of variables are okeh, of course, and a vernier is a necessity.

Coil Turns	Wavelength Range
24	85-273
10	40-126
5	24-71.7
2	11-37.3

A single turn tickler is used for all coils but is changeable as is the secondary, so that others can be used. With 90 volts on the detector, 201-A, no other tickler was found necessary for the range of the receiver. By the use of so small a tickler, which proves to require very little adjustment, and fixed tuning in the antenna by 3 turn coil four inches from secondary, the

receiver is virtually a unicontrol set. No grid-leak was found to be necessary.

**Notes by the Department Editor**

There are several changes that might be necessary or desirable in the receiver de-

plate voltage is used. This has been noticed by a number of observers and seems to be a pretty well-proved fact: and with the low plate voltages, in the vicinity of 10 to 20 volts, a single turn tickler is likely *not* to be satisfactory.

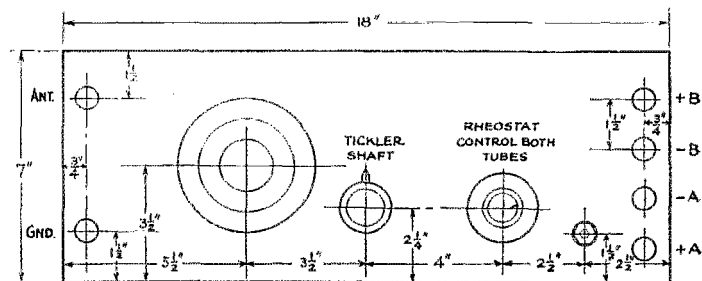


FIG. 1 LOW LOSS TUNER PANEL LAYOUT

scribed above which will come to the mind of the reader and which no doubt had been thought of by the constructors but eliminated from the construction for simplicity and for their own use.

First of all you must realize that this receiver can be used on any wavelength by making the primary removable and by providing a sufficient variety of coils. Then not everyone is going to get that single turn tickler to working but they will be able to work with larger sizes, these three being suggested; 8 turns, 4 turns and 2 turns; but don't forget that you can try others. Also, the fact remains that a detector using

For the man wanting the sizes of coils necessary for the broadcast band, the following sizes are suggested: Primary 15 turns and Secondary 70 turns of 18 or 20 Cotenamell, magnet wire, and the tickler about 22 turns.

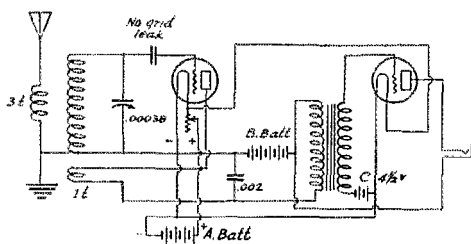


FIG 2

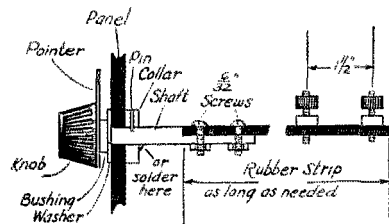
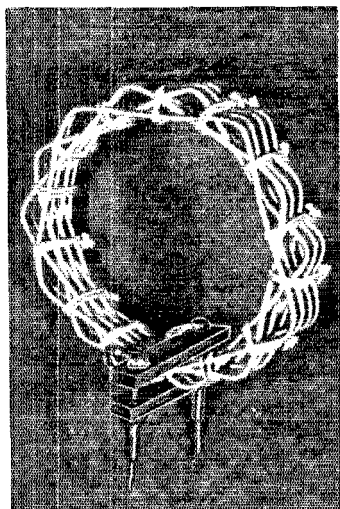


FIG. 3 DETAIL OF TICKLER SHAFT

Another thing that suggests itself is the use of two variable condensers and the Hartley oscillatory arrangement from which the Reinartz is derived. This forces us to have a three terminal coil and avoids the use of extra tickler coils. With the plug system of mounting, it is very simple

a high plate voltage proves to be less sensitive to really weak signals than when a low

to make up a three-terminal coil mount similar to the two-terminal mount and as has been suggested and illustrated before

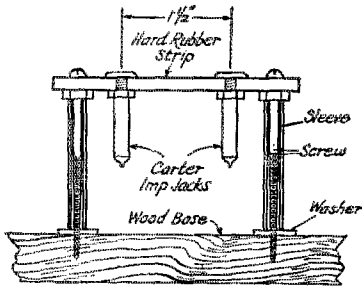


FIG 4 DETAIL OF COIL MOUNTING

in QST.<sup>1</sup> The circuit for such a set is shown with constants in Fig. 7. Coils for it are suggested as follows:

- 32 turns tapped at 24 giving 8 turn tickler.
- 14 turns tapped at 10 giving 4 turn tickler.
- 7 turns tapped at 5 giving 2 turn tickler.

The primary size remaining at 3 turns for the amateur range and with the same

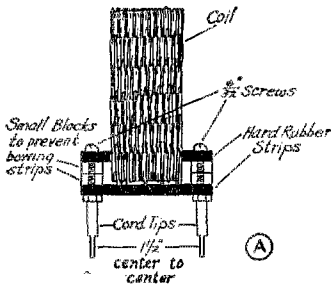
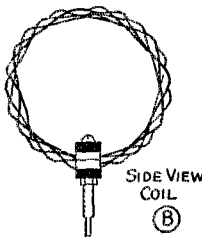
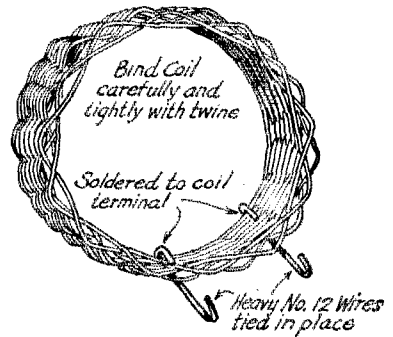


FIG. 5 DETAIL OF COIL AND PLUG

spacing and fixed coupling, four inches, found in the set described by 2BRC and 9UN.

1. See the single control super-het. article in November QST, obtainable from QST circulation department for regular price.
2. Obtainable from circulation department for regular price.

In either this Hartley circuit set or the set described by 9UB-2BRC the coils should be spaced to be clear of all large solid bodies by at least 1½ inches or 2 inches. That means that the coils should be that far from the baseboard, the condenser, the panel, and the cabinet. The distance the primary is from these things is not so important because it is in a relatively high resistance circuit, the antenna circuit. The distance from the antenna coupling coil and the secondary was adjusted to avoid dead spaces in the tuning where the receiver failed to oscillate. Such dead spaces show that the antenna is in tune either directly or by harmonizing, and the primary is too close to the secondary.



POSSIBLE METHOD OF MOUNTING COILS FOR BINDING POST TERMINALS

FIG. 6

Don't get the idea that it is necessary to wind your coils like those used in the set described in this article. The Lorenz winding, the correct name for the basket-weave, is used for only one reason, to give a minimum distributed capacity. It is no better than the straight cylindrical coil such as

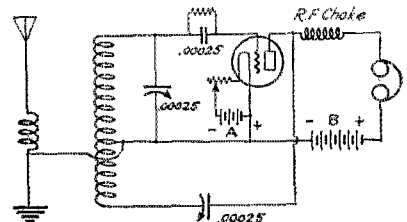


FIG. 7

pictured on page 41 of the August issue of QST.<sup>2</sup> The Lorenz coil has another bothersome feature: it will often short-circuit a turn where the wires cross giving you a dead tuner; the cause being very difficult

(Concluded on Page 59)



# Who's Who in AMATEUR WIRELESS



## HARRY F. DOBBS, 4XS

Harry Dobbs' start in radio, as radio dates go, is almost shrouded in antiquity. In 1908 he built his first radio set which included coherers and, later, electrolytic detectors. His radio experiences were further enriched by war radio service, after the Naval School at Cambridge, Mass. After his release from service he secured the call 4DN and later 4ZA. Now he owns the call 4XS and a good experimental layout. In addition he has been President of the Atlanta Radio Club; is the President of the Atlanta Association of Radio Engineers; and holds a commission in the Naval Reserve.

He is the present director of the Southeastern Division, a live amateur, and member of the firm of Dobbs and Wey.



## BERNARD S. SHIELDS, 5AJJ

Mr. Shields obtained an unusually early start in Radio because his father was a Morse man and the whole family could read the code. The change, then, to Radio was comparatively easy as wires were strung around rather generously anyhow. Before the war he carried a crystal receiver as he traveled, which his job required and which prevented him from owning a station.

He is now the West Gulf Division Publicity Manager, City Manager of Dallas, owner and operator of a good master oscillator set, and, in his spare time, a salesman. He has been heard by WNP, Cuba, Hawaii, and other distant places using a so-called '20 watt transmitter.'

## PAUL M. SEGAL, 9EEA

Paul Segal's first touch upon Radio was in 1911 when he built a transmitter, but no receiver, and used it. After that he let Radio get along as best it might without him for a number of years. Just before broadcasting came into its own he built a crystal receiver with results that were satisfying. From then on he advanced with characteristic rapidity through the operators license, station license, District Superintendent, and Assistant Division Manager stages. Now he is the Director for his division, the Rocky Mountain, and owner of a Denver Station.

He is an Attorney and Counselor at Law and a married man in addition to being a sincere and alive A.R.R.L. member.



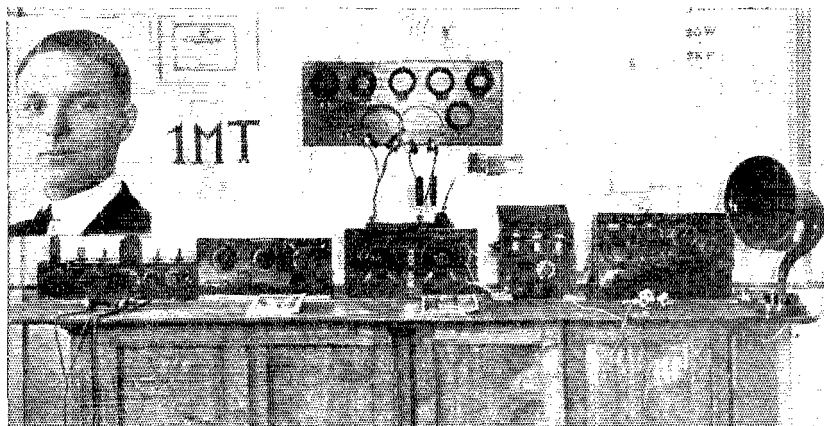


# INTERNATIONAL Amateur Radio

## The Station of Giulio Salom of Venice

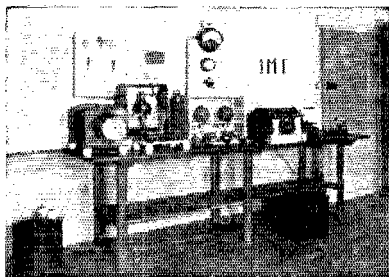
1MT at Venice, Italy, is one of the pioneer amateur stations of that country, and is owned and operated by the President of the Radio Club Veneto. It has, too, com-

per left-hand corner. In the center is a three tube long wave set using honeycombs. To the right of it is a Marconi G16 crystal receiver of the navy type. To the left of the honeycomb set is a short



municated rather effectively throughout Europe.

Three different aerials are in use. One, a "he" antenna, is a single wire for receiving about 700 feet long and nearly 115



feet above the ground; a double wire inverted L about 160 feet long for spark and telephony; and a 45-foot cage for the short wave telegraphy.

Several receivers are shown in the photograph with Mr. Salom's picture in the up-

per left-hand corner. In the center is a three tube long wave set using honeycombs. To the right of it is a Marconi G16 crystal receiver of the navy type. To the left of the honeycomb set is a short

wave relay receiver which has two stages of R. F. amplification. The set to the extreme left is a four tube set of Italian manufacture that covers a wavelength range of 200 to 5000 meters. A Grebe 13 has been purchased and installed since the photograph was taken. The transmitting apparatus shown consists of a 300-watt spark set (4-amperes antenna current), and three different powers of C. W. obtainable from two sets. One of the sets, used mainly for radiophone, is not shown. The other set uses either of two kinds of oscillator tubes; one Marconi MT4 200-watt input tube with 6500 volts A. C. on the plate or two French SIF 250-watt input tubes with 2500 volts on the plates. Space requirements necessitated our cutting from the right end of the picture a large marble power panel with a number of switches and meters.

A new 250-watt Hartley set has been installed since this photograph was taken. It was built for communicating with the United States.

### Notes on Holland and Germany

R. W. Barrington of KDOB, the S. S. Ala., took a six-day bicycle trip through Holland and met most of the prominent amateurs there. He writes into International on a number of things which have been extracted and detailed below.

The most prominent Radio Club of Holland is the "Nederlandsche Vereeniging Voor Radiotelegraphie", which, in English means the Radio Club of the Netherlands. The majority of its members speak English as it is taught in the Dutch high schools. This Club has been the active instrument in obtaining government-licensed Radio for the amateur in its country. Licenses are allowed only to a branch of the club and only one license to a town. As branches are forming rapidly, that is being taken care of. The station must be installed in a private house which has telephone service. The maximum power in the antenna is limited to 100 watts and a working period of four hours, from 7 to 11 P. M., except under special permit for tests at other hours. Wavelengths up to 200 meters may be used. The operator is required to have a code speed of 12 words per minute and the station license comes to about \$20 of our money per year.

One Holland amateur has to send his storage battery 35 miles by canal boat to have it charged.

These interestingly humorous sidelights on the trial of PCII were also mentioned in Mr. Barrington's letter: A number of reporters were unfamiliar with the technical terms used but were familiar with gas-engine terms. So when they heard "three element valve", they transcribed "three cylinder valve" as a compromise between their brain and their ear. When the three element valve was mentioned to the Judge, he objected stating, "you can't fool me" and wanting to know whether one or three valves were meant. Finally an agreement was reached whereby the data went into the records as "one electric valve."

Germany licenses no transmitters and few receivers. The receivers have the controls on the inside and the set is sealed by the Inspector after he sets the tuning to the wave length of some particular broadcasting station. German wartime tubes sell for 1G/50c or 54c which, perhaps, is just cause for envy.

The intermediates used at present, in addition to those we already know, are; Holland N, Belgium B, Switzerland S, Luxembourg L, Finland FN, and Denmark D.

Frederick L. Hogg, g2SH, writes that he is beginning to really hear 9's and 5's for the first time, now that a number of them are on the 75 to 80 meter band. He says

that they seldom are heard on any other wave. He has been transmitting some on the shorter waves and asks that a closer watch be kept for the English stations over here for he has had little luck. Until after December he will be on seldom as he is going to college.

D. Miguel Moya has been chosen to represent the Radio Club of Spain at the International Amateurs' Congress. Mr. Moya is a well-known Publicist and Engineer and possessor of the first official license granted in Spain. His call is EARL.

Belgian amateurs are requested to send their address and call letters to Mons. L. Henrotay, President of the Radio Club Belge de l'Est and delegate to the International Amateur's Congress. Mr. Henrotay will then supply the information thus gained to all that are interested. Address; Henrotay T. S. F., Vervieux, Belgique.

The correct address of the Wireless Weekly of Australia is; Publicity Press, Limited, 33 Regent St., Sydney. This was published before with the addition of the name W. L. Maclardy, who was then the Editor. He has since left the magazine and letters that have been addressed to him have, as a result, had to be forwarded and an inevitable delay resulted. Mr. A. W. Watt is now the managing editor and called our attention to the necessity for this correction.

### British 6LJ

One of the amateurs on the other side of the Atlantic who has been doing very good work in receiving amateurs in America is Stanley K. Lewer, English 6LJ. To date he has heard over 400 U.S. and Canadian amateurs, including stations in every U.S. district and four Canadian districts.

"My set is but a simple single circuit tuner, detector, and one stage of audio amplification," says Mr. Lewer. "I have tried radio frequency amplification but I am convinced that there is nothing to beat the good old detector and one step. (And this from an Englishman!—Dept. Ed.) The hookup is shown in Fig. 1. There are two points of special interest. The first is that the grid lead is taken to a point higher on the coil than the antenna tap. This permits the tube to oscillate very easily on short wavelengths. I can get down to 45 meters with ease. The next point is that a lower plate voltage is used on the amplifier than on the detector. The detector is a low vacuum tube of Dutch manufacture with 20 volts applied to the plate. The amplifier is a good high vacuum tube with 15 volts on the plate. At times this is reduced to four volts or even less. Cutting down the plate voltage is done to reduce all of the unwanted background noises which, when audio amplifiers are used, wash out all

of the really weak signals. Of course the signals will not be as loud when you reduce the plate voltage, but this is an advantage, as the local stuff is limited to a certain strength while the weak signals are amplified as usual. Reducing the plate voltage alters the working of the tube and you will have to do some experimenting to get the best grid bias adjustment. Both a potentiometer across the filament with the lever connected through the transformer to the

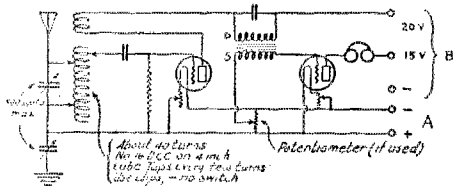


FIG 1 THE RECEIVING CIRCUIT USED AT ENGLISH 6LJ

grid, and a C battery should be tried. The whole secret of making the thing amplify is to place the grid at the right potential at the outset. The rest of the tuner is constructed in "low-loss" fashion and Brown phones are used.

"The antenna now in use is very badly screened by surrounding buildings. The receiving ground connection is made to thirty square feet of metal buried directly under the antenna. The ground lead is a stranded copper cable, twenty-five feet long and one quarter of an inch in diameter.

"I intend to listen every Sunday morning right through the summer to see if it is possible to do any transatlantic work all the year around, and will send periodical reports to *QST*. Since the end of January I have kept a complete log and will be pleased to send reports to any hams who care to write me. The address is 32 Gascony Ave., West Hampstead, London, N.W.6.

No bids have yet been made for the trophy announced on page 43 of the April, 1924, *QST*, to be given to the first American or Canadian amateur who definitely establishes two-way radio communication on amateur wavelengths between New Zealand

Several more reports on the reception of New Zealand and Australian amateurs in the U.S. have been received; some verified; and some not. Conditions are becoming more favorable at this end and we expect a telegram to arrive at Quist factory at any moment telling that the inevitable bridging of the Pacific has been accomplished. Who is going to be the first to do it? That's the question.

Three new short wave stations heard recently are UFT, LPZ, and POZ. UFT is the French station at St. Assise, France;

LPZ is the new station at Monte Grande, Argentina; and POZ is situated at Nauen, Germany. All three of these stations can be heard most any evening on wavelengths between 60 and 75 meters. Argentine amateurs and British amateurs report having heard all three of the above stations, which represents quite some DX. We have no idea what equipment is used at these three stations but it is rumored that they are using a directive system of transmission somewhat similar to that used by Marconi at British 2YT a few months ago when that station transmitted to Australia on short waves using 28 kilowatts. The signals from the Eiffel Tower, FL, have also been heard in Argentina.

A station signing C9G, located somewhere in Venezuela, was heard calling CXI on August 24th by 6CTE of Brookdale, Calif. This is the first indication we have had of there being any good transmitting amateur stations in the Northern part of South America. Can anyone give us any further dope on this station.

#### New Zealand Activity

Mr. F. D. Bell, z1AA, writes the following news:

"We are pretty much allowed to do as we please so long as we don't worry the BC stations. Most of us live from 100 to 130 meters and our inputs vary up to 200 watts.

"You were asking how we cut out the 'canaries' on the BC waves—well, we don't. All that is done here is to try to reduce the disturbance by making everyone use [inductive] coupled circuits on the short waves. It is the Radio Inspector's job to pay surprise visits under any aeriads that he may see to dig out unlicensed sets and to see if a single circuit blooper is being used. If either such cases is found the R. I. can make it very unpleasant for the lawbreaker. On the ham waves the interference from howling valves has rather lessened lately in most towns, I am told, and reason no doubt is that most hams here use the 1BGF tuner, the Cockaday, or some other non-radiating type. It is to the interest of the hams to boost the use of such receivers among themselves.

"At present all N. Z. hamdom and quite a number of Australians are focusing their thoughts and their signals on Mr. R. Y. Orbell, x3AA, who has rigged up a ham set on the S. S. Port Curtis bound for England via Cape Horn and Montevideo. He has left us to take up a position in the Peel-Connor Telephone Co., Stobie, Coventry, England, and letters addressed care of that firm will find him. He looks forward to to working us from his new home, Hi!

"The transmitter is a '10-watter' with a normal input of 55 watts and operating on 143 meters the last I heard. The power supply is from a motor-generator supplying 600 volts; and the transmitter uses a Hartley circuit. It was built by Mr. Orbell in three hours! He and I, with the help of local amateurs, made the aerial, a sixty-foot four-wire semi-vertical cage, on board the ship. Thanks to the kindness of the Senior operator, the whole thing was installed in a corner of the ship's wireless cabin. The receiver consists of the usual low-loss and two-step with an optional two steps of R. F.

"This stunt is of course a private affair fitted up at Mr. Orbell's own expense. Still it is hoped that before it is over we shall have put up some pretty good records in short wave work. It will be some time of course, before we receive his complete log for we expect to keep in touch with him for some time yet."



## BOOK REVIEWS

(Continued from Page 51)

one cannot make the unqualified statement that regeneration reduces the resistance. There are limits to this thing.

"Primary Radio—Frequency Standardization by use of the Cathode-Ray Oscilloscope," by Grace Hazen and Frieda Kenyon, both of the Radio Section, Bureau of Standards. Also known as "Scientific Paper of the Bureau of Standards, No. 489". To be obtained same as No. 487 above.

By all means get a copy of this report. You will find it immensely interesting stuff if you are not familiar with Braun tube work—and very thoroly worth reading even if the Braun tube is an old friend. Please don't miss it.

"Directive Radio Transmission on a Wavelength of 10 Meters," by Francis W. Dunmore and Francis H. Engel, both of the Radio Section, Bureau of Standards. Also known as "Scientific Paper of the Bureau of Standards, No. 469," and to be obtained as the two just reviewed.

Is any review needed? Surely every transmitting amateur will want a copy of this booklet, for anything that works well at 10 meters is certainly worth knowing about at 5 and 20 meters. Without the directive equipment there is still left a good 10 meter sending set.

"Practical Radio", by James A. Moyer and John F. Wostrel, McGraw-Hill Book Co. Inc., New York, N. Y.

The name of this book was well chosen—but it wasn't completed. The complete title would have been "Practical Radio Broadcast Reception". The reader is carried forward rapidly, but in a perfectly logical fashion, thru simple theory, circuit development and the construction of modern receivers. The information (how unusual in a book) is thoroly up to date and the construction of sets includes thoroly modern types. So much detail is given that surely even the veriest novice must be able to construct the super-heterodyne successfully.

Amateur radio telegraphy and telephony receive 18 pages, and all is done for them that such space will permit. However the very existence of ship-board and transoceanic radio is ignored, for which reason I objected to the title given the book.

This does not detract from the book within its own field tho—here it is considerably the best we have seen and we can only wish that the authors had taken their subject with a little less deadly earnestness.

"Quality Condensers", a folder issued by the General Radio Company of Cambridge, Mass.

It isn't often that this book review mentions a piece of direct advertising literature.

However there has been so much discussion and so many contrary claims on the goodness of different types of condensers that we believe everybody will genuinely appreciate a folder which sets down many things about condensers and does it briefly as this pamphlet was done.

## AMATEUR BUILDER

(Continued from Page 54)

to locate. But, in spite of all this, the fact remains that the Lorenz winding is mechanically very strong when properly and carefully built, as well as being an efficient coil.

## Notice

We would like to have suggestions as to what you would like to see in this department. It is a department intended to serve the beginning amateur, the man who has begun but not arrived at the point where technical articles of the usual sort are meat for him, and the man who must have more or less detailed information before he can build anything because he does not have the technical knowledge necessary to interpolate missing dimensions. That being the case, we want suggestions from fellows who are themselves beginners and don't know much about this awfully mysterious radio, but who want to know and know what it is they want to know. However, don't snow ye Ed under with correspondence and expect high speed answers, but be sure and do snow him under with suggestions, even if he can't find his way to daylight again.

# Strays



We are very sorry to announce that H. F. Mason has left QST to go back to his home in Seattle and that L. W. Hatry, now ex-5XV, has taken his place as Department Editor. Mason was extremely fortunate in finding that he could obtain the same call that he had previously held when a member of the Seventh District. (Written by Hatry—hence the modesty. Hi!—Ed.)

Our attention is called to the fact that the Fourth District has opened a new office in the Custom House at Savannah, Ga., in charge of Mr. Paul. G. Watson, Assistant Radio Inspector, and also 4ZD-4XX.

Your automobile blue book will show the location of small towns in your state for which you have messages and do not know which way to route them. Don't let a message die on the hook because you do not know where the town of destination is. Look it up.

## Thermocouples for B Battery Potentials

\* Advance gives the highest E.M.F.'s with iron, copper, or nickel chromium alloys, but the maximum E.M.F. obtainable with the Advance-Copper combination would be around 60 millivolts per couple. Figure up the available spare space in your whole house and then you probably haven't enough room for a "thermocouple B battery". It simply isn't.

Please say "My antenna current is ..... amperes" instead of "I radiate ..... amperes." The latter is all wrong, because you cannot radiate amperes, you can only radiate watts.

## 80 Meter Sockets

Any of you been worrying about the half-pound of porcelain in your 5 watt sockets? Looks sorta doubtful, doesn't it?

Very well—at three amateur stations such sockets were replaced by the new Pyrex-Garod socket. Without touching another thing the antenna current went up

and the plate current down. Naturally the plates no longer bloom so rosily.

What make were the porcelain sockets? Naw—you guess that.

If your receiving set is noisy, look to the grid condenser and leak for the trouble.

Norfolk hams put across a good stunt. They sent a message to New Zealand to the friends of an unfortunate widow who needed help. The result was that she is now on her way to comfort and happiness. Another star in the crown of the A. R. R. L., thanks to the members at Norfolk.

By-the-way, our old friend 1ZE, Irving Vermilya, is the fellow who had that idea about putting the oath regarding message delivery on the new O. R. S. certificates—as many who were at the Second National Convention can remember.

5VL complains that every one that sees his A. R. R. L. pin wants to know what Railroad club he belongs to. Maybe it's these whistle notes that gets 'em.

A Ford spark coil makes a good plate transformer. Screw down the vibrator and give it the regular A. C. with a voltage of 6 to 15 on the coil primary. The secondary is used like any other transformer secondary made for the purpose. 8BLP says he gets good results that way.

The information service has gained John M. Clayton, a pre-war ham and a genuine old-timer. He will answer letters seeking information, and the information service will be prompter than it has been of late. Clayton's advent allows the staff to see the tops of the desks after months of being snowed under.

Wheee!! Just found some "static condensers" listed in the Westinghouse catalogue under the numbers 374984 and 375743. They are made to stand 5,000 volts which ought to take care of Texas

static and the capacity is 3 microfarads—only gotta empty them once an evening.

How come the Radio Corporation has kept this quiet so long?

“Dear Sirs:

The motor you sent me only had 25 cycles. The company here says I must have 60. Please send me the other 35 cycles by parcel post so I can use your motor.”

—Trumbull Cheer

The same guy that wrote us for the rubber wavelength, I'll bet.

“The A. R. R. L. . . . has recommended Esperanto as the future international language. Those fellows don't need any secret language. Nobody outside their own gang can understand that 'QRM-CQ-QSL-QTA' language they've been using for years.”—Milwaukee Journal. Hail, hail, etc!

2CTY says to take along a solution of lye when you go to buy aluminum. Dip the aluminum in the lye for about five minutes and see what happens. If any aluminum is left, it should not be streaked because good aluminum will not streak on such a test.

#### Corrections

In the article “Parallel Operation of Power Tubes” on page 26 of the November issue there appeared a formula for calculation of the natural period of a parasitic circuit. The first line of figures in the formula should have read:

$$13 \text{ to } 14 \times 10^{12} \text{ farads}$$

The last line should have read:

$$L = 430 \times 10^9 \text{ henries}$$

Outside of this the formula is all right.

The Capitol City Radio Club of Des Moines put up a station at the State Fair that did excellent work in spite of numerous difficulties. Over 600 messages were handled with the usual A. R. R. L. dispatch and a number of subscriptions were obtained. The gang that ran this display deserve a great deal of credit and our thanks, which are sincerely given herewith.

Somebody cracked this wise one: Don't QST mean Queer Sounds Transmitted? He learned what PDQ meant at the same time.

The Seventh District hams are thinking of giving a medal to one of their number who never resorted to profanity when his fifty-watter blew. One of the Sixes objects

though, on the ground that the Seven would have cussed if he hadn't fainted.

Someone told 5JJ that “history repeats itself.” That's why he now has fuses in the filament circuit of his fifty-watter, we suppose.

The new R. E. suggests that if the antenna were buried and the counterpoise raised you wouldn't get out.

Most offices have an office cat to carry off various contributions that are inadvertently lost. We haven't a cat and were wondering where our stuff went, but now we have found out. There's a little Squirrel here who claims that some of the manuscripts are as good as his regular fodder with the additional advantage of not needing shelling. We have named him “static” but we call him “Stat” for short. If you get a card saying that Stat got your contribution, we are sure you will understand how it is now.

Don Wallace suggests that all of the QSL cards have the address printed as a unit in one spot so that a fellow does not have to look in different parts of the card for the name and the address.

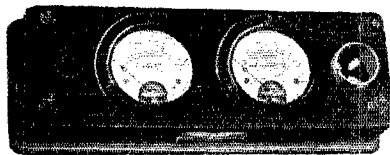
Viz: John Doe  
2345 Main St.,  
Soupcon, Oblivia.

The 3½-year-old junior op at 8DGS saw a broken wire the other day. “Daddy, here's one of your wires in trouble.” The kid didn't know it but that wasn't the half of it.

#### Tube Test Sets

There seems to be a pretty general demand for more information on tubes as sold across the counter. The customer would like to see a better test than just to have the filament lit for a moment.

A convenient instrument for making check-tests has just been placed on the



market by the Jewell Electrical Instrument Co. It is known as the Type 110 Tube Checker.

The 110 “checker” works on the principle that a tube is all right if the plate current

is normal under known operating conditions. The tube is put into a socket in the instrument, the filament rheostat is turned until the filament voltmeter shows the proper reading, and then the plate current is read. The internal connections of the



device are such that the grid is connected to the negative end of the filament, therefore the plate current obtained corresponds to zero grid voltage, a common operating condition. A 1000-ohm resistance is provided to protect the tube and the B battery against accidental mis-connections and short-circuits.

The "checker" supplements the complete Jewell test set, which latter is known as type 95. This is a device with 5 instruments and gives all necessary readings so that complete sets of static characteristic curves may be run on any receiving tube.

Another interesting member of the Jewell family is the type 20 gridleak tester. A few minutes with this instrument will give one many disagreeable surprises about the average gridleak's accuracy. There are some good makes of gridleaks, though.

Lost: A C. W. signal that started about the time my tube went west. Any one finding the same, please wrap it up carefully and bring it to me. The Parcel Post would break anything.

The Washington Radio Club held a general discussion of the use of aluminum vs. brass plates for variable condenser plates.

The outcome was that the club unanimously decided that aluminum was poor because of its oxidizing habit and that soldered brass plates were ideal. Our attention, however, is called to the fact that corrosion on brass never ceases and can become very bad. The solution to that is to silver-plate the brass used to make condenser plates and thus make the condenser a permanent job.

8CBE advises us that a Woodpecker is pecking away on his tin nest. He is worried lest he get into trouble with the S. P. C. A. We don't think he should worry; maybe Burbank has been playing around with birds lately.

The Loyal Order of the Derby, originally introduced to the Milwaukee Radio Amateurs' Club, Inc. (affiliated), from the old Ravenswood Radio Association, Chicago, in 1920, by H. F. Wareing, 9NY, has been revived, and hard hats and green ink are the rule among Milwaukee hams. Their club has officially recognized them and permits derbies to be worn during meetings. L. S. Hillegas-Baird, 9HO, and C. S. Polacheck, 9CMP, head the Order, and Fred H. Schnell, T. M., by virtue of his winning a brown derby, has been selected an honorary member.

You have heard of the rubber contact key, haven't you? Now we have the Limberger detector for strong signals, the Boiler Tube for damped signals, and Marshmallow ear-muffs for static.

We have heard that the Traffic Department sent out some QRS Certificates but couldn't make them stick.

A radio teacher of a radio class had all of his pupils subscribe to *QST*, which was to be used as an aid to the text books. It seems to us that a number of other radio teachers ought to be able to do the same thing and help make their classes much more interesting. Ahem!

Clifford J. Goette, a perfectly good A. R. R. L. member, and 2JU, has joined the well-known affiliated organization of A. O. O. B. (Ancient Order of Benedicts). Yes, it's his own fault.



# Radio Communications by the Amateurs

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



## A Word From An Old Timer

617 Union Ave.,  
Petersburg, Va.,

Editor, *QSTs*

Acting in accordance with the thoughts impressed upon my solid cranium, I chronicle this epistle on the Ham.

There are as many types as there are splinters in a wood-pecker. Foremost are the CQ artist who wants QSL cards, the message man, and the no-message man who wants DX.

But, foremost above all in the eyes of the old timers is the all around Ham; the fellow who greets you with a GE that carries with it an indescribable personality. He is the fellow who is looking for real traffic and shoves it through as near to its destination as circumstances will permit. He also delights in getting cards, and always sends one for every one received. He is not a maniac over working DX, but takes it in its turn, not ignoring traffic or the calling of a nearby station. The dots and dashes that slip from his key carry with it good hard common sense, law, and personality. Yes, we have some few of these kind of amateurs amongst our throng. Luck to these fellows who possess non-skid tires.

There are times when the fireworks subsides from a 35 word-per-minute rapid fire concrete mixer that we wonder, as we gaze at the scattered letters of the alphabet we have acrobatically been trying to copy, whether the performer is functioning for his health and is trying out a sure-fire muscle builder. Just think how often you could have copied this fellow solid through QRM and QRN if he only knew the meaning of QRS instead of QSQ. Speed contests are never run through static and interference. It is not reflecting on a fellows' proficiency as an operator to ask for a QTA. Of course it is nice to hear the clean cut fast sending, but when the static is so bad that the iron ring pacifier fails to soothe your nerves and QRM has a special program on it is no disgrace to slow down and consider the fellow at the other end.

Another thing, how about sticking in front of that "5-watt transmitter here" on your card, the input to the innocent oscillator? This would enlighten the new-

comers and avoid their expecting the marvellous DX on 5 watts that you are not doing.

When the patent runs out on that automatic phrase, "Nil hr CUL OM," we will have more real features to talk about and more real traffic to report. Let us hope this happens soon. Why waste your energy and wear out the old sock when there is plenty of real live news astir and real traffic afloat?

More power to the five watters.

—Raymond J. Carr, 3BMN-3CCJ.

## Re Filters

49 Avenue Georges V,  
Paris, France.

Editor, *QST*:

There seems to be a great deal of misunderstanding among amateurs in regard to building filters on a two wire or loop basis. The majority of the filter formulæ

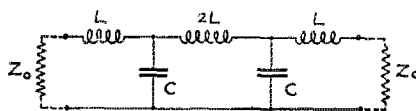


FIG. 1

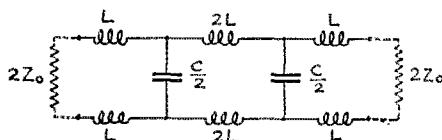


FIG. 2

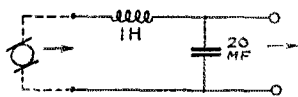


FIG. 3

that have been published, including those in *QST*, have been for filters designed on a single wire basis, such as the filter in Fig. 1.

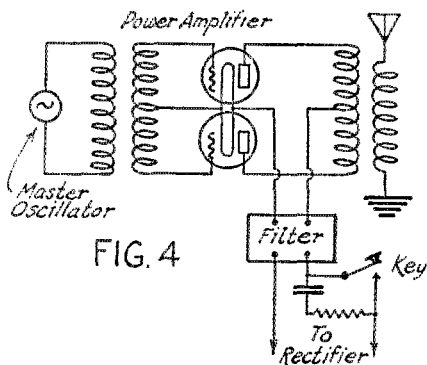
Now if we wish to build this filter on a loop basis, Fig. 2, we will first have to de-

sign it on a single wire basis using one half the desired characteristic impedance

$\frac{Z_0}{2}$ . Then having determined the

constants for the single wire filter we only have to double our characteristic impedance ( $2Z_0$ ) and use one half the calculated capacities for our double wire filter. The inductance values remain the same per coil.

For a mathematical discussion of this subject see page 20 of "Artificial Electric



Lines" by A. E. Kennelly or, much better, if they can be obtained, the Western Electric notes on the subject.

Last summer, in California, I made some experiments with "push-pull" or balanced amplifiers, with a view toward reducing B battery noises. The amplifiers were used for frequencies from 3,000 to 30,000 cycles and the plate power was furnished from storage batteries through a standard Western Electric filter as in Fig. 3. The storage batteries could be charged, while operating the amplifiers with a single phase mercury arc rectifier.

When using an ordinary amplifier the noise produced by this rectifier was terrific but when the push-pull amplifier was used it was difficult to tell when the rectifier was in operation or turned off. Therefore it seems to me that it should be possible to build up a transmitter on this principle, using a small tube supplied by batteries as a master-oscillator and a balanced or push-pull power amplifier supplied from a rectifier.

Also, by locating the key in the B battery lead of the power amplifier as shown in the diagram, Fig. 4, we should be able to do away with most of our "key clicks".

—E. A. Tubbs.

## The Puritans

Sandy Falls,  
c/o Northern Canada Power, Ltd.  
Timmins, Northern Ontario,  
Canada.

Say Eddie:

This Edison battery for plate supply on this transmitter of mine is taking hold at the finish, and there is every indication of it getting to be fashionable. The boys didn't care about looking for it there for a while. But now they are on to it in great shape, although some of 'em come back and say the stuff is so sharp a guy is liable to cut his finger tuning it in if he isn't careful.

Which puts me in mind of a story.

There was once a town, of quite a size, and quite a number of hams lived there. They used sending sets of various kinds, with various kinds of juice to rattle the plate with. Some used motor-generators, some rectifiers, some raw A.C., while one fellow still used spark. Several of them used storage batteries, like I do, to do the trick.

Now the hams with the pure D.C. were much respected by their fellow hams, and were called "Puritans" by the gang because their plate supply was as pure as pure D.C. could be. As fast as a fellow could afford it he got the batteries fixed up, planted flowers in his rectifier, and became a "Puritan."

What I wanted to tell you about was the system they had in that town. They kept a record of all the traffic of the "Puritans" and the guy who handled the most real, bona-fide messages in a year was appointed to the post of "No. 1 Puritan." The runner-up was appointed "No. 2 Puritan," etc. The reason for these appointments was because the mayor of the town and the town council had asked the radio amateurs of the town for some emergency communication protection in case of storms, fire, or flood, so that the town would not be cut off from the rest of the world.

And they had a good system, too. Whenever a big fire, or flood, or bad storm tore down the telegraph poles and phone wires of course all the boys jumped in and helped to handle the communication. When the power lines went out, however, most of the transmitters were silenced and things were in a worse tangle. It was here that the "Puritans" came in, for they were the only boys who could work their transmitters without needing power from an outside source. The first man on the air would be "No. 1 Puritan." He was good for five or six hours work with his transmitter batteries and would proceed to hook up with the other towns and the railroads, starting relief messages, handling news dispatches, etc. Then, when his batteries were done for and the job was still not done, "No.

(Continued from page 64)

2 Puritan" would come on the air with his fresh batteries and hold the fort till the town was back to normal, or until "No. 3 Puritan" fell in line with his battery operated transmitter.

These amateurs have done such good work on several occasions that "No. 1 Puritan" has a cute little solid gold star with a diamond in its center, presented yearly, whether any call is made on the "Puritan" service or not. The Mayor pins it on him, and it has the hams name on it and the words, "For Service Rendered." Besides which, every cop, fire chief, hospital, etc., is given his name, radio call and phone number so they can find him any time the "Puritan" service is needed. How OM?

—M. J. Caveney, Can. 3GG.

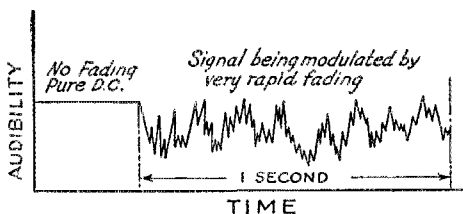
### Audio Frequency Fading

90 Kensington Ave.,  
Jersey City, N. J.

Editor, QST:

In the August issue of QST you published a letter from Mr. L. E. West in which he stated that he never heard any pure D.C. notes on the very short waves. Following is an explanation of this phenomena which may or may not be correct. Any one fortunate enough to own an oscillograph can use it to good advantage in determining whether this explanation is the right one.

We are all more or less familiar with fading signals, but the fading has had a relatively slow period; that is, the interval between maximum and minimum audibility was several seconds or even several minutes. Now supposing we have a pure D.C. signal which has a fading period of only one-hundredth of a second. The effect at the receiver is the same as if the signal were being modulated at a frequency of one hundred per second, or in other words the station would have a hundred-cycle note. As the fading period would very likely change several times a second the note would



not be modulated at a constant frequency but would be modulated at different frequencies at different instances thus producing a "rough" note at the receiver. The diagram enclosed will make this clear I think.

Hoping someone will either prove or disprove the above, I remain,

—P. J. Falkner, Jr., 2BFH.

(This matter has been investigated for many months by Dr. Greenleaf W. Pickard and Mr. H. S. Shaw. They find that exactly such fading does exist and that it amply accounts for the fearfully bad quality that is frequently heard on short wave radio broadcasting, using the term "short-wave" to mean those wavelengths below 120 meters. Many photographic records have been made and it is found that the fading is fairly systematic, considerably more so than is suggested by Mr. Faulkner's diagram. When one is near to the station this sort of thing does not take place and that is why WGY, KDKA and others are able to send out particularly perfect telephone materials on short waves which nevertheless sounds as if it had been run through a meat chopper when it is received several hundred miles away.

The Editor wonders if this is not a thing which will permanently prevent the various short-wave re-broadcast schemes from ever amounting to anything.—Tech. Ed.)

### Very Sad

14A. Ave. Norte, No. 21,  
San Salvador, Rep. of Salvador  
Central America.

Editor, QST:

It is a sad tale that I have to unwind, and I hope you will help to make it a glad one for all.

I have been listening with my Grebe for several nights, and have been rather surprised at the number of hams that come through in spite of the heavy QRN prevailing. However, I have been able to copy only one and I was lucky to get that; all because of the what-you-would-call-it chain lightning sending when they make their own calls. I am no turtle at receiving code, and have copied many messages, but those sines are merely streams of dots and dashes of which I can make tails nor heads.

There are some ones and twos and threes whose messages are copied in spite of some QSS and to whom I would only be too glad to send QSL cards but they, themselves, stop my wish rather short. That is why I am writing,—to plead that all hams send their own call more slowly and distinctly.

I believe all hams will take note of this as they all wish to kick out. They can depend on me to do my part.

J. Federico Mejia, E.E.,

### A QUICK COIL TEST

(Continued from page 26)

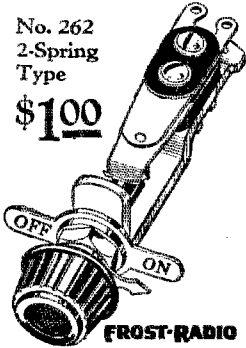
The difference between the resistance of the coils were quite a bit greater than the

currents would indicate because these currents had to flow through the fixed series resistances of the hot-wire ammeter and the pickup coil. The condenser was good enough so that its resistance need not be worried about. Of course, a real job of measurement would have required the measuring and subtraction of these series resistances. In that case, the difference between the coils would have been quite a lot more prominent.

Some of our correspondents accuse us of overdoing this business of good coils. We plead "Not Guilty" because there is still plenty of room for improvement of the coils in most receivers. We are just conceited enough to believe that our insistence on some attention to the coils is a good thing for the industry and that eventually coils will change just as did variable condensers after we began harping on that subject, and calling attention to the few good condensers that existed at the time.

—S. K.

No. 262  
2-Spring  
Type  
**\$100**



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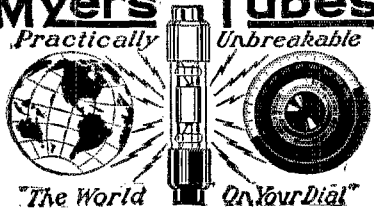
# MARCONI

recommends  
Short-wave reception

as being vital to the best results from radio. The design of Myers Tubes makes them adaptable for short-wave as well as long-wave reception. They achieve this result by having the grid and plate leads extend from opposite ends of the tube.

Amateurs using Myers Tubes get virtually every station on the continent. Three types for dry and storage batteries. Complete ready to mount. At your dealer's or sent postpaid for, ..... **\$4.95**  
246 Craig Street, Montreal

**Myers Tubes**  
Practically Unbreakable



"The World On Your Dial"

Write for descriptive circular

## German 30 Watters

Are very rugged, filament voltage 10  
Plate Voltage 1500

Plate connection brought out at top of tube

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HEAD SETS and LOUD SPEAKERS

These instruments have powerful magnets giving great sensitivity and the finest tonal quality.

They have layer wound and layer insulated coils—a feature exclusive to Stromberg-Carlson apparatus. They stand up under high voltage and maintain their excellence indefinitely.



No. 2A Head Set



No. 1A Loud Speaker

Ask your dealer

**STROMBERG-CARLSON TELEPHONE MFG. CO.**  
ROCHESTER, N. Y.

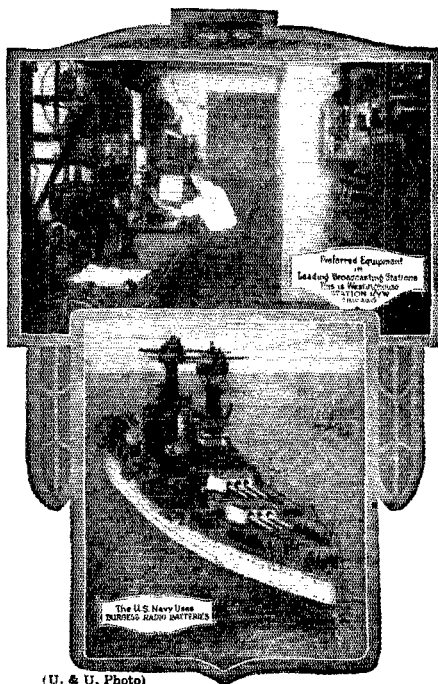
# More Adventures of **BURGESS** RADIO BATTERIES

The same Burgess Radio 'A', 'B' and 'C' Batteries which are today faithfully serving the nation's armed forces on land and sea and in the air, and used by leading radio broadcasting stations, experienced radio engineers and amateurs, are sold in your own community by your own dealer for your own receiving set.

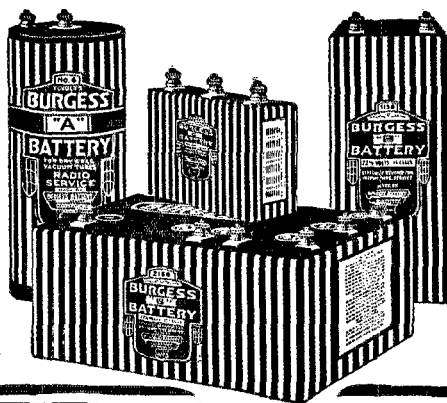
When you replace your old batteries, ask your dealer for Burgess. Insist upon this brand of laboratory products—you will receive the same measure of satisfactory service that has won the confidence of the radio public.

*"Ask Any Radio Engineer"*

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*Engineers DRY BATTERIES Manufacturers*  
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Laboratories and Works: Madison, Wisc.  
*In Canada: Niagara Falls and Winnipeg*



(U. & U. Photo)



# How many radio miles did you go last night?

HOW many radio miles did you travel last night?—that's the up-to-the-minute question. Did you voyage from New York to Chicago? Did you look in on Boston fifty seconds after, and on Philadelphia half-a-minute after that? If you *didn't*, why didn't you? There's fun and excitement, too, in a De Forest Radio—and it's ready to "get to work" five minutes after it enters your home.

Here is a radiophone so astonishingly simple for the work it does that it's your best introduction to the marvels of radio space. Here is one so perfectly developed that it invites graduation from other less efficient instruments.

Here is a receiving set sponsored by the very genius who made radio, as we know it, possible—an instrument that offers a really remarkable demonstration in radio performance at a price far less than any instrument whose achievements compare with it. Here is a practical, a modern Radiophone, depending upon no out-strung wire to obtain results, but which, with a simple loop the size of a picture frame, opens to you a far-flung range of concert, speech and lecture—and all with a tonal purity, a sensitive choice, as



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## DE FOREST RADIOPHONE

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is free from rattles. Every De Forest Loud Speaker is thoroughly tested, and is guaranteed free from defects. Sold by authorized De Forest dealers only. Price, with 6 feet of cord, \$25.00.

between station and station, that is rare to any but De Forest users.

The De Forest Radiophone is a complete four-tube receiver, built on the best reflex principle. Its four tubes and crystal detector do the work of seven tubes. We could be extremely technical in telling you how the four tubes do the work of seven and why the crystal detector gives both power and economy to this instrument. If you are technically inclined we shall be glad to do so if you will write us. Technical or not, however, know this: You can get splendid results from a De Forest D-12 Radiophone. Its

upkeep is low. Its tone is clear and pure. It can be moved easily from room to room.

### Why it pays to look for the De Forest agent

De Forest from first to last stands for all that is substantial and thorough and fundamentally right in radio. De Forest agents are qualified to give you sound and practical advice and help in radio. When you find a De Forest agent you find a man who knows radio—a man who has given us his word that he will see that every instrument he sells is thoroughly inspected and properly serviced after the sale. He has been carefully picked and schooled in the operation and servicing of De Forest Radiophones.

He will install your instrument and explain to you simply how to get the fullest satisfaction and enjoyment from it.

### Prices on De Forest D-12 Radiophones (COMPLETE)

Including loop, self-contained loud speaker, four De Forest tubes, A and B batteries, and all equipment ready to operate.

#### With Dry Batteries

In two-tone gray and black Fabrikoid cabinet \$161.20  
In two-tone Mahogany cabinet 176.20

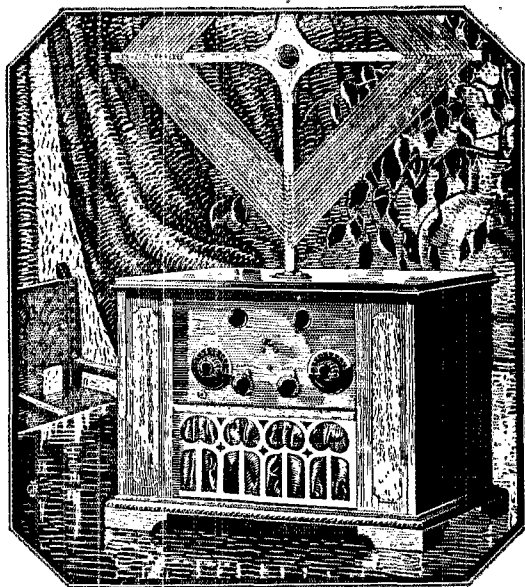
#### With Storage Batteries

In two-tone gray and black Fabrikoid cabinet 180.00  
In two-tone Mahogany cabinet 195.00

#### De Forest D-14 Radiophone

In burl walnut cabinet with loop and loud speaker built in. Price, including five DV-2 tubes, four B batteries, and storage batteries 371.50

**DE FOREST RADIO COMPANY**  
Jersey City N. J.



# DE FOREST RADIOPHONE

REG. U. S. PAT. OFF.

REG. U. S. PAT. OFF.

## Your set deserves De Forest tubes

De Forest DV-2 Tube for use with Dry Cell Batteries.

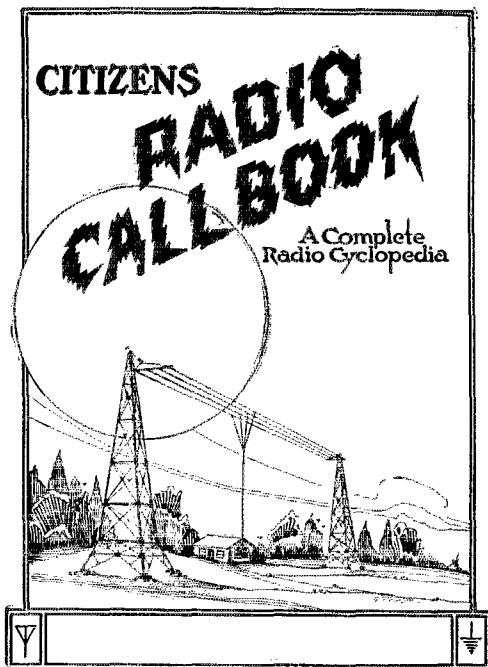


The original De Forest vacuum tube was the first of many millions of De Forest tubes that have stood foremost in quality of workmanship and performance. They are noted for uniformity, volume,

and clarity. Use DV-3 with dry batteries, DV-2 with storage batteries. They are guaranteed against defects in material and workmanship. Sold only by authorized De Forest dealers. Price \$4.00 each.



De Forest DV-2 Tube for use with Storage Batteries.



## Important Announcement

**We have compiled a 268 page book containing in addition to all the information in the present issue**

### U. S. AMATEURS

Complete fresh lists from the nine Radio Supervisors' offices, containing all new calls assigned and changes of addresses.

### CANADIAN AMATEURS

Includes all Canada compiled by the Bureau of Marine and Fisheries, at Ottawa.

### ENGLISH AMATEURS

Gives call letter, name and address of every amateur in England, carefully compiled from several different sources.

### AUSTRALIAN AMATEUR STATIONS

Gives call letters, name and complete address of amateurs in all provinces of Australia.

### NEW ZEALAND AMATEUR STATIONS

Shows call letter, name, address, power and wave length of all stations in New Zealand.

### FRENCH AMATEUR STATIONS

Complete and up-to-date list just received from France.

### LAND RADIO STATIONS OF THE WORLD

Shows all commercial and high-powered transmitting stations giving call letters and wave length in every country of the world.

### COMMERCIAL LAND AND SHIP STATIONS

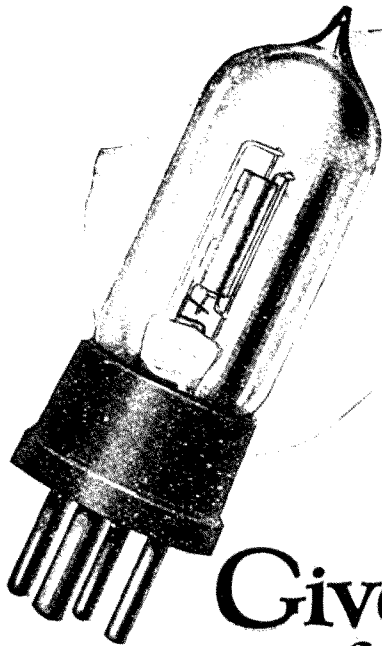
Complete list corrected right up to date of all American ships and American commercial land stations.

**The price is 75 cents**

If your dealer does not have them in stock send us 75 cents and we will do the rest. This volume takes the place of the present coupon system.

**CITIZENS RADIO SERVICE BUREAU**  
508 So. Dearborn Street,  
Chicago, Illinois





# Give Radiotrons *for Christmas*

Radiotron WD-11  
The ideal  
dry cell tube.



*This symbol of  
quality is your  
protection*

It isn't a genuine WD-11  
unless it's a Radiotron.  
It isn't a genuine WD-12  
unless it's a Radiotron.  
It isn't a genuine UV-199  
unless it's a Radiotron.  
It isn't a genuine UV-200  
unless it's a Radiotron.  
It isn't a genuine UV-201-a  
unless it's a Radiotron.

Take a peek into any radio fan's set—  
and you know what to give him for  
Christmas. Note the type of Radiotron  
he uses. Go to any radio store—and  
when you buy, look for the name  
RADIOTRON and the RCA mark.  
Then you are sure to be giving him  
*genuine* Radiotrons. And mighty sure  
to be giving him the gift for a merry  
Christmas.

Radio Corporation of America

*Sales Offices*

233 Broadway, New York

10 So. La Salle St., Chicago, Ill.

28 Geary St., San Francisco, Cal.

# Radiotron

REG. U. S. PAT. OFF.

## To Our Readers Who Are Not A. R. R. L. Members

Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

.....1924

American Radio Relay League,  
Hartford, Conn.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose \$2 (\$2.50 in foreign countries) in payment of one year's dues. This entitles me to receive *QST* for the same period. Please begin my subscription with the ..... issue. Mail my Certificate of Membership and send *QST* to the following name and address.

.....  
.....  
.....

Station call, if any .....

Grade Operator's license, if any .....

Radio Clubs of which a member .....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? .....

.....Thanks?

Greatest Reception Range with Maximum Selectivity

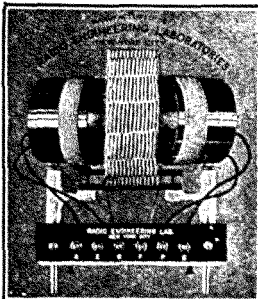
### The Lopez Low Loss Tuner

Those Who Know Use the ORIGINAL Because

1. LOWEST OHMIC and DIELECTRIC LOSSES—Large solid wire, SECONDARY coil practically SELF-SUPPORTING with minimum insulating material.
2. VARIABLE ANTENNA COUPLING adapts to any antenna length—REGENERATION secured at ALL WAVE LENGTHS.
3. UNTUNED PRIMARY—Easier to tune, Secondary dial may be calibrated.
4. MECHANICALLY RUGGED and ELECTRICALLY EFFICIENT—A laboratory product for practical use. Has improved mounting bracket.
5. GUARANTEED to give satisfaction. Testimonials upon request.
6. TWO TYPES—Regular Amateur 40 to 205 meters (new) and Broadcast 200 to 600 meters (new).

Price \$10.00 each At Your DEALER'S or write

**A. C. LOPEZ & CO., 334 Fifth Ave., New York City**



# “Gets the Absolute Limit Out of Any Set”



“Your Superspeaker is my biggest help in closing the sale of any complete set” writes in a successful amateur builder. “It gets the absolute limit out of any set in tone, volume and distance.”

Here’s a frank, simple statement. It rings true. Grasp its full significance!

‘The absolute limit of any set’! That’s what every devotee of radio wants with all his heart. And The Superspeaker is the way for him to get it—without extra batteries and with an original method of adjustment that never deteriorates.

The owner of a Superspeaker-equipped set always welcomes every form of competitive test. Comparison always confirms the pride in its performance.

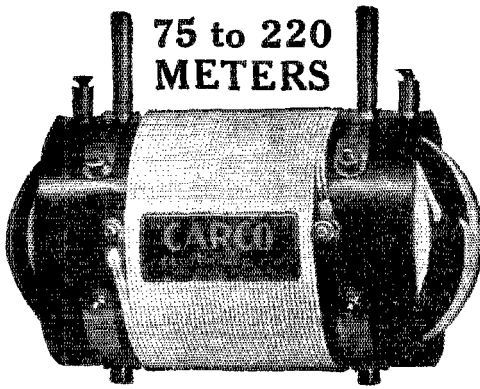
Here is the reproducing instrument you need for 100% performance.

Get a Superspeaker and reach out!

JEWETT RADIO &  
PHONOGRAPH CO.  
5680 Twelfth St., Detroit, Mich.



# The Superspeaker



**75 to 220 METERS**

**40 METERS**

A ten turn coil placed in shunt to secondary coil tunes as low as forty meters; see August Q. S. T. 1924 page forty-three for detail.

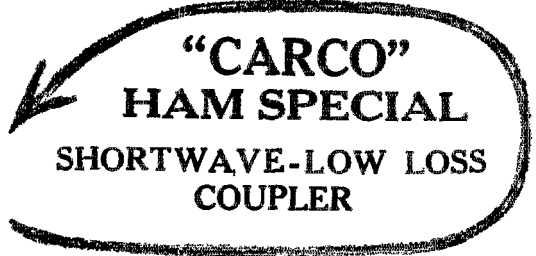
The Carter Manufacturing Co.,  
1728 Coit Ave.,  
East Cleveland, Ohio.

Gentlemen:  
I received my coupler from you a short time ago and wish to state I am highly pleased with it. Using the three circuit hook-up with one step of audio I have copied 1RT Paris every night since hooking it up, they are transmitting on 85 meters. Amateurs from every district came in very Q. S. A.  
Yours very truly,

W. A. Knight, ICNA,  
U. S. S. Acushnet,  
Woods Hole, Mass.

**LAST CHANCE!**

"HAMB" get your coupler now as this unit goes into the hands of dealers Dec. 15, 1924, at advanced price.



DESIGNED BY A HAM FOR HAMS

A compact unit in a space of only 3" x 5 1/2". Antenna Rotor and secondary Stator designed for "Low Loss" and "Low Resistance." Our special single layer, multiple wound inductance does the trick.

A "Low Loss" Condenser for secondary is the only addition required for a complete tuning unit. DX work requires a "Low Loss" tuner. Rebuild your set with a "CARCO" Ham Special. An increase in efficiency will result.

PRICE \$8.00 EACH

SPECIAL PRICE TO HAMS ONLY. \$5.00

This Special Price is NET.

Sent C. O. D. A postal with name, address will bring it.

\$6.75 BROADCAST TUNER \$6.75  
NO. 3 "LOW LOSS" 175-600 METERS

This unit is of the same type as the shortwave tuner. The coupler is recommended for use in congested districts where interference is bad.

THE CARTER MANUFACTURING CO.  
1728 Coit Ave., East Cleveland, O., U. S. A.

**LOOK WHAT'S HERE**

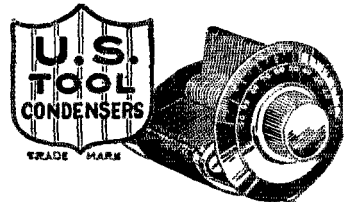


ONE OF THE MOST USEFUL SET FOR AMATEUR RADIO USES. 1 Drill each No. 10, 16, 20, 29, 36 and 45, and 1 Plug Tap each, 4<sup>24</sup>, 6<sup>32</sup>, 8<sup>32</sup>, 10<sup>32</sup>, 12<sup>34</sup>, and 14<sup>30</sup>.

SOLD BY MORSE DEALERS EVERYWHERE. IF YOUR DEALER CANNOT SUPPLY YOU, WRITE TO US.

Send for Circular Form 3-A Which tells the whole story.

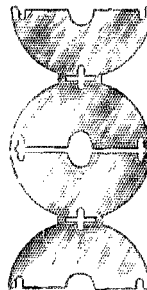
**MORSE**  
TWIST DRILL & MACHINE CO.  
NEW BEDFORD, MASS., U.S.A.



The Innovation of the Year

**One Piece Stator**

(Pat. Applied for)



An EXCLUSIVE and UNIQUE FEATURE—value immediately recognized by entire radio world. Eliminates broken contacts, soldered joints, leakage and resistance. Found in types 3 (plain) and 4 (all-vernier). CELORON END PLATES: Types 5 (plain) and 6 (all-vernier), METAL END PLATES.

CS and CV Low Price Types always in stock.

ASK YOUR DEALER!

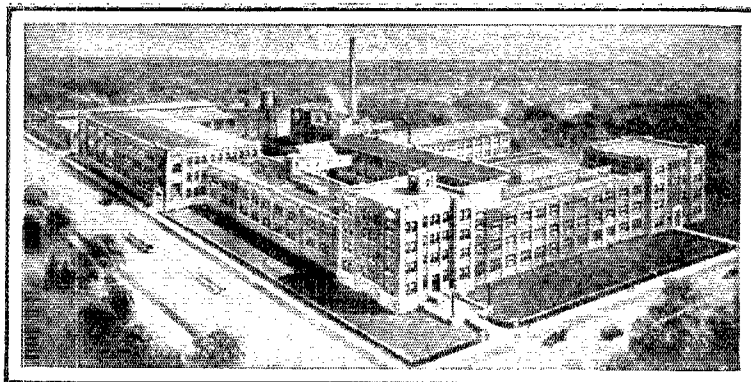
100% GUARANTEED

Write for Folder

U. S. TOOL COMPANY, INC.

112 Mechanic St. Newark, N. J.

Mfrs. of special tools, dies, jigs, automatic machinery and sub presses.



The Springfield, Illinois, plant of Sangamo Electric Company, the world's largest plant devoted to the manufacture of electrical meters and instrument transformers.

## Sangamo Electric Company announces A new long wave radio frequency transformer tuned at 4500 meters

THESE R. F. transformers, the heart of the Pressley circuit, are used in Army airplane receivers to build up great volume so that long range messages can be heard distinctly above the roaring engine.

Jackson H. Pressley, Chief Engineer of U. S. Signal Corps Radio Laboratories, at Camp Alfred Vail, is the inventor. Sangamo Electric Company has secured the exclusive right to manufacture for commercial use. A set of four, with a coupler coil, all matched and tuned, can be bought for \$22.50.

Sangamo Electric Company is peculiarly well fitted to

manufacture radio instruments which require unusual accuracy. This company has been making electric meters since 1897, bringing to this business the training and careful workmanship of the watchmaker. Sangamo meters and precision transformers, as finely made as multi-jeweled watches, are used throughout the world.

Just as Sangamo pioneers brought their experience in precision manufacturing to the building of electrical devices, so they now extend skill to the making of radio transformers. The Sangamo trade mark extends its protection in one more market.



### ASSOCIATED SANGAMO ELECTRIC COMPANIES

CAPACITY 3500 METERS PER DAY

SANGAMO ELECTRIC COMPANY  
Springfield, Illinois

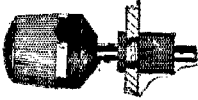
BRITISH SANGAMO COMPANY LIMITED  
Pondersend, Middlesex, England

SANGAMO ELECTRIC COMPANY  
OF CANADA LIMITED Toronto, Ontario

ASHIDA ENGINEERING COMPANY  
Osaka, Japan

Domestic Offices—New York, Chicago, Birmingham, San Francisco, Los Angeles. Radio Division—50 Church Street, New York

# Fleron RADIO SPECIALTIES



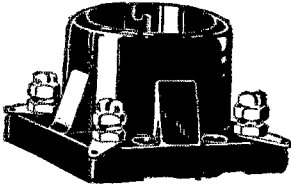
## VERNIER ADJUSTER

The best adjuster on the market. Spring holds head away from dial when not in use. With slight adjustment spring can be made to hold head against dial if desired. Patented 65c.



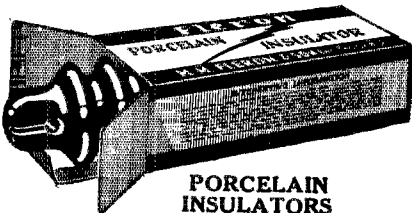
## LEAD-IN BUSHING

This device makes a workmanlike finish at a point in aerial installation that has been a source of power loss. Adjustable to most every normal thickness. Black Body Porcelain. Black Glaze. \$1.10 ea.



## PORCELAIN SOCKETS

Lowest losses of any socket. Very carefully made. Black Body, Black Glaze. Side and bottom contact springs of reinforced phosphor Bronze. Solder Tabs. Cap Nut for screw driver or Spintite Wrench. All parts nickel plated. 65c. each.



## PORCELAIN INSULATORS

Lowest power losses in the antenna Dielectric absorption reduced to minimum because of very low phase difference of Fleron Porcelain. Very tough body. Sold Black Glaze. Seven sizes. 20c to \$1.00. Each insulator in a separate carton.

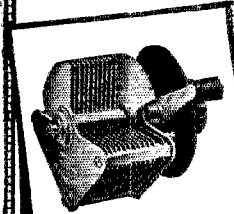
For Sale by all Good  
Jobbers and Dealers

**M. M. FLERON & SON, Inc.**  
TRENTON, N. J.

# DUPLEX CONDENSERS

## Stand Every Test

For all around efficiency and the micrometer adjustment permitted when unusually accurate tuning is required, DUPLEX CONDENSERS lead the field. Made of only the finest material obtainable under the guidance of foremost radio engineers, they certainly are precision instruments.

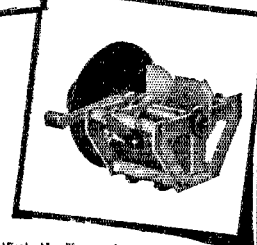


## "DR" Series

A low loss precision condenser of High value and unusually low price. Great for set builders who want excellent value at low price.

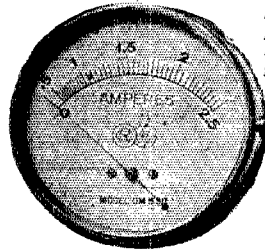
## "FR" Series

The highest quality low loss condenser made. Used by foremost set manufacturers. Condenser tests at Yale University in May, 1924, definitely determined its remarkable efficiency.



Write for "Cons" and "Facts." They are free.

**The Duplex Engine Governor Co. Inc.**  
32 Flatbush Ave. Extension Brooklyn, N. Y.



## Hv U a Little Meter in Ur Home?

If not, here are some brand new E. C. A. 0-2.5 hot wire ammeters which we have secured at a very low price. Originally listed at \$6.00 each. Our price \$1.50. 3 1/2" in diameter, projecting panel mounting and finished in handsome nickel brass.

Price \$1.50

**The Utility Radio Co.**  
58 North 6th St., Newark, N. J.

# MAGNAVOX Radio

*The Utmost  
in Quality and Value*



Always look for the Magnavox  
Trade Mark when buying radio.

AS the rapid progress of the radio art leads every experienced user to expect supremely high standards of efficiency in his equipment, it becomes of vital importance to know what apparatus deserves your investment in hard earned cash.

Regarding the quality of Magnavox Radio Reproducers, their distinctive characteristics are too well known throughout the radio world for special explanation or comment.

Those for whom radio has become an actual daily need, however, will welcome a brief word about the new Magnavox Radio Receivers and Vacuum Tubes.

The unique feature of the Magnavox set is the gearing together of its several resonant circuits so as to per-

mit **positive control by a single dial.**

The Magnavox Tubes have extremely high amplification factors, and as detectors, give sharper tuning and eliminate microphonic noises.

*It is well worth your time to examine these products at the nearest Magnavox store.  
Literature on request.*

## THE MAGNAVOX COMPANY OAKLAND, CALIFORNIA

New York: 350 W. 31st St. Chicago: 162 N. State St. San Francisco: 274 Brannan St.

Canadian Distributors: Perkins Electric Limited  
Toronto, Montreal, Winnipeg

12R

Use DURHAM  
— to get Europe —  
Week of November 24

The biggest  
little thing in radio

# DURHAM Metallic Grid Leaks—

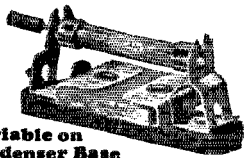
There's nothing equal to metal — and these are the only metallic leaks. They're bound to help your set.

At dealers or postpaid

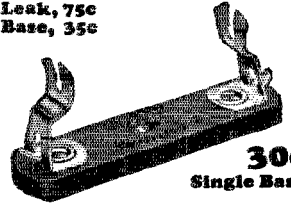
**23 Sizes**

There's a DURHAM Metallic for every high resistance need. Each marked with guaranteed, tested value.

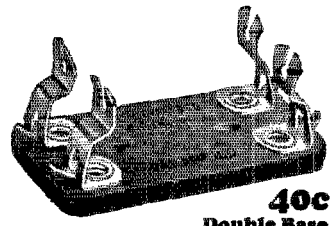
Prices	
<b>Fixed Metallics</b>	
Over ¼ meg.	50c
Under ¼ meg.	75c
<b>Variables</b>	
1,000—100,000 ohms	75c
100,000 ohms—5 megs.	75c
2 megs.—10 megs.	75c



Variable on Condenser Base  
Leak, 75c  
Base, 35c



**30c**  
Single Base



**40c**  
Double Base

## All about Resistance Amplifiers—25c

Build a distortionless amplifier. Parts for two stages cost less than one good transformer. Complete detailed instruction booklet, 25c. At your dealer's or postpaid.

Satisfaction Guaranteed

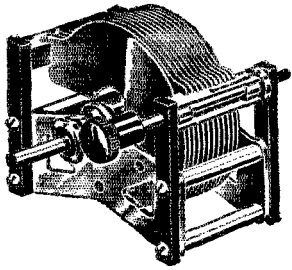
**DURHAM & CO., Inc.**  
1930 Market St., Philadelphia

Dealers:—

Customers would rather buy DURHAM products at your store. We have a display that helps.

Canadian Distributors: DeFOREST RADIO CORP., Ltd., Toronto

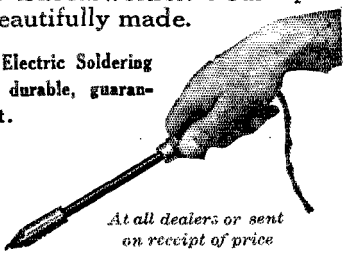
## HICO The New Sexton Condenser



For neutrodyne or any other circuit the HICO is a real worker. Four capacities. Beautifully made.

Live Heat, Electric Soldering  
Iron, Light durable, guaranteed element.

PRICE  
**\$2.50**



At all dealers or sent on receipt of price

**HARTFORD INSTRUMENT CO.**  
307 Pearl St. Hartford, Conn.

## Make Your Radio Joy A Sure Thing

YOU are going to give a "radio party," or you are going on a hunt for "DX". You get yourself set for a "large" evening. Then some little unavoidable thing happens and you blow all your tubes. Money, fun and everything is lost. The quickest way to spend \$20 is to accidentally drop a screw-driver in a five-tube set. Zip and your money is gone as well as your fun—until the radio store opens. Either style of KANT-BLO means protection against blowing out tubes.

## Kant-Blo SIGNAL

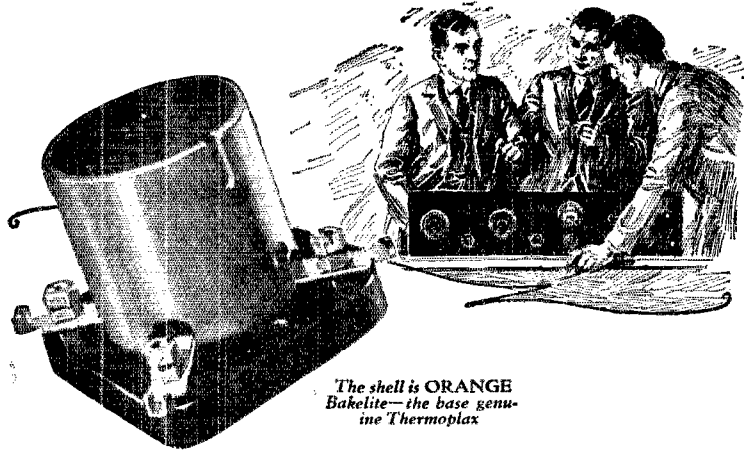
SWITCH BINDING POST

"Lights on any Short Circuit"

The KANT-BLO is not an extra accessory to your set. It is designed as a B battery Binding Post or as an A battery filament switch. Post Style and Switch Style—are at all the best radio stores. If your dealer is out of stock send us \$2 for a KANT-BLO Binding Post Style, or \$3 for the Switch Style, and we will ship any number of KANT-BLOS direct to you, charges prepaid.

Manufactured by  
**GANIO-KRAMER CO., Inc., N. Y.**  
Sole Distributors  
**APEX RADIO CO., Inc.**  
503 Fifth Ave., New York.





The shell is ORANGE Bakelite—the base genuine Thermoplas

## The More You Know About Radio the Better You Will Like This Socket

If ever a device were designed to increase the efficiency of all receiving sets, it was this new socket by the Master Builder. Radio Engineers praise it—new set builders marvel at its ease of installation and the clear, loud reception obtained that bespeaks the absence of losses—many old-timers have even rewired their sets to establish new distance records and enjoy clearer reception with this better socket.

You'll like its construction, embodying a minimum of both insulation and metal—capacity absolutely minimized *without sacrifice of mechanical strength*. And its base of ebony Thermoplas in beautiful color contrast with the thin shell of orange Bakelite adds greatly to the appearance of any set as the construction does to its efficiency.

You'll like its contacts (the source of losses and noise in most sockets); they are radically new in design, formed of phosphor bronze and *silver* plated—because the contact resistance of silver does not increase as it stands exposed to air. Then, too, electrical losses are minimized by providing maximum spacing between terminals, both in insulation and in the air.

You will like the way the tube is inserted and removed without turning—which prevents twisting the bulb from its base. You will like its appearance—its small size—its neatness. You will like its silvered posts with slotted nuts that are fastened *well* with either screw driver or wrench. You will like the way these terminals are arranged for soldering—extra long so that they may be bent down where under-wiring is desired—and provided with ears to hold the wire in place for soldering. And best of all you will like the price, 90c. *This socket that meets the specifications of the most exacting radio engineer costs no more than most of those on the market today!* If your dealer has not yet been stocked, you can be supplied direct from factory at regular price plus 10c for packing and postage.

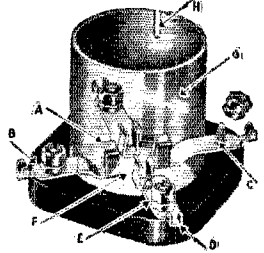
### THE CUTLER-HAMMER MFG. CO.

Member Radio Section, Associated Manufacturers of Electrical Supplies  
Works: MILWAUKEE and NEW YORK

*"Built By The Master Builder"*

**C-H**

*These Exclusive Features Assure Better Reception*



**A**  
Perfect contact. Both sides of tube prong cleaned when inserted—no contact or wear on soldered end.

**B**  
All metal parts *silver* plated—perfect contact for the life of the set. Silver may tarnish but its contact resistance does not change.

**C**  
One piece contact construction. The binding post is NOT a part of the circuit—the wire to the socket always touches the contact strip which carries the current direct to the tube prong—no joints to cause losses.

**D**  
Convenient terminals for soldering—full length to allow bending down for under-wiring. Ears hold wire in place for soldering.

**E**  
Extra handy binding posts—tight connections with either wrench or screw-driver. Lock washers hold terminals rigid.

**F**  
Wide spacing of current carrying parts both in air and insulation—true low-loss construction.

**G**  
A minimum of both metal and insulation for low capacity. Shell of thin Bakelite—the base of genuine Thermoplas.

**H**  
The tube is held in place by merely a vertical motion—no twisting to separate bulb from base.

*The attractive orange shell helps identify this better socket, but the famous C-H trade mark both on the socket and on the orange and blue box is your genuine protection.*



# RADIO SOCKET

# NO DISTORTION WITH DAVEN RESISTANCE COUPLED AMPLIFICATION

## Daven Amplifier Kits

*For Those Who  
Build Their Own*

Complete with sockets and condensers.

3-Stage ... \$12.50

4-Stage ... 16.00

Without sockets and condensers.

3-Stage ... \$ 8.00

4-Stage ... 10.50

Resistance Coupled audio frequency amplification has assumed the prominent place in the field of radio reception that its merits of efficiency and perfect quality have long justified.

The *Daven Super Amplifier* illustrated below is the neatest and most compact amplifier ever offered to the public. The base is of molded bakelite and so designed that it will fit within any cabinet. All connections complete and assembly labor is eliminated.

By the use of this amplifier, distortionless amplification is assured, thus making the reception of broadcasted concerts a joy that will be forever permanent.

### SOLD EVERYWHERE

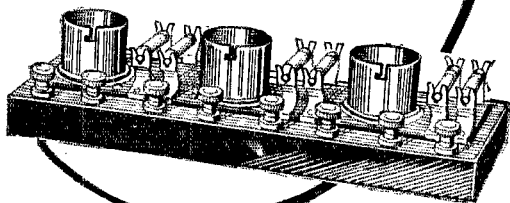
Ask your dealer for the Daven "RESISTOR MANUAL" By Zeh Bouck. It gives you the how-to-make-it data on Resistance Coupled Amplification.

PRICE 25 CENTS

**DAVEN RADIO CORP.**

"Resistor Specialists"

**NEWARK, NEW JERSEY**





TRADE MARK  
REG. U. S. PAT. OFF.



Radio &  
Audio Frequency

## TRANSFORMERS

Buy One NOW  
Price \$3.00  
Up to \$6.00

**MARLE ENGINEERING CO.**  
**ORANGE, NEW JERSEY**

*from Coast to Coast  
from Gulf to Hudson Bay*

## BRACH

vacuum arresters  
have protected

principal Railway Signal  
Systems, Police and  
Fire Circuits, and  
RADIO  
for 18 years

Approved by National Board  
Fire Underwriters  
No. 3077



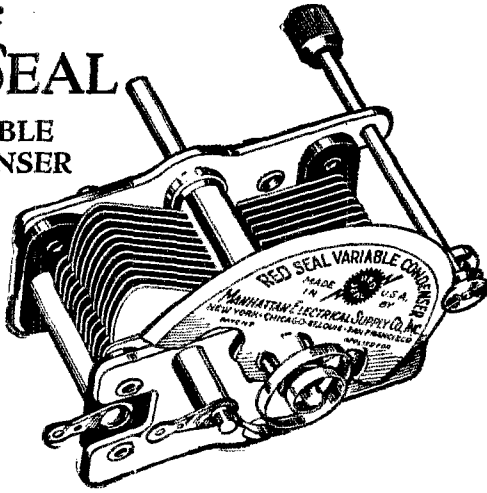
**SAFETY  
demands the  
BRACH**

vacuum radio arrester

L. S. BRACH-MFG. CO. NEWARK, N. J.

# The RED SEAL

VARIABLE  
CONDENSER



## At Last—an ideal vernier to control a low-loss condenser

You have probably often wished for such a combination. Now for the first time the vernier of the Red Seal enables you to easily take full advantage of high condenser efficiency without turning right through the sharp peak of the wave.

No more slipping, lost motion, or tight bearings. No more tuning with one knob and adjusting with another. All the adjusting may be done with the vernier knob alone.

The above does not give you an adequate picture of the Red Seal Condenser. Go to your dealer and ask to see it. As you operate the vernier for yourself, note these six important features which make it the ideal control for this efficient, low-loss instrument.

1. The action of the vernier is positive, giving delicate, smooth adjustment.

2. There is no lost motion or play at any point.
3. All tuning may be done with the vernier alone.
4. Only one dial setting—stations easily logged.
5. There is no fibre, rubber, or gears. Nothing to wear or get out of order.
6. Plates turn freely. Balanced vernier eliminates need for friction at bearings.

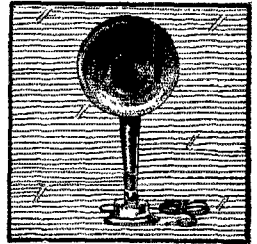
The Red Seal has four other points of note:

1. Plates are of brass and are soldered.
2. Spring "pig-tail" connection employed.
3. End plates are grounded, eliminating the effect of hand capacity. For supercritical work, insist on the Red Seal Variable Condenser.
4. To facilitate tuning the movable plates are given a special shape, making the Red Seal of the "straight-line" type.

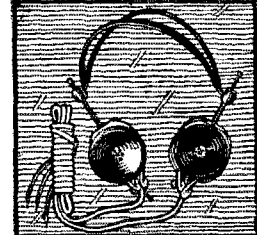
Manhattan Electrical Supply Co.  
Incorporated  
New York Chicago St. Louis  
San Francisco



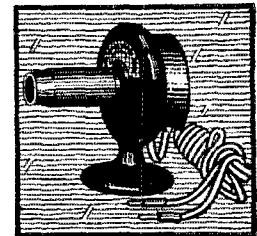
MADE BY THE MAKERS OF THE FAMOUS RED SEAL DRY BATTERIES.



**Manhattan Junior Loud Speaker**—A real musical instrument containing a specially designed reproducer unit for loud speaker work. Not just a headset in a base. Has "Concert Modulator" adjustment giving best results under all conditions—\$10.00



**Red Seal Headset**—Designed for "DX" work. Tone quality excellent. Workmanship the best. No distortion or chattering. Bakelite case, soft rubber sanitary headband—\$6.00

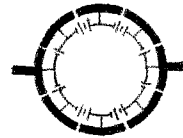
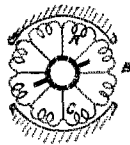


**Red Seal Phonograph Attachment**—Makes a loud speaker of your phonograph. A high grade reproducer; reproducing the work of the broadcasting artists with fidelity—\$5.00



**Red Seal Batteries**—The dependable dry battery for "A" circuits. Long operating life and great recuperative power make Red Seals ideal for radio work. Sold by all classes of dealers. Remember, fresh Red Seals bring in fresh stations.

No. 1 of a series of 10  
**"FILTER FACTS"**  
 Follow them thru monthly.



**RIPPLES.** D. C. Generators operating under normal conditions have three sources of disturbance, i.e. commutator ripple, slot ripple and the noise of moving contact.

**COMMUTATOR RIPPLE.** Armature windings are a series of coils around the armature, forming one large coil, with taps brought to commutator segments. The voltages induced between commutator segments are not equal, and vary as the armature revolves. The voltage is maximum at A, minimum at B, and maximum, but in the opposite direction, at C. The series parallel battery connection is analogous. As a brush leaves one segment and passes to the next the voltage changes slightly. The resultant ripple is known as commutator ripple.

**SLOT RIPPLE.** As each slot passes a pole tip there is a slight interruption of the field at this point. Each surge in the field slightly changes the value of the voltage induced in the coils. The resultant ripple is known as slot ripple.

The frequency in cycles per second for the above ripples may be expressed—

$$F_c = \frac{\text{No. of segments} \times \text{r.p.m.}}{60}$$

$$F_s = \frac{\text{No. of slots} \times \text{r.p.m.}}{60}$$

**NOISE OF MOVING CONTACT.** The infinitesimal sparking caused by microscopic unevenness in the surfaces of both the commutator and the brushes produce an audible noise in the transmitter

The ratio of ripple voltage to maximum voltage for A.C. equals 200%.  
 The ratio of ripple voltage to maximum voltage for R.A.C. equals 100%.

THE AVERAGE RATIO OF TOTAL DISTURBANCE, AS OUTLINED ABOVE, FOR ESCO GENERATORS IS .9 OF 1%.

**ELECTRIC SPECIALTY COMPANY**

TRADE "ESCO" MARK

225 SOUTH STREET

STAMFORD, CONN., U. S. A.

Makers of Motors, Generators, Dynamotors and Motor-Generators that give the maximum miles per watt.

**We repair the following RADIO TUBES  
 and Guarantee Them**

WD-11 .....	\$2.50	DV-6 .....	\$2.50	UV-201A .....	\$2.50
WD-12 .....	2.50	DV-1 .....	2.50	C-301A .....	2.50
UV-200 .....	2.50	DV-2 .....	2.50	Marconi .....	2.50
UV-201 .....	2.50	DV-6A .....	2.50	Moorhead .....	2.50
C-300 .....	2.50	UV-199 .....	2.50	6 v. Plain Detector .....	2.50
C-301 .....	2.50	C-299 .....	2.50	6 v. Plain Amplifier .....	2.50
				UV-202 Transmitter and C-302 .....	\$3.50

Mail Orders solicited and promptly attended to.  
 Dealers and Agents write for Special Discount.

**Tube Repair Laboratory**  
 P. O. Box 119, Weehawken, N. J.

The Ideal CHRISTMAS GIFT for the Amateur Radio Operator

YOUR STATION CALL in SOLID GOLD LETTERS!  
 (Actual Size)

**RADIO CALL PINS**



Pat.  
 App'd  
 for

The INSIGNIA of RADIO OPERATORS Everywhere

Slip \$2.00 into an envelope with your call to  
**9FZ,** R. C. BALLARD  
 1522 W. Sunnyside Ave., Chicago, Ill

**KESTER Radio SOLDER**  
 (Rosin-Core)

If your dealer cannot supply you  
 send us 25c in postage

**CHICAGO SOLDER COMPANY**  
 CHICAGO, U. S. A.

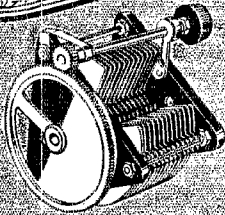
**Super-Heterodynes**

We use only proven circuits in our Super-Heterodynes. We Specialize in building to order any type Super-Heterodyne and guarantee them. Dealer's prices on most equipment.

**Ensell Radio Laboratory**  
 1208 Grandview Avenue Warren, Ohio

Quality - Easily Recognized.

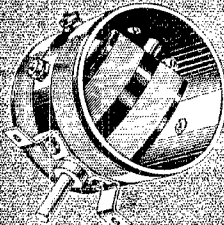
# Gifts that will bring joy to any Radio BUILDER



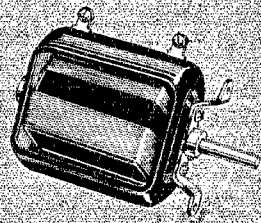
TYPE 247-H  
geared Condenser  
Price \$5.00



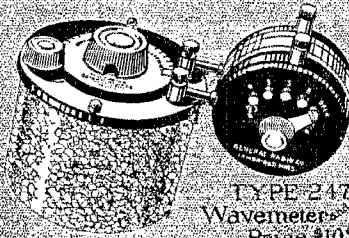
TYPE 231-A  
Amplifying Transformer  
Price \$5.00



TYPE 268  
photo coupler  
Price \$3.50



TYPE 269  
Variometer  
Price \$5.00



TYPE 247-W  
Wavemeter with Filter  
Price \$10.00

## For a Merry Radio Christmas

### Acceptability

In selecting articles for Christmas giving, those who choose with the true Yuletide Spirit consider *acceptability* and *practicability*.

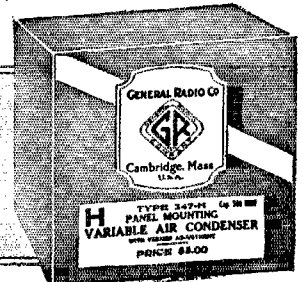
To the radio builder who knows the necessity of good apparatus, nothing is more acceptable and practical

### Practicability

than General Radio parts, which are scientifically designed by radio engineers.

A set built with General Radio parts is your unfailing assurance of quality reception. Ask the man who has built one.

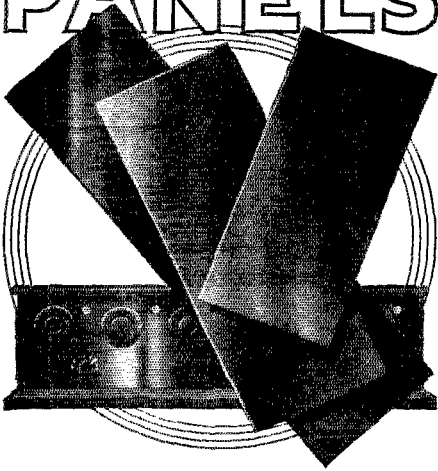
**GENERAL RADIO CO.**  
Cambridge, Mass.,  
U.S.A.



# ELECTRASOTE

TRADE MARK

# PANELS



Clear reception and selectivity are what every radio fan wants. To obtain these advantages, every part should be chosen wisely—beginning with the panel.

Electrasote Panels are unaffected by climatic conditions, they will not warp or change color. Due to their electrical qualities they reduce surface leakage to a minimum. And yet they cost less than other standard panels.

Electrasote is one of the famous "sote" products introduced by The Pantasote Company, Inc.

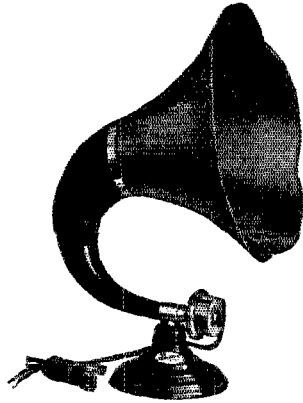
*On sale at good Radio Dealers*

**M. M. FLERON & SON, Inc.**

**Sole Sales Agents**

**Trenton,**

**New Jersey.**



*Burns*

**LOUD  
SPEAKER**

**DISTINCTIVE  
IN DESIGN  
14-INCH BELL**

**VOLUME, CLARITY, BEAUTY**

The loud speaker that will fully satisfy you. Equal to hearing the original tones.

No. 205B—Polished black flare. . . \$22.50

No. 205D—Shell pyralin flare . . . 25.00

MAKERS OF TELEPHONES FOR 30 YEARS

*American Electric*  
COMPANY

State and 64th Sts. Chicago, U. S. A.

## In She Comes!

**TIP** your whisker to almost any point of an NAA Meter tested crystal and the full flow of the impulse instantly hits your phones, clean, clear, steady.

Reason—no guesswork in the test;—every, EVERY crystal meter-tested singly by specially made electrical instruments to a point away beyond normal sensitivity. In addition, the Newman-Stern mounting is new—patents pending—cold assembly, provides for refilling, and avoids damage to crystal by hot alloy; recessed for protection.

### Perfect for Reflex

At all good jobbers and dealers, in neat turned wood box, 60c. If dealer can't supply, order direct and send dealer's name.

**The Newman-Stern Co.**

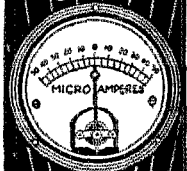
1746 East 12th Street  
Cleveland, Ohio

Originators of  
tested crystals in 1914.  
Oldest and Largest  
Producers.

Pioneers in Radio  
Equipment in Ohio



*New*  
**NAA  
Meter  
Tested  
Crystals**



*Nuggets  
of  
Sensitive-  
ness*



**ZENITH**  
**KENNEDY**  
*W*  
**RADIODYNE**  
*C*  
**Pathé**  
**ULTRADYNE**  
**MURDOCK**  
**MICHIGAN**

*Howard*

**IZARKA**

**MUSIO**

**PFANSTIEHL**

**PHOENIX**

**ANDREWS**

**MALONE LEMON**

**AUDIOLA**

**GATES**

**GLOBE**

**HARMONY**

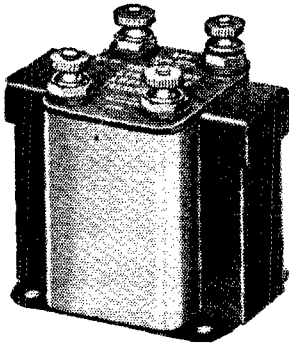
**ODELL FERRY**

**PEERLESS**

**DUCKS DELUXE**

**SAAL**

*More set makers  
use*



**EXCLUSIVE!**

**THORDARSON SQUARE COIL LEAK-PROOF CONSTRUCTION**

The Thordarson-made layer-wound SQUARE coil fits snugly around the square core. No air space between coil and core (exclusive!)—no lost energy, no lost volume (especially on low notes), no leaks from primary to cause howls in set. Over-size core provides 50% larger magnetic circuit—minimizes core losses, prevents over-saturation. No rivets or screws through core to cause short circuits or eddy current losses between laminations (exclusive!) Do you wonder Thordarson produces more transformers for more makers of quality sets than all competitors combined?

**New!**

We announce the Thordarson **INTERSTAGE** Power Amplifying Transformer. Provides two stages of **POWER** amplification when inserted in circuit between Input and Output Power Amplifying Transformers. Four tubes are required, but the quality of the reception more than repays you. Only Thordarson builds a transformer of this type. Price \$8. Write for free hook-up.

New York City, Sept. 25, 1924.

Thordarson Electric Mfg. Co.,  
 500 W. Huron St., Chicago.

The transformers which you supplied to equip the Radio on the schooner Bowdoin stood the extreme temperature of the Arctic without the slightest mishap. These transformers are in exactly the same condition today as they were the day they were installed, May, 1923.

Sincerely yours,

*Donald H. Mifflin*  
*WHP*

(signed)  
**Follow their lead**

**— Amplify with Thordarsons!**

Can you imagine nationally famous builders of sets costing up to hundreds of dollars each, jeopardizing the tone quality of their instruments with anything short of the best amplification? Of course not! Then remember, in buying transformers, that Thordarsons are standard on thirty-four makes of high grade sets. That leading set manufacturers use **more** Thordarsons than all competitive transformers combined.

Replace your present audio frequency transformers with a pair of Thordarsons. You'll be astonished, delighted. Distorted speech will disappear. You will find they amplify with **even** volume over the **entire** musical range. Note below some of the reasons why.

Buy a Thordarson-equipped set—or follow the lead of the leading makers and build with Thordarsons. Increased production this season enables any store to supply you. If your dealer has not yet received his stock you may order from us by mentioning his name. Interesting bulletins sent free.

**They Are Unconditionally Guaranteed**

**THORDARSON**  
*Super*  
**AMPLIFYING TRANSFORMERS**  
*Standard on the majority of quality sets*

Thordarson "Super" Audio Frequency Transformers are now to be had in three ratios: 2-1, \$5; 3½-1, \$4; 6-1, \$4.50. Thordarson Power Amplifying Transformers are \$13 the pair. Write for latest bulletins.



Six floors, 100,000 square feet, devoted to making transformers.

**THORDARSON ELECTRIC MANUFACTURING CO.**  
*Transformer specialists since 1895*  
**WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS**  
**Chicago, U.S.A.**

# Why it is Better

"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer:— Volume without distortion is the basis for the beauty of Federal Tone.

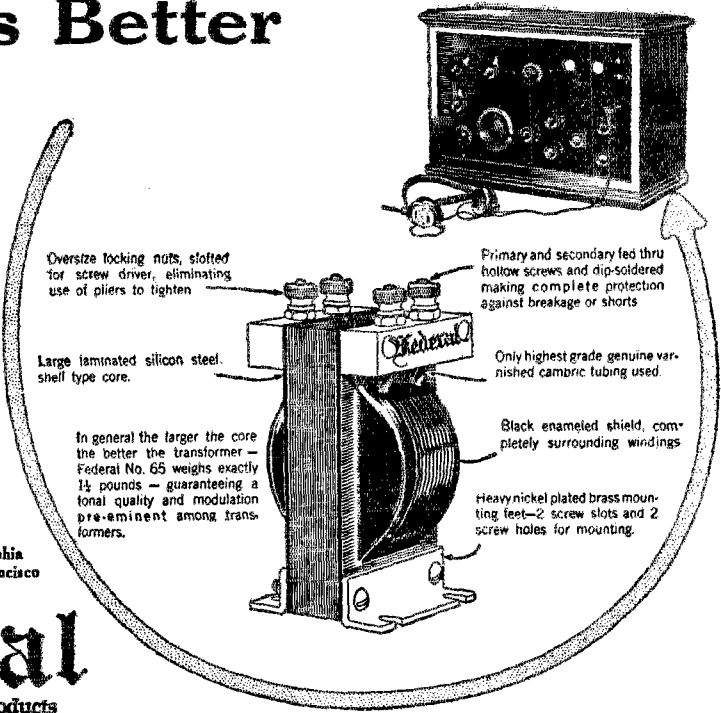
From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890. Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

**FEDERAL TELEPHONE & TELEGRAPH CO.,**  
Buffalo, N. Y.

Boston New York Philadelphia  
Chicago Pittsburgh San Francisco  
Bridgeburg, Canada



**Federal**  
Standard RADIO Products



Oversize locking nuts, slotted for screw driver, eliminating use of pliers to tighten

Large laminated silicon steel shell type core.

In general the larger the core the better the transformer — Federal No. 65 weighs exactly 1½ pounds — guaranteeing a tonal quality and modulation pre-eminent among transformers.

Primary and secondary fed thru hollow screws and dip-soldered making complete protection against breakage or shorts

Only highest grade genuine varnished cambric tubing used.

Black enameled shield, completely surrounding windings

Heavy nickel plated brass mounting feet—2 screw slots and 2 screw holes for mounting.

## NOW IS THE TIME, AMATEURS!

To Do Your Experimental Work on Your Receivers in Anticipation of Better "DX" This Winter

Parts of every description and at prices that are right to rebuild or add to your present equipment.

**You Will Work EUROPE THIS WINTER**  
With a Good Set—

Look over a few of the items worth while.

Variometers  
Variocouplers  
Cock-a-day coils

Reinartz coils  
Condensers  
Rheostats

Formica Panels  
Jacks  
Plugs

### ROSE RADIO and ELECTRICAL SUPPLIES

129 CAMP STREET,

Pioneers in the Radio Field

NEW ORLEANS, LA.

### Get our new Amateur Catalog

#### the HAMALOG

Full of good things you need

Some Leaders—

No. 12 solid copper enameled wire 1000 ft. \$6.90. Less at 75c per 100 ft.

20 in. Sure Fire Insulators, \$1.15 four or more, \$1.00 each.

E-2111 Power Bradleystat. \$6.50

Ballantine's Radio Telephony for Amateurs, latest issue, \$2.00

Don't Miss Our HAM-ADS

E. F. JOHNSON

9 ALD - - - Waseca, Minn.

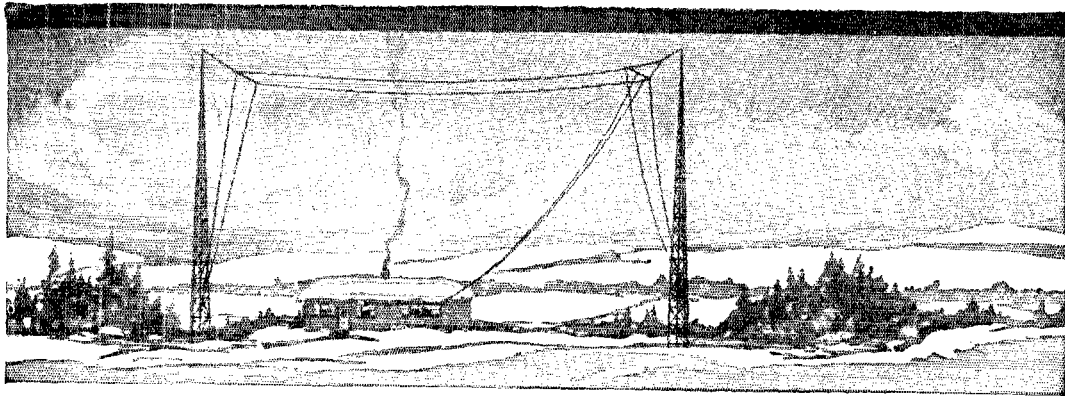
### Telegraph and Radio Instruments



Open circuit Keys are recommended when it is desired to have two way communication between points without the use of closed circuit batteries. Other types carried in stock.  
No. 8037 Legless Key Polished Brass Body . . . \$6.00  
No. 8038 Leg Key Polished Brass Body . . . . . 5.60  
Send stamps for Telegraph Manual 43-Q.  
Special Price to Dealers.

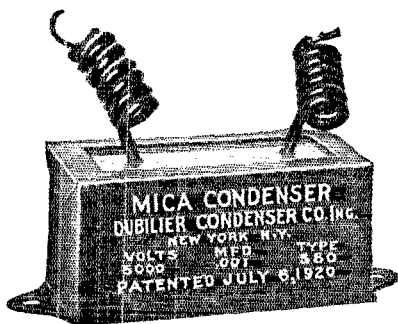
J. H. BUNNELL & CO. 32 Park Place, N. Y.



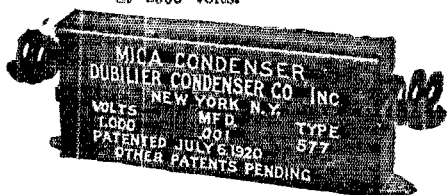


# Dubilier Condensers

## In Far-Off Government Stations



Type 580 condenser made in capacities of .0005 mfd. at 5000 volts to .02 mfd. at 2500 volts.



Type 577 condenser made in capacities of .0001 to .01 mfd. at 1000 volts and 2000 volts.

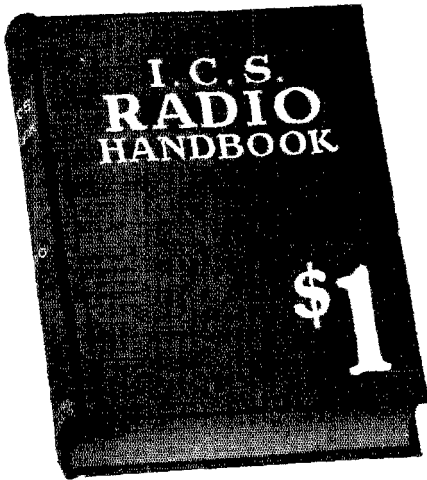
REGIONS such as ice-covered Alaska—where governments outposts are maintained—miles from supply depots—these are places where Radio assumes a vital importance. These are the places where life depends on the power to send and receive messages—under all circumstances—at all times. In these places—wherever there are government posts—the powerful transmitting sets are equipped with Dubilier Condensers. Government experts know the merits of Dubilier Condensers.

Dubilier specializes in condensers for amateur low power tube transmitters. Types 577 and 580 have fixed capacity and low loss. They excel in their field—and have no rivals for efficiency, performance and reliable service.

*Ask your dealer to show them to you.  
Or write for information to 49-51 West  
4th St., New York.*

# Dubilier

**CONDENSER AND RADIO CORPORATION**



A practical,  
authoritative book on  
**RADIO**

514 pages. Price only \$1  
Compiled by HARRY F. DART, E.E.  
Formerly with the Western Electric Co.,  
and U. S. Army Instructor of Radio  
Technically edited by F. H. DOANE

EVERY member of the *American Radio Relay League* should have a copy of this I. C. S. Radio Handbook. Price only \$1. Written, compiled and edited by practical radio experts of national reputation. A handy reference book that will help you improve your sending and receiving apparatus. Explains the operation of dozens of circuits. Filled with interesting experiments. Note this list of contents:

Electrical terms and circuits, antennas, batteries, generators and motors, electron (vacuum) tubes, every receiving hook-up, radio and audio frequency amplification, broadcast and commercial transmitters and receivers, wave meters, super-regeneration, codes, license rules. Many other features.

Send the coupon to-day with \$1 and get this 514-page I. C. S. Radio Handbook.

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I enclose One Dollar. Please send me—post-paid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name .....

Address .....

Check here  and enclose \$1.50 if you wish the deluxe edition, bound in Leatheroid.

**CONTINENTAL**  
**Lo Loss**  
**CONDENSER**

**A LABORATORY INSTRUMENT  
AT A POPULAR PRICE**

The superior features of the CONTINENTAL Lo Loss Condenser are so pronounced that the experienced operator can comprehend them at a glance.

The general design of the instrument insures mechanical strength, rigidity, extreme accuracy and long life. This mechanical perfection was attained only by using quality materials, expert workmanship and many rigid inspections.

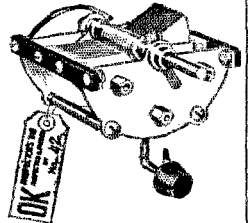
Write us if your dealer does not carry Continental Lo Loss.

**GARDINER & HEPBURN, Inc.,**  
Sales Dept. Factory  
611 Widener Bldg. Philadelphia 2100 Washington Ave.

All capacities  
are exact

15	Plate—cap.	.00025	—\$5.50
15	" "	.00035	—\$5.75
25	" "	.0005	—\$6.00
45	" "	.001	—\$7.00

Prices without Vernier \$1.00 less.



**WORLD'S RECORD  
COILS FOR ROBERTS 2 TUBE REFLEX**

1 STEP RADIO, DET., 1 STEP AUDIO

Using these coils W. B. Magner, 6BCP, San Pedro, Calif., and F. D. Bell, Wai-hemo, New Zealand held two-way communication for first time in history over 6900 miles, Sept. 21st, 1924.

We are now prepared to furnish these coils using new LOW LOSS principle designed especially for hams.

**Broadcast Band 200 to 600 Meters**

**Amateur Band 60 to 200 Meters**

Using these coils the following stations have been copied consistently, 100 to 120 meters, z4AA, Argentine CBS. Complete set coils, instructions and blue prints, postpaid \$8.00.

**Worlds Record Coils Co.**

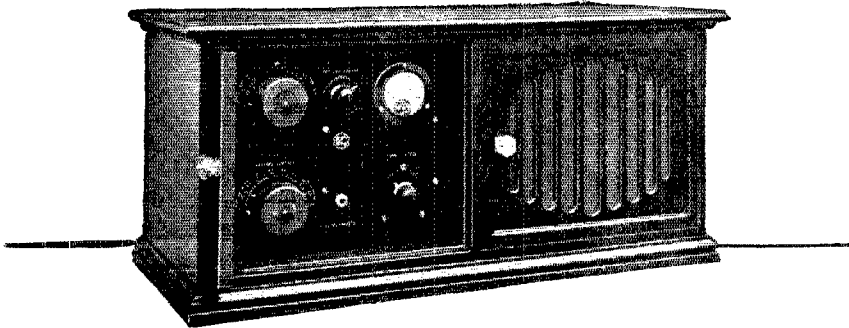
W. B. MAGNER, 6BCP, Pres.

464 6th Street

San Pedro, Calif.

# BAKELITE

TRADE MARK REG. U. S. PAT. OFF.



## K. & C. DeLuxe *and* Bakelite

For clear radio reception, reliable insulation is essential. That is why the Kilbourne & Clark Mfg. Co. uses Bakelite—Radio's premier insulation—for this DeLuxe receiving set. Manufacturers who use Bake-

lite insulation guarantee good results from their radio sets. Amateurs will do well to profit by the experience of these radio experts and use Bakelite when building their own sets. Write for our Booklet "C."

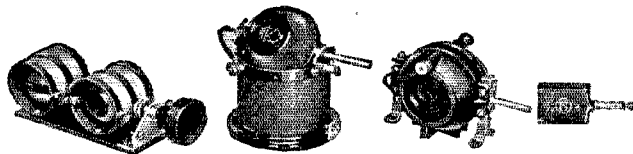
### Send for Our Radio Map

The Bakelite Radio Map lists the call letters, wave length and location of every broadcasting station in the world. Enclose 10 cents to cover the cost and we will send you this map.



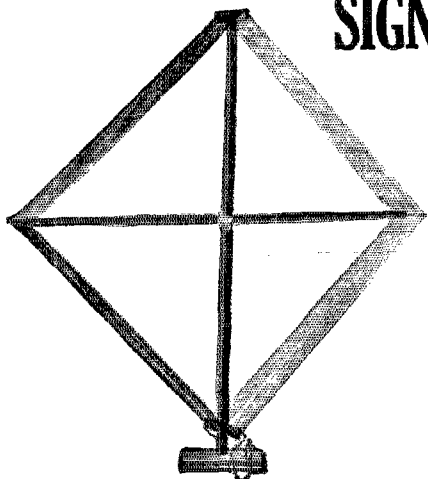
### BAKELITE CORPORATION

247 Park Avenue, New York, N. Y.  
Chicago Office: 636 West 22d Street.



**THE MATERIAL OF A THOUSAND USES**

# SIGNOLA Portable Loop Aerial



Folds like an umbrella—has third tap for use on super and other sets.

100 feet of silk covered, flexible, non-kinkable wire wound on genuine Formica spreaders, entirely insulating windings from frame.

Wood parts are hand rubbed, dark mahogany finish. Metal parts are highly polished heavily nickel-plated. Binding posts are insulated from base by Formica strip.

Turns easily in metal socket. Can be taken apart and put together in a few seconds.

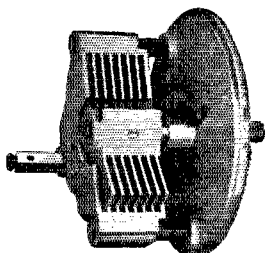
## Price \$8.50

Your dealer can supply. Write us for folder of this and other Signal radio products.

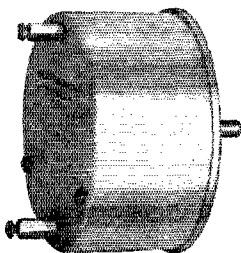
# SIGNAL Electric Mfg. Co.

Factory and General Offices  
1915 BROADWAY  
MENOMINEE, MICH.

Boston Chicago Seattle Minneapolis Montreal New York  
Pittsburgh Havana, Cuba St. Louis San Francisco Toronto Philadelphia  
Los Angeles You'll find our local address in the Telephone Directory Winnipeg



With Shell Removed  
Note Pillar Insulation



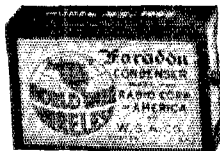
Completely Shielded  
No Stray Coupling

Introducing the **\$5**  
**MANNING**  
**VARIABLE**  
**CAPACITY**

250 Mickomikes at 2 Cents Per Mike  
By Mail Post Paid from the

**MUELLER INSTRUMENT CO.**  
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Give Your Set a Christmas Gift!



Price \$1.00

**The Utility Radio Co.**

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U. C. 1806 R. C. A.  
mica condenser, capacity .002 mfd.,  
6000 volts effective.  
Used principally as  
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blocking condensers.  
\$7.50 value for  
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**GENUINE**  
**EBY Binding Post**

"With tops which Don't Come Off"

Eby Posts are scientifically designed,  
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This is our Ensign post which can be  
furnished either plain or engraved in  
twenty-five different markings.

EBYS Are Binding Posts PLUS

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*"The Musical Instrument of Radio"*—amplifying horn of natural wood, mellow and resonant

MODEL VI (14" Horn)  
**\$30**

MODEL VII (21" Horn)  
**\$35**

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**A** Music Master for Christmas! A gift the whole family will enjoy. Had you thought of that?

Music Master embodies all the proved principles of sound reproduction.

The sensitive reproducing unit responds to the faintest impulses. The tone chamber is heavy cast aluminum, unequalled for developing sound waves free from distortion. And the amplifying horn is natural wood, mellow and resonant like a violin.

Broadcast reception is at its best only with Music Master.

Your dealer will be glad to demonstrate it for you, or to place one in your home for trial.

*Dealers Everywhere*

**MUSIC MASTER CORPORATION**  
*Makers and Distributors of High-Grade Radio Apparatus*  
10th and Cherry Streets  
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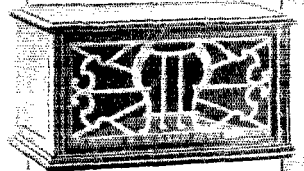
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# Music Master

RADIO REPRODUCER

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The New Music Master Cabinet model, with "Full floating" horn of natural wood, possessing all the wonderful reproducing qualities of the famous horn type Music Master. Handsome mahogany cabinet.

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Connect any Music Master in place of Headphones. No batteries required. No adjustments.

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## A New Book

By  
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264 PAGES  
150 ILLUSTRATIONS  
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High Efficiency Amateur Transmitters

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Everything of importance relating  
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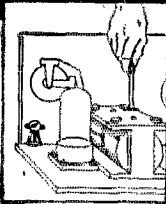
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# The Tool Every Radio Builder Needs

Reachit makes it easy to place nuts and screws deep down in where fingers and pliers can't reach. Has a 9-inch reach. Press the top and the steel jaws grip hold. Then turn. Saves time and trouble, prevents damage.



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A practical mechanic's invention. Handles any nut or screw up to three-eighths inch diameter—square, hex or round. Made of finest tool steel, knurled grip, handsomely nicked. Every radio builder, mechanic and electrician needs one.

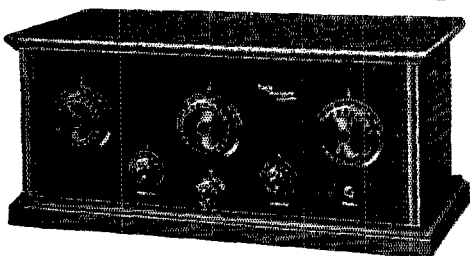
**JOBBERS—Write for our attractive proposition**

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**EAGLE** Balanced Receiver  
Model B, 5 Tubes \$175

GREATER because of exclusive Eagle features—Multiple (filament control) switch, ball-bearing, die-cast condenser, rheostat with revolving resistor element. Found ONLY in the Eagle Model B. NOT obtainable in any other way.

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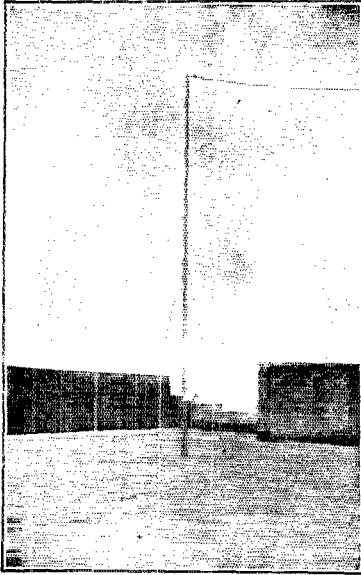
Licensed by Independent Radio Manufacturers, Inc., under Hazeltime Patent Nos. 1,450,080, dated March 27, 1923, and 1,489,228, dated April 1, 1924. Other patents pending.

Eagle

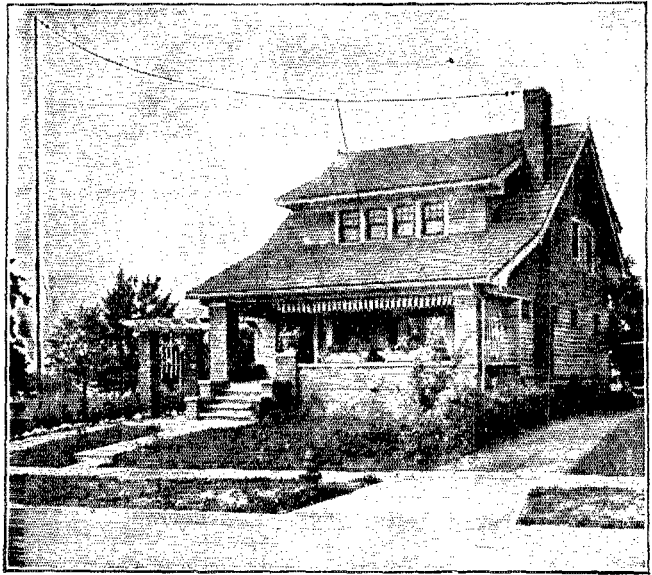


Radio Co.

23 Boyden Place, Newark, N. J.



20 ft. Mast on Roof of Apartment House



40 ft. Mast in Yard

# The HERCULES AERIAL MAST

This mast is made in sizes to get 20 ft., 40 ft. or 60ft. clearance and is the answer to an efficient aerial system. This graceful mast is an improvement to any property, whether it is installed on the roof or in the yard. A pulley is furnished at the top for raising and lowering the antenna. All parts are made of steel and are light and strong. The mast will safely stand a 500 pound pull at the top and will support a 6 wire cage antenna. We furnish complete blueprint plans for erecting the mast and it can be erected in a few minutes. It is shipped in sections for convenience in handling. The 20 ft. mast weighs 40 pounds, the 40 ft. mast weighs 100 pounds and the 60 ft. mast weighs 200 pounds. Guy wires are spaced 120 degrees, or three equal spaces, 4 ft. from the base on the 20 ft. mast; 8 ft. on the 40 ft. mast and 10 ft. on the 60 ft. mast.

20 ft. Mast	\$10
40 ft. Mast	\$25
60 ft. Mast	\$45

Order direct from this "Ad" and we will ship Freight Prepaid.

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It has been said time and again that the best results are obtained only by the intelligent use of the best apparatus procurable. This applies not only to the receiving equipment proper, but also to the antenna system. THE AERIAL MUST BE EFFICIENT if the reception of long distance stations, theoretically within range of the receiver, is desired.

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Very few novices realize the importance of a good aerial installation. The feeble currents from long distance stations will never reach the receiving set if the aerial is strung too close to surrounding objects that tend to absorb the energy. It is this inference that we have experimented with for years and—present the answer—THE HERCULES AERIAL MAST.

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For years we have been building radio towers for important broadcasting stations. Included among the names of our customers is the UNITED STATES GOVERNMENT SIGNAL CORPS. Only after years of experience and development work have we been able to perfect this wonderful steel aerial mast to sell at a price within reach of the amateur.

## Give Your Set a Chance! Get Results!

Not only will the proper aerial clearance, thus obtained, give you the pleasure of long distance radio reception, but the appearance of this beautiful mast on your property will give you a reputation. This reputation will grow as you bring in stations such as you never hoped for.

## Mail Coupon for Literature



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Without cost or obligation on my part, send me full particulars of the HERCULES Aerial Mast and your FREE FREIGHT PREPAID offer. I am interested in a ( ) ft. Mast.

Name.....

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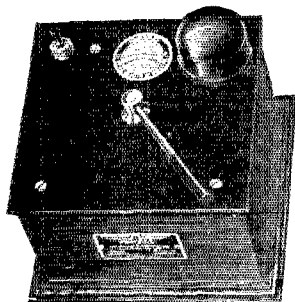
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**A Real Amateur Wavemeter,  
Range 140-230 Meters, One  
Meter Division Scale. Also  
Reads in Kilocycles.**



**A**T the request of a number of prominent amateurs, we have developed a special amateur range wavemeter, which is equipped with a special condenser arrangement whereby the scale is broadened, enabling accurate readings to be made with considerable ease. The one meter divisions are approximately one millimeter wide.

D. C. Wallace of 9ZT-9XAX, winner of the 1923 Hoover Cup, made a test of this wavemeter against the most elaborate standards available, showing the instrument to be far more accurate than would be expected from its low price. The experiences and statements of other prominent amateurs show this special amateur wavemeter to be quite accurate and so built that the accuracy will be retained. Jewell Pattern No. 90 amateur range wavemeter, price \$25.00. Range, 140-230 meters.

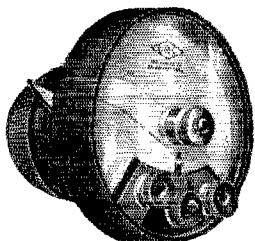
**BROADCAST RANGE**

**T**O cover the broadcast range, there is a wavemeter similar to the above with a range of 150-625 meters, as well as a special type equipped with a self-contained buzzer and dry cell for checking receiving sets and having a range of 200-625 meters. The instrument for checking transmitting sets is priced at \$20.00 and the wavemeter complete with buzzer and dry cell at \$30.00.

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*Manufacturers of the Jewell complete line of miniature switchboard instruments, Jewell radio test set, wavemeters, etc.*



*A non-inductive*

**Potentiometer**

*that insures noiseless tuning*

The Centralab Non-Inductive Potentiometer for panel mounting has no wire wound resistor or sliding contacts. It makes tuning noiseless. It permits the free flow of high-frequency radio current without choking or retarding waves. It makes possible adjustment of the resistance, without steps, for the finest gradations. It does away with the need for a shunting condenser. Single hole mounting.

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CENTRAL RADIO LABORATORIES  
291 Sixteenth St. MILWAUKEE, WIS.

**FREE**  
Greatest Catalog  
of Radio  
Bargains



**Send for  
It Today**

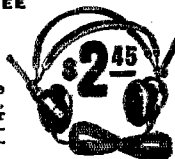
It contains a thousand bargains of everything in radio: parts, supplies, complete parts for sets, complete sets, etc., also a mine of very latest information on all different circuits, complete list of broadcasting stations and other valuable data. Send your name and address and we'll send **FREE** catalog.



**American Bell  
Loud Speaker**

\$3.95  
without unit  
\$6.95  
with unit

With American Adjustable Unit. Wonderful volume, clear reception. Speaks for itself without coaxing. 10-inch bell—made of non-vibrating material.



**HEADPHONES  
"Randolph Special"**

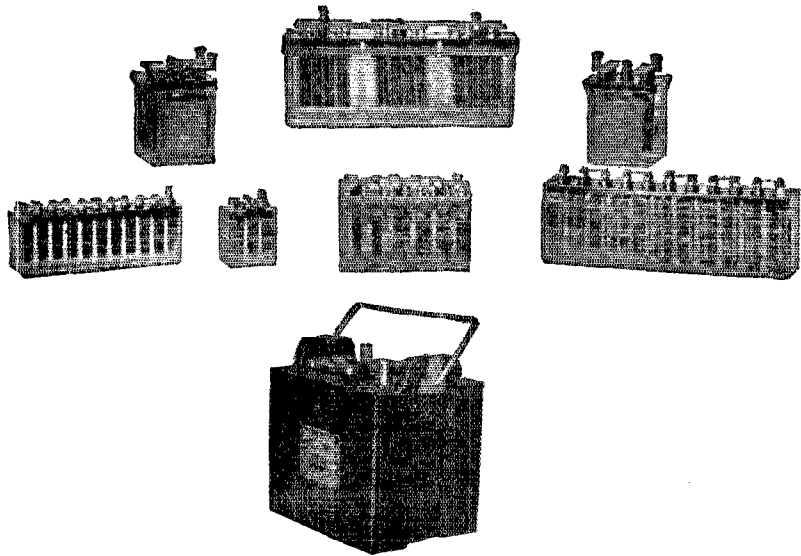
2200 Ohm moulded headset, properly designed to give strong and clear reception. Biggest headphone value ever offered.

**Hundreds of Other  
Bargains**

Our catalog is filled with bargains like these. Order direct from this ad. We prepay charges. Don't buy anything in radio before you see our catalog. **FREE** Service Dept.

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It makes no difference what set you are using; whether one or nine tubes, whether two or six volts, single or multiple circuit, regenerative or reflex, or one of the numerous "dynes", there is a Westinghouse battery to fit it.

Furthermore: If you are not already a user of Westinghouse Radio Batteries, you have no idea of the increased economy, reliability and all-around satisfaction to be had by using storage batteries, particularly Westinghouse Batteries, for all receiving sets.

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*Distributor for Canada*

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*Offices in all principal Canadian Cities*

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# **WESTINGHOUSE**

## **RADIO**

*"A," "B" and "C"*

# **BATTERIES**

# Amateurs!

We have a large  
quantity of

Western Electric  
and R. A. C.

## TRANSMITTING TUBES

VT-2  
N Tubes — VT-1

AND OTHER TYPES

900 Cycle  $\frac{1}{4}$  KW complete aero-  
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F. B. for I. C. W.  
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Westinghouse 30-32 volt dyna-  
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AMRAD NEW TYPE "S" TUBES  
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INDUCTANCE  
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Dielectric — easily worked — uniform quality

No. 3



SEE TALKER in.

Manufactured by  
DIAMOND STATE FIBRE COMPANY

Bridgeport, Pa., and Chicago, Ill.  
BRANCH FACTORIES AND SHOWROOMS:  
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## Greater Volume

A Celoron Radio Panel helps you  
get the best results from your  
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strength gives your set greater vol-  
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is approved by the U. S. Navy and  
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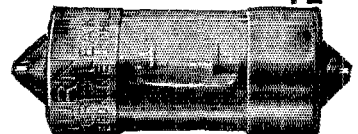
Celoron panels come in nine  
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## TURN-IT ADJUSTABLE GRID LEAK

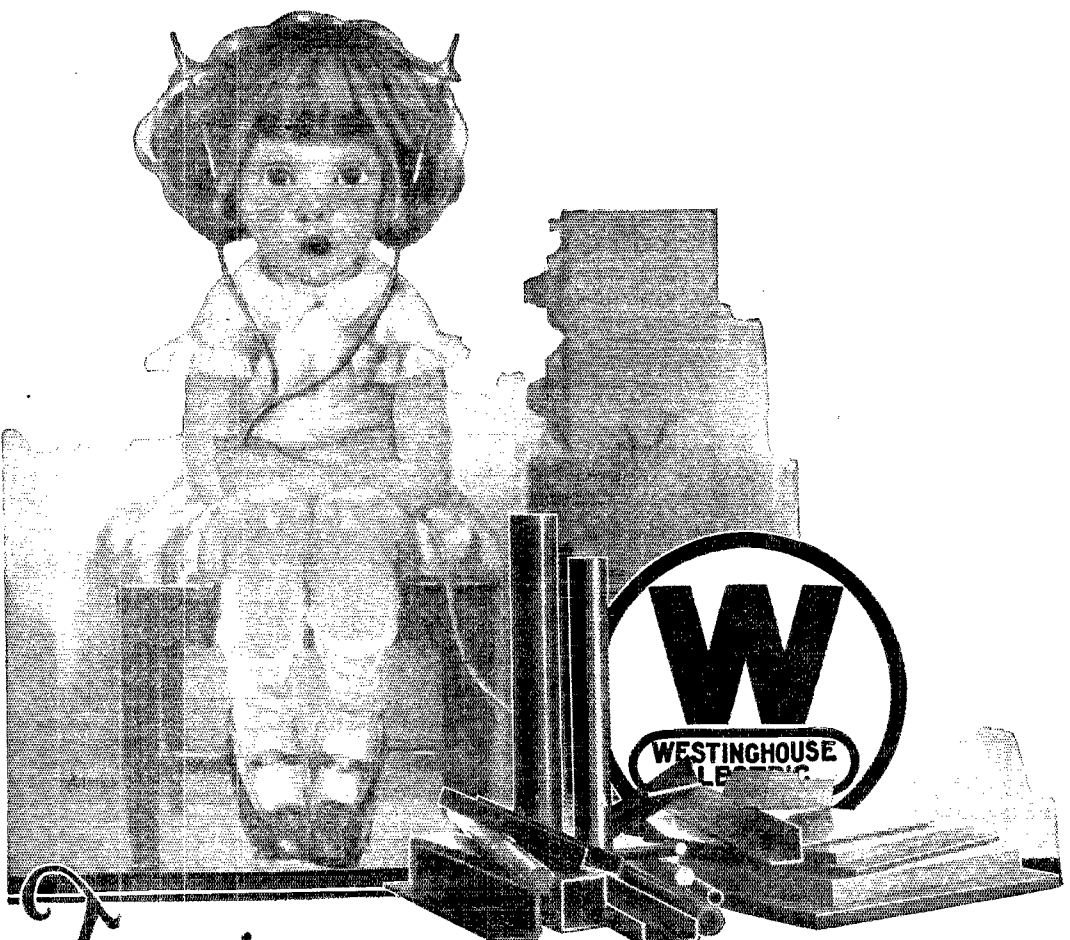
*Changes the Range of  
Resistance to Suit the  
strength of Reception*

Constructed along entirely new lines  
which avoid all use of graphite or  
carbon and the microphonic noises  
generally attending the use of these  
materials. Turn-it greatly increases  
the volume, secures greater distance  
and reduces noises in your set. A  
Turn-it gives constant and undim-  
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anteed.



Turn-It Grid Leak Is Only \$1  
At Your Dealer or  
Direct from Us.

TURN-IT RADIO SALES, Inc.  
71 Murray St., N. Y.



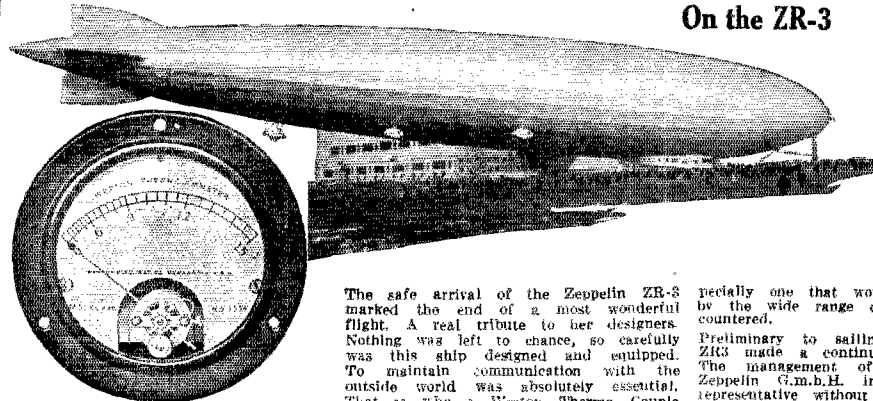
Tune in  
with **MICARTA** — *The Material  
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**M**ICARTA tubes, plates and other forms are appreciated by radio amateurs. They know that *Micarta* affords that splendid insulation so vital to perfect receptivity. They know *Micarta* is not a substitute, but a better material.

*Micarta* is easily machined, drilled and punched. It takes a high polish. It does not expand or shrink due to contact with oil or moisture. *Micarta* can be engraved with great facility, giving clean cut, sharp characters. Ask for booklets F 4566 and F 4621. *Free on request.*

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# Westinghouse



On the ZR-3

**Weston  
Thermo-  
Couple  
Antennae  
Ammeter**

**Antenna  
Ammeter**

Circular J is an attractive 24-page booklet that explains in detail all Weston Radio Instruments. Sent free on request.

The safe arrival of the Zeppelin ZR-3 marked the end of a most wonderful flight. A real tribute to her designers. Nothing was left to chance, so carefully was this ship designed and equipped. To maintain communication with the outside world was absolutely essential. That is why a Weston Thermo Couple Antennae Ammeter and other instruments were selected for use on her transmitting set.

To insure proper contact with the world during the flight, an accurate rugged Antennae Ammeter was necessary and es-

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Preliminary to sailing to America the ZR-3 made a continuous 36-hour flight. The management of the Luftschiffbau Zeppelin G.m.b.H. informed our Berlin representative without solicitation of the excellent behavior and inestimable value of the Weston Model 425 Antennae Ammeter on this trial flight.

An accurate and dependable Weston Instrument is a good investment—imitations do not approach the quality and performance of the original.

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Electrical  
Indicating  
Instrument  
Authorities  
Since 1888

**WESTON**

STANDARD - The World Over

**INCREASE  
YOUR RADIATION**



WITH  
**PYREX ALL WEATHER  
TRANSMITTING INSULATORS**

LOW PHASE ANGLE DIFFERENCE  
PERFECT MOISTURE RESISTANCE  
LIGHT IN WEIGHT BUT STRONG

**\$1.50 each, C. O. D.**

**CORNING GLASS WORKS**

INDUSTRIAL DIVISION

**CORNING, NEW YORK**

**National Electric  
TRANSMISSION  
CONDENSERS**

*For Radio Filter Circuits  
Less QRM More DX  
No More "Break-Downs"*

Are you tired of "break-downs"? Here is a special, high-dielectric, low-loss condenser that will end your troubles. Under tests at double their rated voltage, their phase angle does not exceed 20 minutes—which means a loss of not over 1/2 of 1%—or an efficiency so close to 100% as to be negligible. With National Electric Condensers you send out less QRM and gain the good will of every BCL around you. And you get more DX because a properly designed filter circuit gives a clearer, more understandable note.

- No. 1, 1000 V. DC Service, per 2.5 mfd. condenser ..... \$7.00
- No. 2, 2000 V. DC Service per 2. mfd. condenser ..... \$8.00

Order direct by letter

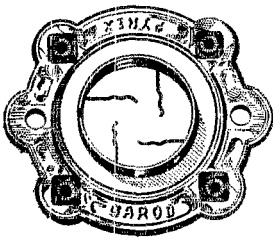
We will ship C. O. D. or on receipt of your remittance.

**National Electric Condenser Company  
New Haven, Connecticut**

The

**GAROD**

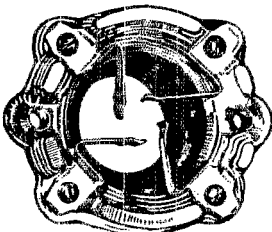
# PYREX GLASS Low Loss Tube-Socket



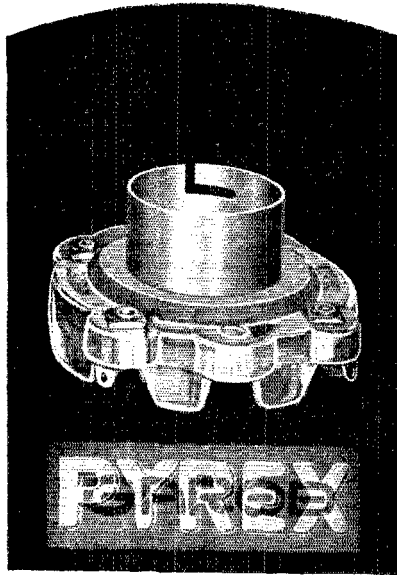
Top View

REPLACE your present sockets with Garod "Pyrex" sockets — or — if you intend building a set — be sure to get Garod "Pyrex". They are solely controlled by the Garod Corporation.

If your dealer cannot supply you — send us \$1.50, plus the parcel postage for each socket wanted.



Bottom View



The "Perfect Socket" to complete the Perfect Set!

\$1.50

Garod Engineers, after intensive research, announce the perfection of the ideal tube-socket. In Pyrex glass they have adapted to use in radio frequency circuits, the finest insulating material commercially obtainable, and have placed it in one of the weak spots of the radio circuit: the V. T. Socket.

Exhaustive tests, covering a period of more than twelve months, prove "Pyrex" to be the lowest loss insulating material for R. F. C. yet presented, with the exception of quartz. It is strong and heat resisting, and does not absorb moisture. Even the heat of a soldering iron does not affect it. It is entirely free from surface condensation, and is unaffected by those influences which commonly make rubber, rubber derivatives and compounds, porcelain, phenol products, and the ordinary vitreous products so inefficient. Indeed, the perfect socket to complete the perfect set, and exclusively a Garod product.

Made by the

**GAROD CORPORATION**

120-124 Adams Street,  
Newark, N. J.

Makers of

The Powerful Garod Neutrodyne Receiver

The Powerful **GAROD** Neutrodyne\* Receiver.

Neutrodyne Radio Sets, Ltd.  
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*Noiseless Tested  
Mica Condensers*



maintain their fixed capacity due to scientific design and construction in which constant equal pressure is exerted on the condenser plates over the entire area; making the Freshman condensers the only ones that avoid noises due to variable pressure on the plates. A metal casing protects the plates and reduces hysteresis losses to a minimum.

Capacity	Each	Capacity	Each
.00005	.....\$0.35	.0025	.....\$0.50
.0001	......35	.003	......60
.00015	......35	.0035	......70
.0002	......35	.004	......75
.00025	......35	.005	......75
.0003	......35	.006	......75
.00035	......35	.0075	.....1.00
.0005	......35	.008	.....1.00
.0006	......40	.009	.....1.00
.0008	......40	.01	.....1.00
.001	......40	.015	.....1.50
.0015	......40	.02	.....2.00
.002	......40	.025	.....2.50

### *Exclusive Features of Freshman Noiseless Tested Mica Condensers*

1. No losses through di-electric hysteresis of fibre covers.
2. No insulating binder to melt at the application of heat and by releasing pressure, change the capacity.
3. Capacity fixed and invariable.
4. Metal case protects against accidental injury.
5. Direct connection to copper plates avoids losses through inefficient eyelet contact.
6. Application of soldering iron does not affect condenser.

At your dealers—otherwise send purchase price and you will be supplied postpaid.

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*Radio Condenser Products*

106 Seventh Ave., New York

**GLOBE**

**America's  
Best Phones**

*Regardless of Price*

**\$5**

One Model  
One Quality  
In Canada \$7

**WE** challenge comparison with America's best known headphones. Globe Phones always show up best where the opposition is greatest. And the quality is there to last for years.

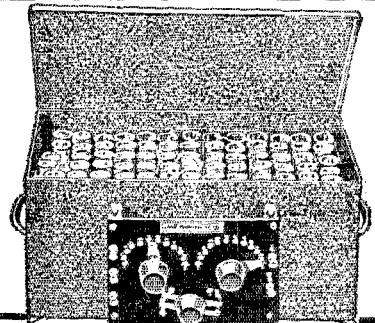
There is long experience in making hearing aids for the deaf behind the amazing tone purity and reaching qualities of Globe Phones.

As beautiful as they are efficient. Leather covered head bands, heavily nickeled parts, extra powerful magnets.

If your dealer fails you, write us.

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Distributed in Canada by  
Otto Higel Co., Ltd., Toronto  
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**GLOBE PHONE MFG. COMPANY**  
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## **LANE 100 Volt**

*Non-Acid Storage*

**"B" BATTERY**  
**NO MUSS NO SPILLING—**  
**CLEAN, ATTRACTIVE**

Makes a wonderful improvement in your radio set. Gives it more life and pep. Makes listening in a real pleasure. Gives a clearer reception than you have ever experienced. Brings in more stations louder and clearer, takes the guesswork out of distance reception.

**Life of Battery Unlimited**

**LITTLE OR NO REPAIRS EVER NECESSARY**  
No deterioration—easiest, quickest to charge—will operate a 3 tube set continually for over 30 hrs. Ordinary use one to four months without recharging.

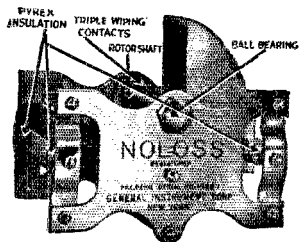
**PANEL SWITCHES** Gives Instant and Correct Voltage

A great and necessary improvement on batteries. Gives instantly correct voltage at all times and perfect reception. Allows for charging in two equal parts. Comes in handsome **\$25** direct, 160 v. \$37.50. Indestructible case.

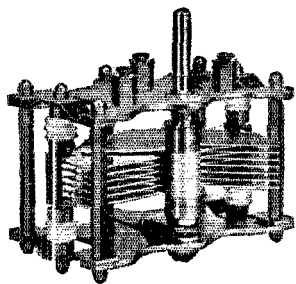
Attractive Proposition to Dealers and Jobbers.  
**LANE MFG. CO., Dept. H 2941 W. Lake St., CHICAGO**

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## NOLOSS TRADE MARK TYPE 51 PYREX INSULATION



## NOLOSS TRADE MARK TYPE 56 ISOLANTITE INSULATION



IT is now possible for the amateur to get results formerly reserved to laboratories.

The experimenter who requires every micro micro watt of energy to bring in heretofore inaudible signals must turn to General Instrument NOLOSS Variable Air Condensers.

They are constructed with laboratory methods, and insulated with laboratory insulations—Pyrex or Isolantite.

Products worthy of your purchase.

General Instrument apparatus costs a little more but is worth infinitely more.

## General Instrument Corporation

*Manufacturers of Laboratory Equipment*

423 BROOME STREET  
NEW YORK, U.S.A.

# KIC-O "B" Battery and Charger

## —the ideal Christmas Gift

Nothing gives more pleasure or lasting satisfaction to the radio fan than this outfit of KIC-O nickle-zinc "B" Battery and Charger. Battery is of the alkaline type giving constant current and long life. Heavy glass jars are completely enclosed in a highly finished cabinet. Nothing but new 2500 M. A. H. capacity elements used.

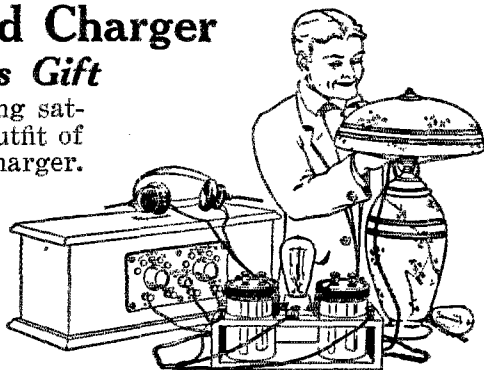
KIC-O Multi-Polar Double Potential Chargers recharge storage "B" Batteries quickly and economically. They use both halves of the A.C. cycle and operate from the ordinary electric light circuit. Fully guaranteed.

Ask your dealer or write for further information

**KIMLEY ELECTRIC COMPANY Inc.**

2666 Main Street

Buffalo, N. Y.



PZ Indicates panel type with switches.  
CZ is plain type without switches.

TYPE	VOLTAGE	M.A.H.	PRICE
PZ	130	2500	\$36.00
CZ	130	"	32.00
PZ	100	"	27.50
CZ	100	"	24.50
PZ	70	"	21.50
CZ	70	"	18.50
PZ	45	"	16.00
CZ	45	"	14.50
CZ	22½	"	7.50

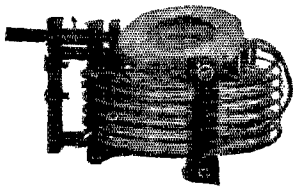
### KIC-O CHARGERS

Type K-1 Single mounted	\$1.50
Type K-2 Single mounted	3.50
Type K-3 Multi-Polar, mounted	5.00
KIC-O Special Charger Chemicals	.75

### GUARANTEE

Your money back on any KIC-O Battery if not satisfied within 30 days' trial. Write for full information on "B" Batteries.

## GLOBE LOW-LOSS TUNERS



Patent Applied For

A Model of Efficiency.  
Wound On Air.  
No Metal—No Eddy Current Losses.  
Little Insulation—Low Distributed Capacity.  
Large Wire—Self Supporting.  
Anti Capacity Windings—Low R. F. Resistance.  
Imitation is deceit.\*

GET ORIGINAL GLOBE COILS

PRICES:

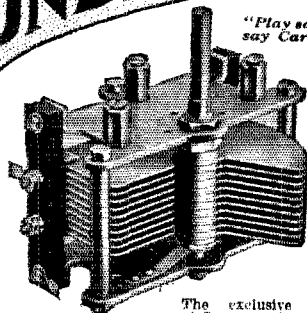
Standard Tuner (Broadcast Range) . . . \$7.00  
Short Wave (70-250 Meters) . . . \$7.00  
For Superdyne Circuit . . . \$8.50  
Circular on Request. Dealers and Jobbers Write.

**Allied Radio Co.**  
SOLE DISTRIBUTORS FOR  
**Globe Radio Equipment Co.**  
162 West 34 St., N. Y. C.

\*Legal Action Pending.

# CARDWELL

## LOW LOSS GROUNDED ROTOR CONDENSER



"Play safe—say Cardwell"

The exclusive choice of Lawrence M. Cockaday for his new Four Circuit Tuner, described in the October Popular Radio. This again emphasizes the fact that of all the various kinds of radio apparatus on the market today the CARDWELL CONDENSER is the ONLY unit which is recognized by engineers and technical Editors of National prominence as the ONE best.

A Postcard brings you an Education on Condensers.

**Allen D. Cardwell Mfg. Corp.**  
81 Prospect St., Brooklyn, N. Y.

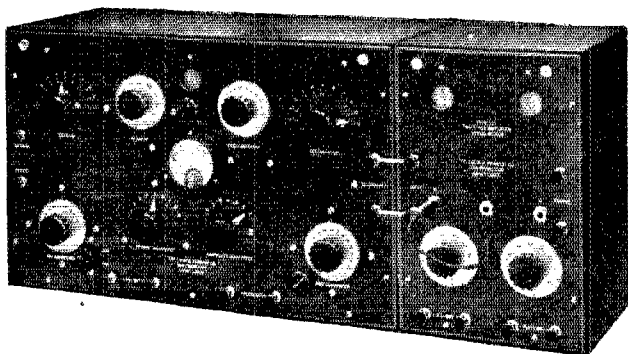


# Kennedy Universal Receiver

Type 110

Formerly \$285.00

**NOW  
ONLY \$94.00**



## Two-Stage A. F. Amplifier

Type 525. Formerly \$85.00

**NOW ONLY \$21.00**

Both Formerly \$370.00—Now Reduced to \$115.00

Here is that Famous Kennedy Universal Receiver—the set that will get those European long-wave stations—the instrument that universities buy to receive all wave lengths from 175 to 26,000 meters. Formerly \$285.00, now \$94.00

Many experimenters have wanted for years to own one of these famous Kennedy Universal Receivers because they are highly efficient on every wave length from 175 to 26,000 meters. Universities and scientific laboratories have gladly paid the high price for this receiver because there is no other set that will do so much. It has been beyond the reach of thousands of other experimenters who long to own one.

The decision of this Company to concentrate on short-wave receivers for the B. C. L. gives you an opportunity to buy the finest code and voice receiver ever constructed at far less than the ac-

tual cost of building it. This is not a cheaper model made to sell at the price—it is the original incomparable Kennedy Universal.

Only a few of these splendid instruments are left—no more will be made—and it is worth while wearing shabby clothes and going without shoes to get one at this bargain price. Don't let this opportunity slip away or you may regret it for years. You could not build this set yourself for twice the price.

Hurry—only a few are left.

Send your order today with 10% remittance, balance C. O. D.

## The Colin B. Kennedy Company

6400 Plymouth Avenue

Saint Louis

*Write for a circular if you want more information*

# K E N N E D Y

The Royalty  of Radio

TOWER'S

**TOWER'S Scientific**  
 WEIGHS ONLY 8OZ  
 Perfect Tone Mates  
**\$2.95**  
 plus a few cents postage



**OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET**

**WORLD'S GREATEST HEADSET VALUE**

now \$2.95, with Notable Improvements

Longer Cord (full 5 feet), Stronger Magnets, Higher Resistance, Increase of Sensitivity, Perfect Tone Mates  
**EVERY SET TESTED BY LICENSED RADIO OPERATORS**

**Send no money - Order on a Post-Card**

**THE TOWER MFG. CO. : 98G BROOKLINE AVENUE, BOSTON, MASS.**

Scientific

**NODUST Will Keep Your Radio Set CLEAN**

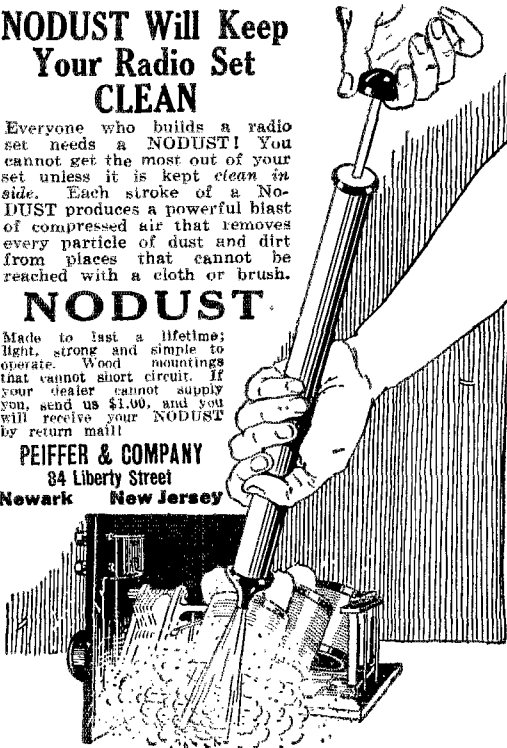
Everyone who builds a radio set needs a NODUST! You cannot get the most out of your set unless it is kept clean inside. Each stroke of a NODUST produces a powerful blast of compressed air that removes every particle of dust and dirt from places that cannot be reached with a cloth or brush.

**NODUST**

Made to last a lifetime; light, strong and simple to operate. Wood mountings that cannot short circuit. If your dealer cannot supply you, send us \$1.00, and you will receive your NODUST by return mail!

**PEIFFER & COMPANY**  
 84 Liberty Street

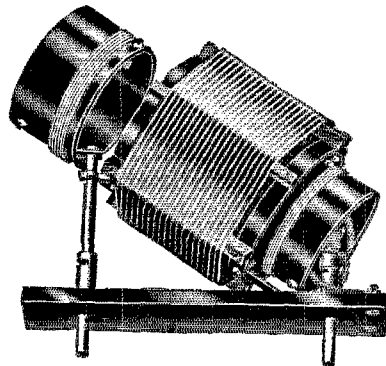
Newark New Jersey



**Hendrick Low Loss Tuner**

Tested ranges 175-600 with .0005 mfd. with Hammariund 75-205 with .00025 mfd. Condensers. Lower ranges to order.

Secondary wound on squirrel cage form. Heavy wire. Single layer solenoid. No inefficient basket weave coils to get out of shape or develop shorted turns.



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P.P. to any part of the Globe.

180° Rotors-Dial uses all indications. Makes tuning easier. No useless marks on dial. Secondary dial may be calibrated. Uses 3 or 4-inch dials. Leads all marked and very short. Very ruggedly constructed of finest materials. Wiring diagram furnished with each order.

**Stuart A. Hendrick, 85 W. 181 St., N. Y. City**



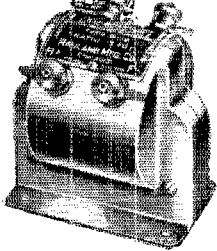
# ALL-AMERICAN

*Solves Every Gift Problem*

If He Has a  
Radio Set  
Already ~



If He Needs  
a High Grade  
Receiver ~



It can be made a better one by installing ALL-AMERICAN Audio Transformers—the most efficient and dependable audio ever designed. Two of these instruments, fitted into any set not already equipped with them, will give the receiver greater volume with remarkable purity of tone. 3 to 1 Ratio, \$4.50; 5 to 1 Ratio, \$4.75; 10 to 1 Ratio, \$4.75

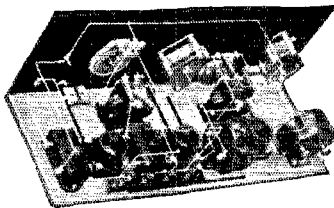
Give him ALL-AMERICAN Super-Fine Parts, and he can build an intermediate frequency receiver embodying all the newest and most advanced features known in Radio. His set will be the envy of all "distance" fans; its tone quality will please his musical friends. Super-Fine Parts provide the *ultimate* in broadcast reception. Price, \$26.00

And the Ideal Gifts for Anyone ~

## All-Amax Junior

A gift that will be appreciated by the beginner in Radio. It is a one-tube reflex receiver and comes mounted on panel and baseboard, with complete instructions. It can be wired by anyone in a few hours. Easy to tune—loud speaker volume—"crystal" tone—cuts through the locals and brings in the distant stations.

Price complete (semi-finished) \$22.00



## All-Amax Senior

The set to give if you are looking for a complete receiver of the highest type. It is a three-tube reflex with great range and selectivity. Brings in far distant stations on the loud speaker with undistorted tone quality. Only two controls. Completely assembled—ready to be wired; full instructions are provided.

Price complete (semi-finished) \$42.00

### The Radio Key Book

Will help anyone to hear farther and better. Contains practical hints for the set builder—tested hookups—diagrams of All-Amax and other circuits. Sent for 10 cents, coin or stamps.



RAULAND MFG. CO.  
2642 Coyne Street  
Chicago

Pioneers in the Industry

*Largest Selling Transformers in the World*

# NOW you can build YOUR "One Control" Superheterodyne

*SPECIAL parts AS SPECIFIED and RECOMMENDED by  
Mr. J. L. McLAUGHLIN, Research Engineer, Precise Mfg. Corp.,*

each having his *personal approval*. These are now ready, including  
SPECIAL DUAL CONDENSERS, No. 285 "Precise" Transformer  
SPECIAL INDUCTANCE COILS—OSCILLATOR and TUNER

## 200 M.H. Choke coils—"FILTOFORMERS"

These special accurate approved parts, together with "how to build" instructions, are now ready for amateurs and experimenters.

Because of the wide interest of thousands of "hams" in this great development of Mr. McLaughlin, as featured in "Q.S.T." for November, we have prepared this special material. All values are accurate.

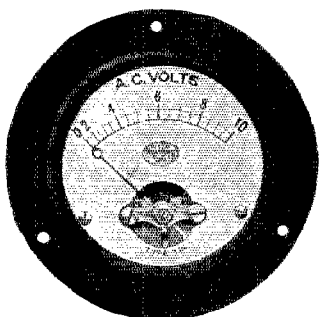
Full prices and details mailed immediately upon request.

## NIAGARA SALES CORPORATION

Eastern Representatives, Precise Mfg. Corp.

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NEW YORK CITY



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know that it doesn't pay to buy cheap stuff. Roller-Smith  $3\frac{1}{2}$ " Ammeters, Voltmeters and antenna Ammeters are not cheap, neither are they expensive. The prices are right and so are the instruments.

Send for Bulletin No. AG-10, pick out what you need and ask us to quote you. We'll treat you right—we're radio fans ourselves.

**ROLLER-SMITH COMPANY**

16 Park Place,

NEW YORK

Offices in principal cities in U.S. and Canada, also in Havana, Cuba

## FERBEND TRADE MARK *Maxmin* All Range Condenser

Here is a new type of low loss condenser embodying exclusive features ranking it supreme among low loss condensers. It is the same condenser used in the Ferbend Wave Trap, and is largely responsible for its remarkable success. So constructed that it is DUSTPROOF and FOOL-PROOF. Absolutely eliminates body capacity. Cannot short-circuit.

Takes place of any condenser from 5 to 48 plate, giving vernier adjustment over whole scale

May be used in any circuit regardless of capacity specified. Simple in design. Compact. Low internal resistance. Ideal for quiet, clear reception. Can be used for transmitting up to 250 watts power. Sent postpaid for \$2.75. Money back guarantee. Illustrated folder on request.

FERBEND ELECTRIC CO.

23 E. So. Water St.,

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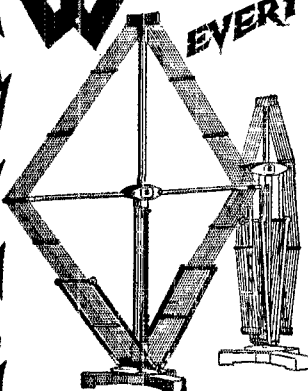
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**MASSACHUSETTS RADIO  
and TELEGRAPH SCHOOL**

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**D. T. W.****THE SENSATION OF EVERY RADIO SHOW****Ideal Xmas Gift**

# GERMAN

## Imported D. T. W. Collapsible Loop

It does not matter if your set is the finest that money can buy. In the final analysis, the receiver is dependent upon the antenna system for signal strength and for distance. The new 1925 D. T. W. Collapsible Imported German Loop is the one piece of Radio Apparatus acknowledged universally by Radio Manufacturers to be Superior.

**Height 42 inches**  
**Width 40 inches**

The inductance consists of 14 turns of REAL Litzendraht which is made up of 60 strands of Number 38 gauge enamelled copper wire woven into three cables of 20 strands, which in turn are wound into one strand with double silk insulation. The wire is connected into plots or sections to a series of binding posts located on the upright arm, giving a wave-length range of 100-400, 200-600, and 250-800 meters. Our method of not tapping, but cutting the inductance prevents dead end losses. A table graduated into the degrees of an arc is placed at the base of the loop so that the angle of reception can be accurately determined. Carefully designed and fitting for any type Super Heterodyne for this loop has a center tap.

The loop is a distinctive instrument of truly scientific nature and uncommon beauty which will add a thrill to the performance of your set, and bring in stations you never heard before.

From the Boston Traveler: "Masterpiece in Construction, having no equal made in this Country."

John Schantz, American Institute of Electrical Engineers: "Nothing more can be, nothing more need be said about it. The results are beyond my expectations."

Manufactured by the Deutsche Telephonwerke und Kabelindustrie of Berlin, Germany. Makers of telephone and scientific apparatus since 1887 and now employing over 6,000 skilled mechanics.

If your dealer cannot supply you, order direct and we will ship Parcel Post C. O. D.

**\$25.00**

Shipped in a permanent cylindrical container. Money back guarantee.

(Formerly \$35.00)

**Usual Discounts to Dealers and Jobbers**

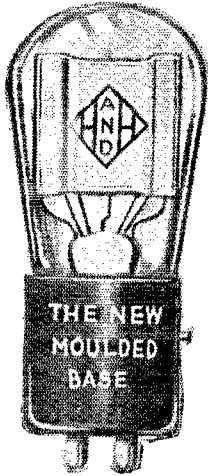
**Tobe C. Deutschmann**

American Representative and Distributor

46 C Cornhill

Boston

Reference: First National Bank, Boston, Mass.



Type 201A

# Airtron Radio Tubes

With the new highly developed dielectric moulded bakelite base which eliminates all kinds of electrical losses.

## Airtron Tubes

Speak for quality, volume and all other characteristics demanded of a Radio Tube. Designed and manufactured to give the highest efficiency that a tube at the present time can possess.

Type	200	— 6 Volt	1 Amp. Detector
Type	201A	— 5 Volt	.25 Amp. Det. and Ampl.
Type	-12	— 1½ Volt	.25 Amp. Det. and Ampl.
Type	199	— 3-4 Volt	.06 Amp. Det. and Ampl.

Standard Base

**Every Tube Guaranteed**

**List Price \$4.00**

*Sold by all dealers, or shipped C. O. D. direct by Parcel Post. When ordering mention type*

**Discount to Dealers**

**H. & H. RADIO COMPANY**

CL. HILL STA. BOX 22

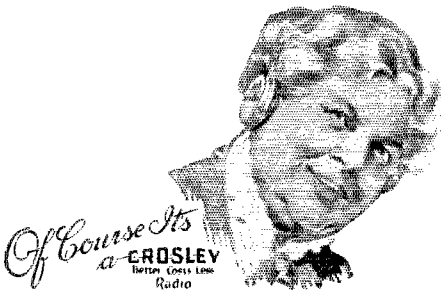
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NEWARK, N. J.

*We are still Repairing*

**ALL TYPES OF RADIO TUBES**

**\$2.50**



*Of Course It's*  
**a CROSLLEY**  
Better Costs Less  
Radio

It is a delight to operate a Crosley. The immediate response to the turn of the dials; the clearness of reception from far distant points; the real ease with which interference may be tuned out; all help to make Crosley reception distinctive and exceptionally pleasurable. The very low cost at which this really remarkable radio performance can be obtained places Crosley sets within the reach of all—the ideal Christmas gift. Bring Continued Happiness to All with a Crosley Radio.

FOR SALE BY GOOD DEALERS EVERYWHERE

*Write for Complete Catalog*

**THE CROSLLEY RADIO CORPORATION**

POWEL CROSLLEY, Jr., President  
**1218 ALFRED STREET CINCINNATI, OHIO**

*Crosley Owns and Operates Broadcasting Station WLW*

**Crosley Model 52**

**Price \$30.00**

*With three tubes and Crosley*

*Head Phones, \$45.75*

*Crosley Regenerative Receivers are*

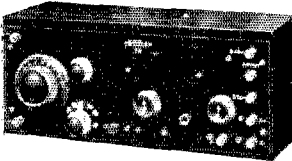
*licensed under*

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*Patent 1,115,149.*

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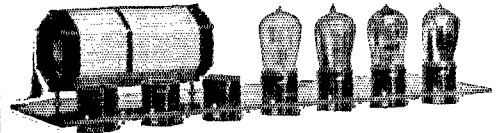
*Rockies add 10%*



# Locke Sockets

LOW LOSS

SURE CONTACT



At last a socket with these exclusive features: A phosphor bronze WIRE, silver-plated, Contact Prong—assuring wide spacing of parts, a minimum of both metal and bakelite insulation for low capacity. Self-cleaning; easily shelf or base mounted; makes contact at tube base; direct soldering connections. Seven sockets mounted like cut on 6 x 20 1-2 x 3-16 inch bakelite base panel, \$12.

75c each, plus postage

## Locke Low-Loss Coils

to match Super Transformer; Tuner 59-T Sec., 8-T Prim., of No. 18 DCC; Oscillator 60 turns-40 turns No. 18 DCC, \$5 ea. Coils made for Single or Double Control Supers. Coils mounted free if ordered with panel and sockets.

**Locke Radio Shop, Victor, N. Y.**

## RADIO MASTS

When you buy a Whittlesey Self-Supporting Standard Steel Mast you buy a mast-head pulley, raising cable, and hoisting reel as well. This is the Whittlesey System. Patents pending. Never climb up except for painting, then "use the elevator." These masts are solid, stiff, rigid and beautiful. 50-75-100-125 feet.

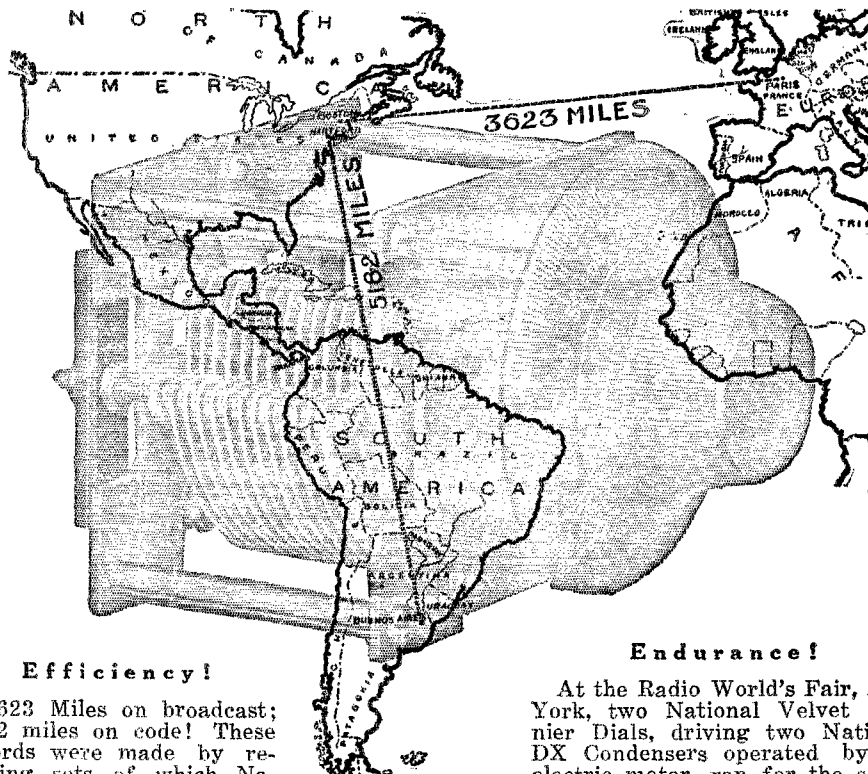
**THE WHITTLESEY ENGINEERING CO.**  
Cleveland, Ohio

# Achievement!

## A Record for Efficiency and Endurance

Established by

**NATIONAL CONDENSERS and VELVET VERNIER DIALS**



### Efficiency!

3623 Miles on broadcast; 5182 miles on code! These records were made by receiving sets of which National DX Condensers and Velvet Vernier Dials were parts. Nationals made the achievement possible. To get distance **clearly** buy Nationals. They give supreme satisfaction.

### Endurance!

At the Radio World's Fair, New York, two National Velvet Vernier Dials, driving two National DX Condensers operated by an electric motor, ran for the seven days of the Show for a total of 324,429 revolutions. At the finish they showed no evidence of lost motion or back lash. And they still possessed that velvety smoothness that makes Nationals so desirable.

Sizes:	.001	.0005	.00035	.00025
Prices:	7.00	6.00	5.75	5.50

Complete with Velvet Vernier Dials. Write for Bulletin No. 104 Q

Made by **NATIONAL COMPANY, INC.**  
Engineers and Manufacturers *Estab. 1914*  
110 BROOKLINE ST., CAMBRIDGE, MASS.

# GET CLEAR RECEPTION ALL THE TIME!

"OH BOY,  
What a dif-  
ference!"

For \$1 you can now obtain clear reception from  
your phones *EVERY TIME* you "listen in."

## Here's a Wonderful Invention

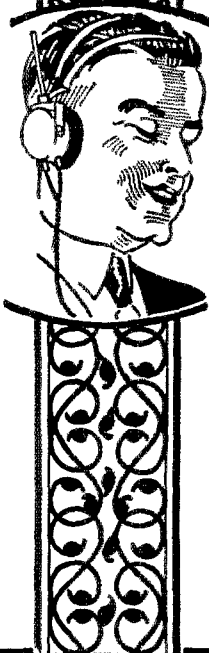
**OLDRAD PHONE SNUBBERS** are guaranteed to clarify reception and to soften static sounds to a surprisingly low degree. Very easy to insert. Once installed, they require no further attention.

The rubber disk in this phone snubber allows the diaphragm to function properly, but stops excessive movement, which is the cause of improper reception.

### OLDRAD PHONE SNUBBERS SOLD WITH A MONEY-BACK-GUARANTEE

Send us \$1. for a pair, postage prepaid. Be sure to mention the make and model number of your phones. If you are not entirely satisfied, return them within 5 days and your money will be promptly refunded.

**THE O-D RADIO RESEARCH LABORATORIES**  
South Attleboro, Massachusetts



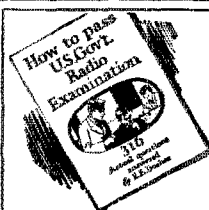
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by E. E. Bucher

Of inestimable value to those desiring Commercial or Amateur Radio License. Covers transmitters, receivers, storage batteries, motors and generators, radio rules and regulations. 316 actual questions answered! Written by a radio expert, author of Practical Wireless Telegraphy, etc. Over 150,000 copies sold. Send 50 cents in stamps or coin for your copy, postage prepaid to any point in the U. S., Canada, or Mexico.

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**CRESCENT LAVITE RESISTANCES**  
Absolutely non-inductive.

12,000  
45,000  
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LIST  
\$1.50  
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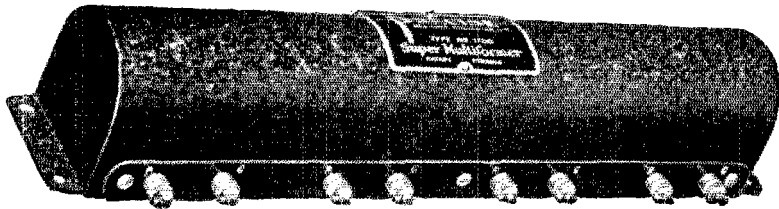
Special resistances to order \$2.50. When better resistances are made they will bear the Crescent label.

**CRESCENT RADIO SUPPLY CO.**  
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# Christmas demands the best that money can buy!

*Precise instruments are laboratory  
instruments at commercial prices*



## PRECISE SUPER-MULTIFORMER NO. 1700

*Maximum Amplification—Stability of Performance*

This amazing new instrument is the only great advancement that has been made in Superheterodyne design since the circuit was conceived. Precise Super-Multiformer No. 1700 replaces all long-wave transformers in any type or modification of the Superheterodyne

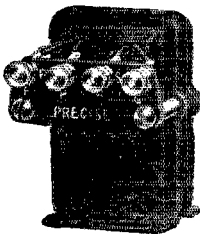
circuit.

It cuts in half the time and eliminates all trouble in building a Superheterodyne. Yielding results that can only be secured by Precise instruments, Precise Super-Multiformer, at only \$20.00, offers the best buy of the season.

### PRECISE TRANSFORMER NO. 285

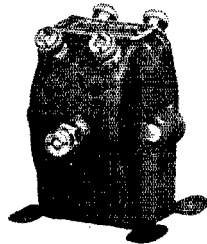
Used by Mr. Cockaday, one of the leading radio engineers, in the construction of the great Cockaday Circuit as the only transformer fulfilling every requirement.

Distortionless reproduction and fine tone quality are produced by this little giant. It reproduces perfectly every note in the orchestral range.



### PRECISE "PUSH-PULL" TRANSFORMERS

For perfect amplification and volume, you want Precise Balanced Power Amplifying Transformers for "Push-Pull" audio circuits. The extreme care used in the construction and balancing of coils is such that no other Transformers approach Precise results. Only \$11.00 per pair.



*Sold by the better dealers*

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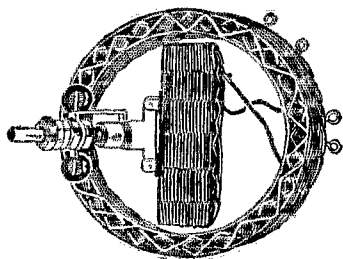
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### SOUTHERN REPRESENTATIVES:

Seal Products Sales, Inc., 35 Warren Street, New York City

# Here it is at last!

## The Sharp Radjo Low Loss Tuner



You will never know what Low Loss means until you have equipped your set with a Sharp Radjo Tuner.

It will assist you in tuning out the locals by minimizing the losses, thereby allowing a maximum of signal strength and increasing the range and selectivity of your set.

The only tuner which can be mounted into any previously wired set without changes, as it is mounted by a single panel mounting and the rotor and stator are suspended by a single mounting. Sharp Radjo tuners are furnished as follows:

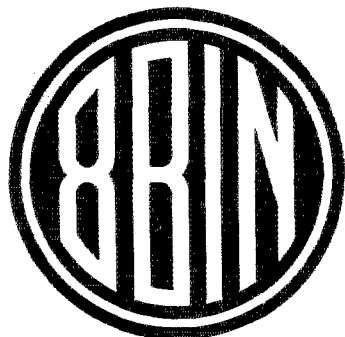
Type A—Single or Double Circuit .....	\$6.00
Type B—Three Circuit .....	6.00
Type C—Radio Frequency Units .....	2.25

Manufactured by

**The Sharp Spark Plug Co.**

Licensed Manufacturers

Bennett St., Wellington, Ohio



**THE OLD MAN SEZ:**

**“Dont Be A Hamjammer, Say It With Filters.”**

Whether it be filters, aerial equipment or any kind of ham stuff, we have it. Price list is yours for the asking.

**E. J. Nicholson**

1407 First North St.      Syracuse, N. Y.

*“The Eight That Pays The Freight”*

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### THE RELIABLE “ILLINOIS”

We use no useless metal or dielectric to lessen efficiency. 43 PL. \$3.50, 23 PL. \$2.75, 13 PL. \$2.25. Vernier \$1.50 extra. Without Dials 25c less. Discounts on orders of 2 to 5, 20 per cent; 6 or more, 25 per cent. Prompt Shipment. Send for Bulletin.

G. F. JOHNSON

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REPLACE YOUR B BATTERIES with a Kellogg Trans-B-former. Furnishes necessary plate voltages from your 110 A C 60 cycle socket at an enormous saving.

Price \$50.00 At your dealers.

**Kellogg Switchboard & Supply Co.**

1066 W. Adams St.

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## “WARRANTED” RHEOSTATS

6 ohm and 30 ohm

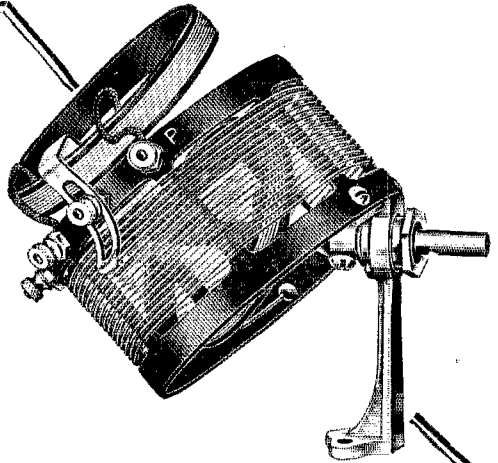
For any type vacuum tubes, 60c. Ten days money back guarantee.

*Dealers write*

**C. C. ENDLY, 22 Sturges Ave. Mansfield, Ohio**

# NEWS!

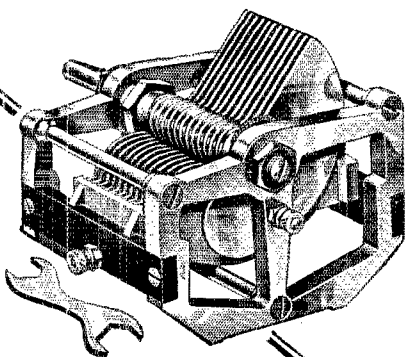
**9ZA Got  
English-French  
and Mexican  
Stations with a**



## B-T SHORT WAVE LOW LOSS TUNER

Hams and B. C. L's! Here's a **short wave tuner** that gets 'em all from 50 to 150 meters. 9ZA did it with our first tuner from our regular factory run.

The reasons for his success are obvious. The size of the wire in this new B-T product is right. The coil form has a minimum of dielectric. The windings are spaced and the rotating tickler is the right size. Adjustable "fixed tune" primary gives any desired degree of selectivity. Best of all B-T make a **real low loss** condenser to go with the tuner. Type 7-L tuning from 49 to 110 meters, or type 11-L tuning from 50 to 151 meters. Straightline wave length plate design; adjustable life-time bearing; soldered pigtailed connections and clear "Redmanol" insulation with low phase difference, low dielectric constant, and low hygroscopic properties, make this the ideal working mate for the type SW, B-T Low Loss Tuner.



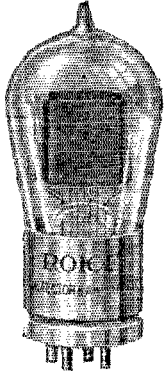
See these precision instruments at your dealers or write us for full information. Sixth edition of our book "Better Tuning", containing construction, tuning and general information on crystal to multiple tube R. F. Circuits, postpaid for 10c.

**BREMER-TULLY MFG. CO.**

*"Pioneers of Better Tuning"*

532 S Canal Street, CHICAGO, ILL

# "ROICE" Radio Tubes



The Royalty of Radio Tubes. A powerful and durable tube that will greatly improve reception, increase range and volume with a maximum of clearness.

Our direct sales plan enables you to buy "Roice" at the lowest possible price.

Type-200 .....	5 Volts, 1 Ampere Detector Tube
Type-201-A .....	5 Volts, .25 Ampere Amplifier and Detector
Type-199 .....	3-4 Volts, .06 Ampere Amplifier and Detector
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## ALL TYPES \$2.50

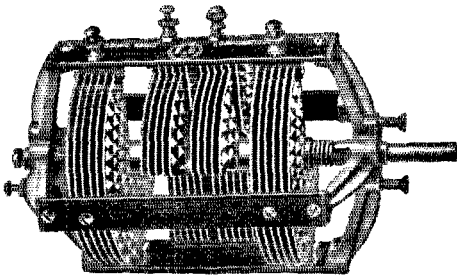
Type-202 ..... 5 Watt, Transmitters, \$3.00

### EVERY TUBE GUARANTEED

to work in Radio Frequency, especially adapted for Neutrodyne, Reflex and Super-Heterodyne Sets.

Shipped parcel post, C. O. D. When ordering mention type.

**Roice Tube Co. Dept. S. 21 Norwood Street Newark, N. J.**



LIST PRICE  
\$7.50

# "Bruno"

Pats.  
Pend.



8 in 1

## Ultra-Vano Condenser

A balanced precision instrument scientifically designed, having minutely small losses.

Can be used in 8 separate capacities from .001 to .000125 mf.

And can tune several stages of R. F. with a single control.

**Bruno Radio Corp.**  
**NEW YORK CITY**

## SURPLUS NAVY RECEIVERS

For Broadcast Music and Ship's Code

CN-113	300-2500 Meters	\$21.50 (Cost \$150)
CS-102	50-1000 "	\$55.00 (Cost \$500)
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For Long Wave Arc Reception

CN-239-240 1000-10,000 Meters \$45 (Cost \$500)

Complete Airplane Telephone Transmitting Sets with Hi-Voltage \$35

Shipping Charges Paid

**GEORGE W. EATON ELECTRIC CO.**  
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We Repair All Standard Makes of Tubes, Including

W.D. 11 or 12  
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C. 11 or 12  
D.V. 1 or D.V. 2  
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**\$2.00**



C 300 or 301 U.V. 202 Repaired. \$3.00.  
All tubes guaranteed to do the work.  
**RADIO TUBE EXCHANGE, 200 Broadway, New York**  
All Mail Orders Given Prompt Attention  
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## KESTER Radio SOLDER

(Rosin-Core)

If your dealer cannot supply you  
send us 25c in postage

**CHICAGO SOLDER COMPANY**  
CHICAGO, U. S. A.

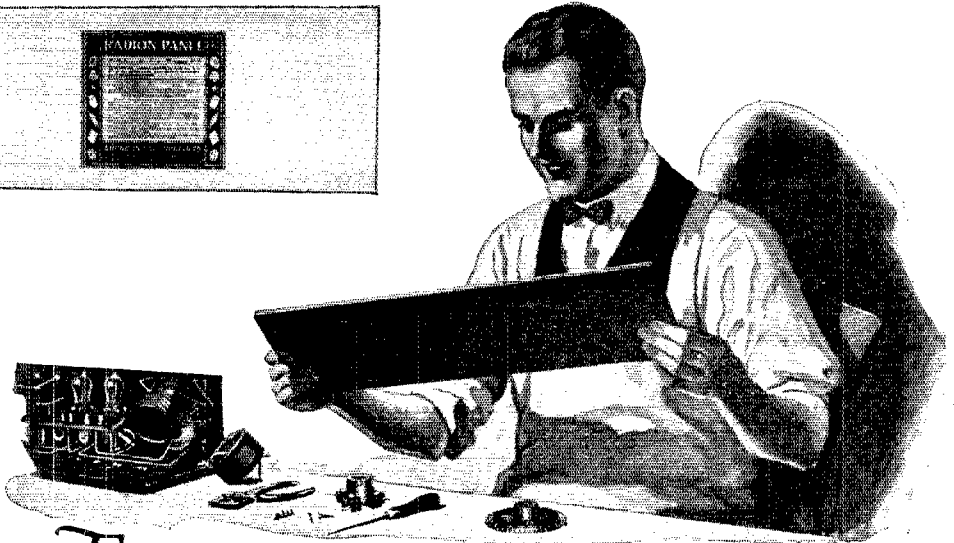
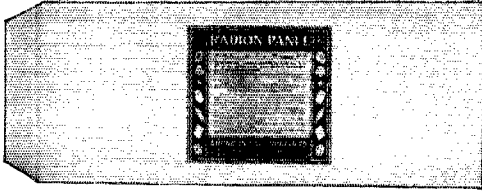
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**FREE!** Thousands of radio bargain standards plus standard parts for sets, vacuum tubes, etc. at one-third less than regular prices. Also latest information on all circuits, complete list of broadcasting stations and other valuable data. Send name and address, we'll send you. See book **FREE!**

**FREE SERVICE DEPARTMENT, Mr. Decker at N.Y. Eve**  
World will help you solve your radio problems and furnish up-to-date information on set construction, operation, repairs, etc. This service **FREE!** to our customers. Write today!

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## Engineers developed this special panel material for radio ONLY

**T**HERE is nothing quite like Radion—"the supreme insulation"—for real results. Authoritative laboratory tests conclusively prove highest insulating characteristics. In the set you build, it may give you just that extra energy needed to tune in a distant station. When you see Radion in a ready-built set, it is usually an evidence of general good quality in that set.

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Everyone knows Radion is the easiest panel material to drill, cut and saw. There are eighteen stock sizes, two colors, black and mahogany. Sold universally by dealers who know radio. Better performance will make it worth your while to ask for it by name, and to look for the name on the envelope, and the stamp on the panel.

Radion dials to match, also sockets, binding post panels, insulators, knobs, and new Radion built-in horn.

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Mail coupon below for our catalog and booklet. "Some Insulation Stickers Explained".

AMERICAN HARD RUBBER CO.,  
Dept. Q12 11 Mercer St., New York City  
Chicago Office: Conway Building

Pacific Coast Agent: Goodyear Rubber Co., San Francisco—Portland

# RADION

*The Supreme Insulation*

## PANELS

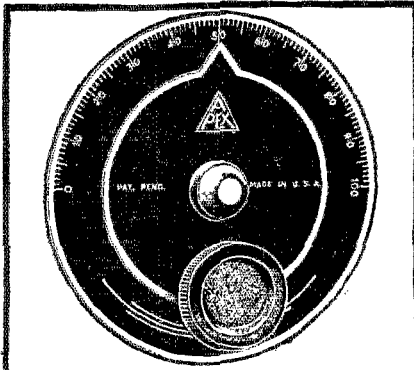
Dials Sockets, Binding Post Panels, etc.

AMERICAN HARD RUBBER CO.,  
Dept. Q12, 11 Mercer St., New York City  
Please send me your catalog and booklet  
"Some Insulation Stickers Explained".

Name.....

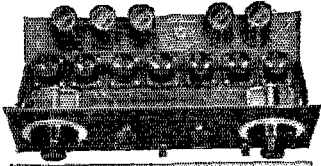
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**APEX VERNIER DIAL**

Do not bother with geared condensers, requiring many holes in the panel and careful lineup of pinion shafts, when this marvelous instrument provides the fine adjustment for tuning in distant stations. Ratio 10 to 1—quickly applied to any shaft. For sale by all good radio dealers. If unable to obtain, fill in coupon and enclose \$2.50 for nickel finish or \$3.50 for Gold Plated finish.



**Coast To Coast On An 18-Inch Loop**  
Assemble Your Own 7 Tube Super-Heterodyne

—on a 7 x 18 panel in three hours, \$37.50 buys the parts complete, including drilled and engraved panels, condensers, sockets, transformers, dials, connecting plugs, cables, etc., with drawings, diagrams and instructions. Price of cabinets to fit—furnished on application. If your dealer cannot supply these parts for this complete Heterodyne Radio Set, fill in coupon, mail check or money order and send dealer's name.

Apex Electric Mfg. Co., Dept. 1200  
210 W. 39th Street, Chicago, Illinois.  
Gentlemen: Enclosed find \$..... for which send me  
Name.....  
Street.....  
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**AMERICAN BRAND CONDENSERS**  
with the  
**~100 to 1~**  
**Worm Drive Vernier**  
**Finest Condenser Made**  
and the  
**Greatest Radio Value Offered the Public**  
23 PLATE only \$5.00 In Canada \$7.00  
**AMERICAN BRAND CORPORATION**  
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Price \$8.50

**Duo-Spiral Folding Loop**

Famous for its great convenience, handsome appearance and superior performance. Standard loop for super-heterodyne. Has concealed hinge. Rotates on base. Has dial graduated for calibration. Handle permits adjustment without body capacity effects. Fine silver and mahogany finish. We also manufacture TINY-TURN, the superior vernier control. Write direct, if your dealer cannot supply you.

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**PREMIER**

**HEGEHOG**

This marvelous little audio frequency transformer requires half the space of any other. Unsurpassed for volume and tune quality. Unique construction. Self shielded core. Light and compact. Mounts anywhere. Ideal for portables. Write for bulletin No. 34 showing full line of

Ratio 1—3  
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**\$3.50**

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Quality Radio Parts  
Premier Electric Co.  
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**WIMCO Announces**

Our experimental laboratory is developing instruments for short wave transmitting and receiving.

A real Wave Meter will be ready soon. We know that all hams will be interested.

*Send us your name for our mailing list*

**The Wireless Mfg. Co. Canton, Ohio**

**RADIO**

Big, complete stock. Standard prices. And you're sure it's reliable if it comes from Andrae.

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**JULIUS ANDRAE & SONS CO.,**  
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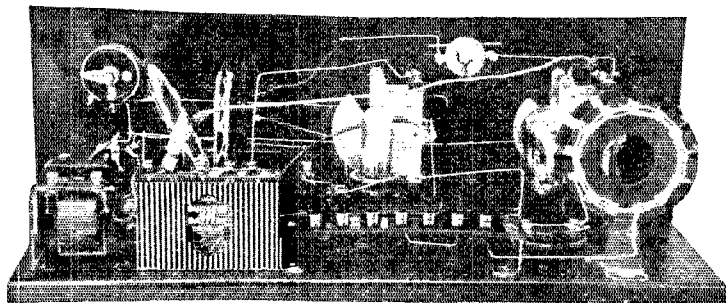
**ANDRAE** *In Business Since 1860*

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Volume and range are both secured with B-METAL Crystals. Your dealer has or will get them.

**B-Metal Refining Co.,**  
6th Floor 525 Woodward Avenue  
**DETROIT MICH.**

# The Set That Got Across!



On September 21st, 6BCP, San Pedro California, worked New Zealand 4AA, staying QSO for one hour and twenty minutes, establishing a new long distance record for two way amateur communication.

Magner gives due credit to the short-wave set designed by Zeh Bouck, 2 PI. 6BCP claims three times the audibility of the standard 3-circuit tuner.

We told you in the July "QST" that this radio frequency set was a humdinger. We have a few copies of our August number left for the ham who is after records.

## RADIO BROADCAST Magazine



A magazine written and edited for the *progressive enthusiast*—whether amateur, engineer or fan.

(Coupon)

Circulation Department, Radio Broadcast, Garden City, N. Y.

I enclose twenty-five cents (stamps or coin). Please send me the August issue containing 2PT's article on the short wave set.

Name .....

Address .....

# HAM-ADS

Six cents per word per insertion in advance. Name and address must be counted. Each initial counts as one word. Copy must be received by the 1st of month for succeeding month's issue.

HO HUM—60 cycles. DON'T HOOK THAT TEAM TO YOUR SET. NOISY JAZZ MAY DROWN IT OUT, BUT FOR REAL DX YOU NEED AN EDISON B (THE 8ML KIND). A CHRISTMAS PRESENT FOR YOUR SET, A LASTING GIFT. 54 VOLTS \$8.75 (HI-POWER GAS FOR THAT LOW LOSS TUNER). 100 VOLTS \$16.00 (JUST THE RIGHT SIZE). 130 VOLTS \$20.00, 150 VOLTS \$23.00. THE CABINET IS FUMED OAK WAX FINISHED, COVERED, RIBBED RUBBER MAT. LARGEST SIZED PEPPY EDISON ELEMENTS, WIRED WITH PURE SOLID NICKEL. GENUINE EDISON ELECTROLYTE. (THAT'S NO LYE). PERFORATED HARD RUBBER SEPARATORS, WHITE SEALING OIL. CAREFULLY PACKED FOR SAFE SHIPMENT. INDIVIDUAL CELLS. 16c. THAT NEUTRODYNE AND SUPERHET NEEDS A HUSKY B. DOUBLE CAPACITY 2000 MILIAMP HOUR 100 VOLTS \$24.00. CELLS IN HEAVY GLASS JARS, 1/2" THICK. A BANG-UP B. BUILD YOUR B FROM 8ML SURE-FIRE PARTS. LARGEST LIVE, CLEAN EDISON A ELEMENTS 6c, DRILLED AND CUT IN UNITS. 7c. WIRED WITH PURE SOLID NICKEL, 10c pair. DOUBLE 2000 MILIAMP HOUR UNIT READY TO WIRE 14c. G ELEMENTS, 4c, 2 POSITIVES, 1 NEGATIVE, 5c. HI-CAPACITY UNIT READY TO WIRE, 10c. HICAP CELL PARTS 17c. DRILLED READY TO WIRE 19c. CELLS WIRED 24c. INCLUDING GENUINE EDISON SOLUTION. GREAT FOR SUPERS, POWER AMPLIFIERS, TRANSMITTERS. 3000 MILIAMP HOUR SUPERCCELL FOR THE SUPERHET AND HIPOWER TRANSMITTER, 30c CELL FOR PARTS, 40c WIRED. ANNEALED GLASS TEST TUBES INDIVIDUALLY WRAPPED TO REACH YOU SAFELY 3/8x8", 3c, 1x6", 4c. FLAT BOTTOMED HEAVY GLASS JARS 1/2" THICK, MOULDED ESPECIALLY FOR THAT B, AND FOR RECTIFIERS TOO, 1x6", 4c, 1 1/4x6 1/2", 5c. FOR A LASTING JOB WIRE YOUR ELEMENTS WITH NO. 20 PURE, SOFT, SOLID (NOT ALLOYED OR PLATED) NICKEL WIRE 1 1/2c PREPAID. PERFORATED HARD RUBBER SEPARATORS 1/2c PREPAID. STEER CLEAR OF LYE FOR SOLUTION. TO REALIZE THE FULL CAPACITY OF YOUR EDISON ELEMENTS IT IS IMPERATIVE GENUINE EDISON ELECTROLYTE BE USED. CHEMICALLY CORRECT COMBINATION OF LITHIUM AND POTASSIUM HYDRATE. \$1.50 PREPAID TO MAKE 5 lbs. ELECTROLYTE. SAMPLE CELLS—A or G, 25c—supercell 40c. YOU CAN'T TAKE OUT MORE THAN YOU PUT IN. REALLY CHARGE THAT B WITH A WILLARD COLLOID, \$2.00. JUMBO SIZE \$3. FULL WAVE COLLOID CHARGES 100 VOLT IN ONE BITE, NO SWITCHES, \$4. JUMBO SIZE \$6. USES BOTH HALVES OF CYCLE. EVERYTHING FOR THAT EDISON B. FRANK MURPHY, RADIO 8ML, 4837 ROCKWOOD ROAD, CLEVELAND, O.

QST BACKS US UP. READ PAGES, 31, 32, 56 NOV. QST. THE LOW WAVES POSITIVELY DEMAND NO. 12 SOLID COPPER ENAMELED AERIAL WIRE. PURE COPPER COATED WITH ELASTIC NON-FLAKING ENAMEL BAKED ON—TESTED A YEAR AT 8ML. EACH ORDER SHIPPED IN ONE PIERCE BURLAP-WRAPPED COIL, PREPAID TO 3rd ZONE. 1c FOOT. IF YOU ARE PROUD OF YOUR STATION YOU MUST HAVE THE BEST IN INSULATORS—THAT MEANS OHIO BRASS CO. PORCELAINS, 5", 75c; 10", \$1.50 PREPAID TO 3rd ZONE. FLUX DISTRIBUTING SHIELDS \$1.00 ATTACHED TOTALLY ELIMINATE CORONA. LOW LOSS TUNER WIRE NO. 12 DOUBLE COTTON, \$1.25 100 FEET, PREPAID. NO. 16 60c. SILICON STEEL LAMINATIONS FOR THAT CHOKO AND TRANSFORMER 20c lb. 2 1/4x10" STRIPS, 1 1/2" to 2" widths AIR SHAPED CORE WITH CLOSED OR ADJUSTABLE AIR\* GAP. RADIO 8ML NOW YOU CAN INSULATE PERFECTLY EVERY POINT OF YOUR RADIATING SYSTEM. A NEW LINE OF X INSULATORS—DENSE NON-POROUS PORCELAIN, BROWN GLAZED. 5" 25c in 10 lots, 75c PAIR, 9" 40c in 10 LOTS, \$1.00 PAIR, 13" 90c in 10 LOTS, \$2.00 PAIR, 20" \$1.50. GUY INSULATORS, 4 AND 8c. A REAL FIND, GANG. RADIO 8ML, 4837 ROCKWOOD ROAD, CLEVELAND, O.

118

ALL HAMS TAKE NOTICE. NEW U. V. 208-A FIFTY WATTS NOW AVAILABLE. LINE FORMS AT THE RIGHT, NO SHOWING ALLOWED. TUBE ONLY PULLS 3.25 AMPS FILAMENT, 1000 VOLTS ON THE PLATE, VOLTAGE AMPLIFICATION CONSTANT OF 25. BUILT MUCH MORE RUGGED, LARGER PLATE, ANCHORED GRID AND FILAMENT, ETC., IN STOCK FOR IMMEDIATE DELIVERY, PRICE F. O. B. FT. WORTH, \$34.00. MAKE YOURSELF AN XMAS PRESENT OF ONE OR MORE. OMS, IF YOU'VE NEVER TRIED OUR SERVICE YOU HAVE MISSED A LOT. WE SHIP TO MEXICO, CANADA, CUBA, PORTO RICO, NEW ZEALAND, AND ELSEWHERE, NOT TO MENTION THE GOOD OLD USA. ALL ORDERS ARE SHIPPED THE SAME DAY THEY ARE RECEIVED, NO WAITS, NO DELAYS, AND WE NEVER SUBSTITUTE. YOU GET REAL SERVICE AND A SQUARE DEAL. FROM THE ONLY HAM STORE IN THE FIFTH DISTRICT, FT. WORTH RADIO SUPPLY CO., 104 EAST TENTH ST., FORT WORTH, TEXAS.

"RADIO CALL PINS," u9FZ (see Page 82).

RADIO GENERATORS—500 volt 100 watt, \$28.50 Battery Charging Generators \$38.50. High Speed Motors, Motor Generator Sets, all sizes. Motor Specialties Co., Crafton, Penna.

MAKE YOUR NEUT REACH OUT—Same panel, same layout, fewer parts. Our \$5.00 Kit includes the one different part, 22 feet real gold sheathed wire, lithographed print of Kladag Coast to Coast Circuit, and complete, simple instructions. Nothing else to buy. Gives selectivity with deep, resonant volume. NOT obtainable elsewhere. We originated this and can name scores of buyers it has delighted. Satisfaction guaranteed. Details 10c. Kit prepaid anywhere \$5.00. New 48 page catalog, thousands of items, many exclusive, for stamp. We accept postage stamps same as cash. KLADAG RADIO LABORATORIES, Kent, O.

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnigraph Mfg. Co., 16M Hudson St., New York.

ENVELOPES—100 good white envelopes with name and address printed, 50c postpaid. Emblem or call in red \$ .25 extra. Guy Sherman, Clinton, Ia.

STORAGE "B" batteries at dry cell prices. Purchase a rechargeable "HAWLEY" storage "B" battery. Non-sulphating or buckling of plates, which means clearer enjoying reception with unlimited life. Sold in complete knock-down units which requires no former experience to put together. These units contain everything for the actual construction of battery such as large size tested Edison elements, special molded flat bottom glass cells (not ordinary test tubes), punched insulating fibre board for support of cells, pure annealed solid nickel wire Rubber stoppers, perforated hard rubber separators, full strength chemical electrolyte. With all orders there is included free an 8 page illustrated folder showing simple putting together making of charger and charging. Prices of units as above—22 volt \$2.95; 45 volt \$5.75; 90 volt \$8.95; 100 volt \$9.95; 120 volt \$11.60; 135 volt \$12.75; 150 volt \$13.90; 200 volt \$17.50. Special voltage units put up at no increase in price. Complete sample cell, 35c prepaid. Complete non-heating "B" battery charger \$2.75. Extra special 100 volt whitewood cabinet at \$2.75 only. Also "A" batteries at attractive prices. Order direct or write for my literature, 30 days' trial offer and guarantee. Orders ship same day received. No waiting. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

SEND me your burned out or broken Power tubes—50 watt or over. Will pay liberally. W. Baker, 36 W. 20th St., New York City.

158 GENUINE Foreign Stamps. Mexico War Issues, Venezuela, Salvador and India Service Guatemala, China, etc., only 5c. Finest approval sheets 50 to 60c. Agents wanted. Big 72p. Lists Free. We Buy Stamps. Established 20 years. Hussman Stamps Co., Dept. 151, St Louis, Mo.

FOR SALE—Westinghouse dynamotors 10-12 volt drive, 350-450 volt output with filter system at \$15. A few

ALWAYS MENTION Q & T WHEN WRITING TO ADVERTISERS



30-32 volt drive with 350-450 volt output at \$15.00; also General Electric double current generators and dynamometers 12 volt drive 500-550 volt output each equipped with Dublier filter system, \$15.00 each, all generators are new. Western Electric Navy submarine chaser CW 936 outfits complete with tubes, wired for ICW, CW, Phone, Outfit is brand new, first \$200 takes it. Navy long wave receivers type CN240 range 1000-20000 meters, bargain \$70—1-200 watt continuous wave transmitter, panel outfit, the finest transmitter you ever saw, \$125.00; 1 Western Electric 1/4 KW type 1 tube \$65, also 50 watt tubes \$28.00; all Grebe receivers at 30% off list—all types Navy wavemeters, range 100-4000 meters, the finest meters you ever saw at \$50.00 each. First money order takes them. 2AGD.

100 VOLT EDISON Type "B" battery, knocked down. Parts and plans complete, \$12.50. LANE MFG., 2940 W. Lake, Chicago.

NEW RECEIVING SETS, FULLY GUARANTEED. Zenith J-R Receiver and 2-M Amplifier \$90.00, Jones No. 503-J (3 stages audio) \$125.00, Kennedy Intermediate \$75.00, Grebe CR-5 or CR-8 \$50.00, Grebe CR-12 \$125.00, Federal No. 8 Detector and 1 step \$20.00, Grebe RORN radio freq. amplifier \$25.00. The Radio Store, 560 E. Colorado St., Pasadena, Cal.

"RADIO CALL PINS." u9FZ (see Page 82).

FOR SALE—15 watt CW and fone transmitter, transformer, tubes, three meters "S" tube, rectifier, etc., bargain for \$55.00; DX New Zealand, Hawaii, Greenland, etc., also eight DeForest Honeycomb coils, 100 to 1250 turns, the set for \$7.00; (9ckf) Clarence Arundale, Lewistown, Ill.

GENUINE SILICON Transformer steel cut to order 25 cents lb. 10 lbs. and over, 4 cubic inches, weight 1 lb. postage extra. Geo. Schulz, Calumet, Mich.

No. 12 Double cotton covered wire 1 1/4 ft. No. 16 double cotton covered wire 70c lb. No. 12 enameled solid copper wire 1c ft. No. 12 Hard drawn tin copper wire 1 1/2c ft. Low loss tuners and coils made to order—all kinds and sizes. For best results on low waves. Pyrex transmitting and lead-insulators. 8AGO, 3046 Centre Ave., Pittsburgh, Pa.

DEALERS—write for our illustrated catalogue of reliable radio merchandise. Rossiter-Manning Corporation, Dept. B, 1830 Wilson Ave., Chicago, Ill.

SELL—National Radio Institute course of 14 textbooks. No instrument, otherwise complete. Ten dollars. Want honeycomb coils. Pliny Goddard, Jr., Leonia, N. J.

FIRST CHECK FOR seventy dollars take SUV204 used 4 hours. Guaranteed never overloaded and in perfect condition. 3AUL.

COUPLED INDUCTANCES: \$15.00. PHOTO ON REQUEST. CAPITOL RADIO, LANSING, MICH.

RADIO MECHANIC—four years experience, fair draftsman would like steady position with manufacturer, can furnish hand tools. Address J. L. Teats, P. O. Box 106, Elk City, Kansas.

\$4.50 New United States Aviators leather helmet with head phones and microphones, cost \$25.00, postage free. Send at once, limited supply; other radio bargains. Weif's Curiosity Shop, 20 South 2nd St., Philadelphia, Pa.

"PUREST VIRGIN ALUMINUM FOR SALE. PARTICULARS UPON REQUEST. 2EM."

CORE IRON—taken from large commercial choke 5" wide three different lengths, 8c per lb. plus postage. Smith, c/o Dilley, Barton, Vt.

WESTERN ELECTRIC 2M.F. rolled condensers. Tested to withstand 550 volts, guaranteed new and condition perfect. Postpaid \$1.00 each, 6 for \$5.00, 14 for \$10.00. Peerless Radio Lab., 208-25 104th Ave., Bellaire, L. I.

NEW FAD—An 8UX comic cartoonlet for your call card envelopes or letterheads. Small .75, large 1.00 postpaid. Have your local engraver make plate. Make your card distinctive. D. A. Hoffman, 1551 E. 93rd St., Cleveland, O.

MADE TO ORDER Q-S-L CARDS. 5A-Q-C PRINTS 'EM. 500 TWO COLOR CARDS \$4.00. SAMPLES ALL DISTRICTS, 10 CENTS. CURTIS, 1109 EIGHTH AVENUE, FORT WORTH, TEXAS.

HELLO GANG! CATCH THESE GOOD ONES! USED APPARATUS BUT ALL IN FIRST CLASS OPERATING CONDITION, MAGNAVOX R3 AT \$19.00; RADIO CORP. AR-1800 TUNER AND CRYSTAL DETECTOR AT \$35.00; AR-1400 DETECTOR AND 2 STAGE A.F. AT \$60.00; AA-1520 THREE STAGE R.F. AMPLIFIER AT \$64.00; UC-1820 FARADON PRECISION CONDENSER, VARIABLE TO .0006 MFD. AT \$6.25; WESTINGHOUSE MG SET 110 VOLTS AC. 500 VOLTS DC. 100 WATTS AT \$72.00. LOTS OF NEW APPARATUS AT 10 PERCENT DISCOUNT AND IF I DON'T HAPPEN TO HAVE JUST WHAT YOU WANT, WILL GET IT FOR YOU QUICK. SHOOT YOUR ORDER IN NOW. ALL SHIPMENTS C. O. D. J. F. DAVIDSON, 9CEK.

LOW-LOSS SHORTWAVE UNIT with which you can tune down to 10 meters and will oscillate from 25 meters up to 125 with a low loss 11 plate condenser, price to hams \$5.00 prepaid. RAY-DEE-ARTCRAFT MANUFACTURING CO., 1005-17 Tribune St., Redlands, Calif.

RADIOLA V detector and 2 stages—audio and crystal detector like new list complete \$142.50; sell for \$55.00; less tubes and batteries; but with 3000 ohm Frost Phone. \$5.00 deposit with express agent, balance C. O. D. subject examination. Geo. Schulz, Calumet, Mich.

GENERATORS, MOTOR-GENERATORS and Dynamos, 500 to 1500 volts. \$45, \$75, and \$85, new and unused machines, as you can see these are real bargains and will not last forever. State your requirements. 9CJj, W. G. Mulks, Whitewater, Wis.

COUPLED INDUCTANCES: \$15.00. PHOTO ON REQUEST. CAPITOL RADIO, LANSING, MICH.

BUILD YOUR OWN rechargeable "B" batteries from our large size Edison elements, wired with pure nickel wire. ELECTRICALLY WELDED CONNECTIONS, \$0.7 1/2 per pair, prepaid. Instructions with order. Sample \$1.0. Arthur Chappelle, 7NX, Woodburn, Ore.

TRANSMITTER AT BARGAIN—20 watt fone CW, on bakelite; 5 meters, 500-1250 volt plate supply, from 4-NEW "S" tubes well filtered, 4-coil Meissner circuit. Complete, \$125.00; less than parts cost wholesale. Guaranteed to "perk" from 80-200 meters. Also 500 volt 200 watt Robbins-Myers Motor Generator—\$35.00. 9QI, Greentown, Ind.

FOR SALE—Acme HWA O-10 amps. \$5.00, RCA rheostat PT537, \$5.00; 1IV, 66 Vine St., Bridgeport, Conn.

FIVE WATTERS—you saw the ad in October QST—plenty of them on hand. Filament 7-1/2 volts, 2-1/4 amps. Plate 300 to 500 volts. Every tube actually tested on a ham transmitter. Your money back if you are not satisfied. We ship C. O. D. Parcel Post \$3.50 and charges. No delay. The day the orders come in the tubes go out. Radio Vacuum Tube Co., 55 Halsey St., Newark, N. J.

SWAP OR SELL—Radiolas RC - RT and A.R. WANTED—Grebe C.R.8 and Grebe RORK 2 stage amplifier. Geo. Woodbury, Union City, Ind.

PURE DC FOR THE PLATES. GE 12/350 volt—143 ampere dynamos with filter \$18. Holtzer-Cabot 12/500 .07 ampere \$20. GE 24/1500 volt. .233 ampere 750 volt tap. Original boxes \$45.00. adapted for belt drive \$3.00 additional. Just the thing for 32 volt plants. Limited number slightly used, while they last \$25. Guaranteed. Crocker-Wheeler 500 cycle self excited and motor generators. Navy flame proof keys with "blinker" light \$1.50; 1/4 KW 500 cycle airplane transmitters \$65.00; cost \$1650, ship transmitters. Henry Kienzle, 501 E. 84th St., New York City.

GREBE RADIO DEMONSTRATOR CR-8 WITH RORK AMPLIFIER \$65, BAUMGARTEL RADIO CO., 537 Coit Ave., Grand Rapids, Mich.

LOWEST LOSS VERNIER CONDENSERS. Acme \$4.95; General Radio—\$4.59; Hammarlund, \$4.95; plain \$4.49; Fox Instrument Company, 1665 Third Ave., New York City.

SELL—Two AMRAD "S" TUBES AND RCA RHEO-  
STAT FOR \$7.50 EACH. 9BR.

GREBE CR-12 with shipping box \$35.00; Western Elec-  
tric 10-A \$90.00; both practically new; Sodian DR-6 set  
with tube, new \$15.00; three circuit regenerator in 6x9  
cabinet guaranteed thousand miles \$10.00, Lieutenant  
Wenstrom, Fort Bliss, Tex.

\$10,000 worth of radio transmitting, receiving sets and  
parts, bought from U. S. Government Aircraft Depart-  
ment. We sell at reduced rates. Send 2c stamp for  
list and prices. Mail orders answered. Well's Curiosity  
Shop, 20 S. 2nd St., Philadelphia, Pa.

SA, OM—if you should ever send one of your good cards to  
8AYN in Cleveland you are making one helluva big  
error because RAYN doesn't live there. 8AYN has been  
assigned to Don Mackenzie—3JX—1332 Duncan Ave., Cin-  
cinnati, O.

COCKADAY FOUR CIRCUIT WITH TWO STAGE  
AMPLIFIER \$50.00. John Young, 23 Spruce St., At-  
lanta, Ga.

500 WATT PLATE AND FILAMENT TRANSFORMERS  
\$15 and \$10 respectively. No. 12 ENAMELED WIRE  
8.75 100 FT. \$3.50 500 FT. WILSON ELECTRICAL  
LABORATORIES. HAM DEPT., 1416 MORSE AVE.,  
CHICAGO, ILL.

COUPLED INDUCTANCES; \$15.00. PHOTO ON RE-  
QUEST. CAPITOL RADIO, LANSING, MICH.

BAKELITE STRIPS—for sub panels and antenna insu-  
lation to 5" wide any length 3/16 inches thick 100 square  
inches \$1.25 prepaid. Geo. Schulz, Calumet, Mich.

COILS FOR ONE CONTROL SUPER HETERODYNE  
AS PER SPECIFICATIONS NOVEMBER QST WOUND  
READY TO MOUNT. \$10.50 SET. STUART A. HEN-  
DRICK, 85 W. 181st St., N. Y. C.

GET THOSE CARDS FROM 9AQB—red call and border,  
with blue lettering. 200-\$2.00, 500-\$3.50, write for sample  
cards. Bill Lippman, Jr., 6 Thornby Pl., St. Louis, Mo.

GREBE CR 13 in perfect condition forty bucks f. o. b.  
Pittsburg, Pa. 8AGO.

CHICAGO HAMS—A.R.R.L. emblem engraved on mem-  
bers' panels \$5.00, finest Gorton machine engraving. Also  
larger emblems with call letters for station signs. Prompt  
service on original "50 watt bottle" call pins, \$2.00.  
A. L. Woody, 20 So. Wells St., Chicago.

"RADIO CALL PINS." u9FZ (see Page 82).

FOR CASH—GREBE CR3; RORN; INCLUDING  
TUBES \$100 EDISON MOVIE PROJECTOR WITH  
NEW LAMP ADAPTER AND ALL EQUIPMENT FINE  
CONDITION, ANY OFFER. WRITE, A. W. HYND, S.  
SEWARD, N. Y.

YOU need these bargains. Jewell meters: 0-5 antenna  
\$7.00; 0-10 antenna \$7.00; 0-500 milliammeter \$1.60;  
RCA 750 watt power transformer \$15.00; RCA micro-  
phone transformer \$3.50; Federal microphone \$4.50;  
Myers choke coil amplifiers with sockets \$2.75 each; 7  
inch throw lightning switch \$1.00; all new goods. Du-  
Buclet, 3722 Concord Place, Chicago.

TUSKA 2 step amplifier with tubes, \$32.00 new; RADI-  
OLA III, new, \$29.00; Brandes Horn nearly new, \$5.75;  
guaranteed tubes \$3.25—types 12—199—201A. Clear-  
tone and Independent tubes \$3.25. tube repairing, \$2.75.  
adjustable horns, \$16.95; complete C. W. station for sale.  
Macks' Radio Shop, Box 190, Hartford, Conn.

LOW LOSS (Squirrel Cage) COIL FORMS. Similar  
to those used in One Control Neutrodyne, page 9,  
August issue. Carefully constructed of seasoned ma-  
hogany strips and Formica rings. Stock sizes: (4"  
diam. 4" long) (4" diam. 3 1/2" long) (3 1/2" diam. 4"  
long) (3 1/2" diam. 3 1/2" long). Price \$1.50; cost no more  
than tubing and is definitely better. Try one in the  
secondary circuit with a low loss condenser and hear  
for yourself. Use the 3 1/2" diameter sizes for neutro-  
dyne coils. Special (3 for \$4) or (4 for \$5) for neutro-  
dyne builders. All forms complete with terminal screws  
and drilled for mounting posts ready to wind. Care-  
fully packed and shipped postpaid. Quick Service.

120

Special sizes made to order. Low loss sets made to or-  
der or designed at reasonable prices. STUART A.  
HENDRICK, Radio Equipment, 85 W. 181st St., Bronx,  
N. Y. C.

EDISON BATTERY SUPPLIES. LARGEST SIZE  
TYPE A ELEMENTS 4c A PAIR, 5c DRILLED. PURE  
NICKEL WIRE 1c A FOOT. PERFORATED HARD  
RUBBER SEPARATORS 1/4c EACH OR 5 1/2x5 3/4"  
SHEETS 3c. TEST TUBES 3/4x6" 3c. CHEMICALS  
FOR FIVE LBS. EDISON SOLUTION 75c. ALL ARTI-  
CLES POSTPAID. BERNARD STOTT, 60 PALLIS-  
TER AVE., DETROIT, MICH.

CODE MADE EASY and interesting. Alphabet in 15  
minutes. Easy to remember. Boy of eight learned ten  
consecutive letters in five minutes. Copyright 1924. \$1.  
Cheques \$1.10. Dept. Q., KWIKKODE, 724 Beresford  
Ave., Winnipeg, Canada.

COUPLED INDUCTANCES: \$15.00. PHOTO ON RE-  
QUEST. CAPITOL RADIO, LANSING, MICH.

POWER AMPLIFIER, Western Electric 10A new, \$100,  
and EIS superheterodyne, \$110. Lease, 725 N. Main St.,  
Niles, O.

SELL—following used goods. Acme 1.5 henry, 150 mil.  
choke \$2.00; Baldwin loudspeaker unit \$4.00; one:UV202  
\$2.00; Murdock type 55 headset \$3.00; Hoyt peephole volt  
meter \$2.50; original homcharger \$10; Jewell type 90,  
150-625 wavemeter \$15.00; All Radiotron receiving tubes  
direct from factory \$3.50. P. S. Van Deusen, 327 S.  
Willow St., Kent, O.

FIRST CERTIFIED CHECK OR MONEY ORDER  
GETS IT. Panel mounted 20 watt C. W. tone complete.  
Tubes, mike, key, Acme plate, separate fil. transformer  
chokes, condenser, sockets for S tubes, Jewell meters,  
1 DH circuit \$95.00; 24 jar rectifier in rack with electro-  
lyte \$10.; 20 wattor OW tone fil. transformer, panel  
mounted; 1 DH circuit \$45.00; 50 wattor, filament  
transformer, new stuff, 1 DH circuit \$53.00; also sev-  
eral smaller transmitters; low loss short wave \$12.00;  
Joe Ballard, 110 Malone St., Sikeston, Mo.

BARGAIN—DEFOREST TYPE 0-20 WATT TRANS-  
MITTER 3 meters, key, modulation transformer, etc.,  
less tubes \$65.00; JOHN P. MATTHEWS, Newton, Ia.

NEW TUBES CHEAP—50's and 250's. W. E. and  
others—act quick. Rdo 8BHN.

LIMITED QUANTITY—following new Radio Corpora-  
tion apparatus: 0-2 1/2 Radiation ammeters \$2.25; 0-5  
\$2.00; 0-500 voltmeters \$9.00; chopper wheels \$2.75; 1/2  
mfd condensers \$ .75; filament transformers \$5.00; sili-  
con steel 20c lb. A. Schumacker, 1917 54th St., Brook-  
lyn, N. Y.

QSL Cards—Send for samples and price list. Large  
red call letters. 2AOT, 2748 Fulton St., Brooklyn, N. Y.

GREBE IN ORIGINAL FACTORY CARTONS—CR3,  
\$35.00; CR8 \$45.00; RORN, \$35; RORK, \$35; closing  
out line. Remit in full or 20% cash, balance C. O. D.  
The Radio Shop, 792 Locust, Dubuque, Ia.

SELL New equipment. UL 1008 inductance \$8.00; C302  
\$5.00; Jewell 0-15 volts AC \$6.50; UM530 0-2.5 amps  
ammeter \$4.00; UC1806 .002 mfd. 6000 volts \$2.00; UC  
1014 .002 mfd 3000 volts \$2.00; 1 mfd. filter condenser  
\$1.50; 5000 ohms grid leak \$1.00; what offer? Write  
Melbourne Renken, Cole Camp, Mo.

COUPLED INDUCTANCES: \$15.00. PHOTO ON RE-  
QUEST. CAPITOL RADIO, LANSING, MICH.

\$25 takes complete ten water: tubes, meters, etc. Sell  
separately. 9CMN.

250 Watt, 1000 volt Westinghouse motor generator set  
used only few hours. Cost \$175.00; price \$96.00; other  
transmitting apparatus for sale. Write for list. H. M.  
Warner, Great Notch, N. J.

MOTOR GENERATORS—New Rob. & Myers 500 volts  
150 watts with 110 volt A. C. motor drive \$36.00. Gen-  
erators without motors \$25.00; motors and generators  
repaired and rewound 1 year's guarantee. MORTON  
ELECTRIC CO., 4832 Rice St., Chicago, Ill.

WESTERN ELECTRIC CW 936 Set—transmitter and  
receiving tuners, amplifier, two dynamotors, power

switchboard, loud speaker, hand set, transmitter, wall type transmitter, 5VT-1 tubes, 3 VT-2 tubes, jacks and plugs all for \$200.00; send for photograph. A. Ackerman, Belmar, N. J.

EDGEWISE WOUND copper ribbon the only really satisfactory antenna inductance 5/16 inch wide, 4 inch diameter 12 cents, 5 inch diameter 13 cents, 6 inch diameter 16 cents, 7 1/4 inch diameter 18 cents per turn, prepaid, any number turns in one piece. Geo. Schulz, Calumet, Mich.

Slightly used Grebe CR13 like new. Need money. Fifty dollars. C. O. D. 9DLF, Aneta, N. D.

WANTED—GOOD VIBROPLEX, STATE PRICE AND CONDITION. 5AJQ.

HOT PUPS—10 watt transmitter \$50.00. E. S. Guilford, Farmingdale, N. J.

GENTLE "RADIOTRON" TUBES \$3.40 POSTPAID. MACCLAREN, ONSET, MASS.

ACT QUICK—200 Watt mounted Acme Power transformer filament winding, \$11.00; Mod. trans. \$3.00, Tuska CW inductance \$3.00. 6BRC.

200-20,000 METEE receiver, including radiotron \$25.00; two step amplifier \$18.00. Smith, 4416 Market, Philadelphia, Pa.

FOR SALE—three tube honeycomb receiver complete with tubes, storage battery, charger, Magnavox and phones. Also many extras \$85.00 or best offer. A. Malins, 17 Dodworth St., Brooklyn, N. Y.

GRAB THIS! 3 Kenotrons U. V. 217, \$14 each; 1UV 203A \$20; 50 watt sockets \$1.40; G. E. Thermocoupler ammeter \$6.00, worth \$15.00; Everything above guaranteed absolutely brand new, never used a minute; also 3000 volt plate transformer middle tapped, etc., \$15. Filament transformer tapped five places \$10; both excellent transformers. Sacrificing everything. B. T. Vail, 1761 State St., Schenectady, N. Y.

LOW LOSS INDUCTANCE FORMS. Linen Impregnated Bakelite, 50c each. The Kehler Radio Lab., Abilene Kansas.

COUPLED INDUCTANCES: \$15.00. PHOTO ON REQUEST. CAPITOL RADIO, LANSING, MICH.

KENNEDY RECEIVER type 110 with amplifier and tubes—receives 175 to 26,900 meters, new condition; cost \$400.00, sell for \$100.00. Westinghouse R-C T-R and A-R with loading coil; new condition cost \$275, sell for \$55. New Grebe CR-13 original case \$65.00. Dr. Sceleth, 25 E. Washington St., Chicago, Ill.

TWO! PRACTICALLY NEW ACME TRANSFORMERS 550-750 VOLTS, CENTER TAP \$12.00, 375 VOLT CENTER TAP \$6. POSTPAID. R. HAILE, 6570 Scanlan, St. Louis, Mo.

8ATL quitting radio selling 20 watt transmitting set mounted in cabinet, complete, includes 3 Jewell meters, 3 5-watt tubes—250 watt 550 V. transformer, choke, relays, fones, etc. \$75.00. Hrd in New Zealand. Low loss tuner 90-300 meters 2 step with tubes \$30.00. 200-600 meters, variometers, 2 step in cabinet \$25.00. f. o. b. Fred Bretschneider, 6059 30th St., Detroit, Mich.

R-2 Magnavoxes \$46.75, Robert Wood, Knoxville, Pa.

"RADIO CALL PINS." u9FZ (see Page 82).

FOR SALE—Type thirteen Esco Motor Generator, Motor 110 Volts sixty cycle, Generator three hundred Watts, one thousand volts, with taps at four hundred and six hundred Volts, in perfect condition, used about three months. Price Ninety Dollars. D. W. Pinkerton, 8 UQ, Sta. B. Toledo, O.

HR YA OMS Selling a-4-5 watt set, a clean record breaker. Complete with tubes, chokes, meters, etc., \$80.00. Write BBOV, S. Strobel, 3923 N. 6th St.: Philadelphia, Pa.

FOR SALE—I have the following material, no junk, all in as good condition as new, 1000 watt, 2000 volt motor generator, Zenith special and two step, 125 to 700 meters, Westinghouse RC & two step, DeForest 3 tube Reflex.

Also other miscellaneous material. Floyd L. Vanderpoel, Litchfield, Conn., Radio 1BEP.

450v EDISON BATTERY in five sections, complete with magnetic rectifier, sell \$100.00 or consider exchange deal for 1000-1500 v DC 110 v AC motor-generator, ESCO preferred, also have New rotary gap with 110v Universal motor \$7.00, 10,000 v open core transformer, \$15.00 .01 glass plate condenser \$3.00. G. Arnold Edwards, c1AW, North Sydney, N. S., Canada.

FOR SALE—New Grebe CR8 perfect condition \$30.00, T. T. Ryde, 14311 Terry Ave., N., Detroit, Mich.

PARAGON RA 10 three circuit tuner for both amateur and broadcast waves. Has received both coasts. Only \$30.00. H. Meyer, Jr., Rockdale, Tex.

RECEIVING APPARATUS New RCA UV712 Audio transformers \$5.00, UV1714 Radio Transformers \$4.00 UV1716 for superhet \$5.50, 100 volt Kimley B Battery \$14.00; 140 volt Kimley Battery \$17.50. Both are panel type. Van Blaricom, Helena, Mont.

Swap or Sell: Motion picture camera A-1 con. and motion picture machine. Want Grebe CR9. C. Cary, Orland, Ind.

SELL—Western Electric 10 D loud speaker, \$25, guaranteed; Jewell O-100 milliammeter \$4.75, slightly used. W. A. Ritzi, Creston, O.

3-HK'S COMPLETE 100-WATT CW. Phone, and ICW. Actual cost \$290. Send offer or write for list. James Thomas, Ambler, Penna.

Thordarson CW Transformers, National Condensers, Jewell & Weston Meters, Radio Corporation transmitting parts and broadcast sets, Radiotron tubes, Pyrex insulators, enameled antenna wire, etc., at substantial reductions. A card brings my list. D. W. Pinkerton, 8UQ, Sta. B., Toledo, Ohio.

SELL—Complete parts, ten watt set. 1BHM.

CHEMICALLY PURE ALUMINUM 1/8 inch \$1.80, 1/16 inch 90 cents; sheet lead .59 per sq. foot, postage paid. Geo. Schulz, Calumet, Mich.

MAGNET WIRE ALL KINDS AND SIZES No. 10 DCC 50c lb., add 2c lb. for each size up to No. 20, 100 ft. No. 12 enameled aerial wire 85c; best grade Silicon Transformer Steel cut to size 22c lb.; special jappaned radio frequency transformer steel cut to size 45c lb. Cash with order. MORTON ELECTRIC CO., 4832 Rice St., Chicago, Ill.

AT LAST! Real Ham wavemeters, range 75 to 225 meters, solidly built, accuracy guaranteed within 1%. \$7.00 postpaid. Edward Bromley, Jr., Whitewater, Wis.

FOR SALE—4 WD-12 Radiotrons used 5 hours \$10.00 500 cycle 1/10 KVA motor generator, new condition. A. W. Gavett, Leeds Center, Me.

FOR SALE—Western Electric 10-A power amplifier complete with horn and 216-A tubes, \$75.00, C. O. D. Also RC set with Uncle Sam Litz wound vario-coupler substituted for tickler coil and variometer, affording sharper tuning, \$35.00, C. O. D., P. H. Chase, St. Asaph Rd., Bala, Pa.

EXPERIMENTAL RADIO. Page 63 July QST.

EDISON BATTERY FOR SALE. BATTERY CONSISTS OF FIVE A-5 CELLS WITH NEW CASE, SOLUTION AND CONNECTORS. IN PERFECT CONDITION. CAPACITY 325 AMPERES. \$60 PREPAID. BERNARD STOTT, 60 PALLISTER AVE., DETROIT, MICH.

YOU SHOULDN'T BE SATISFIED with "just any kind of sigs", om. Get 'em "QSA es FB", OM. Our low-loss coils do the "trick" and grab that DX. 5 interchangeable secondaries cover the range of 12-220 meters. O YES, they'll oscillate over entire range, too. You can't APPRECIATE 'EM till you own a set. Price, with blueprint and instructions, \$4.00. Sent C. O. D., AMES RADIO SHOP, FRANCESVILLE, IND.

AMMONIUM PHOSPHATE—Just what your rectifier needs. Has everything else skinned a mile. Two pounds

for a dollar, postpaid. Use half pound to the gallon of water, 3QC, L. M. Klinefeiter, 86 LaSalle Ave., Norfolk, Va.

ATWATER KENT four tube regenerative \$35.00. Fada Neutrodyne, \$65, both o. k. Cunningham tubes, \$3.50, cash with order. Send for list of standard apparatus at greatly reduced prices. Tully Battery Co., Tully, N. Y.

SACRIFICES—Baldwin phones, \$4.00; WE216-A bulbs, \$5.00; UV 200, \$1.50; UV201, \$2.00; also sacrificing: Cardwell Variables, Honeycomb coils, Thordarson A. F. Transformers, sockets, rocostats, rheostats, cabinets, inch spark coil, write, L. Sharp, Greenwood, Ind.

FOR SALE—New direct current generators, ball bearing type. G<sub>n</sub> 2.275v Plate and 25v filament designed for five tube transmitting and receiving sets, the filaments in series, \$15.00; R. Wood, 38 Way Ave., Corona N. Y.

BARGAIN—Honey comb coil receiver, detector and two step, with ten coils. Guaranteed ok, must sell, fifty dollars gets it. Carl Cardin, Cushing, Okla.

\$.60 ACME LOW LOSS condensers \$5.25 new. Limited supply, guaranteed against defects by Acme Co. A. E. Cooper, 5232 Beaumont Ave., Phila., Pa.

SELL—Kennedy receiver, type 281 with 521 amplifier. A bargain at \$48.00; C. Bailey, 412 11th St., Niagara Falls, N. Y.

HALF HORSE POWER MOTOR, Westinghouse 110 volt 60 cycle single phase speed 3400 RPM. Will drag a big generator fine. Rebuilt and in A1 condition. \$17.50 takes it. Van Blaricom, Helena, Mont.

REMLER, GIBLIN and DeForest coils, new mounted only few left as follows—100-150-200-300-400-500-750 turns half list price. Postage extra. Geo. Schulz, Calumet, Mich.

"THE BEST IN REAL HAM EQUIPMENT MEANS GOOD DX THIS WINTER"—THE ENSALL RADIO LAB. SPECIALIZES IN BUILDING "REAL HAM" STUFF. MANY OF THE GANG REPORT OUR EQUIPMENT VY F. B. IF YOU WANT REAL HAM EQUIPMENT AT HAM PRICES LOOK OVER THE LINEUP. SUPERHETS THAT ARE GOING TO HELP LOG THE AUSSIES AND N. Z. BROADCAST TYPE WHEN YOU SPECIFY. HAM SUPERHETS THAT GET DOWN TO THE LOWER WAVELENGTHS. LISTED FROM \$65.00 UP. TYPES, FROM SIX TUBES TO 10 TUBES. USE HIGH EFFICIENCY LO-LOSS COILS. THESE COILS SUPPLIED FOR ANY CIRCUIT NO "DOPE" USED ON THEM. IN THE TRANSMITTING LINE: ANTENNA INDUCTANCES FOR DIRECT OR INDUCTIVELY COUPLED CIRCUITS. INDUCTANCES FOR THE MEISSNER CIRCUIT, 3 and 4 COIL TYPES. WAVEMETERS FOR THE LOW WAVELENGTHS. BE SURE THAT YOUR SIGS ARE ON THE RIGHT WAVE, OM. DON'T GUESS! KNOW WHERE YOU ARE AT! IF YOU WANT TO USE A. C. ON THE SET GET OUR DOPE ON CHEMICAL RECTIFIER POWER UNITS, COMPLETE. INCLUDE JACK IN THE 110 VOLT LINE. ALSO TUBE RECTIFIER POWER UNITS COMPLETE. RECTIFIERS FOR ANY VOLTAGE. SPEECH AMPLIFIERS TO HELP PUT THAT FONE ACROSS. WHY NOT USE TWO TRANSMITTERS, OM? YOU'LL FIND IT SAVES TIME WHEN YOU WANT TO CHANGE FROM THE SHORTER WAVES TO THE OLD WAVE LENGTHS. WE WILL BUILD YOU AN OUTFIT AT PRACTICALLY YOUR OWN PRICE. THAT IS WHY WE ARE REPORTED F. B. WITH THE GANG. "IF ITS HAM WE ARE THE HAMS TO GET IT FROM" WE DEAL EXCLUSIVELY IN THE AMATEUR LINE. SEND US YOUR INQUIRIES. ESTIMATES GLADLY GIVEN. QSO. THOS. ENSALL, (ENSALL RADIO LAB.), 1208 GRANDVIEW AVE., WARREN, O.

"FOR REAL SHORT WAVE WORK" A RECEIVER THAT GETS DOWN AND "PERKS" QSA. EMPLOYS HIGH EFFICIENCY LO-LOSS COILS. HAS BUT TWO TUNING CONTROLS. WORK 'EM FROM 200 METERS DOWN. THE PRICE IS LOW. GET THE DOPE. WE BUILD ANY TYPE RECEIVER, TRANSMITTER OR WAVEMETER. FOR DOPE ON ANYTHING, GET QSO WITH ENSALL RADIO LAB. THOS ENSALL, 1208 GRANDVIEW AVE., WARREN, O.

IVORY RADIO PANEL—Grained white "IVORYLITE" makes most beautiful set of all. Guaranteed satisfactory. Any size 3/16" thick sent prepaid 3c per square inch. Sample free. E. P. Halton, Dept. T, 814 Main St., Fort Worth, Texas.

FIRST \$25 takes low wave three circuit detector and two step in cabinet. Has filament ammeter. UV-202 \$5. SDGV, 1159 East 145th St., Cleveland, O.

PYREX your antenna system. Pyrex Lead-in Insulators, \$3.75. Pyrex Strain Insulators \$1.60. Unit of four Pyrex Strain and two Pyrex Lead-in Insulators for \$12.50. Prepaid in U. S. P. F. Bechberger, 8BFR, Norwalk, Ohio.

FOR SALE—The following new R. C. A. transmitting apparatus at half price; UT501 tube mountings; UT 1367 Magnetic Modulator; PT587 rheostats; UC490 condensers; JL1655 choke; UT541 socket; UC1831 condenser; one tone wheel and brush; UP1718 grid leak; UC1014 condensers; UC1806 condensers; one UV203; one UV204; UL1008 oscillation transformer. Cash with order. Theodore H. Cowee, Box 32, Berlin, N. Y.

COUPLED INDUCTANCES: \$15.00. PHOTO ON REQUEST. CAPITOL RADIO, LANSING, MICH.

A FEW GENUINE EDISON TWIN CELL STORAGE "B" BATTERIES, in Nickerled Steel containers. 32 cells, in Edison Tray and Enameled Metal Box, \$19.00, 40 cells, \$23.00, 48 cells \$27.00. Some are new; all guaranteed. Treat yourself to a really good charger, requiring no "attachments". Bulb type, charges 4, 6, or 12 volt "A" batteries and up to 120 volt "B" batteries. Variable rate up to 4 amps. Special price, \$16.00, without bulb, \$12.00. Send for circular. Special chargers of all descriptions made to order. A. R. Spartana, 615 N. Washington St., Baltimore, Md.

RENT ME YOUR NO. 2 Omnigraph long enough to learn code. Earl Deakins, Macedonia, Ia.

HIGH VOLTAGE—Lead type batteries ready to use. All connections Welded. Four ampere capacity. 40 volts, \$4.90, 80—\$9.25, 500 volts, \$50.00. Plates 6 cts. each. Two year guarantee. Howard Frazier, Bogota, N. J.

HAMS—Let me make your tools Radio parts and equipment, bronze, brass, steel, aluminum, wood, bakelite, rubber, machined or welded, to specifications—send sketch. For estimate prices consistent with workmanship. Precision where required. D. M. Barclay, 1812 Washington Ave., Ft. Worth, Tex.

SELL—ACME Cw transformer, \$7.00; chopper and motor, \$6.00; complete ten watt transmitter, \$40.00. 2BZJ.

SELL GREBE CR 13 practically new \$30.00. L. Southwick, 450 19th St., Brooklyn, N. Y.

BRANDES Superior phones \$4.75, Radiotron or Cunningham tubes any style \$3.25. Send for price-list, Radio Engineering Co., P. O. Box 197, Berkeley, Calif.

"RADIO CALL PINS." u9FZ (see Page 82).

RELIABLE OT's, heavy aluminum strip, constructed per QST, only \$5.00: WHY WASTE TIME OR MONEY. SATISFACTION AND PROMPT DELIVERY GUARANTEED. SDDV, Kentselaer Falls, N. Y.

HIGHEST OFFER takes my Briggs & Stratton Motor Scooter. 1924 model, slightly used, excellent condition cost \$125.00. Edward Moxey 6629 Quincey St., Mt. Airy, Philadelphia, Pa.

THE BEST SUPERHET YET. GETS DOWN TO 40 METERS AND "PERKS". THE PRICE IS LOW ENOUGH FOR EVERY HAM TO HAVE ONE. WE ALSO BUILD THE E-1-S INC MODEL C-7 AT LIST PRICE OF PARTS WHEN YOU BUY THEM FROM US. ENSALL RADIO LAB. THOS. ENSALL, 1208 GRANDVIEW AVE., WARREN, O.

EXPERIMENTAL RADIO. Page 63 July QST.

ROICE 5 WATT TUBES OUTSTEPS DX—FULLY GUARANTEED—TRY ONE \$3.00. CARDWELL LO-LOSS .00025 \$3.85. JEWELL 0-500 MILLIAMPERES \$6.97. JEWELL 0-15. AC-VOLTMETER \$6.97. STAND-

ARD KEY \$2.48, No. 4000 "S" TUBES, PAIR \$20. JAMES RADIO CURTIS, 5A-Q-C, 1109 EIGHTH AVENUE, FORT WORTH, TEXAS.

**MASTER CODE IN FIFTEEN MINUTES—TEN WORD SPEED** in three hours. These world records made by our students. Code learning story as told by 150 students, all now licensed, mailed free on request. Method \$2.50 Kills Hesitation. Dodge Radio Shortcut, Dept. SC, Mamaroneck, N. Y.

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**FOR SALE UP 1016 750 watt transformer \$17.50; 2 UV 217 (new) Kenotrons at \$17.50; UT 1367 Magnetic Modulator \$8.50; UL 1008 Inductance \$8.50; Illinois 13 plate condenser \$1.00; Illinois 43 plate condenser \$1.50; Harry Todd, 1015 North Sixth Street, Springfield, Illinois.**

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**QST SAYS**—either use enameled wire, or polish your antenna every day. If your time is worth more than a cent a day send in your order NOW for the only real antenna wire, No. 12 solid copper enameled. Here's where it costs only \$6.90 per 1000 ft. or 75 cents per hundred for less; You don't need to be told that the long skinny glazed porcelain insulators are the only type to use. Sure Fire insulators are made of the highest grade porcelain, 20 inches long, 1 inch diameter, yet 1800 pounds strong. Only \$1.15 each, or \$1.00 if you get four or more; Westinghouse \$5.00 lightning switch for \$1.50; Get a new power Bradevstat (Radio-stat) E-2111 for the filament transformer primary, \$6.50, capacity 500 watt transformer. E-210 Bradevstats too, for the little transformer; Transmitting inductance, twin brother to RCA, \$8.70; 4000-1 S tubes \$10.00 mogul sockets for them, 90 cents; Sixteenth inch 99% pure aluminum 75 cents per square foot, lead 90 cents; RCA 0-250 or 0-500 DC milliammeters \$6.00, 0-2.5 Thermo-ameters \$8.00, 0-5 Thermo-ameters \$9.00, 0-2.5 or 0-5 Hot Wire ammeters only \$2.00; 5 watt grid leaks \$1.10, 50 watt leaks \$1.65; General Radio 247-W wavemeters 75-250 meters, or 150-500, or 37½-125, for checking both receiver or transmitter, any range \$9.50. Extra coils for any range \$2.35; All General Radio condensers in stock, and say, they are still the LOWEST LOSS condensers at RADIO FREQUENCIES, despite all the new fancy ones which give the resistance at 1000 cycles; Cardwell transmitting condensers \$15.00; UC-1806 .002 mfd 6000 volt Faradon condenser \$1.50, regular price \$7.00; UC-487 ½ mfd 750 volt filter condensers \$ .85, UC-490 1 mfd 1750 volt \$2.50, Western Electric 1 mfd 1000 volt \$1.90; PX-1638 chopper wheel and contact \$2.00; UP-1368 power transformer \$14.50, UP-1016 power transformer \$17.50, Thorndarson 80 watt filament transformer \$6.80; UP-1262 160 mill. filter reactors \$5.00, UP-1653 160 mill. 40 henry reactors \$7.25, UP-1654 800 mill. 50 henry \$10.45; Jewel thermo-ameters \$10.80, DC milliammeters and AC filament voltmeters \$6.75; PR-535 5 watt rheostat \$1.20. Get our new real Ham Catalog, the HAMALOG, full of dope you'll delight in. A card will bring it, and bet-

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**WESTERN ELECTRIC 10A** Loud speaking outfit; new \$95.00; General Radio type 174 B wavemeter—150-3000 meters new \$55.00; 936CW Power control panel, \$25.00; 500 v. 200 watt generator, Crocker Wheeler, \$20.00; 2—32-350 volt generators in cradle, \$25.00; DeForest MR6 receiver 150-20000 meters, \$50.00, coils for same \$1.00 each 15 dial omnigraph new, \$20.00; 2 large Edison A batteries, 6 volt 400 A. H., \$30.00 ea., any of above shipped upon receipt of money order; want two new fifties, S tubes and power transformer. W. E. Thompson, 2629 Sedgwick Ave., New York City.

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"RADIO CALL PINS," u9FZ (see Page 82).

**FOR SALE—Grebe 13, \$40.00,** with Grebe two-stage amplifier \$70.00. G. L. Hight, Rome, Georgia.

**SELL—Esco Motor generator 350 volts 40 watts,** one unit, cost \$60.00; sell \$30.00; Esco motor generator 500 volts, 200 watts 2 unit, cost \$121.00; sell \$70.00. Both

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1WR-Portable transmitter 5 watt. Floyd L. Vanderpoel, Litchfield, Ct.

1ZL-1AVW—Carlton A. Weidenhammer, 33 Washington Place, Bridgeport, Conn.

RADIO 3FF Sherman Holland, Crisfield, Maryland.

4NJ-4VN—Thomas B. Wetmore, Arden, N. C.

4UC—D. B. Whittemore (ex 2CUZ), 925 Grandview Ave., Seabreeze, Fla.

5ABE—A. CAMPBELL, 621 Seventh St., Perry, Okla.

5CK—John Mitchell, Havana, Ark.

6BAF—St. Clair Adams, Union Labor Hospital, Eureka, Calif.

6BEV—Jay Peters, Route 3, Box 6, 342 Stepney St., Inglewood, Calif.

6BOM—HERBERT PERRY, Dorm. Polytechnic School, San Luis Obispo, Calif.

6VW—Morris Houser, 830 Boston Place, Pomona, Calif.

8AQQ—R. P. Lippelman, 876 Glenwood Ave., Cincinnati, O.

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8BWW—Robert T. Ferguson, Moxahala, Perry County, O.

8DG—Noel J. Groh, 151 Bradley St., Buffalo, N. Y.

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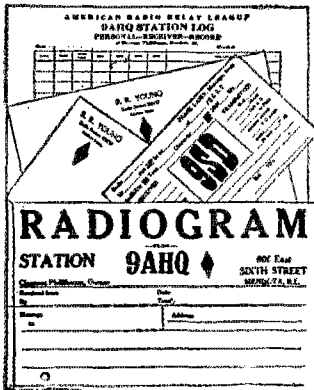
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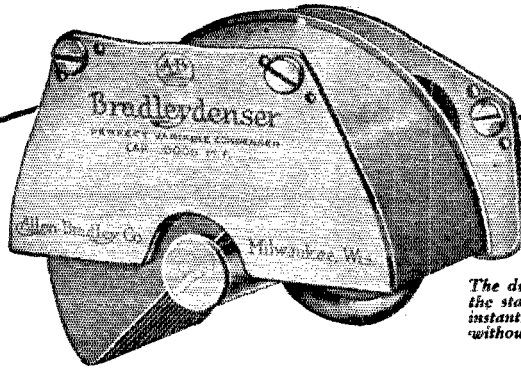
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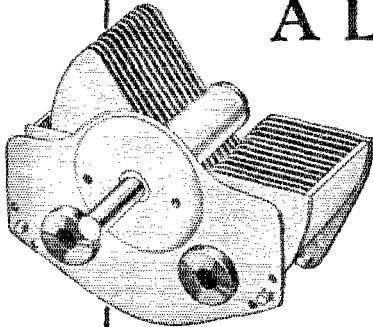
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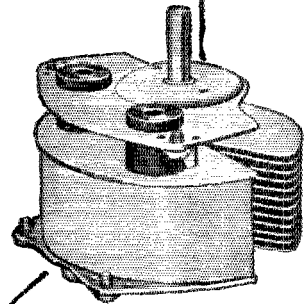
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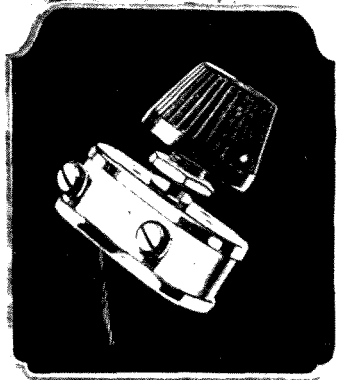
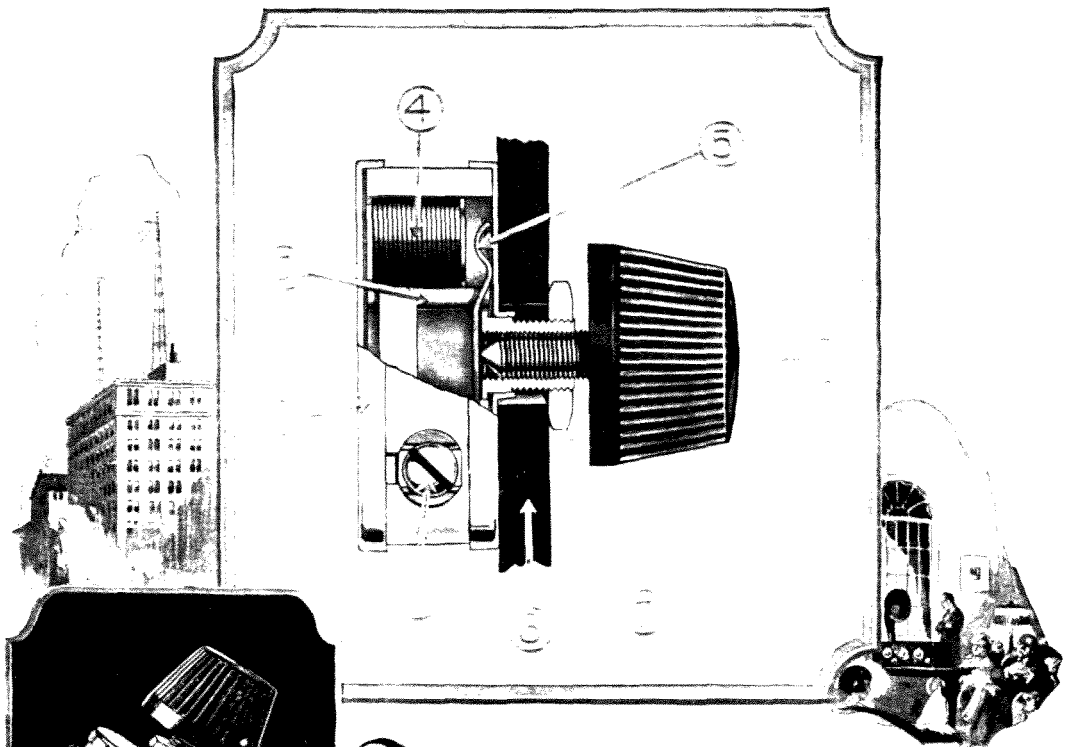
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*Supreme in design and performance*

## Important Features

- 1 Two terminals suffice for ALL tubes.
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- 4 Graphite discs give stepless, noiseless control.
- 5 Internal switch opens battery circuit.
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ASIDE from the novel "one-hole mounting" that characterizes the Allen-Bradley line of radio devices, the most striking new feature is the extreme compactness of the graphite disc container. When mounted on the panel, the new Bradleystat extends less than three-quarters of an inch behind the panel. The same is true of the Bradleyleak and the Bradleyohm. And the Bradleyometer extends only seven-eighths of an inch.

You can improve your radio set immensely by substituting a Bradleystat for your present wire rheostat or a Bradleyleak for your old grid leak. There's plenty of room. Try it!

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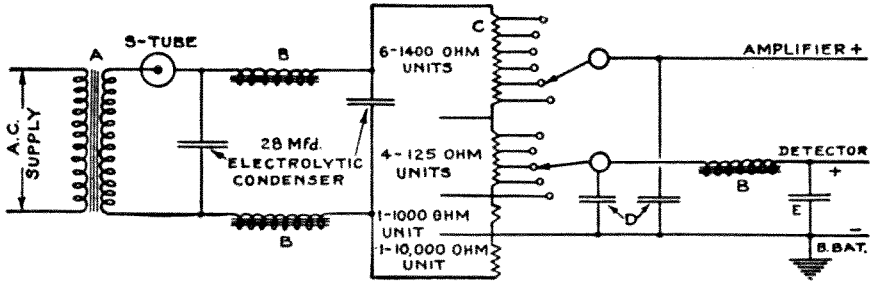
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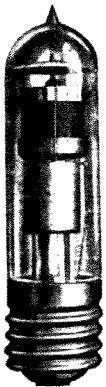
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## S-Tube as "B" Battery Supply

One of the most popular uses of the "S" Tube and Electrolytic Condenser is to eliminate B-Batteries. The circuit above shows the wiring and indicates the necessary parts.

A similar B-Battery eliminator, using "S" Tube and Electrolytic Condensers, was described in September "Radio Broadcast," P. 369.

To get rid of the Batteries and use the usual 110 a.c. of the house lighting circuit to supply the necessary detector and amplifier voltage, has long been the idea of the amateur. Results obtained have been most satisfactory, thus opening an entirely new field.



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It was first used for transmitting that the "S" Tube was first put to work—as a rectifier to produce pure D.C. for power tubes. It is now so used by thousands of dyed-in-the-wool amateurs from coast to coast.

It may also be used to charge storage "B" Batteries, or for other purposes where pure D.C. is desired under conditions requiring economical, dependable performance.

Place orders at once for "S" Tubes and Electrolytic Condensers with your nearest Dealer. If he is not stocked, place your order just the same and he will obtain it as promptly as possible. This will help build a convenient source of supply for yourself and your friends.

(Orders filled in rotation.)

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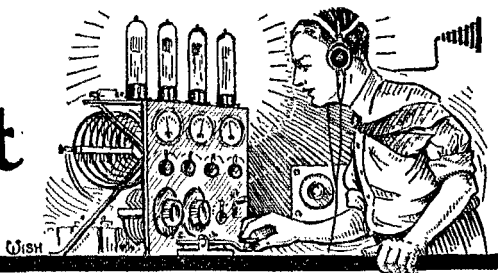
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## AMERICAN RADIO AND RESEARCH CORPORATION

Dept. Q Medford Hillside, Mass.

# The Traffic Department

F. H. Schnell, Traffic Manager  
1045 Main St., Hartford Conn.



Outshadowing everything that has gone before, in the way of work for our U. S. Navy, was the work of the radio amateurs in keeping watch on NERK, the U. S. S. Shenandoah, during her flight from Lakehurst, N. J., to Tacoma City, Washington, and return. The co-operation extended by the amateurs to the Navy Department is very well defined in the following message which was broadcast from NKF on Navy Day, October 27th:

"From: Secretary of the Navy.

To: Amateur Radio Operators of the United States.

1. The co-operation of the amateur radio operators with the Naval Research Laboratory has resulted in increasing the communication efficiency of our Navy. The new long distance communication records made by the Shenandoah are a direct result of your co-operation.

2. Interest such as you have shown in the Navy in time of peace is the country's best guarantee of our Navy's readiness when called upon for our country's defense.

3. It seems appropriate, therefore, that on Navy Day, which coincides with the completion of the wonderful trans-continental flight of the Shenandoah, I congratulate and thank you for your contributions toward a better and more efficient Navy.

Curtis D. Wilbur."

At the request of Dr. A. Hoyt Taylor, Radio Division, U. S. Naval Research Laboratory, the A.R.R.L. supplied the calls of stations operating on 75 to 80 meters for communication with NERK, who was on 91 meters. NKF, on 54.5 and 82 meters was the station to be relied upon for all communication, and only in event of failure to hookup with NKF was NERK to work amateurs. However, things went so smoothly that there was plenty of time for NKF and amateurs to work NERK. At times NERK'S note seemed a bit wobbly, but all during the voyage from October 7th to October 25th there wasn't a minute of the day or night that some amateur wasn't on watch for her. Not once was the 91 meter wave used, unless some amateur heard it. It was great work, gang, and while the T.M. was at NKF October 25th, Dr. Taylor said that he was more than

pleased with the splendid co-operation of the amateurs.

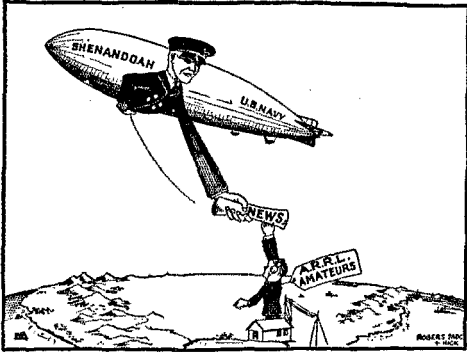
Of the logs received, we are able to give some information as to what stations were on the job for NERK. Since we are not mind readers, and because logs from other stations have not been received, although we put in a plea for them, we cannot give full credit to those stations because we have no details and next month will be too late. MIM!

7GQ seems to have the best reception record, he having copied NERK each day or night from October 8th to 20th. Too bad he didn't get a chance for QSO, because he surely was on the job every minute. 6YB did some fine work in all departments. A complete station was rigged up in eight hours; a blinker was in operation and a motorcycle and rider was available for any emergency. In addition, six operators stood watches. 6YB was QSO NERK October 9th, QSR'ing a Government message, and again on the 22nd. NERK was heard on the 8, 10, 11, 12, 14, 18, 19, and 20. 6YB's log was complete and nearly the whole story is told therein. 7EO heard NERK on the 10, 15, 16, 17, and

A.R.R.L. Headquarters Station, Call 1MK, 1045 Main Street, Hartford, Conn., is on the air (75 to 80 meters) every noon from 12:00 to 1:00 P. M. and from 5:00 to 6:00 P. M., E.S.T. Let's have your traffic, OM! The operators and their personnel signs are: A. A. Hebert, "AH"; C. A. Service, Jr., "CS"; F. H. Schnell, "FS"; F. C. Beekley, "BEEK"; K. B. Warner, "KB"; L. W. Hatry, "KN"; S. Kruse, "LQ"; A. L. Budlong, "BUD"; J. M. Clayton, "ZL".

finally on the 18 got his chance and took a load of press from her, which he had to "haul" to McMinnville, Oregon, seven miles away, because his W.U. man was off watch. (FB, 7EO!) 6BUR took two Government Msgs October 10 after hearing her on the 9th. 5AFN, with his gang, didn't

let a thing get by on the 9th when they were QSO NERK, also copying everything on 975 meters. 1XW intercepted press on the 7th and copied her nearly every night during the trip out; and QSO NERK while she was near El Paso, Texas. 4XE reports NERK every night but one up to the 14th. No further reports. 7ZU logged her October 9 and 10; 6AWT, 9; 6WI, 9 and 22; 5AJT, 8, 9, 10; 3BZ, 9; 6ZZ, 10; 5XBH, 7 and 8. The following stations seemed to



have some connection with NERK: 7AFO, 7AFN, 6AGE, 6CMU, 5JF, 6CGW, 6BBH, 5DW, 5HW, 6CFZ, 6ALV, 5UE; but since we are depending upon amateur telegraphy and not mental telepathy for our information, we are only sorry they didn't give us copies of their logs for this story.

Certainly some of us have poor fists! But it goes further than that—some have rotten, terrible, sloppy fists, and if we were to sum up the kicks from the amateurs of Australia, New Zealand, South America, England, France, Holland and Italy, we would have to go still further. Aside from our fists, some of us don't seem to have much gray matter. The past month has brought us a whole swarm of this sort of stuff, and it must be true. The foreign hams tell us to tie a can to the bug and cootie key, unless we are absolutely sure we know how to use them. That's right! Just for the sake of verifying some of these kicks, this T.M. went home with the idea of listening to this gang to see if it was so. Well, the things we heard in the course of about four nights were not as bad as the foreigners had said—it was worse! Terrible! Funny, too, we had often heard these same things but just passed them by hoping they would improve.

What we ought to have is a code instruction class for some amateurs who think they know how to send, but really we've heard riveting hammers that were far better. There ought to be a class for "CQ Hounds". Haven't we tried and tried to get over to you the proper way to use CQ without making a hound of yourself? Get out May 1923 QST and read the story on page 20. That is the way the foreign amateurs want you to do it. Don't try to see how long you can call CQ without sign-

ing, and see how long you can keep it up at one stretch before your arm gets tired. Ye Gawds! Why do we have to keep using valuable space, that could be put to better use, by telling you these things month in and month out?

In the four nights we listened at 1XW-1MO, we logged 67 amateurs, who, in our judgment, had rotten fists. While we do not claim to be FA on good and bad fists, we do believe we know a rotten one when we hear it. There are times when two hams are working together and who understand each other and know how to chop their stuff so each will understand the other, and we are not counting that, but we refer to amateurs who have rotten fists right along. Then we ran across the "CQ Hound"—we logged 81 of his kind, some of which were in the R.F. class. Along with them was the long caller and short signer—the chap who calls about 40 times and signs once, and then so poorly his call could not be recognized. We were able to count 26 known and perhaps that many more unknown because of bum fists.

The four nights were so interesting that we've decided to make a habit of logging these chaps under three different heads, Rotten Fists, CQ Hounds, and Long Callers, and if we have any luck, providing it is bad enough, we hope to be able to present the calls in this department next month.

Now for more pleasant things. Word comes from French 8AB, our good friend Deloy, that he also is QSO Argentina and New Zealand as are the British hams. By the way, F8AB and the two New Zealand hams we heard have very good fists, Z2AC and Z4AA. A great many British amateurs are using code words and transmitting them practically every night in order to determine the most consistent transmitter for the entire season. Code words are on file with the T.M. for verification. The waves in use are between 90 and 120 meters. F8AB will be on the air every Wednesday and Saturday night at 10:30 P.M., E.S.T., on about 85-90 meters. B. D. Vermani of Lahore, India, probably is on the air now with 350 watts on 100 meters. Several Egyptian amateurs have broken into the game, too. We're getting on toward that "Round the World Relay by Amateur Radio".

A complete list of every O.R.S. station has been sent to every O.R.S. This list appears in alphabetical order by calls. If you are interested in becoming an O.R.S., write to your D.S., A.D.M., or D.M. There is plenty of room for more O.R.S.'s, but we want only those which can and will be a credit to amateur radio and the A.R.R.L. How about you, OM?

Official A.R.R.L. broadcasts are sent every Saturday and Sunday night (75-80 meters, 8:00 P.M.; 150-200 meters, 10:30 P.M.)

ATLANTIC DIVISION  
C. H. Stewart, Mgr.

The DM was out of commission with an attack of gripe that put him out for two weeks, the result being that many of the divisional affairs suffered a set-back. However, the time of getting O.R.S. Certificates out to the fellows will be reduced to make up for lost time and no trouble should be experienced in the future.

The report from West. Penn. is missing this month—something unusual must have happened with PEW, as he always gets them through on time and in fine shape. Eastern Penn.: DX traffic has taken a decided increase on short waves. Many stations are prepared to get down and use the 75-80 meter band and still further increase is expected. 3QV has completely remodeled, from antenna to ground. 3ADP is getting out great on 78 meters. 3BAQ will be on the air with a complete new outfit, also. 8CMT, 8BPN, and 8DBN keep traffic going ok. 3OG worked all districts and Canada in three hours, using 2 5'ers. 3AUV continues to bat 'em out in all directions. 3CCU, 2 5'ers, has reached England and New Zealand. Old 3DM and 3BRF are opening a new station together. 3ARP will assist at 8XE. Most up-state stations are operated over the week end because of the gang being away at college during the week. In district No. 6 the short wave fever is breaking out all over. 8CCQ worked a bunch of west coasters and G2SH the first crack out of the box. 8BFE, 1 5'er, has been heard across the Atlantic. 8BFE has been appointed CM of Williamsport. QRA, C. R. Bell, 282 Union Ave.

Traffic: 3ZM, 15; 3QV, 9; 3BNU, 49; 3BLC, 19; 8CTZ, 2; 8AVL, 8; 8CJN, 24; 3MQ, 12; 3TP, 28; 8BPN, 10; 8DBN, 9; 8CMT, 62; 3AUV, 22; 3OG, 16; 3ZO, 103; 3CCU, 33; 8CCQ, 32; 8BFE, 17; 3BTU, 22; 3HD, 9; 3FS, 11. (Fine msg report—T. M.)

DIST. OF COLUMBIA: Practically every active station is down on the short waves. 3BWT is the most active. 3BE, 3BPP, and 3HS, have been going all summer and there will be no let-up this winter. 3BHV has been doing some nice work, although he is a newcomer. Miss 3CDQ, the "OW" of the District, has put up a man-sized antenna and threatens to DX or bust. 3BPP and 3CEJ have put up new antennas. 3AB is getting back into operation, too. Welcome, OM! 3BWT will have a dual system, one on short waves and one on about 180 meters.

Traffic: 3BWT, 10; 3BPP, 15.

Dist. No. 6, of New Jersey, is the only report on hand. More traffic than ever is going through this section and with good speed, too. 3CS-3ZI is on the air and with a nice new 60 footer is going good. 3CBX is doing good work with his new antenna also. Reaches 9's every night and has been heard in England. 3XAN has been going strong and handling his share of traffic. 3XAN, 2XBF and 3XP are organizing a storm route along the transmission lines of the Public Service Electric Company, between Newark and Camden. Several test messages were started from headquarters without pre-arranged schedule. These messages were addressed to the respective heads of the dispatchers along the route and in less than an hour and a half answers were received back by telephone stating that all emergency test messages had been received ok. (Vy FB—T. M. and lets have more of this RF dope).

Traffic: 3CBX, 14; 3XAN, 44; 3ACC, 9; 3BAY, 36; 3BEI, 4; 3BTQ, 19; 3BWJ, 5; 3CHH, 7; 3AII, 32; 3AS, 32; 3BCO, 60.

CENTRAL DIVISION  
R. H. G. Mathews, Mgr.

MICHIGAN—The Fourth Annual Michigan A. R. R. L. Convention will be held in Lansing in February. We are trying to make this the best yet.

Dist. No. 1: The report this month looks promising, however, there are too few report cards coming into this office for the number of O.R.S. in the district.

It is time to boast for the next Michigan convention at Lansing in February. If we all begin plans now this convention will be the biggest yet; give Lansing a helping hand fellows and all plan to be there if possible.

Dist. No. 2: On October 6 the Third District held a meeting at 8CPY, Kalamazoo, at which 12 members of district No. 2 were present. A hilarious time was had by all. 8CY won the lair's contest only because 8ZF and 8NZ could not take part. The gang, outside of 8ZF, don't seem to be doing much on short waves, although several are still experimenting. 8FS worked three sevens the first time he tried his new 5 watt set—8 inch coupling, too. 8CED leads the district this month.

Dist. No. 3: 8CPY is back on now for the fall and winter and working out great. 9CNO and 8BUC are putting in a big station at the aviation field at South Haven. 8AEB is working in fine shape. 8ZK will be out of radio for some time on account of school. 8CWK worked NKF in daylight on 5 watts.

Dist. No. 4: 9BOH and 9CWI are both off the air at present.

Traffic: 8CED, 102; 8AZW, 64; 8DOK, 59; 8DGT, 56; 9CE, 44; 8CPY, 38; 8BDO, 36; 8AEB, 35; 8DCY, 32; 8NX, 31; 8DOO, 29; 8BTF, 26; 8DEP, 23; 8CWF, 22; 8DDT, 18; 8ZZ, 17; 8ZF, 16. 8BUC, 15; 8BD, 14; 8CEP, 13; 8BRD, 12; 8CCW, 12; 8AUB, 11; 8ZH, 9; 8DJH, 7; 8AMS, 6; 8WA, 3.

ILLINOIS—The general condition seems to be on the upgrade.

The D. S. of Dist. No. 1 has resigned. 9NQ on with spark some but is getting 3.1 amps from one 5 wattier. 9DAY just returned from a Pacific coast trip. He and 9VM are attending the U. of I. 9CTF is arranging schedules for the winter and will be on with a good set. A lot of stations could take a lesson from 9CTF's method of handling traffic. 9DLO says no ink on the messages ever fades at his station. 9BUC is getting great DX on 80 meters and has worked all districts in U. S. and Canada, but the 5th, also Mexico. 9BRX is working on 77 meters. 9AIC is very QRW and is only on early Sunday mornings. 9DXL has been reconstructing for the past month. 9ARM has changed to the 4 coil Meissner and finds it so sharp he can't raise anyone. 9DZR is also using the 4 coil Meissner with CRAC. He is using the Low-loss described in August QST and is the "berries." The report from district No. 3 was returned by the A. D. M. because it did not follow the proper form. 9BHJ opened up this month with two 50's and is knocking the sixes for a goal. 9CLJ erected a stick and strung up a couple wires and is working on 80 meters, which is far the better. 9DQU on Sept. 24th worked 6VC at 6.45 P. M., C. S. T. and as the sun set at 6.00 most of the distance was covered in sunlight. 6LJ was worked a few days later at 7 P. M. All this on 80 meters. 9CZL had a little hard luck when his radio shack burned down and he will be out of the game for the time being. 9AP is on 80 meters with two fifties. 9BGC is attending the U. of I. The report for district 5 did not come up to standard form and was returned by the A. D. M.

Bill Ridgway of Dist. No. 6 is very QRW with worked. 9BQW went off and came back in a tightly coupled circuit—Mrs. Wisman. We are glad to hear 9CLX on the air again. 9COW put up a new tower. 9BNA got out to 43 states. Although 9DHQ is chasing the OW, he still has time for the C. W. Schweitzer, 9AAW, has put in a Ham Squaker. He says there is a method in his madness though. By talking of the Chicago Radio Traffic Association and the A.R.R.L. to the stations he works, the B.C.L's get an earful of instructive information. 9RC is still tonking on ICW. 9DWX is still on the high waves and for that reason can only be on in Ham hours. We wish someone would steal 9BUC's spark—A.D.M. The C. M's report that a number of stations report direct to the D. M., A. D. M., or D. S. Report only to your C. M. if you have one and get your report to him by the 15th of the month.

Traffic: 9CZL, 176; 9BNA, 111; 9CTF, 86; 9DQU, 48; 9BRE, 36; 9AHQ, 32; 9DLO, 32; 9BGK, 29; 9RQ, 27; 9DVV, 23; 9RC, 22; 9DHZ, 20; 9AAW, 19; 9CDY, 19; 9ATT, 18; 9DWX, 17; 9DNP, 16; 9CVF, 15; 9APK, 15; 9BUC, 15; 9BRX, 15; 9TW, 14; 9DHQ, 13; 9CLZ, 12; 9MC, 12; 9DAY, 12; 9EDG, 10; 9CA, 6; 9DKK, 5; 9AHJ, 5; 9CXT, 4; 9ALL, 3; 9ABF, 3; 9EFQ, 3; 9TS, 2; 9CVS, 2; 9BHJ, 2; 9AIC, 2; 9DXL, 1; 9ARM, 1.

SOUTHERN INDIANA—9BRK is back on the job as D. S. of Dist. No. 3 and things there are looking up. 9CHK is handling the bulk of the traffic in the south end. 9ES is putting in part time at 9BBW working 50 watts on 80 meters. 9BVZ, on 80 meters, works the west coast quite

regularly. 9ASJ has just started up at the Speedway with a 5 watter and raw A. C. 9BCC is off to Purdue Univ. 9ARK is married, has sold his outfit and will be off indefinitely.

Indianapolis Radio Club has established two loop stations, 9ASJ and 9AXH to locate strange noises. They also have appointed a committee to help keep peace with the B. C. L's.

Traffic: 9CKH, 36; 9EJI, 35; 9PB, 24; 9BVZ, 14; 9CSC, 12; 9ES, 10; 9AWG, 10; 9BK, 10; 9BRK, 16; 9CUR, 8; 9UT, 8; 9AGU, 8; 9BJL, 7; 9BBW, 6; 9ADK, 6; 9AUW, 4; 9CJA, 2, 9ASJ, 1.

**KENTUCKY**—Traffic has been moving very slowly. 9WU has been doing very good work. 9ELL is busy with football. 9ARU is going FB with 5's. 9MN has been doing great DX on 80 meters—works west coast nearly every night. 9DJN is hitting the sixes too. 9TT is on again and going good. 9DAW has moved his set to Willmore while at school and will soon be operating under a 9 call. 9EP has been having generator trouble, but the reliable chem. rect. has been called back into service.

Traffic: 9EP, 46; 9DTT, 19; 9MN, 18; 9WU, 16; 9ELL, 14; 9HP, 11; 9DJN, 10.

**OHIO**—Dist. No. 1: 8MQ is ready to go with a new mast. 8CIE is out with a blown fil transformer. Defiance is going full blast. On 75 meters, 8ZY, cannot move the meter but works both coasts easily. 8FU is going on 200 but is going to rebuild so as to have two sets—100 watts on 200 and 250 watts on 75 meters. 8AND blew his tube and was out most of the month. Findlay is mostly rebuilding, 8ARO and 8DFP in particular. 8BQL, a sure-fire station, cannot get traffic. 8BN sends in a nice bunch of messages. 8CIC is the only live station in Lima. 8AA is rebuilding a 75 meter antenna and transmitter with 50 watts for power.

Dist. No. 2: 8DBM is trying to arrange schedules but hasn't had much luck. 8ANM is using the 4 coil Meisner circuit. 8XT-8ZE-8GX is back on the air again on 78 meters. 8RY will be off the air until 8XT is finished. 8BIE has been rebuilding. 8BCE is on 75 meters.

Dist. No. 3: 8DMX leads the district this month. 8CYT worked VDM and is knocking off 6's and 7's. 8BNH comes home from college over the week-ends and ties up with many of the boys out west. 8TT, 8BWK, 8ADA and 8DAE are also getting their signals out to the Pacific coast. 8BVR is back from Europe now and is on the air regularly. Ashtabula is getting in shape. 8ATW has a new antenna.

Dist. No. 4: 8CVH expects to be going good soon. 8CWR is pretty busy. 8YX has 10 operators. 8GW is rebuilding set so as to handle more traffic. 8CNR has been on a vacation. 8AIW will hit them again since the convention is over. 8ANB-8ZAB is putting up a new steel tower.

Dist. No. 5: New D.S. for this district is H. C. Storck, 694 Carpenter St., Columbus, Ohio. 8DO lost most of his set in a fire. 8BYN will have a second operator in 8DEM. 8BYN is working both coasts FB on 75-80 meters and 150-200 meters. 8CWP and 8PL are FB on 80 meters. 8BBH is also FB on 80 meters.

Dist. No. 6: The new D.S. is H. J. Mitchell, 253 Perry St., Alliance, Ohio.

Traffic: 8GZ, 70; 8BN, 49; 8DMX, 37; 8CCI, 31; 8BKM, 29; 8TT, 29; 8CYT, 28; 8BOQ, 22; 8HN, 20; 8ANB, 19; 8DBM, 18; 8DHS, 15; 8BWK, 14; 8ADA, 14; 8YX, 13; 8DCF, 11; 8ZY, 10; 8AAJ, 9; 8COJ, 9; 8ALW, 9; 8CNL, 9; 8TJ, 8; 8BQL, 7; 8FU, 2; 8DND, 2; 8ANM, 2; 8HS, 2; 8BVR, 2; 8GW, 2; 8BNH, 1.

**WISCONSIN**—The most important event of the season took place during the past month when the amateurs of Wisconsin and a few from surrounding territories gathered at Madison on August 31st to hold their second annual state traffic meeting. It was a three-day affair starting Saturday night with a supper at the Madison Y. M. C. A. and following with a traffic meeting on Sunday afternoon. The meeting was presided over by Clarence N. Crapo, A.D.M. of Wisconsin, and the following men gave interesting addresses: R. H. G. Mathews, B. M. Miller, R. D. Lighty and short talks by all the prominent operators present.

The Technical meeting was very well attended and among those who spoke at this meeting were: E. T. Plewelling, R. M. Miller, W. B. Schulte, Prof. W. H. Lighty, Robt. E. Knoff, Mr. Hoffman, R. H. G. Mathews, C. S. Polacheck.

At the organization meeting the Wisconsin A. R. R. L. Assn. was thoroughly organized and the following officers and directors chosen: President, C.

N. Crapo, 9VD; vice-president, K. C. Maas, 9AZA; second vice-president, M. H. Bishop, 9DHG; secretary, O. C. Austin, 9AKR. Directors: V. Wright, 9DST; W. C. Bridges, 9BTH; E. T. Howell, 9CVI; K. C. Maas, 9AZA; M. H. Bishop, 9DHG; O. C. Austin, 9AKR; C. S. Polacheck, 9CMP; and C. N. Crapo, 9VD.

The first five directors represent each of the five A.R.R.L. traffic districts in Wisconsin and the next two representing the publicity department and the A.D.M. for Wisconsin to preside at all traffic meetings, being an ex-officio director. Membership in the organization is limited to A.R.R.L. members. The association is to be incorporated as soon as possible and affiliation with the A.R.R.L. has been applied for. Dues are a dollar a year payable in advance. All Wisconsin men desirous of supporting the organization are requested to communicate with the secretary, Mr. O. C. Austin, 1316 Drake St., Madison.

Dist. No. 1: 9CII works 1000 mi in daylight on short waves and easily works all districts. 9HW works first district in daylight on new short antenna. 9DTK has new 50 ft. mast. New aerial and counterpoise using enameled wire and working all districts on 80 meters. 9CVI has been laid up in the hospital. 9BKR reports rebuilding station antenna system.

Dist. No. 2: 9OM is using five watts and getting out fine although western traffic is rather bum. 9EAR must have been in a hurry as he says he has rebuilt everything and in as many words. 9BMF and 9DCP, going strong. 9CWZ, our star station, says traffic is picking up and just about ready to put up a new 80 ft. mast. 9DZV had hard luck trying to raise an 80 footer, it came down in three pieces. He is swinging down to 80 meters. 9EGH is putting in a 250 watt bottle with M.G. 9CCF is operating on 80 meters now with 9EQG helping him out. 9AZA has succeeded in raising a 74 foot mast and will be on the air soon.

Dist. No. 3: 9BYE says that on 80 meters its hard to connect under 500 miles but easy up to 2000. 9ALA is doing real DX now connecting with the first and fifth districts easily. 9AGT says everything is going fine at his station. 9BVA has overhauled his antenna system and is doing better work. 9AEU is working on schedule and reports traffic scarce. 9BQG sends traffic total by radio but no news. 9BYJ is overhauling his set in preparation for a 50 watter. 9CIU hasn't started up yet but is getting ready for the winter session.

Dist. No. 4: 9ALI has a card from Madrid, Spain, verifying reception of his sigs at that place. 9AZN handles most of his traffic in daylight working as far east as Schnecktady. 9DSO can work the coast easily. 9DST, newly appointed Q.R.S. is erecting a new mast. 9AKY is back on the air with a 50 water RAC. 9BKC is using 50 watts this season on 150 meters. 9CFX is rebuilding again.

Dist. No. 5: 9ELI is using a ribbon antenna on 80 meters with considerable success. 9CYG reports damage by a storm but will be back with two 50's soon. 9BTH is operating on 75 meters. 9DPR is on 155.

Traffic: 9CWZ, 91; 9ALI, 69; 9CII, 47; 9AZN, 42; 9HW, 40; 9ADP, 36; 9ELI, 22; 9BYE, 22; 9DTK, 22; 9BMF, 22; 9COI, 22; 9EMD, 19; 9ALA, 18; 9AGT, 17; 9BVA, 16; 9CDF, 13; 9CCF, 12; 9OM, 10; 9EAR, 10; 9NY, 10; 9CVI, 9; 9BSO, 9; 9DST, 9; 9AEU, 7; 9DHG, 6; 9DPR, 6; 9VD, 6; 9BKR, 4; 9DCV, 4; 9AKY, 4; 9BQG, 2; 9BKC, 1.

**NORTHERN INDIANA**—Dist. No. 1: 9UC is attending Purdue University. 9DJZ has resigned as C.M. of Fort Wayne. Muncie was visited by 9PC. 9DDA is going but the rest of the Muncie fellows are hard up. 9CLN is waiting for a new Kenotron. 9AZX the D.S., moved to 2803 W. Sixth St., Marion, Ind., and will be going soon.

9APD is back again but reports no traffic moving. Traffic: 9BKJ, 98; 9DLW, 70; 9DBJ, 22; 9AEI, 20; 9QRS, 16; 9CLN, 14; 9AFY, 12; 9CNV, 10; 9AZX, 8; 9APD, 6; 9CZF, 6.

#### DAKOTA DIVISION W. C. Wallace, Mgr.

**NORTH DAKOTA**—Dist. No. 1: Things rather quiet but seem to be improving. Our main stations are all busy with things besides amateur radio and



it is telling on our record. 9CSI, 9AEJ, 9DNX, 9AMP, 9CRG are all doing fine work. Dist. No. 2: 9DM has never failed to send in his report even through the summer. The district superintendent is having trouble with his antenna but he swears he will be on the air soon.

The A.D.M. believes that the Minneapolis convention will do more to awaken the amateurs to real work than any one thing that could possibly be done. After the convention undoubtedly every station will be going full blast. The amateur needs something at least once a year to pep him up and get things going again. 9ARM has been appointed O.R.S.

Traffic: 9AMP, 31; 9CRG, 6; 9CSI, 2; 9DNX, 2. MINNESOTA—O.R.S. certificates have been issued to the following: 9ABK, 9SW, 9CMN, 9BFU, 9BQY, 9DYZ, 9SE, 9DEQ, 9AWM.

Dist. No. 1: D.S. Hayes says his gang in the first district is slow in getting started this year and they are even slower with their reports. He intends to get after them. The D.S. is also planning several through routes for reliable communication between what were formerly dormant communication centers.

Dist. No. 2: D.S. Schensted is regularly on the job trying to get both his own and other stations in his district lined up for traffic. 9DDP has worked Mexico City, MLB, using 40 and 80 meter waves. 9DCH had bad luck with his 60 foot mast which the wind wrecked the day after it was put up. 9ANJ has worked Kentucky in daylight and 9CMS is remodeling the station for short waves. 9BZJ is back from camp and 9CPO has a new 80 foot lattice mast sticking into the clouds. 9BAB will not be on this year. 9CMM is now 9BLV.

Dist. No. 3: D.S. Smeby reports very little doing in the Twin Cities territory this month but this is doubtless the calm before the storm, as the Dakota Division convention comes off the latter part of this month with a record crowd expected. There is great activity on 80 meters, however. 9SE is moving to 73 and Lyndall Sts, Minneapolis. 9ZT is working Mexicans fairly regularly.

Traffic: Dist. No. 1: 9CDV, 226; 9CO, 84; 9EGU, 14; 9DXT, 11; Dist. No. 2: 9COF, 2; 9BLV, 27; 9DDP, 32; 9CMS, 6; 9BNF, 34; 9EGG, 3; 9BBF, 9BKK, 4; 9SW, 1; 9CAJ, 51; 9CPO, 8; Dist. No. 3: 9BMX, 91; 9DPX, 5; 9BOB, 28; 9BPN, 37; 9DEK, 4; 9aSW, 4; 9BQY, 3; 9DNV, 1; 9CCX, 18; 9ZT, 31; 9BIS, 17; 9BPY, 39; 9BQJ, 20; 9SE, 8.

SOUTH DAKOTA—The new rules cut down our reports some but with the new D.S.'s on the job and a lot more new O.R.S. we will be back again stronger than ever in the near future.

Dist. No. 1: 9BOF leads the state by a wide margin this month and is a good way to route your traffic. 9CKT has been QRU but is back again for keeps this time.

Dist. No. 2: 9AGL is putting up a new enameled antenna and expects to get out better though we don't know what better he wants. 9CGA is getting ready for some short wave work and is getting the 50 all shined up. 9DBZ is a new O.R.S. but just got his appointment. 9CKD, the D.S., is lining up a bunch of new O.R.S.'s and will have a good organization going in his district and with the good stations in that part of the country ought to turn out a good total. 9CJS was reported very QSA in England with one so-called 5 watter but has had moving QRM and is off the air for a while.

Several good reports were sent in but could not be used on account of the new rules. Get that O.R.S., OM. 9AYD is on regularly again. 9ADZ is a new O.R.S.

The personnel of South Dakota is as follows: A.D.M.—M.J. Junkins, Bryant, S.D.; Dist. No. 1: W. E. Marquart, D.S. 103 S. Union St. Madison; C. M.—W. E. Eymer, 811 Douglas Ave., Yankton; C. M.—H. B. Manning, 114 S. Euclid St. Sioux Falls; Dist. No. 2: D.S.—W.F. Mathemeir, Webster; C.M.—Merle F. Buck, 677 Lawn Ridge St. Huron; C.M.—Ted F. Anderson, 404 S. 8th St. Aberdeen.

Traffic: 9BOF, 93; 9CKT, 7; 9CJS, 6; 9AGL, 11; 9DBZ, 27; 9AYD, 8.

#### DELTA DIVISION

W. W. Rodgers, Mgr.

MISSISSIPPI—This state came through FB this month. 5KR's 20 watter beats his 100 watt outfit so the big heap is for sale. 5AGS is arranging traffic

schedules for the work this winter. 5AKP says that business is QRming his work. 5QZ is having an awful time getting his O. R. S. certificate, but Uncle Sam is to be blamed for the trouble—punk mail service.

Traffic: 5ALZ, 64; 5KR, 23; 5AGS, 16; 5AKP, 14; 5QZ, 12.

TENNESSEE—5KA used his convention-gained 50 watter to come in at the head of the list. H. H. Suttor, 5JV, has been appointed C. M. of Memphis in recognition of his League spirit in the settling up of the convention matters. 5EK went down to 150 meters and will go lower whenever possible. 5APC operated but half of the month due to a shortage of tubes. 5CN is with us again. Broken antenna ropes and remodeling of his transmitter mark the work at 5CN. He is reaching England FB on 80 meters with 150 watts. 5AAZ, 5AQY, and 5AIY complete the Tennessee bunch.

Traffic: 5KA, 81; 5EK, 32; 5APC, 20; 5CN, 5; 5AAZ, 4; 5AQY, 3; 5AIY, 1.

ARKANSAS—Old Man 5QH is hitting it hard. 5ANN comes through with another mighty welcome report. 5WK refuses to stay up all night, so turns in a total of 25 for the month.

Traffic: 5QH, 65; 5ANN, 30; 5WK, 25.

LOUISIANA—D. S. Greenlaw, 5ZK, complains of the poor cooperation he gets from his stations and officers. (How about battering this, gang—D. M.) 5ZK has been licensed for 75 to 80 meters and 105 to 110 meters for the new low wave work. 5UK, 5WT, 5KC, 5ARL, 5NJ and 5ZK are all very active but only 5ZK reported any traffic.

Traffic: 5ZK, 13.

#### HUDSON DIVISION

E. M. Glaser, Mgr.

At this writing the O.R.S. in the division total an even hundred. Every officer is co-operation and things are going over strong. Every owner and operator of an O.R.S. will please copy the following regulations and observe them:

There are certain types of messages that should not be taken or given out. 1. Thanks for card, etc. 2. Please QSL card, etc. 3. Greetings by radio. 4. Your sigs heard hr. 5. Any message that has little or no sense, is not in the correct form, or if the origin, to, address, or signature is incomplete or lacking. It is quality that we are going to be after and not quantity. Don't send or originate any local messages unless they are addressed to an active station—deliver them. Sometimes a message travels thousands of miles to the city of destination and then goes around circles and is finally lost. Deliver all messages for your immediate vicinity and don't pass them on. In your regular monthly reports state the number of messages delivered as well as those sent and received. This includes delivery in person, by fone, or by mail. Use the method of numbering messages as described in June QST. If possible get down on the lower bands and do better work than ever before. But, watch your wavelength carefully. A few certificates are on the verge of cancellation for violation of wavelength law.

In a previous report 2AV was accused of violating the law in several respects. This was an error as 2AV wasn't on the air and there are several clues as to the fellow who has been using 2AV's call. (Sorry that happened, 2AV.) 2AAI is doing good work on 78. 2BBX is on seldom due to college. 2CRQ was inactive this month. 2CVU works lots of sixes on 75. 2CWR will be going soon. The four nite owls at 2CYX are going strong including the YL. (FB, Marty, keep 'em at it.) 2CEI is still rebuilding. 2BRB heads the traffic list for the division, with 205 and 114 delivered. This is the best ever done at the D.M.'s station. Many sixes and sevens report 2BRB the loudest east coast station. 24AA and 4AG have been copied several times. 2WZ has a few new fifties after wrecking the other with 400 watts input! 2CHY likes the pure peep on a bug key. 2ABR was getting two amps on a 5 watter for a few days. He doesn't now though! Hi. 2WC reports nil due to change of QRA—new QRA 30 Linden Ave, Brooklyn. 2CPQ is operating 1CPQ. 2AAY has just been appointed O.R.S. 2KR has changed QRA. 2BNL is the same old standby. 2AU is feeling around the low waves but doesn't seem to establish himself. 2CIZ has been away on vacation. 2AQL promises to get down. 2CHK is knocking 'em dead with his low wave outfit. Works many fives in spite of numberless B.C.L. aeri-

running circles around the antenna system. Only 100 watts input, too. Manhattan is certainly wide awake. (FB, Gang!) 2BSL is a new O.R.S. 2RB has been doing fine work. 2AVE is rapidly getting into shape. 2CEP gets the honors for being the only active station in Richmond. (FB, OM, keep the hore alive.) 2CEV seems to be dead to radio. Must be the Y.L.'s again.

Traffic: 2AAI, 93; 2BBX, 54; 2CUV, 12; 2CEI, 28; 2CYX, 108; 2BRB, 205; dlvd 114; 2WZ, 94; dlvd 8; 2CHY, 65 dlvd. 18; 2ABR, 16; 2ADC, 4; 2CHK, 15; 2BNL, 20; 2CNK, 11; 2KR, 6; 2AUX, 6; 2RB, 49; 2AVE, 8; 2BSL, 9; 2CEP, 36.

EASTERN NEW YORK—Dist. No. 1: Things are still slow here but few active stations being on the air. 2KX is the most active with 2BPB next, but all O.R.S. in this district are very QRW with school. 2CXB and 2ABD have combined stations.

Dist. No. 2: This district is waking up, Yonkers taking the lead, being very much alive with 2CIL, 2AAN and 2APY doing the best work. 2BQB is on his toes but says the YL's QRM him some. 2UA is so QRW with his Evening World ham column that he has practically no time for operating. 2CFE is having hard luck losing his mast just when he had his transmitter perking FB.

We need more O.R.S.'s and the material is here, so go to it D.S. and C.M.'s.

Dist. No. 3: 2CDH is consistent and doing commendable work handling a nice bunch of traffic each month. 2ANM is doing the best work of his Ham career, working the west coast and C2KF and G2OD.

Dist. No. 4: 2CXG is doing good work with his 5 watter, handling a good bunch of msgs and getting out in fine shape. He recently spent a lot of time on his antenna system and is now reaping the reward. 2CHZ is working the BX by the dozens with his 100 watter. 2AQR blew a tube and hasn't done much this month. 2CYM just received his O.R.S. 2AGQ handled the most traffic and says he is doing good DX on the side. (There's a tip for you, DX hounds—A.D.M.)

Dist. No. 5: All the active stations who can be relied upon are now on the air. Albany still has its lone representative, 2AWF, the C.M. but he promises some more soon. Schenectady is the little town that keeps this district on the map. About 20 stations are now on the air, only 5 of whom are O.R.S., the rest will receive appointments when they show themselves worthy. 2BY is our prize station. He received about a dozen reports from Australia in the last month and also one from Chilean 9TC. 2BY is after traffic too. 2AIF is QRW with college and football. 2CPA has the true ham spirit, he finally got his 70 foot mast up after it collapsed 3 times. He is a new O.R.S. and doing good work. 2ACS is not a world beater but his lone 50 watter gets out in fine style. 2GK is almost neck and neck with 2BY in the DX game, Italy and Argentine being his latest catches. His 80 meter signals are described as the best ever heard on that wave by many who have heard him. 2BXW is on again with a 100 watt outfit on the low waves. 2CGH is the boy who handles the traffic in this district.

Traffic: 2KX, 20; 2BPB, 6; 2CXB, 1; 2BQB, 14; 2AAN, 25; 2APY, 6; 2CIL, 43; 2CDH, 130; 2ANM, 33; 2AGQ, 131; 2CXG, 66; 2CHZ, 16; 2AQR, 12; 2CGH, 179; 2ACS, 81; 2CPA, 43; 2AWF, 12; 2BXW, 11; 2BY, 46; 2GK-2XAB, 32.

NORTHERN NEW JERSEY—This report of Jersey activities is much better than the previous month and indicates that the new Hudson division is getting the ball rolling and getting stations to report. All O.R.S. should bear in mind that their appointments are subject to cancellation if no reports are received in two consecutive months. 2FC has a new transmitter but can't try it out as he has no tubes. HI. 2BGI has coupled his transmitter and reports that DX is very much better. 2BZJ is on the job and will prove to be a valuable O.R.S. 2AUH works on schedule with 8DGO who clears all of his western traffic. 2WR is still not in operation due to loss of a few 50 watters. 2KK has just received a license for all of the new short waves and will operate with 250 watts. Induction trouble has forced 2BGO to abandon short waves and weekly attempts are being made by 2XBF and 2AHO to locate the source of trouble. 2CDR has just been appointed superintendent of district No. 2. 2CRP has been operating steadily and is heard on the Pacific coast regularly. 2BAW reports things slow and is rebuilding from antenna to counterpoise. 2AJF is brushing the dust off things after a long

rest from radio. 2ADU has been reported heard in England. 2CJX never fails with a good husky report. 2CXY handled the largest number of messages this month, with 2CMK running a close second. 2AXF is now stepping out in fine shape.

Traffic: 2CXY, 132; 2CMK, 101; 2CTQ, 57; 2BAW, 53; 2BMR, 51; 2CRP, 42; dlvd 8; 2BGI, 38; 2CJX, 38; 2CRW, 38; 2AUH, 31; 2ADU, 20; 2CXE, 19; 2AJF, 17; 2BZJ, 14; 2BGO, 12; 2CHG, 12; 2CQZ, 13; 2FC, 11; 2EY, 8; 2ACO, 8; 2ATE, 8; 2KK, 6; 2AHO, 6; 2WR, 5; 2CGK, 4; 2CDR, 2; 2AXF, 6.

Fine work fellows, we'll show the rest of the country some activity! Keep up the good work—D.M.

## MIDWEST DIVISION

P. H. Quinby, Mgr.

NEBRASKA—Dist. No. 1: The D.S. reports very little activity in his district. Very little traffic handled, although weather conditions have been favorable. 9BNU heads this district. School is taking a great deal of time which accounts for part of the slump. We are all sorry to hear that 9COU is dismantled. He was one of Omaha's most consistent stations. Traffic routes are in very poor shape and are being reorganized. Few stations working on any of the low bands. 9BNU seems to be doing very good work in the 75-80 meter band, and other stations are changing over to the new bands.

Dist. No. 2: D.S. reports considerable activity to be going on but traffic reports are very poor. The D.S. is doing some very good work organizing this district and must have the support of all A.R.R.L. stations.

Traffic: 9AKS, 41; 9EAK, 20; 9BNU, 13; 9EB, 10; and 9NL, 9.

IOWA—Traffic seems to have slumped off this month for some unknown reason. Des Moines is doing half the work of the state. C.M. of Des Moines reports the gang. 9CLQ, 9APM, 9BPF, 9AYE, 9BKZ, 9BAC, and 9BRS all set for any traffic. 9CLQ is doing long distance relaying on short waves. 9DMS reports traffic moving ok in all directions except east into Iowa. 9ATN reports being heard in New Zealand again. At present there are 31 O.R.S.'s in Iowa. However, a good many of them have ceased to be active, due to their leaving for college so we need more applications for appointment.

Traffic: 9DMS, 34; 9CLQ, 35; 9APM, 1; 9BPF, 19; 9DIP, 34; 9CZO, 38; 9ATN, 12; 9CTD, 55; 9CS, 14; 9AED, 17.

KANSAS—This state is picking up very much for the DX season. 9BRD and 9AFP are running a schedule for the exchange of school nets between Newton and Wichita. 9HN reports lots of DX but no traffic on 80 meters. 9AFP blew four fivers and a transformer during the month. All the southern Kansas gang are using the four coil Meissner circuit now. 9AIM is doing the DX work on his 250. The R.M. is getting the routes working in fine shape. 9BVN has schedules with 6GT and 6CFS. 9CFI, on 80 meters, with a 250 and 3.5 amps in the antenna is QSO both coasts. All Kansas relay routes are open for immediate QSR of QTC any direction, so pass your msgs. to Kansas. 9AOD and 9BXG QSO in all dists. 9CCS is working the two coasts on 180 and 150 meters. He is on every Saturday and Sunday morning from 3 A. M. on. He will QRX for schedules and traffic. 9BIO is putting up a new aerial system.

Traffic: 9BVN, 156; 9BGX, 41; 9DLM, 10; 9CVL, 20; 9AOD, 12; 9EHT, 6; 9DNG, 25; 9BGX, 10; 9CFI, 26; 9CCS, 25; 9DHW, 60; 9BRD, 20; 9AFP, 13; 9CEA, 1; 9BIO, 1.

MISSOURI—Traffic in Missouri has taken on much greater activity this month due to the decrease in QRN and resumption of work by many inactive stations. (The changes in O.R.S.: added, 9DOE, 9AYK, 9CRM. Delted, 9ADC—no report for 3 months. Beware, the ax. East Missouri is kept on the map by many good stations among whom we note 9DWH, 9BDS, 9BSH, 9DCW, 9DXN, 9EKF, 9EKY, 9BHI, 9IMJ, and 9DLE. Most of this is done on regular waves. 9AAU-9ZK works mostly on 80 and got a good total. Each one of the above stations has been logged handling traffic at the station of the A.D.M. 9DWK is keeping up the old relay route cross-state with 9CCS. 9CCW left for the first district. 9BRU has abandoned keeping count of blown tubes. Got too monotonous and so he uses 201A's now. 9DXN and 9BLG are handling

N.Y.C. emergency work in St. Louis. 9AAU-ZK are heard on the P.R.R. work. 9DXN thought he didn't have enough handling N.Y.C. at home so he helps AAU with the P.R.R. too. South Missouri is a minus quantity but for one station 9CRM who maintains a fairly consistent schedule with 9RR. 9EDH and 9BUX north and east, and with 4FG to the southeast. His worst trouble is QSS. Western Missouri; St. Joseph come to life with a good report from all hands. 9DLT moved to Kansas. 9DLH is a new 5 water in St. Joe. 9CHE (old 9EX) is QSRING on 50. 9LJ is heard frequently handling traffic, but some fellows say he is fooling with fone. 9CTG is on with 15 watts. Rebuilding is keeping out 9DRW and 9BYN for a while. 9EAO is active and has no local QRM to fight. 9CKS is on 80 meters regularly with a 50 watt and 9CYK is at liberty at last with his own set—also 50. 9DIX was chewed up in a football game and was laid up for most of the month. However, he had been logged often at the A.D.M.'s station and worked all districts in one sitting on 77 and 170 meters. 9DAE and 9DZO joined forces for a week or two working a 50 watter. 9DAE and 9DZO are again operating an Amrad spark coil station, but are expecting more power shortly. The list of O.R.S. is voted FB by the D.S. 9ZB-DJB in KC and 9ZD-SS are doing most of the short wave work in K.C. getting good results. 9ZB was logged in France. Numerous calls are arriving in KC. 9ACX moved to a better location and will be on again soon—he is using a Ford coil temporarily. 9BDZ completely rebuilt his antenna system and put up a new pole. 9AHZ is away attending Kansas U. at Lawrence. He is 9BCG there and keeps a regular 5 P. M. schedule with 9AYL. 9ST is also away at college. Missouri University has a gang of transmitters available 9ST reports; 9XBQ. 9BNX, 9EFC is having a hard time to get on and attend to school. 9AOJ the other of the old time Amrad. QG fellows has moved to Schnectady. 9RT and 9AJD work early mornings.

Traffic: 9IB, 6; 9RR, 16; 9ZB, 1; 9ZD, 19; 9ACX, 1; 9AYK 2; 9AYL, 83; 9ADR, 23; 9BKQ, 2; 9CDO, 12; 9CHE, 118; 9CKS, 20; 9CTG, 60; 9DIX, 7; 9DLH, 72; 9AAU, 35; 9BHI, 16; 9BRU, 13; 9DCW, 21; 9DLB, 5; 9DMJ, 22; 9DXN, 30; 9EAO, 25; 9EKF, 10; 9EFC, 2; 9RR, 1; 9CRM, 8; 9DAE, 10.

## NEW ENGLAND DIVISION

I. Vermilya, Mgr.

RHODE ISLAND—Things in Providence are picking up while the rest of the state remains about the same. Everyone is installing new tubes and putting up new aerials for the coming DX. One by one the gang are succumbing to the short waves. 1BC worked six sixes and two sevens in one week on the short waves. 1AWE's battle cry is "Low Waves Forever". 1AWV will be off the air for a short time.

back again with two 50's. 1AID was first night she was on the  
has a schedule with 1AH, 8BOE, 3CKL and B. 1ABP has erected a new aerial and counterpoise which is fixed rigid to prevent swinging of sigs. 1BCR, 1RF, portable 1AHW is now located in Providence. 1II is now in Brown. He says school QRM is bad but pounds brass when he gets time. He is using 500 watts and raw A.C. too. 1QV had a truck back into his counterpoise and put him out of commission for a while, but he is going strong again. 1AAP rebuilt his antenna system in favor of the short waves and spoiled everything. Says he can't get out of the yard now. 1BVB has worked all districts on the low waves.

Traffic: 1BIB, 12; 1CAB, 11; 1BFN, 15; 1AWV 53; 1AWE, 14; 1AEL, 13; 1OW, 5; 1BC, 10; 1ABP, 11; 1AID, 76; 1II, 4; 1QV, 30; 1AAP, 2; 1BVB, 71.

MAINE—Conditions are picking up in Maine as usual in the fall and all stations show an unusual amount of interest. Very few are working on the short waves at the present time.

Dist. No. 1: 1ALK is experimenting on 5 meters. 1AUR is QSO England since October 4th, also worked 1HT off coast of Africa and Porto Rico 4SA. 1PD is hearing foreign stations on 75 meters.

Dist. No. 2: 1APM is having hard luck with coupled circuits and is going back to 1DH. 1CKQ is another 5 meter shark. 1APF will soon be on regularly in their new quarters. 1FM can't find receiver to suit him, has built 13 so far. (Better stop on the 13th, may be lucky—A.M.M.). 1BN expects to be back soon. 1BTT is experimenting with different kinds of antenna wire. 1KX has rebuilt his

transmitter and is replacing his steel poles with wood. The transmitter at 1KX is novel it uses 1-50 or 2 5 watt tubes throwing one switch changes fil and plate voltage and takes ½ second without changing the wave.

Dist. No. 3: 1BDH expects to drop to 80 meters soon. 1CRU has been experimenting on 60 meters with 5 watts but will change to 50 soon.

Dist. No. 5: 1AUC is on 80 meters. 1CX is using "S" tubes. 1EF will soon increase power.

Dist. No. 6: 1IB is putting in a 1 kw tube. Dist. No. 6 boasts of the only active spark in Maine. We won't give his call as we are ashamed of him.

Traffic: 1ALK, 29; 1AUC, 20; 1AUR, 6; 1BDB, 3; 1BDH, 10; 1BHR, 22; 1BKK, 28; 1BTT, 32; 1CKQ, 1; 1CRU, 3; 1CX, 8; 1EF, 5; 1FM, 20; 1HB, 10; 1IT, 3; 1KX, 1; 1AXQ, 20; 1PD, 4; 1VF, 2.

CONNECTICUT—Summing up all reports the past month has been a quiet one. Every one reports traffic as being small. Most of the O.R.S. are on the air and DX is FB, but messages are few and far between. 1AEA, the latest addition to the O.R.S. ranks, is doing some fine work. He is confined to a wheel chair all the time and can be heard most any time. 1BM says he hears great DX but the old go-getter won't raise 'em. 1XW is on most every night and works 'em all. He handled close to 300 messages with WNP, while at Wiscasset, Me. 1MY never misses a day and has worked England five times. 1CDE is building a new set and will be back on the air again soon. 1IV has worked a bunch of stations. 1AVJ cannot make his set perk on 75 meters so he is back on 150 again. 1APO is on reporting, like the cow's tail, "always behind." Red is thinking of putting a box in his front yard with a sign on it "Drop your messages to your friends and sweethearts in here, we send 'em all over the world free of charge."

Traffic: 1BGC, 21; 1CTI, 7; 1CKP, 24; 1AVJ, 20; 1AH, 35; 1CDE, 8; 1XW, 26; 1AEA, 15, 1MY, 118.

VERMONT—Not so hot this month. Seems like a sort of lapse between the summer and winter. Either the whole gang too busy with school and the like, or else have not had time to get going, since school has begun. 1ARY just taking a few first gasps and starting to turn over. 1YD is in the same fix. 1AJG and 1BDX valiently trying to uphold the reputation of the state. Dont know whether 1APU has his one kw tube in yet or not, but he is going strong anyway.

Traffic: 1BDX, 16; 1AJG, 28; 1APU, 16.

NEW HAMPSHIRE—1YB has been doing some good work this month, on 80 meters. They worked G2OD and G2MN using 2 fifties. 1ATJ is also getting out using two 5 watt tubes. He was heard by GSH London England, also worked 7AFO.

Traffic: 1YB, 90; 1ATJ, 15; 1AVL, 25; 1AER, 30; 1BFJ, 36; 1AER, 21.

EASTERN MASS. Everyone seems to be enthusiastic and altho the traffic is small, the fellows are reporting in fine shape. Even tho they don't handle any traffic for the month, they report just the same. The star stations being 1AJA, 1AAC, second, and Miss Hannah, 1KY, our newly appointed O.R.S. a close third.

The 75 meter band is opening up fine. 1AAC reporting that as more stations get on down there, traffic increases, which is a big help. 1KY, D.S. Dist. No. 1, is the first American station to work across the Big Pond this fall. He has worked G2KF and G2OD. Another station that is doing fine DX is 1ALL, the whole country and Europe are his meat. 1AQY just got the transmitter going, so no traffic from him this month. 1BZQ has been away on a vacation for three weeks, so his traffic is light. 1LM reports traffic about normal at his station. 1CIT complains of the lack of traffic. 1BBM is on again and is doing his usual stunt of DX every month. 1SE blew 8 transmitting tubes, and 9 receiving tubes. Hi. 1SE says that Attleboro has turned into a regular experimental lab. for the short waves and that he has some pretty good stations in his city now. 1AHL is canning the Telefunken and installing a 203A. 1ZW seems to be having quite a lot of trouble in getting his aerial to stay elevated. Therefore his traffic is nil again this month. 1PP, a newly appointed O.R.S. has had to cancel his O.R.S. as his teachers are jealous of the time he spends on radio. 1GA reports fine DX on the short waves, and says it is good for traffic as well. 1NV, on a little bit, but reports traffic as nil. 1SN has a schedule with G6LJ.

Traffic: 1AJA, 90; 1PP, 7; 1CIT, 1; 1BZQ, 18; 1GA, 36; 1ALL, 24; 1KY, 41; 1LM, 27; 1BBG, 35; 1BDU, 7; 1AHL, 6; 1SE, 13; 1mIUW, 3; 1AIR, 16; 1SK, 8; 1AEO, 29; 1CEA, 6; 1AAC-ZPO, 45; 1AQI, 12.

WESTERN MASS.—Dist. No. 3: Not many stations are operating in this district. 1ARE is most constant operating on 77 meters, during silent hours and 150-163 meters at other times. 1CLN has been heard some.

Dist. No. 4: This district has the high total for messages this month, regardless of the fact that nearly everyone is trying to make short waves and coupled circuits work. 1ABF, 1BLU, 1PY and 1AWW are already on short waves and getting out fine. 1BWW is expected to be back on the air soon.

Dist. No. 5: 1KC is on over the week-ends and can be found on short waves. 1BIZ continues to be the most active regular station in the district.

Dist. No. 6: 1BOM is the only station heard and he can be relied on to handle traffic for his district.

Dist. No. 7: At an informal meeting held in Worcester Mass. Y.M.C.A., Saturday, Oct. 4, 1924, Mr. C. J. Green, 1ASU, 11 Greendale Ave, Worcester, Mass., was chosen as the new D. S. of Dist. No. 7. Mr. D. Hayward Carr also received an unanimous vote as an expression of opinion for his good work as C. M., and was asked to continue. There has been one new O. R. S. appointment during the last month, namely: 1BBP, who is very active handling traffic. 1BIP on short wave, worked G2OD during the month. 1YK will be on short waves with a new antenna system. 1AAD and 1ADN are at school. 1AFD is a new station on the air. 1JE is on with a 50 watt. 1BDP is on with 5 watts. This district seems to be getting back to business, and stations who have been off the air for the summer are now heard again.

Traffic: 1AAL, 15; 1ABF, 28; 1AWM, 8; 1ASU, 2; 1AWW, 48; 1BBP, 10; 1BQK, 6; 1DB, 14; 1IL, 42; 1PY, 12; 1VU, 6.

#### NORTH WESTERN DIVISION

Glenn E. West, Mgr.

The past month has been full of many interesting things of the transmitting amateur. The winter season has opened with a bang and is now in full swing. Many of the gang have tuned down to the 75-85 meter band relieving the congestion between 150 and 200 meters. This has improved reception in the 150-200 meter region and more reliable communication has resulted.

7FD is easily the star station of the North Western division. He has been down on 78 meters for some time and succeeded in working Porto Rican 4SA and New Zealand 2AC.

Mr. O. R. Redfern, Supervisor of Radio for the seventh district, visited most of the larger cities in the northwest and licensed a good number of new amateurs.

The visit of NERK, the Shenandoah, has created a great deal of interest. Some of our best short wave stations handled gobs of press and other material from the Navy air ship. A great deal of credit is due those stations which maintained a twenty-four hour watch and kept the Shenandoah Q. S. O. Washington, D. C.

There is one thing however, that the Div. Mgr. is not pleased with, and that is the message report. In the mad scramble to get down to shorter waves, everybody seems to have forgotten traffic work. Traffic handling is an important part of our work and we can't afford to neglect it. Let's keep a plenty of traffic on the air.

Another thing men, we haven't enough official Relay Stations in this division. The official list of O. R. S. published at Headquarters shows a very small number of O. R. S. in the Northwest. Come on men, let's get those tickets. Rite your D. S. or A. D. M. promptly.

WASHINGTON—More activity and participation all around marked this month. More stations than ever are going down on 80 meters with all doing DX that was never accomplished before. 7FD pushes out a real wicked signal. His latest DX worked is Porto Rican 4SA and New Zealand 2AC. Wow! Wat next? We greet 7BK of mn at QST factory back to Gawd's Country. He will be on soon under his old call (Tks to Mr. Redfern) with a couple of 203A's and with all his experience will knock 'em all dead. 7ABB is back trying to make up for time

lost this summer. His 75 meter sigs cut thru to east coast every nite. 7QC is star traffic station. He has dismantled his set and moving to northern part of Idaho. (We regret to lose you OM but glad that you still stick to N. W. Div.) 7RY and 7GE both report empty sockets. Ditto 7JS, 7FN es 7AB. 7AX is back. (Welcome OM) 7II a new-comer in Vancouver helps 7GR and 7GY boost the traffic report. 7BJ has assumed new radio duties so his transmitter is at rest. (Teaching radio at Y at Portland, FB OM). 7PM, 7DC es 7NG showing signs of life but no traffic. 7PZ and 7GY are heard on low waves. 7DM es 7IX are remodeling. 7AFE es 7UU are experimenting on 5 meters. 7ADQ not on much for school QRM. 7KU is hrd at 200 plus. (Thot those days were gone forever.)

Traffic: 7QC, 74; 7RY, 37; 7AJY, 25; 7AX, 22; 7GR, 22; 7ABB, 20; 7DM, 16; 7GE, 16; 7FD, 11; 7GY, 10; 7KU, 9; 7II, 3; 7BJ, 3; 7ADQ, 2; 7PZ, 1; 7IX, 1. Total 202.

OREGON—The past month has been exceedingly good for DX, as there has been just enough rain to clear up the weather and not enough to effect the poor insulation of some of the antennas. 7AKK has been working out well on 80 meters, 7MF has worked all districts but the first, and is increasing his QSO by the addition of another 50 on 80 meters. 7ABY reports that he has been trying to get down to the 75-80 band but hasn't had much luck as yet. New ORS appointments have been issued to 7ALD and 7AKH, who are both on the air constantly between 150 and 175 meters. 7AEK and 7AVV are on regularly and report that they are ready to go on 80 meters. 7FR-ACM is on 77 meters and reports being heard in New Zealand, besides working all districts and Mexico in three and one-half hours. 7SY maintains a schedule with 7IS of Washington on Mondays, Wednesday, Fridays, and Saturdays—hours not known. 7EM and 7TQ are going to O. A. C. and are pounding brass now and then at 7OH. 7IS and 7UN are still on the higher waves, and report few messages handled. One of the greatest events of the year has been the trip of the Shenandoah—NERK\*\*. To the Pacific Northwest. When NERK was in this district 7GQ and 7IW held a continuous watch for her press. NERK was worked by 7GQ and a lot of press was turned in to the Western Union according to addresses given the press. Much credit should be accorded 7GQ for his good work, as NERK was copied under very unfavorable conditions. 7GQ is working on 78 meters, using only one lone five, and finds little difficulty in working lots of DX. 7IR has just got started on 80 meters, but finds little time for working late owing to his having to train for Football.

Traffic: 7SY, 22; 7FR-ACM, 18; 7ME, 23; 7IS, 7; 7ALD, 20; (MSG. reports) from Portland were lost.

IDAHO—Due to the change in the office of assistant Division Manager the reports from the stations are missing. Several new stations are heard on the air and they are requested to get in touch with either the D. A. or A.D.M. We need more official Relay Stations in Idaho so let's snap out of the rut men and get lined up. Traffic seems to be very scarce.

In southern Idaho the only stations heard are 7GW and 7AHS who seem to be getting out well and are on regular.

Around Boise the active stations are 7ZN-7OT and 7PJ, 7OB. 7IO is heard once in a while. 7FT is back from Alaska and has a first commercial ticket. He will soon be on again for the winter. There will be several new stations around here after the R. L. has held exams here next month.

In Northern Idaho, 7IU who is attending the Idaho University is the only active station. He is going strong and has schedule with 7OB to clear traffic for the University.

MONTANA—Stations in Montana are now lined up for the winter season. Many have gone to the shorter waves while a few are still heard between 150 to 200. Traffic is a minus quantity in almost every case. Nobody seems to have any traffic. Let's start some men!

Montana State College seems to be a rendezvous for hams. Among those registered of Helena, Benning of Red Lodge, Keith of Chalk Buttes and Crouter of Billings. They ought to keep 7XB hot this winter.

7ZL has moved eight miles out into the country where there is less QRM. 7MB is doing nicely for a beginner. 7MP has a new antenna and counter-poise. 7AGI and 7AFP promise to be on the air soon. 7ACI of Butte has been appointed D. S. for district No. 2. 7DD received an O. R. S. ticket during the month. A good number of Butte amateurs took license examinations Oct. 25th. 7NT is down

to 75 meters and kicks thru fine. 7IF has been heard recently. 7KZ handled his share of traffic this month. JCO has been on regularly and handled considerable traffic but failed to report. Several distinguished visitors called at 7ZU during the month. Among them were Howard Mason recently of QST staff, TNT A. R. Willson of Butte, and O. R. Redfern, Supervisor of Radio, 7II of Stevensville, has been on the air fairly regularly.

**PACIFIC DIVISION**  
**M. E. McCreery, Mgr.**

**SOUTHERN CALIFORNIA**—Traffic is moving in all directions and messages are cleared without much effort. Routes have been established by some stations in almost every direction. Many individual schedules have been arranged between stations which is a great help to clear the hooks. This is one thing that can not be emphasized any too strongly. A meeting is being arranged for all superintendents, city managers and official relay stations in order to establish regular route in Southern California. Since communication with New Zealand has been established regular routes in Southern California. for most of us. We are glad to have the star stations in our territory who have broken the ice. The whole division seems to be cooperation in an unsurpassable manner.

Dist. No. 1: 6CGO is now using a 50 watter on 75 meters and has a regular schedule with east coast stations. 6BIK is rebuilding and will be on the air soon. 6CDV has had hard luck with tubes and was forced to use a spark until he is rich again. 6AIB and 6CGC are two good stations to get your traffic to. 6CGC takes most of San Diego's traffic. 6CHX and 6ADT are handling their share, but have no regular schedules. 6VD and 6VL are new O. R. S.'s and are taking a lot of traffic. 6ZH has fallen off on his message report. He usually takes San Diego's share at all times. San Diego is a hard place to get traffic into.

Dist. No. 1A: 6XAD is kept busy fishing although he has been heard frequently with the old kick.

Dist. No. 2: 6ALF is a D. S. who is hard to beat. Organization in this district is perfect. Traffic in and out of Los Angeles has taken quite a slump, when considering the number of O. R. S.'s in the city. A game of elimination is going to be the system from now on. There is only to be a limited number of O. R. S.'s in L.A. The one that doesn't prove his worthiness is going to have to forfeit for a better station. The cause of the slump might be because of too many fellows moving down to 80 meters. It has been suggested by 6ZP that O. R. S. reporting also include the number of messages that are delivered by them. With the two lists in hand we can tell who is doing the most efficient work. 6BRF again heads the list of traffic with 122 messages. Some of the LA gang have made schedules with Oakland. This works out very well to clear northern traffic. 6CAE has been appointed C.M. of Long Beach as 6CNH has gone away to college. 6CGW also felt the call of higher learning, but he worked Z4AA before leaving. The gang at Santa Monica are all rebuilding for 80 meter work. 6AGK is the new C. M. there. Glendale is in the same position as Santa Monica with all stations rebuilding. Only three stations reporting from Pasadena but those are old standbys. 6BBQ is doing DX and handling traffic as ever. 6RN just got back from the east and will be on soon. 6CMQ is a new O.R.S. who does good work. 6BUR reports ND. 6CDY is the third (and last we hope) C.M. to leave us to go to University. The Oxnard hams are fighting B.C.L.'s. In Riverside, 6AJI is the high point man in amount of traffic handled. He is going to school too. His traffic report is from daylight work. 6CIA has combined with 6BEB. 6CIA will stand watch up till 8 P.M. and 6BEB will stand watch after 10:30 P.M. 6BLW has increased power and reports his radius increased considerable. He is regularly QSO the east. 6US hasn't been able to do much the last month on account of rebuilding. 6BKX sends no report for the second time. We hate to lose him as an O.R.S., but we will have to. 6GT finished rebuilding and has managed to be on the air often the latter part of the month, but didn't have any time to do his share. 6ZP-6IV expects to be on the air after rebuilding. 6BNY is having hard luck getting tubes for his station. Hurray for our side. We now have with us our old friend 6AQW in Big Bear, way up in the hills where DX pounds

in, who reports that he will be with us soon again. He will be QRV for Bear Valley msgs soon. 6PL-6MG have worked a bunch of districts on their harmonic. They will be down on 80 meters shortly. 6MH expects to be on soon again. 6AAO is on 80 meters now working tons of new stations. 6AFG finished raising a new stick after moving into L.A. Some of the O.R.S.'s failed to report. Two times is final for them. Wake up, men! O.R.S.'s don't grow like mush-rooms. 6CMU is now using 100 watts in tubes and handling part of LA's msgs. 6IN is stepping out as well as any of them and an efficient relay station.

Dist. No. 3: Traffic has been moving in about the same manner it previously has. Working conditions have become better and more stations are worked. By next month traffic should be moving with ease. 6ZBT has resigned as C.M. and 6CMD has taken his job. We hope 6CMD makes good at his new job. 6CDG is on occasionally and managed to handle a few. 6CMD is the high man in this district and is doing good work. 6AKZ, 6ZBT, 6JJ and 6CGD have been on occasionally but handled no traffic. Everyone in district No. 3 is in favor of a traffic meeting, which looks like business. 6CDG promises to have a better report next month.

**CENTRAL CALIFORNIA**—Dist. No. 4: A resume of the station reports indicate that all stations are experimenting on the low waves and that very little traffic is moving down there. 6ABD using 6 watts on 80 meters and working good DX. 6LV worked 25 states in 10 nights on 80 meters. 6ALW still on 160, new antenna and more power planned. This station carried a test with NDF USS California reports NDF vy QSA on 166 meters. 6CIE is rebuilding for short waves. 6CFI is not on the air very much—rebuilding for short waves. 6CJV worked two eights and a bunch of nines and fives. Experimenting with short waves also. 6ZAU (Note A.D.M.) got a kick out of Los Gatos only on two weeks in August using 50 watts on 156 meters. 6ZAT is waiting for a 1000 volt 500 watt generator. New antenna going up for short waves. 6ZAH just got back from China as 2nd operator on Pacific Mail Steamer, is down to 80 meters with 100 watts reported vy QSA. 6AFQ is 50 watts preparing for 80 meters. 6BON is preparing for short waves. 6BCL is only O. R. S. that did not report. That spoils a good record. The following stations in Stanislaus county are actively operated. 6FY, 6ANE, 6AME, 6CLP, 6CKH, 6ACU, 6BNH. The Merced bunch is absolutely dead but will probably be back on the air for winter DX. 6BTP is a new station starting up on five watts. 6CTE is having a vacation hence he is ND.

Dist. No. 5: Things are going along FB in this district at last, but there are still some stations which fail to report. 6BQL has been appointed O.R.S. 6RY is doing fine work on 150 meters having been heard in Oklahoma on voice, and his C.W. sigs are going east in fine style. 6BQL is using a 50 watter in the 4 coil Meissner and gets 3 amps on 150 meters. 6AWT put up two commercial type pyrex glass antenna insulator and then the fun began. Everything started sparking in the station. Hi. The coupled Hartley was then put in and after the transmitter was re-wired the whole panel was shot to pieces so the transmitter was rebuilt. With 10 inches of coupling on 150 meters. The radiation varied from 10 to 12 amperes. Everything is going along FB Nw. 6CHL is having good luck with his 250 watt tube. He is radiating 5½ amps on 195 meters and has done fine work with it having out-worked his 100 watt set which was radiating 6¼ amps.

**NORTHERN CALIFORNIA**—Dist. No. 6: Due to the fact that only the reports of the D. S. will be considered in a particular district, the Oakland gang is going to have a short report in this month's QST. D.M. is not entering a report from C.M. and O.R.S. stations—we hope this will be a lesson to you fellows and that you will send your messages to Poage 6HP, in the proper routing. He makes a kick on this and he has one coming. If anybody is to be ridden it is the C. M. who disappoints the O. R. S.'s. Get after them and see that their reports are turned in right. We hate to do this but we think to do things right you have to have a system to go by, and then live up to the system—D.M.

Dists. No. 7 and No. 8: A few have received the short wave license and are rebuilding. 6DD is on again. 6AVM, 6GR and 6BKB are all working. 6BQB is putting in 50 watts. 6FH is a 50 watter now and ready for business. 6AGE is on short waves with 5 watts and will be on 76 meters soon with 250 watts. 6LU has been on with C.W. and fone.

6APE is off at present rebuilding for low waves. 6BUA has been on with 85 watts but a storm took his antenna. 6BAF in Eureka, a new station, is the farthest north O.R.S.

Traffic: 6CGO, 103; 6AIB, 30; 6CGC, 23; 6CHX, 16; 6ADT, 10; 6VD, 8; 6VIG, 6ZHL, 3; 6CDV, 3; 6BBQ, 13. 6CGW, 61; 6CNI, 4; 6AKQ, 2; 6CAE, 14; 6AHD, 2. 6AGK, 17; 6BRF, 122; 6IH, 12; 6AAO, 62; 6CMU, 26; 6FL, 102. 6MG, 102; 6AJI, 32; 6CIA, 28; 6BLW, 15; 6US, 3; 6CMD, 20; 6CDG, 10; 6NX, 6; 6LV, 47; 6ADB, 28; 6ALW, 40; 6BON, 5; 6CIE, 7; 6CFI, 7. 6CJV, 52; 6ZAU, 36; 6AFQ, 28;

ARIZONA—This is our first report from old 6ZZ now 6FP. He is moving and rebuilding his house so is off the air temporarily. He is busy scaring up stations in Arizona and says that the Cottrell Plant situation looks very favorable and as he controls it I believe he will be able to be on the air again soon. Glad to have this report from him this month but hope for a bigger one next month.

NEVADA—We have a new A.D.M. in the state of Nevada, 6ATN M. E. Smart. Have two O.R.S.'s in that state now and prospects for more. The O. R. S.'s are 6ATN and 6UO, so traffic is open in that district. Things as a whole seem to be pretty well settled for the winter DX season and organization is about completed. In the future please make all reports short and snappy as we are limited to space in QST and nothing but pertinent facts must appear and only those of O.R.S. will be considered.

HAWAIIAN ISLANDS—6ALS was again QSO with the mainland via 7FR and 6CGW. 6ANY has left for the mainland and traffic from the coast can be sent to 6AOF, 6CEU of DX fame, is back from the states and is pounding brass again. He is QSO coast. 6OA has completed installing a hundred watt. 6ASR has plans for a 250 watt. 6CCR and 6TQ have installed chemical rectifiers and are putting out a better signal than pure A.C. 6TQ reports logging the following New Zealand stations: 2AC, 2AK, 4AA, 4AG, 4AK. Sigs were QRK, free from QSS and on a wave length from 100 to 120 meters.

#### ROANOKE DIVISION

W. T. Gravely, Mgr.

A. D. M. Simpson of North Carolina has resigned and a new A. D. M. has been appointed in R. S. Morris, Gastonia, N. C., 4JR. Kindly send your reports to this station not later than the 20th of each month.

NORTH CAROLINA—4BX and 4RW are the only two O. R. S. at Wilmington to sent a report. 4RW is off the air at present. 4BX is going full blast and is on every night. He is coming down on short waves soon. 4UN is going FB and yelling for traffic. 4TJ is working 75 meters and says its the real stuff. 4AF is at State College and will help at 4UN and 4RU. 4RU should be on again now.

WEST VIRGINIA—A. D. M. Bock threatens a big shake up in the O. R. S. if the necessary reports are not received. 8CFE, a new station is on with 50 watts. 8CQH has been out of the game for sometime on account of an auto accident. 8DKB is still buying MG's and motors. Any junk? 8ATC is off at school. 8AMD is on 75 meters and says it is FB. 8DKB, 8DOI, 8CQH, 8CFE and 8AMD, all attended the convention at Cincinnati and came home full of pep. 8WZ reports very little doing. 8BLI uses a MO set three 202's. He will come down when he gets receiver rebuilt for short waves. 8AIP and 8CXM are away at school. 8DSM is off the air, blew up his tubes. 8ATP is on with 75-80 meter set with a 50 watt bottle.

VIRGINIA—3CKK has up an 80 foot mast, has worked all districts but sixth and seventh. He wants schedules with anybody at 5:00 and 5:30 A. M. 6:00 to 8:00 P. M. and after 10:30 P. M. 3ABS has started up again with chemical rectifier on 150 meters. 3AUU is working 78 meters and designing a wave meter for 4-5 meters. 3ATB is waiting on a 10 watt transmitter that 3BCH is building for him will be on this coming month. 3BCH is still working on the code. 3BMN lost another 5 watter, making a change in aerial to get down on 80 meters. A new transmitter using pyrex glass insulation throughout is being built. 3BGS pulled his transmitter down from 186 to 80 meters but she would not perk so will rebuild, and use another circuit. 3BVL, the only O. R. S. at Richmond, is off at school but will be on the air during the holidays. 3APR has returned to South Boston. He says he logs them in all districts and expects to work them also on short waves in the near future. 3BZ is working all

around the lot. 3CKL worked 6XAD using one 5 watter. This is the way he celebrated his first anniversary on the air. He is on 150-200 meters and no way to get him down on shorter waves. 3DT will be going soon on 75-80 meter wave, and 3FV will also work on the short waves.

Traffic: 4BX, 7; 4UN, 3; 4NJ-4VN, 6; 4JR, 25; 4TJ, 76; 3CKK, 12; 3BMN, 17; 3BFE, 11; 3BZ, 6; 3CKL, 27.

#### ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

COLORADO—Denver: Due to the C. M. of Denver being out of the city the report for the City of Denver is almost Nil. 9CAA takes the box seat for messages this month and 9DED is the only other Denver report received. The stations have been on the air consistently and better arrangements should be made for reporting when any official is out of the city. Make it double next time, gang!

Dist. No. 1: 9DTE now 9AOI is the only station reporting from this district. Traffic has moved regularly through 9AOI which has been open nightly.

Dist. No. 2: All stations in this district have put through traffic in varying amounts. 9CHT, 9CDE, 9CLD, 9DFH and 9EAE have all been on nightly and traffic has moved through this district in regular fashion. O. R. S. for 9AZG has been cancelled due to the station not being in operation any longer.

UTAH—Salt Lake City—Reports from three stations only out of the entire state—6FM, 6BUH and 6AJA reporting traffic. The A. D. M. is out of the state on an extended vacation and report was forwarded by C. M. of Salt Lake. The stations have been active but reports not forthcoming.

WYOMING—7HW is back on the air. 7NR also, and traffic has moved through this state fairly regularly. 7AJT has been handicapped by power wire leaks and has gained valuable experience in locating them. 7ZO has moved a bit of traffic. A new station will soon open in Casper with 10 watts. 7LU is also in Casper and may open up this winter. 7DH is back in the state and has been on regularly.

Traffic: 9CDE, 4; 9CHT, 20; 9CLD, 15; 9DFH, 11; 9EAE, 7; 9AOI, ex-DTE, 23; 9CAA, 93; 9DED, 10; 7AJT, 3; 7ZO, 15; 7OH, 21; 6FM, 12; 6BUH, 20; 6AJA, 12.

#### SOUTHEASTERN DIVISION

H. L. Reid, Mgr.

ALABAMA—Some good radio weather has been experienced during the past month and as a result traffic has increased quite a bit. 5ACM leads the state. 5VV comes second with 5AMH falling into third place. Traffic on the low waves increases as each station gets down and experiences that grand and glorious feeling. A total of 473 messages were handled in the state.

Dist. No. 1: Stations 5AMH and 5UP are combining and are planning to open in several weeks with a new low wave set. These stations are noted for their ability to handle traffic consistently. 5VV and 5ADS continue to operate regularly and handle their part of traffic. 5MI, while low in messages this month, did a nice bit of DX. He worked IHT for 45 minutes on October 3rd, while IHT was off the coast of Africa. Anniston stepped out this month with 5ACM handling messages and operating on the higher waves too. Gadsden reports only one station working—5QP. 5ARI is down on the low waves and ready for work. 5ARI has been appointed as O. R. S. Mr. Johnston is also the new C. M. of Tuscaloosa.

Dist. No. 2: Only two stations handled traffic for the month, 5AR and 5AC. 5AC is now located at 958 Marine St., Mobile, Ala. Several Mobile Stations have combined and are now operating as 5QK. 5QK has been appointed O. R. S.

Dist. No. 3: Supt. Brooks reports plenty of interest in his district, especially in Montgomery, where a real live club has recently been organized. 5WI has apparently not recovered from a recent storm but is expected to be on the air at an early date.

Dist. No. 4: 5XA is on the air now and reports traffic. Many old timers may be found on the operating staff of 5XA. These are 4GN, 5JR, 5HL and 5GP.

Traffic: 5AC, 20; 5ACM, 120; 5ADS, 10; 5AJP, 446; 5AMH, 57; 5AR, 6; 5MI, 17; 5VV, 68; 5ZAS, 13. 5XA, 116.

SOUTH CAROLINA—4SH, 4PV, 4IT and 4DX are away enjoying (?) college life. 4DX, however, has

his portable 4SY with him and is on with three 202's. 4RR-4VL broke his arm playing foot-ball and is now operating with the left.

Traffic: 4DX, 3; 4RR, 34.

FLORIDA—Mr. Herbert has just visited us and lent us a helping hand, resulting in considerable improvement in our stations. We are indebted to him for enlightenment on matters of both technical and organization standpoint, and the gang thoroughly enjoyed his visit.

One noteworthy fact which we are proud to report is that all Florida O. R. S.'s. are on file in the F. E. C. Ry offices, to be called on in emergency. Florida stations have also aided in following NERK's sibs throughout her voyage, reporting her position regularly to NKF, and handling traffic for her. 77% of all Florida O. R. S.'s. are on short waves. 4FS keeps a schedule with Porto Rico and is copied frequently in S. A. and Europe. After blowing his last 50 he put in a 5 watter on 80 meters and worked Mexico the first night. 4EZ is back on the air and in reliable touch with Cuba. 4KK is doing some splendid relay work north and west. He has for his motto "Immediate Delivery," and the boy lives up to it. 4PK is on but little. There is a great boom in amateur activities in Jacksonville, many B. C. L.'s installing transmitters, two of which are soon to be O. R. S. Jacksonville O. R. S. want it known that they will accept no msgs which do not comply with standard A. R. R. L. form. St. Augustine has two excellent short wave stations in 4SB and 4PL. 4SB has just been made O. R. S. 4PI puts his station to practical use and orders merchandise direct from Jax and Atlanta by radio. 4XE has worked every U. S. district by daylight with M. O. since October 1st, and has schedules with NKF. 4PB and 4PY are on some. D. S., 4QY, is getting South Florida lined up in good shape. 4CH of Miami is heard often on short waves.

Traffic: 4IU, 4XE, 29; 4FS, 26; 4KK, 12; 4QY, 11; 4SB, 9; 4EZ, 9; 4PL, 8; 4PB, 7.

GEORGIA—More stations have been on the air this month than have for the past several months. Most stations are using the short waves and are doing excellent work although some stations in going down on their wave length lost tubes and have been forced to use smaller tubes temporarily. Among the stations making excellent distant records are 4DT, 4BW, 40A and 4IO. 4IO has worked IHT, F8CS, G2OD and also seven other British stations and two French stations. IHT was worked off the coast of Brazil and Africa. NERK was worked by 4KU and 4IO and was heard by any number of other stations on his trip to the west coast. No trouble was experienced in maintaining communication for distances of several hundred miles and quite a few messages were handled.

4JD and 4DT have been appointed O. R. S.'s, which opens the route for traffic to Montgomery, and Selma, Ala., and other points west. Mr. J. S. Morris has been appointed D. S. of District No. 1 and all C. M.'s and other stations not having C. M.'s should forward their reports to Mr. Morris.

Traffic: 4EQ, 38; 4HS, 8; 4IO, 27; 4SI, 310; 4HS, 6.

#### WEST GULF DIVISION

F. M. Corlett, Mgr.

Two outstanding events occurred during the month of October, the Navy's pride of the air, U. S. S. Shenandoah, known to us as hams as NERK, passed over our division twice and found a number of stations ready to assist in maintaining communication and some traffic was handled with her. Then, Mr. A. A. Hebert, field man and treasurer of our A. R. R. L., visited Houston, Dallas, San Antonio and El Paso, where great amateur gatherings took place, real hamfests. In Dallas, every traffic officer of Northern Texas Section was present except D. S. Martin of Dist. No. 5, Amarillo.

This report is being written on the 31st of October and up to this time traffic reports have not been received from the A. D. M.'s of Oklahoma and New Mexico. These reports must reach division headquarters before the last day of the month or they cannot be included in the division report. Only O. R. S. activities are included in this report, activities of other relay stations appear in the sectional bulletins issued by the A. D. M.'s of the respective sections. If you are not on your A. D. M.'s mailing list drop him a card and request that you be put on.

5GU ex-5ADO, Roswell, N. Mex., is back on the air and ready for traffic. He reports handling 18.

NORTHERN TEXAS—Cool weather has at last hit this part of the country and DX sibs once more pound in. 5JF worked NERK when he was coming through Texas. 5DW was QSO NERK as well as with NZ 4AA. The latter he worked on the morning of October 13th. Several other stations stood watch for NERK and logged him. School is making its claim on the ops and several stations have been closed. Traffic is picking up slightly this month, although fewer stations reported than did last month. Traffic is moving in fine shape all over the state from indications. Daylight and night routes are both working well.

Traffic: 5DW, 14; 5AMB, 10; 5JF, 20; 5QY, 2; 5ADH, 7; 5PH, 87; 5VU, 53; 5AJT, 70; 5UO, 71; 5XAJ, 12; 5OQ, 3; 5VF, 12; 5AJJ, 45; 5HY, 44; 5QL, 10; 5AKZ, 25; 5SD, 3; 5QW, 11; 5CV, 2; 5AJH, 55.

SOUTHERN TEXAS—The opening of college has wrought havoc in this section, at least half of the O. R. S. had their certificates cancelled because they will be away from their stations. But to compensate at least in part for this loss we have with us again our old standby 5XAU, the station of the A & M Radio Club. Among its operators will be 5GE, 5KG, 5VO and 5NN. D. S. Sherrod of Galveston, is at Rice. We will miss 5VY-5ZG. New stations that have applied for O. R. S. are 5JT at Cuero, 5EW at Brownsville, 5MS at Corpus Christi, 5APM at San Marcos, 5FT and 5ALE at Austin, 5NK at Houston, and 5XAU at College Station. With this new addition the section will doubtless recover from the summer slump.

Two important meetings were held, one at Houston on the 27th and one at San Antonio on the 31st of this month. Mr. A. A. Hebert and the A. D. M. visited these meetings. From the lively interest shown by amateurs in these meetings we have every right to expect a very good season this year.

Traffic—5APM, 19; 5EW, 24; 5XAV—5GW, 2.

#### CANADIAN SECTION

There is little to report this month, the main thing being the coming division managers' meeting at Winnipeg on the 1st of December. There will be present at this meeting the five division managers, the Canadian general manager and the A.R.R.L. field man, Mr. Hebert, and at this meeting all branches of Canadian affairs will be taken up and discussed and an endeavor made to straighten up any difficulties which have arisen in the past in Canada. Any A.R.R.L. members are invited to attend the general meeting to be held in Winnipeg during the sessions above mentioned.

Good news also comes from Mr. Hebert, the field man, who advises us that he is intending to visit the Vancouver and Winnipeg divisions this fall and also the Maritime, Quebec and Ontario divisions within the next eight or nine months, so that we will have a complete tour of the Canadian divisions at an early date. The Quebec and Ontario divisions report that a radio show to be held in Montreal and Toronto will have a representative of the A.R.R.L. there to tell the story of the League with demonstrations of amateur apparatus.

The short waves are engrossing the attention of most of the progressive amateurs in Canada with the preference at the present time being shown for the 75 and 80 meter wave band. The thing is so comparatively new in Canada that little of a startling nature has as yet been done but those who are on the short waves are noting the freedom from swinging and the apparent ease with which daylight work is carried out.

## MARITIME DIVISION

W. C. Barrett, Mgr.

Radio, especially in the outlying districts is taking a good hold. New Brunswick in Particular is coming along well. Only the activities of O.R.S.'s can be mentioned in traffic reports and all Maritime hams are requested to apply for O.R.S. certificates. IAW has been appointed D.S. of Cape Breton, N.S. and also an O.R.S. All C.B. stations please get in touch with him. 1EI sent his report by radio to the D.M. (F.B., other A.D.M. and D.S. might do the same.) 1AF is rebuilding. These are the only two O.R.S. station in N.B., but there are also some eight or nine stations in N.B. now in different stages of construction. A few more O.R.S. would be in order. 1BZ and 9AK report no traffic. Several new stations are reported from Cape Breton, Newfoundland has three stations but no QSO rest of Maritime yet. Halifax City has only 1EF doing much work. Other Halifax O.R.S. are rebuilding including 1BQ, 1EB and 1DJ. 1DD is on handling the weekly QST at 8 P.M. Atlantic Standard Time, on Saturday and Sunday on 80 meters. 1DD works on 80 and 130 meters. 1AR is by far the star O.R.S. this month. 1AR works on 140 meters. He has worked Canadian 4AA direct and also a complete message of his was copied solid by NZ 4AG during September. Joe was working C2nf at the time and was relaying a message from VDM for C. P. Edwards of Ottawa. The Halifax gang were honored with a visit from Bill Choat of V.D.M. and C3CO fame during the month, and he was duly initiated into the ROTAB's. He having worked G2NM from VDM. Bill gave the local gang a fine lecture on "Up north" and presented some two hundred photographs.

Traffic: 1EI, 4; 1DD, 24; 1AR, 36.

## ONTARIO DIVISION

C. H. Langford, Mgr.

Another month has turned around and radio weather is getting better every day. More enthusiasm is shown on the short waves this month. One setback is the fact that quite a few former men have let up on their transmitters or have other work that keeps them away. Several fellows are attending University in other cities and their work will be missed. In spite of this, the A. D. M.'s are very optimistic as to work in their districts this winter. (FB fellows.)

3BQ is in Toronto attending University. 3ADU has been appointed C. M. in his place. 9BC has a new aerial and is crying for traffic. 3WV is raising two new steel masts. 3LY and 3VH are QSO west coast regularly. 3KQ is doing fine work with amplifying tubes. 9CC and 3AFP are chief experimenters on 20-40 waves. 3NF has a new 80-foot latticed mast. 3AEL, radio editor on daily paper is doing good publicity work. 3HE has a new aerial system, which gives better results on traffic work. 3AD is doing real DX to west coast regularly. 3AD and 3XI are on 50 watts. 3TB and 3XN are doing experimental work on short waves. 3NI and 3WS are combined. 3WS is also at Toronto University.

Traffic: Eastern Ontario—18. 3LY, 12; 3KQ, 16; 3VH, 5; 9AL, 40; 3FC, 23; 3WV, 19.

## QUEBEC DIVISION

J. V. Argyle, Mgr.

The past month has been a momentous one for this division for we have pulled off something which we always greatly wished for but for which the opportunity had not yet arrived. Our booth at the Montreal Radio Show, to sum up, was a huge success. We were informed by hundreds of people that it was the liveliest feature of the show and this could be easily proved by actual count of the numbers of people at the various booths. Our Geissler tube outfit attracted immediate attention and the interest of the public was retained by good friend 2FL, while he showed them the difference between the old-fashioned spark transmitter (none of which, he explained, had been in operation in Quebec since 1923) and the new C. W. transmitter which was working full blast handling traffic with outside. 315 messages were filed in all and to the gangs credit, they were all hundreds of miles enroute to their destination by Sunday night. 2HV supplied the transmitter, 2CM and 2EV the receivers, while the "Ancient and Historical Tube and Junk" exhibit

was contributed to by the entire crowd of Quebec brass-pounders. Much publicity did we get and a lot of fuss was made of our only OW, Mrs. Sturgess of 2CN, who sat in and handled our traffic with us every night. 2CM's receiver was shoved into the B. C. L.'s competition at the last moment, just for the fun of the thing, and it won second prize. Hi. Yes boys indeed the gang had fun; what with George his batteries and the ostrich, the Tesla and the jolts, the radio airplane, minus antenna, 2AG and 2HV, the black-eyed twins, and say who was it shoved his hand into the tarpot fixing the antenna on that Windsor Hotel roof? 2DO showed us how a set could be wired without having to bend down to throw the antenna switch, though we did have to curl our toes up a bit to prevent them getting a bite from Fred's rectifiers. 2BE, 2CG and 2AZ shot out most of the traffic and a hard time they had as very few of our friends across the line seemed inclined to accept traffic from us and in despair the D. M. had to broadcast a QST to all O. R. S.'s for assistance. We thank 9CEK, 2KU, c3LY, c1AR, 2CVS especially for having done their best and greatly helped us out when we were CQ'ing to get someone to QSR messages per night. 2AG is appointed an O. R. S. He is ex-commercial and a real op.

## VANCOUVER DIVISION

A. J. Ober, Mgr.

The whole division is away to a good start quite equal to midwinter season of last year. Most all stations are QSO in daylight from coast to Saskatchewan.

ALBERTA—4IO spiked 35 this month and is working schedule with C5DS every night. 4AX hands in a fine traffic report and is doing good DX. 4CW is with us again after rebuilding—small report, but a good one. 4GT is also on again after moving to new quarters. 4DQ has been cutting down aerial and power, now down to 5 watts and single wire and has worked C3AD, Kansas, and through to Kentucky.

Traffic: 4IO, 35; 4AX, 23; 4GT, 4; 4DQ, 12; 4CW, 1.

VANCOUVER—5GF hands in a brief report of "who's spearin' all the messages?" Total 3. 5AN is on 80 meters and reports more traffic down there. 5GO did not hand in a full report, but N. Z. reports his sigs vy QSA on a non-oscillating receiver. The new O. R. S. stations are: 5AN, 5BZ, 5AY.

Traffic: 5GF, 3; 5AN, 19.

VANCOUVER ISLAND—When four five-watters signed off at 5CT, he slapped in a lone one and says she twists and squirms but delivers the goods. 5HK has run into some more transmitter trouble.

Traffic: 5CT, 17.

EDMONTON—4CL is a ship operator and his fist will no longer be heard on amateur waves. 4HF is still the only active station and gets out fine with 50 watts.

Traffic: 4HF, 17.

PRINCE RUPERT—All active stations please get in touch with Mr. P. Black of Prince Rupert who is the new D. S. for this district.

## WINNIPEG DIVISION

J. E. Brackett, Mgr.

WINNIPEG—The majority of stations here have been inactive this summer. A few of the old timers are on occasionally but QRN has been hitting pretty hard, making traffic handling rather spasmodic. 4AW 4CH, 4FZ and 4CO are inactive but are polishing up for the winter season. 4AG-9AD-4CI has gained an additional operator in 4EA, who will handle the set all winter. 4BI is still having trouble in getting out. 4DY is working 4AA and 4CR on regular schedule and can give 9VA QSR on westbound traffic, although it is difficult to work east at present. REGINA—4BR and 4FV are going strong here. 4FV is being handled by ex-G5MX who apparently never sleeps.

MOOSE JAW—4HH, 4AO and 4BF have kept traffic jumping through here and are QSO in all directions. 4EZ is putting up those new big sticks and will be on shortly. 4GH is on the air regularly. 4AA has a new 80 ft. lattice mast up and is putting Unity on the map. 4HZ has the city juice attached to his house now, and will be on the air soon. 4CB-9BX is going when time will permit, but the OM is alone now and is pretty busy keeping the wheat heading east so cannot arrange for schedules just yet. Traffic: 4DY, 25; 4HH, 29; 4FN, 9; 4CB, 6.



# Calls Heard



## Important Notice

It is necessary to emphasise the rules of this department with special notice this month.

1. American and Foreign amateurs should make their call heard lists like that of 6LJ published below: in numerical order according to districts and alphabetical order for each district, with separate list for each country included in the list.

2. The list must be well spaced horizontally with a comma between calls, and each line should be spaced a line from the following—typewriter double spacing. If the list is hand done it should preferably be printed and not used for writing practice with an assortment of fancy letters. I wish I could show you the hand-made copy sent in by 6LJ, u2AGQ and u3TY, as they were extremely legible and well done.

3. Calls heard lists must be in our hands by the FIRST of the month following reception so that they will not be over two months old when published. Start them from your location in time to reach our office by the first. This is the same as saying that they must be in by the first of the month preceding publication. Foreign amateurs, due to the slowness of the mails, can ignore this rule. It applies to U. S. and Canadian amateurs only.

4. Men sending lists heard on shipboard are the only ones with reason for giving a separate list for each date, as their position varies daily. Ship operators should specify whether or not their name is to be published.

5. Let's make the calls heard lists just that, and leave out stations worked. The people directly concerned already know about the station worked and no one else is interested, so why let the stuff take up space that could be used to present more heard calls? Leave your best worked dx in the list and surround it by asterisks like this \*7FOB\*. That puts in only ONE station worked in a "heard" list. Now, what do you think of the idea?

The American and Canadian gang are sticking to the rules commendably with but few exceptions, who fail to get their lists printed. No foreign amateurs, with the exception of British 6WJ and British 2WJ, obey the rule of double spacing, and the majority break all of the rules. The British amateurs are the chief offenders because they send in the majority of the foreign lists. The time has come that so many are sending in lists from around the world that a carefully prepared list is going to become the only one used.

If the above rule were not enforced, it take two people four days every month to prepare the lists for printing in QST.

C'mon, fellows, co-operate with us.

Rene Burlet, f8CS, Le Bis Rue Tarbe, Reims  
Marne, France.

laac, laard, laare, larf, laip laid, lall,  
lamw, lazl, labs, labt, labk, lakz, laur, lah,  
lamw, lahl, lahw, laht, larw, laaj, lajw, laap,  
lapy, labf, lbfq, lbgo, lbsd, lbkr, lbbo, lbip, lbis.  
lbbd, lbjg, lbgf, lbqi, lbeb, lbgt, lboa, lbvl, lbht,  
lbhn, lcs, lgl, lcu, lcpo, lcre, lckp, lcmp, lcaak,  
lczg, lcoo, lde, ler, lfd, lgv, lkc, lmy, low,  
lrr, lse, lsf, lsw, lvj, lxw, lxx, lxae, lxav, lyb,  
lyk, lze, lzz, zabi, zaa, zabd, zapy, zagw, zagb,  
zawf, zadd, zann, zbrb, zbe, zbyw, zbcz, zku,  
zki, zkv, zmk, zmu, zmw, zpd, zpk, zwc, zvx, zcqr,  
zcmv, zcik, zadd, zari, zaha, zaid, zauv, zhta.  
zbtu, zbg, zbva, zbsb, zbdo, zcia, zcmg, zcbl, zcdg  
zhh, zii, zkd, zmb, zmw, zog, zoc, zwb, zzs, zai,  
zbc, zch, zeb, zfm, zio, zku, zoa, zsa, ztj, zue, zxe  
zxx, zzd, zfk, zmi, zux, zzas, zavi, zbjn, zbbe, zbps,  
zbbn, zbsc, zbjn, zcmi, zcyi, zcl, zchw, zdm, zda,  
zgz, znb, zgl, zvt, zzz, zaaw, zazx, zai, zbwz, znmr,  
zom, zcanadians, zar, zbi, zgc, zbd, zav, zmiscel.  
zmf, zht, zwh, zgy, zdkc, zkac.

J. L. Menars, F8FJ, Le Blancat, Gan. (B.-P.)  
France.

Last Half September.

laac, lagd, lagk, laox, larf, laur, lbkr, lbsd  
lckp, lmy, lsf, lxae, lxav, lxx, zaa, zbl, zapy,  
zbrb, zdx, zku, zmu, zpd, zsi, zxxb, zadd, zaid,  
zbb, zbg, zbsb, zhta, zbtu, zbva, zbwj, zmb, zqv,  
zsp, zse, zwb, zadd, zcr, zfg, zfa, zio, zku, zoa,  
zsa, ztk, zcn, zfk, zmi, zbr, zxc, zza, zgoa, zamb,  
zlv, zbi, zgep, zadd, zasl, zbk, zcg, zxb, zgd,  
zals, zbcd, zbg, zbfz, znm, zmf, zcanadians  
zar, lq, zgc, zbd, zbg, Italian acd. All cards answered. QRM my 500 watter.

R. W. Bates, Pendarves St., New Plymouth, New  
Zealand.

lxat, zou, gaab, gabe, gany, gaof, garl,  
6avj, 6awt, 6bwl, 6cbb, 6cer, 6cct, 6cffi, 6cgs, 6cgv,  
6chl, 6cmh, 6cnl, 6gr, 6gu, 6oa, 6pl, 6xad, 6xbn,  
7ar, 7ct, 7qc, 7sf, 7eky.

John L. Liestra, Walneburgstreet 4, Rotterdam,  
Holland.

Three coil tuner, 1918 style, no amplification.  
las, lam, lazl, lbbo, lbec, lbd, lbgo, lbkb, lclj,  
lco, lfd, lse, lvj, lze, lxw, zaa, zbrb, zkg, zku,  
zpd, zpk, zxd, zbg, zhg, zchl, zchg, zsa, zxc, zxs,  
zht, zmf, zcanadians zar, ldm.

James Steffenson, Ehlersvej 8, Hellerup, Denmark.

laac, laap, laez, laer, latj, lbeb, lbhn, lbip,  
lbi, lbsd, lcaak, lcre, ler, lfd, lli, lkc, lmy, lrr,  
lsf, lsw, lxab, lxam, lxav, lzz, zaa, zapy, zbrb,  
zkg, zki, zpd, zmu, zbdo, zaid, zcdg, zhh, zvv, zsa,  
zxe, zbbv, zbcn, zzt, zmf, zcanadian lq.

Ing. Santangeli Mario, S. Euphemia 19, Milano,  
Italy.

lare, laur, lbkr, lboa, lcpv, ler, lmu, lsf, lyb,  
lyd, lxav, zann, zbnb, zbrb, zbvva, zbyw, zcg, zdx,  
zkg, zpd, zyb, zbg, zbdo, zbp, zhta, zbvva, zoc, zgc,  
zck, zfs, zea, zfg, zio, zoa, ztj, zzd, zaa, zadd, zcei,  
zcmi, zcyi, zdx, zgz, znb, zpl, zckf, zeld, zcanadians,  
zar, zbp, zbg, zka, zba, zmf.

J. V. Newson, G2GF, 139 Ormside St., London, S. E. 15, Eng.

1aac, laea, laez, lar, lajm, laur, lard, lbdp, lbia, lbp, lbsd, lbqi, lcf, lcp, ler, lcw, lif, lmb, lss, lsw, lxx, lss, lbop, lbqg, lbg, lboa, lbkr, lbsr, lckp, lckr, lcre, ldq, ldqg, lfd, lgw, lgc, lkc, ljw, ljm, low, lrw, lsf, lxxm, lxxv, lxx, lyb, lzym, zagb, zana, zann, zaxp, zbc, zbgg, zbr, zbrc, zenk, zdr, zfo, zem, zkg, zku, zkd, zkj, zmu, zmy, zpd, zsm, zari, zaun, zbd, zbh, zbv, zbw, zcdg, zcb, zcdn, zchg, zfr, zhh, zll, zjh, zjs, zku, zkw, zmb, zoo, zog, zsf, zsh, zwb, zwd, zzz, zka, zba, zbd, zbt, zcf, zfu, zfa, zja, zka, zmi, zoa, zot, ztj, zuk, zxe, zzd, zcn, zex, zmi, zqk, zuk, zbr, zcy, zajm, zajn, zbk, zbl, zbf, zcm, zcz, zdh, zdhw, zdm, zef, zjm, zmi, znb, zpl, zss, zsv, zsx, zav, zby, zcm, zem, zan, zar.

G6QB, L. H. Thomas, 33 Harpenden Rd., West Norwood, S. E. 27, London, Eng.

1aja, lajp, lakl, laj, lare, laur, lbf, lbcn, lbsd, lbtr, lccx, lckd, ldq, lbf, lfv, lmb, low, lyb, lxxh, lxxk, lxxm, lxxv, lxx, lat, zabd, zagb, zapy, zawf, zaxw, zayv, zby, zbc, zbnl, zbq, zbr, zcv, zfs, zpd, zxd, zaa, zadj, zbg, zbtu, ziu, zmb, zot, zpr, zby, zby, zbz, zfa, zhn, zhs, zsa, zxe, zcn, zmi, zbk, zxp, zbg, zcd, Canadians, zbg, zpl, zxx, zfv, nkf, wgh.

G5NF, Bank House, Horne Bay, Kent, England.

1aal, lare, laur, lbep, lbrc, lbqi, lckp, ler, lgv, lmyl, lts, luw, lxx, zaet, zagb, zawf, zbrb, zbu, zby, zkg, zkj, zpd, zar, zad, zats, zbt, zbd, zcdg, zch, zhh, zwb, zzd, zaa, zbpv, zem, zbg, zht.

G2WJ, R. L. Roylle, Aldermans Hill, Palmer's Green, London, England.

1aay, lajw, laro, lboa, lbg, lcdp, lckp, ldd, lli, lpy, lsf, lsw, lvj, lxx, lzz, zagw, zary, zbr, zcv, zcla, zem, zkg, zbd, zbt, zbsv, zcdg, zch, zjs, zqv, zsa, zni, zsx, nkf. Canadian, lar, New Zealand, zaa, zag, zak.

S. K. Lewer, 6LJ, 32 Gascony Avenue, West Hampstead, London, N. W. 6., England, Sept. 28-Oct. 19.

1aac, laaj, laaw, lab, labt, laea, lahi, lahl, lajj, lajw, lakz, lall, lare, lark, lasp, lasu, latj, lau, laur, laww, laxa, lbqg, lbgt, lbhb, lbhn, lbip, lbja, lbkr, lboa, lbqi, lbkr, lbsd, lbse, lbvl, lcg, lckp, lck, lcmb, lcmp, lcu, lcut, ldq, lei, lli, lkc, lmy, low, lqi, lrj, lrp, lse, lsf, lsw, lta, lvj, lxxv, lxl, lxx, lxx, lxx, lyb, lzz, zadj, zagb, zaf, zana, zann, zapr, zapy, zaxf, zbx, zbq, zbq, zbrb, zbr, zby, zce, zcei, zcms, zcnk, zcqc, zcvs, zcyw, zkg, zjr, zki, zku, zmu, zmy, zpd, zpl, zzw, zadb, zadj, zari, zauv, zavk, zbd, zbe, zbhv, zbtu, zba, zbjw, zcc, zcdg, zcia, zcin, zcz, zhh, zii, zkd, zog, zqr, zsv, zwb, zad, zai, zfg, zfs, zio, zku, zkt, zoa, zrh, zsa, zsb, zta, zti, zxe, zzd, zadj, zkg, zmi, ztr, zsa, zzb, zga, zbij, zbk, zwt, zsu, zajn, zauf, zbf, zbh, zbv, zbl, zcei, zcl, zcdh, zbn, zpl, zsz, zaa, zau, zai, zeky, zcl, zcv, zgw, zxx, zxt, zan, zar, zbd, zbe, zaa, zht, lpx, zfv, nkf, wgh. Single tube onli. All cards answered.

Heard by IABC at Sea with a UV199.

Sept. 18, 200 miles east of Delaware, lanm, land, lare, lawg, lbgt, lbkr, lbvr, lli, lmy, lsf, lte, lxx, lzz, zbrb, zbs, zxs, zda, zbp, zbu, zcc, zcd, zdmx, zdk, zxb, zaa, zawn, zbvz, zdda, zdf, zdp, zdxn, zvi.

Sept. 19, 400 miles east Jacksonville, Fla., laac. lazl, zagw, zad, zauv, zbp, zbv, zka, zkk, zccq.

Sept. 20, 500 miles east Palm Beach, Fla., lbkr. lbqg, lfd, zbrb, zku, zbg, scmi, zcyl, zsz, zvt, zem.

Sept. 21 500 miles s.w. Key West, Fla., labt, zagb, zbg, zmb, zcam, zcnw, zcyi, zdnf, zeky, zan, zar, lq.

Sept. 22, 100 miles n. w. Jamaica, lajp, lbqg, lxxm, zbrb, zbg, zba, zli, zeky.

Sept. 24, 100 miles n. e. Panama, lbqg, ler, lsf, lli, zcqc, zxd, zeq, zti, zqv, zame, zcmi, zsz, zdxn. Everything heard through terrific QRN, 73.

Heard by P. A. Field, c4CL, on SS Vancolite, VGLJ.

Sept. 17th. 135 miles west of Pt. Aguja, Peru., Lat. 5:59 s. long 83:29 w. 2XD.

October 5th. Lat. 20:29 n., long. 107:21 w., P. R. 4io, 5jf, 5ph, 5ps, 6aa, 6arb, 6bcp, 6bfw, 6bra, 9agl, 9cdo, 9cld, 9clq, 9thk., lat, 14:31 n., long. 96:26 w., lmy, low, lte, lxx, lxxv, 3btu, 5ajj, 5dw, 5ot, 5ov, 5za, 6ba, 6cgw, 8xs, 9aw, 9xw, nkf, wgh, fone 8xs, Mex. lb.

9th. lat. 12:46 n., long. 93:01 w., lmy, low, lte, lxx, lxxv, 2aay, zana, zxe, zame, zmw, 5ot, 5ph, 5rh, 6adt, 6age, 8xs, 9bm, 9cj, 9cfi, 9ci, 9dx, 9eld, 9xun, 9zd, merk, nkf, wly QRA?

10th. lat. 11:02 n., long. 89:35 w., lxx, 2ad, zkg, zadb, zbg, zcdg, 4kl, 4ku, 6awt, 8cvs, 9ars, 9aru, 9bch, 9by, 9cw, 9cii, 9cjc, 9dyn, 9ei, 9eld, 9mc, 9xm, nkf, wgh, P. R. 4io.

12th. lat. 7:41 n., long. 82:44 w., laac, laur, lbqg, 4ku, 5ama, 5uk, 8dhi, 8dhw, 8xs, 9cm, P. R. 4io.

12th. lat. 7:41 n., long. 82:44 w., laac, laur, lbgo, lbgc, lxxk, lxxv, lxx, zbrb, zkg, zpd, zfg, zku, zdm, zgai, 6lj, 8cys, 9bi, 9fn, nfv, nkf.

13th. Bay of Panama, lml, lxx, zblm, zcx, zle, 3auv, 3eh, 3zac, 4ft, 4my, 5aju, 5ov, 8cse, 8dgo, 9bmx, 9cee, agz, nfv, wci.

14th. Panama Canal, 9cai.

17th. lat. 20:45 n., long. 74:28 w., lbqg, lbhn, lca, lcmp, low, zbq, zbyc, zbn, zbr, zcp, zcty, zkg, zgl, zpd, zbc, zblu, zbno, zcj, zdu, zhg, 4bw, 4je, 4kt, 4qf, 4ti, 5jf, 5ph, 5qk, 5uk, 8cjp, 8ckm, 8dln, 8pl, 8xb, 8xe, 8xs, 9dfq, 9duq, nkf, Dutch hm8 loudest station on air.

8BWB aboard KFL SS Ishpenning, Marine, P. O. Detroit, Mich.

liv, lkl, lmy, lsf, lsw, lvj, lxx, laad, laes, lagg, lahi, lahl, lajw, laou, laqi, lare, lauc, lavx, lcbp, lbgc, lbga, lbgt, lbis, lbiz, lboa, lbvh, lcea, lme, zam, zcj, zej, zkg, zbr, zku, zmu, zpd, zaa, zch, zalr, zann, zaxf, zbr, zbm, zbyn, zcnk, zcqc, zcx, zczr, zbb, zbg, zbz, zca, zdi, zhh, zhg, zog, zov, zwb, zadp, zain, zalk, zasi, zauv, zbd, zbsb, zbtu, zcd, zcdg, 3cnj, 4ai, 4eq, 4fg, 4hr, 4ku, 4mw, 4rr, 4sb, 4tj, 4va, 4zd, 5ac, 5cn, 5fv, 5kq, 5mi, 5ot, 5ajh, 6vo, 6wi, 6ap, 6bar, 6clb, 7cw, 7fr, 7ij, 7aj, 8fm, 8jq, 8na, 8nb, 8pl, 8rv, 8ve, 8vx, 8wa, 8wx, 8zz, 8act, 8ajf, 8ajn, 8alf, 8apt, 8apv, 8apy, 8aqm, 8avl, 8bau, 8bce, 8bit, 8bkh, 8bl, 8bna, 8hoc, 8bos, 8boy, 8bzf, 8cci, 8ced, 8ck, 8cl, 8coj, 8cpn, 8cwl, 8cyi, 8daa, 8dha, 8dmt, 8dnp, 8dvp, 9ei, 9em, 9hn, 9hw, 9mc, 9qb, 9yb, 9zb, 9zt, 9aal, 9aau, 9abf, 9axt, 9ayx, 9bch, 9beg, 9bju, 9bkr, 9bnf, 9bnk, 9bmu, 9bmx, 9bty, 9cco, 9cdv, 9cdy, 9cii, 9cjc, 9clo, 9cpq, 9ctr, 9ctu, 9dap, 9bek, 9dhy, 9dmj, 9dxn, 9dys, 9dzc, 9efy, 9egg, 9eji, 9ela, 9eli, 9fv, nkf, Can. 3th, 3tc.

1 ABC at sea with one UV199.

Sept. 26 (100 miles W Panama) lli, lsf, zkg, wgh.

Sept. 27 (100 NW Panama) laac, zsa, zefy.

Sept. 28 (300 NW Panama) lbqg, lxxv, zku, zsa, zame, zni, zai, gapw, zvc, zavl, nfv. Sept. 29. (50 W Nicaragua), zxe, zame.

Oct. 1 (1500 SE San Diego) 4tj, nkf.

Oct. 2 (1300 SE San Diego) 4fs, 5anh, 6alw 6cto.

U. S. S. Rochester, c/o Postmaster, New York, N. Y., Panama Bay, Panama.

2bgo, zby, zcgb, zcqc, zxbf, zzo, 4ft, 4hr, 4kt, 4pt, 4tv, 4ua, 5aj, 5amp, 5ari, 5ka, 5lh, 5nj, 5nt, 5qi, 5vg, 5sk, 5ue, 5uk, 5xa, 6cms, 6pl, 6xad, 7aci, 8ap, 8bp, 8cqh, 8cwu, 8dmx, 8dtg, 9aau, 9atn, 9awg, 9bk, 9cbp, 9cky, 9cym, 9dix, 9drx, 9dsa, 9ekr, 9eky, 9xad.

U. S. S. Wood No. 317 Vallejo, Calif.

lbgc, lbvl, ler, low, lxxm, lxx, 2aay, zbe, zbhv, zcb, zcr, 4iz, 4ku, 4pb, 4pd, 4tj, 5afh, 5ef, 5ew, 5gu, 5hk, 5jf, 5nj, 5og, 5oc, 5ox, 5ph, 5qk, 5ue, 5xa, 5yd, 5za, 5afj, 7abb, 7adf, 7afb, 7afo, 7ahc, 7aho, 7ahs, 7aim, 7aix, 7aiv, 7ajy, 7akk, 7ao, 7ar, 7av, 7cf, 7cw, 7dd, 7df, 7do, 7fd, 7fg, 7fj, 7fr, 7gj, 7gk, 7gq, 7gv, 7gw, 7ho, 7ij, 7iw, 7ku, 7kz, 7lq, 7ls, 7lw, 7mf, 7mp, 7mv, 7nh, 7ok, 7nx, 7oz, 7ob, 7ok, 7pj, 7qc, 7qf, 7ry, 7sf, 7sy, 7un, 7uv, 7vn, 7zw, 7zu, 8aav, 8ah, 8bgn, 8ced, 8cae, 8can, 8dat, 8dea, 8dnp, 8gh, 8tt, 8vy, 8xs, 9ado, 9aiv, 9and, 9atl, 9azr, 9bcd.

9bce, 9bcf, 9bch, 9bjj, 9bkx, 9bkz, 9bnk, 9bob, 9bas, 9bus, 9bvu, 9caa, 9cek, 9ceti, 9cfy, 9cii, 9cjs, 9cju, 9cid, 9cld, 9cok, 9cro, 9cti, 9cyl, 9dat, 9dbz, 9ddp, 9del, 9dfw, 9dmc, 9dte, 9dum, 9dvi, 9eam, 9eat, 9eaj, 9eky, 9hn, 9nc, 9kvs, 9df, 9fv, 9gh. Canadian: 4aa, 4br, 4cr, 4cv, 4go, 4hh, 4as, 4ba, 4bf, 4cp, 4fi, 4go, 4hs. Foreign: 16a. Received on one tube.

**Daylight log by OW. at Canadian 4DQ. Vulcan Alberta.**

2cvj, 2ekd, 4mi, 5as, 5eg, 5zas, 6im, 7mf, 7cf, 7qd, 7ec, 7ahs, 8cvm, 8uf, 8zp, 8zah, 8aen, 8aey, 8agl, 8adu, 8ach, 8ado, 8ayo, 8baw, 8bzm, 8bpf, 8bdc, 8bob, 8buz, 8cdv, 8cpm, 8cdu, 8ce, 8cmx, 8cdw, 8cip, 8dpr, 8dwx, 8deq, 8dxx, 8dbz, 8ph, 8zt, Can. 9al.

**Can. 3MR, 15 Churchill Ave., Toronto, Ont.**

4ai, 4bq, 4eq, 4gk, 4gl, 4gw, 4hw, 4js, 4lg, 4mi, 4mv, 4oa, 4pi, 4rr, 4uk, 4un, 4vn, 4vw, 4zd, 5ac, 5cn, 5cq, 5hy, 5jf, 5ka, 5kq, 5lj, 5mi, 5mv, 5ot, 5ov, 5ph, 5pv, 5ru, 5sp, 5ue, 5uk, 5vv, 5wy, 5aa, 5aa, 5aaq, 5acl, 5adh, 5agj, 5agl, 5ago, 5ahw, 5ail, 5aio, 5ajh, 5ajp, 5anh, 5ans, 5ame, 5vc, 5aao, 5age, 5agk, 5apw, 5bka, 5bqr, 5bur, 5cax, 5ced, 5cei, 5cej, 5cft, 5cgo, 5cgv, 5cms, 5emu, 5gk, 5hp, 5hm, 5hw, 5ic, 5ej, 5ek, 5em, 5er, 5gh, 5hk, 5ap, 5hw, 5hy, 5jz, 5kq, 5mc, 5ny, 5pb, 5rc, 5ti, 5tf, 5vc, 5ws, 5xi, 5yb, 5za, 5zt, 9aan, 9aav, 9af, 9abt, 9acv, 9adu, 9ah, 9ahq, 9ajk, 9akn, 9aod, 9apk, 9aqv, 9avb, 9avw, 9axt, 9axx, 9ayx, 9azj, 9azt, 9bbj, 9beg, 9bez, 9bez, 9bga, 9biv, 9bjv, 9bjk, 9bhm, 9bmv, 9bqj, 9bsh, 9btd, 9bva, 9bvu, 9bwa, 9bye, 9cac, 9cbl, 9cbz, 9cci, 9ccm, 9ccq, 9ccs, 9cub, 9cvc, 9cee, 9cep, 9cii, 9cip, 9cja, 9cjs, 9ckd, 9ckl, 9ckg, 9clx, 9cmd, 9cmx, 9cvo, 9cpq, 9ctr, 9cvf, 9cvi, 9cy, 9cyk, 9cym, 9dad, 9ddp, 9ded, 9dfz, 9dhw, 9dii, 9diw, 9dkk, 9dlc, 9dlj, 9dng, 9dnv, 9doy, 9dpr, 9dqg, 9dqu, 9drc, 9dtk, 9dxx, 9dyj, 9dzn, 9sep, 9sfy, 9sgu, 9sht, 9sre, 9sej, 9sela, 9er, 9xbg. Can. 1ar, 1dd, 1ei, 2am, 2ax, 2cg. All inquiries answered.

**L. R. Virgin, 1AER. 270 No. State St., Concord, N. H.**

2ac, 2bc, 2br, 2eq, 2fj, 2iu, 2kf, 2ld, 2sy, 2zw, 2az, 2ao, 2ac, 2act, 2aek, 2aeu, 2aey, 2agw, 2alk, 2ams, 2ans, 2azz, 2bco, 2bkl, 2bqu, 2bqz, 2bvs, 2bsj, 2bvc, 2cdp, 2cdw, 2cee, 2cgl, 2cpa, 2cpm, 2cpz, 2cty, 2cua, 2cvh, 2evj, 2ewj, 2cwt, 2dij, 3bo, 3dq, 3ia, 3jg, 3ki, 3lg, 3od, 3oq, 3qk, 3sp, 3tp, 3uy, 3z, 3xx, 3ay, 3aky, 3ats, 3avm, 3bco, 3bel, 3bmx, 3buv, 3bw, 3cbx, 3cev, 3cdm, 3cec, 3cfc, 3chg, 4bx, 4eg, 4ft, 4gw, 4hr, 4tn, 4un, 4ur, 4vk, 5ek, 5nj, 5no, 5ud, 5vv, 5zz, 5ak, 5ac, 5ki, 5nz, 5pu, 5qb, 5qr, 5si, 5vq, 5vw, 5xy, 5zz, 5asm, 5add, 5ay, 5af, 5ahj, 5aif, 5ale, 5ams, 5ann, 5aoo, 5apy, 5aqd, 5aqm, 5art, 5atr, 5aua, 5avx, 5awa, 5ayi, 5avt, 5axw, 5bcr, 5bgn, 5bhg, 5bjz, 5bmy, 5bvo, 5bpu, 5bqv, 5bqi, 5bqr, 5bsf, 5bfs, 5bix, 5bxw, 5bzf, 5bzu, 5ect, 5eko, 5eng, 5eni, 5ese, 5esi, 5euk, 5eve, 5ewl, 5dah, 5dal, 5dat, 5dda, 5dea, 5dii, 5dke, 5dnt, 5dnh, 5doo, 5dpo, 5dpp, 5dre, 5dvw, 5dxc, 5em, 5ez, 5gr, 5if, 5vc, 9vk, 9ws, 9zj, 9zt, 9abj, 9adm, 9afy, 9ai, 9ale, 9au, 9aw, 9aw, 9bdb, 9bfg, 9bjr, 9bmc, 9bob, 9boy, 9br, 9bvw, 9buh, 9bvu, 9bws, 9cap, 9cbz, 9cdx, 9cfa, 9ckl, 9clx, 9cyd, 9cyq, 9cyx, 9dng, 9dno, 9dlw, 9dmi, 9dmb, 9dnn, 9duj, 9dvw, 9dwx, 9ebt, 9eib, 9eky. Canadian: 2am, 2fj, 3gk, 3gv, vnd (qra ?).

**1ARE, 15 White Terrace, Pittsfield, Mass.**

5aai, 5aal, 5aaq, 5ac, 5aec, 5agj, 5agl, 5ai, 5aif, 5alj, 5amg, 5amw, 5atj, 5au, 5ek, 5ew, 5in, 5jf, 5kq, 5mi, 5ot, 5ov, 5ph, 5uk, 5wy, 5xa, 5zas, 6aao, 6ac, 6adm, 6age, 6agk, 6alw, 6ame, 6anr, 6arb, 6asv, 6bft, 6bfw, 6bjj, 6bjk, 6bka, 6bql, 6bqr, 6bra, 6brw, 6buc, 6cae, 6cdm, 6cel, 6cgp, 6civ, 6ckh, 6cms, 6cmu, 6cng, 6gz, 6gt, 6hp, 6oh, 6pu, 6uf, 6vc, 6vo, 6wt, 6xbn, 7abb, 7bj, 7eq, 7fd, 7gk, 7mf, 7qc, 7ud, 7zm.

**2AGQ, Milton-Hudson, N. Y.**

4db, 4jr, 4kt, 4mi, 4rf, 4rl, 4si, 4sn, 4ts, 5abc, 5abn, 5ac, 5acl, 5acm, 5ads, 5aex, 5agj, 5ahi, 5ajt, 5akn, 5alz, 5amg, 5amb, 5aph, 5apm, 5aqj, 5asd, 5cg, 5fs, 5in, 5io, 5ka, 5ls, 5ox, 5qh, 5qk, 5qw, 5sz, 5se, 5si, 5tn, 5vu, 5vv, 5ab, 5akw, 5avb, 5avj, 5awt, 5bbh, 5bcp, 5bfw, 5blw, 5ceb, 5cgv, 5csw, 5cti, 5cto, 5fh, 5gt, 5ih, 5mg, 5pl, 5pg, 5rn, 5ti, 7ahs, 7akk, 7co, 7io, 7no, 7qc, 9abk, 9ado, 9adp, 9aed, 9afe, 9afy, 9agi, 9ahd, 9ahe, 9ail, 9aim, 9akn, 9ala, 9ali, 9aob, 9aqr, 9arr, 9ars,

9ash, 9asy, 9att, 9aus, 9auy, 9axh, 9axs, 9avb, 9bbj, 9bbr, 9bcb, 9bcj, 9bdj, 9bdu, 9bhi, 9bhx, 9biu, 9biv, 9bjl, 9bki, 9blb, 9blk, 9bmc, 9bhm, 9bmv, 9bmv, 9bof, 9boy, 9bpm, 9bpu, 9bqj, 9bqn, 9bre, 9bs, 9bsj, 9bsp, 9ove, 9bvk, 9bvn, 9bwp, 9bwt, 9bvw, 9bwx, 9bxc, 9bxs, 9ca, 9caj, 9cap, 9cau, 9ccj, 9ccs, 9ccu, 9cub, 9cvi, 9cv, 9egr, 9cfa, 9ckm, 9cd, 9ckl, 9cm, 9cov, 9cpi, 9crr, 9csg, 9cvf, 9cvi, 9cxg, 9cyq, 9czk, 9daj, 9dbz, 9ddv, 9ded, 9dsg, 9dex, 9dfh, 9dfr, 9dim, 9dia, 9dli, 9dlj, 9dlm, 9dmi, 9dnn, 9dnu, 9doa, 9dpc, 9dpr, 9dre, 9dri, 9dtt, 9dta, 9duj, 9dvp, 9dwx, 9ear, 9ech, 9ei, 9eij, 9ej, 9ejx, 9eiy, 9em, 9er, 9fi, 9ie, 9it, 9jg, 9kp, \*9la\*, 9nl, 9pj, 9qi, 9tf, 9tv, 9tw, 9wo, Can. 3gz, 4aa, 5ba.

**R. E. Groebe, 338 El Mora Ave., Elizabeth, N. J. (New QRO of 2 AREY)**

Hrd on det. only. All crds ansd.  
4ai, 4bq, 4cu, 4du, 4dy, 4ea, 4eg, 4eh, 4eq, 4fs, 4fy, 4gw, 4hr, 4io, 4ja, 4ka, 4kk, 4kl, 4lp, 4lx, 4mb, 4mi, 4my, 4oa, 4og, 4pd, 4pi, 4pv, 4qf, 4qw, 4rl, 4rr, 4sa, 4sb, 4si, 4tj, 4un, 4us, 4ux, 4vl, 4vn, 4xe, 4zd, 5aal, 5aaq, 5acm, 5aed, 5agj, 5ago, 5ail, 5air, 5ajh, 5akw, 5alr, 5alt, 5ame, 5amf, 5amh, 5ac, 5aw, 5en, 5ek, 5gk, 5fk, 5il, 5ot, 5oh, 5ql, 5rg, 5rh, 5sv, 5xa, 5xad, 5abf, 5abm, 5acn, 5add, 5aey, 5afn, 5ahq, 5ahr, 5aig, 5aih, 5aij, 5akk, 5akr, 5ale, 5alf, 5ali, 5alk, 5alw, 5alk, 5aju, 5amq, 5ams, 5anb, 5apn, 5apo, 5apr, 5aqp, 5aqu, 5arn, 5asz, 5atp, 8 atz, 5ab, 5avi, 5aw, 5axa, 5axf, 5axo, 5ayw, 5bau, 5bbm, 5bbw, 5bdv, 5bff, 5bgz, 5bit, 5bjz, 5bkm, 5bky, 5blu, 5bmi, 5bmy, 5bnu, 5boq, 5boy, 5bqj, 5bac, 5baf, 5bs, 5bf, 5bvk, 5bvx, 5bvm, 5bvn, 5bzg, 5bcm, 5cbp, 5cci, 5ccn, 5cko, 5cmt, 5cng, 5eni, 5cnl, 5cqh, 5ese, 5cta, 5euk, 5evh, 5cvm, 5cwl, 5cdw, 5daw, 5dbb, 5dbz, 5dbp, 5dcz, 5dea, 5dfo, 5dga, 5dgo, 5dhh, 5dhw, 5dhj, 5dhs, 5diz, 5dmh, 5doq, 5dg, 5dgl, 5dzb, 5ah, 5hf, 5hn, 5bo, 5bp, 5ef, 5es, 5fg, 5fs, 5gz, 5ij, 5kj, 5mc, 5na, 5nz, 5oa, 5pi, 5qd, 5rc, 5ri, 5rv, 5su, 5tq, 5vy, 5wo, 5xz, 5xy, 5yz, 8gz, 8aw, 9aan, 9aav, 9abf, 9abj, 9ao, 9aen, 9aey, 9afe, 9aim, 9aio, 9akd, 9ana, 9aor, 9apd, 9apq, 9aqu, 9ars, 9asv, 9atn, 9ats, 9auc, 9aul, 9auy, 9avb, 9awf, 9awg, 9awz, 9bcb, 9bec, 9bdc, 9bfb, 9bbh, 9bhx, 9biz, 9bjj, 9bjk, 9bks, 9bck, 9bmk, 9bmu, 9bna, 9bnk, 9bof, 9boy, 9bpm, 9bqj, 9brq, 9bsh, 9bvn, 9bvw, 9bvw, 9bww, 9caa, 9cci, 9cem, 9ces, 9cgv, 9cee, 9cep, \*9cgr, 9cjs, 9ckh, 9ckl, 9cmd, 9cog, 9cro, 9cnd, 9ctd, 9ctc, 9cvi, 9cvs, 9cw, 9cyl, 9cy, 9cyq, 9dcp, 9ddl, 9del, 9dfz, 9dhw, 9dii, 9dng, 9dnt, 9dnu, 9dno, 9dnt, 9dri, 9dta, 9duj, 9dvp, 9dvw, 9dwx, 9dxx, 9dzt, 9ear, 9ech, 9ei, 9eij, 9eky, 9el, 9hm, 9cp, 9em, 9ep, 9er, 9es, 9ez, 9fj, 9hk, 9hr, 9ih, 9im, 9jg, 9mm, 9nu, 9ny, 9qr, 9su, 9vc, 9vw, 9canadians—1ar 2am, 2ax, 2cg, 2be, 2bz, 2eg, 2do, 2aa, 2bi, 2bq, 2bp, 2ci, 2fc, 2ia, 2kq, 2nf, 2ph, 2vh, 2vw, Eng. 2kf.

**3TY at Asheville, N. C.**

1abt, 1agk, 1agk, 1ajo, 1atj, 1avp, 1awg, 1abc, 1ibe, 1ibi, 1ibx, 1icm, 1sz, 2acj, 2ag, 2axf, 2bec, 2bgo, 2bjo, 2bqu, 2ceg, 2chz, 2gk, 2ur, 2xay, 5aaz, 5ac, 5ad, 5ada, 5aek, 5afv, 5agj, 5ail, 5air, 5aiz, 5ak, 5akf, 5akw, 5alm, 5ame, 5amh, 5anl, 5apc, 5bd, 5dp, 5fn, 5g, 5gu, 5hw, 5hy, 5ij, 5id, 5nj, 5pu, 5oq, 5ox, 5qz, 5rv, 5sv, 5wk, 5wz, 5za, 5at, 5za, 5ab, 5ad, 5ajh, 5alg, 5avb, 5bh, 5blg, 5brt, 5bsg, 5cc, 5cdg, 5cgv, 5cni, 5cqe, 5ii, 5pl, 5xad, 7cf, 7eo, 7ez, 7dh, 7hx, 7mp, 9aan, 9abf, 9ado, 9adq, 9adr, 9aed, 9afi, 9afy, 9agt, 9ahy, 9aim, 9aio, 9ajk, 9ala, 9ali, 9aol, 9apa, 9apv, 9aqr, 9arm, 9ars, 9aso, 9ato, 9auc, 9auy, 9avb, 9awp, 9axd, 9az, 9azj, 9bbj, 9bbr, 9bcd, 9bch, 9bdk, 9bdu, 9be, 9bha, 9bhc, 9biu, 9biz, 9bjk, 9bjr, 9bk, 9bkl, 9bks, 9bka, 9bmk, 9bna, 9bnk, 9bof, 9boy, 9bs, 9bsh, 9bsp, 9buh, 9buk, 9bvc, 9bvw, 9bvw, 9bxi, 9bz, 9ca, 9cak, 9cb, 9cbz, 9cc, 9ccj, 9ceb, 9cfd, 9cfl, 9cfy, 9cgr, 9cib, 9ckl, 9ckj, 9clz, 9cmd, 9col, 9cop, 9cov, 9csg, 9cxa, 9cyd, 9cye, 9cyq, 9czk, 9dij, 9dfr, 9dhr, 9diz, 9djp, 9dlj, 9dly, 9ann, 9anp, 9doz, 9dpr, 9dps, 9dqu, 9dro, 9dtt, 9dum, 9dvv, 9dvw, 9dwx, 9dy, 9dzt, 9eij, 9eiy, 9ekf, 9eky, 9eld, 9em, 9ems, 9ep, 9er, 9ev, 9hp, 9ih, 9kq, 9lj, 9mm, 9pr, 9pn, 9qr, 9rt, 9vc, 9vk, 9wo, 9wy, Canadian: 1ar, 1ef, 2ax, 3ach, 3aec, 3gz, 3if, 3xi, 9bc.

**Hrd at 5DW Greenville, Texas, October Det & 1 Step over 500 miles.**

1abh, 1ahr, 1aww, 1bc, 1bge, 1bgr, 1bhk, 1bhn, 1biz, 1bkr, 1boa, 1ber, 1ccx, 1cln, 1cmp, 1ddm, 1er, 1gv, 1sz, 1te, 1vr, 1wr, 1xae, 1xam, 1xaw, 1xz, 1wz, 2aay, 2afp, 2ais, 2ana, 2anm, 2bgg, 2bqw, 2brb, 2byw, 2cei, 2cfa, 2chk, 2cjj, 2car, 2cwk, 2gk, 2ha, 2hr, 2kd, 2ku, 2mu, 2pd, 2wz, 3acy, 3adb, 3ajd, 3bfe,

3bg, 3ccj, 3ehc, 3chk, 3ckj, 3erz, 3hq, 3kq, 3mo, 3og, 3qg, 3zr, 4af, 4ai, 4aj, 4bq, 4fg, 4fs, 4io, 4ku, 4ly, 4oa, 4pl, 4rr, 4sa, 4sl, 4sh, 4tl, 5uk, 4xe, 4xu, 4zd, 5akw, 5aw, 5xat, 5zai, 5zas, 6aa, 6ac, 6ad, 6age, 6agk, 6ajf, 6ajh, 6akk, 6alu, 6alv, 6aoc, 6apw, 6bbc, 6bbh, 6bes, 6bd, 6bff, 6bft, 6bfw, 6bjx, 6bl, 6bnu, 6bq, 6bqa, 6bru, 6bur, 6cbb, 6ccy, 6cft, 6cga, 6cgw, 6chl, 6civ, 6eng, 6coq, 6cto, 6cz, 6fy, 6gg, 6ja, 6li, 6of, 6ry, 6ui, 6vc, 6vo, 6wi, 6xab, 6xad, 6yb, 7abb, \*7afo\*, 7fd, 7fr, 7gr, 7ij, 7lq, 7tk, 8abm, 8ada, 8afn, 8ajr, 8ale, 8alw, 8apw, 8atp, 8avx, 8avy, 8axf, 8bdt, 8bhj, 8bjv, 8bp, 8bpa, 8bqr, 8byn, 8cbp, 8cii, 8coi, 8cwp, 8exi, 8cxp, 8cyi, 8dal, 8dc, 8dfa, 8dha, 8dhw, 8doy, 8dpw, 8gz, 8ug, 8vq, 8ww, 8wx, 8xn, 8xs, 8xts, 8zy, 8zz, Seventy-eight nines. Cannuck: 1dq, 2cg, 9ch. English: 2od. Chilean. 9tc. Argentine: ch8. French: 5nf. Italian: iht. New Zealand: 4aa, 2ac, 4ag. Will QSL crd on request.

**5AQA—Ray Adams, 837 Grape St., Abilene, Texas.**

3oc, 3zo, 4akk, 4al, 4ft, 4jcv, 4rl, 4si, 4wt, 6afg, 6afh, 6ajh, 6ajk, 6ahp, 6alf, 6alw, 6ano, 6bas, 6bhm, 6bhx, 6bar, 6cc, 6chb, 6cmc, 6fz, 6ih, 6iuh, 6ti, 6rv, 6uw, 6vf, 6vo, 7cf, 7co, 7ct, 7df, 7ds, 7go, 7mf, 7ox, 8acm, 8afq, 8ard, 8bau, 8bf, 8bcu, 8brt, 8bkc, 8bzp, 8cly, 8cyi, 8dfo, 8dse, 8dt, 8dte, 8er, 8kz, 8nx, 8pu, 8sq. Mexican: ie, if, bx. Qrk? OM.

**5JF—1607 Fannin, Marshall, Texas.**

1aww, 1bgt, 1bgt, 1bj, 1blu, 1cmp, 1fd, 1ii, 1kc, 1ow, 1sz, 1te, 1xu, 2ana, 2brb, 2brc, 2cyc, 2cyw, 2ku, 3auv, 3mo, 4ai, 4bw, 4cr, 4cs, 4eq, 4ft, 4ku, 4oa, 4qf, 4rr, 4tj, 6aao, 6age, 6agk, 6alv, 6apw, 6bij, 6bka, 6bnu, 6buw, 6cft, 6cgc, 6cgw, 6cmu, 6cng, 6lj, 6pq, \*7abb\*, 7ij, 8aey, 8bau, 8bpa, 8bqv, 8buk, 8bxh 8byn, 8cdt, 8cmi, 8dfo, 8dhw, 8hn, 8kl, 8xb, 8yx.

**6AWT, 653 Union St., San Francisco, Calif.**

1ei, 1sf, 2by, 2brb, 3hg, 3oo, 3bec, 4ct, 4qf, 5aw, 5ck, 5ek, 5fm, 5gt, 5hy, 5jf, 5ka, 5lh, 5nt, 5nw, 5oq, 5ox, 5qi, 5rh, 5se, 5vo, 5xa, 5acm, 5aex, 5alz, 5amb, 5zai, 6any, 6bdt, 6er, 6ug, 6aeb, 6aua, 6bfk, 6bit, 6bft, 6con, 6czy, 6dea, 6doo, 6ei, 6rt, 6vc, 6wo, 6xnn, 6z, 9awm, 9axs 9bbz, 9cd, 9bjb, 9bji, 9bkj, 9bmk, 9bwj, 9coc, 9cpm, 9dbr, 9dbz, 9dhw, 9dow, 9dlm, 9dpx, 9efz. Canadian 3aa, 3gg, 4fv, 4gt. Australian, 2cm, nkf, nse, nerk.

**Stations heard by 7ZU from Sept. 5 to Oct. 25.**

1abe, 1ajy, 1ar, 1avr, 1bdq, 1bdx, 1bgz, 1bw, 1be, 1cmp, 1fd, 1sf, 1xw, 2aay, 2ag, 2ame, 2ann, 2apy, 2bqw, u-2by, 2by, 2cee, 2erk, 2ct, 2ha, 2il, 2kee, 2kf, 2ku, 2kv, 2nu, 2qs, 2sa, 2yb, 3afj, 3aq, 3bhv, 3bdo, 3bta, 3cel, 3cin, 3ek, 3d, 3dg, 3ig, 3lg, 3wb, 3xe, 4ab, 4ax, c-4ax, 4br, 4cb, c-4ads, c-4dg, c-4pq, 4ec, c-4fn, 4io, c-4hh, 4kt, 4kv, 5my, 5mi, 4oa, 4rr, 4tj, 4wb, 4xe, 4zd, 5abe, 5ac, 5ail, 5aj, 5afn, 5ajp, 5amo, 5ah, 5aqa, 5amb, 5ap, 5aw, 5anw, 5ce, c-5ds, 5fn, 5la, 5ni, 5nt, 5ot, 5ox, 5ov, 5se, 5ue, 5v, 5yd, 5za, (6abe), 6aad, 6abz, 6aao, 6adm, 6adb, 6ad, 6adt, 6acu, 6afq, 6age, 6agk, 6alw, 6amo, 6awk, 6awt, 6bua, 6bou, 6bca, 6bg, 6br, 6bna, 6bka, 6bma, 6buh, 6chl, 6cbb, 6cpw, 6cv, 6cmi, 6cax, 6cmv, 6(cef), 6cgs, 6cto, 6can, 6ee, 6fr, 6ey, 6gr, 6ri, 6gg, 6im, 6lv, 6nx, k-6o, 6os, 6oh, 6wt, 6wr, 7ajy, 7asv, 7ar, 7aef, 7ac, 7aim, 7age, 7abb, 7adf, 7ao, 7all, 7ajt, 7akk, 7ald, 7bz, 7cw, 7cu, 7ab, 7ad, 7fd, 7g, (7df), 7dm, 7ed, 7er, 7fa, 7fd, (7co), 7ef, 7dd, 7zv, (7ii), 7ij, 7ie, 7iv, 7js, 7kr, 7md, 7er, 7gn, 7gd, 7gv, (7ii), 7ij, 7ie, 7iv, 7js, 7kr, 7md, 7h, 7mp, 7nx, 7no, 7ng, 7nt, 7ob, 7pp, 7qd, 8acv, 8avx, 8apt, 8anp, 8ars, 8aps, 8ah, 8arr, 8atp, 8axo, 8bfe, 8bjy, 8bau, 8bs, 8byn, 8bft, 8br, 8bxh, 8ct, 8chy, 8cvt, 8ecd, 8ekd, 8cao, 8as, 8dbm, 8dgo, 8df, 8dfo, 8dvr, 8dkn, 8dxx, 8dal, 8drt, 8dea, 8do, 8dfe, 8dgo, 8dea, 8ed, 8er, 8fm, 8fd, 8gh, 8hf, 8nx, 8ro, 8sf, 8wx, 8wz, 8xe, 8zy, nerk, nkf.

**L. F. Strobel, 680 Yale St., Akron, Ohio. 8BSR**

1aac, 1ail, 1ajo, 1ajt, 1ajx, 1ape, 1are, 1aur, 1awq, 1aww, 1bc, 1bdx, 1bgg, 1bie, 1bis, 1blu, 1boa, 1bv, 1chl, 1cl, 1cmp, 1coj, 1fd, 1hn, 1om, 1qr, 1ve, 1xam, 1zm, 4db, 4hs, 4kk, 4my, 4pb, 4pd, 4si, 4vn, 4xe, 5aaq, 5abc, 5acm, 5adw, 5aeq, 5ax, 5agj, 5ahj, 5ail, 5aiq, 5air, 5ay, 5ayj, 5ajp, 5akn, 5alz, 5amg, 5amh, 5amw, 5apc, 5aq, 5asf, 5aw, 5ba, 5ek, 5ey, 5dw, 5ek, 5gk, 5gu, 5hj, 5hr, 5in, 5io, 5ly, 5nj, 5oq, 5ox, 5pa, 5ph, 5qh, 5qj, 5qk, 5p, 5sh, 5uk, 5v, 5w, 5ya, 5xz, 5yw, 5yd, 5zr, 5zs, 6afg, 6akz, 6alw, 6awt, 6bkb, 6brf,

6bsg, 6bts, 6cch, 6cci, 6cgw, 6chl, 6chx, 6cnl, 6cqe, 6cto, 6kt, 6li, 6ne, 6pl, 6ux, 6xad, 6zh, 7acf, 7ahs, 7co, 7dd, 7dh, 7gu, 7hx, 7kz, 7mp, 7q, 9aal, 9aau, 9akw, 9acq, 9ado, 9adp, 9adq, 9aed, 9aef, 9agt, 9ahz, 9aim, 9aje, 9akf, 9akn, 9ala, 9and, 9apa, 9agr, 9asw, 9atl, 9auy, 9avb, 9awl, 9axd, 9axs, 9azf, 9bcd, 9bds, 9bdf, 9bex, 9bfb, 9bfg, 9bie, 9bji, 9bjk, 9bks, 9bvg, 9bmx, 9bnk, 9bof, 9bpf, 9bvr, 9bvt, 9bsp, 9bvk, 9bv, 9bvw, 9bwz, 9bxi, 9byc, 9ccs, 9cdc, 9ceb, 9cee, 9cgn, 9chd, 9che, 9chx, 9cis, 9ckd, 9eld, 9emd, 9eme, 9cmx, 9ent, 9cm, 9epo, 9epy, 9epz, 9erg, 9cro, 9cif, 9ctg, 9cvl, 9cwn, 9cws, 9cxg, 9dac, 9da, 9dbz, 9dcw, 9ddk, 9deg, 9dgb, 9dgr, 9dhw, 9dmh, 9dno, 9dpr, 9dq, 9dsd, 9dte, 9du, 9dun, 9dvv, 9dvw, 9dwi, 9dy, 9dzg, 9eak, 9ecv, 9eky, 9ely, 9epa, 9ex, 9jg, 9nv, 9tf, Porto Rico 4je, 4kt, 4rl Can. 2fo (3gv) iht.

**8DOF, 31 Kingsville, Ave., Ashtabula, Ohio.**

1aae, 1aco, 1acs, 1agg, 1aou, 1are, 1axa, 1axz, 1bbe, 1bdx, 1bjo, 1bkk, 1bqe, 1bg, 1cbh, 1fb, 1hn, 1yk, 1zk, 2aan, 2acs, 2agw, 2bck, 2bec, 2bgi, 2blm, 2bsc, 2bu, 2byg, 2cdp, 2cee 2ch 2cy, 2crp, 2ct, 2cty, 2ev, 2ex, 2ff, 2gk, 2kx, 2y, 2sr, 3ac, 3acy, 3ad, 3agf, 3ahp, 3aih, 3apc, 3auv, 3bbs, 3bco, 3bhv, 3bv, 3bsf, 3bvt, 3bu, 3cox, 3cfc, 3cgs, 3chg, 3cin, 3cka, 3ckl, 3hg, 3hh, 3ic, 3kj, 3kq, 3lg, 3qt, 3sp, 3ti, 4ai, 4db, 4gw, 4mi, 4pd, 4si, 4tn, 4ua, 4vl, 4xc, 5acm, 5ads, 5aef, 5aeu, 5afh, 5agj, 5air, 5akf, 5alz, 5amg, 5amh, 5aqy, 5bq, 5er, 5fh, 5fs, 5in, 5ka, 5mi, 5mz, 5ox, 5qn, \*5uj\*, 5vu, 5yd, 6ac, 6adt, 6ahp, 6cgw, 6cgy, 6fh, 6rn, 9ach, 9ado, 9adq, 9agj, 9agt 9aim, 9arj, 9att, 9atx, 9avb, 9awf, 9axf, 9bdu, 9bji, 9bms, 9bpf, 9bqh, 9bv, 9bv, 9bu, 9cap, 9cbz, 9c, 9cdp, 9cee, 9egn, 9cp, 9cpm, 9ctr, 9ext, 9dap, 9dbz, 9dct, 9del, 9dlj, 9drc, 9dsx, 9dtt, 9dvw, 9dxy, 9dyt, 9eht, 9ei, 9ej, 9elv, 9em, 9hp, 9mm, 9oa, 9rt, 9ta, 9ut, 9uz, 9vr, 9yb, Can: 3aa, 3ad, 3gv, 3lv, 3xt.

**9APY—3337 Oak Park Ave., Berwyn, Ill.**

All heard and worked during October.

C. W. 1avl, \*1axa\*, 1bet, 1biz, 1cmp, 1db, 1ez, 1hn, 1my, 1om, 2bqh, 2bv, 2cbk, 2cor, 2cv, 2wz 3aha, 3do, 4gw, 4hr, 4jr, 4si, 5ac, 5aef, 5aeg, 5afv, 5akn 5akw, 5amw, 5aqw, 5cg, 5ct, 5nt, 5qk, 5tx, 5ua, 7cf, 8af, 8boy, 8bpn, 8bap, 8ct, Canadian. C-3vh. A crd awaits every QSL. QRK?

**9BVA, N. Main St., Amherst, Wis.**

1aig, 1ajp, 1all, 1asr, 1awe, 1aww, 1bdx, 1bx, 1bqe, 1ccz, 1db, 1gh, 1gk, 1gv, 1mo 1qk, 1sf, 2abt, 2ana, 2axf, \*2bkr\*, 2cee, 2chu, 2cjj, 2cnk, 2crp, 2cua, 2cxy, 2cyw, 2bm, 2cy, 2ld, 2qd, 3abh, 3abw, 3agf, 3auv, 3btt, 3blc, 3blu, 3by, 3blp, 3bnu, 3odn, 3dq, 3lg, 3ph, 3ff, 3zo, 4dx, 4hs, 4jr, 4oa, 4rr, 4sa, 4si, 4tj, 4vm, 4wr, 5agj, 5ail, 5amb, 5amw, 5apc, 5aqw, 5aqy, 5mi, 5za, 6ahp, 6aji, 6blw, 6bdt, 6bjx, 6bth, 6cdg, 6cgo, 6cto, 6li, 6ti, 6ts, 6gw, 7ahi, 7co, 8daa. Canadian: 3ly, 3xi. British, 2bm. All cards QSL'ed.

**9ECA, Grandy, Missouri.**

All C. W. 1aac, 1aal, 1aap, 1asa, 1awe, 1bgq, 1bgt, 1bkr, 1cab, 1ccx, 1cg, 1er, 1fd, 1gu, 1my, 1sf, 1xu, 1xz, 2aai, 2aay, 2aco, 2ag, 2bgg, 2brb, 2byg, 2crp, 2czr, 2gc, 2gk, 2mc, 2wz, 3adp, 3ad, 3acc, 3afg, 3afj, 3ajf, 3bdo, 3bbs, 3bu, 3cdg, 3chg, 3cia, 3cin, 3cjr, 3ckl, 3hd, 3hh, 3ka, 3lg, 3mo, 3og, 3oq, 3pw, 3uy, 3vb, 3vp, 3zo, 3ai, 3bg, 3ch, 3eh, 4fs, 4jk, 4pd, 4gf, 4rr, 4v, 4z, 4si, 4vn, 5ai, 5aa, 5aaw, 5ab, 5acm, 5adh, 5aek, 5afu, 5azj, 5ahw, 5ar, 5ajh, 5aji, 5ajj, 5ajn, 5ajt, 5aju, 5ajv, 5akb, 5akf, 5aku, 5amb, 5ame, 5amh, 5ams, 5amu 5aog, 5apg, 5bj, 5oc, 5ck, 5ek, 5ew, 5ex, 5fe, 5gc, 5hi, 5ka, 5kq, 5mz, 5oi, 5ot, 5ov, 5ox, 5ph, 5az, 5tn, 5ua, 5ue, 5ua, 5xbh, 5za, 5zas, 5zav, 5zk, 6aao, 6agk, 6ahx, 6ajh, 6ame, 6bap, 6bqr, 6brf, 6bty, 6buo, 6bur, 6cax, 6cdn, 6cfz, 6chx, 6css, 6cxf, 6fy, 6ih, 6ka, 6rn, 6ry, 6vw, 6wi, 7ah, 7db, 7gk, 7hx, 7ij, 7ot, 7qd, 7zl, 7zo, 8act, 8acu, 8ae, 8ajf, 8ajp, 8al, 8amn, 8apn, 8apu, 8aru, 8atp, 8auk, 8avx, 8bhu, 8bjv, 8bkh, 8bpl, 8brq, 8btu, 8byf, 8cci, 8eck, 8edd, 8ed, 8ep, 8efe, 8chb, 8cgh, 8cwk, 8cww, 8eyo, 8daa, 8dcv, 8dmm, 8dfo, 8dga, 8dgo, 8dha, 8dhw, 8die, 8dif, 8dig, 8dix, 8doi, 8dpp, 8ef, 8er, 8fm, 8fy 8tj, 8uq, 8vq, 8vt, 8wa, 8xe, 8zo, 8z. Can. CW.: c1ef, c2ax, c2az, c3ly, c4cr, c4db, c4dq, c4hh, U. S. Fones, 9ahj, 9bsp, 9erf, 9cfj, 9cni, 9cm, 9cym, 9dce, 9dl, 9did, 9dyt, 9efe, 9emd, 9dg, 9aj, 9ua, 8dat, 8bss, 8bvt, 8brt, 8amw, 8adz, 8amf, 8kp, 8ake, 8ajv. English CW.: g2nm.