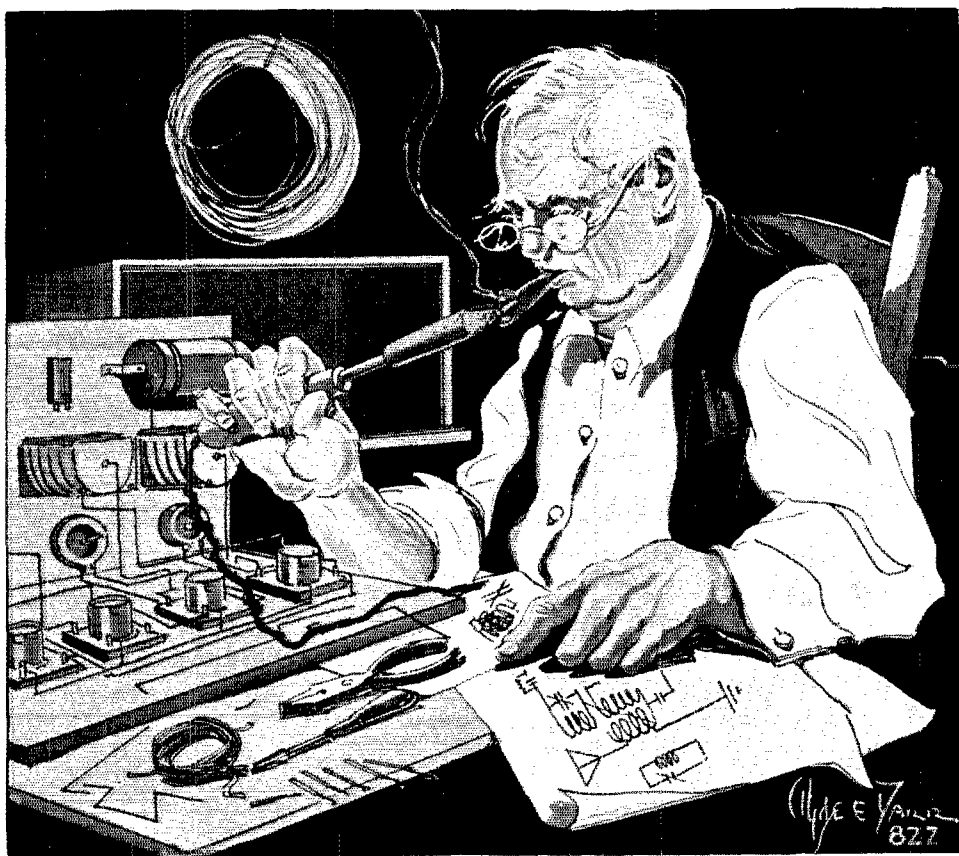


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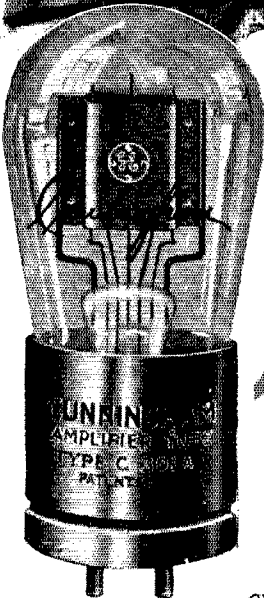
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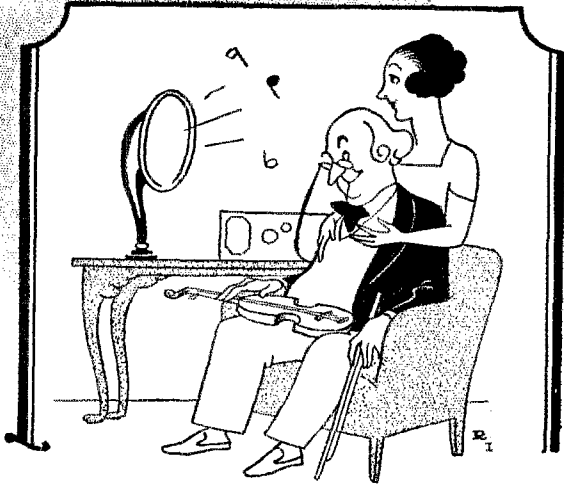
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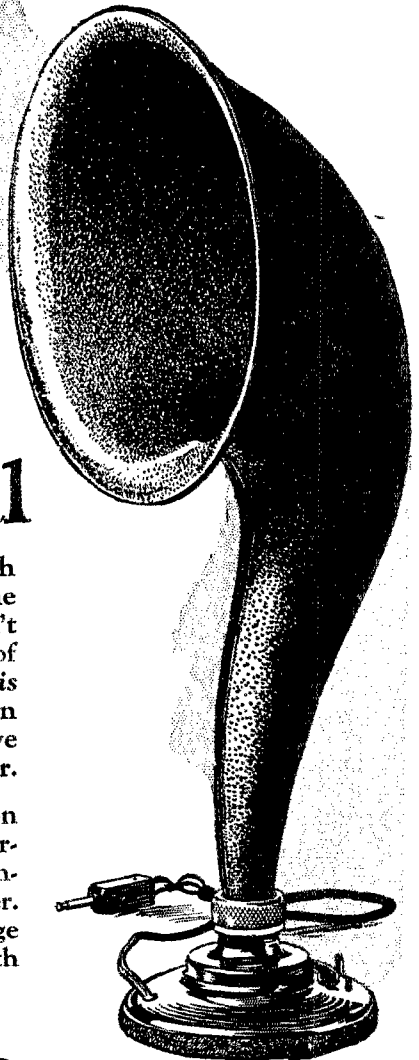
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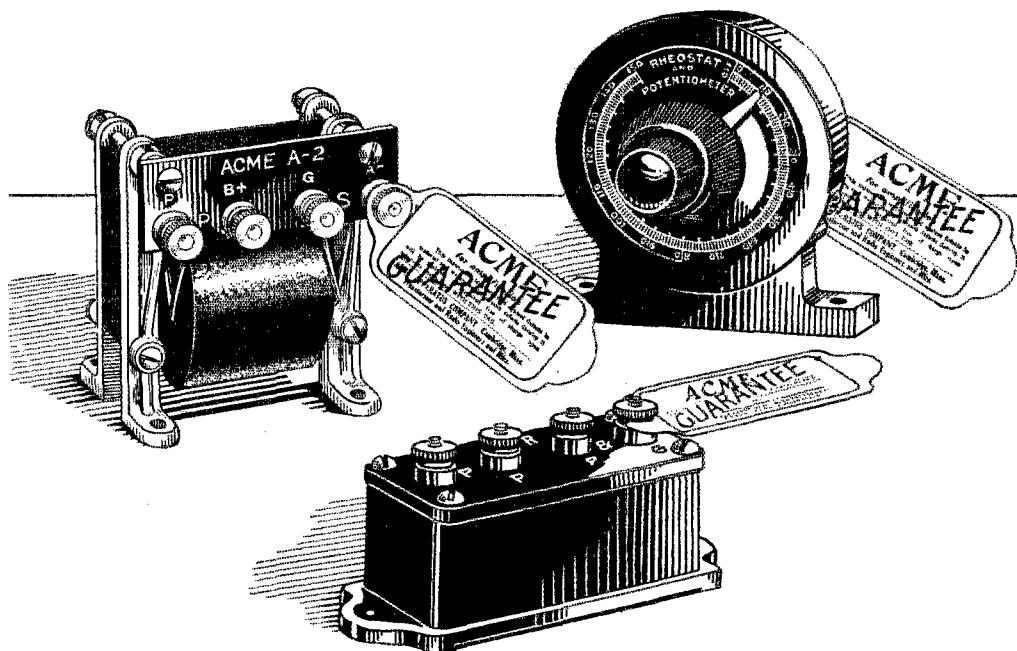
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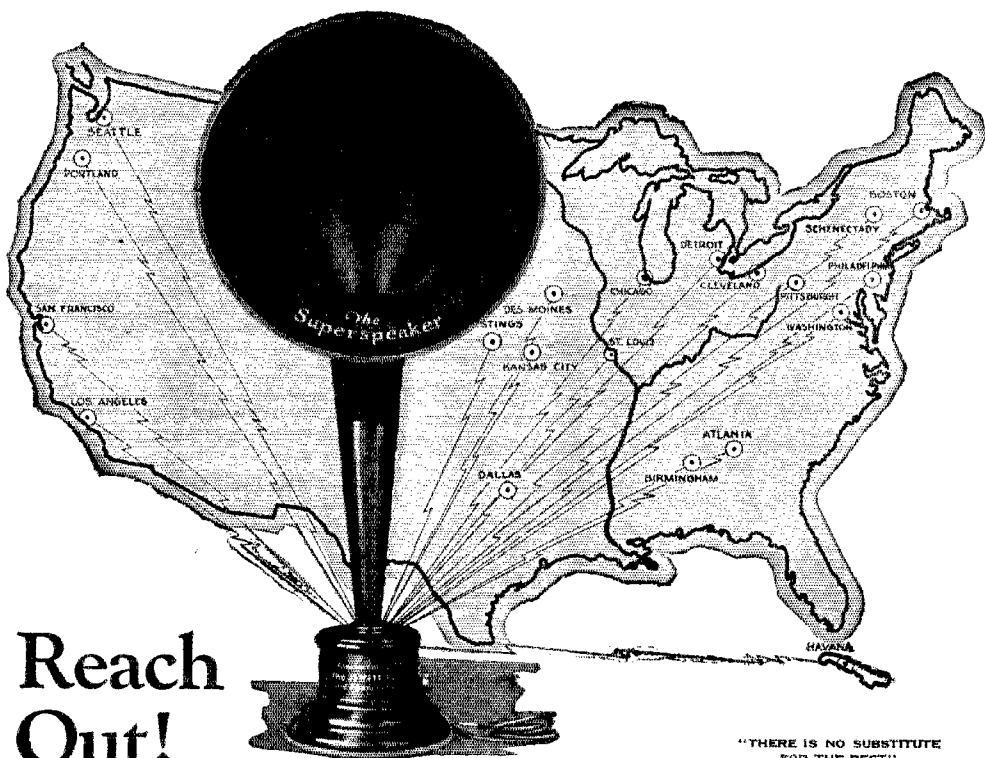
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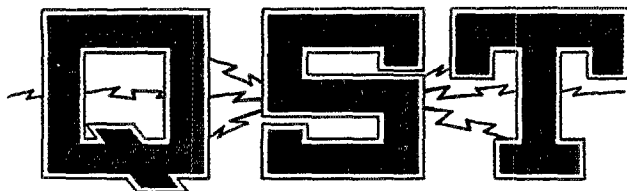
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The Official Organ of the A.R.R.L.

VOLUME IX

JANUARY, 1925

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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



This League of Ours

WE'VE encountered quite a few amateurs recently, even members of the American Radio Relay League, who haven't any really adequate idea of the nature of the League, and it seems we should tell the story again.

Every reader of these lines who is a member of the A.R.R.L. is a part owner of a wonderful and unique organization. Eighteen thousand amateurs have bonded themselves in a non-commercial self-governed society in order that they may gain thereby a greater measure of enjoyment from their chosen hobby of amateur radio than would be theirs as isolated individuals. Starting very modestly something over ten years ago, today the A.R.R.L. is the foremost amateur spokesman of the world, recognized by our government as representing the amateur, our co-operation sought by nations, great scientific agencies, railroads. It is important to realize that this League has no "owners" other than its membership. The A.R.R.L. and all its physical properties belong collectively to the individual members; nobody at Hartford owns any more of it than the youngest member in the most far-distant point.

Let us examine its make-up for a moment. It is an association without capital stock, incorporated under the laws of Connecticut. Unfortunately we haven't space here to tell of the birth of the idea of the A.R.R.L. and its very early history but it's told in a little booklet called "The Story of the A.R.R.L." which we'll be glad to send anywhere upon request. The progress of the League has been one of gradual unfolding, and this has been particularly true of its system of government, which has become more and more democratic as the number of amateurs increased and with it, possibilities of representative government. Today we have a constitution under which our affairs are governed by a board of directors chosen one from each of the thirteen League divisions in the United States and one from Canada, who then jointly elect their president and vice-president. This makes a board of sixteen members. The other officers of the League are not directors, but are engaged and put to work by the Board, and are subject to its orders in all respects. There exists at Headquarters an organization of some two dozen people, working daily on the affairs of the League. This staff is divided into the familiar sections:

general administration, traffic, editorial, financial, information service, advertising, circulation, publicity, etc. It exists as a service to you, the members, maintained and governed by you thru your appointed Directors. It makes possible a great number of benefits that come to all of us amateurs as the fruit of co-operative effort, benefits that would never be ours as isolated amateurs, that are ours only because we are organized.

For example, there is our Traffic Department, co-ordinating our practical work on the air, working to achieve a reliable continent-embracing network of communication and an army of skilled operators, while it provides us with interesting activities: a huge organization, possible only because we are organized. Then there is the participation we are able to secure for ourselves in matters of legislation and regulation, where down thru history it has been a constant story of being on the job to protect ourselves from aggression, either because other people were ignorant of our true nature or jealous of our privileges; and that ability to protect ourselves exists solely because we have our national association. Then there is our magazine, our *QST*, co-operatively run, bringing us each month the latest ham news and the best technical dope and fostering the A.R.R.L. spirit. It seems desirable to emphasize here that nobody at Hartford owns *QST*; that, like all other A.R.R.L. activities, this magazine belongs to the membership of the League; the staff at Hartford do not even own the pegs on which they hang their hats in the morning. And because we are organized we have a headquarters information service for members, we are able to maintain a publicity department getting recognition for the amateur and correcting the terrible public ignorance that once existed over this country about the value of the amateur. If we had many pages of *QST* at our disposal we could fill them all with examples of the benefits that come to all of us because we have our national organization, but these few examples must suffice.

There is another way of looking at the proposition. Why are we amateurs? It is because we want to build and operate stations. Why do we have a League? It is because thereby we can secure a greater measure of enjoyment from the pursuit of our hobby than would be ours as unorganized individuals. Everything the League does—its traffic work, its tests, the dissemin-

nation of technical information, the protection in legislative matters, everything—is for the purpose of increasing our individual possibilities in practical work, for the ultimate aim of the radio amateur is to study, build and operate.

And so we join together and have our A.R.R.L., an organization made possible only by the eager desire of amateurs all over the world for a co-operative and protective association. We admit it isn't perfect, but it's the best we know how to make

it now and it's getting better all the while. It can be no better than you—the individual amateur—make it. It is made up of your fellows. It is really the duty of every amateur to belong to it, to help support it, to throw his weight thereby to the protection of amateur interests, to side with good government in amateur affairs—and in return share these benefits of organized co-operation.

By the way, there is a convenient application form on page 62.

Obituary

We sincerely regret to have to announce the death of Leon Wilber Bishop, 1XP, a sincere amateur, ardent experimenter, and writer of technical radio articles. Also, by the way, one of the men who honestly developed good practical Super-regenerative circuits, although he did not get his due credit. Bishop had suffered from ill health for a number of years and had waged a gallant and courageous struggle against it. He left us rich in the respect and admiration of his associates and contemporaries. His death occurred November 6th, 1924.

Particularly the old timers will be sorry to hear of the death of Harrison Schanck of Yonkers, owner and operator of old 2ADM. He was a sincere A.R.R.L. member and an excellent operator. His memory will certainly be revered and his absence felt. He was killed November 7th, 1924, in an automobile accident.

"Washington has lost one of its most prominent amateurs in the death of Mr. George M. Phillips, 3BPF-3XAP," writes Darne of 3BWT. "Mr. Phillips was one of Washington's pioneer hams, and had one of the best transmitters ever operated in the city. He was always known as a true friend, a good sport, and a sincere amateur. His friends will sincerely miss his friendship and his help. He died August 6th, 1924.

A New Volume

THIS issue marks the beginning of *QST's* ninth volume. Our "volume years" have never conformed to the calendar years—since the war they have started with the August issues. This has been confusing and inconvenient for many reasons, so, rather than change the calendar year, we have decided to cut off Volume VIII with only five issues and start Volume IX with January, 1925.

Bound Volume VIII will be ready and advertised soon. An index for Volume VIII will be mailed with the February membership edition. Better join before January 15th and get the index!

—F. C. B.

Governors'— President Relay

Remember the good fun we had during the Governors'-President Relay a few years ago? That was during the days when we used the higher waves. Now we are going to have a chance to see if we can make better speed on the 75-80 meter waves, when we pull off the second Governors'-President Relay during the first few days of March. Details coming along in February will have complete dope—but remember this is going to be an accuracy-speed contest. Don't miss it, gang!—F. H. S.

Some Cylindrical Self-Supporting Coils

By John M. Clayton, 1DQ*

AT the outset please understand we are not presenting any revolutionary theory or practice. We are just trying to combat the effects of the Lorenz type coil craze in showing that there is some other form of self-supporting coil which is just as good as the now famous Lorenz. As explained by Mr. Hatry in this month's "Amateur Builder" the ideal type of coil is one having a maximum inductance for a given length of wire, together with minimum distributed capacity and minimum high-frequency resistance at the particular frequency band in which the coil is to be used. The coils about to be described are practically self-supporting hence have a minimum amount of solid dielectric in their fields and a low R. F. resistance; they can be wound so as to have a minimum distributed capacity; they are sufficiently strong for practical purposes.

These coils were first described by Harold Westman of 2BQH and independently by Mr. Mandly of Hartford. Figure 1 illustrates four of them together with a sample form on which one of the four was constructed. In making the form for winding, quarter inch wood dowels are driven into holes in

easily. After the required number of turns have been wound, fasten the other end of the wire around a dowel. The spacing between wires is governed by the size of the string used in tying the wires. The three smaller coils in Fig. 1 were tied with ordinary twine, while "chalk line" was used for the large coil. The string should be waxed before tying the coils, to prevent moisture absorption.

Next cut piece of cord about four times

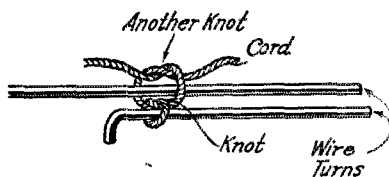


FIG. 2

as long as the finished coil will be. Pry up the bottom turn of wire from the dowel-base and slip one end of the cord under the first turn. Pull the cord thru until there is an equal amount of it both inside and outside the coil. Slip the first turn back



FIG. 1. THE WINDING FORM AND SOME OF THE COILS DESCRIBED IN THIS ARTICLE

a block of wood an inch thick. The dowels must fit tightly so that, when the coil is wound on them, there will be no tendency for the dowels to spring in. The number of dowels required will vary from 6 to 12 depending on the diameter of the coil. The dowels should be at least an inch longer than the completed coil will be.

Start the winding by hooking one end of the wire around one dowel at the bottom. Then LOOSELY wind on the required number of turns on the dowels, taking care not to draw the wire tight enough to make the winding non-cylindrical. The wire should be loose enough to slide off the dowels

A.R.R.L. Information Service.

in place and pry up the second turn. Now pass the end of the cord which is inside the coil OVER the first turn, and pull it thru so it is on the outside of the coil. Then pass the other end back into the center of the coil. Slip one of the cords over the other so that a "half hitch" knot is tied in the cord. This knot should be on top of the first turn of wire, and it should be drawn as tight as possible. The idea will be gleaned from Fig. 2. Successively repeat the above process, alternately weaving the ends of the cord around the turns of wire and tying a knot between each wire. It will be best to start tying the knots alongside one of the dowels so that the

knots will be in line, using the dowel as a guide.

When the top of the coil is reached tie two half hitches in the cord, clip off close to them and daub the knot with glue to keep it from coming untied. The number of rows of knots will depend, also, upon the diameter of the coil.

Fig. 3 shows a section of coil wound on glass supports. Notches were moulded in



FIG. 3

the glass rod by clamping the glass against a notched piece of metal and heating with a blow torch until the glass softened. While probably more difficult to build, this coil should have even lower losses than the "knot spaced" variety.

The following table contains wave length ranges with the four coils illustrated when shunted by a 250 μ f. Cardwell condenser. The coils were successively cut down and their range remeasured as per this table*.

Coil No. 1 had a diameter of $2\frac{1}{4}$ inches and was wound on 6 dowels on a 2-inch circle. The coil was wound with No. 18 Double Cotton Covered Annunciator wire—the covering being paraffined. Coil No. 2 had a diameter of $2\frac{1}{4}$ inches and was wound with 25 turns of the same size wire. Coil No. 3 has a diameter of $4\frac{1}{4}$ inches

and was wound with 35 turns of No. 16 D.C.C. magnet wire. Coil No. 4 had a diameter of $6\frac{1}{4}$ inches and was wound on 12 pins on a 6 inch circle. There were 27 turns of No. 13 enamel wire in this coil. It is probable that it would have been better to wind all the coils with enamel wire. The excess insulation on the 3 small coils contributes nothing as the proper spacing could have been obtained by using larger cord. However the insulation on the wire is so much unnecessary dielectric in the field of the coil, and could have been eliminated. Also no attempt was made to proportion the coils to the proper diameter-length ratio, nor was there any attempt to secure the theoretically correct spacing of turns for the given diameters. The coils were successively measured, cut down and remeasured; the wavelength ranges being determined by means of an oscillator and wavemeter.

No. Turns	Wavelength range	
Coil No. 1		
35	72-157	meters
25	46-136	"
15	35-103	"
10	25-72	"
Coil No. 2		
25	61-196	"
15	49-147	"
10	34-106	"
Coil No. 3		
35	100-320	"
25	80-244	"
15	53-180	"
10	42-119	"
Coil No. 4		
27	100-300	"
27	100-540*	"
15	60-190	"
10	29-87	"

*Due credit should be given Harold Westman of 2BQH for his help in calibrating the coil ranges.

*Capacity varied from 15 μ f to 850 μ f

Tuners With Spaced Windings

By S. Kruse, Technical Editor

FOR some reason the impression has gotten around that QST has no faith in any coil which is not wound in the Lorenz fashion, either pancake or basket type. Quite the contrary—we have repeatedly said that we have no faith in the pancake coil, believing it to have no particular advantage except compactness. We have also said very distinctly that we regard the Lorenz coil as having one advantage—and only one—namely the fact that its distributed capacity is low. If anyone is in doubt in this matter

they are advised to read over again "More About Low Loss Coils", also Dr. Pickard's paper "The Receiving Coil Problem" in the October issue.

There is an excuse for the Lorenz coil in the low distributed capacity, but the writer has a notion that it is popular mainly because of its attractive appearance and the ease with which many coils can be made on a single coil-winding form, especially when one is "tinkering" with different sorts of coils. As a commercial proposition the coil seems doubtful—the

chances for short-circuited turns are excellent and most manufacturers make no test for such accidents. There is a notable exception, one firm is using a balanced induction bridge for this purpose. Others should do the same for a single shorted turn will play hob with the signal strength.

When a Coil Needs to be Good

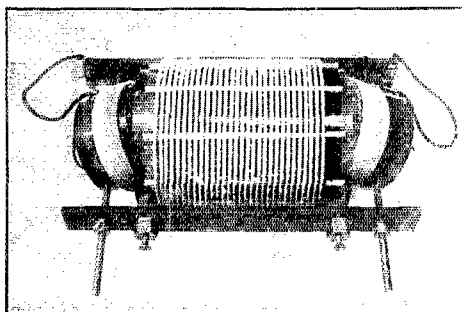
Of course the whole question of losses in coils becomes less important as we approach the condition of oscillation—in C.W. reception it is least important of all. It is interesting therefore that experience has proven Ballantine's; contention that *even in oscillating reception* it is of value to cut down the resistance of the input circuit. The difference is not noticeable with strong signals—of course it can hardly be expected to show up very startlingly with voltages that can be measured easily. Where the effect seems to be greatest is on those signals that are too weak to hear with the poor coil—but come in with the good one.

The story is totally different when the set is non-regenerative. Here the coil re-

proving mightily in these matters and most of the kits of parts have followed their lead.

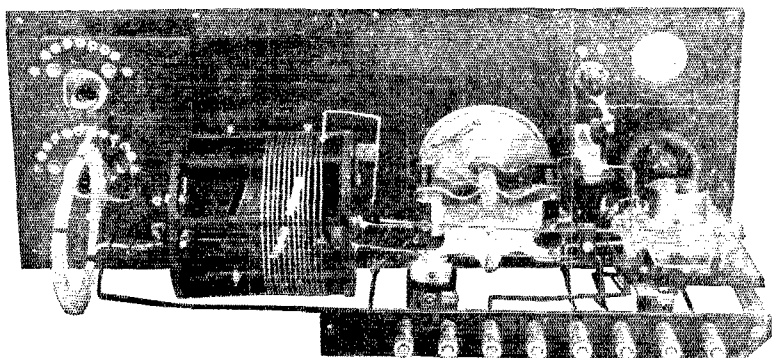
What Makes the Coil Good

I have ranted about the "coilquestion" un-



THE BELL SPACE-WOUND TUNER

til I am frankly rather sick of it. I do not propose to touch the matter again,



CONVERTED ZENITH TUNER WITH SPACED WINDING

The replacement of the original winding is no reflection on the winding the manufacturer put on—the idea of making the change was to transfer the wavelength range to a new position. Since a smaller coil would answer it was possible to use a spaced winding while still being perfectly sure that the field of the coil would not spread all over the set.

Secondary coil diameter 4 inches, 11 turns number 14, spaced 1/16".

Primary—Fixed coil with 6 turns tapped at 3. Coupling set at best position and left there. Only one of the primary switches is used.

Tickler—Diameter about 2 1/2", 5 turns, size does not matter much.

Condenser—250 micro-microfarad, General Instrument Co., operating with the original Zenith belted vernier.

Socket—Garod-Pyrex.

Wavelength range—59 to 149 meters with margin left at both ends of the scale.

sistance is something to worry about, and it is in just these sets that the coils are usually the poorest. For instance most homemade neutrodyne and superheterodynes (not to speak of the re-, counter-, super-, ultra- and-Lord-knows-what-else "flexes") are provided with the poorest sort of input tuner and no decent chance to use controlled regeneration to alleviate the matter. Factory-made turners are im-

wishing to leave further talking along this line to others who have some new ideas that the readers of QST are not already wearied by.

However—since this is the last "say"—I wish here to stress again the fact that there is no special virtue in any sort of fancy winding unless it—

1—Lowers the distributed capacity.

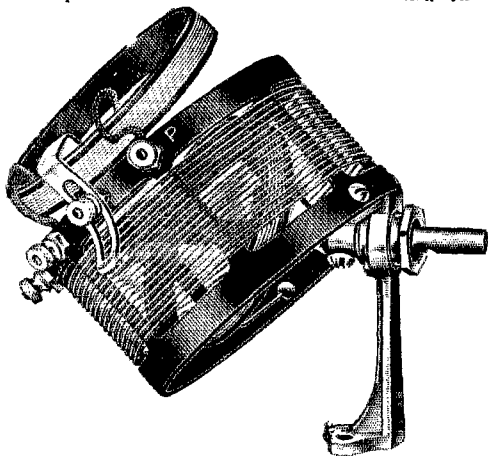
2—Does not spread the coil field all over

the neighborhood so as to include all the hardware and insulation in the set.

3—Keeps down the eddy currents in the wire of the coil.

4—Does not require an elaborate insulating frame with much "high-loss" material next the wire.

Requirement one is the easiest and the



THE BREMER-TULLY SPACE-WOUND TUNER

rest are about equally hard to meet. As a rule one can take care of No. 1 by spacing the wire in almost any fashion whatever (Lorenz winding, spaced helix, etc). But—as soon as this is done we run into an argument with the other three requirements. The second requirement especially sneaks into the argument while the designer is looking the other way—because Mr. Designer was looking at the coil alone without remembering that the thing had to live inside a set.

When one has 4 variables, guesswork is worthless. The only way out is to measure a "family" of coils and choose the one that fits the job best. Of course the measurements must be made under the operating conditions—make a good coil first and then make sure it *stays* good when in the set.

Which Sort of Winding

One of the simpler windings, meeting all of the 4 requirements to some degree, is the old-fashioned helix with spaced turns. It is not especially hard to make, there is no trouble with shorted turns, and taps can be made easily. As to the losses—certainly they compare very favorably with any of the "fancy" windings so that it is a matter of personal opinion.

And now—let us have done with the coil business until someone arises with some measurements, such as those given by Dr. Pickard. Several men in the experimenters Section are working on the thing now.

WWV and 6XBM Schedules

THE Jan. 5 and Feb. 5 schedules give good opportunities for checking our wavemeters on the shorter waves. Don't miss these.

Details regarding these transmissions are given on page 51 of the November issue.

Schedule of Frequencies in Kilocycles

(Approximate wave lengths in meters in parentheses)

Time*	Jan. 5**	Jan. 20	Feb. 5**	Feb. 20
10:00 to 10:08 p. m.	2000 (150)	1500 (200)	3000 (100)	125 (2400)
10:12 to 10:20 p. m.	2200 (136)	1650 (182)	3300 (91)	133 (2254)
10:24 to 10:32 p. m.	2500 (120)	1800 (167)	3600 (83)	143 (2097)
10:36 to 10:44 p. m.	3000 (100)	2000 (150)	4000 (75)	155 (1934)
10:48 to 10:56 p. m.	3500 (86)	2200 (136)	4400 (68)	166.5 (1809)
11:00 to 11:08 p. m.	4200 (71)	2450** (122)	4900 (61)	205 (1463)
11:12 to 11:20 p. m.	5100 (59)	2700** (111)	5400 (55)	230 (1153)
11:24 to 11:32 p. m.	6000 (50)	3000** (100)	6000 (50)	315 (952)

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

**The schedules marked with this sign are tentative for station 6XBM, Stanford University; later announcement will be made if there is any change.

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.

Super DX

Amateurs of Europe, Australasia, South and North America Now All Working Each Other Nightly

THE past month has been so replete with wonderful developments in world-wide amateur communication that the Editor is quite at a loss to know where to start the story. It is perfectly dazzling, this story of the conquest of space, brilliant with achievements that stagger the imagination. Australasia is talking nightly to Europe and both of the Americas, France is QSO the Argentine as well, and Chile and Denmark have been added to the list of the U. S. ham. Some of this work has been at distances greater than half the circumference of the world, paradoxical as that may sound. All of it has been on waves between 75 and 100 meters, and most of it with powers below 300 watts. The air is a maze of far-off chirpings, and with an ordinary low-losser anyone can bag a couple of dozen foreigners from a half-dozen different countries on any decent night. It makes thrills run up and down the old backbone to hear the varieties of notes, fists, languages and intermediates that shout to the world that the day of true international amateur radio is here!

The Work With Australasia

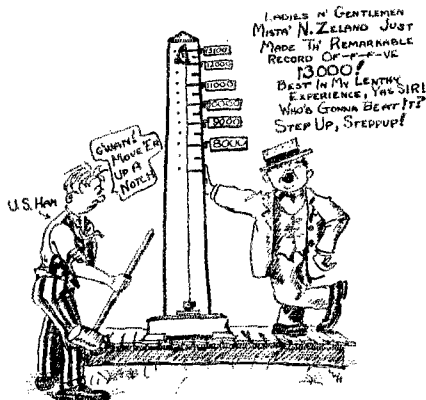
Perhaps America's greatest kick the past month has come from working the "Zedders" and the "Aussies". A big number of U. S. hams have tied up with one or more. The list of Australasians working this continent comprises z2AC, z2AP, z4AA, z4AG, z4AK, a2CM and a3BQ. u6AHP in Pomona, Cal., and u6AWT in San Francisco have worked all seven of them, u6CGO in Orange, has worked all but z2AP and has been QSO sixteen times in the first half of November, while even as far East as Atlanta u4IO has worked z2AC, 4AA, 4AG and a3BQ. u1AAC in Framingham, Mass., worked z2AC for three-quarters of an hour using one 5-watt with an input of 35 watts, DX 9000 miles. Many messages have been handled in both directions, one being of greetings from the Wireless Institute of Australia, Victoria Section, to the A.R.R.L., handed by a3BQ in Melbourne direct to u1SF at Short Beach, Conn.

Among the many other stations communicating with the Anzacs in recent weeks are 1KC, 1BKQ, 3AUV, 3CHG (first U. S. ham to report verified reception of N. Z.), 5UK, 5LU, 5DW (many times), 5OX, 6GG, 7FD, 7GM and 9EFZ. Countless others

have heard the Z's and A's of course. The only Anzac heard but not worked is a2ME, reported by 6AHP, and also heard in England. We are very glad to see Maclurcan, a2CM, in the bunch getting over; he has been heard as far East as u1KC. But we mustn't get stuck up over this communication, for the Europeans have it beaten to death, and even this reception is nothing, for French 8FJ has copied 19 "Enzeds" and 3 Australians on one night, 167 U. S. stations in an hour and a half, and over 1000 U. S. and Canadians this season!

The best time for U. S. work with Australasia would seem to be from 4:00 to 6:00 a. m. C. S. T. The wavelengths run from 80 to 95 meters. Those reported for the most prominent stations are: z2AC, 83; 4AA, 89; 4AG, 85; 4AK, 84; a2CM, 88; a3BQ, 84.

The Zedders are giving us the merry razz for calling and not listening long enough, for poor operating, for being helplessly un-



able to make conversation beyond the senseless Q-formalities when we really do hook up. Let's buck up, fellows.

Chile QSO U. S. A.

California got a real thrill on the night of Nov. 17th when 6CGO, 6LJ, 6AHP and 6GT all tied up within an hour with Chilean 9TC, operated by our good friend Major R. Raven-Hart at Los Andes. This is Chile's first contact with us. ch9TC is on about 86 meters; D. C. CW. This work was also overheard by g2OD and u3VAP. On Oct. 28th u5DW had heard ch9TC calling z2AC, altho we do not know whether they hooked

up. Major Raven-Hart operates two stations, Argentine MA1 and Chile 9TC. His most convenient mail address is c/o Union Club, Necochea y Peru, Mendoza, Argentine Republic. As we have previously reported, the major offered a genuine Chilean hat to the first U. S. amateur to tie up with Chile. 6CGO has won it, and Raven-Hart helped him to do it. A message came via ch9TC to u6CGO:

QUIST HARTFORD
CREDIT 6CGO ONE CHILEAN HAT
RAVENHART

Hi, but F. B. all around, OM's; congrats!

Another Chilean station, FAL, has been worked by z4AG. FAL? QRA? We've heard of a "Falky" somewhere. QRA, OM?

The German signal for ch (four dashes) has been assigned as the intermediate for Chile, instead of the r which up to this time they have been sharing with The Argentine.

Argentina Hard At It

The Radio Club Argentine reports that the Pan-American tests of October were not very successful, results not being what had been hoped for because of unfavorable weather and season, but some of their stations are getting out quite well.

At 1BHW on the morning of Nov. 30th we copied rA8, Mr. Gomez in Buenos Aires, working u6GG for a couple of hours. He was good QRK, DC supply, 94 meters. CB8, Braggio, the original Argentine DX station, is coming thru splendidly, and on the same morning was in easy communication with his first love, u3BWT. DA8 in Bahia Blanca has not yet been reported here, altho he is working N. Z. easily.

Add Denmark

Denmark became the eleventh foreign country for North American amateurs to work when d7EC in Copenhagen worked u1MY, East Hartford, on Nov. 28th, with several messages in both directions. One to us:

ARRL HQ
HARTFORD CONN
GREETINGS FROM FIRST DANISH AMATEUR
ACROSS.
DANISH 7EC.

d 7EC's wave measured 105 m. at 1BHW. We hope to pick him up often.

The G-Z Work

We are able to report briefly in our last issue that New Zealand and England amateurs were working, to the shattering of all previous records. It is indeed so. Starting with g2SZ and z4AA on Oct. 18th, there has been easy and reliable communication almost every night. British stations 2SZ, 2KF, 2NM, 2OD, 2WJ, 6TM, 2JF, 5LF and 5NN, in the order named,

got into communication with Zedders 4AA, 4AG, and 4AK, and the ether has been resounding with the 12,000-mile wallop! This is the really marvelous work of the year. Except g2NM, none of these stations used over 250 watts. We hand it to 'em; great stuff!

A peculiar thing is that the three N. Z. stations getting QSO are situated in a radius of 50 miles on the south island of New Zealand and z2AC to the north, altho heard in England, has not yet been able to work. Nor has Australia, altho a2DS reports g2OD and g5LF. All of the work so far done has occurred between 0615 and 0730 G. M. T., when it is dawn in England and dusk in New Zealand. With the rising of the sun in England, the signals fade out at both ends. Peculiar antipodal effects enter into the communication; both the G's and the Z's say it is decidedly easier to work each other than it is to work U's!! British and French amateurs comment on the great intensity of N. Z. signals, often mistaking them for nearby stations. They have worked easily when U. S. stations reported the British signals quite weak; but that is understandable, as investigation has showed that signals are often stronger at the Antipodes than they are at intermediate points. The long-wave high-power European stations have their antipodes near southern New Zealand and their signals are much stronger in the vicinity of the NZ-fours than they are further north; but it is also interesting to note that these long-wave stations are received at maximum strength about 6 a. m. N. Z. time, while amateurs have been utterly unable to communicate between Britain and N. Z. at this time. Recently, however, z4AA and several Australians have been heard in England at 7 p. m. British time, and it is hoped that communication may yet be effected when the times of dawn and dusk are reversed in the two countries.

Now here is a dizzy feature of this business. The shortest distance between England and New Zealand is East from London, a little less than half-way around the world. All communication has occurred during the hour of sun-up in England and dusk in N. Z., when it is daylight over the area east from England. Since signals fade out regularly with the rising of the sun, it is obvious that they are not going thru the daylight area. They therefore go the other way, across the Atlantic, Canada, the United States, and the Pacific, over a distance greater than half the circumference of the globe! This is even more emphasized in the work of French amateurs with N. Z. This balls up all our calculations. We really don't know now just how far it will be possible for amateurs to work on this footstool!

Credit g2OD with being the first English-

man heard in N. Z., and the first to hear N. Z. for sure. This occurred just a day before the two countries clicked. Apparently all that was necessary was to determine the time of day that signals could be heard in both places. Most of this work has been done with low-loss tuners, detector and one-stage audio, no fancy trappings necessary, altho g2OD uses a superhet.

There must be a terrific kick for an Englishman in this business of working the Empire's far-flung Dominions. Mr. C. W. Goyder of g2SZ tells us dispassionately enough, however, how it first happened:

"I called u1KC at 5:30 or so and as QRN was bad and I got no reply I stood by and at about 6 GMT I heard g2OD working u1XAV. Apparently u1XAV had heard me and wanted to get QSO, so g2OD was helping us to connect; but I could not hear u1XAV and he seemed to lose us. While g2OD was trying to get him again and I was searching for him I heard a station,

6:30 tmw GMT fr G amateurs—Congrats OM—K.

2SZ gz 4AA—Wl cable OM Hr nr 1 to hemo NZ—Still dalite U fainter now Input 150 watts Hr nr 2 to g2OD—Ur sigs. QSA last night—sig z4AA—K.

4AA zg 2SZ—Nr I R OK Wl cable but hr hw K.

2SZ gz 4AA—R vy psed to greet u friend(qss)....1.3 amps Dusk hr nw Congrats OM....(too faint to read but audible for few minutes more).

"This was about 7:30, so I worked him for an hour and a quarter. At 11 a. m. a cable confirming above was received and read 'Congratulations on first trans-world message.—Bell'."

France Grabs The Record

About October 10th f8FJ started receiving Anzacs in quantity, and on Oct. 23d induced f8BF, Pierre Louis at Orleans, to call CQ NZ. Immediately he was answered



ALL THE SUPERVISORS OF RADIO, together for the first time at the Department of Commerce's Third National Radio Conference in Washington recently. Front row, left to right: R. Y. Cadmus, Third District; S. W. Edwards, Eighth District; W. D. Terrell, Chief Radio Supervisor; Mr. Downey, Assistant Chief Supervisor; Theo. G. Deiler, Fifth District; E. A. Beane, Ninth District. Rear row, left to right: Oscar R. Redfern, Seventh District; Walter C. VanNostrand, Fourth District; Chas. C. Kolster, First District; Arthur Batcheller, Second District; John F. Dillon, Sixth District. (Photo by F. A. Schutz, Washington, D. C.)

pure DC, very steady, good strength, and on about 95 meters, calling me and signing z4AA. Owing to his steadiness and strength I doubted the genuineness of his sigs, but this is the log:

2SZ gz 4AA K.

4AA zg 2SZ—R QRK If u r really z4AA cable K.

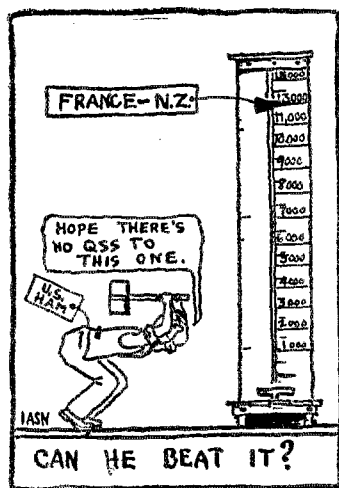
2SZ gz 4AA—Wl cable OM hr nr 1 to Radio Society GB—Greetings fm NZ—sig Bell—K.

4AA zg 2SZ—Nr 1 R OK Wl cable but QRA? Greetings fm us OM—QRX

by z4AA but, altho 8FJ heard the reply, 8BF did not. But on Oct. 28th they were more successful and z4AA and f8BF had a good ragchew, all of which was copied in this country by u8BDG. We believe this is the first operation between the two countries.

On Oct. 30th f8AB, Leon Delay of Nice, first European to work across the Atlantic, called NZ and was answered by 4AG and 4AK, but, like f8BF, he did not hear them then altho f8FJ did. The next morning, however, he succeeded in clicking with z4AK

for what we believe is the world's record amateur DX. Deloy and Shiel found that contact disappeared with the coming of the sun, just as it did in England, for this was early-morning work with Deloy, and as it seems certain that his signals traveled west to get to N. Z. he must be credited with a greater DX record than the British amateurs; and, because Nice is almost to the eastern border of France, greater than



f8BF, f8AB and z4AK then seem to be joint holders of a record of some 13,000 miles! That is real DX.

On Nov. 1st Deloy and Bell of z4AA tied up, communication lasting from 0620 to 0728 G. M. T. At 0700 Deloy told Bell that the sun was above the horizon in France and Bell replied "Still broad daylight here. Vive la TSF!" But of course that wasn't "daylight communication".

Orbell Arrives in England

Jack Orbell of z3AA who, it will be remembered, took his ham set aboard the S. S. "Port Curtis" for a voyage from N. Z. to England via Cape Horn, has duly arrived in London and has had the pleasure of working "the gang back home" from g2SZ. His little set had an input of 60 watts and put 1.1 amps in the aerial at 125 meters, signing x3AA. With this set he worked z2AC every night up to Montevideo, Uruguay, 6500 miles, and up to 5000 miles had consistent communication with 4AA, 4AG, 4AK, and a2DS (25 watts) and a3BQ. Past Montevideo static was very bad, and altho 2AC, 4AG, and 4AK were heard thru QRN up to Pernambuco, 10,000 miles, communication then was via rCB8 and rDB2 in Buenos Aires. Here some real relaying was done and long messages and replies made the 16,200-mile round trip in a few minutes.

Orbell, writing in *The Wireless World & Radio Review*, says: "There were several rather interesting occurrences that were noticeable during the voyage. One was that the U. S. amateur signals which were constantly heard, reached a maximum strength about half-way across the South Pacific, and faded out very considerably later when the South American continent intervened. Later, in the Atlantic, near Las Palmas, they returned to nearly the same strength as previously. This appeared to point to a decided screening effect due to the land between us and the United States.

The Winter

With thus auspicious a curtain-rise, who can say what this season has in store for us? Apparently there is no end to the possibilities. Just think, we haven't plumbed the shorter-wave bands yet! And there are still whole continents to go after: Africa and Asia. But g2SH has been heard in Johannesburg, South Africa, and fn2NM (Finnish) in Urdarband, India, so we'll have that 'round-the-world relay yet.

Summer is coming on now in the southern hemisphere and we don't know what QRN will do to the Anzacs and South Americans. We must keep trying.

Sweden is licensing amateurs and there are several dozen on the air, with 4-letter calls beginning with the letters SM—. Jap JFWA is on, on 100 meters, trying for France, but his times are wrong for us. But where are the Dutch and Italian amateurs of last year? QRW, OM? QRV!

"All The World's A Stage"

World-wide DX now awaits every short-wave amateur, be his equipment ever so humble. And for the experimenter there are fascinating problems; for instance, around 100 meters there is a great swarm of weak DX signals, just below the threshold of readability with present-day receivers, low-power stations that need only the help of a better receiving set to bring them into reliable touch with us.

In four and a half hours one night 4AG in New Zealand was in touch with British 2NM, 5LF and 5NN, Australian 2YI and 2BK, 6CGO and 6AHP in this country, and FAL in Chile. This approaches the New Zealand amateur's dream when, Sydney Strong of Dunedin says, they "will work G's and F's at dusk, then R's and u's, 2's and 3's and east-coast Canadians till daylight appeareth there; then come west and catch up some of the tardy 6's and also 6TQ in Honolulu, a few zedders, then A's and Phillipine 1ZA (when he hops down), then the Japs and Chinamen and also India; then as daylight doth come into ol' N. Z., we shall wish the O's (South Africa) a GM".

—K. B. W.

Three Cups Offered for Short Wave Work

RECENT tests have shown that very unusual daylight work can be done at 40 meters wavelength. This wavelength does not seem to be as good as some others for night transmission but by daylight it seems to out-range (many times over) any wavelength in the 75-80 or 150-200 meter band. Between one pair of stations the recent tests have shown that it was possible to work two-way for 220 miles *daylight* at 40 meters with an input of less than 15 watts. The same stations have no daylight communication on any other wave, even with powers as high as 150 watts. This is probably an extreme case but shows that the 40 meter band has possibilities of a very interesting sort and that it should provide an excellent traffic channel to relieve the overloaded upper bands.

Practically nothing is known about the 4-5 and the 20-22 meter bands. The recent tests have given decidedly spotty results—a few stations have gotten good results, others very poor ones. In general we know nothing except that these extremely short waves are very interesting things to work with—absolutely free from any interference whatever—do not cause any interference with any other radio work—and require only the simplest and cheapest sort of apparatus.

The Cooper Cup

In order to encourage development on the three bands three cups are offered—one for each band.

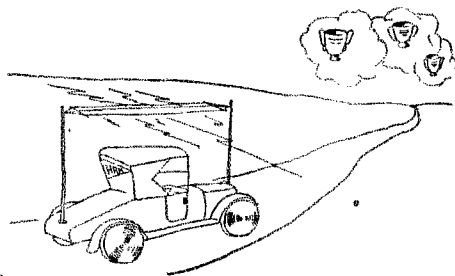
The first cup offered is the Cooper 40-Meter Cup, offered by Mr. J. C. Cooper of Atlanta. The purpose in offering the cup is to encourage careful, detailed work of an original nature. The idea is not to put a premium on the use of much power. Therefore Mr. Cooper has set the rule that all work in competition for the Cooper Cup must be done with one transmitting tube having a manufacturer's rating of 5 watts output. This includes such tubes as the C-302, etc.

The complete rules are as follows:

- 1—The sending tube shall have a manufacturer's rating of 5 watts output or less. Only one tube at a time may be used.
- 2—The contest starts Feb. 1, 1925 and closes at Midnight of May 25, 1925. Nothing done outside of these dates will be considered.
- 3—All letters, logs, measurements, photographs and other records must be mailed to the headquarters office of the A. R. R. L. on or before June 30, 1925. If the envelope containing the records is post-marked after midnight of June 30, the

entry will not be accepted. This will give stations at any distance from the headquarters office an equal chance.

- 4—The Transmitter must comply with the Radio Laws and Regulations of the United States. It must operate with loose *inductive* coupling.
- 5—Complete log of all transmission must be shown. This shall include date and hour of transmission, also nature of the transmitted matter.
- 6—Extensive "CQ" calling, unnecessarily long calling and any other form of transmission not in accordance with the practices of A. R. R. L. will disqualify an entry.
- 7—No transmission will be considered unless it is verified by letter, telegram or card from the receiving station. These proofs must accompany the entry and they must agree with the station log. This applies to tests as well as message work.
- 8—The wavelengths used are to be in the so-called "40 meter band". At this writing the exact limits are 37.5 to 42.2 meters but it is understood that these may be shifted by later ruling of the Department of Commerce.
- 9—While no hours are specified, daylight work will be given preference on this band.
- 10—A sworn affidavit must be supplied with each entry. This affidavit may be made by the station owner at the office of any Notary Public and must show that the



station did not use more than one "5-watt" tube in any of the work entered for the cup. (It is suggested that there be added another statement to the effect that the station complied with all the rules as to circuits, hours, operation, etc.)

- 11—A complete diagram and as many photographs as may be valuable shall be submitted. (The photographs need not be professional but the advice of a good

photographer should be gotten, even if a small camera is used. Most station photographs are taken with too short an exposure and too large an opening.) The diagram *must* be complete and must give all details concerning size of wire, construction of coils, capacity and construction of condensers (number of plates and spacing if capacity is not known); also any other details that may be of value.

The A.R.R.L. 20-Meter Cup

The offer of the Cooper 40-Meter Cup at once suggested cups for the 5 and 20-meter bands. These cups are being offered by the American Radio Relay League.

Since this is being written on November 20 (to allow time for trip to Midwest convention at Omaha) it is impossible to say what results have been gotten in the recent 20-meter tests. From the few letters that have arrived it seems that advance tests were pretty spotty. This does not show anything—except that more work is needed.

It therefore seems wise to offer the A. R. L. 20-meter cup under the same rules as the Cooper 40-meter Cup. The only change will be that rule No. 8 will read—
“8—The wavelengths used are to be in the so-called “20-meter band”. At this writing the exact limits are 18.7 to 21.4 meters but it is understood that these may be shifted by later ruling of the Department of Commerce.”

The use of vertical antennas as shown on page 18 of the October issue is suggested—increasing the size if desired. Super-regenerative receivers will be desirable if they are so used as to cause no interference. It might be better to begin with the plain regenerative receiver. Other good antenna systems are suggested on page 31 of our November issue.

Transmission with reflectors at the sending end is rather difficult at 20 meters but the use of a multiple-tuned antenna is possible.

The A.R.R.L. 5-Meter Cup

The 5-meter tests are in the same shape as the 20-meter ones—not enough reports have arrived at this date to make estimates possible. Therefore this cup will be offered under the same rules as the other two, excepting that rule 8 will read—

“8—The wavelengths used are to be in the so-called “5-meter band”. At this writing the exact limits are 4.69 to 5.35 meters but it is understood that these may be shifted by later ruling of the Department of Commerce.”

The 5-meter band offers the most interesting “playground” of any wave now available. We are inclined to think that it will not be a good long-range wavelength

but it can be used with reflectors, multiple tuned antennas, loops and straight “rod” antennas of the Hertzian type. In addition to this—it is possible to work a 5-meter set within 2 inches of an ordinary receiver without creating any interference.

5-meter work will almost certainly have to be on schedule, but it will be worth the trouble and should provide a variety of very interesting information *plus* airtight short-distance communication.

General

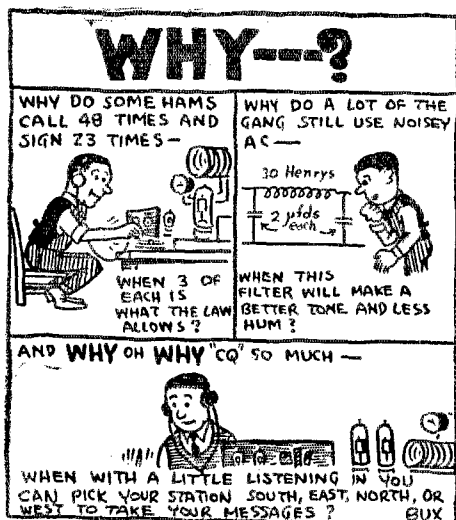
For several months we have been offering a variety of general information on operation at waves below 100 meters. Take care *not* to follow them too closely. The way to get somewhere in this short-wave business is *not* to trail after someone else but to make a trail of your own.

Read what the other man has done—then do your own work the way you want to. Besides—the business of QST is not to tell you how to build your set. Our business is to pass suggestions around so that you can do the thing some *other* way.

Your Records

Above all things—*keep complete records*. When you have an adjustment that works make a complete record of the setting of every clip and condenser, the circuit you are using, and the readings of all meters. If the plate is running red-hot put that down. If the antenna is brushing or the condenser insulation smoking put that down, too. But **KEEP A COMPLETE RECORD OF EVERY CHANGE AND SEND THE RECORD IN WITH YOUR ENTRY.**

—S. K.



The Neutrodyne C. W. Tuner at 9ZT

SINCE Australian amateurs appear to be getting satisfactory performance from R.F. amplifiers at 160 meters, it seemed possible that a one-step R.F. amplifier might work as far down as 60 meters if built in real low-loss fashion.

Accordingly a one-step neutrodyne set with oscillating detector was assembled, using the lowest loss materials available at the time. There is nothing exceptionally original about this tuner, and several minor improvements could be made. However, it will be described exactly as it stands.

The Circuit

Several C.W. sets have appeared (and disappeared) in which an oscillating R.F. tube worked ahead of a non-oscillating detector. These sets have not been successful, probably because the oscillating R.F. tube acted as a heterodyne detector so that the non-oscillating "detector" could only operate as a second-rate audio amplifier.

A more sensible combination is a non-oscillating R.F. stage ahead of an oscillating detector. This cannot be done unless the R.F. tube is used in some "anti-

a somewhat cramped tuning scale, but it does not matter here, the tuning is somewhat broad anyway because this circuit is coupled to the antenna. The detector-input circuit tunes very sharply because little resistance is "coupled into" this circuit, also because the detector is oscillating. Therefore, the detector tuning scale is broadened out by a simple trick. Two tuning condensers, C3 and C4, are used in parallel. C3 has a capacity of 250 μfd . (11 plates) and is set for the desired tuning range. Then the small condenser C4 is used to do the actual tuning. For instance, if the large condenser set is at 6", the small one will just cover the range of 74-86 meters.

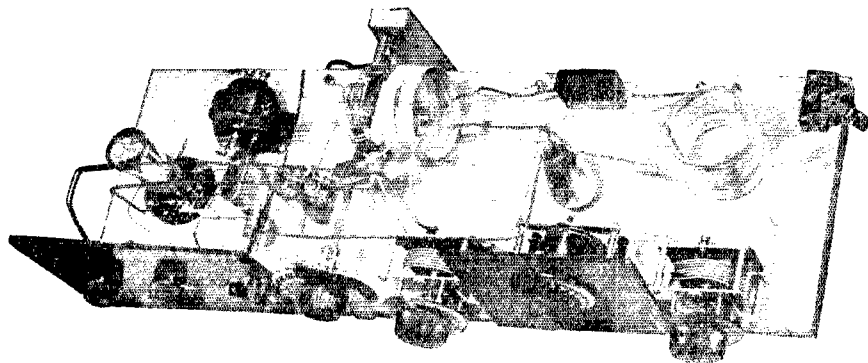
Sets for other ranges of wavelength could be made just as well by simply cutting down or increasing the size of the coils and condensers.

Construction

The construction is made pretty clear by the illustrations.

The tube bases have been removed to prevent any chance of losses at this point.

Some cutting and trying gave a size and



9ZT'S SHORT-WAVE NEUTRODYNE

regenerative" circuit to prevent it from being set into oscillation as soon as the detector begins to oscillate.

For this reason the R.F. tube is connected in the well-known "Neutrodyne" circuit devised by Prof. L. A. Hazeltine. By over-compensating somewhat it is possible to keep the R.F. tube out of oscillation at all times.

The set at present covers the range, 69-192 meters, thus including both of the upper amateur bands. This would ordinarily result in a cramped tuning scale, therefore a tuning trick is used. The input circuit of the R.F. stage is tuned by a 250 μfd . condenser which covers the entire range of 69-192 meters with room to spare. This gives

location for the tickler which will permit making it stationary, little or no adjustment being needed from 69-192 meters. Even when it is moved the tickler has very little tuning effect because it is far from the detector-input coil.

The neutralizing lead N is tapped from the center of the detector input coil L4. The neutralizing condenser C7 is very simple, a piece of varnished cambric tubing ("Spaghetti") is slipped over the end of N and two inches of this covered lead is tied to the amplifier grid lead.

The coils are the heart of the set. They are made as described in the leading article of this issue.

The detector-input coil is made of No. 22

wire because resistance in this coil is partly counteracted by the action of the oscillating detector. The other coils are made of No. 18 D.C.C.

Operation

This outfit was built up after a short-wave super-heterodyne had been junked and some dozens of other tuners tested out.

No exceptional receiving has been done with this set at 9ZT, mainly because of very strong induction which can be heard 50 feet from the phones.

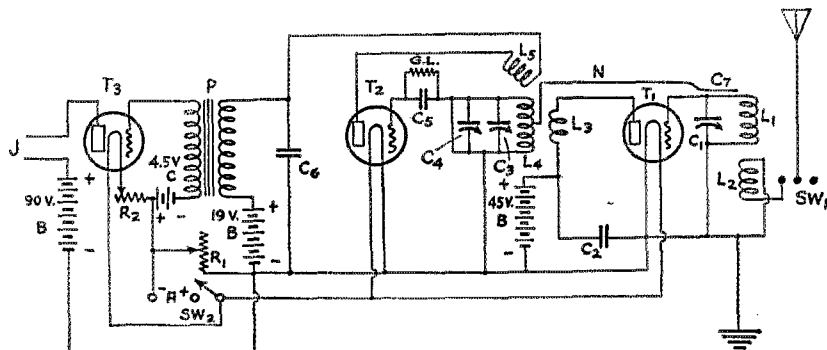
However, Mexican 1K and 1D have been

General

The set may look complicated but is actually a "two control" set. It is possible to "set and forget" the tickler and C3. Then one can tune with C4 and when a signal is heard finish up by running C1 into tune. The signals then become much stronger without any of the annoying pops or clicks common to C.W. sets using R.F. amplifiers. The operation of C1 does not detune the detector circuit.

P. S. The knot in the pine baseboard has been found to have no effect on the operation of the set.

D.C.W. + S. K.



CIRCUIT DIAGRAM OF THE 9ZT SHORT WAVE NEUTRODYNE.

- L1 23 turns No. 18 D.C.C. 3" diameter.
- L2 7 turns No. 18 D.C.C. 3" diameter.
- L3 4 turns No. 18 D.C.C. 3" diameter inside L4.
- L4 18 turns No. 22 S.C.C. 3½" diameter.
- L5 8 turns No. 18 Bell wire.
- C1 250 micro-microfarad National low-loss condenser with National Vernier Dial.
- C2 UC-1014 Faradon mica condenser, capacity 2000 micro-microfarads.
- 3C 250 micro-microfarad National low-loss condenser with National Vernier Dial.
- C4 Cardwell condenser with rotor cut down to 1 plate plus ½ plate plus plate cut down as shown in photo (or any other way that pleases you). Most of the end plates have been whittled away, leaving just enuf to keep the parts together.
- A National Vernier Dial is used here also.
- C5 Slice taken out of a UC 180C Faradon mica condenser. Capacity about 200 µfd.
- C6 5000 µfd. Micadon.
- R1 5 ohm Fada rheostat.
- R2 60 ohm frenstat.
- T1 UV-201A, base removed, spaghetti over plate lead and one filament lead.

worked while using a 6-foot piece of wire for an antenna. The set is now used with an antenna 40' long and a counterpoise 15' below it. With this combination 2CQZ has been copied (about 700 miles) at 2:30 P. M. through the usual induction noise. The induction is as loud as ever, but the signals cut through better than with the usual regenerative receivers not using R.F.

On one Sunday this set was taken out in a Ford, using a 4' wire as antenna and the car frame as counterpoise. Many Eighth and Ninth District stations were copies between 11:00 A. M. and 1:00 P. M., as soon as the city wiring was left behind.

- T2 UV-200, base removed and spaghetti put over filament leads.
- T3 UV-201A tube.
- SW1 Antenna transfer switch to same antenna can be used in broadcast receiver.
- SW2 Switch for filament battery.
- N Neutralizing condenser made as explained in text and by photograph.
- P 3 year old UV-712 9/1 General Electric transformer (This is the old "maximum distortion" variety which was made for code work, has a peak at 1000 cycles and helps cut down 600 noises. Don't use the new "Star," (it was made for broadcast work).
- BSube C battery, 4½ volts.
- G. L. Grid leak, the tube used at 9ZT happened to work best with a 7 meg. R.C.A. leak.
- J Telephone jack.

Notes:—
There is no grid leak mounting in the usual sense, the leak being suspended from the wiring.
The tickler coil is operated by a ¼" wooden dowel shaft in brass bearings.
Separate B Batteries are used thruout.
The coils are all supported ½" clear of the base.



Mercury Arc Rectifiers

By Earl D. Smith, 3PZ-3XO

THE mercury arc rectifier, as used in rectification of high voltage and low amperage for radio transmitting tubes, has not been properly used nor have its possibilities been realized.

Mr. C. P. Sweeny, 5KM, has given some good theoretical information* which is of considerable interest. I wish to show how his ideas may be extended to practical amateur radio operation.

The first experiment tried at this station was not successful but indicated the necessity of some means of continuous vaporization without keeping a load on the tube. In Fig. 1 is shown one of the first circuits tried. This circuit is similar to one of those shown by Mr. Sweeny. The output of the exciting transformer was about 12 volts. This 12-volt transformer creates a vaporizing spark to start the tube. To get this vaporizing spark, we tilt the tube so that the mercury from the large well flows to that of the small well, closing the starter circuit. When the tube is tilted back again the mercury breaks and a short but heavy spark occurs. If the high voltage is turned on at this time the tube will operate for one-half cycle but will then go out because there is no external load to keep it going. To remedy this we will put on a "keep-alive load", the object of which is to keep the tube vaporizing steadily. Unfortunately the load has to be fairly large (500 ohms or less) and absorbs almost the rated power of the tube. Also after a few minutes of operation the load resistance generates a large amount of heat. The efficiency of the arrangement is very low.

This set-up was next connected to the transmitter to determine what sort of D.C. it gave and to find out something about the voltage drop under load. The input was 2000 volts across the two cathode terminals. With the 14-volt drop in the tube a resultant output of 986 volts should have been obtained, but the voltmeter showed it to be only 450. This, therefore, seems to be an impractical circuit, although the output was smoother than had been expected.

A Better Circuit

The next step was to eliminate the load resistance entirely. A high voltage that would jump the gap between the two mercury wells was needed. Such a thing would operate without the necessity of putting on a "keep alive load" because the tube would ignite automatically at each half

cycle. The Tesla coil was impractical because of the low current output. The most convenient source of high voltage was a one-half kilowatt, 10,000-volt, spark transformer. This was connected across the starting terminals of the tube as shown in Fig. 2. The tube was expected to break but instead it worked beautifully and vaporized steadily. The set was now connected up again with the key in the primary of the 2000-volt transformer which was connected to the cathodes. This worked well and the input voltage was raised to 3,000, which gave an output voltage of 1486.

The Concentrating Ring

To get still better operation a flux-concentrating copper ring was placed around the top of the main anode-well and connected to the starting terminal in the smaller well. This arrangement is shown in Fig. 2. This helped to make the mercury

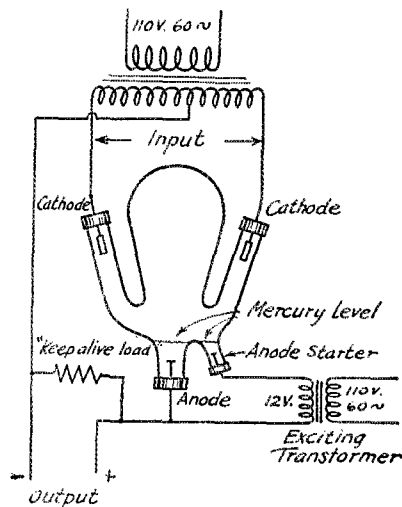


FIG. 1

splatter and to make a more intense exciting arc. The tube worked very steadily then and it was decided to connect it to the transmitter again.

Operation

When our transmitter was operating with 15,000 volts "raw" A.C. the antenna current was 5 amperes. The same wattage applied to the mercury arc and rectified before feeding it to the oscillator raised

*"Phase Multipliers and Mercury Arc Rectifiers", by C. P. Sweeney, Page 16, April, 1924, QST.

this current to 7 amperes; in other words it gave practically twice the antenna energy. The voltage as previously stated was about 1486.

We connected with a southern amateur about 200 miles from Washington who reported that the tone was quite satisfactory.

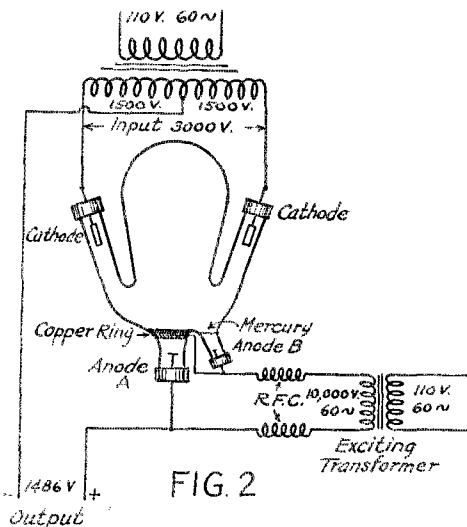


FIG. 2

We then added a filter consisting of an 8-microfarad condenser and two 60-henry chokes. At the distance of 200 miles the tone then was pure D.C., as closely as could be observed. Even nearby the tone was quite pure.

This kind of a rectifier is not recommended for less than a 50-watt transmitting tube; in other words, for a load of less than 125 or 150 watts. The reason for this is that the mercury arc tube works better as more power is drawn. For 250-watt tubes it should work excellently.

The importance of the radio-frequency chokes in the starter secondary must not be overlooked. These chokes prevent radio-frequency damage to the exciting transformer. Two single-layer coils of 250 turns each will suffice.

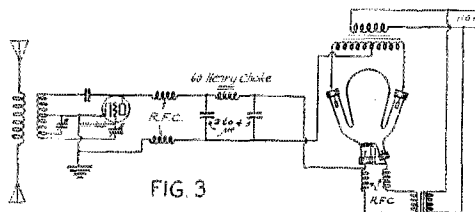


FIG. 3

The only precaution necessary is not to put too high a voltage across the cathodes. This may generate sufficient heat to crack

the tube. If the tube is put in an oil bath it will stand a much higher voltage.

The Tube Used.

The Tube used here is a small General Electric tube, rating 10 amperes at 350 volts. At such a small current as used here it will stand very much higher voltages.

Figure 3 is a suggested circuit for use with the transmitter.

I would be glad to receive any suggestions for better operation of the tube and hope that this article will help the transmitting amateur to supply his transmitter with low-priced D.C.

Since this article was received we have been informed that the use of the 10,000 volt "ignition" transformer was suggested by Mr. J. H. Turnbull of 2XQ, the suggestion being tried out by Mr. C. P. Sweeney of 5KM and then passed on to the writer of the present paper.

The scheme has not been a uniform success—several tubes have been cracked by the development of excessive heat at the ridge between the two mercury wells. Larger rectifier tubes seem to stand the heating better than small ones.

Notes on Mercury Arcs

From correspondence with our members

Many of our members have bombarded us with demands for mercury arcs. The idea is fine—but the aim is wrong. Go after Westinghouse and General Electric with special attention to the Charging Equipment Section of the latter firm at Schenectady.

How to Crack Mercury Arcs

There is only one reason for wanting to know how to crack mercury arc tubes—that is to know what not to do.

Messrs. Sweeney and Smith have had hard luck in this regard—so have plenty of other members. The trouble is seldom caused by overloading the tube generally it is too sudden heating or else a local arc. Naturally the stunt of using the 10,000 volt transformer to keep the arc going is dangerous; don't use more than just enough power to keep the arc going.

Another good way to crack a tube is to shake it.

In this connection Wm. Snyder of 9BNO points out that mercury arcs are meant to operate in oil and should not be used in air.

A rectifier tube that is suitable for amateur use is the G.E., catalogue No. 40525.

The Supersink Receiver

By Morris Taurenwerfer, Assoc. Mem. U. R. A.*

QST is pleased to announce that it has secured the services of Mr. Morris Taurenwerfer, who will act as Associate Editor of QST. Mr. Taurenwerfer comes to QST direct from New London, Conn., where he has been doing private research work for several years. He entered the radio field in 1923, after passing through two years of extensive experimental work on short waves. Because of great native ability and intensive application Mr. Taurenwerfer has progressed far in his chosen profession. He is recognized as a prominent radio engineer, is an A. M. U. R. A., but is best known as the inventor of the famous Taurenwerfer "Supersink" circuit, which has almost (but not quite) revolutionized radio reception methods.

It is with particular pleasure that we present Mr. Taurenwerfer's first QST article, a complete working description of his "Supersink" receiver.

LET me start off by stating that the Supersink Receiver is not an expensive one. The total cost of the best form of this receiver is \$14.97. This includes all batteries, antenna wire, tubes, ground wire and ground clamp, lightning arrester, and lead-in bushing, but does not include the loud speaker, the choice of which is left to you. The loudspeaker is absolutely necessary, however, because headsets do not stand up under the signal strengths regularly obtained with "Supersink" circuit.

The new circuit, although the result of an enormous number of experiments, is really quite simple after you understand it. It is simple enough for anyone to construct *providing most explicit attention is paid to all the details, dimensions and theory I give.*

The theory of operation is shown in Fig. 1. As is well known, if we have a tuned input circuit "A" feeding into the tube, and then put a tuneable circuit in the plate, as at "B" we will be able to obtain oscillation and regeneration.

Now, as the circuit "B" is tuned to resonance, the weak impulses originally impressed on the grid circuit will be built up thru the tube to greater magnitude due to the feed back occurring from the plate circuit to the grid circuit and the strength will eventually reach a point where the circuit will effectively ground itself through the *intra-electrode* capacity of tube. To correct this tendency, which is called by some "oscillation," I devised the choke "X" shown in Fig. 1. The theory of operation with the choke is quite obvious to the most uninitiated. But I found that this choke would not work unless the condenser C1 was placed in series with it. I believe that this condenser can properly be called a blocking condenser for apparently it pre-

vents the direct current, emanating from the plate battery, from flowing thru the tuned circuit. It also greatly lengthens the life of the battery. This capacity is quite critical and should have some value between .002 and .1 μ d.

All inductances should be wound according to my double involute system. This system is patented by me, and I am giving it to you amateurs for your use provided "it is used for amateur experimental and entertainment radio use as set forth and to the extent indicated in the current issue of the New York Evening Chimes." I was once a mere amateur myself and I know how high the amateur can and has risen in the radio field—again, having been an amateur myself once. The purpose of the double-involute system is to aid what I have called the Electron Differential. This is a new theory advanced by me. The coils are wound in an alternately clockwise and counterclockwise direction. That is the first turn of wire is wound clockwise, the



MR. TAURENWERFER IN HIS LABORATORY

second anti-clockwise, the third clockwise, etc., etc. According to my "Electron Differential" theory it is obvious that when we change the direction of the current flow, particularly if the bend in the wire is made at right angles, the current on the

*United Radiotricians Association.

outside of the bend will lag behind the current on the inside, due to the fact that the current on the inside has less distance to travel. My double involute system of winding the coils, makes an equal number of right hand and left hand bends, which neutralize each other and which totally prevent the usual distortion. I have found that distortion CANNOT occur in any part of the circuit or in any of the apparatus. However, if audio frequency amplification

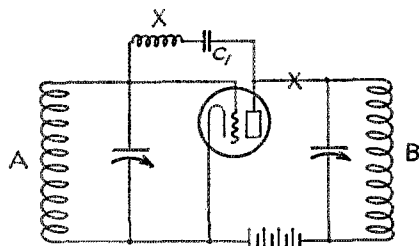


FIG. 1

is used, it will be absolutely necessary to use amplifying transformers having a turns ratio of exactly 3.48/1. I know that you want my personal advice in the choice of a transformer and on request I will be glad to give you the address of an excellent firm which is manufacturing it. I am acting as Chief Consulting Engineer for the Company.

In Fig. 2 is shown the complete circuit—the constants are as follows:

L 3" diameter 31 turns No. 25 AWG single cotton wire.

L1 2.75" diameter 23 turns No. 31 B&S gauge single silk.

L2-L3 5" dia. 65 turns (each) No. 25 B&S enamel.

L4 5.3" diameter 60 turns No. 23 AWG wire.

Choke X 2" dia. 39 turns No. 37 Single cotton.

C1 varying from .002 .1 μ fd. (critical)
C2-C3-C4 and C-7 .0005 μ fd. high loss condensers with 6" WOODEN VERNIER HANDLES.

C6 .0001 MMF.

R1 variable from .1 to 10 megohms.

5 Ampere fuse, Edison Plug type.

30 Ampere S. P. S. T. Knife Switch, (Porcelain Base preferred).

Please note that ALL coils are wound double-involute as explained long ere this.

As to results which can, and are being, obtained with the Supersink circuit, isn't it enough testimony as to its wonderful selec-

tivity and sensitivity when I say that all commercial shore stations have recently been equipped with the Supersink—replacing the magnetic detectors. When I say "all commercial shore stations" It should qualify that statement to exclude those stations located in Canada.

The coil L4 and condenser C5 constitute a commutator-ripple filter. Most broadcasting stations fail to provide the proper filter in their generator circuit, so we are compelled to provide it in the receiver.

When switch S is thrown to position 1 the operation of the set is normal; when it is thrown to position 2 static interference is greatly reduced.

The condenser C1 should be very carefully chosen as it is occasionally subjected to very high voltages because of the great signal strength generated by this circuit. Breakdowns in even the best condensers are not unknown and therefore a 5 ampere fuse is provided at the point marked "X" to protect the "B" battery. (This feature of the circuit has just been done away with by a unique and brilliant invention of Mr. Taurenwerfer which will be described by him in our next issue.—Tech. Ed.)

I don't think that anyone can fail to understand the circuit after this explanation—I have frequently been complimented on my particularly clear and effective explanations of circuits. Many people have written me and thanked me for explaining circuits that I didn't understand myself. If you would have me answer any of your questions, just address me care QST, being

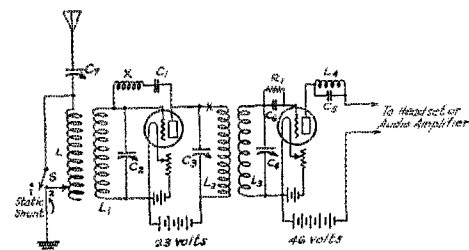


FIG. 2

sure to enclose the customary 3 cents in postage for return reply. Better write at once, though, for I may not be around here long.

For the present it suffices to say that I hope the reader will now understand that this article is absolute BUNK—that I, Morris Taurenwerfer do not exist. However, judging from contemporary articles and the public's near-enthusiastic reception of them I have my doubts as to whether or not I can convince anyone that I am not the genius I don't claim to be.

A Nationwide Fading Test

The January Eclipse Offers an Opportunity to Serve Science

MANY amateurs have already seen announcements in the *Scientific American* of a total eclipse of the sun on January 24th and that a general check of radio variations on broadcast waves will be run. The American Astronomical Society is making visual observations of the eclipse as they have done many times in the past but the *Scientific American* is interesting broadcast listeners in a test of this nature for the first time. The latter magazine has asked the co-operation of the League in running similar tests on amateur waves, leaving the details of the tests to us to prepare in such a way as we think will yield the most interesting results. Amateurs in general form a body of observers unusually well trained to make accurate observations on account of technical knowledge and the ordinary experience gained from DX work. In this eclipse we have a chance of compiling some data of real scientific value.

Here is an outline of the eclipse which, by the way, will be a wonderful spectacle to those located in the path of totality, as very few of us have ever seen a total eclipse and may never have an opportunity of seeing another. It takes place the morning of January 24th, beginning at sunrise or a little before in the vicinity of Duluth, Minnesota, and covering a path that sweeps across the country in a southeasterly direction towards Connecticut. When the period of totality, or that time in which the sun is totally eclipsed on account of the moon coming between it and the earth, reaches the New England states the sun will already be fairly well up in the sky, between 8:00 and 9:00 A. M. Strictly speaking, the band of totality is not a band at all but is simply the path along which the shadow of the moon will pass across the face of the earth; this shadow is approximately 100 miles wide and stretches from Beaver Bay, Minnesota, (50 miles north-east of Duluth) to New Haven, Connecticut, and on out to sea. Although the actual band in which the sun will be totally eclipsed is quite narrow, a partial shadow in more or less degree, depending on the distance from the band of totality, will be cast across the entire United States and Canada, a distance of 2100 miles each side of the band. This is lucky for us, fellows, as it makes it possible for everybody in the country to listen in and take part in the tests.

We have no exact dope on what may happen to signals but we do expect them to do some mighty funny things in the way of

fading; static or unusual noises may occur temporarily; possibly dead spots will develop.

The tests will start before, go thru, and continue a short time after the eclipse, so we will have a chance to hear sigs under normal morning conditions in places east of the Mississippi, at sunrise west of it and at dawn on the Pacific Coast—till the eclipse starts, when part of the country will suddenly be darkened, the stars will come out and signals should be expected to take a jump in strength. In the southern part of the United States the shadow of the moon will bring on partial darkness and we may get sunset or sunrise effects.

At all events, nobody can tell ahead of time and that is the best reason why as many as possible should take part. It's our chance to get some authentic information. Our activities will be confined entirely to amateur wavelengths and we hope to be able to give the *Scientific American* and the scientific world something of value. The time is too short to announce final details of the tests before this issue of *QST* goes to press so that instead we will outline a general plan of what will take place and ask all those interested in taking part to give us their names and we will mail them detailed instructions as soon as possible.

In a general way this is what we propose:

(1) To locate about ten or fifteen amateur transmitters in the path of totality which will transmit certain specific signals, probably on the same order as those sent out during the fading tests of the Bureau of Standards in 1920 and 1921.

(2) These stations will be sub-divided to transmit on the amateur bands of 150-200 meters, others on 75-80, and possibly others on 40 meters.

(3) Calls of these stations, wavelengths, time and details of transmission will be announced by A.R.R.L. official broadcasts and the stations themselves will probably send this information a number of times a few days before the tests, in addition to our mailing details to those who want to take part.

(4) Absolutely accurate time should be kept by both the transmitting and receiving stations and in order that you may set your watches correctly, NAA will send time signals before and after the eclipse which will be rebroadcast by radiophone stations in and near the band of totality.

(5) As the eclipse will be seen and its effects felt in a radio sense throughout most of the United States and Canada, receiv-

ing stations will have a chance to keep an accurate record of variations in signals of the transmitting stations, presence or absence of static, unusual noises or other phenomena, and the data will be collected and correlated by the League.

If you are interested—and we know you are—simply drop a postal *at once* to "Eclipse Committee, A.R.R.L., Hartford, Conn." and say "Send me the eclipse dope", and we'll do the rest. Here's hoping for clear weather and unusually interesting reception.

—C. A. S.

Prospective Regulations

THE expected new amateur regulations have not yet issued. The Bureau of Navigation is studying the matter, and we understand a tentative draft of new regulations is now in the hands of the Supervisors for further suggestions, so that they should be published shortly. We are advised that all amateur station licenses will be recalled and replaced by a new form and we have reason to suspect that the use of "raw A.C." on the plates will not be permitted during what has been "quiet hours", on the short waves; at least full-wave rectification probably will be required.

In our last issue we reported the Conference recommendation of three new classifications of broadcasting stations, 1, 2 and 3; Class 3 to contain all stations of not over 100 watts power, operating on the shortest broadcast waves, just above amateur territory. When it came to the practical application of this recommendation the Bureau of Navigation was unable to adopt it, for it was found that the majority of the broadcasting stations would fall in Class 3, which had the most limited territory. The Bureau was therefore obliged to discard the recommendation and has continued the old plan of two classes, A and B. Class A stations, power not exceeding 500 watts, are allocated the band from 200 to 278 meters. Thus we have an entirely unexpected situation, with many good Class A stations assigned below 220 meters, right down to amateur waves. There seems no way out of it—the conference recommendation wouldn't work.

The Bureau has notified broadcasters that it expects to comply promptly with a Conference recommendation compelling the elimination of harmonics. This will be a help. Broadcast harmonics are a fearful nuisance in short-wave territory now, and it is only fair that where we are obliged to loose-couple and rectify in the interests of other services, the broadcastng stations should do the same.

—K. B. W.

The November Elections

KEEPING right in style with the federal government, our A.R.R.L. had elections of its own in November in half of its U. S. divisions—more than half, for this time there was an election in the new Hudson Division.

In the Northwestern, Roanoke and Rocky Mountain Divisions, the present directors, Messrs. Weingarten, Gravely and Segal, respectively, were returned for two-year terms without opposition. There were no other nominees in their respective divisions and, under our amended By-Laws, they were declared elected by the Executive Committee, without popular balloting.

Dr. Lawrence J. Dunn, 2CLA, president of the Radio Club of Brooklyn and a director of the Second District Council, was elected director from the new Hudson Division, over Theo. G. O. Droste, 2IN.

The only other new face on the Board will be Dr. Elliott A. White, 1YB-1XAV, of Dartmouth College, Hanover, N. H., who in the New England Division won over Geo. H. Pinney, 1CKP.

In the Central and West Gulf Divisions the present directors, Clyde E. Darr, 8ZZ, and Frank M. Corlett, 5ZC, respectively, were returned over their opposition.

The balloting, as found by the Executive Committee:

Central Division

Clyde E. Darr, 8ZZ	1077
Clarence N. Crapo, 9VD	301
G. Kiley Bergman, 9CA	298

Hudson Division

Lawrence J. Dunn, 2CLA	507
Theo. G. O. Droste, 2IN	392

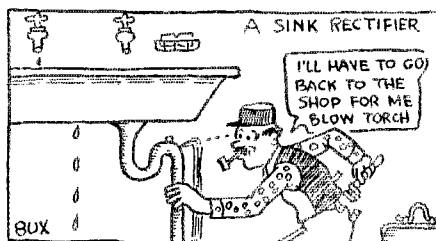
New England Division

Elliott A. White, 1YB-1XAV	388
Geo. H. Pinney, 1CKP	348

West Gulf Division

Frank M. Corlett, 5ZC	206
L. D. Wall, 5ZAE-5BH	25

The newly elected directors take office at noon January 1, 1925, for a term of two years.



The First Pacific Division A.R.R.L. Convention

By Bob Brown, 6CJJ, A.D.P.M.

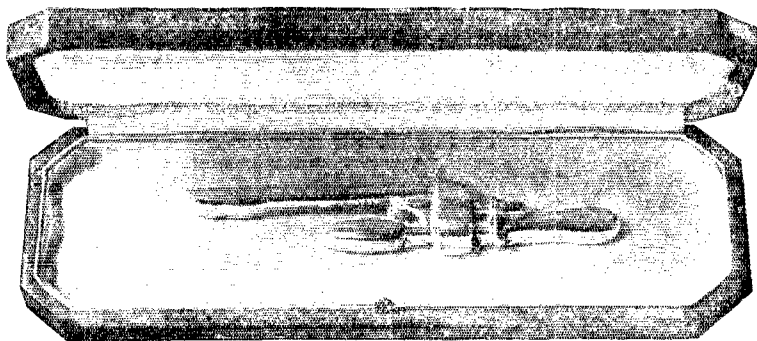
THAT November 7, 8 and 9, 1924, in Modesto, California, will stand out in the annals of amateur radio is an assured fact. These were the dates on which the Pacific Division of the A.R.R.L. staged its first convention, the fifth convention of Sixth District amateurs. And believe us, fellows, it was some convention! There were over a hundred and fifty delegates there from California, Nevada, Utah and Arizona. The beauty of the whole thing was that almost every man there was an active amateur, and on the air every night; we had all worked one another at some time previous so that we all felt perfectly at home the minute we arrived.

Division Manager M. E. McCreery, 6LJ, started the ball rolling when he called the traffic meeting to order on Friday afternoon. At this meeting everything was brought up from working some of the "Aussies" to the

6BLB, 6CJJ and 6ANB showed the gang their vocal ability by singing (?) a couple of songs with "ham words" composed by 6BLB, introducing the new popular song entitled "Where Does Our Money Go?" (Buying more radio stuff!) In view of the fact that there were no cabbages or tomatoes in the audience, they got away with it.

At this convention the Pacific Division voted to send a representative to the I.A.R.U. convention in Paris next spring, financing his trip by a small tax on the division members. Nominations for the representative are to be sent to Director Babcock, and ballots are to be circulated thru the division by Division Manager McCreery.

Saturday morning was given over to contests in receiving and sending, the Southern California Radio Assn. offering two handsome cups for these contests. The transmitting cup was won by 6CMD of Fresno.



THE MODESTO RADIO CLUB'S WOUFF-HONG TROPHY

rights and duties of the O.R.S. We certainly discussed traffic rules and regulations pro and con, and if the Pacific Division's total of traffic handled doesn't come up in the next two months we'll miss our guess.

In the evening the gang journeyed over to the High School Auditorium, where Division Director A. H. Babcock presided at the main session of the convention. Here "Ye Editor", K. B. Warner, also the secretary of the A.R.R.L., told us in detail all about the inner workings of the League and QST. Other speakers of the evening were A. A. Hebert, treasurer of the League, D. B. McGown, radio inspector, and Mr. Babcock. The Modesto Radio Club put on a clever little skit, the main purpose of which was to introduce its members to the convention.

Runners-up were 6AO and 6AWT, with honorable mention to 6ZH. 6DL won the receiving cup, with 6AFG and 6BAB on deck.

The entire afternoon was devoted to a technical meeting. D. B. McGown gave a very interesting talk on short-wave transmitters, mainly of the master-oscillator type. Gerald M. Best gave an illustrated talk on his short-wave superhet, while Gaston B. Ashe concluded the meeting with a talk on antenna systems.

The banquet came at 7 p. m. and, after all the noise had subsided, the notables present each gave a short five-minute talk. One of the most interesting of these was Treasurer Hebert's description of the return of Don Mix, WNP. Good for you, Don, we wish we could have been along!

Lester Picker of 6ZH was present at the convention in his wheel-chair, and during the dinner it was announced that the gang present had subscribed the means for constructing and installing for Picker a 250-watt short-wave transmitter. (VYFB!—Ed.) The banquet finally came to an end, as banquets unfortunately do, and all A.R.R.L. members were initiated into the Royal Order of the Wouff Hong. This was the first time the R.O. W.H. had ever been put on in the Pacific. It is indeed something every A.R.R.L. member should go thru, the first chance he has. The bunch from Hollywood and other members who made up the initiation team deserve great credit for their work. Oh yes, during the banquet the Western Amateur Radio Assn. entertained with a good tumbling act.

During the dinner the Modesto Radio Club's trophy Wouff-Hong was exhibited and was received with exclamations of approval. It is a beautiful little thing and has a most romantic history, for it is made of the melted-down plates and grids of five hundred burnt-out tubes, contributed by amateurs all over the country! Countless record-holding tubes are embodied here, tubes with an original value of some \$5000. The idea originated with Frank Flowers, 6ST, president of the Modesto club, and after long hashing was put into execution by a club committee. Some symbolic trophy for a transmitting amateur! It will be awarded at the next convention to the best all-around amateur station in the Sixth District.

After a spirited contest Santa Barbara was selected as the place for next year's convention. CU all there, OM.

The last day of the convention was turned over to visiting local stations and seeing "Sunny Stanislaus" in general.

(Hand it to these Modesto fellows, gang. Here was a splendid convention, which everybody enjoyed hugely, put on for a cost to the visitor of just \$1.50 if \$1.50. That's a new record for miles-per-watt.—Ed).

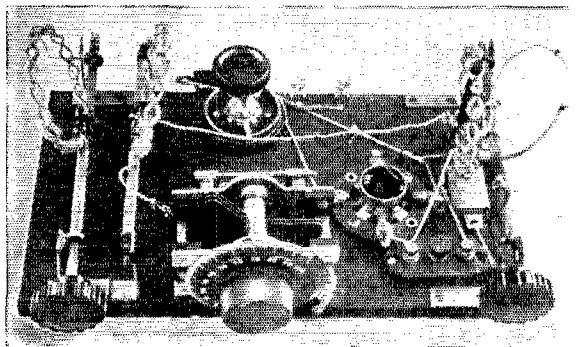
The 5-Meter Tuner at 9APW

ON page 40 of the December issue we gave a description of 9APW's 5-meter equipment. Now the tuner has come along and we are able to offer a photograph.

At the left is the 4-turn primary, mounted on a wooden dowel as a shaft so that the coupling can be changed easily. Next is the first section of the secondary

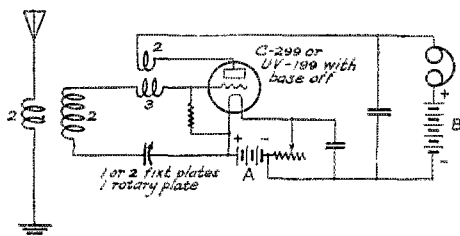
(marked "2" in the diagram of connections), then the other secondary section (marked "3" in the diagram) and finally the two-turn tickler. The tickler is mounted on another wooden shaft.

Surprisingly enough the base has been left on the tube, although the socket used (Remler) seems to be an excellent type for short-wave work and gives promise of very



low capacity as such things go. The secondary coils are 3" in diameter and are wound in the Lorenz pancake fashion. Our own guess would certainly have been to use a spaced-turn coil. The condenser is surprisingly large, the capacity probably being 100 micro-microfarads. The tuning range, with the coils shown, is from 12 to 21 meters. To get down to the five-meter band, 9APW tells us to use but one turn in coil "2" and two turns in coil "3". The range will then be 4½ to 7½ meters. Note that this is a series tuned affair.

The variable gridleak, also the 500 micro-



microfarad mica bypass condensers, can be seen easily enough in both the diagram and the photo.

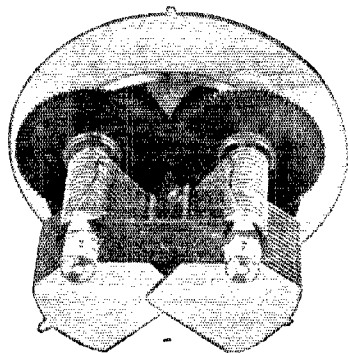
We repeat— isn't this sort of thing beautifully easy compared to 200 meter work? Let's see the first 5 meter transmitter with a reflector—it should be very easy to work for a mile or less with exactly O interference. What the top range will be we cannot even guess—let's try it and see.

Unique Variable Condensers

AS a rule we are not especially excited about unusual condenser constructions—they are generally nothing but the result of an attempt to be different.

However the new Remler variable condenser really gains some advantages by departing from standard practice. Both sets of plates are made movable, each being mounted on its own shaft. As a result the condenser action can be reduced to a quarter turn instead of the regulation half-turn. This makes it possible to bring flexible leads from both sets of plates without the usual difficulties. In addition the plates can be made small and can be soldered together at one point on their outer edges, and also at the shafts.

The two shafts carry bakelite gears and both of these gears are driven by a small brass pinion. This pinion is on a short shaft which carries the dial. It will be seen that the dial will make a complete turn while the two bushings carrying the condenser plates will make only a quarter turn or so. This gives a wide open scale. The three shafts are carried by a molded bakelite disc with plenty of leakage distance between parts. The rear ends of the two main shafts are supported by a spacing-strip which can be seen in the photo. The shafts terminate in binding posts. The flexible leads go from these posts to the plate assemblies on the two rotary bushings.



THE REMLER CONDENSER

The dial is special, having a removable knob so that a round paper scale can be put under it or else a blank paper disc can be used and records of wavelength, station calls, etc., made directly.

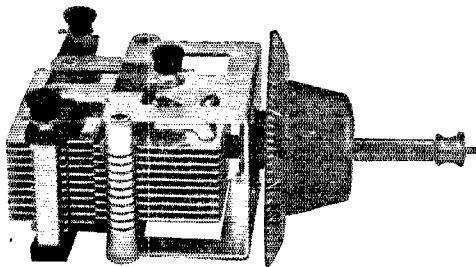
The capacity of the condenser is 500

micro-microfarads at maximum setting. The minimum is low but that is of no particular importance as we have said before, any condenser can secure a low minimum by running the plates clear out of each other. When this is done with the usual constructions the result is a curve with a sudden drop at the low end—a perfectly useless low minimum.

In the Remler condenser the thing is done intelligently, by taking the plates apart cornerwise so that a *straight* calibration line is secured with a low minimum. This means a *useful* low minimum.

The same thing can be done with "shaped" plates on a rotary condenser as explained by Mr. Mason in our September issue.

The Barrett & Paden condenser is even more unusual in architecture. It is especially designed to secure very small varia-



THE BARRETT AND PADEN CONDENSER

tions. The operation is not especially easy to describe but a look at the photo will help.

The moving plates do not turn at all—they slide. Now don't condemn the condenser as a "throw back" to the sliding-plate horrors of past years—it is nothing of the sort. To begin with—the insulation is good and is well located, the mechanical design is solid. The sliding member is pulled in and out by means of a stem which makes its complete stroke if the dial is turned 10 complete revolutions. This means that the scale is 3600 degrees long. The construction is good enough so that the slack is only about 2 divisions.

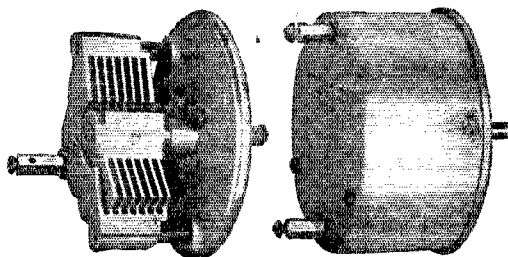
By pushing in the small pin at the end of the stem it is possible to set quickly to the right tenth of the whole range—he fine adjusting then being done with the dial as before. For this purpose the stem has 10 divisions marked on it, and the dial 360. The sliding plates are guided by a grooved pillar on each side and connections are made by a flexible jumper to the top binding post in the photo. The stator plates can be connected to at either of the two corner posts.

A neat mechanical trick makes it possible to run to the end of the scale and keep right on turning—nothing will be hurt as a clutch slips.

The condenser is made in two varieties. The 1000 micro-microfarad size has rectangular sliding plates, the 500 micro-microfarad size has a V notch cut out of these plates at the entering end so as to give an even scale and a lower minimum.

And lastly we have the Manning Variable Capacity as made by the Muller Instrument Company.

This condenser is of the usual design with



THE MANNING CONDENSER

semi-circular plates but differs considerably in the details of construction.

It is patterned to a large extent after the Bustan quartz-pillar-type precision variable.

The plates, rotor and stator, are not die-castings but are milled directly from a solid casting. This has a triple advantage. It eliminates contact resistance, allows the use of aluminum without fear of high resistance joints and permits a high degree of precision in manufacture. This last point is of importance in that the calibration of each condenser is a uniform straight line and the maximum capacity of all condensers is closely identical. To get the same uniformity in case a built-up rotor and stator had been used, the thickness of the plates would have to be held to such close limits as to be impractical from the sheet-metal standpoint.

The bearing is a single long sleeve.

The insulating supports for the stator are three tiny hard-rubber pillars. There is less than .09 cubic inches of solid dielectric in the condenser.

The whole assembly is covered by a neat aluminum shell. This protects the works from dust and rapid corrosion and prevents stray coupling of the stator to other parts of the radio set. This shielding is a decided advantage in short wave work and in balanced multi-stage R.F. broadcast receivers. It adds only a negligible amount to the minimum capacity.

The makers believe one size, .00025 μ f (250 μ fd), to be sufficient, now that experimenters have learned the value of proper inductance design.

The uniqueness of these designs cannot be denied. Their value can be better passed on after some months. Our readers' experience will be welcomed.

The Radiola Superheterodyne

IT has come to our attention that we are being mis-quoted with regard to the Radiola Superheterodyne. We have been quoted as saying that the Radiola Super was a bad source of interference and this statement has even been used in propaganda for other types of receivers.

We deny emphatically that we said such a thing, and we wish to point out what we actually DID say.

On page 15 of the July issue we said "The Superheterodyne is one of the most capable interference factories ever devised. Usually the oscillator is supplied with an entirely senseless plate voltage—40 or 60 instead of the 20 that is needed. And to make matters worse the oscillator is tightly coupled to a secondary that is overly close to the primary or antenna coil." We then went on to say that this difficulty could be cured in several ways and mentioned the *best* cure as follows "4—if you really want to do things right, put in a radiation-preventing tube. This will be discussed next month".

In the August issue we discussed the use of a radiation-preventing tube, stated that such a device was used in the Radiola Superheterodyne and said "This arrangement solves the oscillator problem and in addition practically eliminates radiation."

We think this makes it perfectly definite—we said nothing against the Radiola Superheterodyne and it took lively imagination or ignorance to think that we did.

—S. Kruse, Technical Editor.



Measuring Very Small R. F. Currents

A Method That Can Be Used to Measure the Antenna Current Generated by an Oscillating Receiver

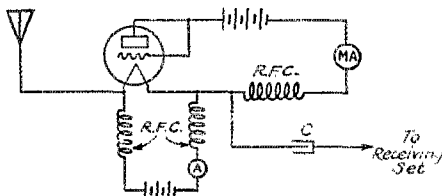
By J. H. Turnbull*

WHEN a regenerative receiving set is oscillating it is feeding energy into the antenna circuit. This is evident from the fact that distances as great as 50 miles have been covered by using an oscillating receiving set as a transmitter and signaling by tapping the grid or interrupting the antenna circuit. As the average receiving antenna is of high resistance the current in the antenna is so small that ordinary hot wire or thermo-couple meters are valueless for measuring this current. However, it is desirable to have some kind of a meter which will measure the current so that the interference occasioned by different types of receivers can be compared.

A sensitive means of measuring quantitatively radio frequency currents of even short wave lengths is shown in the diagram. The circuit is useful for measuring currents as small as 0.1 milliamperes. The current is measured by noting its effect on the plate current of the tube. The assumption is that the radio frequency current will have the same heating effect on the filament as a direct current would and that the arrangement may therefore be calibrated with direct current. A curve is plotted showing the plate current when different values of filament current are used. This curve must be made with a fixed plate voltage high enough so that the plate current will reach saturation. This voltage has been reached when a further increase of the plate voltage will not raise the plate current as shown by the milliammeter in the plate circuit. The resulting curve is inspected and the filament current corresponding to the steepest part of the curve is noted. When a measurement is to be made the filament current is set at this value and the receiving set put into oscillation. It is evident that the antenna current caused by the receiving set will now go through the filament of the tube and heat it, thereby raising the plate current. From the curve it is now possible to tell what the total filament current is and by subtracting the direct current part of it (as shown by the ammeter) one can find the radio frequency component.

Putting it differently, the radio frequency antenna current is equal to the total filament current minus the direct current portion which is indicated by the filament ammeter. The total filament current is

deduced by noting the plate current. Values of r.f. current as small as 1/10 of a milliampere (.0001 ampere) are directly measurable. If the output energy is wanted, the antenna resistance can be measured



MEASURING CIRCUIT

A - 0-1 D.C. Ammeter

MA - 0-10 or 0-100 D.C. Milliammeter, depending on the tube used.

C - 1 μ f. telephone condenser

R.F.C. - 3" tube, 300 turns D.C. wire No. 20 to 30

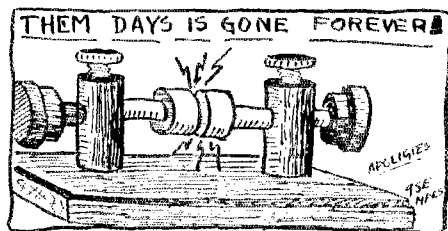
NOTE: If the filament current is to be measured more exactly use a standard resistance in this circuit and determine the voltage across it by means of a potentiometer.

and the output calculated in the usual way. In order to insure that the antenna current will take its proper path the circuit is equipped with several radio frequency chokes. These must not be omitted or the results will be in error.

In order to get the greatest possible effect upon the plate current of the tube it is probably advisable to use a tube which has a small normal filament current.

Put this on a single-circuit receiver or one of the so-called "super-regenerators" and receive a real surprise.

(The Editor wishes to suggest that still bigger surprises are in store for those using tuned radio-frequency amplifiers under the impression that they never oscillate. One such device was recently used to transmit eight miles in daylight, receiving with a single tube.—Tech. Ed.)



*Late of Union College, Schenectady, Experimenters section A.R.R.L.

A Simpler Way to Find the Fundamental

By S. Kruse, Tech. Ed.

USUALLY we are told that the fundamental wavelength is the wavelength at which an antenna will operate if it is worked without series condensers and without loading inductance.

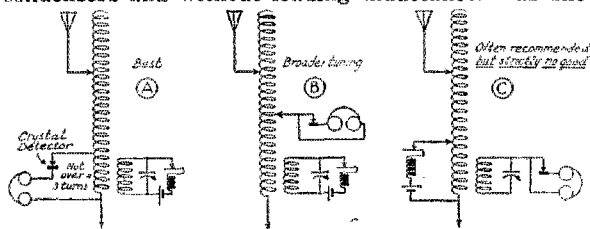


FIG 1 SOME SIMPLE METHODS

circle (1) at the place corresponding to the wavelength and the number of helix turns. Then move the clip downward and do it over again until a series of points is found as shown. This is not a particularly difficult thing to do and it takes care of any peculiar characteristics the antenna may have. It will not be very convenient to get these points all of the way down because the antenna resistance is very high at the fundamental. Therefore the curve will stop and we will have to "guess it in" as shown in the diagram. This may seem like a

Frankly I am a little curious as to the reason for the amateur interest in the exact fundamental of the antenna. What difference does it make anyway? As long as we insist on the silly practice of shifting a station wave all over the lot every evening we are never going to be able to work at or near the fundamental anyway. It will not be until stations recognize the value of operation on fixed waves in the fashion of 9ZT-9XAX, that it will make a whole lot of difference just what the fundamental really is.

However, we started out to tell how to find the thing.

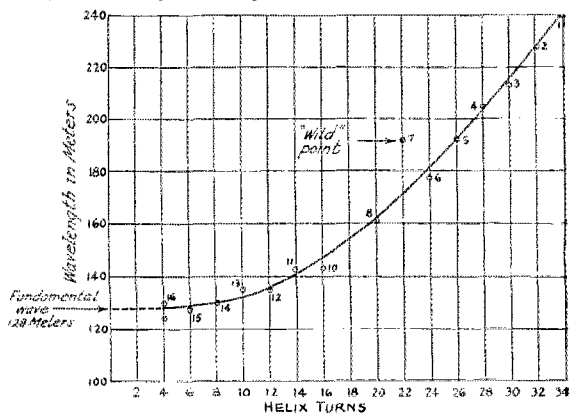
Finding the Fundamental

It is not very satisfactory to find the fundamental wavelength of the antenna by any method which calls for the use of a formula. The reason for this is that antennas are not enough alike so that a formula taken from a book will give decent results when used on another antenna.

In Figure 1, supposing we set the clip at the top of the helix and measure the wavelength of the combination. It is pretty evident that the antenna will be operating quite a way above the fundamental. Let us say we are using 34 turns in the antenna circuit and the wave measures up as 240 meters. Now suppose that we lay out a chart as shown and put down a dot or small

POINT NUMBER	HELIX TURNS	WAVELENGTH (MEASURED)	NATURAL WAVELENGTH
1	34	240	Antenna No. 2
2	32	228	Station 9KW
3	30	214	Sept. 14, 1923
4	28	206	
5	26	193	
6	24	182	
7	22	192	
8	20	162	
9	18	Missed this one	
10	16	143	
11	14	143	
12	12	135	
13	10	135	
14	8	130	
15	6	128 Broad	
16	4	Not sure, either 125 or 130	
17	2		
18	0	Cant get point - no tuning at all	

HELIX USED
34 turns No. 14
Copper on 5" tube
Spacing equal to
wire thickness.



NOTE - No need to number the points in the diagram - This was done here for clearness only

FIG 2

risky business but as a matter of fact the results are considerably more accurate than those usually secured by a mathematical method.

Still Another Way

If one has a good powerful driver the

thing may be done in still another fashion as shown in Figure 3. With this method it may be possible to get resonance when the coupling coil in the antenna is reduced

with spreaders or cages. On the other hand these things are heavier, harder to build, more expensive, harder on the masts and much more likely to come down in bad weather.

Don't bother with high-priced stranded wires, they are not as good as No. 12 enameled copper, they cost more and they do not last as long. Also don't bother with fancy insulators but get a good plain insulator of high-grade porcelain, pyrex, hard rubber, or some composition which will shed dirt and rain when the rain hits it. The insulator had better be a real one, 3 to 10 inches long, shorter if the highest grade materials are used.

Keep the wire "in the clear" instead of trying to see how long and how high you can make it. A lower and shorter antenna is better if it is away from things.

The lightning protector and the lead-in insulator are up to the underwriters. We don't know anybody who understands their regulations but let the local agent give you his idea and follow that.

You have now done the unimportant part of the job. The really important part is the ground. Run ground wires to *everything in the place* and try all the possible combinations. There is absolutely no general rule. Above all don't (oh please don't) believe that ancient yarn that a waterpipe ground is always good. If neither the piping nor a driven ground is any good in your case try burying 50 feet of bare wire just under the sod and if that does not work try a one wire counterpoise about as long as your antenna, although not necessarily in the same direction.

All these things are simple but they make a great difference in results.

Finally, try several antennas, nobody can tell which will be best.

Socket Contacts

Most sockets on the market make the mistake of trying to secure contact with the solder on the end of the tube terminal pins. A permanent friction contact with solder is almost impossible.

If your tubes are noisy try using a socket which makes a wiping contact with the *side* of the pins. There are two kinds of these sockets, the ones in which the tube is put in after the usual fashion and the ones in which the tube is put straight down without turning.

In the meantime take out the tube and clean up the contact springs of your old socket, bend them up a trifle and replace the tubes after cleaning the pins with a file or fine sandpaper. Don't get too enthusiastic or they will get too short to make contact.

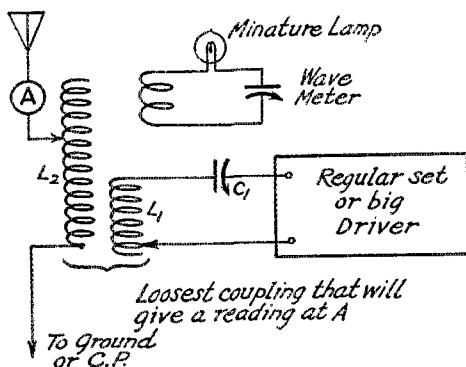


FIG. 3 FINDING THE FUNDAMENTAL

*A - The smallest ammeter you have
L₁ & L₂ - Any helices. If the regular set is inductively coupled no change is needed except loosening the coupling
OPERATION - Set clip at top of helix, adjust C₁ and L₁ until meter A shows resonance, now measure wavelength with wavemeter. Next move clip down a turn and repeat.*

to a single small turn so that for all practical purposes we are measuring the fundamental directly. This is hard to do though.



CONDUCTED BY S. KRUSE, TECH. ED.

The Receiving Antenna

A good receiving antenna and good receiving ground are worth while.

It is particularly worth while to put them in so that they will *stay* good, and not quit business after a while.

Use a single wire. It does not help the signals particularly to mess up the scenery

Experimenters Section Report

THE results of the 5 to 20 meter tests cannot be reported in this issue as copy is being turned in 10 days ahead of the usual date and reports have not had time to arrive.

A complete report will appear in the next issue.

Our Progress

Practically all of the problems are now receiving some attention. In a few cases there is a great deal of very active work, most of which is being done under handicaps as to apparatus. Nevertheless, some gratifying results are being obtained and will be used in future QST articles.

The preparation of the laboratory sheets goes ahead slowly. Better time can be made after this however, as the Information Service has been taken over by Mr. John M. Clayton, leaving the Technical and the Department Editor with more time to devote to the business of QST and the Experimenters Section.

At this particular moment the most active interest is in the work below 75 meters. Most surprising daylight transmission has been obtained by a few men and more will be at it shortly—possibly they are already testing.

Coils measurements, antenna work (including counterpoise and grounds), insulation tests, audio transformers and short-wave R. F. amplifiers seem to be the most active problems after that. The work on double-modulation transmission has been suspended because the director of this problem, Mr. H. J. Tyzzer, has been swamped with work at the "Amrad" factory.

The radio survey problem has attracted a number of men who are willing to do the necessary tedious observing. Such work is particularly wearying at times and the men that tackle it are to be complimented.

The Eclipse and the Experimenter

All members of this section are especially invited to take notice of the A. R. R. L. plans for observations at the time of the eclipse of the sun on January 24. These plans are announced elsewhere in this issue. Special observations will also be made by Dr. Greenleaf W. Pickard at some point in Western New York. The station will be chosen from a number suggested by the A. D. M. for Western New York.

All men who are taking part in the 20 to 5 meter tests are especially urged to arrange schedules with some nearby station at the time of the eclipse and to make ob-

servations on radio transmission at this time.

There will not be another total eclipse while most of us are alive—it is a rare opportunity. Let us arrange to observe on *every* waveband. The general membership will take care of 150-200, also of the 80 meter band. Therefore it is the business of this section to observe on 40, 20 and 5. Let's do a good job of it.

Transmitting Grid Leak

A very useful bit of experimental work would be to run a series of curves showing the effect of changing the size of the grid leak of a transmitter. This should be done in a systematic fashion for different tube arrangements and at different wavelengths, especially the latter.

The Grid Condenser

Equally desirable would be a set of curves showing the effects of varying a grid condenser. Variable grid condensers are frequently stated as being highly desirable in transmitters but the Editor will admit having been quite unable to do anything with them that could not be done by moving the grid clip.

The Stopping Condenser and the Plate Choke

In most amateur transmitters absolutely no attention is paid to the proper choice of the plate stopping condenser and the plate feed choke. Will not someone do some experimental work that will enable us to put indefinite understandable shape, the importance of doing this thing right?

Having cured some 60 or 70 sets of various bad ailments by removing concentrated chokes and substituting single layer ones I am pretty firmly convinced that this question at least does not need investigation.

Our Friend the Node

Antenna resistances and currents apparently are measured at almost any place in the system, now that we are using counterpoises. It was simple enough in the days of the ground—one just measured as far down the system as possible.

Here is a suggested standard method on which comment is requested.

All measurements of antenna resistance and antenna current should be made at the nodal point of the system. In some circuits this will involve cutting the helix at its center. As an alternative the resistance and current should be measured at the antenna lead-in insulator. These seem to be the only two definite points in the system. What does the membership think?

The Moon and KDKA

Problem G-3, "The effect of Weather, Barometer & Moon on Radio Transmission" is showing plenty of life. The theory that we presented on page 35 of the August issue has come in for much attention.

Observations are being made by a number of men, with rather negative results. Perhaps this is because the tests have not been going on for a very long time. A representative set of figures follows.

Problem G-3

(1) 9/1/'24. Paden City, West Virginia. Done by Virgil Henthorn.

(2) Purpose. Effect of weather, (barometer) and moon on radio conditions.

(3) Used Crosley XJ, one step audio, Brandes fones; two steps audio, Brandes Table-Talker. 100 foot aerial including lead-in running southeast by northwest. Station KDKA chosen for test. 326 meters. 100 miles airline distance. Signals must travel nearly due south.

(4) Errors, Local disturbances. Defective reception.

(5) Day Weather Static Moon Reception.

Sept.					
1	Electric storms	Vy bad	....	moderate	
2	fair	little	....	loud	
3	fair	little	....	loud	
4	slightly stormy	some	....	good	
5	fair	some	....	moderate	
6	fair	some	....	good	First Quarter
7	cloudy	bad	....	moderate	
8	cloudy	vy bad	....	moderate	
9	rain storm	vy bad	....	moderate	
10	cloudy	little	....	good	
11	cloudy	some	....	good	
12	cloudy	little	....	moderate	
13	cloudy	little	....	good	Full Moon
14	cloudy	some	....	moderate	
15	cloudy	some	....	moderate	
16	fair	some	....	good	
17	cloudy	little	....	moderate	
18	cloudy	little	....	moderate	
19	fair	some	....	moderate	Last Quarter
20	cloudy	some	....	moderate	
21	cloudy	some	....	moderate	
22	cloudy	some	....	moderate	
23	fair	little	....	good	
24	fair	little (none)	....	good	
25	cloudy	little	....	good	
26	cloudy	bad	....	moderate	
27	cloudy	little	....	moderate	
28	rainy	little (none)	New Moon	good	
29	rainy	little	"	good	
30	fair	little	"	good	

(6) Conclusion: Unable to draw any definite conclusion. Evidently very little static during full moon. Also evidently none during no moon.

More observations of this sort are needed. Pick some broadcast or commercial station that is heard

regularly as it is important to observe signal strength along with the static. Incidentally—the observations so far have all been on rather short waves, why not some above 10,000 meters?



Concerning Crystal Oscillators

Mr. O. Riddel of Chicago calls attention to the fact that Dr. W. G. Cady holds two United States patents on the crystal oscillator and that these give interesting information about the device. The numbers are 1450246 and 1472583. Copies of these may be obtained from the Patent Office at Washington, D.C.; presumably for the usual ten cents fee.

We have been getting many inquiries as to the possibility of purchasing such crystals. Unfortunately we do not know anything definite yet and must refer inquiries to the General Radio Company at Cambridge, Massachusetts.

Exchange Report

Corona Shield Design

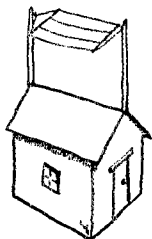
Undoubtedly many of the readers of *QST* are equipped with the engineering knowledge to design proper corona shields to reduce the losses in our most popular types of insulators. We have many inquiries for such designs and would recommend that someone capable of working out such a job give us designs suited to the 9DNH "Surefire" insulator, the Ohio Brass Company 10-inch and 5-inch insulator, also the Pyrex transmitting insulator.

The Tech. Ed.'s Paragraph

THIS time the talk is short—but not sweet.

Where did everybody get this foolish idea that anything labeled "technical" must be hopelessly hard to understand? It is a silly idea—the word "technical" simply means "Useful in practice". With us that means anything useful in the operation of a sender or receiver, and that covers all of our articles with the exception of the reports on A.R.R.L. affairs and the convention reports and—but the list is getting too long.

Just the same, I'll bet that 95% of *QST*'s readers will keep right on thinking that "technical" means "Highly scientific". Oh, Rats!



Short Wave Daylight Transcon Report

WELL, gang, we darn near did it, but not quite. Just by small errors did we fail to make a 100% job of what we started out to do. The enthusiastic co-operation and the feverish attempts to get messages through show that we are keen for relays of this nature. In every log, and there were dozens and dozens of them, every possible evidence points to a good hard try for success. But two or three participating stations failed to send in logs. From those received, the following report has been abstracted.

First let us tell you something about the messages and their numbers. Those of you who handled the Daylight Transcon Messages probably wondered at the funny numbers and queer code. The numbers were adopted purely to enable us to trace the messages. The number covered the month, date and number. For example, number 90111 represented the 9th day of the 11th month and was number 1. Those going west were like this. Those going east had a number like 11901. This also covered the same things, but was for the purpose of identifying it from a west-bound message. On Nov. 16th similar numbers were used.

There is absolutely no sense to any message. They could not be decoded to mean anything. The words were made from letters picked at random on the Underwood. There was a reason for this. We didn't want mental telepathy to creep in, which it often does with straight English, but we did want to be sure there would be no flukes in copying. We wanted to find out how accurately we can handle messages. We did. Some messages were badly garbled, others not quite so badly, but not one message got through more than five stations without at least one error. These good cases were few and far between, with most of the messages rather badly garbled. Just where the garbling took place we don't know, as complete copies of messages were not received from all stations. We do know that more attention must be paid to handling our keys and in copying. The errors cannot be called anything other than carelessness.

There seems to be a wholesale national error in our time-pieces. A very few logs did check in time, but more than 75% of them were anywhere from 15 to 45 minutes out. Remember, fellows, in tests or relays time is one of the most important factors. Your time-piece ought to be checked at least once every day, which can be done with NAA on 2650 meters at noon and 10:00 P. M., E. S. T., or Western Union or Postal Telegraph or your telephone operator. Time is very important in all radio work! The proper time to place on a message is not

the exact minute you start sending it. It often happens that a message may take many minutes to clear because of repeats and other things. The proper time to enter is the time at which the message was acknowledged by the receiving station. Watch this in the future, OM.

Now the messages—we'll give as complete a route as we can on each message. Allowances must be made for "open places" which we could not fill because of lack of information. We'll start off with the west-bound messages of November 9th, taking them by number.

Nr. 90111.—Started from 1ALK. 1ALK-1ABF—it stops here because we have nothing from 1ALK. 9AAD QST'd it and 9BVA picked it up and also QST'd. In some way 8AMR sent it to 8ZZ—no further information.

90211.—Started by 1MY at 10:06 A. M., EST, and died at 9BNU at 3:43 P. M., CST. The routing was 1MY-3CHG-8HJ-8BOE-8XB-??-8BPA-9CXX, also 3CHG-8ADA-9YB-9DBF-?? From 9CXX it went to three stations, 9CFI, 9ZT, and 9DQM, finally getting to 9CJ who gave it to 9BNU, where it stuck.

90311.—4KU, 10:03 A. M., EST. Got to 6APW at 4:14 P. M., PST, but had three code words garbled—it made good time, though. 4KU-5ADS-5MI-5DW-9BJI-6BKA-6APW. From 9BJI it seems to have reached 6BUH and 6RM, also 6APW direct. Not quite clear on this. 9EKY intercepted it at 9:45 A. M., CST and gave it to 9AOD who sent it to 9BDU, 9AEY and 9BJI. 9BDU sent it 9EAK-9DED-6AME, where it reached the coast at 4:04 P. M., PST.

90411.—1AID-2ADT-8BOY-3BWT-8UE-8BNH-8ZY-9EM-9DQU-9AYS-9BDU—complete route, as it stuck at 9BDU at 3:04 P. M., CST, having left Miss 1AID at 10:09 A. M., EST. Another branch that developed somewhere was like this: 3BVH-8ATZ-8BPL-9EHY-??

90511.—Here is a fast one, but badly garbled—too bad! 4XE started it at 10:48 A. M., EST. 4XE-5UK-5AIL-5JF-(5AJH-5ZA-5BE-5APG)-6BKA-6APW—3:04 P. M., PST. This message made fine time going thru all stations, but it was garbled in 4 words out of 8.

90611.—Also garbled and we are not entirely sure of this routing, but here is the best we have: 5MI-5AC-5GI-5UK-5AIL-5JF-5ADH or 5ZA-6BKA-6APW. 5BE-5APG get in there some place, but we don't know where—the logs don't check at all. This one got to 6APW at 3:09 P. M., EST. 5 of 8 words garbled.

90711.—Poor logs prevent correct routing. There are several disconnected ones. C1DD-

1CCX-2BEO-C3BQ-9BIQ-?? C1AR-1EF-1KL-1ALK-1CME-?? 1XW intercepted from 1AR and this route developed: 1XW-3CHG-8DHW-8DPN. Another incomplete route is 9VZ-9EM-9DQU-9XI-9BKX-9XBP-9AEY. Another: 9ELB-9CTR-9BNU, where it stuck at 5.10 P. M., CST.

90811.—Complete, but not enough speed. Only one word garbled and of that word only one letter was wrong. Otherwise it just got in as the curtain was going down, at 5:00 P. M., PST, having been started from 2BRB at 10:23 A. M., EST. The complete route was possible only because all logs were complete in every way. The routing was 2BRB-8CCQ-8BNH-9EM-9BYE-9CLQ-5AIL-5AME-6BKA-6APW. FB!

90911.—Got off on the wrong foot with a bum number which made tracing difficult—what little there was. 2XQ-8AVL-8ATZ-8BPL-9EHY-?? That's all we have on it.

91011.—Poor logs, wrong number, badly garbled. Impossible to determine routing. 4TJ started it and here's our guess at the route: 4TJ-8BPA-??-5HW-5QY-9AOD-9BJI-6RM-6APW. That's about the best we can make of it. 5 words of 7 were garbled.

91111.—1ZE-1BKQ-2BPB-3QT-8BOY-stuck.

91211.—3BMN sent this to 3CA and 4MI. 3CA couldn't move it, but it moved via 4MI-8COJ-9VZ-9EM-9NV-?? Then we pick it up at 5DW-9BJI, where it was sent to 6RM and 6BKA. 9BJI wasn't going to let anything get cold; he was out for moving them fast.

That's all of the westbound messages of the 9th, and now we come to the eastbound of the same date.

11901.—6CTO-6BLW—no further information.

11902.—9DXY-9DVP-9CTR-1AEA. Much too late, having left 9DXY at 2:54 P. M. and reaching 1AEA at 8:30 P. M. No count on this one.

11903.—9DXN-9BUK-8BPA-1AAC-1BVL. Good time but not enough "transcon flavor" as it started from St. Louis. 1XW intercepted 1AAC-1BVL and sent it to c1AR and c1DD at 2:05 P. M., EST. It left at 9:28 A. M., CST.

11904.—Didn't start from 9DED. 11905, 11906, 11907, 11908, 11909, 11910 were not started.

11911.—6LJ-6BRA—no further information.

11912.—6AGE-6CTO-6BLW-??.

West bound of November 16.

01116. — 4KU-5AC-5JF-5AME-5AIJ-?? That's all we know about it.

02116.—This one got a bum number some place and routing is poor. Details are missing and we have to guess at it and it looks like this: 11I-2AZY-??—no dope from 2AZY. 8AMR-8GZ-9DFV-9CXX. 9AOD-5ZAV-6ALK. 9AYS also sent it to 9EAK. Some place we remember that it is reported

to have been at 6CGW at 4:30 P. M., PST, but the information isn't at all clear, so we have to pass it up at this point.

03116.—1AID didn't start it.

04116.—This one looks fine and if we had complete logs, it may have been the 100% message, but there are some holes which prevent correct routing. At 10:14 A. M., EST, 3BMN sent it to 4JR. 4JR didn't give us the missing link on it, but 4TJ got it and here's that route: 4TJ-8GZ-9DWK-5JF-5AJH-5ZA-6CGO. It was QSL'd by 6CGO, according at 5ZA, at 2:37 P. M., MST. Plenty of speed, correct copy, but a hole in the route. Too bad, OM!

05116.—1ZE-1CMP-2BBN-3XO-8ADA-9EFZ-9CIA-9EFH-9DAC-QST-9CFZ-9DIX-9AOD-5ZAV-6ALK. It got over, but it was slow, arriving on the coast at 8:19 P. M. Only one word of 8 was correct and the others were very badly garbled.

06116.—Sure a flock of routes on this one. 4TJ-8GZ-9BUK-9CEE-9BNU-?? Also 8GZ to 9CXX and thence to another pair of routes, one of which was 9CXX-9EHT-5ADH-5QY-5AJH-5ZA-6BKA-6CGO. The other branch from 9CXX was 9ZT-9BNU-9CFI-9DES-5DW-??. Somewhere at the beginning another route started 8RY-8ZE-8DOO and 8BVY, thence to 9EM who branched out to 9CLQ and 9DFV. 9CLQ to 9AOD. 9EFZ, 4MI, 5AJH, and 9EHY get into the scramble, but we don't know where to put them. The message moved slowly so it doesn't matter much. The routing was OK on all branches but we couldn't piece them together.

07116.—Another slow one with a couple of long routes. 2BRB QST'd it and the routing is 8CEO-8BVR-9EFZ-9EHY-9CLQ-9AOD-5ZAV-6ALK. 8HJ and 8AMR enter right after 2BRB's QST and we get this: 2BRB-8HJ and 8AMR-8BNH and 3BHV-8GZ-9EM-9DFV-9CLQ and the tail end of this route is the same as the above. Slow moving and doesn't count.

08116.—Don't know a thing about this one.

09116.—Lots of speed, but not enough Transcon DX. 5MI-5UK-5JF-5AJH-5ZA-6BKA-6CGO. 6BKA reports it QSR'd to 6CGO at 3:07 P. M., MST. It started at 10:00 A. M., CST.

10116.—Didn't even get out of the first district. 1ALK-1BVL-1AAC-1BFQ.

11116.—Also stuck in the first district. C1DD-1EF-1KL.

12116.—4XE-5AC and 4FS-5ZAS and 5JF-5AME-5AIJ-??. ??9CFI and 9DFV-9CXX-9ZT-9BNU-9AYS-9EAK and 9XBP-??. ??9EHT-9AOD-5ZAV-9BM-6BKA—6CGW. Time of arrival is missing.

Now the eastbound messages for the 16th. 11601.—9DXY-9DIX-QST-5ADH-5UK-4XE. Not enough Transcon DX, but good time and clear routing, altho badly garbled in 3 of the 10 words.

11602.—9DXN-9DYY-9DFV-9YB-8GZ. No speed and not enough Transcon DX.

11603.—9DED to 9BNU and there it stuck.

11604 didn't start. 11605 got started, but didn't get far enough to make a routing. 11606 didn't get started. 11607—same as 11605. 11608—also the same, 11609—not sufficient data. The same for 11610, altho indications are that 5AC handled this message, but we're not sure as details are missing.

11611.—It appears to be like this: 6AGE-6AHP-6BKA and 6CGO-??-5ZA-5AJH-5JF. Not enough information about it—sorry.

11612—Here is another one that just got under the wire before 5 o'clock, but it had one letter of one word wrong. This one was clean-cut except for that slight error, and this message along with Nrs 90811 and 04116 were the three best of the entire 48 messages during the two days. We have two good routes on this message and to give details, we'll give both complete routes. You'll see where they branch off, all right; keep your eye on 'em! At 9.05 A. M., PST, 6CTO sent it to 6WI-5ZA-5AJH-5JF-9DWK-4MI. That's one way, and here is the other: 6CTO-6WI-5ZA-5AJH-5QY—to 4SI, 4XE and 4SB and to 4FS, where the message landed at 4:51 P. M., EST. Pretty close work, O.M.

One of the biggest things we learned about getting information after tests are over concerns the method of reporting, providing we can make you see the necessity of sending in your reports. As it was, the huge bundle of mail about the Daylight Transcons kept us going for 23 solid hours and 30 minutes—actual time. Nobody, unless he has done it, can realize the tremendous amount of work after the tests are over. All this is loaded on a couple of men—and believe us, it's some job. Why? Well, because logs are so carelessly compiled. We have to wade thru them a dozen times, checking here and there to pick out one little bit of information. Some of the logs were just what we wanted, others were absolutely useless in every way.

In the future, on tests of this kind we want NOTHING BUT A COMPLETE COPY of the message as you received it, together with the call of the station from which you received it and the station to which you sent it, and the exact times. If, under these conditions, we can pry complete messages from each participating station we will only have to paste them together and get the complete routing without wasting so much time doing it.

These Short-Wave Daylight Transcons were pretty fair, but they were far from being the success we wanted them to be. We're going to have more of them in February and we hope you will profit as much

from this report as we have. If it gets so bad that we simply fail and fail to get a message over, we'll make up a route right from the results of these tests. We don't like to do that, but at the same time we shall have a 100% message across the country in full daylight before we give it up. So, gang, let's get busy now and work out some reliable routes before the next tests.

—F. H. S.

Brains or Volts

By "S.S.B."

THE American amateur is first in everything, particularly in blowing out tubes.

The Australians have proved it unnecessary to put Lord-knows-what on the plates. Americans should follow their example and develop more efficient transmitters and fuller pocketbooks.

If overloading were justifiable or necessary it would not be my place to squawk, but it is futile and foolish. No amount of overloading will improve a sloppy station but the tubes will all go to the land of eternal darkness.

My idea of a fourth-rate ham is one that runs a third-rate station with a second-rate instinct and with no brains at all. This individual usually throws together a thing he calls an antenna, insulates it with anything at hand, lets it hang any way, guys it too liberally, and pays no attention to soldering any portion of it.

This slothful soul allows a transmitter to collect itself. It is composed of a rotten condenser, a still rottener inductance, dubious sockets, fishy rheostats and doubtful accessories.

He connects the mess to his so-called antenna and makes up for all the follies, faults and shortcomings by overloading the tubes. The tubes try to do their duty but sooner or later they give up the ghost. Then the nincompoop goes around wailing about his hard luck and gets much sympathy, whereas he needs a spanking and a guardian.

If he does get away with it he tells everybody how he is getting 6½ amperes out of a little 8-watt tube. He is also getting ready to buy another tube but he does not know this.

Must we after these years of progress go back to the habits of the barbarous spark days when the fellow with the biggest transformer got the farthest? Can't we, by the use of a little intelligence and thought, develop transmitters that will give more miles per watt? Must we continue on the road to self-destruction?

The Amateur Arc

TRANSMITTING tubes are expensive things. But that isn't all. Delivery on transmitting tubes is slow and unsatisfactory because the ordinary dealer does not give a hurrah for a small market. A little healthy competition might cure this thing and it would certainly be fine if the tubes of the General Electric Company, Western Electric Company, Telefunken and the French and British manufacturers were all available without artificial restriction.

However, we can't do anything about that so it is interesting to think over the possibilities of devices for replacing the tube entirely. Alternators to work at 2,000,000 cycles are hardly practical so we turn to the arc.

The Willoughby Experiment

Some years ago Mr. J. A. Willoughby of Washington, D. C., did some experimental work with the idea of making an oscillating arc work at short wavelengths. The circuit used was the very simple one in Fig. 1. Used in the ordinary fashion this circuit would not go much below 1000 meters with reliable operation. Commercial arcs are made to go down further by using a strong "blowout magnet" but such a thing is expensive and hard to build and in any case the arc will hardly work at 200 meters. Mr. Willoughby therefore thought

that this chemical action would be neutralized. That I have never tried. As I remember it the best results were obtained using electrodes of the same material; two copper electrodes worked very well. The

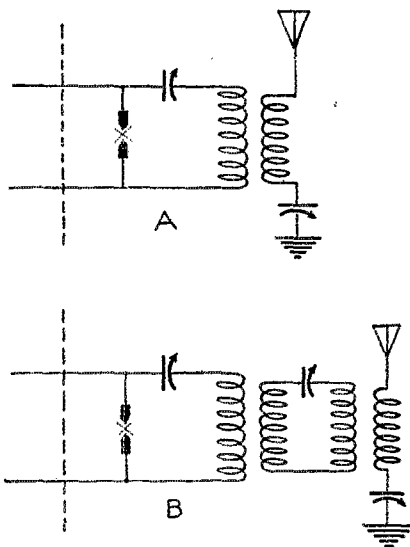


FIG. 2

electrodes should be pointed and have a cooling flange near the point. It is possible that if the tips were made of platinum or Tungsten the note would improve. The whole thing is a cut and try proposition.

"The radio choke coils should be made with core of radio frequency iron, also a tuned radio choke should be used. (It seems quite possible that by putting the tuned radio chokes between the iron-core chokes and the arc, rather than next to the generator as shown, the iron-core chokes might use regular core-iron or rod or even cast-iron cores instead of radio-iron.—Ed.) A magnetic field is not necessary as the alcohol does the quenching."

Some Suggestions

Anyone unlucky enough to live near a commercial or government arc station knows what a terrible blanket of mush and harmonic an arc will generate when used in the ordinary fashion. Amateur arcs should not be guilty of this same thing, therefore the simple experimental circuit of Figure 1 had better not be used. Some other circuits are suggested in Figure 2.

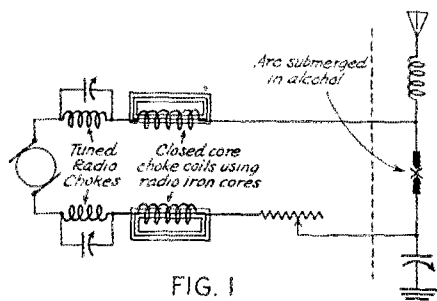


FIG. 1

of another device, that of putting the arc in a hydro-carbon liquid, in this case ordinary denatured alcohol.

This arc worked down to 200 meters without any particular difficulty and gave good operation for a short time but a trouble developed that was not overcome. Quoting from a letter of Mr. Willoughby, "There is some chemical action in the alcohol which after a time makes the fluid a conductor instead of an insulator. Someone told me that if the container was made of zinc or a zinc rod was put into the alco-

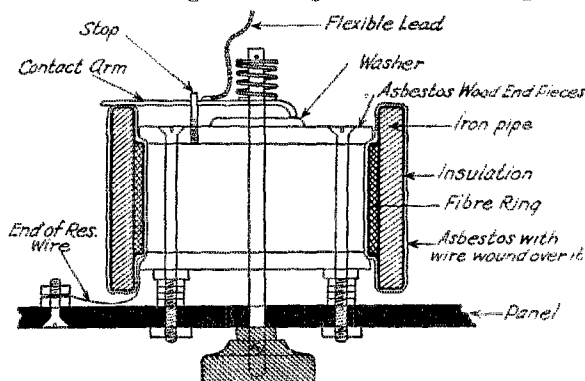
A Primary Filament Rheostat

By A. W. McAuly. 8CEO

THE FOLLOWING is a description of a rheostat for use in the primary circuit of a filament heating transformer and may be used on sets using from one to four UV-202 tubes or their equivalent. Its construction is such that it acts as both resistance and inductance.

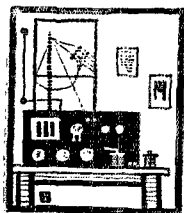
Procure a piece of standard wrought iron pipe, 4 inches inside diameter and $2\frac{3}{4}$ " long. It should be cut true in a lathe or pipe cutting machine. Dress the corners with a file both inside and outside, or, if cut in a lathe, have the corners rounded slightly. Cut a piece of sheet fibre $1/16$ " thick, $1\frac{3}{4}$ " wide, and about 16" long. Be sure to make the width exactly the same for its entire length. Lay this strip inside the pipe ring and cut off the end of the strip so that the ends will just meet when forced tightly against the ring. Place the strip exactly in the center of the pipe. Now wind ordinary friction tape over the pipe and fibre strip lapping the tape one half its width until the ring is entirely covered. While the tape is still sticky the asbestos sheet covering described below should be applied and this is the part which requires the most skill. The asbestos covering should be prepared before winding the ring with tape. From a sheet of asbestos paper $1/32$ " thick cut out two circular pieces, each one forming a complete circle having an outside diameter $\frac{1}{4}$ " smaller than the inside diameter of the pipe. Lay one asbestos paper circle on one edge of the pipe (which has been taped) and force the paper down around the edge of the pipe. The outside of the circle will tear some but not much if the circle is made not too large. The inside will have to be relieved by cutting away some of the paper in wedge shaped pieces. Use a sharp knife for this purpose and take out only enough to allow the paper to cover the tape in one thickness. By using the ends of the fingers, the paper can be smoothed down without much trouble. Now apply the other circle in the same manner to the other end of the pipe. Cut two strips of the paper of sufficient width to fill out the spaces inside and outside the pipe not covered with paper and apply by pressing the paper onto the tape. If good

tape is used it will stick readily. The ring is now ready for winding. Purchase one pound of No. 26 "Climax" resistance wire. "Nichrome" is better but costs much more. Both grades may be obtained from the Drive-Harris Wire Co., Harrison, New Jersey. The resistance wire should be wound on a spool small enough to pass through the ring without forcing. Now comes the tedious part but if time is taken to do a good job of winding the contact arm will work smoothly and you can get on more wire. Place the ring in a vise or hold it rigidly in some way that will leave both hands free to handle the wire. Wind on one turn and pass the free end under the turn and pull the wire tight. Wind the turns as closely as possible without touching and *pull the wire tight*. Cover almost the entire ring with the winding leaving only about an inch or so. Pull the end of the wire under the last turn and go to bed. Next day at the shop look for a piece of asbestos lumber $\frac{1}{4}$ " thick and big enough to make two of the end pieces shown in sketch. Sometimes this material is used as clapboarding on a building. When you get home don't wait for supper but cut the asbestos lumber into circular pieces, tapering the edges so that they will just fit into the ring far enough to leave the edges of

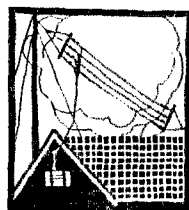


the winding extend out $\frac{1}{8}$ " or so. The edges of the asbestos can be dressed with a flat file. Bolt the end pieces into place with stove bolts which preferably should be long enough to go through the panel after passing through a short sleeve or a few washers to provide ventilation. Drill a $\frac{1}{4}$ " hole in the exact center of the end pieces and run a $\frac{1}{4}$ " brass rod through to carry the contact arm. There are many ways to make

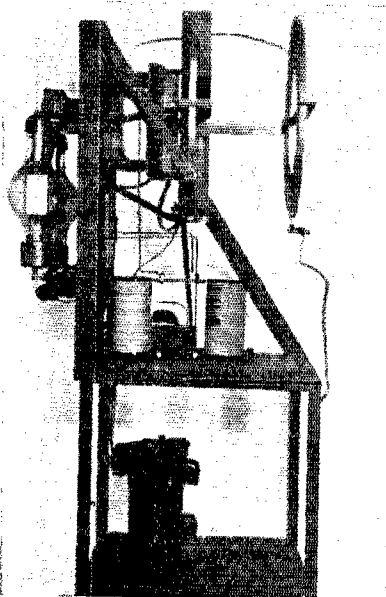
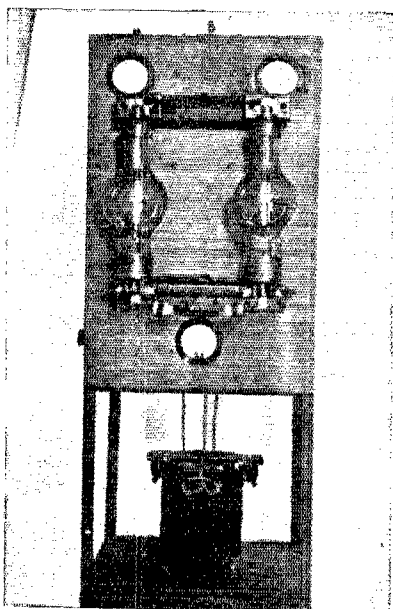
(Concluded on page 42)



Amateur Radio Stations



6AWT, San Francisco, Calif.



6AWT is the Station of B. Molinari at 653 Union St., San Francisco, Calif.; and a very interesting one. Among other things, the call 6AWT has been heard just about everywhere there is a receiver, and is one of the most consistent stations heard on the east coast.

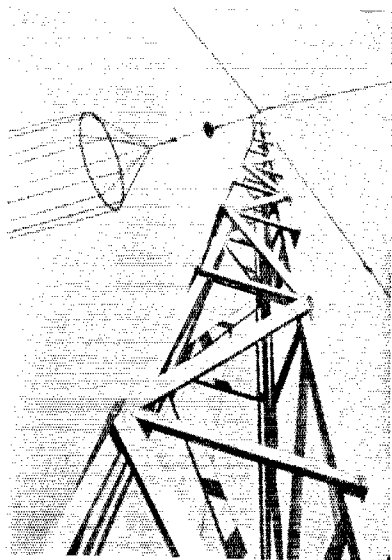
The receiver is a Grebe 13 and is not pictured here. The transmitter uses two 250-watt tubes as shown, with an input of about 750 watts at 3000 volts. The circuit is an inductively coupled Hartley for all wavelengths used, and the antenna current is about 13 amperes on 150 meters. The reason for such an antenna current is that, at that wave, the antenna is worked above its fundamental, which is 125 meters. On eighty meters the antenna current is 6 amperes or a little more.

The Antenna is a semi-vertical cage about six feet diameter at its top, tapering to a six inch leadin. The antenna is in-

sulated with the commercial Pyrex insulators, which are 30 inches between ends and therefore certainly are effective. The counterpoise is a real one. As can be seen from the diagram of the counterpoise it is quite large. It fills in the entire space between two buildings, or about 25 feet, and is about 75 feet long. The number of wires can be told from the diagram herewith.

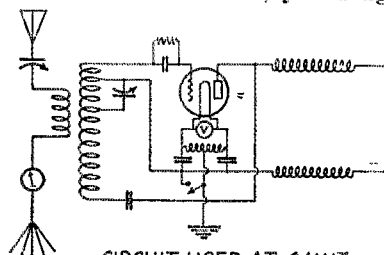
6AWT in sending in his station description also told of an interesting freak that is given herewith in his own words: ".... concerns a church about one and one-half blocks—air line—north of me. It is an all steel structure and towers to the height of 180 feet. Two years ago they started building it. At that time I used to be lucky if I could get a card from an "8". As the church was increasing in height I noticed I could work east a little better every night, until finally I received a card

from a one. Church structure was completed about a year ago, and that was the time I swung into England, China, Japan,

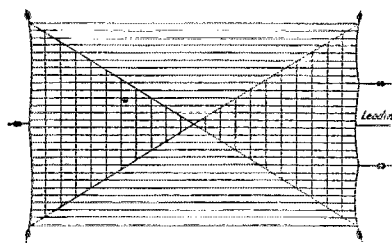


Cape Horn, etc. Ever since then I have been able to get any place no matter what power was used here. Even a 216-A putting out .1 ampere was heard by several Atlantic coast stations."

As a result of the above, ye Ed figures



CIRCUIT USED AT 6AWT



A REAL COUNTERPOISE AT 6AWT

that there ought to be more interesting freaks of the sort. If a few of the members will send in some of the sort, we will see if we can whip them into some sort of order for an article.

PRIMARY FILAMENT RHEOSTATS

(Concluded from page 40)

the contact arm but here's one. File two sides of the brass shaft for a space of one inch from the end leaving the shaft about $\frac{1}{8}$ " thick. Make a copper contact arm as shown in sketch $\frac{1}{16}$ " thick, $\frac{1}{2}$ " wide and about $3\frac{1}{2}$ " long. Bend one end down slightly as shown in sketch. Drill a $\frac{1}{8}$ " hole $\frac{3}{4}$ " from the bent end and slot this hole out with a small round file until it will slip onto the end of the brass shaft. It should move freely up and down the shaft but not sideways. Drill a small hole in the end of with a $\frac{1}{4}$ " hole next to the asbestos end the shaft for a pin. Place a large washer piece and assemble the shaft, washer, contact arm, spring, washer and pin as shown. Cut the front end of the shaft so that the knob will hold the spring in compression. Solder a flexible lead to the contact arm and run it back through the spring for one connection. The other connection may be arranged as shown in sketch. Stops made from machine screws may be screwed into drilled holes in the asbestos end plate. The edges of the contact arm should be rounded where it passes over the wire.

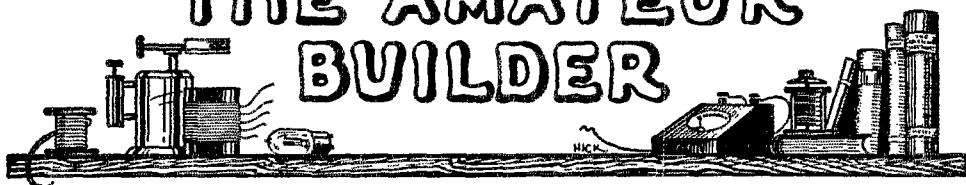
Regarding Primary Rheostats

By J. L. Martin, 5ZH

MY attention recently fell on the QST article about primary rheostats. I had been wondering the same thing as I measured several filament transformers, and had found the tubes working a little under their rated filament voltage giving me the same results with increased life. For instance with my 50-watters going on 9.6 volts I got the same plate and antenna currents as with 10 or even 12 volts.

To get back to the rheostats, we all know that in inserting rheostats in the secondary circuit of the filament transformer is throwing the filament center cap to the winds and is not the right way to reduce the filament voltage, that should be done on the primary side of the transformer. Ordinary rheostats were of little use to me and like all desperate hams I began searching through junk piles. I solved the situation for exactly nothing by using the wire from the heating elements from an old electric iron, cutting away the excessive material and winding the desired amount on asbestos sheets $4" \times 8" \times \frac{1}{4}"$ using a hack-saw to cut grooves in the edge so as to provide spacing for the wire. Some electric heating elements are punched in zig-zag shape and must be used as they are. Be sure to keep them out in the air to provide cooling and to prevent fire

THE AMATEUR BUILDER

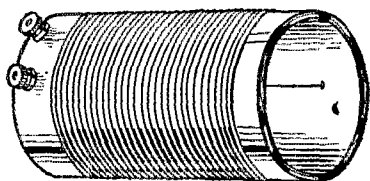


About Coils

By L. W. Hatry

WE know that the ideal coil is one of non-corroding wire, of no distributed capacity, with no losses, and of a maximum inductance for the amount of wire used. This is granted impossible to do, but we do our best in all particulars. If the wire must corrode, we can enamel it and stop oxidation by preventing exposure to air. We can not have a coil without insulation but we can design one with a minimum of it or reduce the effect of the insulation. We can not have a coil without distributed capacity but we can take means to reduce the distributed capacity; and, finally, we have no perfect conductor but we can take means to reduce the resistance by proper choice of wire and wire size. In other words we do not discover some freak form of super-efficient coil but we correctly design the ordinary coil for whatever purpose we desire.

Just about the best coil that we can build is one of spaced turns, large wire (consequently large diameter because of the difficulty of making large wire into a coil of small diameter), bare wire, and supported in air well away from anything by



THE USUAL COIL (*Rather poor*)

FIG. 1

thin silk thread. This, to me, is obviously an impractical coil for any use, but even it has appreciable losses; mainly the actual resistance of the wire because the amount of dielectric present other than air is negligible. This coil is essentially a laboratory proposition.

Compare the above to the usual coil you see in the average manufactured radio set. This second coil is generally closely wound on some sort of insulating form with relatively small wire, either cotton or silk insulated, and further bound by a liberal coating of some sort of cement or else

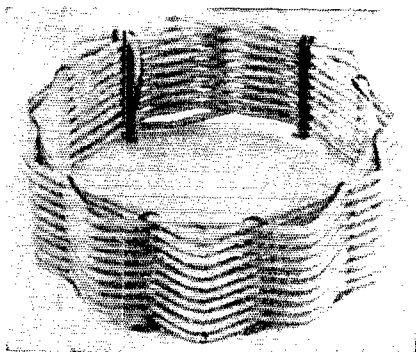


Fig. 2

the wire is uncemented depending upon tension for it to stay in place and upon the cotton or silk covering for insulation. This is not sufficient as either silk or cotton absorbs moisture. Also, generally with a couple of terminals brought out to one end of the form with binding posts as in Fig. 1.

I think I am safe in saying that we can consider no method of constructing a coil that does not make for a mechanically firm unit that will stand ordinary use and movement. That, then, becomes our first requirement in making our coil and it is possible by several means. We can make a coil of the Lorenz (Fig. 2) type which is mechanically strong when bound with thread, or we can make one of the type illustrated in the article by Mr. Clayton in this issue which is not so rigid but sufficiently strong nevertheless; or we can wind one on some proper type of rigid form, which will automatically take care of the mechanics of the coil.

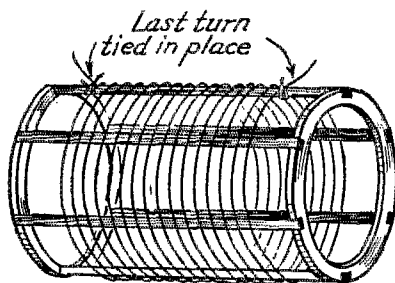
The wire itself in your coil deserves first consideration. As I have hinted, only the enameled wire will not corrode but we can not use it in the ordinary close wound coil because of the extremely high capacity that would result between turns. However, you can obtain wire that has enamel under the double cotton covering and is in that way protected both from possible dampness of the cotton *partially*, and from oxidation. As, at any wave below 300 meters, litz is not as good as solid wire of the same cross section or even smaller, it becomes out of the question and the only thing left is your choice of the proper size of solid wire. (Litz becomes worth the price on waves from 600 meters up.) This can be partially determined in this manner; there is no profit in using a size of wire larger than 16 gage in a close-wound cylindrical coil of the ordinary type due to *eddy-current* losses, but if you do use a larger size of wire it should be space wound, preferably the diameter of the wire, to reduce these same eddy current losses. The Lorenz method of winding the coil only partially takes care of this and figures on it can be obtained from the article by G. W. Pickard on Page 59 of the September issue of *QST*. Please note carefully that Mr. Pickard does not state that merely larger diameter will allow you to use larger wire for this is not logical, but that larger diameter plus *spacing* will most likely permit an increase in wire size. The limitation of the coil size for some particular set, the dimensions of which are fixed when the set design is being prepared, can automatically limit the wire size. Theory must be conformed to the practical very often, and should be if necessary.

In building an efficient coil the distributed capacity is of great interest for two reasons; to get as great a tuning range with a given variable condenser as possible with a given coil and to make it possible to use as little capacity in the shunt variable and as many turns in the coil as possible—this last because it is considered a fact that greatest signal strength is possible when a maximum amount of coil (inductance) and a minimum amount of condenser (capacity) are used to tune to a given wave.

To get an idea as to how the distributed capacity of a coil can control the wavelength with a given variable condenser consider these figures; coil A has a distributed capacity of 50 $\mu\text{fd.}$ (.00005 $\mu\text{fd.}$) and is to be used with a variable condenser whose minimum capacity is 20 $\mu\text{fd.}$ and whose maximum is 250 $\mu\text{fd.}$ (.00025 $\mu\text{fd.}$). This means that the minimum capacity across the coil is 70 $\mu\text{fd.}$ and the maximum is 300, a capacity range of approximately 1 to 4 or a wavelength of 1 to 2 (wave-

length varies as the square-root of the capacity) so that if the coil minimum wave was 100 (with this condenser) the maximum (with this condenser) would be 200. However, if the coil capacity were 25 $\mu\text{fd.}$ and the same condenser were used the minimum capacity would become 45 $\mu\text{fd.}$ and the maximum 275 or a range of capacity about 1 to 6 and a consequent wavelength variation of 1 to 2.4. (approximate square-root of 6). Figuring down from the same maximum wave as obtained with the coil A, we get a wavelength of 83 to 200 meters with this second coil. Assuming you were designing this second coil to have the same minimum wave as previously or 100 meters, then your maximum wave would become 240 and your inductance would have been higher in the second case but with a lower distributed capacity. If this second coil should have had the same inductance as coil A, its minimum wave would be approximately 80 meters and its maximum about 192; 20 meters below the minimum of A and only 8 meters below the maximum. Actual shortwave coils such as the sort shown in Fig. 2 have distributed capacities of the order of 5 $\mu\text{fd.}$ and less.

There are several methods of going about reducing distributed capacity. You can wind the coil of the cylindrical Lorenz type-called basketweave—or the spiral Lorenz type—the Spiderweb. Both types require more wire to arrive at a given inductance than a spacewound coil such as



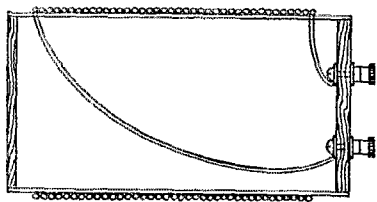
A VERY GOOD COIL

FIG. 3

in Fig. 3 although they both reduce distributed capacity and insulation losses effectively. I am inclined to think, though, not so effectively as the coils illustrated in Fig. 3 and in Mr. Claytons article, or any other properly designed space-wound coil (which is another method of reducing distributed capacity). The Spiderweb requires even more wire than the Basketweave to

gain a given inductance and, for that reason, should not be used by the amateur who wants a first class coil; its only excuse for use is space limitation.

All the inherent capacity that a coil has does not come from the capacity between turns. Coils mounted so that they have terminals at a single end of the form, such as in Fig. 1, have what is practically a small condenser shunted across them, and the capacity of the lead from the end of



THE WAY THE COIL PROF. MORECROFT
MEASURED WAS BUILT

FIG. 4

the coil that has to pass through the coil to terminate adds even more capacity—also some resistance. Professor Morecroft states that one coil (Fig. 4) that he tested had a natural wavelength of 117 meters with one lead of the coil passing through it and the both ends of the coil terminating on a wood coil end. Taking the leads from the two terminals in the wood reduced the wavelength to 93 meters. Running the lead that went through the coil as nearly central as possible reduced the wavelength to 86 meters; and bringing the two ends of the coil out from their actual location at the ends of the coil resulted in a wavelength of 71 meters. By this simple rearrangement of the coil terminals the internal capacity had been reduced from 13.7 $\mu\text{fd.}$ to 5.05 $\mu\text{fd.}$ Thus you see that you can easily raise the capacity of the coil beyond reason by improper arrangement of connections in your receiver.

Nor is the above all the effect of connecting two terminals of the coil close together. By connecting the terminals close together and running one lead through the coil close to the side as in Fig. 5A you can raise the resistance as much as 5 ohms. Merely running one lead through the coil against the side will raise the resistance of a coil several ohms so if a wire to one end of the coil *must* be passed through the coil it should be done so as nearly centered in the coil as possible, Fig. 5B.

The coil form is something to really worry about. It must have minimum bulk so that it will introduce a minimum of dielectric into the field of the coil. It must not be moisture absorbing, and it must be mechanically strong. Bakelite and Hard Rubber or insulations of that type are the only materials that I know of on the market and easily obtainable that both fulfill the foregoing and at the same time stand the test of time. The brown bakelite is the best of that because the black has various different kinds of coloring compounds which may or may not be good electrically; depending upon the company doing the moulding and the compound they choose. The fact that you should have a skeleton form eliminates anything like tubing and more particularly cardboard *unless* it is prepared by baking to remove moisture and then given a thin coat of celluloid varnish, collodion, or paraffined, to keep out the moisture. On top of that it should be prepared with strips on its surface to lift the wire above the body of the form about the diameter of the wire, Fig. 6. This prevents the concentrated part of the coil field near the wire from cutting through the form and thus raising the internal capacity of the coil. Also it reduces the losses in the form. Skeleton coil forms can also be made of wood strips or dowels waterproofed. Any insulation that is waterproof and will hold its shape serves the purpose. Of course the Lorenz type of coils need no forms; nor do those described in the article by Mr. Clayton.

If you make a good coil and then crowd it into a set you can produce as high a resistance in it by having it close to various poor dielectrics as in a poorly designed coil. The coil should have a clear space completely around it of about two inches and surely not less than one. Professor

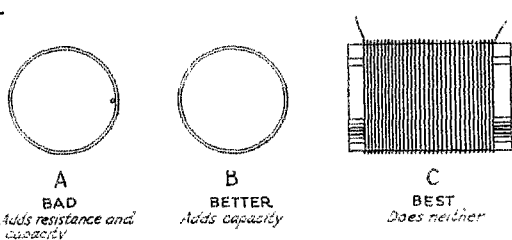


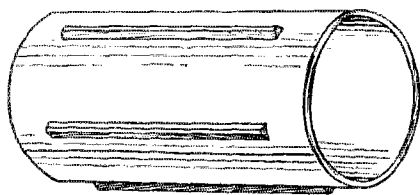
FIG. 5

Morecroft has found that merely having an active coil near to one not in use resulted in the active coil having an added resistance of 90 ohms.

Having given you all the considerations necessary for practical use in designing a

coil for a set, suppose now some practical cases are considered.

First we have a problem which says build a ham receiver to cover a wavelength range of 35 to 110 meters approximately. There are no limitations for size, space for coil in set, or economy. Perhaps we don't know offhand what coil will go as low as 35 meters but there is nothing to keep us from trying a coil and finding out (Mr. Clayton's article in this issue would solve this). So we wind one of 30 turns, 3 inches in diameter, of 16 enamel insulated wire, spaced its diameter and expect it to more than reach the minimum wave, which it may or may not do. As there is sufficient space between the 80 and 40 meter amateur bands, it ought not be difficult to tell when we reach each by listening in. The tuning condenser is not hard to choose. The wavelength range it has to cover is approximately 1 to 3 which requires a capacity range of 1 to 9 as the wave varies as the square-root of the capacity. Figuring that the minimum capacity of the condenser and the coil would be about 20 $\mu\text{f.}$ (which is an excessive figure and based on a coil capacity of 5, a minimum condenser capacity of 10 and additional capacity for wiring); then a maximum capacity of 200 $\mu\text{f.}$ will be necessary. That is a convenient size to purchase anyway. That gives a capacity of 1 to 10 which allows some leeway. Then the only thing left to do is to install the coil and cut it down if necessary. In installing the coil we should see



WAY TO PREPARE CARDBOARD TUBING
(Using celluloid varnish for waterproofing and binder) Rubber tubing should have wire supporting strips, also.

FIG. 6

that there is two inches of clear space all around to reduce outside absorption losses. If it were not convenient to build a skeleton form on which to wind the coil, or the knot spaced coil (as in Mr. Clayton's article) would require too much time, then we can make a Lorenz cylindrical (Basket-weave) coil wound with number 18 an-

nunciator wire; using this wire because it is spaced approximately its own diameter, or a little more, by its heavy layer of cotton; and it is waterproofed by being paraffined, which also makes the insulation air tight and prevents corrosion of the wire. Only the white insulated wire is to be considered as the coloring of the other kinds will attack the copper wire. The coil is to be wound with thin metal rods for the pegs because the nearer the turns of the coil approach the circle, the nearer they come to the property of the true cylindrical coil of having maximum inductance for the length of wire used.

The second problem calls for a coil that covers a wavelength range of 200 to 600 meters so that its owner may listen to the concerts in that band. Space limitations are 5" x 8" for the coil. As it stands it would not be advantageous to use too small a diameter because that would require excessive length so take a diameter that will allow an inch spacing on either side of the coil, 3 inches. Then wind a coil of 96 turns of this number 18 white-insulated annunciator wire without spacing between turns because it is already well spaced by its insulation. 96 turns because that makes a 6 inch length of coil, (16 turns of this annunciator wire to the inch) leaving 1½ inch spacing on either end, and because I think that 96 turns will most likely prove too many and can be cut down. The variable condenser chosen has 250 $\mu\text{f.}$ maximum for these reasons; approximately 10 for coil plus wiring and approximately 15 $\mu\text{f.}$ for minimum of condenser, or a minimum capacity of 25 $\mu\text{f.}$ with a required capacity range of 1 to 9 (1 to 3 wavelength range). The form for winding this coil would be of cardboard waterproofed as before mentioned or else thin hard rubber tubing because rubber has relatively low dielectric losses. Or, of course, some sort of skeleton form; which would be best of all.

The next article on coils in this department will take care of tapped coils, mounted coils, and coils coupled together.

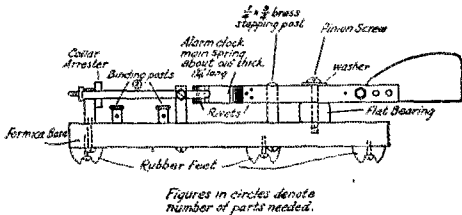
The reading of a single radio book and the use of it for reference will allow the merest beginner to understand the ordinary technical article in QST. Therefore I suggest what I consider to be both the most inexpensive and the most complete of the understandable books on Radio Communication: "The Principles Underlying Radio Communication" prepared by the Bureau of Standards and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. at a cost of one dollar. (Not stamps.)

Making Your Own Bug

By Ralph E. Kepler, 80T

HEREWITH the long-promised semi-automatic sending machine dope. The machine described is similar to, yet vastly different from, the regular bug as used on telegraph circuits. It has been

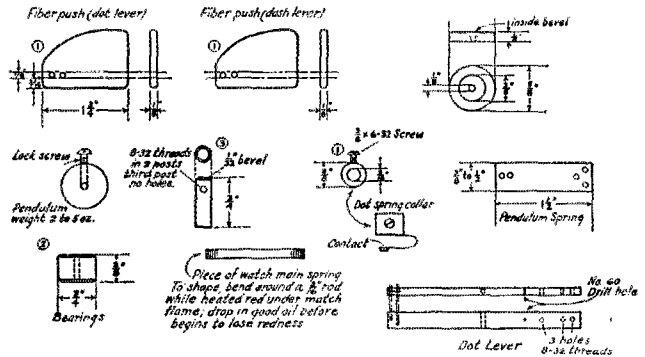
less than 20 or 25 dots before dying out. To adjust the dot-contact, press the dot-push and move the contact screw in until it just touches the dot contact spring. Here it should be locked. The rest of the machine to be adjusted to the operators' touch.



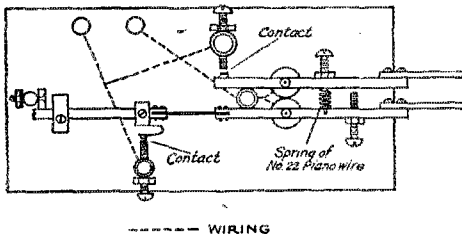
used on a "fast" bonus wire by myself for a period of about 6 months, and by several other operators on faster circuits. The main reason for this peculiar looking piece of machinery is the defeat of cost. I am at present using the bug at 80T and can find no difference in signals between it and a regular factory-built bug.

The sketches are almost self-explanatory, and the dimensions are not at all critical. That is, they do not have to be lived up to in utmost detail.

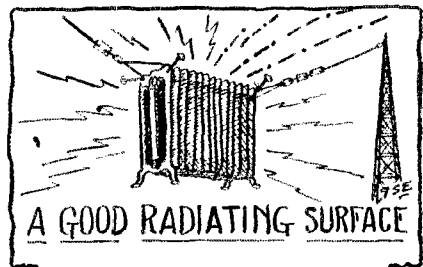
The pendulum spring and weight that govern the speed of the dots deserve a word or two. The spring must be firm, and vibrate with not too much lag after pressing of the dot-push. The weight should be made so



produce some of the best code you ever heard if properly handled.—Ed.)



that it will not allow the pendulum to make over 40 dots without beginning to die out, nor





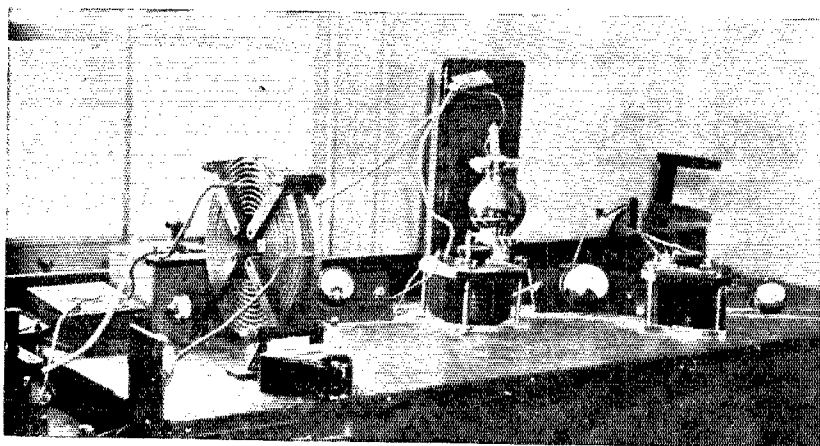
INTERNATIONAL Amateur Radio

g5LF, London, England

5LF is the station of Kenyon Secretan of 149 Lowther Parade, Barnes, London, England, who is the owner and operator. As is essentially true of the English sta-

which runs off of 220 DC, and delivers 3000 volts at the output terminals. A field rheostat is used to control the high voltage values.

The receiver is a detector-one arrange-



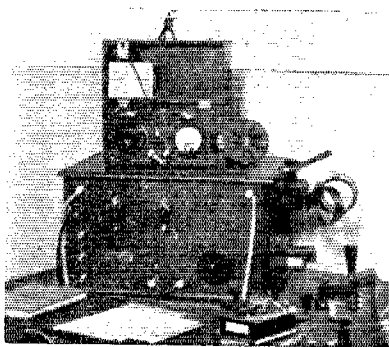
THE TRANSMITTER AT g5LF

tions, which are not allowed to handle traffic, 5LF is an experimental station and generally changes appearance very often. However, the station as pictured in these photographs is as it was when the greatest DX accomplished was done; the working of two New Zealanders, 4AA and 4AG.

The Aerial is a TX inverted L type cage 68 feet long, and though on the top of a three story building, only has an effective height of 50 feet. The counterpoise is a five-wire fan, somewhat longer than the antenna.

In the photograph of the transmitting apparatus you get a general idea of the average appearance of the experimental layouts. The circuit used as shown was a series-feed Meissner arrangement with an oil filled variable condenser used in the antenna circuit to get the shorter waves. The meters are of Weston make and the tube used is a Mullard 250-watt. The source of plate supply is a dynamotor

ment with low loss coils used on honey-



g5LF'S RECEIVER

comb-coil plug mountings so that all waves can be received with facility. On top of

(Continued on Page 49)

(Continued from page 48)

the receiver can be seen the wavemeter, and in the same photograph the key and changeover switch.

Mr. Secretan says in part: "We listen for the U.S. stations on the eighty meter band and answer on 96 meters, so it is hoped that the American stations will listen for Europe on waves near 100 meters."

Among the other distances that g5LF has been heard is that between London and Sydney, Australia.

Extracts from the Spanish Radio Laws

Experimental stations have to pay a tax of 20 Pesetas (the Gold Peseta is 19.3c) per watt on the input power.

The Amateur is allowed 500 watts if not within 50 kilometers (about 40 miles) of a government or broadcast station and only 100 watts, otherwise (input rating in both cases). He has to pay 2 Pesetas per input-watt, tax. He is not allowed to step on the toes of any other service including message traffic, and the station owner is fully responsible for any sort of law-breaking that occurs at his station, with or without his knowledge.

Broadcast stations have wavelength bands of 300 to 400 and 460 to 500 meters. Each station has to make a statement regarding its compliance with the general regulations, which are very similar to ours, and post a guarantee of 1000 Pesetas of its compliance before it can get a license without inspection. If, when inspected, it should prove not to have done what it claimed, it will forfeit the guarantee sum, its license, and be in danger of confiscation of apparatus. Government broadcasts will generally be sent on waves between 1550 and 1650 meters.

The receiving sets also must be licensed, and the cost of the license is 5 Pesetas or, if the receiver is in a public place, 50 Pesetas. Home building of a set or the selling of a privately owned receiver are possible without tax. Everyone is required to respect the secrecy of all radio matter. Foreigners must suffer investigation before they are licensed, and anyone desiring to install a receiver must describe his location, the type of receiver, and his reason for getting it. Then he may be allowed to have a receiving license.

Finally, all of these are merely tentative and will be changed as soon as advances or conditions warrant it.

Nauen, Germany, has two transmitters on the short waves, 75 to 80 meters, each of 2-K.W. capacity. It has been heard in Denver. Dr. A. Esau has a 100-watt transmitter working on 75 to 80 meters using the call of Nauen, POZ. Please report if you hear them.

Belgian W2 is now working every night, between 0600 and 0700 G.M.T., with 200 watts input and a 600-cycle note on waves below 110 meters. Reports on the reception of the signals would be appreciated and should be sent to u1AUR, who will forward them promptly. Tests with W2 on other waves may be arranged on request. Other Belgian stations now working are: P2, G2, W1, W3, W4, W5, W6, W7, W8, W9, 4AA, 4ALS, 4GP, and B7.

f8Aé, the station of La, T.S.F. Moderne the French radio magazine, is in operation transmitting standard waves so that wavemeters can be calibrated. It transmits on Tuesdays and Wednesdays according to the following schedule which is given in G.M.T. (Don't confuse 8Aé with 8AE.)

2200 to 2205	series of T	200 meters
2210 to 2215	" " A	175 "
2220 to 2225	" " U	150 "
2230 to 2235	" " V	125 "
2240 to 2245	" " M	100 "

Argentina

Mr. Segundo Acuna of Argentina, owner of AE5, says that, "Heaven looks not to be for the Argentine radio amateurs." The R.C.A. objects to the amateur having the short waves, and the Government has, therefore, had its attention called to their advantages and is preventing the use of them. However, the experimental stations can and do use the short waves.

Argentine general amateur stations use calls similar to CB8, DB2, AE5, and so on; the experimental stations use A1, A8, etc., and work below 150 meters with D.C.C.W. The intermediate used is r.

rAE5 and chFAL have worked 14 kms. (800 miles approx.) over the Argentine, Pampa and the Cordillera de los Andes mountains. FAL works on 90 to 110 meters on every Saturday at 5 G.M.T. AE5 calls A.R.R.L. every Saturday at 4 to 8 G.M.T. Listen for AE5 below 100 meters—especially 60-75 meters.

Chili Breaks Through

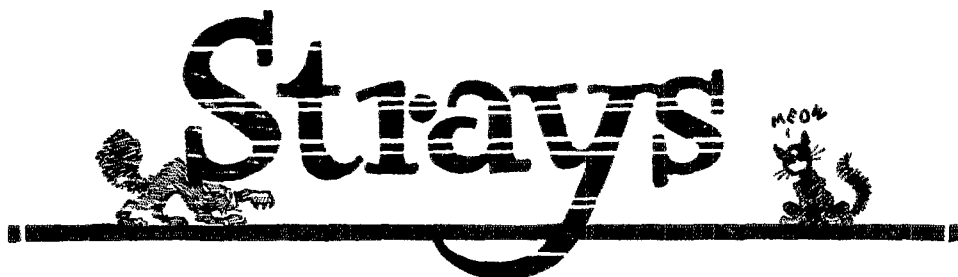
ch9TC has worked several west coast amateurs and a very few others over the U.S. His wave has been 87 meters and his note pure D.C. His intermediate, ch, is the continental form using four dashes — — — —, and not — . —

6CGO has worked New Zealand 16 times during the early part of November.

Mr. E. Allain of Villedieu, France, has heard z4AA, z4AG, during October. Mr. Menars of Au Blancat heard 19 New Zealanders during the same month. f8BF, Mr. Pierre Louis, also heard z4AA.

Every night the English quit working the U.S. coast to call New Zealand. Thus is DX annihilated.

Strays



9DMI made a useful discovery. 8ML told him to use a rat-tail for boring a hole through plate glass but he found the rat-tail too soft; so now he's feeding his pet rat ground glass to make its tail stand the gaff. Further information about the rat will appear later.

Also 9DMI discovered that a candle will tell you if your storage battery is gassing or not. First you enter the place where the battery is charging and hold the candle near the battery; then you again enter the same place if you can walk replacing the portions of the wall that were removed, and turn off the battery. If you do not have to reenter the room or if you have any adequate memory of leaving it, the battery was not gassing.

The gang at the Sixth District Convention got together and raised enough cash to present Lester Picker, 6ZH, with a complete new outfit to work on the low waves; and enough apparatus to complete a new 250-watter. E. deK. Leffingwell, 6BUW, is going to donate the tube. Picker, it will be remembered, fell from his pole a few years ago and has been confined to bed ever since.

The Modesto Radio Club announces that not enough fellows in the Sixth District have signed up for the Wouff-Hong that is to be awarded to the best all around ham in the District at the 1925 Convention to be held in Santa Barbara. Sign up now, before it is too late!

6CMQ and 6BGO say that their tube turned red, then white, and finally blew. Then they mailed it to Headquarters labeled, "A Patriotic Tube."

Since the recent Radio Conference, the favorite wail of one of the big companies is, "Ain't Gonna Reign No More."

Charles A. Service, 1ID, of Glastonbury, Conn., took a six-week trip through Labrador and Newfoundland and spent the time installing radio sets in districts that had not even heard of them, and in Hospitals.

These sets proved a great boon to the sick and the isolated, and were more than appreciated. Mr. Service is an A.R.R.L. member and an active one so we are more than proud to be able to say publicly that he accomplished a task of such manifest humane worth.

One elderly woman, a fisherman's wife, heard an orchestra play "The Last Rose of Summer" soon after a set was installed. When the selection was concluded she turned around and said in a rapt tone full of appreciation; "I never heard 'Home Sweet Home' played so beautiful before."

Wonder if 6IR is any kin to this guy 1R.

Somebody writes in to learn if these calls belong to the Woolworth aggregation: 1CT, 2CT, 3CT, 4CT, 5CT, 6CT, 7CT, 8CT, 9CT. As we don't know, perhaps these are also in the same class; 10CT, and 9CTS.

8BIU says that 8CSK was shoving his Corona around the table when he accidentally caused it to short the B battery through his three tubes which were dispatched with celerity. 8DCX now wants to know if that's what's called a corona discharge.

All of which reminds us that 1AEL saw 1DQ's Corona and wanted to know which of the big Underwood's had had a pup.

H. P. Woodward of 4DQ and Miss Ruth Estey Walton have agreed to make 4DQ a two-op station. Yes, the new Mrs. knows the code but she lacks speed. (Don't be silly, Reginald, I mean code-speed).

Wouldn't it be wonderful if—

Everybody didn't expect his calls heard list printed and didn't get grouchy when we fail to find room for it.

We could print all of the hundreds of calls heard lists we get.

Some of these traffic hounds would use the standard way of asking for "fills" when part of a message is missed.

Some of these D. C. notes didn't sound like their origin was a slide trombone, and some of these A. C. notes didn't sound like the zoo at feeding time.

The West Coast and the East Coast would decide that they are getting fair representation in QST and not that the other was always getting the most.

Each of the CQ's we have heard were a penny in our bank account.

Most of these birds with speed keys would learn how to use them.

The RCA would reduce the price on their sending tubes in the same proportion that they have reduced the price on the receiving tubes.

Anybody read more of the Traffic Department reports than just his own division.

Static crashes were money, so that a two-step amplifier would become useful on bad nights.

Key clicks, also, were valuable, so that the BCL's would pay us to operate during silent hours.

All this weren't nonsense.

Tommy Holland is a Linotype operator so he writes his letters A La Newspaper.

The League now has a new kind of stationery for the Members which does not have the Hartford address on it. Thus, a member purchasing this new stationery can have his own address attached by his local printer. We suggest that members, still having some of the old stationery with the Hartford address, discard it and replace it with the new stationery. This avoids the confusion of having mail that should go to member John Doe of Saponia, Nebr. being addressed to John Doe, Hartford.

For lo, he that erreth in his battery connections owneth a glowless tube.—St. Tube VII, 21.

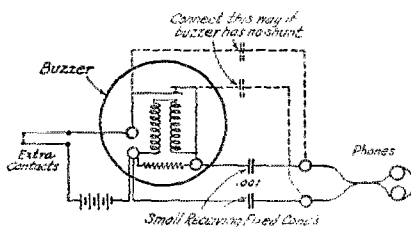
We understand that Sing Sing desires to affiliate with the A. R. R. L. Those voting Aye must send in a Registered Special delivery letter. Postcards will do otherwise.

9ANJ says that every small town has a bank and all the banks are listed in a Rand McNally's Bankers' Directory and Register. If you can get hold of an out of date register, say one of last year, you will have maps and practically complete list of every small or large town in existence; information obtainable on no map of the U. S. and not in many Atlases. With such a directory you can locate a ham before he gets through calling or CQing.

We heard somebody say that the gang at Headquarters were all Connecticut men. How does that bird get that way? We have Warner of Cario, Illinois; Service of Phila-

delphia; Beekley of Media, Penn.; Budlong, the man without a country, of Washington, D. C.; Kruse of Lawrence, Kansas; Clayton of Little Rock, Ark.; Hebert of Nutley, N. J.; Houghton of Washington, D. C.; Adams of Syria (American parents, however), Bolles of Milford, Conn.; Schnell of Chicago, and Hatry of Port Arthur, Texas, where oil and water mix. Now count them Connecticut men, count 'em. Bolles says this list makes him feel like a stranger and that he's beginning to be homesick.

Canadian 5CT says that idea on page 66 of November, 1924, QST, can be improved



in this way, which allows the sound from the buzzer to be heard in the fones without interfering with sigs.

The independent radio manufacturers of the country are to be licensed by the Navy Department to use the many radio patents held by that department, in return for an agreement by the manufacturer to permit the Navy Department to use any patent which he may control. This is a tremendously favorable step in the advancement of radio. The Navy is the owner of about eighty important radio patents, formerly of German ownership and seized by the government during the war, subsequently to be sold by the Alien Property Custodian to the Navy. Several years ago the Navy issued a license to Westinghouse interests to use these patents under reciprocal use agreement. A short time later about forty manufacturers applied for similar license but the war-time legislation under which the Navy considered itself authorized to license had been repealed in the meantime, and so the matter was referred to the Attorney General for decision. It stood at a standstill then until just before the fall election, when the manufacturers agitated it vigorously, whereupon a favorable decision was handed down, authorizing the Navy to issue revokable non-exclusive non-royalty licenses under reciprocal-use agreements. Basic patents on radio frequency and reflex circuits, etc., are understood to be included. It is felt in many quarters that this action will change completely the complexion of the patent situation in the radio industry.

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



Department of the Navy,
Office of the Secretary,
Washington.

The Department has received a report from the Commanding Officer, U.S.S. SHENANDOAH, upon the recent flight of that vessel to the West Coast and return. The following excerpts are quoted:—

"During this flight the SHENANDOAH flew over 25 states and the District of Columbia. The states flown over are as follows: New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, New Mexico, Arizona, California, Oregon, Washington, Arkansas, Missouri, Tennessee, Kentucky, Illinois, Indiana, Ohio, West Virginia, and Pennsylvania. Approximately 250 amateur and commer-

I take this occasion through the American Radio Relay League to express the appreciation of the Department both to the large number of amateurs who rendered this assistance, as well as the large number who, though not permitted to render actual assistance, stood by in readiness to render such assistance in case their services were required.

Acting Secretary of the Navy.

Tulsa, Oklahoma.

Monkeying around for the past year or so with tubes has brought me face to face with several things that are to my mind noteworthy.

It seems to me that the gang have passed up one of the very best helps to them that

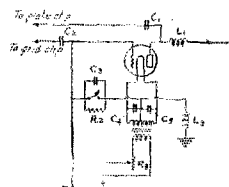


FIG. 1

there is. In low and the medium sized rectifiers (Kenotrons) the inductance of the plate transformer is generally so much as to make it necessary only for a bank of filter condensers to be placed across the output which will reduce the ripple to less than one per cent.

It is my belief that if the fellows that are employing chemical rectifiers would only stop to add up the expense they have been to in the building and rebuilding they would readily see the mistake that they had made. In further of my belief, I point to you the success of the numerous foreign stations

and the wave be much steadier at the receiving end.

Well, that's enuf for awhile. My chest feels somewhat relieved. I am indebted to McKinney of 5SG for his help in the drawings and the testing of the circuits submitted.

—M. B. Lowe.

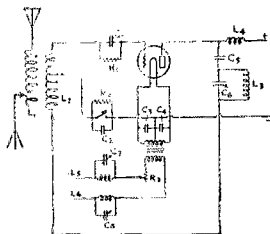


FIG. 2

that employ the kenotrons for their sets. We on this side have got to come to the real DC supply some time and that time is very close in my personal observation. The requirements for the kenotron rectification system are not as expensive as might be first indicated by glancing over the catalogs.

Fig. 1 will help to solve another difficulty that stands in the way of constant frequency transmission. The values of the R-1 and R-2 are left open as the sets vary so much that it would suffice to say try all of them until the best combination is found. The filament or filaments are grounded thru a radio frequency choke coil L-2. The grid or grids are connected to the negative side of the high voltage with the suitable grid leak R-1. The key is placed between the negative side of the high voltage supply and ground, shunted by condenser C-3 and resistance R-2. The condenser is to merely absorb the sparking at the key and it will be found that a .5 µfd. will suffice. R-2 places a definite bias on the grids of the tubes and gives positive keying. A relay in the place of the key would simplify the possibility of a nasty jolt when sending and is recommended, (especially when a CP is used).

Referring to page 48 of the August issue of QST, (double waves), I have a circuit and suggestion as shown in Fig. 2. The use of a trap circuit for the harmonics in the plate side of the oscillating circuit, in conjunction with tuned R.F. chokes in the power leads will enable all of the harmonics to be eliminated, that is, those in the set itself and not those caused by re-radiation.

The trap in the plate circuit is composed of condenser C-6 and inductance L-3. The traps in the line are shown by L-5 and C-7, and L-6 and C-8. By careful tuning of the traps the set will actually radiate more,

Dope on Broadcasts

New York City

Editor, QST:

I am a commercial operator—have been for a number of years; I was a pre-war "8" and have always been a reader and lover of QST. Altho I am a commercial operator, I am only a ham at heart. When I quit the commercial game I will go back actively to the amateur game, as will many many other commercials.

QST caters, now, to a variety of interests; to the receiving operator the transmitting experimenter, the dumbbell listener and dearest of all, the honest-to-Gawd He ham operator—but why not to the commercial man? There is no real radio magazine which looks after us. Why?

The commercial man has very little data on high-power TELEGRAPH broadcasts—broadcasts which at times are invaluable to him. If he learns of all the sx, px, Time and storm warning signals, it is merely thru happy accidental tuning than thru any authenticative information.

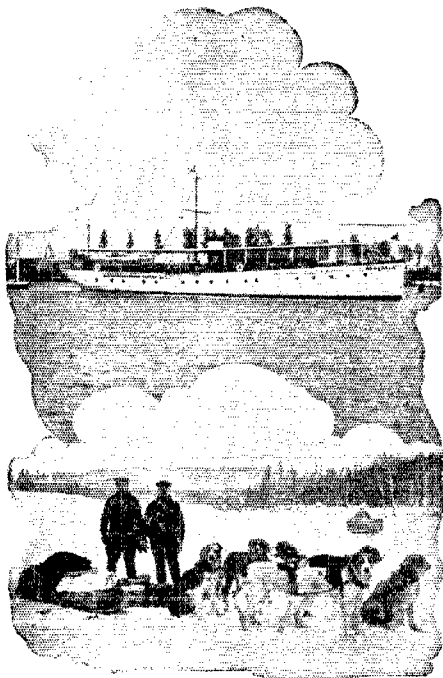
Here is part of a list of "broadcasts" taken from my schedule book—if you ever want more I can give you full dope on most all of the present high power stations—and it's accurate too.

G.M.T	Station	Wave	Service
0000	POZ Nauean	18,000 cw es	3100 spk TIME
0015	BZB Bermuda	600 spk	WX
0110	GBL Oxford, Eng.	8750 cw.	Tfc for US ships
0130	VAL Barrington Pass, Can.	1600 cw	Navgn. Warnings
0130	WSE East Moriches, L. I.	2400 cw	PX
0200	GLD Lands End, Eng.	600 spk.	Navgn. Warnings
GFA	London, Eng.	4000 cw	WX
VCE	Cape Race	600 spk	ICE
0330	GCK Valencia, Ire.	600 spk	Navgn. Warnings
0430	WNU New Orleans	3331 cw	WX
0515	WCC Chatham, Mass.	2150 cw	PX
0925	FL Eiffel Tower	2600 spk	Time

These are only selected at random, and are accurate, I hope this will start the ball rolling and that you will give some regular space REGULARLY in QST to the sea-going hams. Another thing, there is not one op in ten who knows how to "decode" the time sigs as sent from most foreign stations.

I am sure the rest of the commercial fellows will be more than glad to help out in the matter of broadcast data, so you could keep your list up to date.

New Adventures *of* **BURGESS RADIO BATTERIES**



(Above)—They Roamed the World in the
Speejack's Radio Room—U&U Photo

(Below)—Dog Sleds Carry Them to the
Arctic Outposts of Civilization

You're fortunate—you average buyer of radio equipment. For when you are in need of new batteries you can phone or walk a few blocks for fresh ones to replace those in your receiver.

Not so fortunate are those who wander across the world or spend their lives in the lonely outposts on the frontiers of civilization.

To them the correct selection of dependable receiving equipment is vital. For to be deprived of the use of their radio set is a dire catastrophe, and results in complete isolation from the outside world.

Those who *must* receive absolute, unfailing service over longer periods always buy Burgess "A," "B" and "C" Radio Batteries.

"Ask Any Radio Engineer"

BURGESS BATTERY COMPANY

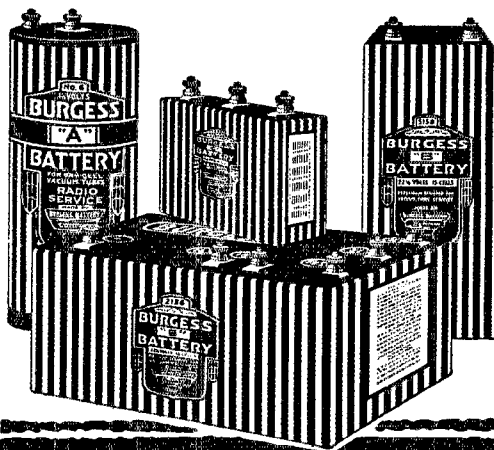
Engineers DRY BATTERIES Manufacturers

Flashlight - Radio - Ignition - Telephone

General Sales Office: Harris Trust Building, Chicago

Laboratories and Works: Madison, Wisconsin

In Canada: Niagara Falls and Winnipeg



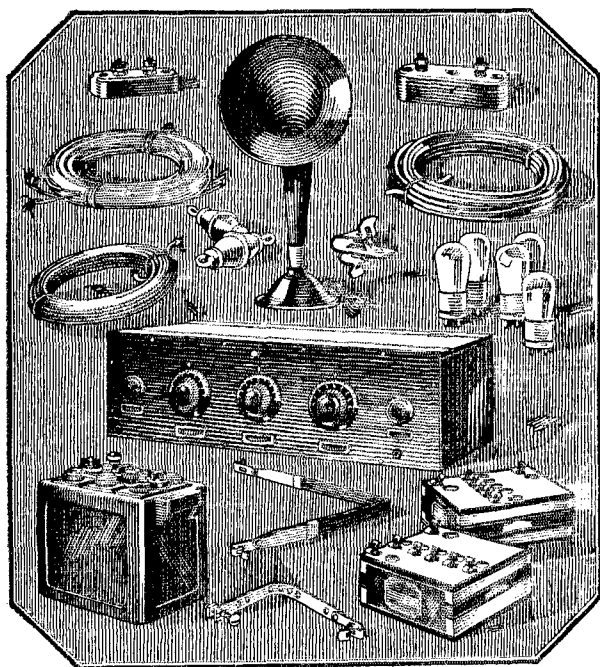
Which would

This →

"WITHOUT ACCESSORIES"

Radio instrument	Loud speaker	Ground clamp
Antenna wire	Window lead in	Antenna spring
Connection wires	Mechanic's labor	Hammer
Clips	Storage battery	Nails
Lightning arrester	"B" batteries	Screws
Insulators	Tubes	Staples

Separate price for each of these items, plus your time.



What "complete self-contained"

IT is the best of fun, we admit, to hook up a radio set, to string your antenna from tree to house, to connect your ground wire—at least it is fun if you are mechanically minded.

If, however, you want principally to use a radio set, there are two things of primary importance—first, that its tone and quality shall be absolutely pure, non-metallic and accurate; secondly, that it shall be as little

fuss and bother to you as is humanly possible. This means De Forest D-12 Radiophone—the leader in the field—bearing the imprint of Dr. Lee De Forest, the man whose great invention paved the way to radio broadcasting.

As to tone—it is impossible to describe the clean and natural quality which this instrument gives. You simply must hear it

DE FOREST RADIOPHONE

REG. U.S. PAT. OFF.

REG. U.S. PAT. OFF.

you choose?

DE FOREST D-12 RADIOPHONE

Complete in one unit, with everything necessary to use it immediately—all at the one initial cost.

Prices according to cabinet finish and batteries.

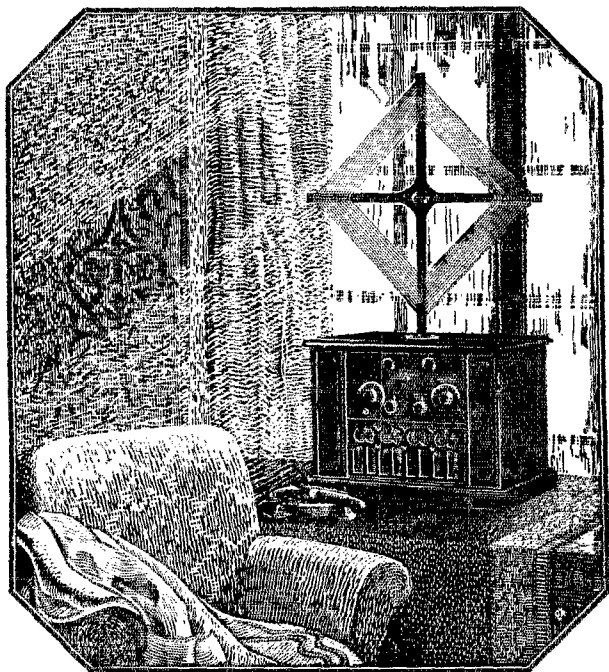
With dry batteries

In Fabrikoid cabinet	:	:	:	:	:	:	\$161.20
In Mahogany cabinet	:	:	:	:	:	:	176.20

With storage batteries

In Fabrikoid cabinet	:	:	:	:	:	:	\$180.00
In Mahogany cabinet	:	:	:	:	:	:	195.00

← or this?



means as in De Forest

and judge for yourself. And as for convenience, remember these important things: it is self-contained and complete in one unit—usable within five minutes after it enters your home—easily movable from room to room because it does not need to be attached to either antenna or ground.

When you find the De Forest agent in your vicinity 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.

Avail yourself of his help. He desires, as we do, that you should get the fullest enjoyment and satisfaction from your instrument.

DE FOREST RADIO COMPANY, JERSEY CITY, N. J.
Also makers of De Forest Tubes, The "Magic Lamp" of Radio

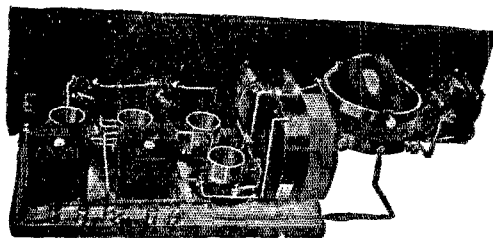
DE FOREST RADIOPHONE

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TUSKA SUPERDYNE PARTS

Three-Control Type B, Selective Superdyne



Complete set of parts, including drilled
and engraved panel with full instructions
—\$60.00 postpaid

With a home assembled Superdyne, Mr. Andrew Walsh, 146 E. 32nd St., Brooklyn, N. Y., heard Newcastle, England, and Aberdeen, Scotland. He writes: "I have tried many sets but this is the only one that will absolutely tune out all New York stations and let DX through. The volume is tremendous."

THE C. D. TUSKA COMPANY

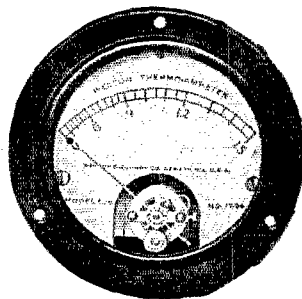
Dept. L.

Hartford, Connecticut

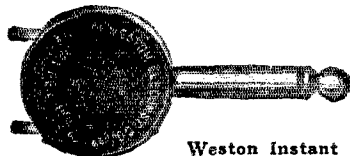
MEETING THE NEEDS OF A. R. R. L. MEN EVERYWHERE

There is a Weston Indicating Instrument to meet every Radio need whether it be for Reception or Transmission. Voltmeters, Ammeters, Milliammeters, Thermo-Ammeters and Thermo-Galvanometers, in low or high range, or in small or large size are available for the amateur, advanced experimenter or commercial station.

Whatever your special requirement or problem may be, get in touch with us, and let us send you full particulars, and prices on the instrument or instruments exactly suitable to your needs. Weston 280 volt-ammeter, is also especially designed for testing tube characteristics, general circuit conditions, for measuring resistance, filament voltage, plate voltage, etc.



Antenna Ammeter



Weston Instant
Change Plug

Weston Instant Change Plug

The original Instant Change Plug, 75 cents everywhere. Interchangeable from headphones to loud speaker in two seconds. No tools. The choice of A.R.R.L. men everywhere. Circular J is an attractive 24-page

booklet that explains in detail all Weston Radio Instruments and shows instrument connections, for both transmitting and receiving sets. Sent free on request.

WESTON ELECTRICAL INSTRUMENT CO., 158 Weston Ave.; Newark, N. J.

Electrical
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Authorities
Since 1888

WESTON

STANDARD - The World Over

3 C H G W O R K S

FRANCE, AUSTRALIA, ENG-
LAND, MEXICO, PORTO RICO,
NEW ZEALAND, AND ALL
U. S. DISTRICTS USING

C A R D W E L L TRANSMITTING AND RECEIVING C O N D E N S E R S

Writing under date of Nov. 30, 1924 he says:

It may interest you to know that using one of your .00025 mfd. 'Low Loss' Condensers in a home-made 'Low Loss Tuner' has enabled me to hear and *work* stations in Australia, New Zealand, France, England, Mexico, Porto Rico and all U. S. Districts. To just log a station is one thing, but to work and hold him good and steady for over an hour at a stretch is an entirely different thing, and I attribute my success to your excellent condenser.

Elmer R. Gabel, (3CHG)

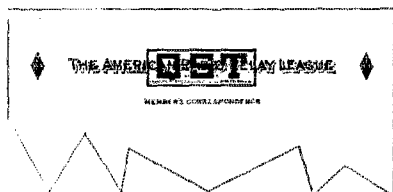
412 Meredith St., Kennett Square, Penna.

Hundreds of other ham boosts on file!

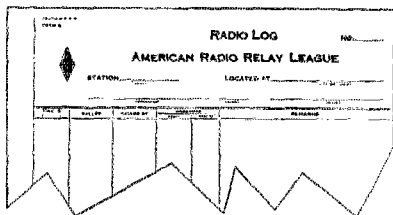
ALLEN D. CARDWELL MFG. CORP'N.

81 Prospect St., Brooklyn, N. Y.

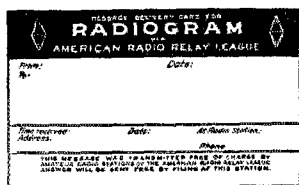
Amateur Accessories!



EYES LEFT! Here's how the new A.R.R.L. member's stationery looks! The old confusing Hartford address is replaced by "Member's Correspondence." Designed for your personal use as a league member. Use it in all your correspondence—it places you as a real radio man with the prestige of the A.R.R.L. behind you. Good bond, 8½ x 11". Postpaid 1000 sheets, \$6.00; 500—\$3.25; 250—\$1.70; 100—75c.



LOGS! There are more kinds of log books than there are punk superhets—but there's one good log sheet—shown alongside. Practical, efficient—the official log put out by Headquarters for A.R.R.L. members. Every shack needs a supply these DX nights to insure orderly logging of stations. Bond paper, 8½ x 11", punched for standard 3-ring loose leaf binder. Postpaid, 500 sheets, \$3.50; 125, \$1.00.



SAVE TIME AND MONEY! When you mail a message use the official A.R.R.L. message delivery card and save a 2c stamp, envelope and blank. Convenient and practical. On U. S. stamped postals, 2c each, postpaid. 1c apiece without stamp (for foreign members, etc.) Stock up now!

The American Radio Relay League

HARTFORD, CONN.

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

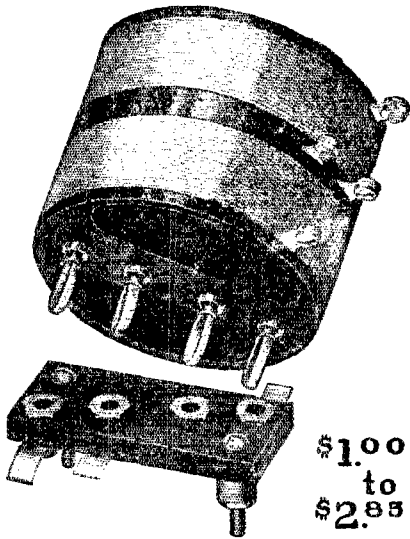
ROSE RADIO and ELECTRICAL SUPPLIES

129 CAMP STREET,

Pioneers in the Radio Field

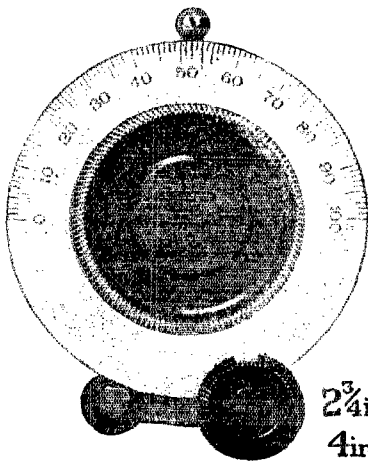
NEW ORLEANS, LA.

NEW GENERAL RADIO PRODUCTS



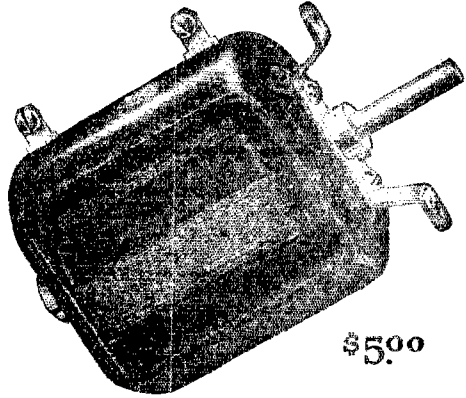
\$1.00
to
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New Low Loss Coils



2 3/4 in. \$1.50
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A New Variometer

RADIO BUILDERS AND EXPERIMENTERS,—here are the newest additions to the well known *General Radio* line of Quality Parts.

A Variometer unusually compact in size and efficient in operation.

Low Loss Coils that mount as easily as a vacuum tube—ideal for oscillator and antenna coupling coils for superheterodyne circuits.

The New Geared Vernier Dial—an improvement in the appearance and operation of any well planned set.

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Cambridge, Mass.

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.

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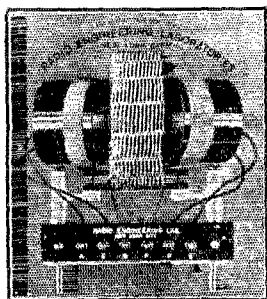
Station call, if any

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!



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Circuit diagrams, panel drilling template and instructions with each tuner

PRICE
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EACH

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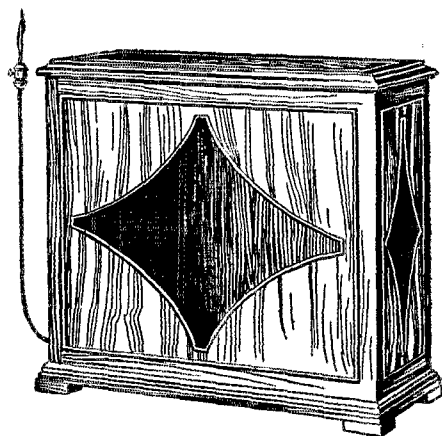
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AmerTran has the *most* uniform amplification. All tones are amplified nearly alike.

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AmerTran makes tubes deliver the utmost in volume, clarity and tone quality.

Use a pair of AmerTrans and you have the combination to give *all* two stages can possibly deliver.

AmerTran is made in two types, one quality — A F 6 — Ratio 5:1 and A F 7 — Ratio $3\frac{1}{2}$:1.

Buy them by the pair!

Price either model \$7.00 at your dealer's.

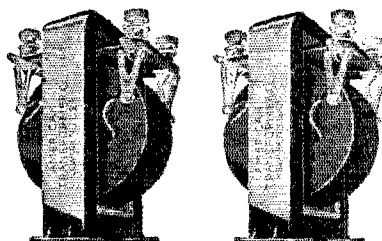
Send for leaflet giving useful amplifier information.

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"Transformer builders for over twenty-three years"



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You must have a friend or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

American Radio Relay League,
Hartford, Conn.

..... 1924

I wish to propose

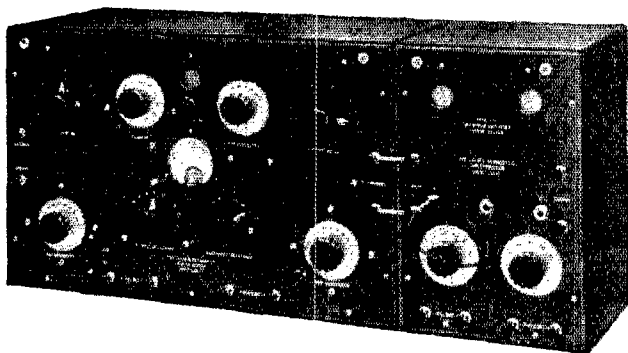
Mr. of

Mr. of
Street & No Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

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The Kennedy Universal Receiver. Range up to 25,000 meters, covering all wave lengths used in amateur, broadcast and commercial service, including transoceanic communication.



Thousands were sold at \$370.00. Now you can buy the greatest receiving set ever built for —while they last **\$115.00**

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With this set you can receive the European high-wave-length stations, direct-from-Arlington time signals, and all the interesting transmission that is beyond the reach of other sets. Then you can drop down to amateur wave-lengths, or tune in on B. C. stations—all on the same set. It is thoroughly efficient all the way up to 25,000 meters.

These prices are lower than the cost of manufacturer:

Receiver only, Type 110, was \$285.00—now	\$94.00
Amplifier only, 2-stage, Type 525, was \$85.00—now	\$21.00
Receiver and Amplifier, was \$370.00—now	\$115.00

Act promptly—this offer will be withdrawn as soon as these few sets are sold. Send your order direct with 10% remittance, balance C. O. D.

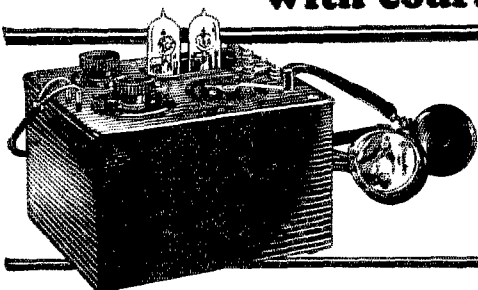
The Colin B. Kennedy Company
6400 Plymouth Avenue
Saint Louis

Write for a circular if you want more information

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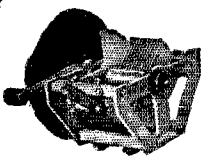
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All manufacturers make various claims regarding their condensers, but FACTS are what count. We can prove the efficiency and superiority of

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This proof is set forth in two interesting folders entitled "Cons" and "Facts." Write for them today and you will have the truth about condensers.



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A low loss precision condenser of High value and unusually low price. Compare it.

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Use it to build Super-Heterodyne, Ultradyne and other long wave circuits. Contains practically everything required for an ideal set.

See Duplex Products at your dealer's. Ask him or write direct for our complete literature.

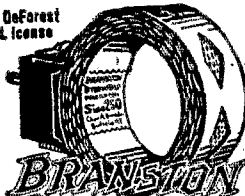
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The highest quality low loss condenser made. Used by foremost set manufacturers. Condenser tests at Yale University in May, 1924, definitely determined its remarkable efficiency.



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Plain or Geared
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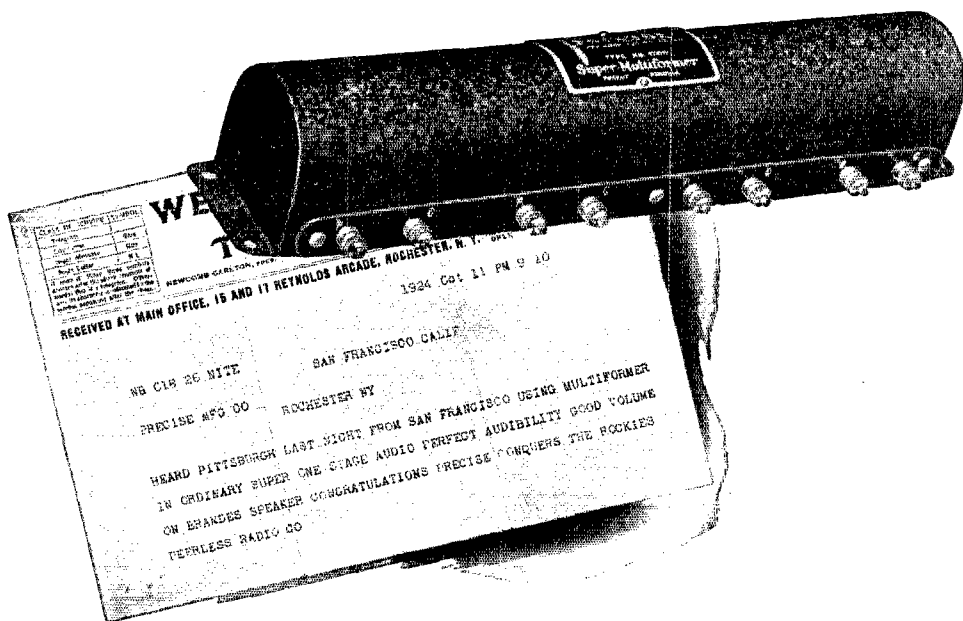
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For those who
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Without sockets and condensers

3-Stage	-	-	-	\$8.00
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Manufacturers of the Daven Grid
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This winter thousands of Radio Fans will change over their Amplifiers to the Resistance Coupled System. The DAVEN SUPER AMPLIFIER illustrated in the cut-out, is the most compact amplifier unit on the market. The base is of molded bakelite, in which sockets and all necessary essentials are inserted. It comes ready for immediate use and is unquestionably the simplest method of adding distortionless amplification to any receiver.

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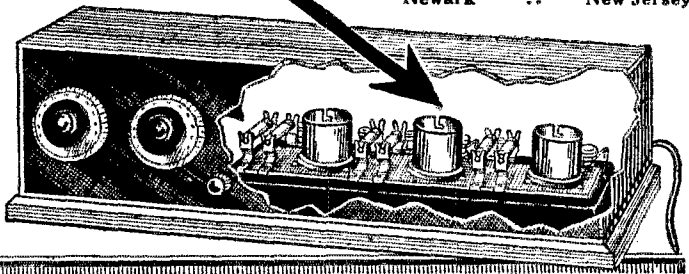
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"RESISTOR MANUAL"

By Zeh Bouck

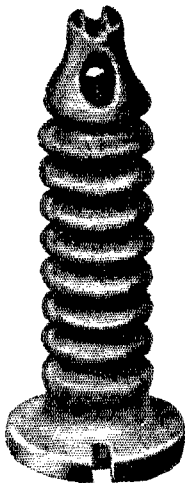
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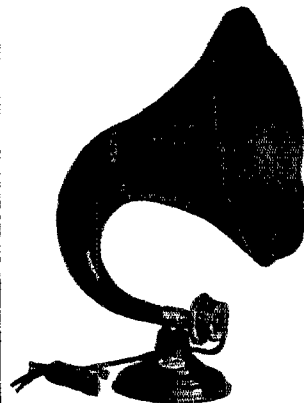
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The loud speaker that will fully satisfy you. Equal to hearing the original tones.

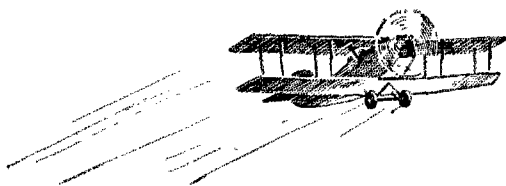
No. 205B—Polished black flare. . . \$22.50

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Bringing to earth the airplane type receiver

RADIO frequency transformers as designed by Jackson H. Pressley, Chief Engineer, Radio Laboratories, U. S. Signal Corps, Camp Vail, New Jersey, and manufactured by the Sangamo Electric Company, assure you of precision instruments.

The essential needs for airplane use are:

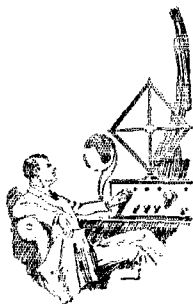
First—Extreme compactness with maximum amplification per transformer stage;

Second—A transformer so designed that there is negligible coupling between stages no matter how they are spaced;

Third—Stability without the aid of manual controls.

It was only after months of experimenting that Mr. Pressley was able to attain these results, and the adoption of his transformers as standard for airplane use speaks for itself.

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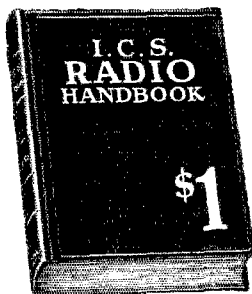
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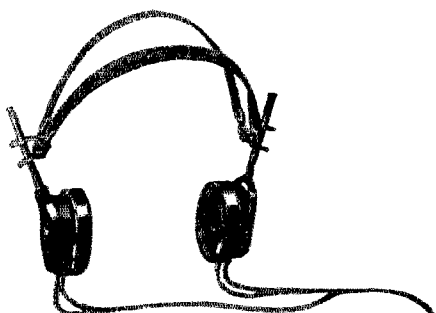
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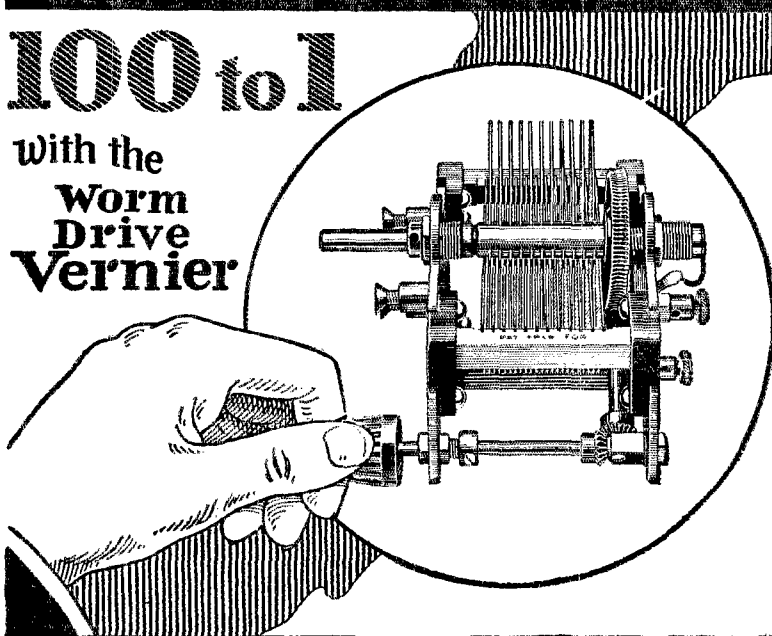
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\$ **5⁰⁰**
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100 to 1

With the
**Worm
Drive
Vernier**



One of the biggest contributing factors to the growing popularity of Radio reception is this fine tuning condenser

Made with a geared vernier having a ratio of 100 to 1, American Brand Condensers assure the successful operation of any set, especially when there is more than one broadcasting station in the air. For DX Reception, American Brand Condensers can't be surpassed.

American Brand Condensers need only to be seen to prove their superior qualities. Ask your dealer to show it to you and to give you a descriptive folder.

Wholesale Distributors everywhere throughout the country are prepared to fill dealer's orders

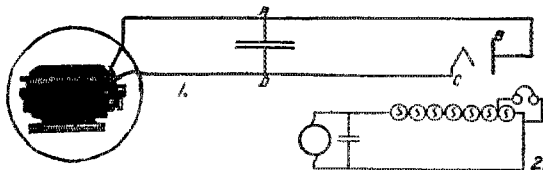
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"FILTER FACTS"
Follow them thru monthly*



THE CONDENSER. The simplest effective step toward ripple reduction is the condenser across the line. If the ESCO generator set is disconnected from the transmitter and loaded with a lamp load as in 2, this effect may be easily noticed. With a one or two mfd. condenser the result will be amazing.

Here is what takes place. The D.C. with a slight ripple component finds at A, two separate paths back to the generator. One thru AD, the other thru ABCD. Both paths offer impedance. That thru ABCD is practically all resistance, about 10,000 ohms for the smaller tubes. This, in so far as the ripple frequencies are concerned, remains constant. The path thru AD is different, its impedance will decrease as the frequency increases. That is, the higher the frequency, the more ripple current it will by-pass.

A 1 mfd. condenser across an ESCO generator with a commutator ripple of 2502 and a slot ripple of 934 will produce the following results. The impedance for D.C. thru AD is infinite, thru ABCD about 10,000 ohms. The impedance for commutator ripple thru AD equals 55.8 ohms, thru ABCD 10,000 ohms. The impedance for slot ripple thru AD equals 170 ohms and 10,000 ohms thru ABCD. Following the paths of least impedance the D.C. passes 100% thru ABCD, commutator ripple 176/177 thru AD and 1/177 thru ABCD, and the slot ripple 58/59 thru AD and 1/59 thru ABCD.

ESCO Generators have such a small ripple component that even with this crude attempt at filter they will surpass A.C. supplies with intricate filter systems, both in tone and miles per watt.

ELECTRIC SPECIALTY COMPANY

TRADE "ESCO" MARK

225 SOUTH STREET

STAMFORD, CONN., U. S. A.

THERE IS NO QUESTION ABOUT THE MILES PER WATT WITH AN ESCO GENERATOR—IT IS THE MAXIMUM!

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ONE OF THE MOST USEFUL SETS FOR AMATEUR RADIO USES.
1 Drill each No. 10, 16, 20, 29, 36 and 45,
and 1 Plug Tap each, 4", 6", 8",
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Which tells
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M. B. SLEEPER

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Kant-Blo

SWITCH SIGNAL BINDING POST

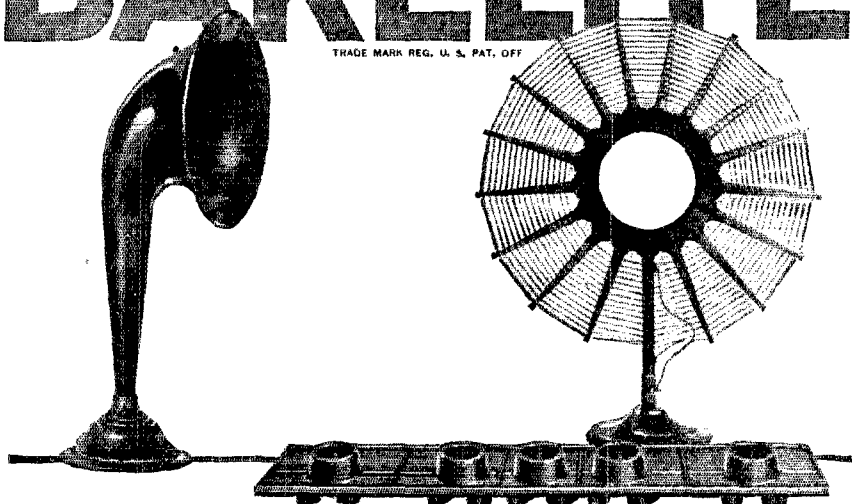
"Lights on any Short Circuit"

The KANT-BLO is not an extra accessory on 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 a Switch Style, and we will ship any number of KANT-BLOS direct to you, charges prepaid.

Manufactured by GANIO-KRAMER CO., Inc., New York, N. Y.
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Radio design progresses rapidly—but radio's standard insulation continues to be Bakelite.

For the further refinement of radio sets and parts, radio engineers rely upon Bakelite. Typical of many new Bakelite applications are the Musette Loud Speaker, the Paramount Loop and the Amsco Tube Mounting Panel.

Of all insulating materials Bakelite alone combines the many characteristics vital to efficient radio reception.

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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. Address Map Department.

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The Importance of Good Radio Panels

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ELECTRASOTE TRADE MARK PANELS



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A book the children
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THE new Magnavox Receiver (with or without built-in Magnavox Reproducer) is an entirely new development of tuned radio frequency.

The ease of selecting the desired station directly with *one dial* is only equalled by the quality of Magnavox reception—the highest musical standard yet achieved in radio.

Magnavox Radio products are sold by reliable dealers everywhere. Interesting literature sent free on request.

THE MAGNAVOX COMPANY OAKLAND, CALIFORNIA

New York:
350 West 31st St.

Chicago:
162 N. State St.

San Francisco:
274 Brannan St.

Canadian Distributors: Perkins Electric Limited, Toronto, Montreal, Winnipeg
1R



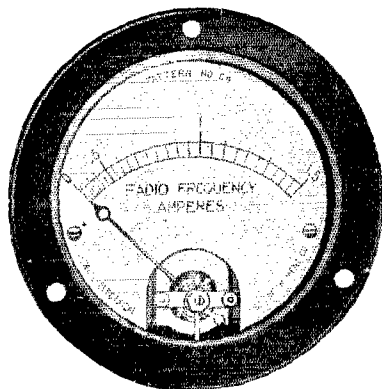
**TRF-5
RECEIVING SET**
A 5-tube circuit in carved mahogany cabinet complete with a Magnavox Reproducer
\$125

**TRF-50
RECEIVING SET**
with doors and built-in Reproducer
\$150

Send me a complimentary copy of Radiotikes.

Name

Address



No. 64

RADIO FREQUENCY AMMETER

Transmitting set Instruments

- ¶ We don't believe that there is an amateur in the U. S. or Canada who is not familiar with Jewell Instruments. Most of them are and depend on them for their work.
- ¶ "The Jewell Trio" is famous among amateurs:—We refer to our Nos. 54, 64 and 74 uniform size instruments for transmitting set panels.
- ¶ We want every amateur in the world to write for our 15-A Radio Instrument Catalog.

Order from Dealer

Jewell Electrical Instrument Co.

1650 Walnut St. - Chicago

Heard across the seas

Mr. H. W. MacKevie, 7 Carlton Terrace, Swansea, South Wales, England, writes: "I was testing my one valve set between 1 and 2 o'clock in the morning when I was surprised to hear K.D.K.A. or Pittsburgh."

Evidently there is no limit to long distance reception with Myers Tubes. Their design is right.

Three types for dry and storage batteries. Complete with clips ready to mount. At your dealer's or sent postpaid for ... **\$4**

246 Craig Street, Montreal

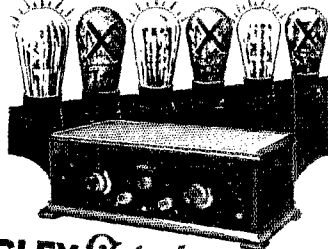
Myers Tubes
Practically Unbreakable



"The World On Your Dial"

Write for descriptive circular

3 Tubes DO THE WORK OF 6



In the
CROSLEY Triradyn

Since the inception of radio, the results obtained with Armstrong Regenerative Receivers have been the goal of comparison for all others. Trick circuits have been designed to get around the Armstrong Patent, hoping to obtain results "just as good." This has resulted in the use of more tubes, necessary without, but unnecessary with regeneration.

The Crosley Triradyn, because it employs Armstrong Regeneration and tuned radio frequency amplification, needs only three tubes. The results obtained in selectivity, volume, ease of tuning and logging cannot be excelled.

Before You Buy Compare **CROSLEY** **Your choice will be A Crosley**
Better—Costs Less—Radio

For Sale by Good Dealers Everywhere
Crosley Regenerative Receivers are Licensed under Armstrong U.S. Patent 1, 113,149

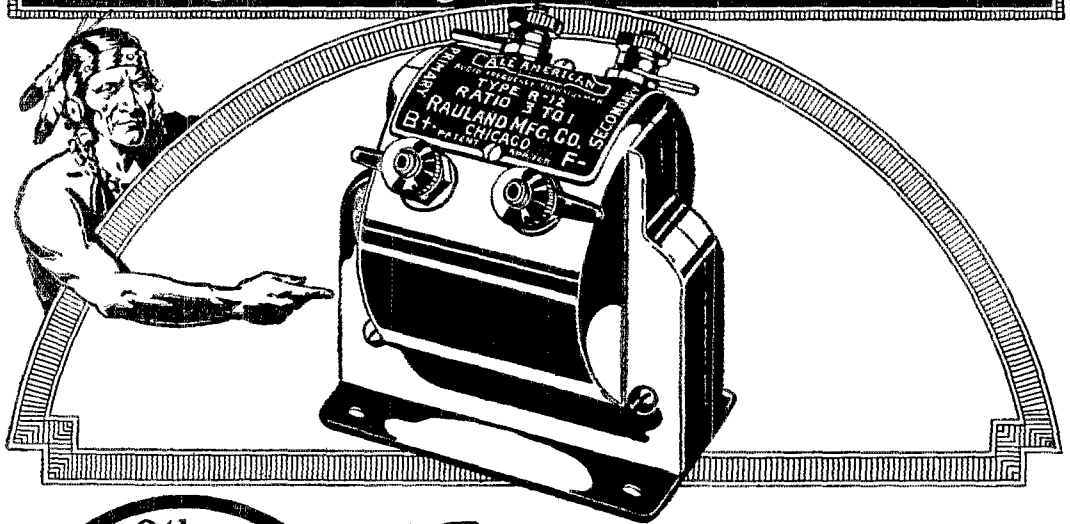
WRITE FOR COMPLETE CATALOG

The Crosley Radio Corporation

118 Sassafras St., Powell Crosley, Jr., President, Cincinnati, Ohio

Crosley Owns and Operates Broadcasting Station

The Largest Selling Transformers in the World



Other ALL-AMERICAN Guaranteed Radio Products

Power Amplifying Transformers (Push-Pull)

Input type R-30.....\$6.00
Output type R-31..... 6.00

Rauland-Lyric

A laboratory grade audio transformer for music lovers. R-500.....\$9.00



Universal Coupler

Antenna coupler or tuned r. f. transformer. R-140.....\$4.00



Self-Tuned

R. F. Transformer
Wound to suit the tube. R-199 \$5.00. R-201A \$5.00

Long Wave Transformer

(Intermediate Frequency)
(15-75 kc.) R-110.....\$6.00

10,000 Meter (30kc.)

Transformer

Tuned type (filter or input). R-120...\$6.00



Radio Frequency Coupler
(Oscillator Coupler). R-130 \$5.00



Super-Fine Parts

Consisting of three R-110's, one R-120 and one R-130
\$26.00

Reliable!

ALL-AMERICAN Standard Audio Frequency Transformers in any radio receiving set mean but one thing—assured efficiency in amplification. Since 1919 ALL-AMERICAN Audios have answered the demand for an instrument that could be relied upon for maximum amplification and faithful tone reproduction. Set builders who know radio do not experiment—they specify ALL-AMERICANS, with full assurance that they will consistently perform with highest efficiency.

Precision-Made

ALL-AMERICAN reliability is a natural result of ALL-AMERICAN precision manufacture. Each part is scientifically designed and accurately built to exact standards. Special machinery and testing equipment assist in achieving perfection.

3 to 1 Ratio \$4.50; 5 to 1 Ratio, \$4.75; 10 to 1 Ratio, \$4.75.

The Radio Key Book

is the most valuable book of radio facts ever published. Sent for 10 cents, coin or stamps.

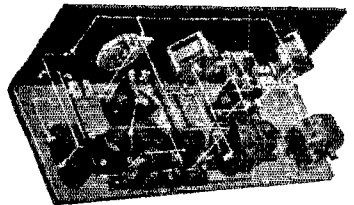
RAULAND MFG. CO.

Pioneers in the Industry

2642 Coyne Street

Chicago

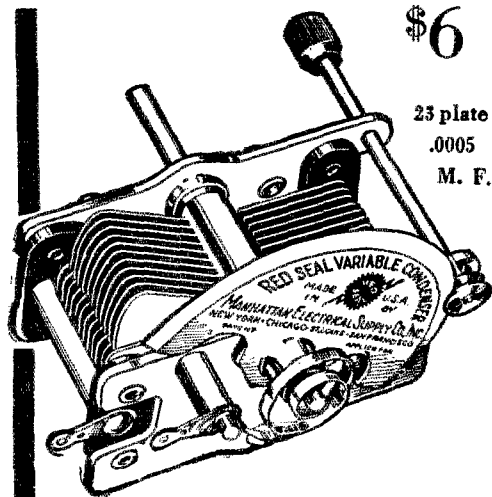
All-American Reflex Receivers



Complete receiving sets with range, volume and selectivity unequalled in receivers of this type. All instruments are mounted on panel and baseboard ready to be wired. Clear photographs, blueprints and a 48-page instruction book make wiring so easy as to be the work of only one delightful evening.

All-Amax Junior (one-tube),
(semi-finished).....\$22.00
All-Amax Senior (three-tube),
(semi-finished).....\$42.00

ALL-AMERICAN



\$6

23 plate
.0005
M. F.

The Low Loss Condenser with Ideal Vernier Control!

1. Action of Vernier is *positive*, giving delicate, smooth adjustment.
2. Only one dial setting—stations easily logged.
3. Plates turn freely; balanced vernier eliminates need for friction at bearings.
4. Plates are of brass and are *soldered*.
5. To facilitate turning, movable plates are given a special shape; "straight line" type.
6. End plates are grounded, eliminating effect of hand capacity.

(13 plate .00028 M. F. \$5.50; 17 plate, .00037, M. F., \$5.75; 43 plate, .001 M. F., \$7.00)

For your set, insist on a

RED SEAL VARIABLE CONDENSER

Made by
Manhattan
ELECTRICAL SUPPLY CO. INC.

New York
Chicago — St. Louis — San Francisco
Makers of famous

RED SEAL DRY BATTERIES

APEX VERNIER DIAL

It Brings 'Em In!

Get more stations—greater range—bigger volume—finer selectivity—less interference. Lasts forever. The one big advance yet made in tuning. Ratio 12 to 1. Quickly applied to any shaft. For sale by all good Radio Dealers. If unable to obtain from dealer, enclose \$2.50 for nickel-silver finish, or \$3.50 for De Luxe satin finished gold.

7-Tube Super-Heterodyne for \$97.50

Receive the parts complete to assemble your own set. Cost to coast on an 18-inch Loop. Assemble this 7-tube Microdyne super-heterodyne on a 7x18 in. panel in three hours. Parts complete, including drilled and engraved panels, condensers, sockets, transformers, dials, connecting plugs, cables, etc., with drawings, diagrams and instructions. Price of cabinet—to fit-on application. If your radio dealer cannot supply parts for complete Microdyne Radio Set, send check or money order for \$97.50 and name of your dealer.

APEX ELECTRIC MFG. CO., Dept. 109
1410 W. 59th Street, CHICAGO

CONDENSERS 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
625 Black Ave. - Springfield, Ill.

NOTICE

3000 vacuum tube aluminum socket shells, rheostats, bakelite knobs, magnet wire, nuts, bolts, ribbon, cabinets; audio transformer cores, bases, panels, dies, moulds, gates, patterns. Complete manufacturers supplies worth \$5000. First \$1000 takes whole lot or will sell in smaller quantity.

WRITE C. C. ENDLY, 22 STURGES AVE., MANSFIELD, OHIO.

AMRAD

Reg. U. S. Patent Office

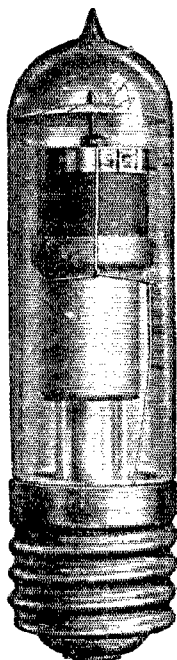
"S" Tube Deliveries Are Improving

Further increased facilities and improved methods are greatly speeding up "S" Tube deliveries. Production has steadily increased in the past six months, but until now only slight headway has been made against a proportionate increase in demand. Orders are being filled in rotation.

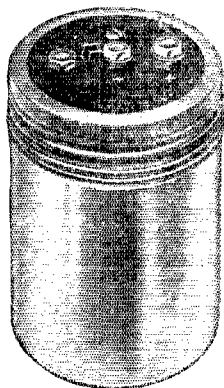
This tremendous demand for "S" Tubes was brought about not by extensive magazine advertising, but by the word-of-mouth endorsement of the amateur and the inherent advantages of the Rectifier itself.

These are some of the exclusive advantages of the "S" Tube:

1. No filament to burn out.
2. Requires no external heating supply, no rheostats nor switches. Operates at maximum efficiency without bothersome adjustments.
3. No mechanical parts to wear out or chemicals to spill or corrode.
4. Absolutely no deterioration while not in use.
5. Requires no attention while in service.
6. Starts and stops automatically and instantly without lag.
7. Gives practically perfect sine wave rectification which means ease in filtering and pure D. C.
8. Long life since there are no fragile parts to burn out.
9. Low internal resistance which means high efficiency.
10. Extremely cheap for power delivered, actual cost being 10c. per watt. (100 watts output for \$10.00).



S-TUBE
Type 4000-1
Price \$10.00



MERSHON
Condenser
Price \$8.00

The Ideal Filter

For all types of filter work and moderate DC potentials where purity of tone is essential, the MERSHON Electrolytic Condenser is offered. It is especially recommended for filtering a rectified B and A Battery supply, as a current reservoir in operating relays, time stamps and time clocks, and wherever a high capacity in a small space is required.

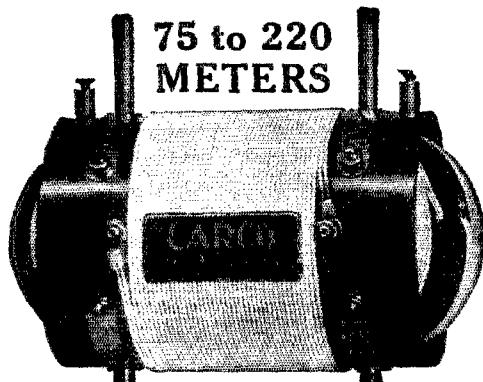
New Bulletin J-3

The "S" Tube and Electrolytic Condenser are described in detail in the new 8-page bulletin J-3 now available. The uses of these products are described and the necessary operating information is included. Every reader of QST will be interested in this bulletin. Write at once before the second edition is exhausted.

AMERICAN RADIO AND RESEARCH CORPORATION

Dept. Q, Medford Hillside, Mass.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS



75 to 220
METERS

"CARCO"

**Low Loss P. S. T. Coupler
175-600 Meters**

This coupler consists of a single unit in which is contained a "low loss" Stator or secondary winding and two rotors, one of which is the antenna inductance and wound with "low loss" coarse wire; the other coil is wound with finer wire and its use depends on the circuit.

The coupler is strongly recommended for use in congested districts where interference is bad.

The signal strength is as great as the best type single circuit regenerative with the additional advantage of maximum selectivity, all due to the "low loss" windings for both Primary and Secondary.

Your Dealer Has "Carco" Products

"CARCO" HAM SPECIAL SHORTWAVE-LOW LOSS COUPLER

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.

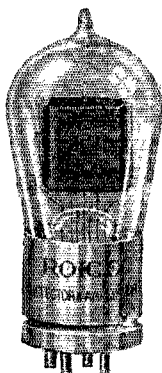
40 METERS

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.

PRICES

"CARCO" Low Loss Short Wave	\$6.00
"CARCO" Low Loss P.S.T. Coupler	\$6.75

THE CARTER MANUFACTURING CO.
1728 Coit Ave., East Cleveland, O., U. S. A.



SHIPPED
PARCEL POST
C. O. D.

"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
Type-199A	3-4 Volts, .06 Ampere with Standard Base Amplifier and Detector
Type-12	1 1/2 Volts, .25 Ampere Platinum Filament Amplifier and Detector

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. *When ordering mention type.*

ROICE TUBE CO. (Dept. S) 21 NORWOOD ST., NEWARK, N. J.

HAMS! Be Distinctive! Wear

RADIO CALL PINS

The INSIGNIA of RADIO OPERATORS Everywhere

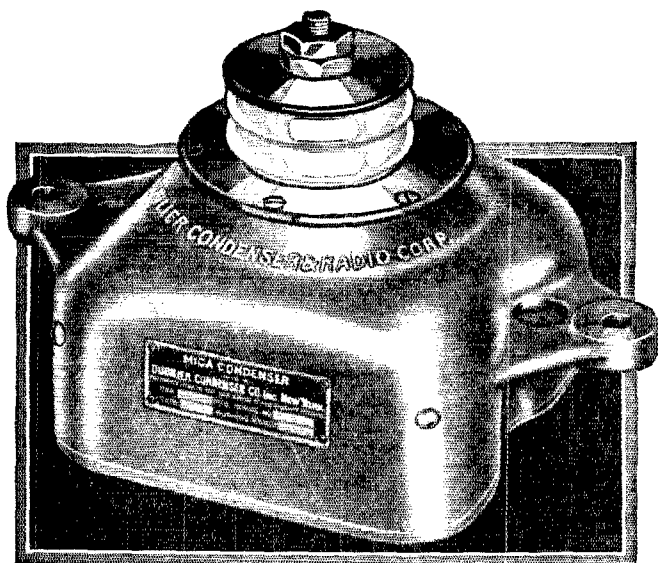
YOUR STATION CALL in SOLID GOLD LETTERS!
(Actual Size)



Slit \$2.00 into an envelope with your call to
9FZ, R. C. BALLARD
1522 W. Sunnyside Ave., Chicago, Ill.

Pat
ap'd
for

Mica Static Condenser



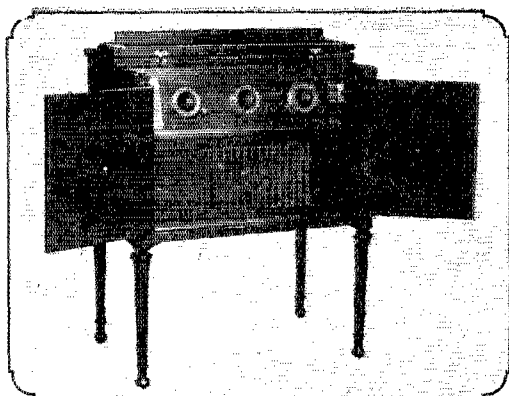
For Better Transmission!

The Dubilier Mica Static Condenser—type 660—is another step forward—towards that vital goal—perfect transmission—at all times, under all circumstances.

Dubilier condensers have always played a large part in the development of radio—better radio. And each new condenser—an improvement on one made before—is a contribution of value and importance to radio science.

Dubilier

CONDENSER AND RADIO CORPORATION



SELECTIVITY

With a Radiodyne you can choose from any of the programs on the air. Nearby broadcasting cannot prevent you from getting distant stations. The Radiodyne will bring in the program you select clear and distinct no matter where broadcasted or where you live.



The Voice of the Nation

Type WC12 RADIODYNE Features

- Has an Amazing Degree of Selectivity
- Uses Dry Cell Tubes
- Receives from Great Distances
- Has Wonderful Volume
- Exceptional Clarity
- Self Enclosed in Beautiful Two-Tone Mahogany Cabinet
- Models Range in Price from \$65.00 to \$250.00

**Write for Our
Free Booklet**

If you can get it with any
set you can get it with the

RADIODYNE

Western Coil and Electrical Co.
305 Fifth St., Racine, Wis.



Clean Your Set Behind the Ears

How can you expect to get the most out of a set filled with dust and dirt? Every radio fan needs a NODUST to keep his outfit *clean* and *efficient*! A bright, shiny panel and a highly polished cabinet won't make your radio work any better; your set must be clean *inside*.

Each powerful blast of a NODUST shoots compressed air into every nook and corner of your set and removes all particles of dirt. You need a NODUST handy to keep your set working at its best.

NODUST

Strongly constructed of best materials, 12 inches long. Wood mountings to prevent short circuiting. Easy to operate, yet very effective. If your dealer has not received his supply yet, send us a dollar bill, and we will ship your NODUST by return mail.

PEIFFER & COMPANY

84 Liberty Street

Newark, N. J.

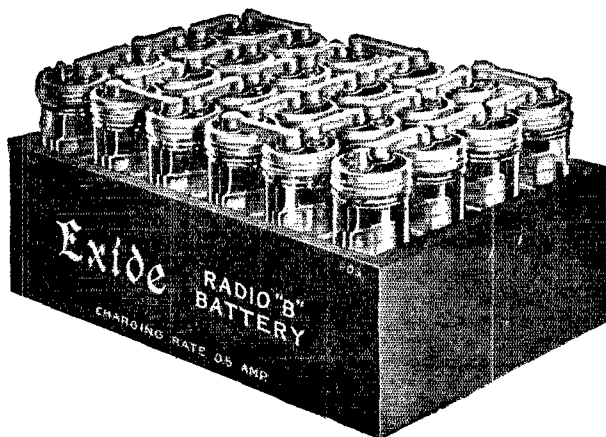


Some pippin!

A Celoron Radio Panel gives a snappy, professional appearance to the home-built set. Its high dielectric strength helps instruments give the best results. Celoron, a bakelite material, is approved by the U. S. Navy and Signal Corps and used by leading radio manufacturers.

Celoron panels come in nine standard sizes, in black, mahogany or oak. Other sizes cut to order. Ask your dealers.

DIAMOND STATE FIBRE COMPANY
Bridgeport, Pennsylvania
Branches in Principal Cities
Toronto, Canada London, England



This new "B" battery has capacity and visibility

IF you are fortunate enough to own one of the larger sets you should be specially interested in the new Exide "B" battery.

This new "B" battery, which is obtainable in 24-volt and 48-volt units, has a capacity of 6000 milliampere hours. It is full-powered and noiseless, maintaining a constant voltage on the plate at all times.

The cells are made of glass, which enables you to see at a glance the condition of plates and separators and the amount of electrolyte. The cell covers are of hard rubber and hold the plates suspended. You need not fear breakage in this battery.

A complete line of Radio Batteries

The new Exide Rectifier, compact and efficient, in a heavy glass jar, makes it possible to recharge your "B" battery

from your house current at a cost that is insignificant.

You can find in the Exide Radio line the right battery for every need. In addition to the glass jar "B" batteries, there are 6-volt, 4-volt and 2-volt "A" batteries—all conservatively rated and all long-lived.

Remember: Exide Batteries are used by many government and commercial radio plants. They are made by the largest manufacturer in the world of storage batteries for every purpose.

Ask to see the Exide Radio line at any Exide Service Station or at your Radio Dealer's.

THE ELECTRIC STORAGE BATTERY COMPANY
PHILADELPHIA

In Canada, Exide Batteries of Canada, Limited
153 Dufferin Street, Toronto

Exide

RADIO BATTERIES

FOR BETTER RADIO RECEPTION USE STORAGE BATTERIES

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

Why It Is Better

THE picture tells the story - seven practical, sensible reasons why Federal sockets should be in your "pet" hook up.

Federal sockets are but another evidence of the care and engineering skill used in designing and making Federal Standard Radio Parts.

There are over 130 standard parts bearing the Federal iron-clad performance guarantee—their use means—"Balanced Circuits" with better performance.

FEDERAL TELEPHONE AND TELEGRAPH CO.

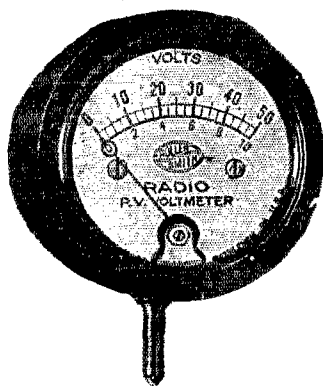
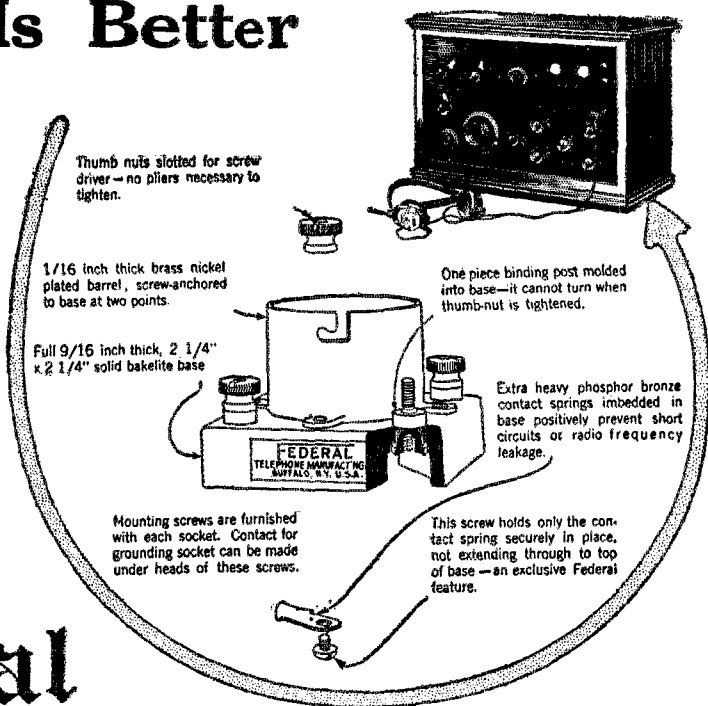
Buffalo, N. Y.

Boston New York Philadelphia
Chicago Pittsburgh
San Francisco
Bridgeburg, Canada



Federal

Standard RADIO Products



Don't Guess

Get a real voltmeter—the *Roller-Smith Radio P.V.*

With it you can quickly and accurately test all radio A, B and C batteries and make any other tests.

Its price is reasonable and it will save its cost many times over.

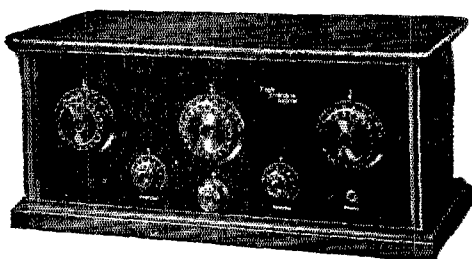
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ROLLER-SMITH COMPANY

16 Park Place, New York

Works: Bethlehem Penna.

Offices in principal Cities in U. S. A. and Canada also in Havana, Cuba.



The **GREATER** Neutrodyne
EAGLE New Model B, \$175
5 Tubes

Reasons for Buying
the New Model B



The **EAGLE GUARANTEE**—The warranty that accompanies every Eagle Receiver fully protects you.

Exclusive EAGLE Instruments

Multiple (filament control) switch, ball-bearing, die-cast condensers, revolving resistor element rheostat—found *only* in the New Model B.

Balance

The perfect balance of tube capacities—the secret of neutrodyne efficiency.

Write for Literature

Eagle

23 Boyden Pl.



Radio Co.

Newark, N. J.

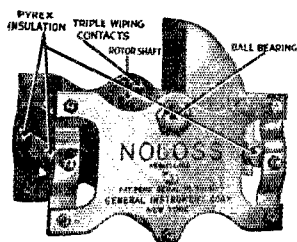
Rugged and Efficient

NOLOSS

TRADE MARK

TYPE 51

PYREX INSULATION



A variable condenser made so rugged that it withstands the hardest jar, thereby keeping the capacity constant for a given setting.

A variable condenser whose high frequency readings measured at 1500 kilo-cycles show negligible measurable losses. The equivalent series resistance is .0037 ohms, the phase angle difference is 3.6 seconds, and the power factor is .00175 percent.

Pyrex and Isolantite insulation make General Instrument NOLOSS condensers possible.

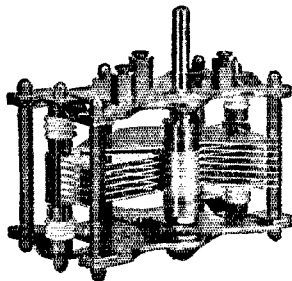
General Instrument apparatus costs a little more but is worth infinitely more.

NOLOSS

TRADE MARK

TYPE 56

ISOLANTITE INSULATION



General Instrument Corporation

Manufacturers of Laboratory Equipment

423 BROOME STREET

NEW YORK, U.S.A.

We Have the "Hard to Get" Things

For Your Transmitter

AMRAD "S" Tubes

PYREX Insulators

WESTERN ELECTRIC

5, 50 and 250 Watt Tubes

R. C. A.

5, 50 and 250 Watt Tubes

JEWELL Meters

WESTON Meters

Large Bakelite Panels

PYREX 5 Watt Sockets

R. C. A. 50 Watt Sockets

R. C. A. Plate and Filament
Transformers

FEDERAL Microphones

R. C. A. Inductances

GENERAL RADIO Wave
Meter Coils for short waves

WESTINGHOUSE
Dynamotors

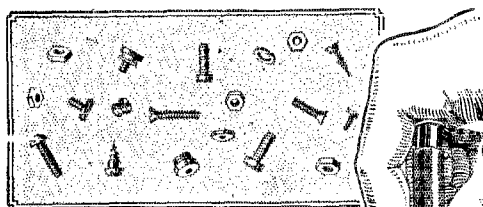
TELEFUNKEN

U. S. N. Wave Meters

*For a more detailed
list write us*

Troy Radio Company

1258 St. Johns Place, Brooklyn, N. Y.



One C. & C. "REACHIT" WRENCH TAKES THEM ALL

No necessity to pick over a half dozen wrenches to fit one nut when you use a REACHIT. It not only fits all sizes but automatically

HOLDS THEM ALL

Firmly (with adjustable jaws) while getting into the intricate positions.

NO OTHER WRENCH CAN DO THIS

It assures a tight connection in the hard to get at places.

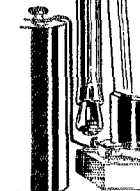
A REAL TOOL FOR MECHANIC, ELECTRICIAN and RADIO BUILDER

Nickle finish-hardened jaws and fully guaranteed.

PRICE \$1.50

If your dealer cannot supply you, send us his name and the above amount and we will forward you a REACHIT wrench postpaid.

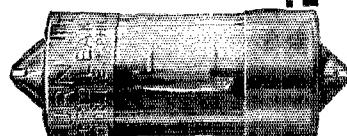
CAUFMAN & CLOUGH CO.
Wilmington, Delaware



TURN-IT ADJUSTABLE GRID LEAK

*Changes the Range of
Resistance to Suit the
strength of Reception*

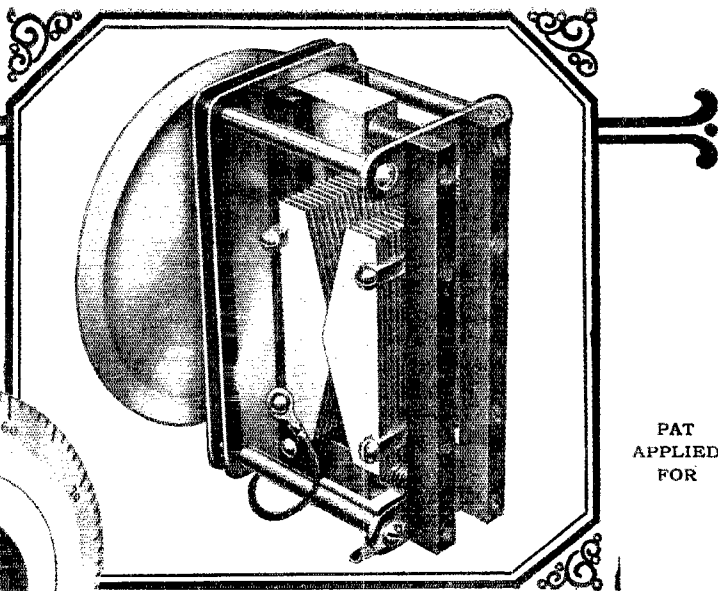
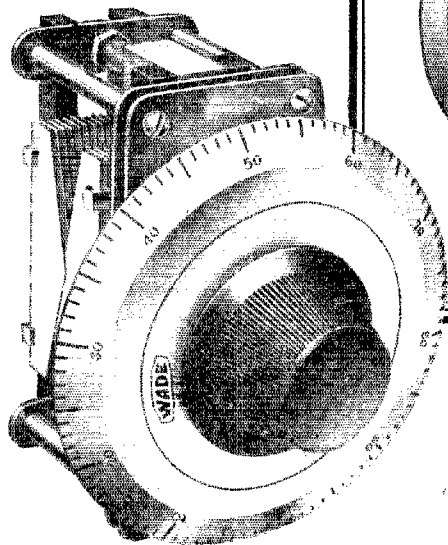
Constructed along entirely new lines which avoid all use of graphite or carbon and the microphonic noises generally attending the use of these materials. Turn-it greatly increases the volume, secures greater distance and reduces noises in your set. A Turn-it gives constant and undiminished satisfaction. There is nothing to wear out. Absolutely guaranteed.



Turn-It Grid Leak Is Only \$1
At Your Dealer or
Direct from Us.

TURN-IT RADIO SALES, Inc.
71 Murray St., N. Y.

**WADE
LOW-LOSS
CONDENSER UNIT**



PAT
APPLIED
FOR

Body Capacity Eliminated by Separately Grounded Frame

All sizes, complete with
4-inch vernier dial, for:
Short wave .000125 mfd.

\$7.50

Tuned Radio Frequency,
.00025 mfd.

\$7.75

Super-Heterodynes,
.0005 mfd.

\$8.00

Oscillator, Wavemeters,
etc.,
.001 mfd.

\$8.50

*At your dealers, other-
wise send purchase price
and you will be supplied
postpaid.*

The Wade square-law variable marks such a drastic advance in construction and compels so complete a revolution in all previous ideas of efficiency that you can appreciate its unusual performance only by actual test.

Separately grounded frame insulated from both sets of plates shields the condenser from all body capacity effects—a vital feature, exclusively in Wade condensers.

All Wade condensers are equipped with full-turn, silvered 4-inch, vernier dials, 32-1 ratio, giving the finest possible control with absolutely no back-lash.

A new idea in one-piece brass plate design gives accurate square-law curve and lowest minimum capacity.

Negligible loss is obtained with the use of hard rubber insulating strips of long leakage paths placed in the weakest part of the electrostatic field. Its small size, ruggedness, and single hole mounting make Wade the most desirable condenser on the market.

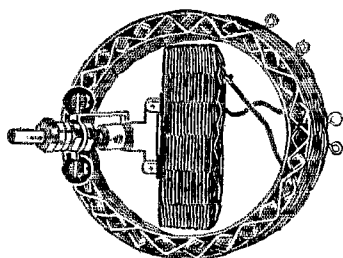
WADE MANUFACTURING COMPANY

1819-B. Broadway

New York City

WADE

Learn What LOW LOSS Means!



Equip your set with a Sharp "Radjo" Low Loss Tuner and learn what LOW LOSS really means.

Minimize your losses — Boost your signal strength — Broaden your range and increase your selectivity.

Sharp "Radjo" Tuners can be mounted in any previously wired set without changes.

Type A — Single or Double Circuit.....	\$6.00
Type B — Three Circuit.....	\$6.00
Type C — Radio Frequency Units.....	\$2.25

Sharp "Anticap" Radio Jacks and Switches

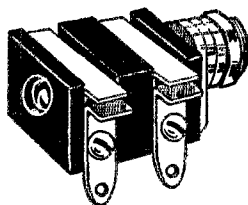
Sharp "Anticap" Radio Jacks are designed for radio circuits exclusively and present advantageous features which no other Jack possesses. Install them in your set and increase its efficiency.

Write for illustrated folder. If your dealer cannot supply you, order direct from us. But do it today and get a new sense of enjoyment from your set.

The Sharp Spark Plug Co.,

Licensed Manufacturers

Bennett St., Wellington, Ohio



The Sharp Radjo Low Loss Tuner

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 VELVET VERNIER

Dials and Condensers Stand the Gaff!

This test proves it. At the Radio World's Fair, New York, two National Velvet Vernier Dials, driving two National DX Condensers operated by an electric motor, ran the entire 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 still possessed that velvety smoothness that makes Nationals so desirable. Write for Bulletin 104QST.

Start the New Year right by
equipping your set with
National Dials and Condensers

NATIONAL COMPANY, Inc., Cambridge, Mass.
Established 1914
Engineers and Manufacturers

They say~

1

THEY SAY OF THE NEW SUPER-ZENITH:

"Greater clarity and volume. Amplification is always at a maximum in each stage for any wave-length. Three stages audio frequency amplification."

Zenith amplifies with Thordarsons!

2

THEY SAY OF THE KENNEDY:

"The Kennedy tone quality is superb; full-rounded, musically pure reproduction of any program within a good long range. No hollow tones or distortion. For the Kennedy is a musical instrument. A musician will enjoy its purity of tone."

Kennedy amplifies with Thordarsons!

3

THEY SAY OF THE MURDOCK NEUTRODYNE:

"To hear the real voice of the nation full and clear—you want volume. . . . Volume that floods your room. . . . Distant stations can be tuned in with remarkable clearness and volume."

Murdock amplifies with Thordarsons!

4

THEY SAY OF THE ANDREWS DERESNADYNE:

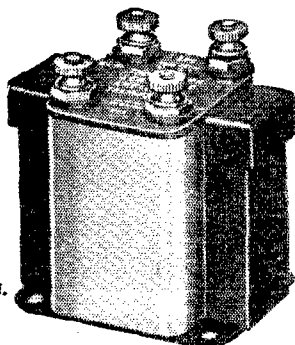
"It secures the finest tone and high selectivity with increased volume and distance. It brings to the home—a reproduction of music really comparable to the original. In volume the Deresnadyne will give anything from a mute tone to a volume that fills a large hall."

Deresnadyne amplifies with Thordarsons!

ZENITH
KENNEDY
Radiodyne
Pathe
ULTRADYNE
MURDOCK
MICHIGAN
Howard
OSARKA

MUSIO
PFFANSTIEHL
PHOENIX
ANDREWS
MALONE LEMON
AUDIOLA
GATES
GLOBE
HARMONY
ODELL FERRY
PEERLESS
DUCKS DELUXE
SAAL
AND MANY
OTHERS USE
THORDARSON.

NOTE:
that Thordarson makes
a 2:1 audio—also an
Interstage Power Amplifying Transformer.
Prices below.



Superiority Proved!

Note the emphasis placed upon **tone quality** in the advertising of the finest sets—the sets that have Thordarson amplification. People want radios that are **musical instruments**. Leading makers are responding with sets embodying the best audio amplification. That is why **more** Thordarsons than all competitive transformers combined are now used in high-grade radios.

Is your present set disappointing? Buy a Thordarson—equipped set—or replace your audio frequency transformers with a pair of Thordarsons—or follow the lead of the leaders and build with Thordarsons. You will be delighted with the **even** volume they deliver over the **entire** musical range. All stores can now supply Thordarsons. If your dealer is sold out, you may order from us by mentioning his name. Interesting bulletins sent free. Write.

THORDARSON ELECTRIC MANUFACTURING CO.
Transformer specialists since 1895
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS
Chicago, U.S.A.

Unconditionally Guaranteed

THORDARSON
Super
AMPLIFYING TRANSFORMERS
Standard on the majority of quality sets

TYPES AND PRICES: Thordarson "Super" Audio Frequency Transformers are now to be had in three ratios: 2-1, \$5. 3¼-1, \$4. 6-1, \$4.50. Thordarson Power Amplifying Transformers are \$13 the pair. Thordarson Interstage Power Amplifying Transformer, \$5.00. Write for latest hook-up bulletins—free!

FRESHMAN

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 fibra 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.

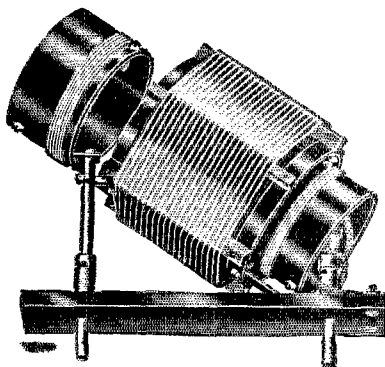
At your dealers—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products

106 Seventh Ave., New York

Hendrick Low Loss Tuner

Tested ranges 175—600 with .0005 mfd. with Hammarlund 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.



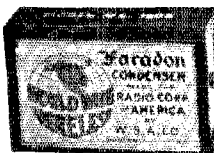
P
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P.P. to any part of the Globe.

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

WOW! \$1 for a Mica Condenser!



Price \$1.00

U. C. 1806 R. C. A. mica condenser, capacity .002 mfd., 6000 volts effective. Used principally as grid and plate blocking condensers. \$7.50 value for \$1.00.

The Utility Radio Co.

58 North 6th St.,

Newark, N. J.

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

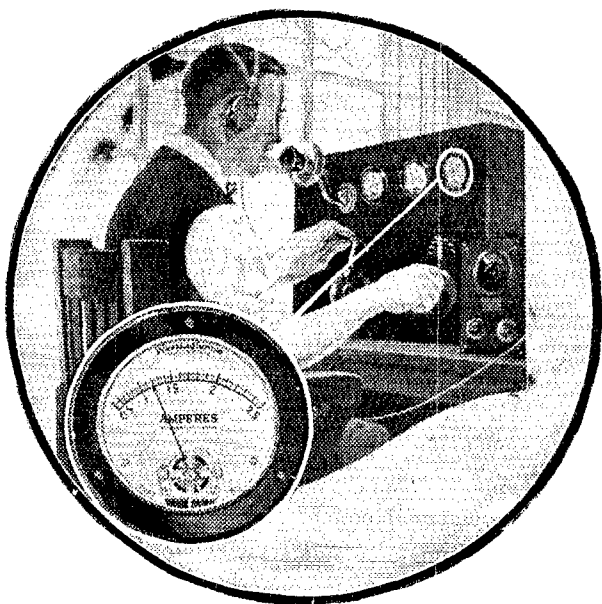
Ballantine's Radio Telephony for Amateurs, latest issue, \$2.00

Don't Miss Our HAM-ADS

E. F. JOHNSON

9 ALD

Waseca, Minn.



A Radio-Frequency Ammeter is essential with Transmitting Apparatus

This ammeter, in your transmitting circuit, will tell the strength of the current in the antenna which, in turn, is an indication of the effectiveness and character of the transmission.

Westinghouse Radio-Frequency Ammeters are available in four styles, the BX is the smallest, 2 9-16 inches in diameter, and is an attractive addition to any panel. The CX is a larger instrument, 3 1/2 inches in diameter, suitable for larger panels. Instruments 4 3/8 inches and 7 1/2 inches in diameter may also be obtained.

Precision workmanship of the finest materials, combined with years of experience in the design of electrical measuring instruments, have made possible these small yet accurate, sturdy and reliable radio instruments.

Westinghouse Electric & Manufacturing Company
Newark Works Newark, N. J.

*Sales Offices in All Principal Cities of the
United States and Foreign Countries*

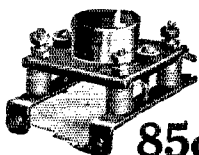
Westinghouse

The Beautiful SIGNOLA Radio Table

The new Signola Radio Table is "The Radio Table Supreme." Large compartments for batteries, tools, accessories, etc.—Built-in loud speaker (Unit extra). The top is hinged in the center to permit opening without lifting off set. Ample leg room is provided below.

Size 30" high, 36" wide, 20" deep.

Price \$30.00



Signal Tube Socket

Metal tube with Formica Base. Heavy phosphor bronze spring, extra brackets for panel mounting, rubber bushing for base mounting. Nothing better made.

85c. Price.....\$0.85 each.



\$30.00

Los Angeles
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Minneapolis
New York
Pittsburgh
St. Louis
Boston

SIGNAL Electric Mfg. Co.

Factory and General Offices
1915 Broadway
Menominee, Mich.

San Francisco
Philadelphia
Seattle
Montreal
Toronto
Winnipeg
Havana, Cuba

You'll find our local address in your Telephone Directory

Welcome

The "SELF ADJUSTING" Rheostat

\$1.10
EVERYWHERE

Write for
FREE
Hookup

No rheostat knobs on panels to turn—no meters needed—no tube worry. One amperite, used in series with each tube, inside the set, automatically supplies just the right current for each individual tube's greatest efficiency. Works on thermo-electric principle. Simplifies wiring. Reduces set cost. Proved in use. Adopted by more than 50 set manufacturers. No set is up to-the-minute in design without it.

RADIALL COMPANY

Dept. Q. S. T-1
50 Franklin Street, New York

AMPERITE
"means right amperes"

60 Ft. "HERCULES" Aerial Mast

\$45 Freight Prepaid

20 Ft. Mast \$10
40 Ft. Mast \$25

All steel construction. Each Mast complete with guy wires and masthead pulley. Write-for literature and **FREE BLUEPRINT**

S. W. HULL & CO., Dept. C2
2048 E 79th St. Cleveland, Ohio

E B Y
BINDING POSTS

Twenty-five Different Engraved Tops

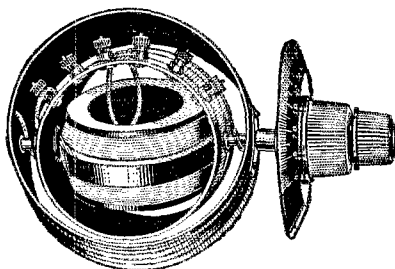
They Don't Lose Their Heads

H. H. EBY MFG. CO.
Philadelphia

C BAT - **B DET +**

At Last A Double Rotor 3 Circuit Tuner

HERE'S what you Hams and B. C. L's have been looking for. A tuner in which losses are low and equipped with a double rotor that makes it possible for you to get just the wave length you want. You fellows who "really know" the principle of reception can realize the advantage of a tuner with an *unfixed* (or variable) coupled primary. That's exactly what the Coast Coil gives you.



\$7.00 Complete
With Special Vernier Dial

COAST COIL

The Only Tuner Scientifically Correct

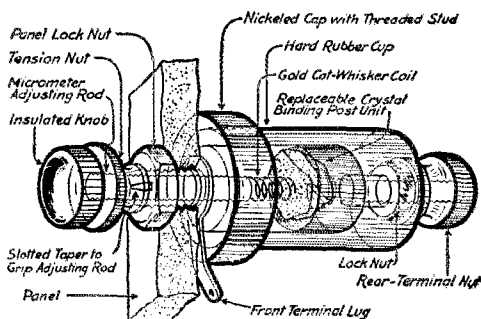
It's the Double Rotor principle of the Coast Coil that makes possible greater distance, with maximum signal strength and selectivity. The primary winding is on the inner ball rotor—the plate circuit winding on the outer rotor—and the secondary winding on the stator. The Coast Coil affords the only correct coupling.

And when it comes to receiving regular radio broadcast programs there's nothing can touch a Coast Coil in a three circuit hook-up.

Ask your dealer to show you a Coast Coil. Notice its fine workmanship. If your dealer hasn't a Coast Coil order direct from us giving dealer's name and address.

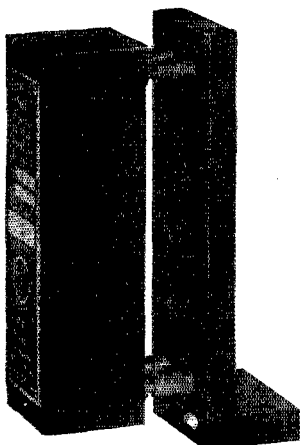
Another Achievement The VARIOTECTOR

As soon as you examine the detailed phantom view of the Variotector shown opposite, you will realize the superiority of this wonderful crystal detector. You have never seen a more reliable or more scientifically built crystal detector. Especially for use in a reflex hook-up. With the Variotector there's no leakage or short circuiting. Assures greatest volume, clarity and distance. **Costs only \$1.50** at all dealers. If your dealer doesn't have a Variotector order direct giving dealer's name and address.



FOOTE RADIO CORP.

120 N. 19th Street, Philadelphia, Pa.



Patented Dec. 19, 1922

**For That Super-Heterodyne Set
You Are Building Use**

VIRBREN DX TRANSFORMERS

and Coils. You are assured Coast to Coast Reception On Loop, with Loud Speaker Volume.

Four features of vital importance in a Super-Heterodyne Transformer are

- 1—High Amplification
- 2—Pure Reproduction
- 3—Great Selectivity
- 4—Uniformity
between transformers

The Virbren Input and DX-2H Transformers Splendidly meet these requirements. See Q.S.T. Magazine, October 1924, Page 20.

Super-Heterodyne Transformers.

DX-2H.....	5,000 Meters	.....\$6.60
DX-Input	5,000 Meters	.....\$6.60
Oscillator Coil		\$3.00
Antenna Coil		\$3.00
Blue Print giving layout and full instructions .....		.75

Short Wave Transformers:

DX-18	220-550	.....\$6.40
DX-19	220-550 Meters	.....\$6.40

Contacts for mounting furnished with all Transformers.

----- Send This Coupon -----

Radio Instrument Co.,
Dept. L-774, 939 D. St. N. W.,
Washington, D. C.

Gentlemen: Mail me free literature regarding your products, or send me the articles as checked on list attached, for which you will find money enclosed.

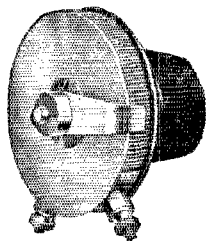
Name

Address

City

Dealers name

Address



A new RHEOSTAT

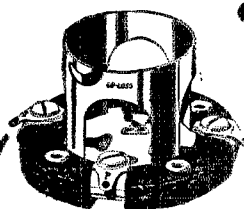
with immovable coils

The coils of the new Centralab Rheostat are firmly clamped between and imbedded in insulating material so they cannot move. This eliminates the noise in the set caused by lateral movement of coils, and maintains a uniform spacing between windings, giving smooth, even regulation and eliminating dead spots. The contact shoe cannot catch. Attractive in appearance, and substantial in construction. Single hole mounting.

No. 206—6 ohms maximum resistance . \$1.25
No. 230—30 ohms maximum resistance . 1.25

Centralab

CENTRAL RADIO LABORATORIES
291 Sixteenth St. MILWAUKEE, WIS.



Premier
"LO LOSS" TUBE SOCKET
Price 90 cents

PREMIER ELECTRIC COMPANY, 3811 Ravenswood Ave. CHICAGO

PREMIER Quality RADIO PARTS

CONSERVE YOUR CURRENT

Write for free bulletin No. 94, describing this radically different tube socket. Lowest insulation leakage, lowest capacity. Contacts always visible. Contact springs automatically clean tube prongs. New cam-action tube lock makes insertion of tubes easy and contact certain. "Hook-up" diagrams free on request.

WIMCO Announces

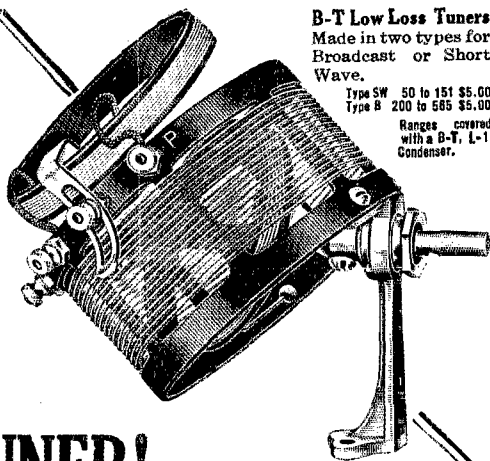
Our experimental laboratory is developing instruments for short wave transmitting and receiving.

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

9600 MILES WITH THE NEW B-T SHORT WAVE TUNER!



B-T Low Loss Tuners
Made in two types for
Broadcast or Short
Wave.

Type SW 50 to 151 \$5.00
Type B 200 to 585 \$5.00

Ranges covered
with a B-T, L-1
Condenser.

Radio 2WR, Arthur G. Wester, Assistant Division Manager of Hudson Division, American Radio Relay League wrote us as follows:

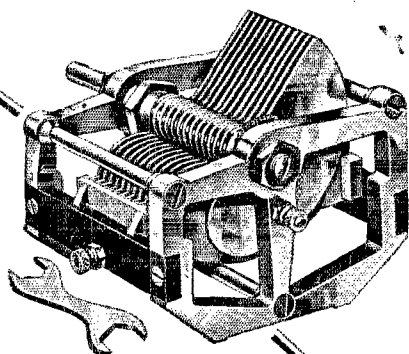
"Having obtained one of your S.W. couplers on November 10th I would like to mention some of the results obtained.

New Zealand 4AA on 80 meters (CW) was copied on November 13th steadily from 6.16 A. M. to 6.39 A. M. E. S. T. using detector and two step amplifier. I believe his power is about 50 watts. The estimated distance is 9600 miles.

Mexican BX was heard and worked from this station on the morning of November 15th from 5.42 to 6.07 A. M. E. S. T. and not one word was missed.

The following west coast stations were heard and worked during the week: 6CTO, 6BNY, 6ADT, 6BDT. All of these stations are in California. Numerous others have been heard from all over the United States.

I cannot imagine what the future holds forth in the line of DX as the first week's results were amazing."



B-T Lifetime Condenser

Type	Capacity	Price
L-7	125 M.M.F.	\$4.25
L-11	250 M.M.F.	4.50
L-23	500 M.M.F.	5.00
L-35	750 M.M.F.	6.50

Results such as these are due to the excellent mechanical and electrical design of the new B-T Short Wave Low Loss Tuner, and the careful painstaking workmanship employed.

Our 40 page book "Better Tuning" gives complete details of this, and other advanced apparatus, circuits, etc. Sent postpaid for 10c.

BREMER-TULLY MFG. CO.

"Pioneers of Better Tuning"

532 S. Canal Street, CHICAGO, ILL

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

TOWER'S

TOWER'S Scientific
WEIGHS ONLY 6 OZ
Perfect Tone Mates
\$2.95
plus a few cents postage



OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET

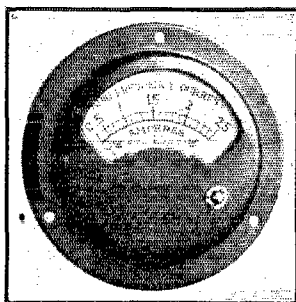
WORLD'S GREATEST HEADSET VALUE

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. : 98 G BROOKLINE AVENUE, BOSTON, MASS.

Scientific



Roller-Smith Co. Hot Wire Ammeters

0-2.5 amps. flush panel model, regulation size, 3 1/2" diameter overall, body diameter 2-5/8", zero adjuster located in the front.

Original List Price, \$13.75 ea. Our Price, \$3.25 ea.

OTHER BARGAINS

Thermo-Couple Ammeters, 0-2.5 or 0-5 amps. \$7.00, D. C. Voltmeters, 0-500 volts \$8.50, 0-1500 volts, \$15.00. D. C. Milli-Ammeters. 0-150 milli-amps, \$3.25, 0-250 or 0-500 milli-amps, \$5.50. All these meters are mfd. by the General Electric Co., and are in original packing. All merchandise is new and guaranteed. Send for our complete bargain price list.

AMERICAN SALES AGENCY, 38 Park Row, N. Y.

TOAZ GRIPFAST TERMINALUGS

Patent Applied For
NOW READY FOR DELIVERY
COPPER - TINNED - \$3.00 M AMATEURS!



- | | |
|--------------------------------|--------|
| 60 Plain Type Lugs | \$0.25 |
| 50 Gripfast Lugs | .25 |
| 25 Dubbelugs, (1 9-16 centers) | .25 |
| 12 feet Bus Wire | .25 |

Any combination—5 items \$1 Pp.

Discounts to Dealers

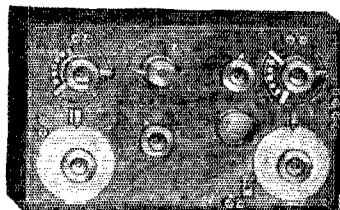
Free Pamphlet Practical Soldering



TOAZ Engineering and Sales Co.

11703 Robertson Ave., Cleveland, Ohio

Copy the Foreign Arcs on Navy CN 239



Tunes 1000-14000 M (Honey combs will load it higher.) Size 2 3/4 x 1 5/4 x 1 1/4 deep. Binding posts for Audion—TICKLER REGENERATION—Capacity and Inductively Coupled—used but guaranteed perfect.

Order now—limited Quantity \$15 Express Paid

GEO. W. EATON ELECTRIC CO.

1915 So. 12th Street

Philadelphia

Extraordinary Book Bargains!

Valuable Volumes by Well-Known Radio Authorities

ROUND OUT YOUR RADIO REFERENCE LIBRARY

		<u>List</u>	<u>Special Price to YOU</u>
MODERN RADIO OPERATION Cloth Bound, 140 pp. fully illustrated	J. O. Smith	\$1.75	\$1.15
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RADIO INSTRUMENTS AND MEASUREMENTS Circular 74, Bureau of Standards Cloth, 330 pages. A standard work		1.75	1.15
THE WIRELESS EXPERIMENTERS MANUAL Cloth, 350 pages	E. E. Bucher	2.25	1.50
		<u>\$10.00</u>	<u>\$6.60</u>

Above 5 books, originally \$10.00
further reduced to **\$5.50 Postpaid**, if ordered together.

PRACTICAL WIRELESS TELEGRAPHY "The Old Reliable", Cloth, 336 pages	E. E. Bucher	\$2.25	\$1.50
ACQUIRING THE CODE — An Instruction book for Beginners in Radio	E. P. Gordon	.50	.35
HOW TO CONDUCT A RADIO CLUB	E. E. Bucher	.75	.50
THE ELEMENTARY PRINCIPLES OF WIRELESS TELEGRAPHY Cloth — 2 volumes — 453 pp.	R. D. Bangay	1.75	1.15
		<u>\$15.25</u>	<u>\$10.10</u>

Special Price for 9 volumes listing at \$15.25
only **\$8.00 Postpaid**, if ordered together.

ALL PRICES ARE POSTPAID

Mail your order and remittance now to

Q S T BOOK DEPARTMENT

1045 Main Street

Hartford, Conn.



Surface leakage exceptionally low with this panel—built to order for radio

RADION is a SPECIAL material, developed to order by our engineers to meet the needs of radio. For radio-frequency insulation its characteristics are highest as proved conclusively by authoritative laboratory tests. Surface leakage and dielectric absorption are shown to be exceptionally low,

You can see the difference by the finish
YOU can see that Radion is different if you look at the finish. That high-polished, satin-like surface is not only good-looking but useful as well. Moisture and dirt cannot gather to form leakage paths and cause leakage noise.

Radion is mechanically right, too. It resists warping. No special tools are needed to make a clean-cut workmanlike job. Everybody knows that it is the easiest material to cut, saw or drill. Comes in eighteen stock sizes, two kinds, Black and Mahogany.

Better performance will make it worth your while to ask for Radion by name. Radio dealers have the exact size you want for your set.

Send for booklet. "Some Insulation Stickers Explained". Use the coupon below.

AMERICAN HARD RUBBER COMPANY
Dept. L-1, 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 Company
Dept. L-1, 11 Mercer St.,
New York City

Please send me your booklet, "Some Insulation Stickers Explained".

N _____

Address _____

City _____ State _____

Globe Low-Loss Tuners

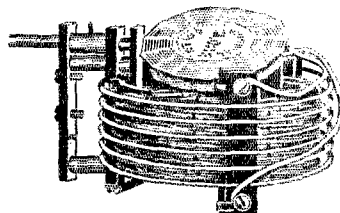
**Loses Nothing
Tunes Every Radio
Impulse the Aerial
Receives.**

No Metal
No Eddy Current
Losses

Little Insulation
Low Distributed
Capacity

Large Wire
Self Supporting

Anti-Capacity
Windings
Low R F Resistance



Patent Dec. 9, 1924

GET ORIGINAL GLOBE COILS

PRICES:

Standard Tuner (Broadcast Range)	\$7.00
Short Wave (35-135 Meters)	\$7.00
For Superdyne Circuit	\$8.50
R F Transformers	\$6.00

Circular on Request. Dealers and Jobbers Write.

SEND ORDERS DIRECT TO

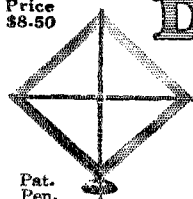
Globe Radio Equipment Co.

217 West 125th St., N. Y. C.

Imitation is Deceit

*Legal Action Pending.

Price
\$8.50



Pat.
Pen.

Duo-Spiral Folding Loop

Famous for its great convenience, handsome appearance and superior performance. Standard loop for super-heterodyne. A special model for every circuit. 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.

RADIO UNITS, Inc.

1304 FIRST AVE., MAYWOOD, ILL.
PERKINS ELECTRIC, Ltd., MONTREAL

RADIO TUBE EXCHANGE

We Repair All Standard Makes of Tubes, Including

W.D. 11 or 12
U.V. 199 or C299
U.V. 201A or C301A
C. 11 or 12
D.V. 1 or D.V. 2
U.V. 200 or 201

\$2.00

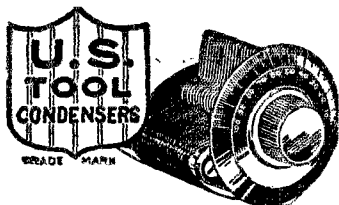


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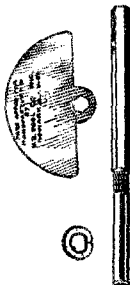
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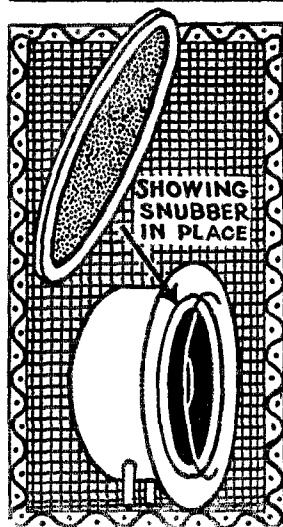
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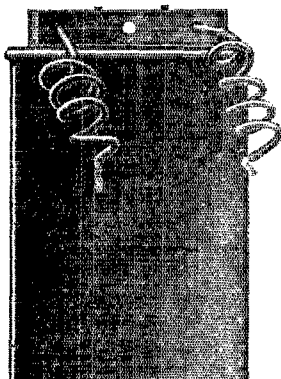
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No More
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2.5 mfd. condenser ... \$7.00

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Order direct by letter or use the coupon.

Are you tired of "break-downs"? Here is a special, high-dielectric, low-loss condenser that will end your troubles. Under test at double their rated voltage, their phase angle does not exceed 20 minutes—which means a loss of not over $\frac{1}{2}$ 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.

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Write your name and address plainly in space above.



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STEADY PLATE POWER. FREE FROM THE
BUZZES THAT EVEN THE MOST CAREFULLY
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WILL BRING INTO YOUR SET. THAT'S AN ED-
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ONE OF THESE; 54 VOLTS (LIGHTNING GAS FOR
THAT LOLOSS TUNER) \$8.75. 100 VOLTS (THE
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RIBBED RUBBER MAT. LARGEST LIVE EDISON
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GENUINE EDISON ELECTROLYTE (THAT'S NO
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TO REACH YOU SAFELY. INDIVIDUAL CELLS
16. FOR THAT NEUTRODYNE AND SUPERHET.
A HUSKY DOUBLE CAPACITY B. 2000 MILIAMP
HOURS. 100 VOLTS \$24. CELLS OF HEAVY FLAT
BOTTOMED GLASS 1/2" THICK. A BANG-UP B.
OTHER VOLTAGES. MAKE UP YOUR OWN B
FROM SML SURE-FIRE PARTS. LARGEST LIVE
CLEAN EDISON ELEMENTS 6c. DRILLED 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.
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HICAP CELL PARTS 17c. DRILLED READY TO
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WIRED IN HEAVY 1x6" GLASS FLATBOTTOMED
JAR. 3000 MILIAMP HOUR SUPERCELL FOR THE
SUPERHET AND HIPOWER TRANSMITTERS 30c
CELL FOR PARTS. 40c WIRED. ANNEALED
GLASS TEST TUBES INDIVIDUALLY WRAPPED
3/16" 3c. 1x6" 4c. HR. NO. 1 FOR THOSE HARD
KNOCKS 1/2" THICK FLAT BOTTOMED GLASS JARS
1x6" 1c. 1x6 3/4" 5c. KEEP QRN OUT OF THE B BY
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(NOT PLATED OR ALLOY) NICKEL WIRE. 1 1/2c
FT. PREPAID. PERFORATED HARD RUBBER SEPA-
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EDISON ELECTROLYTE (THAT'S NO LYE) WILL
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PREPAID TO MAKE 5 lbs. ELECTROLYTE. YOU
CAN'T TAKE OUT MORE THAN YOU PUT IN
—REALLY CHARGE THAT B WITH A WILLARD
COLLOID RECTIFIER \$2. JUMBO SIZE \$3. USE
BOTH HALVES OF THE CYCLE. FULL WAVE
COLLOID CHARGES 100 VOLT B IN ONE BITE. NO
SWITCHES. \$4. JUMBO SIZE \$6. HINVOLTAGE
TUNGAR CHARGER SHEET 50c. EVERYTHING
FOR THAT EDISON B. FRANK MURPHY. RADIO
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A GREAT START FOR THE NEW YEAR—A BRIGHT
NEW SHINY AERIAL—AND ONE THAT STAYS
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ENAMEL BAKED ON. ONE PIECE BURLAP
WRAPPED COILS PREPAID 3RD ZONE 1c FOOT.
GIVE 'EM A KINK IN THE NECK LOOKING UP
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5" 75c. 10" \$1.50 PREPAID 3RD ZONE. FLUX DIS-
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100 FT. PREPAID. NO. 16. 60c. SILICON STEEL
LAMINATIONS FOR THAT TRANSFORMER AND
CHOCES 20c LB. STRIPS 2 1/4" x 10". U SHAPED 1 1/2"
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HAVE YOUR BROKEN and burned out Power tubes
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"ASK THE HAM WHO USES EM" AMRAD S TUBES
RECTIFY UR AC. WITHOUT ANY ATTENTION
WHATEVER. NOTHING TO BURN, OR WEAR OUT,
NO LIQUIDS TO EVAPORATE. NOR CHEMICALS
TO CORRODE. THEY MAKE FIVERS JELLY LIKE
FIFTIES. AND TREAT FIFTIES ROUGH AND MAKE
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AMRAD S TUBES. PRICE IS \$10.00 EACH. MOGUL
BASES TO MATCH. 85c EACH. AMRAD ELECTRO-
LYTIC 30 MFD CONDENSERS. CHEAPEST PER
MIKE. PRICE \$8.00 EACH. ESPECIALLY EFFEC-
TIVE WHEN USED WITH AMRAD S TUBES. FED-
ERAL 1000 VOLT 1 MFD \$2.00 R. C. A. 1750 VOLT
1 MFD \$2.50 FILTER CONDENSERS THAT MAKE A
REAL FILTER SYSTEM. SATISFIED WITH UR AN-
TENNA OM? NO? WELL JUST ORDER SOME NO.
12 SOLID COPPER ENAMEL WIRE. 1c PER FOOT
CUT ANY LENGTHS FOR YOU. ALSO DON'T
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JUST DROP A CARD TO THE ONLY HAM STORE
IN THE FIFTH DISTRICT. ADDRESS TO FORT
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"RADIO CALL PINS." a9FZ (see Page 80).

GREBE 13 FORTY BUCKS NEW WITH TUBES. WILL
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CERTIFIED AND KLEERTONE tubes types 12-199-
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ENVELOPES—100 good white envelopes with name and
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sulphating or buckling of plates, which means clearer
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large size tested Edison elements, special molded flat
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"RADIO CALL PINS," u9fZ (see Page 80).

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KNOW THE CODE OUR WAY— KILL HESITATION. Ask for list many students who won appointment as O. R. S. AM. RADIO RELAY LEAGUE and have reported made rapid progress to quick success—mailed on request. Method \$2.50, Kills Hesitation. Dodge Radio Shortkut, Dept. SC, Mamaroneck, N. Y.

NEW GENERAL Electric 1½ H. P. 110-220 volt 60 cycle 1750 R. P. M. Single phase repulsion induction motors. These are late type continuous duty motors, all in original boxes. Price \$29.50; each f. o. b. Chicago, 25% with order, balance C. O. D. Quantity limited. Queen City Elec. Co., 1734 Grand Ave., Chicago, Ill.

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CHEMICALLY PURE ALUMINUM ½ inch \$1.80, 1/16 inch 90 cents; sheet lead \$.95 per sq. foot, postage paid. Geo. Schulz, Calumet, Mich.

IF YOU DON'T SEE THE LAST HAM AD THIS ISSUE, IT WON'T BE \$AOO's FAULT.

GREAT REVIVAL! Audio transformer revived. Your burnt out transformer brought back to normal activity. The charge is only \$1.50. Satisfaction guaranteed or money refunded. Standard makes only. The Radio Research Laboratories, Box 507, New Bedford, Mass.

When better cards are printed, 8BJT will print them.

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EXPERIMENTAL RADIO, Page 63 July QST.

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GLASS! GLASS! GLASS! GLASS! GLASS! Glass supported coupled inductances. LOSSES NEGLIGIBLE! MOUNTED, supported and insulated entirely on glass. Wave-band 180 meters down—Price \$15.00. Order now for quick delivery. CAPITOL RADIO, LANSING, MICHIGAN.

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HERE IT IS GANG. THE NEW WAY TO BUY THAT STUFF YOU NEED. NAME YOUR OWN PRICE AND WE'LL CONSIDER YOUR WANTS. WE SPECIALIZE IN BUILDING "REAL HAM" STUFF THAT WILL HELP YOU GET OUT. IF IT'S A SUPERHERO WE BUILD THEM FROM \$65.00 UP. FROM 6 TUBES UP. WE USE HIGH EFFICIENCY LOW-LOSS COILS THAT USE NO INSULATING DOPE. THESE COILS FOR ANY CIRCUIT. TRANSMITTING ANTENNA INDUCTANCES STANDARD SIZE LIST, \$9.00 DIRECT COUPLED, INDUCTIVELY COUPLED INDUCTANCES. INDUCTANCES FOR THE MEISSNER CK. THREE OR FOUR COIL. WAVEMETERS FOR THE LOW WAVE LENGTHS. BE SURE YOU KNOW WHERE YOUR SIGS ARE. USE A WAVEMETER TO FIND OUT. FOR THE POWER SUPPLY WE CAN QUOTE YOU ON ANY VOLTAGE CHEMICAL RECT. OR ON A TUBE RECT. ALL UNITS COMPLETE WITH PANEL CONTROL. IF YOU WANT TO GET OUT WITH THAT FONE WHY NOT USE A SPEECH AMPLIFIER? WE BUILD 'EM. AND IF YOU WANT TO SAVE TIME IN CHANGING FROM THE HIGHER WAVELENGTHS TO THE LOWER ANOTHER TRANSMITTER WILL SOLVE THE PROBLEM. JUST NAME THE OUTFIT AND THE PRICE YOU WANT TO PAY FOR IT. O.M. AND WE'LL CONSIDER BUILDING IT FOR YOU. WHETHER A 5-WATT OR A 100 WATT. MAKES NO DIFFERENCE. IF YOU WANT US TO WIRE A SET AND HAVE THE PARTS SEND THEM IN WE'LL GUARANTEE YOU THE PRICE FOR BUILDING WILL BE

O. K. IF YOU HAVE ANY SPECIAL WORK TO DO LET US HAVE THE DOPE. WE ARE REPORTED F. B. WITH THE GANG, THAT'S WHY "IF IT'S HAM YOU SHOULD GET IT HR." THE AMATEUR LINE EXCLUSIVELY. SEND US YOUR INQUIRIES. ESTIMATES GLADLY GIVEN. QSO. THOS. ENSALL (ENSALL RADIO LAB.,) 1208 GRANDVIEW AVE., WARREN, OHIO. (In The Middle Of The Eight's Copying Sixes Without Antenna And With One Tube.)

HERE IT IS THE OUTFIT THAT HAS COPIED THEM FROM NEARLY EVERY DISTRICT WITHOUT ANTENNA. A REAL SHORT WAVE SET. FROM 35 METERS UP TO 200 OR OVER. THE PRICE IS NEARLY AS LOW AS THE LOWEST WAVE IT REACHES. GET THE DOPE. AN IDEA THAT WILL KNOCK THE LIGHT OUT OF THE FIFTY FOR DISTANCE. HAS BEEN IN USE HR FOR ONE YEAR. PRICE ON REQUEST. QSO., ENSALL RADIO LAB., THOS. ENSALL, 1208 GRANDVIEW AVE., WARREN, OHIO.

CHEAP—MUST SELL at once. Dynamotor 400 volt output, \$19.00; 800 volt transformer, \$4.50; 10 watt C. W. and lone, with two meters, will sacrifice, \$14.50; Kenotrons 216, \$3.50 each; 201 tubes \$2.00; George T. Purves, Jr., 5261 Carrollton Ave., Indianapolis, Ind.

Bargains—You hams who are looking for brand new transmitting parts at give-away prices had better drop me a card quick. 2CXT.

New UV-204. This tube has never been used. Have no use for same so will sell reasonable. 1BEP.

DON'T MISS THE LAST HAM AD THIS ISSUE, OM. IT'S HOT STUFF. 9A00.

FOR SALE—Neutrodyne five tube receiving set with tubes and A & B batteries, \$75.00; cash. James Watson, 439 E. Hancock St., Appleton, Wis.

WESTERN ELECTRIC NAVY TYPE POWER AMPLIFIERS WITH LOUD SPEAKER AND THREE TUBES 65 DOLLARS; WESTERN ELECTRIC PHONES \$7.50. MISSION OAK RADIO CABINETS 8"x12" WITH SEPARATE COVERS 2" DEEP 1.25 POSTPAID. H. M. BANTA, 7880 CAMERON AVE., DETROIT, MICH.

SELL set 4 Lacault Ultraformers new \$12.00; H. E. Cunningham, 1111 California, Urbana, Ill.

QSL CARDS—Samples and prices cheerfully furnished. SEUT, 701 Walnut Ave., Scottsdale, Pa.

Canadian 9AD, Selkirk Mine, of the American Development Company, Limited, located in central Manitoba, Canada. Post Office address via Riverton, Manitoba. One hundred and fifty miles north from Winnipeg and a hundred miles from railroad. Radio only constant communication other than weekly mail by dog team. All correspondence answered as quickly as mail service permits. Operated by former Canadian 4EA, Best 73's.

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.

"RADIO CALL PINS," u9FZ (see Page 80).

Sell two Exide radio 2 volt batteries practically new and one 8 volt Exide, 60 Amp. hr., fair condition. \$15.00. Lafford Totten, Aberdeen Proving Ground, Md.

HOMCHARGER GOOD CONDITION \$7.00—JEWELL 0-10 FILAMENT VOLTMETER DIRECT CURRENT \$5.00; H. C. Block, 1 Oak St., Ypsilanti, Mich.

15% OFF LIST. STANDARD PARTS AND SETS. SEND FOR LISTS. BIRCH PRODUCTS, Box 96, READING, MASS.

FOR SALE—200 WATT, 500 VOLT, GENERATOR, FIRST TWENTY DOLLARS. Chas Webb, BELMONT, Wisc.

O BOY! COMPLETE KIT of parts for our "Model NZ" lo-loss tuner, like 9EFZ used in two-way communication with Australia and New Zealand. Complete with cabinet and tubes.—Detector, \$23. With one stage, \$37. Assembled add 10%. Act quick. Immediate shipment. With blueprint and instructions. AMES RADIO SHOP, Francesville, Indiana.

EXPERIMENTAL RADIO by Professor Ramsey, Indiana University. 85 experiments mimeographed. \$2.00 postpaid. For review see July QST Page 63. University Book Store, Bloomington, Indiana.

Transmitters. Designed, built, installed. Any wave from 3.5 to 2000 meters. Short waves our specialty. Have built seven of U. S. best broadcasting stations. Morsemore Engineering & Research Laboratories, Grantwood, N. J.

FOR SALE—GREBE CR9, \$65.00; C. O. D. on approval. Guaranteed, perfect condition. Lynn Daughenbaugh, Jennings, La.

MOTOR-GENERATORS New Robbins & Myers 500 Volt 100 Watts with 110 Volt 60 Cy. A. C. Motordrive \$36.00. Generators only \$25.00. Motors & Generators repaired and rewound; 1 year's guarantee. MORTON ELECTRIC CO., 4832 Rice St., Chicago, Ill.

WANTED—FOUR TYPE 4000 "S" TUBES. WILL PAY \$6.00 EACH. R. SMITH, 2249 McGRAW, DETROIT, MICH.

SENTINEL RADIO FUSES in all capacities from 5 amps for filament to minimum capacity for plate circuits cost ten cents each, they are real fuses, sent postpaid for ten cents or one dollar per dozen. Davis Electric Co., Springfield, O.

2BXE DISMANTLED. 20 watt and 5 watt phone transmitters. 350 volt motor generator, choke coils, condensers, meters, everything for \$50.00. Wilkinson, 30 East 128th St., New York City.

WANT TO BUY OR RENT Omnigraph. A. Morton, 120 Highland Place, Brooklyn, N. Y.

NAVY CN 113-A—TUNER. FOR YOUR HAM STATION. BRINGS IN DX. SHORT AND LONG WAVE. \$20. TAKES IT. OWENS, 65 LORD AVE., BAYONNE, N. J.

FOR SALE—8 tube Superheterodyne, E. I. S. Co., specifications in cabinet with antenna coupler. \$125. Cash, \$25, balance C. O. D. D. W. Evans, 321 Illinois Ave., Peoria, Ill.

Sell or trade: half kilowatt 500 cycle Crocker-Wheeler alternator; RCA power transformers UP1016; 10000 volt .01 Dubiliars; magnetic modulators. 225 volt, 900 cycle, half kilowatt alternators; 12000 volt, .0002 condensers; 0-1000 Jewell milliameters; 0-10 Jewell thermo couple meters; 0-15 AC Voltmeters VT-1's; Deforest D7As. Morris Decker, Baldwinsville, N. Y.

LEST YOU FORGET, I'm still selling Radio Corp. transmitting parts, all brand new and guaranteed. UP1368 325 watt transformer for UV202s, \$16; UP1016 750 watt transformer for UV203s, \$15; UP1627 40 henry 300 mls choke, \$8. UP1626 25 henry 160 mls choke, \$6.50; UM533 0-5 hotwire ammeter, \$1.50; UM576 0-500 milliammeter, \$5; UC1803 .000025 mfd. antenna series condenser, 75c; UC1846 two section antenna series condenser, \$1; UC1806 .002 mfd. 6.000 volt mica grid and plate condenser, \$1; UC1015 .0003, .0004 and .0005 mica antenna series condenser, \$2; UC1866 double filament bypass condenser, \$1; PX1638 chopper wheel and brush, \$1.25; standard 600 amp. lightning switch, \$1.25; UT-1643 1 1/2 amp. magnetic modulator 50c; UT1357 3 1/2 amp. magnetic modulator, 75c; UT 1367 5 amp. magnetic modulator, \$1. W. M. DERRICK, 58 NORTH SIXTH STREET, NEWARK, N. J.

CALL CARDS neatly printed with YOUR Call Name and Address red. Black printing, quality cards. Latest Design (New Postcard backs) 100—\$1.45; 200—\$2.25, 300—\$2.95; 500—\$3.95; 1000—\$6.45 PREPAID. RADIOGRAMS: Name, Address, Call, 100—\$1.35; 200—\$1.85; 300—\$2.35 PREPAID. STATIONERY—Name, Address, Call, 100 envelopes, 100 letterheads only \$2.25; 200 each \$3.25; 300 each \$4.25, PREPAID. LOGS: Name, Address, Call, 100—\$1.45, 200—\$2.10; 300—\$2.75. ARRL emblem added whenever requested by member. SEND NO MONEY. Pay postman AFTER printing arrives. MONEY REFUNDED IF NOT DELIGHTED. Send order NOW. Postal will do. RADIO PRINTERS, Dept. 5041 C, Mendota, Ill.

WANTED—Paragon Phone Transmitter—9CPF.

2—Myers Tubes, new 6 volts—1/4 amps. \$2.50 each; 3—Bremer Tully R. P. Coils cost \$10.50, sell \$6.00; H. Greenman, So. Haven, Mich.

Discounts to Hams: 20% on Cardwell and General Radio condensers, Federal, Brandes and Frost phones, Celoron panels, Bradleystats, Crosley and Kennedy sets, Magnavoxes, Burgess batteries, Universal storage A and B batteries, Federal, Jefferson, Thorndarson, Acme and Kellogg transformers. 15% on Jewell and Weston meters and genuine Cunningham receiving tubes. Edward Bromley, Jr., Whitewater, Wis.

WAVEMETERS, RECEIVERS, TRANSMITTERS, ANY TYPE BUILT TO ORDER. ENSALL RADIO LAB., 1208 GRANDVIEW AVE., WARREN, OHIO.

LOW LOSS DX receivers unicontrol, ham and broadcast range \$22 money order, prepaid. Leslie Vipond, 319-30th St., Norfolk, Va.

NUFF SED, GANG! 9EFZ has either WORKED OR HEARD those "Aussie" or N. Z. hams 12 out of 14 mornings, using our latest "Model NZ" tuner coils. A REAL TUNER we'd say. He WORKED Z-2 AC-4AA 4AG, and "Aussie" 3BQ. Order now om, and get some of this same brand of DX. Per set of coils, with blueprint and instructions, \$4. C. O. D. AMES RADIO SHOP, Francesville, Indiana.

FOR SALE—Westinghouse 350/500 volt M. G. set very slightly used. Cost \$85, sell for \$40.00; Dwight Richards, 2490 Beeley Ave., Columbus, Ohio.

HERE'S THE WAY TO SPEND THAT CHRISTMAS MONEY. LAST HAM AD THIS ISSUE. 9A00.

The best in QSL CARDS—8BJT, 701 Walnut Ave., Scottsdale, Pa.

MOTOR GENERATOR BARGAINS—G. E. motor 220 volt 60 cycles 3 phase 1750 R.P.M. generator 400 volt 150 watts ring oil, \$35.00; Esco motor 220 volt direct current generator 500 volts 200 watts, \$35.00 Esco Motor 220 volt 60 cycles single phase A.C. generator 500 volt 200 watts, \$50.00; 1000 volt 300 watt connected to 60 cycle 110 volt A. C. motor \$80.00; 750 volt 200 watt 3400 RPM generator ring oil, only \$30.00; also others. Queen City Elec. Co., 1734 West Grand Ave., Chicago, 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.

NEW AMRAD basket coupler and variometer \$2.75 each; practising key and buzzer \$2.00; Fisher coupler, variometer, good condition, \$1.00 each. E. I. S. antenna adapter, \$15.00, drilled engraved panel for E. I. S. super het. cabinet, \$10 each, all other parts, Weston volt and ammeter, \$5.00 each. R.C.A. Loop \$9.00, 7-11-23-43 aluminum plate vernier condensers, \$1.00; Manhattan Elect. moulded coupler, \$2.75. Money orders only. Blake, 278 West 119th St., N. Y. C.

Tube, one kilowatt British Marconi MT-4, new, \$60.00 will trade for transmitting apparatus. All correspondence answered. c2BN.

STOP—LOOK—READ!!! Complete 20 Watt. New, with GE & Jewell Meters (3); 2-23 pl. Cardwell Condensers; RCA—Condensers, 325 Watt Transformer, Tubes, Chokes; Key; 12 x 18 Formica Panel; "Mid" connections; etc. A DX RECORD BREAKER 4 "SHORT WAVES". Bargain—Complete \$115.00 Picture upon request. 3BOV—S. Strobel, 3923 N. 6 ST; Phila., Pa.

For sale, Omnigraph, fourteen dials, ten dollars. Edward Cooper, Jr., Bramwell, West Va.

10-INCH plate glass insulators, 50c. Oliver Kirchner, Carthage, Ill. 9EJ.

Power tubes repaired any type or power, work guaranteed. Morsemer Engineering & Research Laboratories, Grantwood, N. J.

Will extend your sub six months in return for first four 1922 issues. Please send to David Houghton, c/o QST, 1045 Main St., Hartford, Conn.

ENGRAVING—A new Type O Deckel machine says I'm gonna engrave A.R.R.L. EMBLEMS on ur panels, only four bits each! "Prettiest Emblem we have seen".—HQ. Station Emblems on 3x5 walnut formica, with ur call, \$1.00 postpaid. My fine Gorton work is well-known in

Chicago and this new service is offered exclusively to Hams. Lissen, OM, permanent masters of ur signature monogram, trademarks, lodge emblems, etc., are not expensive! Glad to answer all Ham inquiries. A. L. Wood, Homewood, Illinois.

"RADIO CALL PINS." u9FZ (see Page 80). {

GLASS! GLASS! GLASS! GLASS! GLASS! GLASS! Glass supported coupled inductances LOSSES NEGLIGIBLE Mounted, supported and insulated entirely on glass Wave-band 180 meters down—Price \$15.00. Order now for quick delivery. CAPITOL RADIO. LANSING MICH.

EXPERIMENTAL RADIO, Page 63 July QST.

DO YOU FEEL WEAK, TIRED AND DESPONDENT? DO YOU HAVE PAINS IN THE BACK AND ARMS? DO YOU PERSPIRE FREELY AND DO YOU HAVE A LARGE FLOW OF PROFANITY? THEN YOU NEED DYNA-KEM RECTIFIER ELEMENTS. THE OLD MAN HIMSELF WRITES THE FOLLOWING TESTIMONIAL, "BEFORE USING YOUR DYNA-ELEMENTS I WAS WEAK AND COULD NOT GET OUT. I LACKED TONE AND PEP. AFTER USING YOUR ELEMENTS I WAS MUCH STRONGER, HAD MORE PEP AND COULD GET OUT. I OWE MY LONG LIFE AND HAPPINESS TO DYNA-KEM ELEMENTS." WHY WHITTLE 'EM UP YOURSELF WHEN WE CAN FURNISH THEM READY MADE 1"x4", 15c pair; 1"x6", 18c. pair, 1 1/2"x6", 20c. FURNISHED DRILLED, READY TO PUT IN THE JARS ALUMINUM IS C. P. AND IS THE REAL STUFF FOR THOSE WHO PREFER TO MAKE THEIR OWN. 1/16" ALUMINUM 90c SQ. FT. 1/16" LEAD 90c SQ. FT. LET US "ROLL YOUR HOOP" DYNA HOOPS FOR THAT CAGE ARE FB FOR THE SHORT WAVES. MADE OF HEAVY COPPER BUS BAR. 3", \$2.50; 18", \$3.00; 30", \$3.50. PRICES ON OTHER SIZES ON APPLICATION. No. 12 SOLID COPPER ENAMELED WIRE (FOR HEAVY DUTY) 1/4c FT. PYREX YOUR AERIAL FOR THE SHORT WAVES. 8", \$1.50; 4", 45c. PYREX STAND-OFF INSULATORS \$2.50. OHIO BRASS GLAZED PORCELAIN INSULATORS. 5", 75c. 10", \$1.50; CARDWELL CONDENSERS. THERE ARE LOTS OF LO-LOSS CONDENSERS BUT NONE BETTER. 11 PLATE \$4.25, 17 PLATE \$4.75, 21 PLATE \$5.00. TRANSMITTING CONDENSER \$15. GREBE CR-3 TUNER \$45. WESTINGHOUSE TYPE MH. 250 WATT 1000 VOLT MOTOR-GENERATOR (NEW) \$125. WESTINGHOUSE 100 WATT 500 VOLT MOTOR-GENERATOR \$60. GAROD PYREX GLASS SOCKETS \$1.50. BRADLEY RADIOSTATS, FOR THE PRIMARY OF THE FILAMENT TRANSFORMER. WILL HANDLE A 500 WATT TRANSFORMER. \$6.50. FOR THE "SUPER". UV-1714 TRANSFORMERS \$6.00. UV-1716, \$8.00. UV-712 AUDIO FREQUENCY TRANSFORMERS \$6.00. WELL THAT'S THAT. WILL SEE YOU AGAIN NEXT MONTH. E. J. NICHOLSON, 8BIN (THE EIGHT THAT FAYS THE FREIGHT) 1407 FIRST NORTH ST., SYRACUSE, N. Y.

INTRODUCING the new ELECTRIC WELDING PENCILS. Operates from your storage battery. Uses current (2 amps per hour) only when actually touching the article to be soldered. Special introductory price, \$1.65. George Voigt, 56 Maiden Lane, Maspeth, N. Y. Dept. J.

"Want No. 2 or 2-Jr. Omnigraph. C. T. Asmussen 130 Marsteller St., LaFayette, Ind.

FOR SALE—100 WATT TRANSMITTER. 9IA.

"CW 936 NAVY TYPE transmitter receiver, power amplifier, loudspeaker, two dynamotors, switch board with meters, remote control, three pair phones, vacuum tubes, several microphones, everything Western Electric, slightly used, excellent condition. Your opportunity \$180. at Buffalo. R. Irwin, 321 Brunswick Avenue, Toronto, Canada."

NEW TRANSMITTING AND RECEIVING APPARATUS MAKES THE OLD SET PERK RIGHT. BUY IT NOW. BRAND NEW CUNNINGHAM 5-WATT \$3.80; PYREX GLASS SOCKETS \$1.40; RHEOSTATS, LO-LOSS TUNERS, CONDENSERS, AND LOTS OF STUFF AT MONEY SAVING PRICES. ALSO HAVE SOME USED EQUIPMENT AT REAL BARGAINS. A FINE WESTINGHOUSE MG SET 110-500 VOLTS 100 WATTS AT \$70.00 CASH; WESTERN ELECTRIC COMBINATION RECEIVER AND 10 WATT TRANSMITTER \$75.00 OR SWAP; MAGNAVOX R3 \$18.00. WHAT DO YOU NEED? ORDER IT NOW FROM J. F. DAVIDSON, 6CEK, KINGMAN, ARIZONA.

For Sale. Eight tube Super Heterodyne, built according to the Experimenters Service specifications. Clapp Eastham Type HR. Also two single circuits. All in fine shape. D. N. Craige, South Walpole, Mass.

TRADE FILAMENT TRANSFORMER FOR PHONES OR MODULATION TRANSFORMER. 150 VOLT-METER 8 INCHES DIAMETER, SIX DOLLARS. 3UZ.

FOR SALE—NEW GREBE CR-8 \$60.00; new 5 watt tube \$6.00; new Radiotron detector tube \$3.50; 0-5 amp. General Radio ammeter \$5.00 like new; Brandes fones \$4.00; other apparatus. Greig, 1100 Wenonah Ave., Oak Park, Ill.

For Sale—Paragon radio telephone type 2-5-U in fine shape \$25.00. Want 15 dial Omnigraph. Elmer Lawton, Plymouth, Ill.

Bargains: Crosley One Tube Good As New \$35.00. Two Stage Amplifier, Mahogany Cabinet, All American Transformers, \$11.50. Kenneth Phippen, Nappanee, Ind.

FEW MORE GREBE'S IN ORIGINAL FACTORY CARTONS LEFT—CR3, \$30; CR8, \$40; RORN, \$30; RORR, \$30; Also following demonstrating sets guaranteed O. K. in every respect—Grebe CR9, \$50; Crosley XJ, \$30. 20% cash, balance C. O. D. The Radio Shop, 792 Locust, Dubuque, Iowa.

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.

\$10000. worth of Radio Transmitting, Receiving Sets, and Parts, bought from U. S. Government Aircraft Department. We sell at Reduced rates. Send 2c stamp for list and prices. Mail Orders answered. WEIL'S CURIOSITY SHOP, 20 S. 2nd St., Philadelphia, Pa.

WANTED: Vibroplex in good condition. 2DX.

GENERATORS—30 V. Input 300 v output \$15.00; battery charging generators 100 watt \$8.00; Wood 151 East 108th St., New York City.

Specially strong designed copper radio test tubes for ur B bats. 3/16" 5c. Chemicals to make five lbs. Edison solution enough for ur hundred volt B bat. \$1.—Prepaid—ABLR Northwestern Radio Laboratories, 1695 Taylor Avenue, Detroit, Michigan.

YOU DON'T HAVE TO WATCH FOR IT ANY MORE. ITS HERE. SEE LAST HAM AD THIS ISSUE. 9A00.

Transmitters. Designed, built and installed, any power. Amateur, ship and broadcasting, prices on application. Morsemer Engineering and Research Lab., Grantwood, N. J.

WEST COAST HAMS: You save money and don't have to wait ten thousand years when you get your ham supplies from us. Write today for list. Seattle Radio Laboratory, 3335 33rd Avenue South, Seattle, Washington.

EDISON A BATTERIES FOR SALE. BATTERY CONSISTS OF 5 A-8 CELLS WITH NEW TRAY, NEW SOLUTION AND CONNECTORS. 300 AMPERES, 6 TO 8 VOLTS. IN PERFECT ELECTRICAL AND MECHANICAL CONDITION. MANUFACTURER'S PRICE NEW \$190. MY PRICE ON A FEW BATTERIES \$62 F. O. B. DETROIT. COMPLETE BATTERY WEIGHS 150 LBS. BERNARD STOTT, 60 PALLISTER AVE., DETROIT, MICH.

SELL—TUSKA 220 TUNER. Three circuit tuner, tuned altogether with dials. Looks like new. Wavelength range 150-800 meters. Connections made on rear of cabinet. Cost \$80 four months ago, will take \$30 cash. Great for broadcast DX. Tungar 5 ampere Battery Charger. Bought new two months ago. Looks like new. Complete with bulb, \$22. PAUL WATERLOO, RIDDLESBURG, PA.

"For Sale—Kennedy 110 with 525 Amplifier, perfect condition inside and out. Circeanian Walnut Cabinet, bargain \$125.00. V. D. Liggett, Tyler, Texas."

SPECIAL INVENTORY SALE. Plenty of the following, new and unused. BRADLEYSTATS 3 terminal \$1.30, POSACO CONDENSERS B-1 or B-2 Three dollars. DeForest KENATRONS Three dollars. ACME INDUCTION and Grid coil Six dollars, Radio Instrument Transformers DX-1 with mountings Three dollars POSTPAID No. C. O. D. ST. CROIX RADIO LABORATORY, Calais, Maine.

EDISON ELEMENTS 5c per pair. CO-OPERATIVE MERCHANDISE COMPANY, Dept. 265 Chelsea, Mass

SELL—750 V 100 W. ESCO MG. \$40. Write 9 C I U.

For Sale—New Westinghouse motor-generator. One hundred watts, five hundred volts, perfect condition never used. Only Sixty Nine Dollars. CRA. 9-CDE.

SELL DEFOREST TRANSMITTER—DeForest Radio-phon transmitter, type OT-3, complete except power supply, Microphone, one 5 watt tube and lot of radio parts for first check for \$50.00. R. E. Schwartz, Buchanan, Michigan.

Look one K. W. 500 cycle Crocker Wheeler generator \$75.00; one KW tube, \$90.00; one KW 500 cycle CW transformer for same, \$35.00; Everything goes for \$160.00; shoved 8UE to New Zealand. Going out of game. 8UE.

WANTED—No. 2 Omnigraph. Describe and state price. Address Box O, care of QST.

BAKELITE STRIPS—for sub panels and antenna insulation to 5" wide any length 3/16 inches thick 100 square inches \$1.25 prepaid. Geo. Schulz, Calumet, Mich.

"RADIO CALL PINS," u9FZ (see Page 80).

TO MAKE ROOM FOR NEW TRANSMITTER AT 1AW the following is offered for sale:—Two P Tubes, 250 watts, new, never used—\$35.00 ea. Two 110 volt—6600 volt, 1KW, centre tap, G. E. plate transformers, new, never used—\$25.00, each; Six Amrad Merphon Electrolytic condensers, type 2747, one year old but never used, \$2.00 each; One G. E. hotwire ammeter, 0 to 3 amps, 8" dial, very fine instrument, \$10.00; one 120 cell home made electrolytic rectifier in mahogany crate, in perfect condition, 12" x 20" x 14" high \$20.00, sent immediately upon receipt of price unless previously sold. Hiram Percy Maxim, 1AW, 276 No. Whitney St., Hartford, Conn.

BARGAIN—Will sacrifice complete 50 watt transmitter. Includes Western Electric fifty Acme 600 watt, Jewell meters, RCA chopper with motor, filters, inductance, Faradon condensers, leaks, bug key, relays, etc. Sell for \$60.00; 2CFE, 300 Webster, New Rochelle, N. Y.

TRADE—150 WATT CW, ICW. Phone transmitter for good broadcast set, superhet or what have you, DX 11 countries, every state. 9DRO.

FOR SALE—New Grebe CR-13 \$25.00, 3ABW.

Canadian Amateurs Attention—Highest offer takes C3TL's 50 watt transmitter. Send for photos and dope. A Habgood, 276 Lundy's Lane, Niagara Falls, Ont.

9BEB for SALE—One MG for two fivers \$30.00; many transmitting parts. Write for list. 9BEB, Urbana, Ill.

Wavemeters. Designed, built, and calibrated any wavelength from 2 meters up. Morsemer Engineering & Research Lab., Grantwood, N. J.

WANTED—Omnigraph No. 2. Must be in good condition. State Price. John Kowal, 1711 Augusta St., Chicago, Ill.

FOR SALE ESCO motor generator, Motor 110 volts 60 cycle, Generator 500 volts 100 watts. Only used about 100 hours. First check for \$38.00 takes it. F. Demarest, 511 Walnut Street, Williamsport, Pa.

PRINTED BY LIGHTNING 100 QSL cards in Blue with red call printed to order on best quality cards for \$1.50 post paid. Samples for a stamp. Satisfaction guaranteed. 9AM Press, Lightning Printers, 6570 Scanlan, St. Louis, Mo.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

THREE Tube Set complete \$35. Two Tube Portable Set \$20. One Tube Set \$9. Mele, 39 Foxon, East Haven, Conn.

LOOK HERE! BRAND NEW GREBE "13" \$38.00 COD. 9BAK, MUNCIE, INDIANA.

For Sale. One K-W spark set. Write for dope. 70L.

HAMS: Get our Samples and Prices on Printed Call Cards made to order AS YOU WANT THEM. Radiograms 25 cents per 100 Hinds & Edgerton 19 S. Wells St., Chicago, Ill.

GREBE 18 New. First Check for \$65.00. Gets it. E. B. Paslay, Box 377, Manhattan, Kansas.

LEMLER, 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.

HAVE YOU TRIED THEM, A.R.R.L. emblem or initial cigarettes. Your initial on each cigarette in script. The cigarette he smokes is part of a man's individuality. Order by hundred at \$1.75 or twenty for 35c by sending us the name of your dealer, and we will supply him. L. F. Strobel, 680 Yale St., Akron, Ohio, 8BSR.

SUPERHETERODYNES Carefully made by old timers of BEST MATERIAL tested and guaranteed. Seven tube \$75.00, eight tube eighty dollars. ANY wavelength to 40 meters. Tubes to match at two dollars and twenty-five cents each, type 201A. RADIO LABORATORIES, BOX 474, SAN BENITO, TEX.

FOR SALE—A 2000 volt 1500 watt 1750 R. P. M. double commutator motor generator set motor and A. C. 60 cycle \$200.00. Also 2000 volt 1000 watt 1750 R. P. M. motor generator, Motor 110 volt direct current, \$125.00. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

Bargains: Any Radiotron Receiving tube \$3.40 each, New Bradleystats \$1.65, Baldwin "C" Headphones \$9.25, Cutler & Ellis, Sullivan, Indiana.

SPECIAL BARGAINS IN RADIO QSL CARDS. Any style of TWO color Qsl card for these prices: stamped 250—\$4.25, 500—\$7.85. Unstamped 250—\$2.50, 500—\$5.00. Order DIRECT from this ad. 8 regular styles Letterheads, Envelopes, and Radiograms, 20c per 100—Rubber Stamps—Send for free samples. LOWEST PRICES, yet BEST QUALITY. THE ARTHUR PRESS, 1453 Arthur Ave., LAKEWOOD, Ohio, C. O. D. Orders direct to 8BOQ. Branch office: C. M. RUSH, Jr., 855 S. BROAD ST., MOBILE, ALA. 5QF.

Sacrifice—Must sell at once to raise money. De Forest MR6, detector and two audio, 200-25000 meter range with 16 DL Coils, all excellent condition \$85.00. F. H. Foster, Oxford, Indiana.

200-20,000 METER receiver including radiotron \$25.00; two step amplifier \$18.00 Smith, 4416 Market, Philadelphia, Pa.

WANTED—1000 volt DC motor-generator—110 volts DC supply ONLY. Following for sale—Cardwell Low Loss Variable Transmitting Condenser, 3000 volt breakdown NEW twelve dollars, list \$15.00; 250 Volts D. C. Westinghouse ten volt battery dynamotor twelve dollars; Aeme 1½ henry choke NEW five dollars. L. Menier, 536 E. 88th St., New York City.

\$70 takes complete ten watt; includes "S" tubes "RCA" choke, four meters, etc., all parts nearly new; Parts sold separate. 9AYS.

FOR SALE CHEAP—Miscellaneous transmitting and receiving apparatus. Write Joe McConnell, Cedar Falls, Ia.

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.

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.

Power tubes repaired, any power, prices on application, unconditional guaranteed. Morsemore Engineering & Research Lab., Grantwood, N. J.

RADIOLA AA 1520 3 stage Radio Frequency Amplifier like new, list \$80.00, sell for \$30.00, \$5.00 deposit, balance C. O. D., subject examination. Geo. Schulz, Calumet, Mich.

Pure DC FOR THE PLATES, GE 12/350 volt. 143 ampere dynamos with filter \$18. But a few left of this model. Holtzer-Cabot 12/500 volt .07 ampere \$20. GE 24/1500 volt. 233 ampere 750 volt tap. In original boxes \$45. Adapted for belt drive making it a double current generator \$30.00 additional. Ideal for 22 volt plants. Operate on 6 volts generating 350 volts, 8-500, 10-825, 12-750, etc. Limited number slightly used, while they last \$25. Shenandoah uses them, mobile broadcasters, and flock of hams. Navy flame proof key with "Blinker Light" C. O. D. \$1.50 Crocker-Wheeler ¼ KW 500 cycle generators with exciters \$20. ½ KW motor generators \$65, (heavy ship model). Equipped number of ICW stations with such material including WNP. Henry Kienzie, 501 East 84th Street, New York.

START THE NEW YEAR RIGHT by putting up a real antenna. You don't have to be told any more why No. 12 solid copper enameled wire is the real stuff. Just order 1000 ft. today for only \$6.90, or less at 75 cents per hundred, any length you want in ONE PIECE. Insulation is equally important. Sure fire 20 inch finest quality glazed porcelain insulators guarantee unequalled efficiency. \$1.15 each, four or more \$1.00 each. A peach of a guy wire insulator, 5½ inches long, 1½ inches diameter, highly glazed porcelain, only 30 cents; 20 or more 27 cents. FB for aerial and ctpe too; Allen-Bradley E-2111 Radiostat for the filament transformer primary, \$6.50—They're the real dope, gang; Got a wave meter yet? General Radio 150 to 500 meters \$3.50, ½ and ¼ wave coil \$2.35 extra. General Radio condensers in stock, all types; Real buy in RCA radiation meters. 5 amp hot wire \$2.00. 2.5 amp thermo-coupled \$8.00, 5 amp thermo-coupled \$9.00; Magnet wire, 14 DCC \$60 per pound, 16 DCC \$65 18 DCC \$70; Antenna series condensers, UC-1015 \$2.00, UC-1881 variable, \$2.25. There aren't many of these left in the country; UC-1806 grid, plate, or RF by pass condenser, \$7.00 value, \$1.50; UC-490 filter condensers \$2.50, UC-437 ½ mfd 750 volt \$3.35; For a real filter, try these, UP-1626 160 milliamperere reactor only \$5.00, UP-1653 160 mill 40 Henry reactor \$7.25, UP-1654 300 mill 50 Henry now only \$9.00; UP-1368 power transformer for four 5 wattors \$13.50, UP-1016 for 2 No. 50 wattors \$15.00; Thoradson 80 watt filament transformer \$6.30; one-sixteenth inch pure aluminum per square foot \$.75, lead \$.90; Westinghouse \$5.00 lightning switch \$1.50; Bremer-Tully real low-loss ham tuner \$5.00; Transmitting inductance like RCA \$3.70; S tubes for a real rectifier \$10.00, sockets 90 cents; Try us for receiving apparatus. Bakelite new type battery charger, the only one we recommend without qualification \$19.50; Western Electric 540-AW loud speaker, the finest you ever heard, see December QST, \$35.00 and fully worth it; Scientific head phones, positively guaranteed, your money back if they are not the best value in phones you ever had, \$2.95; navy type, extremely light, comfortable, and good looking; We're in newer, bigger quarters, fully equipped to give you better service than ever. Send for HAMALOG, a real ham catalog, and SAY, when you order, if you send cash be sure to include the postage. Thanks, OM. E. F. JOHNSON, 9ALD, Waseca, Minn.

"RADIO CALL PINS," 99FZ (see Page 80).

20 Watt Transmitter \$75.00. 500 volt 200 Watt Motor Generator \$50.00. Both \$115.00. W. J. Hengehold, 2951 Trevor Ave., Cheviot, Ohio.

NOTICE—A card from anyone hearing 3SD or 3XX will be appreciated by the owner of these stations. Special apparatus is being used. C. A. Johnson, 5332 Gainer Road, Wynnefield, Philadelphia, Pa.

RECEIVING AND TRANSMITTING ACCESSORIES AND SETS AT SACRIFICE PRICES YOU CAN'T AFFORD TO MISS THESE HOT ONES. RADIOLA V. TUNER, CRYSTAL AND AUDIO DETECTOR, WITH 2 STAGE AUDIO AMPLIFIER IS A REAL BARGAIN AT \$50.00; MAGNAVOX H3 AT \$15.00; RADIOLA 1520 THREE STAGE R.F. AMPLIFIER AT \$45.00; WESTERN ELECTRIC COMBINATION 10 WATT TRANSMITTER AND DETECTOR, TWO AUDIO RECEIVER AT \$70.00 WESTINGHOUSE MG SET 110 VOLTS A.C. 500 VOLTS D.C. AT \$35.00. ALL ABOVE EQUIPMENT IN USED BUT GUARANTEED FIRST CLASS CONDITION. LOTS OF OTHER USED AND NEW APPARATUS. WHAT DO YOU NEED? SHIPMENTS

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CLOSING OUT RADIO DEPARTMENT—HAVE LEFT 3 WESTINGHOUSE RCA-MG SETS, 250 WATT, 1000/750 VOLT D.C. MOTORS; 110 VOLT, SINGLE PHASE, 60 CYCLE. ALSO 2-100 WATT MG SETS 500/375 VOLT, OTHERWISE SAME CHARACTERISTICS. BARGAIN PRICES APPLY. WRITE US QUICK IF INTERESTED. MINE AND SMELTER SUPPLY COMPANY, EL PASO, TEXAS.

HEY FELLOWS, HAVE YOU GOT ONE OF THOSE 25,000 VOLT .001 MICA DUBILIER TRANSMITTING CONDENSER LYING AROUND? CAN'T USE IT, NO MORE SPARK, SO DROP SML A CARD AND PRICE.

RHEOSTATS FOR THE PRIMARY OF YOUR FILAMENT TRANSFORMER. WHY CHANGE THAT DC NOTE INTO SIXTY CYCLE GROWL BY UNBALANCING YOUR PERFECTLY GOOD CENTER TAP. QST SEZ "PUT IT IN THE PRIMARY" SO HERE IT IS: RESISTANCE, 32 OHMS AND COOL AS ICE ON 2.5 AMPS. BUILT LIKE POWERHOUSE. FOR FRONT OR BACK OF PANEL. PRICE WITH 2 1/4" KNOB \$4.00; CASH WITH ORDER. 9A00, J. Krallmann, 1480 Rowan Ave., St. Louis, Mo. QRV HR OM.

Q R A SECTION

50c straight, with copy in following form only: CALL — NAME — ADDRESS. Any other form takes regular HAM-AD rates.

1DQ—John M. Clayton, 122 Naubuc Ave., Glastonbury, Conn.

1ASN—A.L. Budlong, Glastonbury, Ct., address at Headquarters; 1DQ, J. M. Clayton, ditto; 10X, L. W. Hatry, ditto 1XAQ, 10A, S. Kruse, ditto.

1AHG—Wm. John Wityak, 45 Pine St., Seymour, Conn.

1WL—Arthur C. Egan, 783 Dwight St., Holyoke, Mass.

1VF—William B. Andrews, West Baldwin, Me.

2CDC, H. R. Mimno and H. D. Harris, Rensselaer Polytechnic Institute, Radio Department, Troy, N. Y.

2HA—Peter Testan, 2123 Troy Ave., Brooklyn, N. Y.

2SZ—Ransselaer Polytechnic Institute Radio Club, Troy, N. Y.

2XAP—Rensselaer Polytechnic Institute, Troy, N. Y.

3ABP—The Banneker Radio Club of Maryland, 1817 West Lafayette Ave., Baltimore, Md.

3BOV—Address wrong Call Book, shud B—S. Strobel, 3923 N. 6 St., Phila, Pa.

4HR—C.C. Raimer, 254 Church St., Concord, N. C.

5ASE—Fred H. Walker, Box 310, McAlester, Okla.

5CU—R. H. Robinson, 412 Park Place, Ponca City, Okla.

5ZAV—5AIU—LeRoy Moffett, Jr. and Dan Howard, 824 South Elm, Norman, Okla.

6APD—Chandler Brownell, 862 East 6th Street, Pomona, Calif.

6BDO—Portable of 6SR.

6BVM—Don Rinaldi, 2226 Elm Ave., Fresno, Calif.

6SR—Ernest R. Cady, 862 - 54th St., Oakland, Calif.

8AR-8AZD—Loyal L. Reid, Avalon House, St. Johns, Newfoundland.

8BBL—C. Murphy, Jr., 55 Dinsmore Ave., Crafton, Pa.

8BDK—Cyril J. C. Schmidt, 4225 Brownway Ave., Oakley, Cincinnati, Ohio.

8BY—Milton C. Kramer, 26 Coulter St., Crafton, Pa.

8RA—Dwight P. Hill, Clover St., Brighton Stn., Rochester, N. Y.

8CQO—William N. Wherry, 759 Ridgeway Ave., Cincinnati, O.

9AAS—C.R.GREY, Keithsburg, Ill.

9AEO—C. H. Matson, Burke, S. D.

9CNV—Paul Delgado, 109 S. College St., Angola, Ind.

9CPF—W. H. Jennings, 527 First Ave., East, Cedar Rapids, Ia.

9CXG—Leo E. Yoder, R. F. D. 3, Shipshewana, Ind.

9IA—R. C. Thompson, 2852 - 41 Ave., So. Mpls, Minn.

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No Contact Resistance

.00025 by mail, postpaid, \$5.00. See description in this issue.

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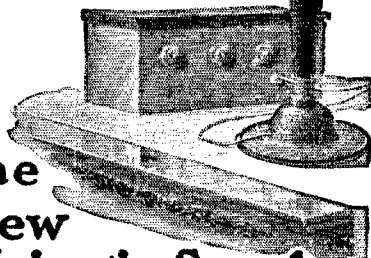
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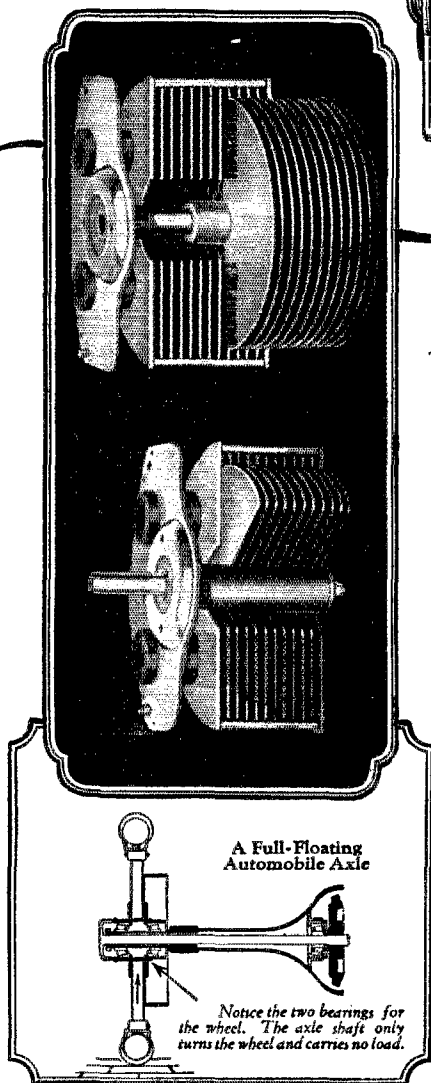
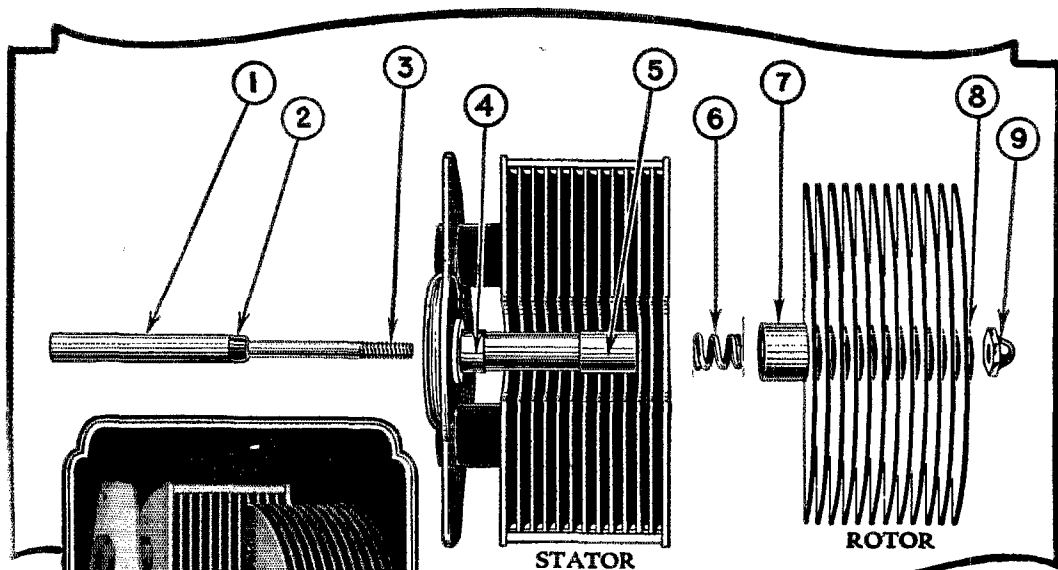
—FOR YOUR CONVENIENCE—

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The Condenser with the "full floating axle"

The striking feature of the Bradleydenser is the rigid double bearing, based on the principle of the "full-floating" automobile axle, that eliminates the usual outer pivot-bearing for the rotor shaft, and still provides a non-sagging support that insures perfect alignment of the rotor plates.

The rotor plates, soldered on a long, hollow tube extending from [7] to [8], revolve on a hollow steel stem provided with two bearings [4] and [5]. The alignment and support of the rotor is independent of the condenser shaft [1], as shown by the first photograph at the left. The shaft [1] merely turns the rotor. It slips through the hollow steel stem and its threaded end [3] is secured to the rotor at [8] with the nut [9] as shown in the second photograph. The spring [6] prevents end-play.

This design, combined with the use of soldered brass plates, results in a rugged, long-life condenser of extremely high efficiency. For superior service, use the Bradleydenser.

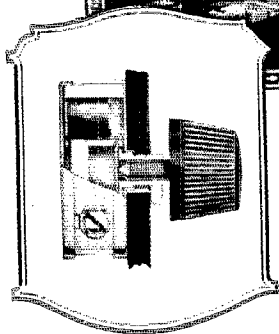
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General Office and Factory: 277 Greenfield Ave., Milwaukee, Wis.

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PERFECT VARIABLE CONDENSER

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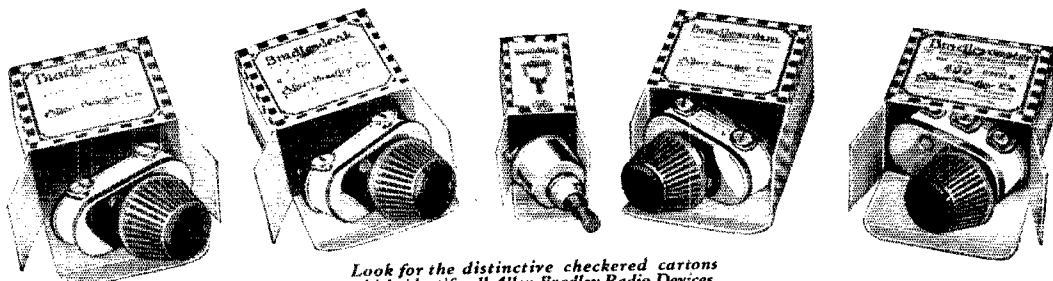
The new Bradleystat, Bradleyleak, Bradleyohm, Bradleyometer and Bradleyswitch have met with instant favor, everywhere. In a super-class, by themselves, they are the exclusive choice of the discriminating amateur who has learned from experience that noiseless, stepless control is essential for perfect radio reception. Your set will work better with Allen-Bradley Radio Devices. For sale by leading dealers.

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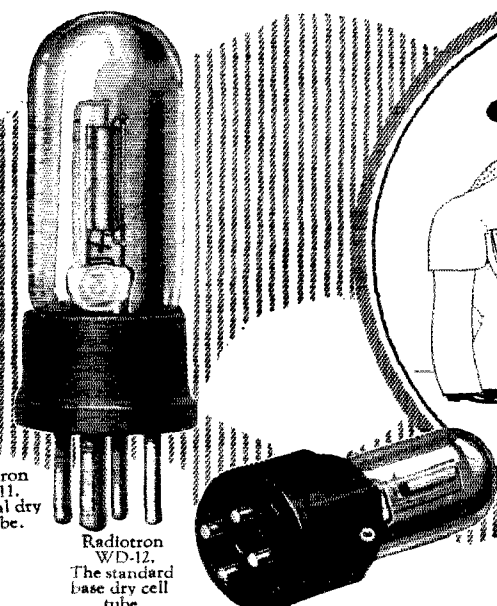
- 1—Extremely compact without loss of control.
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- 3—Noiseless, stepless control, due to graphite discs.
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- 5—Sold in distinctive checkered cartons by leading radio dealers.

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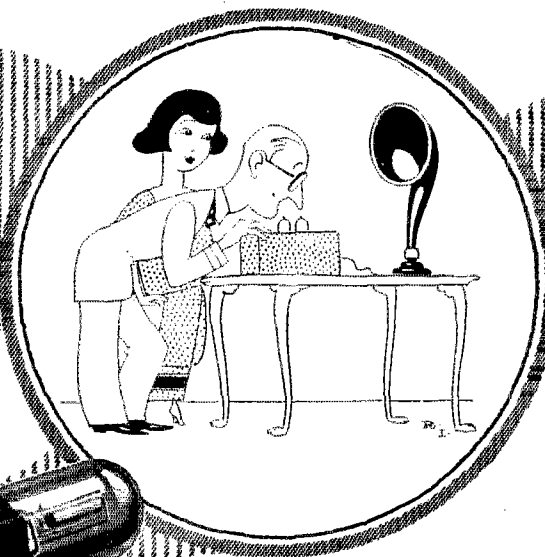


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WD-11.
The ideal dry
cell tube.

Radiotron
WD-12.
The standard
base dry cell
tube.



Get a good detector

Radiotrons WD-11 and WD-12 are the same tube but with different bases.

Radiotron WD-12 has a standard navy-type base. With it, you can change your set to dry battery operation. Ask your dealer today.



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What will Radiotron WD-11 and WD-12 do as detectors? First—they are sensitive to weak signals—superlatively sensitive, as remarkable distance performances show in thousands of one-tube sets. Second, they are good “oscillators”—and that is important in regenerative circuits. And third, they are quiet in operation—add no electrical noises to the music, or speech. Radiotrons WD-11 and WD-12 are famous as audio and radio frequency amplifiers—too—and have made possible the hundreds of thousands of dry battery receivers that are in use today. They mean clear, true reception—over big distances—with dry batteries! Be sure to get a genuine Radiotron.

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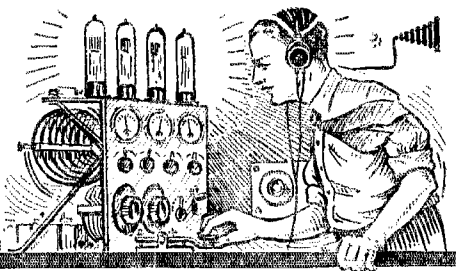
Radiotron

REG. U. S. PAT. OFF.

The Traffic Department

F. H. Schnell, Traffic Manager
1045 Main St., Hartford, Conn.

WISH



The T. M. is out attending the Dakota Convention as these reports are being prepared—hence we are using all available space for the division reports.

CENTRAL DIVISION R. H. G. Mathews, Mgr.

SOUTHERN INDIANA—9DUC blew his 203A and had to invest in a 5 watt and has worked some sixes with it already. 9CSG is putting in a 15-86 meter set but will keep the old long wave standby. 9BTN is building a new plate transformer and will be blowing his tubes next. 9BBW is now on with 10 watts. 9ES blew his 50 and reports he is now getting out FB on 78 meters. He did not report how he does it without tubes. 9BVL, 9AQJ, and 9CYO are not on much lately due to school QRM. 9UT has just put in a new 50 watt and only listens to the far away ones now. 9CBD is in the Navy at Hampton Rds. 9EJL, 9BVZ and 9BJL are handling the bulk of the traffic through Indianapolis now. A. S. Burns, the Club Report Manager for Southern Indiana turns in the following report on the Indianapolis Radio Club: The amateur activities of Indianapolis and vicinity are well reflected in the activities of the Indianapolis Radio Club. This organization, which is affiliated with the A.R.R.L., has a membership of 45 of which are operating stations and represent 75% of the licensed stations here. The club was organized in 1922 and has functioned continuously since that time. Meetings are held on the alternate Mondays of each month at the Chamber of Commerce. The organization has been cooperating with B.C.L.'s in suppressing interference (both amateur and otherwise) and holds a tight check on operating stations. Loop stations have been installed in several parts of the city for the purpose of locating sources of interference and bootleg stations or licensed stations which might transgress the regulations. Club members are punished by a fine and non-members are reported to the Supervisor at Chicago. As a stimulant to amateur activity, medals have been established by the club which are re-awarded each meeting for proficiency, etc. These are: Traffic—awarded monthly; high power DX over 4 five watters; low power DX 4 fivers or less. QRM: CQ—explains themselves; phone DX—no power limit.

Three of the local stations are working on 80 meters and getting out exceptionally well. 9BVZ on 50 watts works all districts and maintains excellent contact with Los Angeles, Calif. Publicity of the activities of the amateurs is obtained through a column entitled "Hoosier Hams" run weekly in the Indianapolis Star by the CC. This column averages 40 column inches a month. Photos and write-ups of the stations are also frequently run.

The club has obtained the Ham Convention for Indiana next year and is already working in preparation for the event. The officers are: R. Scobey, 9BIW, president; D. J. Angus, 9CYQ, vice-president; R. Stark, 9EJL, secy-treas.

Traffic: 9EJL, 38; 9BVZ, 30; 9BJL, 18; 9CSG, 5; 9BBW, 4; 9ES, 4; 9UT, 4.

ILLINOIS—Dist. No. 1: Mr. Henry Powers, 9BIZ, the new D.S. is not fully informed as to his duties and as a result mailed his report before the correct time and it did not include any O.R.S. outside of his own city. 9NQ, the former D.S., sent his report direct to the A.D.M. He tells us that he has junked the 5 watt C.W. and the spark is undergoing repairs.

(Not wishing you any hard luck, OM, but I hope you can't find all of the repairs.—A.D.M.) (Check—D.M.)

Dist. No. 2: 9CTF leads the state in messages again and seems to be getting back to the old tricks again. Says the traffic is plentiful as well as the schedules. 9AHQ is down on low waves and getting good DX so thinks he will stay there. 9RQ at Lisle College is very much pleased with the new O.R.S. appointment. His set has been rewired and good DX is rolling in on three 201A's. 9BUB has been on week-ends only and in the last month has worked 15 sixes and sevens. 9DXL has been on for two weeks now and worked 8 districts in one night, the best DX being 7AJT and 1BUB. 9DZR at Joliet hopes to be on 80 meters soon—then some real relay work in a much needed spot. 9ARM since changing to the Meissner ckt has worked St. Joe, Mo., and has been heard in Hartford, Conn. HI The "Illini Oscillator" has been much delayed due to printing troubles. (Be patient, gang, I will do my best—9CA)

Dist. No. 3: The report for this district was incorrectly made out and had to be returned.

Dist. No. 4: 9CLJ is doing good work on 75 meters. 9CZL has his new shack and 100 watt nearly completed and will be on in a week or so. 9DCR, 9DZH and 9AP are the only stations in Champaign that can be on this winter. 9AP works Porto Rico and the west coast nightly on 80 meters. 9DCR is again in operation and will be on the shorter waves soon. 9DZH is knocking 'em dead on 150 meters. 9ETX, 9VV and 9KX all helped the total this month. 9DQU received reports from Chilean 9TC, 9G1J and 9F8B during the first month on 80 meters. 9BHX is working the west coast daily on 30 meters.

Dist. No. 5: 9EBQ burned out his MG set. 9DZG, the C.M. of E. St. Louis, Ill., is on regularly every night. 9AQY, formerly 9PE, is building a new shack and will be on short waves soon. 9AYB has been working 'em right and left but has a "blue" tube now so won't be on for a while. 9BLO just received an appointment as O.R.S.

Dist. No. 6: Bill Ridgway sent in his last report as D.S. and the new D.S. is Mr. William Anderson, 9DVW of Rockford. All stations have been rebuilding and ought to be on soon. 9DVW had an 80 ft. lattice tower four days old blown down before he could anchor it. 9DK had a 90 foot A frame break in the erection. 9DQR will begin to test his new 250 watt this week. He and 9DJQ are partners in the new station. 9CEC will soon be on O.R.S. 9ALW is again active with a 5'er. 9AKU has increased power to 100 watts so has reached out to Savanna, about 40 miles. HI. 9EJH bought 9CC's half kw sine spark and is getting good DX with it.

Dist. No. 7: Traffic and reports have both taken an agreeable jump this month, more stations reporting than have for some time. 9DKK is still going, but handled only 10. 9ZA-CD is reaching out well but doesn't seem to be doing much traffic handling. 9LZ is with us again and is again a good clearing center. 9AIO, a new O.R.S. is working fine on 80 meters and leads the list. 9CCJ is getting out with a good "sock" every evening before 8:00 P. M. 9DFV is getting out good on low waves. 9NV is also on low waves and getting out in fine style. 9DWW has a schedule every evening with 9DAT in Champaign, also a schedule with 9AEU in Marinette, Wis., on Tuesdays and Saturdays. Hook is always clear at QRT time. 9CLZ is knocking them off on 150 meters. 9BGA, 9CLZ, 9CVS, 9CVF and 9EAS are all getting out great on 80 meters. 9BWP has been doing some testing on 80 meters. He will soon be down on 40 meters and hopes to do some test work on those waves too. 9AER has put in a new 10

watt set modeled after 9BRE's. He worked every district last month. 9BRE has again put up a new aerial. This is the 18th aerial that has been tried there. There ought to be a good one up some time. 9DHQ put in a new 203A tube. 9APK is on regularly on 80 meters.

State of Illinois Club Report.

A personal letter was sent to every affiliated club in the state. Responses were received from the Chicago Radio Traffic Assn. and the Peoria Radio Club which has developed into a B.C.L. club, but Mr. Shakhauer, the president, desires to keep the original charter. The rest of the clubs in the state did not answer the letters at all.

Another letter will go out to them.

Traffic: 9CTF,527; 9DQU,91; 9AIO,72; 9DHZ,70; 9AHQ,67; 9LZ,51; 9BNA,50; 9AWU,42; 9DWX,42; 9NV,42; 9HQ,41; 9DFV,40; 9RQ,31; 9DLO,30; 9CFS,29; 9DHX,28; 9BRE,26; 9AAW,23; 9CCJ,20; 9CYS,19; 9DZG,18; 9CTX,17; 9DWH,16; 9AP,15; 9APK,14; 9BIZ,12; 9BOK,11; 9DXL,10; 9DKK,10; 9ZA,9; 9KX,9; 9EAR,8; 9VUV,8; 9EJH,6; 9AXT,4; 9BRX,4; 9DZR,4; 9CLJ,4; 9CEC,3; 9BWP,3; 9CEJ,3; 9ALW,2; 9AYB,2; 9BLO,2; 9DQU,1.

MICHIGAN—Dist. No. 1: Message totals not exceedingly high but holding steady, class of messages handled is very good, practically eliminating all "comedy" messages. 8CCE has moved to Northern Michigan and will be on soon for north traffic, when he is not on 8AMS will be. 8DOO says he will have another op at his station all winter.

Dist. No. 2: Very little traffic moving on 75-80 meters. Few Michigan stations working on that band makes delivery difficult within state. 8BEZ is ready to go on 41 meters but not much heard there at present. Using ant. 10 ft. long with 15 ft. lead-in and 1/2 amp. ant. cur. Same aerial works fine at 300 miles on 77 meters.

Dist. No. 3: 8CQR is now down on real low waves QRV for traffic, A.C. on plates. 8DSE, a new station of old operator of 8DCY, hands in good msg. report this month. He says he is going to stick to 80 meters permanently. 8DCY has been off the air for three months but will be on again soon. 9DBT sold his French 50 watter and is now on with a 5

on the air as strong as in previous years. 8AQA, C.M. of Benton Harbor, is now in Chicago but will return soon.

Stations in the following cities please write to your D.S., 8CPY, for schedules and places of Michigan route: Muskegon, Ludington, Traverse City, Big Rapids and Mackinaw City.

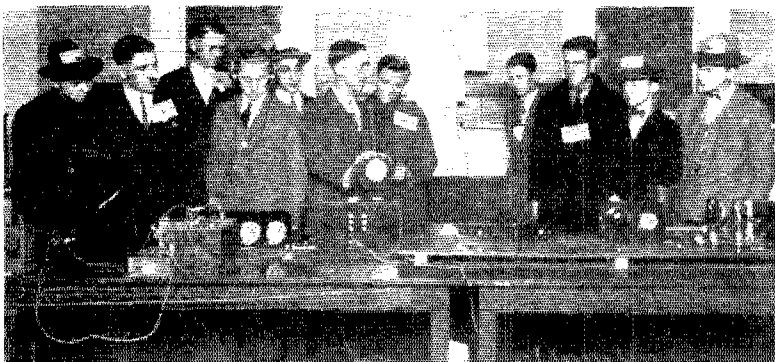
Dist. No. 4: 9CE and 9AEH are the only stations reporting.

Traffic: 8BZD,347; 8CED,108; 8DFB,59; 8DGT,42; 8AZW,38; 8DSE,34; 8CEP,31; 9CE,28; 8CPF,27; 8DOO,26; 8ZZ,24; 8CCW,15; 8ZH,14; 8CPY,14; 8DKF,14; 8ZF,14; 8NX,13; 8DMM,13; 8CWK,12; 8BTF,11; 8DEP,11; 8DGO,11; 8DDT,10; 8AMS,9; 8BBL,9; 8AUB,8; 8CQG,8; 9AEN,7; 8CZZ,5; 8AIH,5; 8BD,2; 8DCW,1; 8BGQ,1.

OHIO—Dist. No. 1: 8BO will be off about a month on account of changing location. 8UQ blinks the lights for two blocks and cannot operate set. Lisk of SCCI says he is the only active station in Lima. The A.D.M. promises him company in a short time now with 8AA on the air. 8ZY is knocking them cold with his 75 meter stuff. 8FU is back again with new set on 200 meters and is waiting for material for his 75 meter set. 8PU is doing fine work on all waves, but says messages are hard to get. 8DCD, Bellefontaine, has a small total on account of school work.

Dist. No. 2: 8DKM is only one in dist. No. 2 reporting. He is using coupled circuit on 150 meters with 9 inch coupling and gets 1.6 amps. Had a nice total of 87 messages.

Dist. No. 3: Cleveland and Lakewood are now showing stuff they are made of. 8BOQ takes the lead this month with 153 messages and promises to even do better next month. Six Cleveland stations have made application for O.R.S. the past month which shows they are on the job. 8DPN handled 90 messages and is on 80 meters which shows traffic can be handled there too. 8ADA and 8BVR, both working on 80 meters. 8BVR and 8DAE both report hearing Z4AK and Z4AA. 8AAJ who is attending Case University and an old O.R.S., is acting as second op. at 8BVR. (When you get back to 8AAJ permanently let us know; be glad to line you up for



9XBG, operated by E. T. Flewelling at the Chicago Radio Show, through which station our president, Hiram Percy Maxim, officially opened the show.

watter on 80 meters. 8BIC is off the air but still receiving cards from all districts on 8BRC's tone. HI. 8ADU will soon be on the air again after a year's absence. He will be QRV on 75 and 80 meters. Has a real DX receiver. 8AYJ is still off the air for lack of apparatus. 8ACO will soon be on 75 and 80 meters—pure C.W. (?) 8DFK says he is using pure "AC." Yea Bo! but now he is putting rocks and filters to get the pure C.W. stuff perking again. 8AEB lacks funds since the fifty watt west and won't be able to be on the air for a few weeks. 8CZZ is in Chicago going to school but found time to handle five messages over one week-end. 8CPY had thirty-three hams at his place on October 4th for a ham fest. Some of the gang blew his 50 watter so he is not putting same plate and filament voltage on UV202. 8CPF is the new station at So. Haven at the aviation field. They want schedules in early evening. 8BGQ is putting up new aerial and will soon be QRV for Grand Rapids traffic. 8DNK is heard on the air quite often with a pure C.W. note. The Grand Rapids gang haven't come back

an up-to-date O.R.S.) 8TT did some relaying of rather important messages this past month and the work is well worthy of mention. The west coast is easy kicking for him of late.

Dist. No. 4: 8YX is doing good work now and has 20 new students learning the code. 8APR is doing wonderful work on 10 watts. 8COJ is now on 80 meters and says it's the "berries." 8ALW is beginning to handle them again. 8ZAB will be back on again after a few weeks off but has the new steel pole up now. 8GW is not doing much on account of remodeling.

Dist. No. 5: 8GZ-8ZG has worked England and New Zealand. Congratulations—D.S. and A.D.M. (Check—D.M.) 8BYN raises sixes and sevens with ease. 8DO lost part of his set in a fire and is remodeling for low waves.

Dist. No. 6: Traffic report received from this district but no activity report. To those interested in traffic handling in this district, get in connection with Mitchell, 8AJD, and he will see that you are fixed up with an O.R.S. and get more space for

dist. No. 6—A.D.M.

The Ohio Club Report.

The Norwalk Amateur Radio Assn. has just rebuilt their station, 8DDQ, for 75 meter work, using two 50 watters in an L.C. 1DH, a 50-140 meter tuner and just installed a 100 volt storage B Battery with charging panel. Have code practice twice a week with lectures on Ballantine. All but one licensed op. is away at school.

The Toledo Radio Club has just moved into new quarters in the Nashby Bldg. Tower. They have a 100 watt set at present and will be on the air soon with a 50 watter.

The Union Central Radio Assn. of Cincinnati is holding code practice every two weeks and discussions on theory every meeting night. They are getting a new motor generator after burning their old one out. They are also adding another 50 watt tube making 100 watt station.

Traffic: 8BYN,550; 8GZ, 235; 8BOQ,158; 8DBM,87; 8AK,57; 8ZY,53; 8TT,48; 8CCL,40; 8DMX,37; 8BN,34; 8UYT,28; 8TJ,23; 8APR,22; 8ALW,21; 8BKM,21; 8BVR,16; 8COJ,16; 8BO,12; 8DCF,11; 8ANB,10; 8HN,7; 8YX,6; 8PU,6; 8BNH,6; 8ADA,4; 8PU,4; 8BBH,4; 8AJD,3; 8AWX,2; 8DND,2; 8GW,2.

WISCONSIN—Dist. No. 1: 9DTE-9CMP's station has been re-constructed and is open to visitors at all times. Out-of-town hams are invited to drop in and pound brass. 9ELV is using 5 watts with 120 watts input, and says traffic is picking up. 9ATO's station is in continuous operation despite OW QRM. 9CUI is rebuilding his station for emergency work, using B Bat plate supply. 9BKR, working on 80 meters, is QSO all parts of U. S. and Canada with 20 watts. 9HW is putting out 2½ amps on 78 meters using 100 watts. 9VD is all set for emergency work on 78 and 156 meters RAC & B bat D.C. 9CVI get out well on 5 watts and manages to pick up a few messages. 9AFZ & 9AAP expect to be on the air again shortly.

Dist. No. 2: 9GWZ is the star station this month and works all points of compass. 9EK, a new O.R.S. is doing remarkable work on a five watter using B bats for plate supply. 9DCP is still upholding his reputation for handling traffic on fone. 9OM at Plattville is doing good work and working East and Canada. 9AER has rebuilt again and she perks better than ever. 9BMF works west coast on 20 watts. He is one of our most enthusiastic boosters of the Wisconsin A.R.R.L. Assn. We need more like him.

The A.D.M. is glad to see Madison so well represented this month. (Check!—D.M.)

Dist. No. 3: 9AGT is sailing on the lakes for the Reiss Steamship Co. on KESA. 9BYE was QSO St. Paul during the transcons. 9EMD has his radio room all equipped now. 9ALA says he is going to try the low waves soon, is QSO good on 150. 9BYJ is working with a 50 watter now and three coil Meissner. 9BVA has been logged by CGS, 4000 miles north. 9DHG has received his emergency plate supply 1350 V B bats. 9AEU says traffic is scarce but gets out well on low waves. 9CIU is working FB on 75 and 80 meters.

Dist. No. 4: 9AZN worked 52 stations last month. He is going down on 80 soon. 9EIL did some good work until he burned out his MG ND now for some time. 9ALI is going to the U but shoots a few messages on week-ends. 9CFX worked 1000 miles on fone using 20 watts the first time he opened up. 9AQD is our champ experimenter, he can almost filter pure A.C. Hi. 9AKY is panelling his transmitter and says "watch my msg. total." 9BKO is operating on 162 and doing well but says no one has any traffic.

Traffic: 9CWZ,77; 9DTE,59; 9AGT,55; 9ELV,36; 9AZN,35; 9EIL,35; 9BYE,33; 9EMD,30; 9EK,29; 9ATO,27; 9ALL,27; 9ALA,26; 9DCP,25; 9COL,24; 9BYJ,22; 9CUI,21; 9BKR,21; 9HW,20; 9OM,20; 9EAR,18; 9BVA,17; 9CFX,16; 9HMY,12; 9VD,10; 9BMF,8; 9DHG,8; 9AEU,7; 9BSO,7; 9AQD,6; 9BST,5; 9CCF,5; 9PJ,4; 9AKY,4; 9CIU,3; 9CVI,2; 9BKC,2.

KENTUCKY—9EP is taking an auto trip through Tenn. and Miss. 9ELL is working the west coast and will QRO with 50 watter, on 1000 V MG soon. 9DTE and 9HP continue to do excellent work. 9WU is moving down to 80 meters. 9BAZ is away at school. 9DYC lost his license through being off wave and testing without listening in. His O.R.S. certificates is therefore cancelled until he gets back in the R.L.'s good graces.

Traffic: 9ELL,48; 9DTE,38; 9HP,17; 9DRC,14; 9WU,8; 9MN,1.

DAKOTA DIVISION

D. C. Wallace, Mgr.

A great portion of the North Dakota crowd attended the Dakota division convention held in Minneapolis and St. Paul on November 23 and 24. During this convention a meeting was held of all the division officers present, some 12 or 15 in number. It is believed that through this meeting better co-operation and a more uniform system has already been developed. It was pointed out at this convention that we should have about fifty more O.R.S.'s in this district.

We were fortunate in having our traffic manager, F. H. Schnell, attending the convention.

It seemed to be the general consensus of opinion, from all of the out of district men who attended other conventions, that we had one of the best if not the best division convention ever held in the United States. We certainly had a gigantic turn out, considering the fact that we had practically one-half of the entire division present at this convention.

MINNESOTA—The A.D.M., resigning because of lack of time, must necessarily make this report short and snappy.

Dist. No. 2: 9AYQ is turning out to be a real relay station with two ops on low wave and power. 9MP, 9AWM, 9AKS and 9DSW are operating at 9X1. 9CPO has replaced the five with a 50. 9DJW blew a 5 and 9CMS a 50. Messages in the district are being numbered and cleaner sending is becoming the rule rather than the exception.

Dist. No. 3: 9BQY is the only O.R.S. to report (with no messages handled) Hi. 9X1 on every night and doing excellent work. Things in general are picking up very well all through the district.

Traffic: 9AYQ, 104; 9COF, 7; 9MF, 3; 9BZJ, 10; 9DCH, 15; 9AXS, 24; 9DDP, 5; 9BFU, 4; 9AWM, 9; 9EBC, 4; 9CPO, 37; 9BKM, 49; 9DFZ, 18; 9EOB, 80; 9BPN, 73; 9APE, 27; 9DND, 6; 9DEV, 15; 9DEK, 9; 9DYZ, 4; 9DAO, 4; 9BPG, 1; 9X1, 12; 9DEQ, 10; 9CPM, 122; 9DQH, 20; 9BIS, 17; 9CCX, 18; 9ABK, 81.

SOUTH DAKOTA—There seems to be a general attack of sleeping sickness throughout the state this month among the O.R.S.'s, with most of the stations as party of the first part. The stations who have not yet applied for official appointment are on the job better than the O.R.S.'s, and it is to be regretted that their fine reports cannot be used. With several new stations already with their applications in, and more coming, things ought to begin to pick up soon. Dist. No. 1: 9AAO feels that he is well enough acquainted with the gang to start getting a little business and with 10 watts is stepping out in good shape. 9CKT, the new D.S., suffered an accident and had to get a stenographer to make out his report. 9BOF is again the most consistent station and turns in a good total.

Dist. No. 2: The Huron gang is busy with plans for the state hamfest, to be held some time in latter part of December, but found time to get in a few messages. 9DBZ has a new mast and is getting out FB. 9ABY has dropped to 75 meters but no DX yet. 9DUI is tinkering with superhets and is too busy to do much relaying. 9CKD is on the job with a new 1000 volt generator. 9CJS lost a couple weeks, due to moving, but is now on for the season, mostly short waves.

Traffic: 9AYD, 17; 9AAO, 25; 9ABY, 4; 9CGA, 2; 9BRZ, 57; 9CKD, 20; 9DID, 2; 9DJS, 38; 9BOF, 120; 9CKT, 15.

DELTA DIVISION

W. W. Rogers, Mgr.

Not to be outdone, the Delta Division will award a complete 50 watt transmitter to the best station in this division this winter. Details are being prepared now and the dope will be forthcoming as soon as possible. Get your station ready and remember, the conditions will closely follow those governing the awarding of the Hoover cups.

ARKANSAS—5QH deserves the credit for the good showing this month—148 messages. (Tnx, OM, that helps a lot!—D.M.) 5WK has left Arkansas and expects to open up in Tennessee shortly. 5ANN reports 36 messages for the month. 5BI is planning a visit to Memphis to "see how we do it."

MISSISSIPPI—5ALZ leads the list this month with 98 to his credit. 5QZ comes next with 66 real ones and a brand new O.R.S. certificate for his shack. 5KR reports the short waves as pure bunk and sticks to the high ones. 5AGV, at 5YD for the winter, re-

ports 26 messages for the latter station. 5YD is getting on the air with a corps of operators. 5AGS has added Porto Rico to his list of outside stations worked with his UV202. 5AKP is keeping up with all of them.

Traffic: 5ALZ, 98; 5QZ, 66; 5KR, 45; 5YD, 26; 5AGS, 24; 5AKP, 17.

LOUISIANA—The only report received from this state this month was one sent directly to headquarters by 5ABC, who reports that Louisiana is rarin' to go. He handled 112 mssgs.

TENNESSEE—5APC heads the Tennessee column. 5KA has more tube troubles, but low power and short waves keep him on the air. 5CN is doing good DX and is getting fine reports from England and New Zealand. 5IK is back from the Navy and has a good 50 wattage going on short waves. 5EK is staying with us—no traffic reported. 5AAZ came through with a lone message—another tube gone!

Traffic: 5APC, 91; 5AMP, 32; 5KA, 30; 5CN, 14; 5AAZ, 1.

HUDSON DIVISION

E. M. Glaser, Mgr.

Stations in the district have kept pace with DX and tests carried on. 2UD and 2BRB have worked Australia and 2AY, 2CVU, and 2WR, have worked New Zealand. Others are QSO at this writing. There are more stations every day on the 80 meter band but nobody on 40. There are several stations that didn't report and there are also quite a few off their legal wavelength. THESE STATIONS HAD BETTER WATCH OUT! After the regular A.R.R.L. broadcast message is sent at 8.00 P. M. from 2BRB, the latest division news will be sent; such as new O.R.S., cancellations, etc. O.R.S.'s especially, are requested to listen for this news. Wavelength-76.

Mardon, A.D.M. New York City, has been seriously ill but managed to take care of the regular duties of his office. (That's the spirit, Fred. Hope you are well now—D.M.) Bronx honors go to 2CVU who worked 24AA with his antenna on the roof and with small input. CVU has also been reliable as a good traffic station. 2CYx was stirred up by this news and has been making every effort to get down on 80. YL at the key from 5 to 7:30 P. M. daily. 2AAI is on 80 but can't find many loose messages. 2BBX is kept busy with college but is on quite a bit nevertheless. 2CEI has been testing. 2CRQ has finished overhauling. 2WZ handled the most traffic this month for Brooklyn but his list has been growing steadily worse. 2CHY hasn't been on much but is talking of a high-power transmitter on 75. Seems to be QRW??? 2ABR is down low but gets no traffic. 2CTY is also down now and doing fine. 2WC is going at his new QRA. 2AAY has worked 24AG on several occasions with his two fifties. 2BO has been QSO around Texas easily, whereas on 150, he never got that far. Nearly every Brooklyn station is on 80. (FB, Men—D.M.) 2ADC is busy drawing "phony" pictures for Amateur Radio and QST while waiting for his S tubes. Hi. 2ABN is now using a single wire No. 8 for an antenna and gets good results. 2BRB was a bit low in traffic this month but the DX makes up for it. Australia and New Zealand are worked daily with 200 watts input D.C. Nearly every active station in this region has been worked. 2PF is making some changes in his 80 meter transmitter. 2CEK has been QSO every district often with his 20 watt. 2BNL is doing fine on the ancient frequencies but will be up soon. 2CZR has a fine signal on 80. 2CNK has delivered a bunch of traffic this month. 2XNA is on 75 meters with a temporary one wire antenna and two wire counterpoise which works very well. 2RB is now at WFBH. 2BSL and 2AVE are still expecting to QSY 80. BSL has been searing up quite a bit of traffic.

Jack Pascal, 2CEV, has resigned as C. M. of Staten Island and Carl Koerner, 2CEP, has taken his place. This borough needs a good stirring up and Koerner is the man to do it. CEV is now operating on a ship.

Traffic: 2AAI, 18; 2BBX, 62; 2CEI, 22; 2CVU, 48; 2CWR, 1; 2CYX, 11; 2WZ, 79; 2BRB, 68; 2CHY, 36; 2CTY, 74; 2ABR, 26; 2AAY, 21; 2BO, 18; 2ADC, 16; 2PF, 8; 2ABN, 7; 2WC, 2; 2CHK, 16; 2AQL, 2; 2CZR, 36; 2CNK, 15; 2LD, 28; 2BNL, 8; 2RB, 22; 2BSL, 12; 2AVE, 2; 2CEP, 33; Delivered: 2BBX, 10; 2CVU, 12; 2CYX, 28; 2WZ, 14; 2BRB, 5; 2CHY, 10; 2CTY, 1; 2AAY, 14; 2ADC, 4; 2ABN, 6; 2WC, 1.

NORTHERN NEW JERSEY—Dist. No. 1: Every O. R. S. in this district reported with the exception

of one and the D.S. should be commended for the good work. 2CTQ is still making plenty noise and is handling plenty of traffic. 2ATE, the new C.M. of Passaic, will install a 50 wattage shortly. 2CXE through some misfortune has reduced to 5 watts. 2AWT is at Cornell but expects to handle lots of traffic at Xmas. 2AT is having his license changed to 75 meters where he will soon be heard. 2CJX is the star station this month handling the most number of messages. 2ADU is attending Stevens Tech. and cannot find much time to operate. While 2AJA is heard occasionally but most of his time is devoted to the building of a new superhet.

Dist. No. 2: 2WR is back on the air again and succeeded in working New Zealand 4AA. 2CMK is off the air but can be heard every Saturday night operating at 2WR's shack. 2AXF with 5 watts on 30 meters was reported QSA by British 6LJ. 2BAW is rebuilding the "whole works" and expects to go strong this winter. 2AFJ was off the air for part of the month due to the fact that S tubes were not obtainable. 2CRP claims that no messages grow stale on his hook. 2CDR erected a new mast and the first station worked was 9AAQ.

Dist. No. 3: 2QS with a "bootleg" 5 Wattage works all kinds of DX. 2CRW is QRW with school but manages to find some time to keep the station on the air. 2CO is trying to get down on short waves but is encountering plenty of trouble. 2BGO's report was received by radio as the report that was mailed failed to arrive. 2CQZ reports little traffic and also announces that a few stations in his district will lose their O.R.S. certificates if they fail in the next report.

Dist. No. 4: 2FC works plenty of 9's but cannot reach the 6th or 7th district. 2BGI is QRW building a "3CEL mast" is a QST. 2BZJ with 5 watts (?) is handling lots of traffic and works good DX. 2AUH complains that there is too much QRM to handle traffic. 2CPD complains that the gang is too busy working DX and no traffic.

Traffic: 2WR, 10 (del. 6) 2FC, 41; 2ADU, 9; 2AFJ, 7; 2AJA, 25; 2BGI, 24; 2CQZ, 12; 2AXF, 6; (del. 6) 2CXE, 16; 2CDR, 2; 2ATE, 16; 2CJX, 37; 2CTQ, 47; (del. 2) 2CRP, 53; (del. 6) 2EY, 3; 2BZJ, 32; 2CRW, 3; 2OBK, 33; 2BGO, 19; 2AJF, 6; 2ACO, 12; 2AUH, 16; 2CPD, 2; 2BAW, 37; 2QS, 15; 2AT, 33 (del. 4) 2AFJ, 6.

EASTERN NEW YORK—The Eastern New York organization is rapidly nearing completion. New O.R.S.'s will be appointed as they show themselves fit and some will undoubtedly drop out, but the organization as a whole is now on a good working basis.

Dist. No. 4: The usual fine report was received from this district. 2CYM is doing fine work as a new O.R.S. 2AQR had the good luck to get a hold of a 50 just as his last five blew. He is having some trouble making it pure right but expects to do some real work next month. 2CXG "the old reliable" is still on the job with that steady signal of his and handed in a fine report. 2CHZ is on regularly now for the winter and wants schedules. He is getting all kinds of DX but this month's traffic total isn't very large. 2AGQ and ex-2BSE are going 50-50 on a new station. They will have 50 watts on the short waves and a brand new antenna, besides other equipment to bring the station to its highest efficiency.

Dist. No. 5: Another real report. This district is booming with ham activities. About 25 stations are on the air and they are being made O.R.S.'s as they show themselves worthy. The fellows, slowly but surely, are going down to the lower waves, and those who have tried them never go back to 200. 21WF is doing great DX on 80 meters but says the days of real traffic are ancient history. 2BXW says the same. He is also on the lower waves and very much pleased with the DX, but is kicking about the scarcity of traffic. 2CGH QSTed to 80. His traffic fell off badly but he worked the west coast. 2BY with his kw power plant is still the leader in DX. He likes the higher waves better and says he can handle more traffic up there now that a great many have gone down to 80. 2ACS is banging away in great style. He blew 3 203A's in a week. Hi. 2CPA, worked 7GK and P.R. 4SA, the first night he was on 80. He said Good-bye to the higher waves immediately. 2GK-XAB had the bad luck to burn out the field of his big generator right after the transmitter was built up into a panel. He will be on with AC or possible kenotron rectified juice until the gen is repaired.

Traffic: 2AV, 43; 2BPB, 11; 3KX, 20; 2CXB, 1; 2CDH, 106; 2ANM, 21; 2CXG, 93; 2CYM, 48; 2AQR,

MIDWEST DIVISION
P. H. Quinby, Mgr.

A great deal of credit for the success of the convention is due to the convention committee; P. H. Quinby, chairman, 9DXY; L. F. Burwell, 9BFG; H. A. Nielsen, 9CJT; R. E. Veverka, 9CGS; and P. D. Maxwell, 9EGA who worked hard and unceasingly in arranging it.

NEW ENGLAND DIVISION

L. Vermilya, Mgr.

RHODE ISLAND—1AKK is on with a new aerial and bids fair to be a real DX station. 1BCC is on 80 meters, and is getting out better, as his msg total shows. 1AWE is installing a 50 watt. 1CAB is hampered by a poor location, but is game to the core and is bound to come out on top yet. 1GV, a new O.R.S., is the loudest noise in the state and smites the ether with 6 amps. on 78 meters. New Zealand is local to him now. 1QW is not the loudest, but has the prettiest note and is landing signals on the west coast nightly. 1AID has beaten us all for msgs, and no wonder; just have a listen to the signal she is pounding out.

The Providence Radio Assn. has new club rooms and seems to have new life as a result. All hams cordially invited to drop in at any time at 279 Weybosset Street.

1AAP has been off the air this month and has completely remodeled his station both inside and outside. 1QV is down on 80 meters and is banging out in fine shape. 1BVB is going along at about the same gait. 1BQD is going, but due to work at the Torpedo station doesn't get on much, but nevertheless he reports.

Traffic: 1AID, 153; 1QW, 5; 1AKK, 14; 1II, 20; 1GV, 30; 1CAB, 4; 1BCC, 40; 1AWE, 20; 1BQD, 4; 1QV, 48; 1BVB, 78.

CONNECTICUT—Traffic at this writing is still scarce. Everyone is after DX, and from all reports some fine individual records are being made.

1MK, the new headquarters station, started recently with a pretty note and a big kick behind it. It will be off the air, however, for a short time until a new receiver is installed. 1IV is working lots of "locals" and a few 6's. 1BM reports business poor, but lots of DX. 1AVJ can't make 75 meters work yet. 1MY has worked ten British and one French station. 1AJT is still lingering.

Traffic: 1MY, 144; 1ZL, 22; 1IV, 9; 1BGC, 17; 1BM, 2; 1CKP, 7; 1AVJ, 6; 1AH, 11; 1BHG, 29; 1MO, 9; 1AEA, 19.

EASTERN MASSACHUSETTS—The traffic totals are beginning to look like they used to. Although it could be a whole lot better, the total for this month is 434 messages reported handled. The star traffic station is 1LM with 76.

1AAC of Framingham, Mass., using but one lonely 5 watt tube, on 75 meters, has been in communication with New Zealand constantly. The station is one of the very best in New England. 1SK will soon be on again. 1SN is on 75 meters. 1KY has been away some of the past month, thus her small amt. of traffic. 1AYX has a schedule with 1APF every day at noon, and is moving quite a bunch of traffic. 1GA reports fine DX on the short waves. 1BBM's 20 watt went on the bum. 1ALL blew his 50's, but is getting fine DX when he is on. 1AQY is on again with 10 watts and handling traffic. 1BQZ has QSY'd to 77 meters and is getting out in fine shape. 1AGS is working plenty of 9's every A.M. 1GS is using a 20 watt on both 150 and 75 meters, with good results. 1AIR blew his filter condensers, but got out just the same. He is QSYing to 75 shortly. 1LM says things about the same at his station—plenty of traffic being handled. 1RR is moving, hence his set is not on the air, but will be back with higher aerial than ever, shortly. 1ZW is on the air once more. His schedule for this season is as follows: Mon., Wed., Sat. evenings from 10:30 to 12 Mid. Possibly Fri. later. 1SE, C.M. of Attleboro, reports that 1ADM is at Harvard. 1SE has not recovered from his loss of the 50 watt. 1NT is at school. 1UW is doing fine work, but small traffic total. 1AHL is putting up a 60' steel mast. The gang around this way seem to be pretty well down on 75 meters and like it.

Traffic: 1AAC, 14; 1CEA, 16; 1AEO, 13; 1CJR, 10; 1AYN, 25; 1LM, 76; 1KY, 23; 1AGS, 11; 1BQZ, 32; 1AQY, 6; 1ALL, 5; 1CIT, 4; 1GA, 71; 1AYX, 10; 1DA, 15; 1AIR, 36; 1GS, 25; 1AHL, 10; 1ADM, 2; 1SE, 12; 1UW, 8; 1BDU, 16.

WESTERN MASSACHUSETTS—Dist. No. 3: More activity is being shown in this district. 1ARE down on 40 and 75 meters is reported by Italian

1ER and several English stations. 1CLN and 1VC are on again and will soon be O.R.S.'s. 1ARE is a new O.R.S. It looks as if Pittsfield will be well represented this winter.

Dist. No. 4: 1BLU has been appointed O.R.S. during the month. 1CBH, the C.M., is giving up radio for a while. 1ABF lost another 50 watt tube, but always seems to have just one more left. 1EO is back on the air again doing good traffic work. 1BSJ will be on short waves. 1CTT, 1BCB and 1ON are heard occasionally. 1VU reports his transmitter not getting out, so he is changing to short waves. This district will soon be solid on short waves. 1IL is still on 150 meters and doing fine work. He will have a new QRA soon. 1AWW has been QSO England six times during the last two weeks, and reported in Italy. During the week of October 27th to November 1st a temporary transmitter was installed in the Springfield Auditorium at the Electrical and Radio Show. This station handled 133 messages during the week. A complete write-up will be found somewhere else in the magazine. The A.D.M. wishes to thank all who helped to make this station a success.

Dist. No. 5: 1BIZ has been appointed an O.R.S. in this district and is doing fine DX and traffic work. 1EC was QSO New Zealand during the past month.

Dist. No. 6: This is the only district without an O.R.S. Will someone please start up a "Ham" station in Greenfield which will be on consistently?

Dist. No. 7: 1BKQ worked ZIAG for more than an hour during the month. (FB) 1BIP was QSO England with two 5 watt. 1ABG using one UV201A worked 1000 miles using 150 volts on plate 1XZ is consistently on the air, having worked 40 stations over 1000 miles away during the month. 1YK with a half dozen good operators will soon be heard on short waves. 1CPN has combined his station with 1FG, the North High School, Worcester, Mass. 1ARI is the new station of the Wachusett Radio Club at Leominster, Mass. 1AKZ lost a couple of bottles, but is not discouraged, as he is still to be found handling traffic. The Worcester County Radio Assn. held their Annual Dinner and Theater Party November 15th. This was a very successful affair, with a large turn-out, and it is hoped that another will be held during the winter. 1AQM, 1BCU, 1ASU, 1CPN are also on short waves. 1DB and 1ACQ still on 150 meters. 1CPN and 1AKZ were appointed O.R.S.'s during the month.

This district has shown wonderful enthusiasm during the past two months.

Traffic: 1ARE, 25; 1EO, 20; 1PY, 16; 1ABF, 32; 1AWW, 184; 1VU, 2; 1IL, 62; 1AAL, 15; 1AKZ, 14; 1AQM, 27; 1ASU, 12; 1BQK, 12; 1CPN, 69; 1DB, 28; 1BIP, 111.

VERMONT—Things are about the same, short waves, more or less traffic, some hard luck, and a lot of other things to do. One new O.R.S. has been appointed, 1APU, Springfield. Last summer he told the gang that he was going to put in a one KW Tube. He comes through fine, but we are still waiting to see the tube. He has been experiencing some trouble with absorption in power lines, so has 1ARY. That is the explanation of why they are still above 150. 1BDX and 1FN are now preparing to work on 80 meters. 1LA is going south. We think that 1CPO is, too. 1YD has blown a 50 and is using a 5 instead for the time being. Little change was noted in signal strength. They have been having the usual run of luck with an electrolytic rectifier.

Traffic: 1ARY, 42; 1YD, 31. 1BDX, 29; 1AJG, 29; 1FN, 11.

MAINE—11 O.R.S.'s in Maine are taking advantage of the short waves, and traffic seems to be moving better there than on the 150-200 band. It is expected that more stations will be down by next month.

Dist. No. 1: 1ALK will be on soon with a 50 watt. 1AUR was heard in Italy—"auf sed." 1PD was heard in France on 10 watts. (FB, OM)

Dist. No. 2: 1APF is doing fine with the 1 wire antenna, and has worked Detroit in the middle of the afternoon. 1CIB will be on short waves soon. 1BNL is back from Commercial and will be with us soon with 50 watts on 80 meters. 1FM says his 14th tuner is FB, has heard F8LF and Brazil. 1HT works sixes regularly with his 15 watts and 4 amps in the antenna. 1BTT says that 75 meters sure is the "alligator's raincoat" for DX, and has worked as far as Michigan in daylight. He also has a new antenna and counterpoise. 1HUB has been re-issued an O.R.S. and did well with traffic this month. 1KX is also now on 75 meters, and has had his transmitter down to 20, but not for regular work.

Dist. No. 3: 1BDH is to change to 50 watts soon. He has received two cards from Belgium on the 10

MONTANA.—Not many ains have been on the air during the past month. A number of our best men are away attending college and a few have moved out of the state. 7MP is the stellar traffic handler, not only of the state, but of the whole division. He is on the air regularly and takes traffic like an old commercial op. 7CO is heard after 10:30 P. M. with the same old punch. 7DD of Butte is on yet. 7ACI puts out a strong signal on 75 meters. TNT has been away on a trip to Idaho but is back now and is to be heard on 75 meters. 7APE of Bozeman came on the air during November and works good DX. He has trouble putting mgs. into Wash. or Oregon. 7MB is out on commission again. 7ZL, the A.D.M., has hibernated for the winter. 7KZ's spark coil C.W. is heard quite often. 7ZU has been experimenting with R.F. feed line around 20 and 40 meters. He is trimming his aerial down so it looks like a dwarf. The following received operators' licenses during the recent exams: 7ACI comm. 2nd, 76K, comm. 2nd, 711 comm. 1st, Hunt of 7CO, amateur 2nd, 7EL, amateur 1st, Cole of 7ZU, amateur 1st.

M. E. McCreery, Mgr.

CALIFORNIA — Although plenty of communication was a great factor during the month, traffic has been at a minimum. The low waves seem to be causing some of the trouble due to stations being on all bands. The DX weather during the month has been worse than the previous month. Quite a few of the fellows met each other personally at the meeting held on the 6th of November in Los Angeles, in which Mr. Warner and Mr. Hebert were the speakers. The bunch enjoyed the meeting greatly and met many friends, so Southern California had a good showing at the convention in Modesto. There are more stations heard on the lower waves now than previously. A suggestion as to traffic conditions is: that in order to save confusion in this division, all stations in a city or county have all their dealings with the C.M. in charge of that county or city. This C.M. has to deal with the D.S., who has charge of the C.M.'s in a district, which comprises of a number of counties and cities. The D.S. deals with the A.D.M. and through the regular

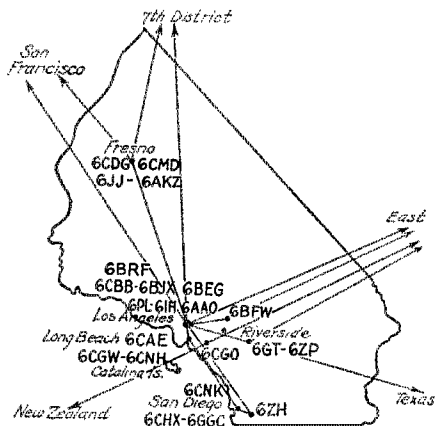
Dist. No. 2: Traffic has been moving at intervals out of Los Angeles county. Most all of the northern traffic is handled in the day time. The stations in the Bay district are about the same audibility in daylight as dark. Few of the L.A. stations have worked MN, Z, and Australia. 6BJX, 6CTO, 6BQR and 6CSW are newly appointed O.K.'s. 6BJX expects to have a German tube soon. 6CTO is a good station to handle City traffic. He is on 80 meters and also on 40, some times. 6BQR is consistent with communication and works east easily. (80 meters.) 6MN is still waiting for his 50's to be fixed. 6AAO is pounding on 80 meters and has been heard often handling traffic. 6BEG finds little time to come on. 6BRF is rebuilding and caused him to lose out on his msg total this month. 6IH has been experimenting on low waves but can't get his heap working good there, so is going up on the 200 meter wave again. 6CSW is a new O.R.S. and is stepping out in fine shape now. 6PL has been on but little on account of other interests and work. He will be QRV shortly on low QRM. 6CTO is taking the position of C.M. for Los Angeles county Riverside; 6GT has taken the job of C.M. left by 6ZP. Things are getting under way in fine shape for fall work in this territory. Although most of the fellows are busy, they find time to come on the air. Most of them are either down on the low bands or are planning on going down there. 6AJI still holds the position of high point man. He will be on with a 50 wattor soon. 6US show an "S" tube and was forced to quit. Will be on shortly again. 6CIA-6BFB was off for a week on account of no power. Their QRM is 75-80. 6BLW is on 75 meters and QRV. 6GT is on 76 meters and has worked ZAG twice. One hour each time. (FB. OM.) Four messages were taken. 6BUR went to the convention and could only handle a few msgs. 6CSS is on 80 meters now. 6AGK has worked NZ a couple of times. 6RH is back on the air after losing his heap. 6RN is QRV Pasadena traffic. 6CMQ went down on 40 meters. He hasn't had much success down there as yet. 6BBQ has more kick on his 5 watt tube than on his 50 wattor. HL 6CGW's big 250 wattor went soft and is now using a 50 wattor. 6CNH is going to college, where it is reported that he has a low loss YL. 6CGK has been calibrating wave meters and attending conventions.

Dist. No. 1: More stations are changing to the lower wave lengths and are doing excellent work there. 6CGO continues to work NZ and Australia often, in fact nearly every night, and will QSR any traffic in that direction. 6ADT is now on 75 meters and has worked NZ 44A. 6ADT is QRV in all directions. 6AIB is another station that has recently shifted to the low waves and is now starting to reach out. 6AVR on 80 meters is QRV to QSR the east coast every night. 6BIK is still under construction. 6LA is putting in a 50 watt 100 ohm QRV school. 6VD has QSY'd low waves. 6BIV is QSO the east often and can QSR nearly every night. 6CHX is one of the very few fellows in San Diego to take traffic for that city. 6ZM is rebuilding and hopes to be on 80 meters before long. There are a number of stations in San Diego and we hope to have some more O.R.S.'s before long. The following O.R.S.' will handle traffic for San Diego and vicinity: 6ZM, 6CHX, 6CDV, 6CGC and 6BAS.

Dist. No. 2: 6ZBT is still working for KGO. 6JJ is a good O.R.S. to handle in all directions. 6CMD has moved down on 80 meters and is QSO all directions. 6ASV is on regularly every night after 10:30 P.M. with a 50 watt and QSO in most any direction. 6CDG is on every Friday and Saturday evenings.

Traffic: 6CGO, 30; 6BFW, 25; 6ADT, 23; 6CHX,
10; 6AIB, 8; 6VL, 8; 6CNK, 8; 6OP, 6; 6AVR, 6;
6VD, 5; 6CGG, 51; 6RAS, 5; 6ZN, 2; 6AJI, 24;
6BLW, 11; 6CIA, 11; 6GT, 8; 6CSS, 8; 6BUR, 10;
6BQR, 25; 6BJK, 29; 6AAO, 54; 6AGE, 11;
6CGW, 24; 6CAE, 7; 6CNH, 2; 6RN, 25; 6CMQ, 4;
6BRQ, 9; 6PL, 23; 6JJ, 31; 6CMD, 33; 6ASV, 15;
6CDG, 21; 6CTO, 40.

Dist. No. 4: The stations are all down on 80 meters and are getting down to the real business of message relay. For quite a while no messages were handled, but the newness of 80 meters is wearing off and consequently message totals are beginning to come in. What can be done on 80 meters, for



TRAFFIC ROUTE MAP OF SOUTHERN
CALIFORNIA-MONTH OF OCT. 1924.

path of the traffic department. This will save a lot of confusion in keeping note on each station in the proper department. Many traffic problems were settled during the meeting of the 5th of November in L.A. and the convention. Many stations are still in direct communication with New Zealand and Australia and can forward traffic easily now.

instance, 6CKV, San Jose, using one 301A, 200 volts B batter at 25 miles, no radiation—QSA at 6CGO, Santa Anna. No radiation at the time. San Jose; 6NX practically shut down all month making alterations. New single cage up, 55 ft. with 6 ft. flat top, QSA the east coast. Using low loss inductances made of No. 7 wire, separated by twine at four points, 6HC, new O.R.S. just got going on 80 meters. He is using radio frequency power trans. line, and expects to run up a nasty message total next month. 6CKV, using 301A as mentioned above. 6AMM reports remodeling. He was heard in New Jersey on November 9th on 10 watts. 6BDT is our prize 80 meters station. Australia and New Zealand has been logged by him many times. 6BON is not down to 80 as yet. He is working on the higher waves and getting out as usual. He will be on 80 meters soon. Stanislaus and Merced counties; 6ADB is using 5 watts, and is stepping out in good shape. 6APQ has nothing startling to report. 6AOI did not do much this month. 6AME using 5 watts coupled Hart. is beginning to step out. Santa Cruz, Monterey, San Benita; 6CFI just got his set working on 80 efficiently. Ones and twos are each now. 6CIE is getting out as usual. Traffic is slow in Santa Cruz. 6CEI is a new O.R.S. getting out to the east FR. 6BCL is back on the air again and trying to work NZ and Aust. San Mateo; 6ALW has gone to sea. 6LV is going to Stanford and has not very much time for radi. 6CGV reports DX not so good. Los Gatos; 6ZAT is the only active station in Los Gatos. He reports lots of DX, but no messages. 6ZAH is attending college. 6ZAU is on occasionally but not many messages. 6CLP, a new O.R.S., recently work four stations in Jacksonville, Fla., one right after another. Hi.

Dist. No. 5: Due to most of our traffic handling stations experimenting on 80 meters and partly due to the change in report date, the reports for this month are not what they should be. Next month the O.R.S.'s failing to report will lose their O.R.S. certificates. Please report to the C.M. by the 18th of the month.

6AC is doing fine work on 80 meters. He has worked every district. 6CW has just got another 50 watt tube and expects to do a lot of good work on 80 meters. 6BAA shot his 5 watt last month and he just got another one. He says he will be going shortly on 80 meters. 6ZAZ (now 6EX) has a 5 wattier thriving on 500 volts D.C. from storage batteries and it puts one ampere into the antenna. 6CHL has been convinced at last that short waves are the only thing and he will be going strong on 80 meters in about a week with 250 watts. 6AT is now putting in 7.5 amps into his big antenna at 80 meters and is doing fine work, having worked a couple of Mexicans, and Australian, and four New Zealand stations. Not bad for only a week's work on 80 meters! One 250 watt tube is all that was used. 6APH will have his C.W. set going again soon. He will be on 80 meters. 6RW has finally managed to do some real DX at last. He is using a 50 wattier and will be on 80 meters soon. 6BUF is now on 80 meters with 10 watts, but as yet has been unable to do any DX. (Don't get discouraged, OM, every one has the same trouble at first.—D.S.) 6CLS is building a complete new transmitter for 80 meter work. He will use two 5 watt bottles. 6HJ is still on the high waves and is doing good work. He has a 50 wattier putting 3 ampere into the antenna. 6BFY has finally managed to keep himself away from the YL's long enough to get his set working again. He is going to stick on the high waves. 6CLV put up a new aerial and expects to be going strong on 80 meters with 10 watts. 6DG is just starting up and will be going strong on 80 meters soon. He will use 10 watts. 6BNT is using a 250 wattier on 180 meters and is doing fine work. He expects to be on short waves soon.

Traffic: 6AC, 14; 6AWT, 15; 6CW, 3; 6BAA, 5; 6RWI, 15; 6CLV, 20; 6CHL, 13; 6CLS, 4; 6BUF, 18; 6NX, 5; 6BON, 9; 6CKV, 2; 6AMM, 3; 6BDT, 37; 6ADB, 16; 6AFQ, 7; 6AME, 10; 6CIE, 16; 6BCL, 18; 6CJV, 12; 6ZAT, 3.

Dists. No. 7 and No. 8: There seems to be a scarcity of traffic at present. Most of the stations are kept busy calling everything in the way of DX except Mars. New Zealand, Australia, Mexico and South America are QSO quit frequently. O.R.S. 6BAF is located at the Union Labor Hospital, Eureka, Calif. The owner, Mr. St. Clair Adams, is a patient at the hospital recovering from a broken back, and would no doubt be pleased to hear from any of the gang.

Dist. No. 7: 6FH finally came down to 80 and works all districts in one night. 6CBW will be on short waves as soon as he gets a receiver. 6CDJ lost his shack by fire. Tough luck, OM. 6GR, 6DD and 6AGE all on regular now. 6AGE succeeded in working Z4AA. He still gets by with only 140 watts input to his gallon bottle. 6ABX is on 150 but is going down to 80 soon.

Dist. No. 8: 6BUA and 6BU are still going. 6BAF is on whenever possible, but very QRW with school. He says after Xmas he can give all his time to radio.

Traffic: 6DD, 10; 6AGE, 13; 6FH, 11; 6GR, 27; 6BUA, 2; 6LU, 2.

ARIZONA—All the boys seem to be trying to get down on the 80 meter wave and are not on regular as yet. 6BBH, the C.M. at Phoenix, is on the air with 80 and 190 wave and reports much experimental work on the 80 meter wave. The U. of Tucson is taking more interest in A.R.R.L. work, doing creditable work with NERK for its last month. 6GS, Bisbee, reports his C.W. coming along fine and 6CUW, an old timer, from Texas, is located here now handling local traffic with a 5 watt set. 6ZZ and 6FP have been off the air for two months on account of remodeling house.

Traffic: 6BBH, 18; 6WI, 1; 6ZZ-6FP, 3; 6GS, 9; 6CUW, 8.

ROANOKE DIVISION

W. T. Gravely, Mgr.

WEST VIRGINIA—8BLI now has a MO perking on 77 meters and gets out FB. 8DSC has been off the air, but is on again with temporary mast and a five wattier on 79 meters. 8DSC is handling traffic in great shape. 8WZ is having trouble getting a transmitter that will work.

Traffic: 8BLI, 5; 8DSC, 34; 8WZ, 12.

NORTH CAROLINA—This report was transmitted by radio from the new A.D.M., 4JR to 3CA. (Some of you "CQ Hounds" try this if you want something to do.)

Dist. No. 1: Things are at a standstill in this district. Everybody, including the D.S., is dead. 4QW is the only station making any report, and he is heard very little. The Winston-Salem Radio Club is making an effort to revive interest.

Dist. No. 2: Asheville is well represented on both the short waves and on 150-200 meters. 4MI is doing excellent work on 75-80 meters. 4GW is raising plenty of racket on 150 meters. 4SX is heard on both 75-80 and 150-200 meter bands, but no report. 4VN at Arden is on low waves and doing good work. 4SX is howling for traffic. (Let him have it, gang.) 4TS is raising a racket in Canton.

Traffic: 4GW, 12; 4VN, 9; 4UM, 6.

Dist. No. 3: This district is represented on the air by 4TJ and 4JR on short waves, and 4HR on 150-200 meters. 4HR is raising an awful racket with something, but no report on it. 4TJ has decided to use the short waves, as he gets better results there, and is trying to work Europe. He has been reported in New Zealand. 4JR is on both 200 and 80 meters, and reports better results on low waves—higher wave is handy when QRM is band on short waves. He is QSO Porto Rico on 167 meters almost every night, and is QRV traffic for 4JE. Charlotte is dead again, as 4JS is at school. He will be on during the holidays, however.

Traffic: 4TJ, 26; 4JR, 155.

Dist. No. 4: This is our live wire district. Everybody is always willing to lend a helping hand and push things right along. 4BX has been very busy and has not been on much, hence the small traffic total. 4RW is in a new location and will be on the air shortly. 4SU has applied for an O.R.S. appointment, and is getting back on the air. Guess someone will have to get the Wouf-Hong after 4FT, also 4EA. 4UN is keeping Raleigh awake. 4RU is coming back on 80 meters soon. 4UN will try the short waves.

Traffic: 4BX, 2; 4UN, 11.

VIRGINIA—8TI has been appointed D. S. for the Norfolk section, and has not had time to get it lined up yet. 3CKK still handles traffic. He says he is going on short waves with four coil Meissner. 3CKA and 3CUJ have in applications for O.R.S. certificates. They will work on short waves, too. 8TI says there is about 10 single circuit sets in his block, and that the short waves won't do him any

good. 3BMM uses a WE 50 watter with 1500 volts on 77 meters. 3ABS is on as time permits and is on 150 meters. 3AUU still adding B batteries to his set and building a wave meter for around 10 meters. 3ATB has a 1BIS tuner finished and says it is the "berries." Teddy Keck will be back during the holidays, and we will hear from them then. 3BGS says if they ever stop shipping apples from station he will be back on the air. (eat 'em up!) 3BFE works on the set one night each week, Saturday night all night. He has worked the west coast often. 3OKL worked 6XAD for two hours on 5 and 10 watts in the late morning hours. He has dropped down on 75-80 meters and going strong. 3BZ says the street people squirt sand on the tracks and the QRN from this is rotten and can't work through it.

Traffic: 3CKK, 9; 3BMN, 18; 3BFE, 5; 3BGS, 3; 3OKL, 18; 3BZ, 6; 3CA, 26.

ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

9CAA

101 Msgs

C. W.

C. R. Stedman, Denver

COLORADO—Denver: 9CAA takes the box seat for most messages this month. Traffic in general is beginning to pick up. 9DUN, a new O.R.S., takes second place this month with 91 messages put through. 9AMB has slumped off but will be at his regular pace after some rebuilding. 9DED, 9QL and 9CJY are the only other stations reporting and all report traffic moved. The short wave and low loss fever is running high and this district expects to have some crack sets along these lines soon.

Dist. No. 1: 9EFY reports traffic through this station and is the only station reporting up in the northern part of the state. He reports his station regular which keeps traffic QSO through dis. No. 2.

Dist. No. 2: All stations in this district have been on regular and all have moved their share of traffic. There is much rebuilding in this district which will soon see several short wave stations. Traffic: 9CDE, 16; 9OHT, 20; 9CLD, 16; 9DFH, 14; 9EAE, 7; 9AMB, 2; 9CAA, 101; 9DED, 46; 9DUN, 91; 9EFY, 20; 9QL, 5; 9CJY, 24.

UTAH—Salt Lake City: Most all the Salt Lake City stations have been on in regular style and kept traffic going through this state. The 70-80 meter band has taken them by storm and we expect to see Salt Lake almost a short wave center. The A.D. M. has just returned from a visit to the coast and says that short waves are going all over like wild fire and that the ham game is generally good all over. He attended the Pacific Division Convention and reports a roaring good time.

Traffic: 6CJB, 15; 6CKL, 1; 6FM, 4; 6ZAM, 12; 6RM, 16; 6BUH, 5; 6GRS, 11.

WYOMING—Dist. No. 1: 7HX ex-7DH is back on the air at the old stand with a new O.R.S. He reports 25 messages put through as a starter. 7HW is on the job as is 7NR and 7AWF. 7ZO is temporarily out of commission.

Traffic: 7HX, 25; 7AJT, 8; 7HW, 10.

SOUTHEASTERN DIVISION

H. L. Reid, Mgr.

GEORGIA—The activities this month have increased, the weather having improved, which probably accounts for the improvement in signals, making it possible to work more consistently and over greater distances.

4SI leads in the amount of traffic handled, having worked the west coast direct. 4EQ is also QSO to the west coast and is second in the amount of traffic handled. 4OA has the distinction of being the first station in the fourth district to work New Zealand. The D. M. has rebuilt his 250 watter with the reward of working G2OD. 4IO has been quite active this month, having worked ZIAG, Argentine A8, and two Europeans in one night. This station is the first in the south to work South America, having worked A South American besides being QSO with Europe fourteen times, and New Zealand once, this month. This work was done using a single 50 watter. (FB, keep it up, OM)

Traffic: 4EQ, 34; 4IO, 27; 4SI, 202.

FLORIDA—High powered tubes have relegated to the discard since short waves became available. Prac-

tically all stations are doing better work with a 5 watter than was formerly done with 50 watters, on high waves. 4SB uses both 5 and 50 watts and the 5 watter on short waves works circles around the 50 watter on high waves. 4SB and 4FS work the sixth district regularly, each with a 5 watter, and one of the sixes was also using a 5 watter. "A two-way 5 watt transcon route!" 4KK is the only Jax station left on high waves, but is a good traffic man. 4PK is a regular traffic handler now and works Mexico and the sixth district. 4PI had a daily schedule with Porto Rico and also put his station to use by ordering merchandise from neighboring cities for his father's store, until his last 5 watter blew. 4XE worked all U. S. districts after sunrise and is easily our best station. We have a live Porto Rican route through 4XE to 4CH and thence to 4SA. 4PB is active again. 4QY is a valuable relay man, due to his strategic location from the traffic standpoint, and also to his good station. He and 4CH of Miami work a wicked daylight route and make Southern Florida a safe place for traffic. 4CH is a new C. M. of Miami and is doing good work in this line.

Australian and New Zealand stations are being copied on any good night. A8BQ was heard calling 4XE for 5 minutes.

Traffic: 4FS, 49; 4XE, 37; 4SB, 38; 4PB, 38; 4CH, 31; 4QY, 23; 4KK, 19; 4PI, 16; 4PK, 12; 4EZ, 5.

SOUTH CAROLINA—4DX has his portable set, 4SY, with him at college. He is doing splendid work using only a one wire 100-foot vertical antenna. 4RR-4VL is operating alternately on 76 and 160 meters. Traffic is picking up, DX getting better, and conditions as a whole are improving.

Traffic: 4SY, 47; 4RR-4VL, 36.

ALABAMA—The fall season in Alabama is now in full swing and traffic has more than doubled for the month. An unusual dry season has been experienced and the gang has just about forgotten that there was ever such a thing as QRN. Over half of the Alabama stations are now on the low waves and all are doing good work. A total of 1059 messages was handled during the month with 5ACM of Anniston leading with a total of 361 messages. 5XA of Auburn comes second with a total of 264 messages.

Dist. No. 1: 5ACM leads this month with 361 messages and all handled on the 150-200 meter band of waves. Birmingham fell way behind this month, as nearly all stations are now on 75-80 meters and it seems that very little traffic is being handled on these waves. 5AMH and 5UP are operating now and should be on the air regularly during the rest of the season. 5ZAS reports being heard in Italy and France last month. 5VV still continues to operate consistently and can now be found on the low waves.

5QP was the only station in Gadsdens handling traffic. Tuscaloosa comes forward this month with the first report. Quite a few stations have been found several good prospects for O.R.S. appointments located. C. M. Johnson is working hard to put his town on the map.

Dist. No. 2: Supt. Rush reports that although traffic is a little off for the month that more stations are actively operating. Stations 5QK, 5AR, 5AC and 5AOM are all operating regularly now and are putting old Mobile on the map. 5AOM reports excellent communication with 5XA, at Auburn.

Dist. No. 3: This district has the honor of introducing three new O.R.S.'s this month: 5ADA, 5NL, and 5WL. These stations proved their value by turning in nice traffic reports for this month. 5WI has replaced his 90 foot mast which was blown down during the summer. 5AJP is now using a 50 watter and is reaching out nicely. 5ADA is strutting his stuff with a repaired 5 watter. 5NL is an old timer returning to the fold and has already crossed the pond with 10 watts.

Dis. No. 4: 5XA steps out this month with 264 messages. This station has a gang of ops and should do some big things this season. We are expecting 5XA to lead the state by a neat margin within the next month. A break-in system is used, so if a QTA is needed just break-in and ask for it.

Traffic: 5AC, 59; 5ACM, 361; 5ADA, 20; 5ADS, 19; 5AJP, 59; 5AMH, 46; 5AOM, 48; 5AR, 6; 5ARL, 14; 5MI, 17; 5NL, 7; 5QK, 27; 5QP, 8; 5VV, 37; 5WL, 51; 5XA, 264; 5ZAS, 16.

WEST GULF DIVISION F. M. Corlett, Mgr.

Louis Falconi, A.D.M., New Mexico, resigns and applications are in order for this traffic appointment. Kenneth M. Ehret, 5APG, has been appointed A.D.M. of Oklahoma, succeeding Mr. Whartenby. All Oklahoma stations will report direct to Mr. Ehret, 2904 Robinson St., Oklahoma City, Okla. 5AQW reports 22 sent and 20 received, making a total of 42 mssgs. being reported for Oklahoma this month. Please send your reports in to the new A.D.M. not later than the 24th of the month—the traffic months being from the 20th to the 20th.

MEXICO—BX reports he is unable to report traffic as the Mexican government won't let 'em QSR any more.

NORTHERN TEXAS—In spite of the testing on low waves that is going on continually, Northern Texas stations showed an increase of 50% in the amount of traffic handled this month against last month's report.

Several stations report hearing POZ as well as some Australian and New Zealand stations.

Traffic: 5DW, 20; 5ALL, 3; 5NW, 10; 5UD, 6; 5VY, 3; 5LL, 28; 5AMB, 5; 5AJT, 65; 5FC, 6; 5PH, 67; 5ADH, 53; 5ADV, 6; 5JF, 48; 5QY, 62; 5APH, 55; 5UN, 8; 5AJH, 91; 5OQ, 25; 5AJJ, 35; 5HY, 60; 5AKN, 27; 5QL, 2; 5CV, 2; 5SD, 19; 5AKZ, 42.

New O.R.S.'s appointed this month are: 5AFH, 5AMZ and 5LL.

SOUTHERN TEXAS—This was an interesting month in Southern Texas. Mr. Hebert's visit certainly had a wholesome effect on the whole section. It made us feel that the headquarters bunch had not forgotten us. The only regret we have is that he didn't bring the rest of the QST factory with him. We would like to meet them all. He was royally received in all parts of the section and we hope that

these "get-togethers" will mature into a Southern Texas Convention, or better yet, into a West Gulf Convention.

A & M College, our old standby of Tolson days, has started activities again. They have their club going and are handling traffic. Texas University has also organized a radio club. Both schools have some of our best operators as student.

Houston and Galveston are rapidly coming to the front under the able leadership of their newly appointed C.M.'s; 5OX at Houston and 5AHH-5ZF at Galveston. Get in touch with these men for your O.R.S. appointment. 5OX brought laurels to the Lone Star state when he worked Z2AC and took two messages from him. 5ZG-5VY is a student at Rice and will be on little, using his spare time to discharge his duties as D.S.

To Mr. Daniels and the president of the Houston Radio Club, we wish to offer our most hearty thanks for their untiring efforts to entertain A.R.R.L. officials. Houston is synonymous with hospitality.

San Antonio has the sad news to report that G. T. Perry, 5ACU, died November 21, after an illness of several months. Southern Texas offers its sympathy to the bereaved family. His signals are known over the greater part of the country.

L. D. Wall, the D.S., still has transmitter trouble but is expected on shortly. Mr. R. W. Carr, Sr., 5UX, reports that he is holding down the key while R. W., Jr., is at Texas U. Mr. Carr is due our gratitude for his kindness in his part on the program of entertaining visitors during Mr. Hebert's stay.

Brownsville is ably represented by 5EW, a new O.R.S. in the Valley. 5MS is the O.R.S. that put Corpus Christi on the map. 5APM is an O.R.S. in San Marco. Austin is represented by 5ZU, 5FT and 5ALE. The latter two are new O.R.S.'s. El Paso is still inactive, leaving the western business to 5BO at Marathon.

Traffic: 5EW, 46; 5UX, 5; 5OX, 32; 5APM, 19.

CANADIAN SECTION

Developments on the short waves continue to monopolize the attention of Canadian experimenters with greatly increasing message totals due to familiarity with work on these waves. The stations on these waves are reaching out as never before but most of them report terrific interference most of the time due to the congested areas in which they have to work.

Eastern stations are handling Ontario traffic with Europeans and we have hopes before long that a Canadian station will emulate the example set by the Americans, French and English in working New Zealand and Australia.

Since our last report both Montreal and Toronto have had a radio show at which the A.R.R.L. in co-operation with their affiliated club in each city had a booth and gave a demonstration of modern methods of traffic handling and transmitter efficiency showing that a modern low wave amateur transmitter can be operated in very close proximity to a receiving station without causing the slightest interference to reception on the broadcast wave lengths. At this show a large amount of traffic was handled successfully.

At the end of the month the meeting of the Division Managers, Canadian General Manager and A.R.R.L. Field man was held in Winnipeg, full particulars of which meeting will be reported later.

MARITIME DIVISION

W. C. Borrett, Mgr.

Applications for the new official relay stations certificates are coming in to the D. M. and certi-

icates are being issued as fast as possible. The majority of the Maritime amateurs are in a state of rebuilding and therefore traffic has been light. We are now QSO with Maine any day whatsoever.

In Newfoundland things are coming along fine. SAR was in Hartford and became acquainted with our HQ gang and has now lots of gear for amateur work. He will be found on the 125 to 150 meter band ready for amateur traffic. He already is QSO Halifax on voice on 225 meters, so should have a splendid signal on 125 for telegraphy. It is pleasing to note that the Newfoundland boys have followed the example of the rest of the Maritimes' in that every ham there with a transmitter big or small is a member of the A.R.R.L., and it is hoped that we will have at least four Newfoundland stations on the air within a few weeks.

NEW BRUNSWICK—1EI is still leading night owl and can be heard almost any night on 140 meters handling traffic. 1AM also is one of our best new stations and has handled much traffic. 1AI of Millerton also will be an O.R.S. from now on. 1AK of St. John, who also is an R.I., is our latest N.B. station to become an O.R.S. Other N.B. stations are in a state of rebuilding.

NOVA SCOTIA—One new station has been reaching out considerably well, 1DM, of Caledonia, who has been reported in England on several occasions this month. 1AR as usual is on the job and is heard all the time in the Canadian west and has done considerable trans-ocean work. 1EF, 1DD and 1DQ are heard most on 135 meters and have been on steadily for the last month. 1EB and 1DJ should be on at any time. The European stations are very QSA every morning and there is nothing to working them these days. For the purpose of avoiding QRM, the Maritime stations use 125 to 150 meters, our exclusive Canadian wave band, for the purpose of Trans-Canada and Trans-Ocean communication. Look for them there any night after 0230 G.M.T.

ONTARIO DIVISION

C. H. Langford, Mgr.

The best publicity stunt for the A.R.R.L. for some time has been put over by the Toronto gang. This was the working of an amateur transmitter in a booth at the recent Toronto Radio Show, and having the Radio Inspector at his desk in the same booth.

A real snappy A.R.R.L. exhibit was put in with the transmitter of 3VH. Although working under great local difficulties, the station at the show handled over 200 messages. The proximity of the Radio Inspector, who had his desk in the same booth, occasioned much surprise, judging by remarks of the B.C.L's. 3WV reports his station reaching out on the new antenna system. Things are rather quiet in Kitchener district, and 3ADU reports most stations out of commission. 3ZB has been appointed C.M. for St. Catharines. St. Thomas is having difficulty in keeping the gang on the air. 3NI reports reconstructed station with new 82 foot mast. We now have a station in Kenora, call 3AR. 3HP has started up on a fiver at Port Arthur. It is reported there are three stations on the air in Ottawa, 3CC, 3GV and 3AFP. 3YY is ready for traffic. Kingston is represented by 3NF, 3HE, 3AFZ and 3AEL. 3XI is doing real DX, also having been heard by NZ 4AA. 3AD is off the air for a rest. 3TB, 3LW and 3XN are on low waves.

Traffic: 3NI, 3; 3ADU, 3; 3QO, 4; 3MV, 30; 3FC, 31; 3WV, 8; 3CO, 97; 3GK, 6; 3KQ, 20; 3LY, 80; 3AEC, 85; 3VH, 204; 3BJ, 48; 9AL, 104; 3IA, 9; 3XN, 3; 3LW, 6.

QUEBEC DIVISION

J. V. Argyle, Mgr.

The last two months have seen all Quebec records broken by this season's O.R.S's. October saw the traffic totals shoot skyward and reach a higher mark than ever before, and every message was a real message. November saw the DX records smashed by the combined assaults of 2BN, 2BE and 2CG. 2BN, in one week, worked across the England 6 times and to France once. He also reports (though as yet unconfirmed) the reception of Z4AA. 2CG, in one week, worked with France once and with England nine times. 2BE has had a jinx in his tracks making him hit the hay each night five minutes before the Europeans begin the good old call



Mrs. D. G. Sturgess of c2CN
Said to be the first Canadian OW.

"A.R.R.L." He beat the jinx once, however, and got across nicely. Britishers worked 2OD, 2NM, 2SZ, 5NN, 2WJ, 5LF, 2JF, and Frenchmen 8BF and 8SM.

A time distance record was made by 2CG, who took a message from G2NM addressed to C5CN, gave it to 9BM, thence to C5CN and reply back in 2CG's hands in forty minutes. Unfortunately, G2NM had gone to breakfast, so it ended at 2CG for two days.

2BE worked all districts in one night with time to spare, this included two sixes. 2BG is rarely on the job, due to business pressure. 2AU reports traffic light but everything going smoothly. 2AG is not yet working consistently.

Applications for O.R.S's are being received, but not all can be granted. O.R.S's must be good operators and must have a station that stays put.

Montreal received a visit from Gowan (C9BC), who was escorted around the stations and gave us news of our Ontario brothers.

At the meeting held at the residence of 2AU, at which were present all the leading Quebec amateurs, a resolution was unanimously passed declaring this division opposed to the idea of a separate Canadian Relay Organization, and urging the D.M. in attendance at the Winnipeg All-Canadian D.M.'s Conference to express this feeling as strongly as possible and to do his utmost in the endeavor to heal the breach between the Manitoba amateurs and the rest of Canada.

After listening to the Britishers working New Zealand these mornings, several of the gang have taken a vow not to call "CQ" until that land has been added to our list of Countries worked. Hi!

To those whose stations do not receive mention this month a reminder is given that only official relay stations may receive this consideration. You can become one of this group if your station and the operators fulfil the requirements shown on the application form. If you want this form, write the D.M.

VANCOUVER DIVISION

A. J. Ober, Mgr.

All Vancouver district stations please make their reports to Mr. Wm. Rowan of 5GF, who is now D.S. With 5CT logging Z4AG two or three times, it looks like we'll soon be QRV for traffic that way. Mr. P. Black of 5HC Prince Rupert is D.S., and is stirring things up. Active stations in this district please get in touch with him for all information in regard to League work.

ALBERTA—Another big meeting was pulled off in Calgary on the 10th, some twenty-five members being present. The initiations were certainly well put on, and the Calgary Hams are to be congratulated. 4GT has moved to new quarters, and with a single wire has worked into the 9th district. 4AB is not on much, but squeezed through five msgs. 4IO's musical voice has been filling the ether from W. W. Grant Broadcasting Station for a few weeks. 4CW says he's selling out. The O.W. at 4DQ keeps traffic moving and has been logged in Hawaii. 4AX hands in a good traffic report.

Traffic: 4AX, 11; 4IO, 17; 4AB, 5; 4DQ, 11.

VANCOUVER—The new D.S., Mr. Rowan, is on the job and has things moving in great shape now. All coast stations are going fine. Traffic is picking up, and a lot of new O.R.S's are coming on each night. 5AS kicks out FB being logged in Hawaii and U2KK. 5GO is testing on 80 meters, and says too much QSS. 5BZ is handling traffic in great shape. 5GF on 80 meters says hard to raise anyone, and wants to run schedules with eastern stations on about 125-30 meters. Please QSL him if interested. 5AN took part in a relay from G2NM to west coast, and handled his end like an old timer. (FB, OM—D.M.) 5AH is clearing traffic. All those wanting O.R.S. appointments please get in touch with your D.S.

Traffic: 5AN, 11; 5AH, 3; 5GF, 9; 5BZ, 8; 5GO, 26; 5AS, 17.

VANCOUVER ISLAND—5CT logged Z4AG a few times. 5AY of River Jordan is a new O.R.S. and will clear his way. 5HK is going strong now, and better DX.

Traffic: 5CT, 11; 5HK, 2.

EDMONTON—4JF is on the air now with a 5 watter and getting out in great shape. 4HF had the misfortune to have his pole blown down in one of those western blizzards, but will replace it at once.

PRINCE RUPERT—At last we have a live D.S. here, who is prodding things along and will have a good report for next month.

WINNIPEG DIVISION

J. E. Brickett, Mgr.

SASKATCHEWAN—Nothing very much doing in this Province. 4AV, 4HH and 4AO, are the only stations operating. Traffic is very poor and QRM has not let up yet.

4CB is too busy to operate a set. 4AX has opened his transmitter and is getting out good. 4DS has his aerial nearly erected. 4CV is leaving town and will not be on this winter.

No report from Winnipeg except that the boys seem to be on, and traffic is only handled on short waves.

Calls Heard



IMPORTANT NOTICE

Please co-operate with us, OM's, and follow these rules in preparing your calls heard lists.

1. Make the list in numerical order according to districts and arrange each district alphabetically. Exactly as the lists shown herewith.

2. Use commas between calls and print or type with double spacing—Skip a line between lines.

3. The list must be in our hands on the first of the month preceeding month of publication, giving calls heard the previous month. State period of reception.

4. Leave out all stations worked for the month on which you are reporting except the one that represents your best dx for that month. Insert it in the proper place with an asterisk on either side; viz., *9PDQ*.

S. K. Lewer, 6LJ.

32 Gascon Ave., West Hampstead,
London, N.W.6 England.
(Oct. 20—Nov. 20).

1aac, 1aaf, 1aaj, 1abf, 1abt, 1aex, 1af, 1aid, 1aja, 1ajg, 1ajw, 1ana, 1anp, 1are, 1asi, 1ati, 1awu, 1aww, 1bce, 1bdt, 1bgq, 1bie, 1bio, 1bkq, 1bkr, 1bmd, 1bnw, 1bqi, 1bsd, 1bvs, 1bvl, 1cak, 1cbg, 1ccx, 1cln, 1cmp, 1crn, 1dd, 1dm, 1er, 1gv, 1gy, 1li, 1kc, 1kz, 1my, 1ow, 1pl, 1py, 1sf, 1sw, 1wl, 1xav, 1xw, 1xz, 1zw, 2afp, 2ajd, 2ana, 2au, 2bbn, 2bg, 2bkg, 2bq, 2brb, 2bum, 2coz, 2cty, 2cvu, 2cvj, 2cxw, 2dn, 2fd, 2ku, 2ld, 2mc, 2mz, 2ra, 2vp, 2wr 2xab, 2xq, 2zo, 3adb, 3add, 3aha, 3ajd, 3aji, 3bco, 3bdo, 3bh, 3bhc, 3bhf, 3bnp, 3bss, 3bva, 3bw, 3bwt, 3cch, 3chg, 3cj, 3ejn, 3ekj, 3gc, 3mz, 3qv, 3sd, 3sf, 3sw, 3te, 3vu, 3vw, 3wb, 3xt, 3xz, 4ce, 4ch, 4cl, 4cw, 4fz, 4io, 4ku, 4nw, 4oa, 4qf, 4rr, 4sa, 4ti, 4uw, 4xx, 5agj, 5ail, 5ar, 5cn, 5cc, 5hl, 5mi, 5ox, 5oz, 5ps, 5ux, 5zab, 6agk, 6arb, 6bj, 6b, 6bur, 6pl, 7abb, 7ob, 7wm, 8abm, 8aey, 8ah, 8al, 8amr, 8aol, 8atp, 8bau, 8bpl, 8bpu, 8bxf, 8ccr, 8eel, 8eko, 8eme, 8exh, 8gz, 8pf, 8pl, 8qu, 8sp, 8wo, 8zd, 8zg, 9abf, 9bcd, 9bci, 9bda, 9bhx, 9hol, 9hsr, 9hu, 9cce, 9cii, 9cjc, 9dk, 9dqu, 9eky, 9eld, 9em, 9ld, 9re, 9ts, 9xbz, 9yv, 9kf, wgh. Canada: 1ar, 1do, 2ax, 2cg, 2hn, 3bp, vdm. Mexico: 1b. New Zealand: 2ac, 4aa, 4ag, 4ak. Australia: 3bq. Receiver—single tube. QRV hr 100 mtrs. Hw?

L. F. Aldous, G2ACX.

48 Harpenden Rd., West Norwood, London, England.

1aac, 1aau, 1ajw, 1ana, 1aou, 1arn, 1ati, 1aww, 1bco, 1bdt, 1bep, 1bgq, 1bko, 1boa, 1bsd, 1cak, 1cmp, 1crn, 1dc, 1er, 1kc, 1mb, 1ow, 1sf, 1sw, 1xav, 1xz, 2ana, 2afp, 2atm, 2bkg, 2brb, 2cel, 2cvu, 2ev, 2cvu, 2me, 2mu, 2ud, 2vr, 3adp, 3ajd, 3bco, 3bdo, 3be, 3bfe, 3bg, 3bhv, 3bhf, 3btu, 3bwt, 3chl, 3cdz, 3chg, 3ejn, 3eia, 3gc, 3qv, 3sf, 3vw, 4fg, 4fs, 4io, 4jr, 4ou, 4rr, 4sa, 4ti, 5hl, 5uk, 5bau, 5bjv, 5bpl, 5eko, 5gz, 5nb, 5sp, 5ar, 5idd, 5zbe, 5zcg.

N. S. Bafuley, G2NB.

94 Ribblesdale Road, Streatham, London, S.W. 16, England.

1aa, 1aac, 1cg, 1cmp, 1ck, 1co, 1cr, 1cvj, 1ean, 1kc, 1sf, 1sw, 1xag, 1xax, 1xj, 1xw, 2ay, 2gk, 2mu, 2xay, 3acc, 3bta, 3chc, 3chr, 3cy, 3kv, 4ku, 4nk, 4xa, 4xe, 5tr, 5cdt, 5nb, 5pl, 5eky. Canadians: 1al, 1ar, 1dd. New Zealand: 4aa, 4ag, 4ak.

QST FOR JANUARY, 1925

L. H. Thomas, G6QB,
33 Harpenden Road, W. Norwood, London, S.E. 2Y.

1aac, 1aal, 1ad, 1ajg, 1anr, 1ati, 1azm, 1bdt, 1bgq, 1bkq, 1bma, 1bvl, 1ckp, 1er, 1fd, 1gv, 1kc, 1mo, 1sf, 1zav, 2aay, 2ag, 2ana, 2ann, 2bbn, 2bkg, 2bo, 2bny, 2cpm, 2eqz, 2cyw, 2ku, 2ld, 2mu, 2pd, 2rn, 3bco, 3bta, 3cgj, 3cin, 3fs, 3hs, 3kd, 3qv, 3sf, 3su, 3wb, 4af, 4ti, 4rr, 5en, 5hl, 5ml, 5at, 5aly, 5bau, 5bjv, 5eel, 5eyl, 5dma, 5dmt, 5nb, 5aac, 5abg, 5efl, 5ell, 5eid, 5lar, 5ldq, 5zbg, 5zmv.

J. Allan Cash, G2GW.

"Fokley Mount," Lymn, Cheshire, England.

1al, 1apc, 1ar, 1cmp, 1dq, 1gv, 1ka, 1my, 1sf, 1tz, 1xae, 1zk, 2afp, 2ann, 2bc, 2cgj, 2erp, 2cvj, 2cvu, 2cxw, 2hx, 2xmw, 3cbx, 3chc, 3cin, 3zo, 3zp, 4che, 4sa, 5add, 5bit, 5bpv, 5bsn, 5eck, 5agt, 5aol, 5bzw, 5cjc, 5kf, 5ag, 1b.

H. E. Nicholson, G6VP.

42 Souttsea Avenue, Watford, Herts, England.

1aur, 1be, 1bge, 1bq, 1brb, 1er, 1jw, 1kc, 1ld, 1se, 1sw, 1xw, 1xav, 2ay, 2bkg, 2brb, 3bdo, 3bge, 3bqu, 3btu, 3chl, 3cdg, 3hh, 3jw, 3vw, 3vyl, 5nb, 5xs.

Alfred D. Gay, G6NF.

49 Thomlau Rd., West Norwood, S.E. 27, London

1aam, 1anr, 1aww, 1awx, 1alf, 1bi, 1bq, 1bdt, 1bgt, 1bgq, 1bjo, 1bip, 1dm, 1er, 1gv, 1li, 1km, 1mu, 1ow, 1sf, 1sw, 1xap, 1xav, 1yw, 1zv, 1zz, 1bfn, 2act, 2aft, 2ana, 2awf, 2aw, 2bo, 2bbn, 2bxm, 2apy, 2gk, 2pd, 2cvj, 2ady, 3auv, 3bco, 3bdo, 3bsh, 3bh, 3mb, 3qv, 4ao, 4bs, 4bx, 4fg, 4fz, 4io, 4km, 4uf, 4rr, 4sa, 4xe, 4xx, 5ajj, 5go, 5aly, 5bau, 5ddq, 5dsw, 5eko, 5aol, 5amr.

Mr. Pierre Auschitzky, F8CT.

Villa Cycamen, Arcadon, Gironde, France.

1bep, 1xav, 1ajw, 1are, 1cin, 1xw, 1aal, 1aac, 1gv, 1sz, 1bvl, 1bhn, 1bkr, 1kc, 1cmp, 1bq, 1bie, 1bsn, 1my, 2brb, 2mu, 2agw, 2abd, 2aay, 2cel, 2pd, 2gk, 3bdo, 3ayd, 3bg, 3be, 4ty, 4sa, C9ch.

René Buriet, F8CS.

4 Rue Tarbe, Reims (Marne), France.

1abf, 1ajw, 1abt, 1aur, 1ahl, 1aja, 1aaj, 1aiu, 1aau, 1abs, 1aae, 1aww, 1ach, 1ajg, 1bdt, 1bko, 1bip, 1bgq, 1bva, 1bco, 1bvl, 1bce, 1boa, 1bsd, 1bie, 1cak, 1cmp, 1cin, 1ckk, 1clg, 1cg, 1eme, 1ekp, 1er, 1fd, 1ga, 1gv, 1li, 1kc, 1mo, 1mi, 1my, 1ow, 1pl, 1xw, 1xz, 1zab, 1xav, 2abd, 2aay, 2ad, 2ana, 2afp, 2brb, 2brc, 2bkg, 2bcw, 2cel, 2cyw, 2cvu, 2cty, 2cvj, 2gk, 2ku, 2mc, 2mu, 2pd, 2ud, 2btu, 3ajd, 3aix, 3ade, 3be, 3bfe, 3bwj, 3bwt, 3bwp, 3bco, 3bdo, 3bch, 3ecj, 3ejn, 3chg, 3ckj, 3cdg, 3hs, 3gc, 3me, 3te, 3qv, 3vv, 3xx, 3og, 3sd, 3qn, 4en, 4ku, 4jr 4io, 4un, 4ti, 4xe, 4rr, 4xx, 4sa, 4amw, 4ado, 4apu, 5cn, 5hl, 5uk, 5pu, 6bar, 5aly, 5alt, 5bpl, 5bxm, 5ccr, 5ccq, 5eel, 5eml, 5eko, 5sz, 5nb, 5pl, 5sp, 5wo, 5zz, 5np, 9bci, 9bhx, 9cja, 9cjc, 9da, 9dqu, 9elb, Canadian 1ar, 1dd, 2be, 2bg, 2cg, 3vh, 2ax, New Zealand 4aa, 4ag, 2ac.

Mr. Coureur, Belgian P2.

Villa Marthe, Watermael, Brussels, Belgium.

1sf, 1xam, 1my, 1ccx, 1xw, 1bip, 1bie, 1bvs, 1cg, 1kl, 1clg, 1aja, 1aan, 1ajl, 1adf, 1kc, 1km, 1mi, 1cmp, 1bgq, 1aww, 1bkq, 1bsd, 1ce, 1ew, 1ar, 1cvs, 1pl, 1gv, 1anr, 1ajp, 1bio, 1abf, 1xav, 1abu, 1ck, 1mo, 1ow, 1dq, 2cia, 2brc, 2cvs, 2kf, 2adi, 2axf, 2ud, 2bco, 2ana, 1cel, 2chk, 2brb, 2vru, 2adh, 2eyn, 2cvu, 2bkg, 2bo, 2bbn, 3cm, 3chc, 3aay, 3cy, 3cc, 3hf, 3auv, 3by, 3zw, 3en, 3btu, 3bhf, 3chl, 3bco, 3bdo, 3chg, 3scj, 3bwi, 3of, 3gc, 3ckj, 3adb, 3aji, 3adt, 3bkg, 3te, 3sf, 3ejn, 4xe, 4cin, 4du, 4rr, 4ku, 4ti, 4io, 4bma, 4fz, 4ed, 4jr, 4abn, 5cn, 5hl, 5np, 5nc, 5eko, 5gg, 5bau, 5pl, 5gc, 5aou, Canadian 1ar, 1dd, New Zealand 2ac, 24aa.

Ing. Sant Angeli Mario, 1ERI.
(5) S. Eufemia 19, Milano, Italy.

1az, 1ajp, 1aww, 1bd, 1bf, 1bgq, 1bkq, 1boa, 1bsd, 1cak, 1cgg, 1j7r, 1ckx, 1cmp, 1dd, 1fd, 1kc, 1mc, 1mo, 1my, 1rp, 1se, 1sx, 1yb, 1yw, 1zz, 2aa, 2ay, 2ad, 2aet, 2ana, 2awj, 2bq, 2bdo, 2bej, 2bge, 2bmb, 2bsb, 2cgl, 2cyw, 2kij, 2mu, 2xq, 2aha, 2ajd, 2be, 2bdo, 2btu, 2fs, 2kd, 2mb, 2qv, 2vw, 2aj, 2bq, 2fs, 2rr, 2skq, 2tt, 2zas, 2bkh, 2duq, 2mz, 2cjc, 2kf, 2fv, 2kda, 1pz, 2an, 2bq, 2aut, 2md.

Fernando Castano, EAR2

25 Fernandez de los Rios, Madrid, Spain

1aac, 1aal, 1abq, 1aid, 1aow, 1aur, 1bep, 1bge, 1bkr, 1bok, 1bvb, 1icq, 1lf, 1lgk, 1mb, 1mo, 1ow, 1se, 1vj, 1xax, 1xw, 1ze, 2aay, 2adi, 2aiu, 2arf, 2aww, 2brb, 2cil, 2cgg, 2cu, 2ibf, 2md, 2ry, 2wc, 2xma, 2adp, 2ari, 2bdo, 2btu, 2cdg, 2cia, 2oa, 2wb, 2au, 2cu, 2sa, 2ti, 2ty, 2xet, 2zd, 2zy, 2q, 2zm, 2ava, 2bfe, 2ce, 2br, 2cjl, 2df, 2dty, 2nu, 2canada: 1ar, 1bq, 2cg, 2rs, 2QRK my 250 watt. 2QRH, 100 to 120 mts.

SMZS, Stockholm, Sweden

1sf, 1cmp, 1ck, 2bfo, 2wb, 2cab, 1gw, 2az, 1awf, 1bco, 1my, 1pl, 1gv, 1tc, 1abf, 2tj, 2sl, 2aod, 2bse, 2bss, 1ana, 2rm, 1bhg.

Edwin H. Vignoles, rMA4.

San Martin 92, Mendoza, Argentina.

1er, 1fd, 2brb, 2rk, 2nj, 2uk, 2age, 2apw, 2arh, 2bur, 2cgo, 2cax, 2cgg, 2csw, 2sa, 2td, 2fr, 2mf, 2gd, 2dxn, 2canadian, 2ly, 2New Zealand, 2aa, 2x3aa.

F. N. Leverrier, A2BK.

"Lorette" Wentworth Rd. Vaucluse, Sydney, Australia

1aro, 2akn, 2abc, 2abe, 2agk, 2ahu, 2aom, 2avo, 2bfr, 2ebb, 2cwx, 2chl, 2chu, 2nfe, 2sf, 2adk, 2dm.

Major R. Raven-Hart, 9TC.

Los Andes, Chile.

1gv, 1sf, 4er, 2agn, 2hp, 2abk, 2bep, 2cgg, 2cto, 2gt, 2hm, 2eky, 2New Zealand, 2*ac, 2ag, 2ak, 2aa, 2heard 200 watts, 90 meters, working nightly, midnight E. S. T.

F. D. Bell, z4AA.

Palmerston South, New Zealand

1all, 1cmp, 1gv, 1pl, 1xae, 2aay, 2ay, 2brb, 2cge, 2cxy, 2mm, 2rk, 2bco, 2bf, 2bsv, 2cjm, 2lg, 2oe, 2ot, 2te, 2yo, 2fz, 2lo, 2tj, 2aji, 2lh, 2nj, 2ph, 2pn, 2se, 2sa, 2cgo, 2avd, 2avi, 2alg, 2adg, 2ad, 2arb, 2amm, 2apw, 2cby, 2bol, 2bur, 2btf, 2bfi, 2brf, 2buc, 2bjj, 2bbh, 2cto, 2enf, 2eer, 2enf, 2cft, 2gt, 2gu, 2im, 2pl, 2rn, 2ti, 2vo, 2xad, 2abb, 2tk, 2sf, 2bf, 2bf, 2uf, 2xs, 2ar, 2ce, 2dy, 2eky, 2ejy, 2hk, 2nv, 2canadian 1ar, 2cn, 2go, 2chil, 2fall, 2tc, 2mexican 1b, 2argentina, 2ob, 2france, 2og, 2miscellaneous, 2wgh, 2ut, 2nt, 2kf, 2bandoah.

LABC on S/S Swiftscout

Oct. 18th. (1040 miles SSE San Diego) 2ael, 2ov, 2ph, 2apw, 2rm, 2vc, 2abn, 2cfl, 2cjl, 2cip, 2zt.

Oct. 21st. (1700 SE San Diego) 1sf, 2cjl, 2bta, 2mo, 2xe, 2ac, 2ajj, 2in, 2ml, 2ph, 2uk, 2apw, 2adt, 2bka, 2lj, 2arp, 2byn, 2cdt, 2zy, 2cjc, 2mc.

Oct. 22nd. (1920 SE San Diego) 2zk.

Oct. 24th. (2360 SE San Diego) 1ajp, 1sf, 1zad, 2eq, 2ame, 2ve, 2eel, 2cap, 2cjl.

Oct. 26th. (in Panama Canal) QRN bad but got 2bg, 2ov, 2fm, 2xbe, 2bhx, 2bvz.

Nov. 19th. (150 NNE Canal) 1arz, 1afc, 1cmp, 1kx, 1rp, 2bqu, 2brb, 2cpa, 2amu, 2xq, 2bmn, 2bfo, 2cdv, 2chg, 2ed, 2ch, 2ak, 2ku, 2sz, 2aey, 2bhx, 2bvz, 2cjc, 2dqu, 2zt. Canadian: 2ax, 2NKF.

By C. R. Simmers, ulPO, quarters L. U. S. Navy Yard, Boston, Mass., Det only

U. S. 2bfe, 2jn, 2al, 2al, 2bq, 2ch, 2ch, 2fz, 2io, 2jr, 2ke, 2or, 2rr, 2sl, 2tj, 2uk, 2xe, 2aef, 2agj, 2ail, 2amh, 2ams, 2ek 2lh, 2ml, 2qy, 2uk, 2ame, 2bka, 2bnt, 2ij, 2abb, 2ada 2adq, 2aex, 2ah, 2ajj, 2aly, 2apn, 2aru, 2ayn, 2bau, 2bbf, 2bge, 2bgn, 2bhn, 2bqa, 2bqr, 2brx, 2buk, 2bvr, 2bvu, 2byn, 2bcp, 2cel, 2ekd, 2ddq, 2dhw, 2dft, 2ef, 2fm, 2gz, 2bz, 2qn, 2ry, 2st, 2uf, 2vt, 2xb, 2ze, 2zg, 2zk, 2auf, 2aio, 2ap, 2ans, 2apt, 2axx, 2baj, 2bkl, 2bgn, 2bge, 2bso, 2bht, 2bhv, 2bhx, 2bie, 2biq, 2bku, 2bmk, 2bmu, 2bmz, 2bu, 2bvz, 2bye, 2ccm, 2ccm, 2cjl, 2cjc, 2cch,

2cjl, 2cip, 2cjc, 2cmn, 2cp, 2cyd, 2dak, 2dbf, 2det, 2dea, 2dzf, 2dlw, 2dng, 2dqu, 2duk, 2efz, 2eht, 2egh, 2eky, 2eld, 2vz, 2za, 2zt. Canadian: 1ar, 1dd, 1dm, 1dq, 2be, 2bg, 2cg, 2dh, 2ly.

1HN, 92 Brookline Ave., Hartford, Conn.,

1 Tube, A. C. on Filament

4bx, 4ch, 4ck, 4cl, 4do, 4dy, 4eg, 4eh, 4eq, 4fs, 4io, 4jk, 4jr, 4ku, 4mi, 4my, 4or, 4oy, 4rt, 4sb, 4sl, 4su, 4uk, 4zd, 4bj, 4ek, 4er, 4fv, 4hl, 4in, 4ke, 4lu, 4ml, 4nw, 4ox, 4ph, 4ql, 4rn, 4se, 4uj, 4wi, 4xa, 4aaq, 4ach, 4adv, 4adw, 4aef, 4aek, 4afs, 4aru, 4agn, 4ahd, 4alz, 4aom, 4ape, 4api, 4aqw, 4arj, 4zas, 4zav, 4bb, 4eb, 4cg, 4gt, 4ij, 4ol, 4rm, 4aig, 4abk, 4aji, 4akw, 4alo, 4ame, 4apw, 4awt, 4blw, 4bql, 4bra, 4bur, 4cgo, 4chl, 4cto, 4tk, 4ip, 4pm, 4*mf, 4ain, 4bk, 4ce, 4dq, 4el, 4ek, 4em, 4er, 4fj, 4hk, 4hx, 4jc, 4jh, 4il, 4mc, 4mf, 4mm, 4mw, 4ny, 4of, 4ox, 4tw, 4vc, 4vz, 4xi, 4yb, 4zt, 2aaw, 2aad, 2aci, 2adq, 2aek, 2aji, 2afy, 2agj, 2ahq, 2aio, 2aim, 2ala, 2amb, 2amt, 2aod, 2aou, 2ape, 2aqa, 2ato, 2atu, 2auc, 2awf, 2awu, 2axf, 2axs, 2baj, 2bge, 2ben, 2bfi, 2bga, 2bhs, 2bht, 2bhx, 2bjj, 2bjr, 2bka, 2bkl, 2bkr, 2bkg, 2bms, 2bmz, 2bnk, 2boh, 2bfm, 2bun, 2bvt, 2bun, 2bva, 2bvt, 2bvu, 2bwb, 2bxx, 2bxj, 2bzi, 2cbl, 2cck, 2ccm, 2cdv, 2ceb, 2cee, 2cej, 2cfl, 2cfd, 2cip, 2cjb, 2cjc, 2cjs, 2cju, 2ckl, 2clx, 2cpm, 2crr, 2csn, 2cvi, 2cvg, 2cvh, 2cwl, 2cvo, 2cvs, 2cyb, 2cyd, 2czv, 2dac, 2dat, 2dbm, 2dbp, 2dcl, 2ddp, 2deb, 2dqf, 2dhd, 2dhq, 2dix, 2djin, 2dkc, 2dkh, 2dks, 2dit, 2iw, 2dmk, 2dms, 2dng, 2dph, 2dpu, 2dpz, 2dqu, 2drc, 2drs, 2dtk, 2dtt, 2duc, 2dud, 2dvi, 2dwl, 2dwx, 2dxi, 2dxn, 2dyt, 2eas, 2eel, 2efc, 2efh, 2egg, 2ehf, 2eh, 2ejj, 2ejy, 2elb, 2eld, 2ell, 2ely. Canadian: 2bft. Cuban: DZ.

Calls Heard at 1BIS.

J. A. Baker, Claremont, N. H.

4ag, 4ai, 4bq, 4bw, 4ch, 4cl, 4du, 4eh, 4eq, 4fs, 4fz, 4io, 4jk, 4jr, 4ku, 4mi, 4my, 4or, 4oy, 4rt, 4sb, 4sl, 4su, 4uk, 4zd, 4bj, 4ek, 4er, 4fv, 4hl, 4in, 4ke, 4lu, 4ml, 4nw, 4ox, 4ph, 4ql, 4rn, 4se, 4uj, 4wi, 4xa, 4aaq, 4ach, 4adv, 4adw, 4aef, 4aek, 4afs, 4aru, 4agn, 4ahd, 4alz, 4aom, 4ape, 4api, 4aqw, 4arj, 4zas, 4zav, 4bb, 4eb, 4cg, 4gt, 4ij, 4ol, 4rm, 4aig, 4abk, 4aji, 4akw, 4alo, 4ame, 4apw, 4awt, 4blw, 4bql, 4bra, 4bur, 4cgo, 4chl, 4cto, 4tk, 4ip, 4pm, 4*mf, 4ain, 4bk, 4ce, 4dq, 4el, 4ek, 4em, 4er, 4fj, 4hk, 4hx, 4jc, 4jh, 4il, 4mc, 4mf, 4mm, 4mw, 4ny, 4of, 4ox, 4tw, 4vc, 4vz, 4xi, 4yb, 4zt, 2aaw, 2aad, 2aci, 2adq, 2aek, 2aji, 2afy, 2agj, 2ahq, 2aio, 2aim, 2ala, 2amb, 2amt, 2aod, 2aou, 2ape, 2aqa, 2ato, 2atu, 2auc, 2awf, 2awu, 2axf, 2axs, 2baj, 2bge, 2ben, 2bfi, 2bga, 2bhs, 2bht, 2bhx, 2bjj, 2bjr, 2bka, 2bkl, 2bkr, 2bkg, 2bms, 2bmz, 2bnk, 2boh, 2bfm, 2bun, 2bvt, 2bun, 2bva, 2bvt, 2bvu, 2bwb, 2bxx, 2bxj, 2bzi, 2cbl, 2cck, 2ccm, 2cdv, 2ceb, 2cee, 2cej, 2cfl, 2cfd, 2cip, 2cjb, 2cjc, 2cjs, 2cju, 2ckl, 2clx, 2cpm, 2crr, 2csn, 2cvi, 2cvg, 2cvh, 2cwl, 2cvo, 2cvs, 2cyb, 2cyd, 2czv, 2dac, 2dat, 2dbm, 2dbp, 2dcl, 2ddp, 2deb, 2dqf, 2dhd, 2dhq, 2dix, 2djin, 2dkc, 2dkh, 2dks, 2dit, 2iw, 2dmk, 2dms, 2dng, 2dph, 2dpu, 2dpz, 2dqu, 2drc, 2drs, 2dtk, 2dtt, 2duc, 2dud, 2dvi, 2dwl, 2dwx, 2dxi, 2dxn, 2dyt, 2eas, 2eel, 2efc, 2efh, 2egg, 2ehf, 2eh, 2ejj, 2ejy, 2elb, 2eld, 2ell, 2ely. Canadian: 2bft. Cuban: DZ.

Calls Heard at 2EQ.

75 Prospect Park West, Brooklyn, N. Y.

1aae, 1abt, 1ary, 1ann, 1aom, 1awe, 1eg, 1cmf, 2bhv, 2bmn, 2dk, 2al, 2cs, 2du, 2ed, 2ke, 2ku, 2mi, 2sl, 2agj, 2ail, 2amh, 2be, 2hl, 2mb, 2ph, 2uk, 2vz, 2bqr, 2wi, 2ag, 2ay, 2bf, 2bkh, 2bgv, 2bqa, 2bqr, 2boy, 2caz, 2cer, 2cz, 2dfl, 2dpm, 2dmt, 2dgo, 2aod, 2axs, 2bq, 2bvt, 2det, 2dw, 2dpm, 2xhp, 2xi, 2zd. All cards answered.

2AGM, Charles C. Fingar, Jr., Hudson, N. Y.

2buv, 2bwt, 2cel, 2hg, 2lg, 2tf, 2tr, 2uz, 2amf, 2ft, 2ag, 2ahq, 2aj, 2alg, 2alk, 2aly, 2amf, 2anb, 2apn, 2ayv, 2bbw, 2bmy, 2bmi, 2bqi, 2bby, 2bde, 2ced, 2cjp, 2cpk, 2ct, 2cvs, 2cwl, 2dan, 2dat, 2ded, 2ado, 2doi, 2dpm, 2ga, 2il, 2kj, 2sz, 2*aci, 2adk, 2afw, 2afy, 2bji, 2bhk, 2bvd, 2cpm, 2et, 2eyd, 2czk, 2dap, 2dlw, 2dnt, 2efz, 2em, 2mm, 2rc. Can.: IAR.

Calls Heard 2CVU

1219 Wheeler Ave., Bronx, N. Y. City

2aaq, 2aex, 2age, 2agn, 2ahh, 2ajj, 2aiu, 2ajb, 2ajh, 2ajj, 2ame, 2ek, 2fj, 2hl, 2in, 2lh, 2nu, 2oc, 2ox, 2rh, 2uj, 2uk, 2ad, 2afz, 2agk, 2ahp, 2aji, 2aku, 2akz, 2alk, 2alv, 2ame, 2ao, 2apw, 2arb, 2arz, 2avr, 2awt, 2bhv, 2bcl, 2bep, 2ber, 2bdt, 2bez, 2bjj, 2bjx, 2bka, 2blw, 2bny, 2bqb, 2bql, 2bqr, 2bra, 2brf, 2bse, 2bur, 2buz, 2cae, 2cdn, 2cfl, 2cgl, 2cgo, 2cie, 2civ, 2cix, 2cmi, 2cmu, 2cni, 2ces, 2cto, 2eb, 2fh, 2fy, 2gt, 2ij, 2of, 2oi, 2rm, 2vc, 2vo, 2xi, 2zp, 2abb, 2ahl, 2fd, 2gb, 2gr, 2ot, 2rd, 2wm, 2zm. Canadian: 2fy, 2an, 2go. English: 2zm, 2zt. New Zealand: 2aaa, 2ag. Australia: 2cm, 2bq. Mexican: 2x, 1b. Cuban: 2z, 2oz.

4ch, 4eh, 4io, 4jr, 4oa, 4of, 4ux, 4zd, 5aaq, 5ags, 5ajb, 5am, 5amh, 5amw, 5ek, 5in, 5jf, 5ka, 5mi, 5oq, 5ov, 5ql, 5rh, 5se, 5uc, 6adt 6agk, 6ahp, 6aiv, 6akw, 6apw, 6ase, 6awt, 6bfr, 6bie, 6bjt, 6bjx, 6bon, 6cgo, 6cgw, 6cix, 6cmu, 6cni, 6cwr, 6gg, 6ji, 6of, 6oi, 6vc, 6xi, 7fd, 7fq, *7gm*, 7gr, 7mf, 7abb. New Zealand: 4aa, 4ag, 4ak, 2ac. Australia: 2cm.

4jf. 4uf. 4us4mb. 4my. 5ac. 5abn. 5adf. 5ads. 5adv.
5ack. 5af. 5an. 5avg. 5air. 5as. *5aw. 5ari. 5gl.
5ov. 5ox. 5oh. 5ru. 5g. 5wk. 5x. 6as. 6ad. 6awt.
6bnn. 6buh. 6bw. 6cl. 6cg. 6cx. 6chx. 6cn. 6er.
6cto. 6cf. 6cg. 6of. 6uo. 6xwi. 7ac. 7agi. 7ahs. 7dh.
7al. 7ahj. 7aog. 7aor. 7att. 7ac. 7aw. 7ay. 7bb.
7beg. 7bmy. 7bqj. 7bnk. 7boe. 7BPT. 7bsp. 7en. 7hva.
7hbx. 7Jcah. 7ces. 7cgn. 7cge. 7Evo. 7dac. 7dd. 7dgk.
7dvm. 7doo. 7dd. 7ejj. 7ehw. 7ky. 7td. 7uz. Canada:
2ct. 3om. 3vv. 4cr. All crds qstg. d. qrk m 5 wtr.

4aa, 4bb, 4ch, 4iu, 4jr, 4ke, 4ku, 4pk, 4sa, 4uk,
4vn, 4xr, 4ac, 4acI, 4acv, 4ax, 4ag, 4ahd, 4ajb,
4am, 4aom, 4apq, 4aw, 4bhn, 4ca, 4cg, 4fv, 4al, 4ca,
5lh, 5lu, 5mi, 5nw, 5og, 5oc, 5o, 5px, 5ph, 6il,
6aj, 6rh, 6se, 6tg, 6ax, 6zav, 6ag, 6ahg, 6anp, 6pl,
6ajh, 6aji, 6akg, 6alo, 6ame, 6aoc, 6apw, 6as, 6bbv,
6bep, 6bji, 6bjh, 6bm, 6bon, 6bql, 6bur, 6ego, 6cgv,
6cix, 6cmi, 6cms, 6cni, 6ctn, 6eb, 6fa, 6fy, 6ji, 6sl,
6of, 6oi, 6rm, 6vf, 6wr, 6xi, 6xvi, 6zp, 6abb, 7afu,
7fd, 7fd, 7fr, 7fr, 7ji, 7ix, 7z, 7mp, 7pm, 7sy,
9aad, 9adq, 9agk, 9ahy, 9aio, 9amx, 9as, 9azr, 9bm,
9bfi, 9bga, 9bgh, 9bht, 9bhx, 9bjb, 9bzj, 9cvm,
9bmx, 9bni, 9bqh, 9brx, 9bso, 9bzg, 9cax, 9cbv,
9ckb, 9cks, 9csa, 9cse, 9ctr, 9cvc, 9cwm, 9cym,
9eyo, 9day, 9dbf, 9dbp, 9deo, 9dev, 9dfa, 9dgv, 9dng,
9dnc, 9dpd, 9dpq, 9dqu, 9drg, 9dsca, 9duj, 9duw,
9dvt, 9enk, 9efo, 9efy, 9efz, 9egz, 9efh, 9eke, 9elb,
9em, 9es, 9hk, 9mf, 9ny, 9oa, 9vz, 9kf, 9ty, 9x, 9ir,
Canada: 1hr, 1dq, 2bc, 2bv, 2cg, 3bp, 5au, 5go, 9bc,
4un, 5hp, 6uo, 6xad, 9dnc, 1px.

1aea, 1aid, 1ana, 1awe, 1axx, 1azy, 1bag, 1bcc,
1bcu, 1bdd, 1bie, 1bip, 1bnd, 1cmp, 1ly, 1zab, 1zat,
1r 4ch, 4eh, 4jk, 4jr, 4sl, 4oa, 4sl, 4ij, 4uk, 4y,
5ac, 5ael, 5aa, 5ak, 5am, 5ano, 5aq, 5en, 5if, 5my,
5se, 5uk, 5wv, 5xc, 5co, 5abm, 5abn, 5add, 5ae,
5agc, 5ajn, 5ady, 5amn, 5ama, 5abl, 5ap, 5app,
5arb, 5auc, 5awb, 5ay, 5bdc, 5bga, 5bll, 5bnp,
5bnj, 5bpk, 5bpl, 5bcr, 5bcr, 5bul, 5bvu, 5bvn, 5bcb,
5cbx, 5ccj, 5ccj, 5ccj, 5ccj, 5ccj, 5ccj, 5ccj, 5ccj,
5ddg, 5dgl, 5dgo, 5dif, 5dio, 5dvn, 5doo, 5dri, 5dpc,
5dan, 5elb, 5eo, 5kc, 5pl, 5sp, 5rg, 5wo, 5xb, 5z,
5zau, 5zbc, 5zdr, 5zdx, 5zen, 5zha, 5zhp, 5zjo,
5zla, 5zpy, 5aur, 5avb, 5avx, 5az, 5azr, 5bcb, 5bck,
5bca, 5bpc, 5bdk, 5bec, 5bgh, 5bhb, 5bhr, 5bbr, 5bbr,
5bkj, 5bkr, 5blg, 5bli, 5bmd, 5bmg, 5bmk, 5bmx,
5bnk, 5bpw, 5bwp, 5bwb, 5bwb, 5bwe, 5bwp, 5bxi,
5cap, 5cbm, 5cbx, 5ceb, 5cej, 5cd, 5cim, 5cip,
5cje, 5ckc, 5ckl, 5clw, 5cpm, 5cvh, 5cxg, 5cdm, 5dgb,
5ddl, 5dr, 5dra, 5drg, 5drc, 5dhs, 5dhr, 5dhy, 5dgn,
5dip, 5djz, 5dit, 5dlw, 5dme, 5dms, 5dnc, 5djd,
5dpw, 5dq, 5drs, 5dte, 5dtk, 5dtt, 5duj, 5dvc, 5dm,
5dvw, 5dwt, 5dz, 5eas, 5efc, 5ek, 5elb, 5el, 5ell, 5em,
5ep, 5exi, 5fj, 5ib, 5mc, 5ny, 5pw, 5tw, 5vk, 5vz,
5wy, 5xi, 5zf, Canadian, 1r, 2ax, CRDS, ANSD.

6aao, 6ac, 6adt, 6age, 6agk, 6ahp, 6aji, 6akw, 6alk,
6alv, 6ame, 6ao, 6apw, 6arb, 6ars, 6aws, 6awt,
6bcr, 6bd, 6bfw, 6bge, 6bij, *6bjx*, 6bka, 6bkb, 6bli,
6bnu, 6bal, 6bqr, 6bga, 6buh, 6bur, 6bui, 6bv, 6bvz, 6cae,
6cad, 6cdn, 6cgo, 6cgr, 6chl, 6cm, 6cmu, 6cmu,
6cni, 6cc, 6ccr, 6eb, 6bi, 6bz, 6ba, 6ba, 6ba, 6ba,
6bf, 6of, 6oi, 6v, 6o, 6xi, 6z, 6abb, 6afo, 6dd, 6fj,
7ab, 7gr, 7hi, 7ot, 7wm, Mexican: 1. English: 1
2kf, 2nm, French: 8ab, 8bf, New Zealand: 2ac,
1aa, 1ag, 1ak,

4ai. 4ci. 4du. 4eh. 4fs. 4fz. 4gw. 4io. 4iz. 4jr. 4ke.
4ox. 4pk. 4qf. 4uy. 4rh. 4rr. 4sa. 4si. 4su. 4ti. 4th.
4ux. 4abn. 4ac. 4ad. 4adh. 4ads. 4aef. 4afu. 4ajn.
4am. 4ame. 4amg. 4amb. 4anh. 4as. 4be. 4cn. 4ek.
4go. 4hl. 4in. 4ij. 4ih. 4ei. 4lu. 4mi. 4mw. 4ox. 4ph.
4ql. 4rh. 4ru. 4se. 4sq. 4sk. 4za. 4zaj. 4aaq. 4adt.

4ai, 4bq, 4cl, 4eq, 4io, 4jr, 4oa, 4pk, 4rh, 4rr, 4tj,
4uk, 5adh, 5ajf, 5afo, 5agj, 5agq, 5ags, 5ail, 5aiu,
5ajh, 5ajj, 5aju, 5alj, 5am, 5ame, 5ame, 5amb, 5amw,
5amw, 5api, 5be, 5cn, 5ek, 5ew, 5ci, 5in, 5ia, 5mi,
5ml, 5ot, 5ov, 5vq, 5ui, 5uk, 5vv, 5wi, 5za, 5zav,
5zao, 5adt, 5agd, 5ahp, 5ajin, 5apw, 5avr, 5bdt, 5bjj,
5bra, 5buh, 5cdn, 5cgo, 5emi, 5emu, 5css, 5cgr, 5of,
5vc, 5vo, 5xbw, 7ot, 9acy, 9ayf, 9aio, 9ap, 9ape,
9axs, 9axx, 9ayi, 9ays, 9ayp, 9azj, 9bcd, 9bcy, 9bhx,
9bie, 9bil, 9bjc, 9bhx, 9bmx, 9buk, 9ac, 9cbz,
9ccm, 9cdo, 9cee, 9cej, 9cir, 9cjl, 9cov, 9ctr, 9dhp,
9det, 9ed, 9dfq, 9dfr, 9dfz, 9djl, 9dlj, 9dtd, 9dpx,
9dqu, 9dvp, 9dxn, 9efh, 9ega, 9ent, 9ehy, 9ej, 9ek,
9eky, 9eld, 9mn, 9ny, 9oa, 9qw, 9vz, 9xi, 9zd, 9st,
Canadian: 1ar, 1dd, 2ax, 2be, 2cg, 3afp, 3fc, 3ly,
3vh, 3vc, 3vf, British: 2nm.

4az, 4bq, 4cl, 4eh, 4fz, 4gw, 4io, 4je, 4ke, 4kk,
4ku, 4mb, 4mi: 4pd, 4pk, 4qf, 4qw, 4rr, 4ti, 4vn
4xe, 4am, 4be, 4bj, 4bn, 4ec, 4hl, 4la, 4kc, 4ih, 4yn
4mi, 4ot, 4ox, 4qn, 4ru, 4se, 4so, 4uk, 4vi, 4vv, 4vs
4w, 4aaq, 4ab, 4acm, 4ac, 4agj, 4alz, 4amg, 4ape
4av, 4ax, 4azv, 4ax, 4cg, 4gu, 4lv, 4oi, 4rm, 4rn, 4sz
4ba, 4bb, 4bbp, 4alv, 4apw, 4arb, 4awt, 4bjj, 4blw
4bl, 4bui, 4buc, 4bucg, 4cenl, 4cet, 4xad, 4xbw
7ij, 7mf, 9at, 9bm, 9dr, 9el, 9ek, 9es, 9fs, 9hp, 9jhw
9kh, 9ld, 9mn, 9nv, 9ny, 9oa, 9ob, 9oc, 9vz, 9za, 9zt
9aan, 9abn, 9ack, 9ad, 9af, 9afy, 9ahy, 9akn, 9amx,
9aor, 9aas, 9att, 9auc, 9avf, 9avy, 9aw, 9bec, 9bda
9beg, 9bhi, 9bik, 9bjj, 9bjr, 9bkr, 9blj, 9bmr, 9bnu
9bna, 9bnb, 9bob, 9boe, 9bpm, 9bul, 9br, 9bvc
9bvn, 9bwb, 9bwp, 9caa, 9cbz, 9cem, 9edp, 9ee, 9efe
9efi, 9egn, 9ecg, 9ejc, 9ejm, 9ekc, 9ekb, 9ekc, 9ekcu
9ekv, 9elc, 9cpm, 9esn, 9etf, 9eur, 9evf, 9evp, 9es
9exx, 9eyd, 9ey, 9dat, 9dhh, 9dbr, 9dfh, 9dhp, 9dlh
9dlj, 9dng, 9dxi, 9dpx, 9dqu, 9dsh, 9dtk, 9dtf, 9dc
9dwz, 9dwz, 9daz, 9eas, 9edq, 9ee, 9eel, 9efc, 9egu
9ehr, 9ehs, 9ehu, 9ehy, 9eji, 9ejy, 9eky, 9ela, 9ell
9xbg, NFV, NKF

Canada: 1ef, 2ax, 2az, 2bq, 2fo, 3bp, 3kq, 3ly
3ms, 3ni, 3tf, 3ws, 3wv, 3xi, 4cr, 9bg. England:
2jf, 2kf, 2nm, 2od, 2sh, 2sz, 6nn. France: 8ab
Mexico: 1b, bx. New Zealand: 2ac, 4aa, 4ag.

No. 13 Olimpo Avenue, Santurce, Porto Rico.

1aac, 1aga, 1aid, 1ajp, 1aiw, 1apc, 1bga, 1bhn, 1bie,
1bio, 1bkr, 1bqu, 1bvb, 1cak, 1cmp, 1cq, 1cre, 1dd,
1do, 1er, 1gu, 1ow, 1rf, 1sf, 1xav, 1xw, 1zz
Canadian 1ar, 1aay, 1agw, 1ad, 1auv, 1bhn, 1bmj,
1bqr, 1bcb, 1byn, 1c, 1cjj, 1cjo, 1cda, 1ck,
1h, 1mu, 1ow, 1 d, 1ga, 1dz, 1an, 1au, 1bdo,
1bw, 1ca, 1ca, 1b, 1qg, 1kf, 1ft, 1io, 1k,
1k, 1kmi, 1ka, 1b, 1qf, 1rr, 1tj, 1tj, 1tj,
1ame, 1ani, 1axn, 1kq, 1mi, 1nt, 1o, 1ru, 1tja, 1tja,
1wy, 1zms, 1zrt, 1ben, 1bgo, 1bpa, 1bwn, 1sco,
1cpl, 1cyl, 1gdp, 1dhw, 1dml, 1cfl, 1gz, 1pl, 1s,
1aaq, 1abf, 1abz, 1al, 1and, 1axr, 1at, 1bch, 1bhw,
1bvp, 1cda, 1cyl, 1cvs, 1dnn, 1dqu, 1eky, 1nv, 1qi,
nkl, wgh, vno, kdka.

U. S.—1aid, 1aja, 1kx, 1py, 1xz, 2bqu, 2bse, 2cpa, 2cwy, 2afu, 2ahd, 2ail, 2ajh, 2eqy, 2hrh, 2uk, 2adt, 2age, 2ao, 2awt, 2bjj, 2cmu, 2cto, 2oi, 2en, 2gm, 2bgn, 2doo, 2agj, 2bby, 2bnn, 2eja, 2ddp, 2ddu, 2eky, 2elb, 2of, Australia: 3bg. British: *2jf, 2nm, 2sz, 2wv, 2nn. Canadian: 1dq, 4er. French: 2ab, 2bf, 2sm. Mexican: 1b. New Zealand: 2ag, 2ak.

1adv, 1ajw, 1bep, 1bqk, 1bkq, 1bqo, 1cme, 1cmp
1kc, 1mo, 1on, 1xak, 1xz, 2ahw, 2anm, 2bbn, 2bo
2brb, 2ejj, 2egz, 2evu, 2eyw, 2dn, 2ku, 2sw, 2xq
3aih, 3bhv, 3chc, 3chk, 3gt, 3qv, 3sf, 3wb, 3xi, 4ch
4cl, 4fz, 4io, 4jr, 4ke, 4my, 4qy, 4rr, 4sl, 4uk, 6aan

6aaq, 6ac, 6adb, 6ame, 6amm, 6apw, 6arb, 6ase, 6avr, 6awp, 6ber, 6bf, 6bfw, 6bij, 6blw, 6bny, 6bon, 6bql, 6bqu, 6bse, 6bux, 6ccn, 6ced, 6cei, 6cej, 6ceg, 6cga, 6cie, 6cjb, 6clp, 6cmi, 6cms, 6coz, 6cvn, 6cb, 6cf, 6cx, 6hp, 6kt, 6lj, 6of, 6pl, 6rv, 6ut, 6ve, 6vo, 6wi, 6yb, 6zf, 6zg, 6iw, 6jq, 6mf, 6mw, 6ada, 6add, 6af, 6aly, 6amr, 6awt, 6bau, 6bor, 6sch, 6ces, 6dgo, 6dmr, 6ef, 6er, 6jq, 6sp, 6zd, 6aby, 6aif, 6ato, 6att, 6axs, 6bzd, 6bfg, 6bjl, 6bnk, 6bvw, 6cdv, 6cee, 6cia, 6cis, 6cvs, 6dac, 6ded, 6dfc, 6dtz, 6dho, 6dk, 6dmj, 6dms, 6dpx, 6dyv, 6egg, 6egu, 6eky, 6nv, 6xi, 6yf, 6oz, 6nv. Canadian: 3bp, 6ef. Mexican: 6x, 1b, 1x, 1e. Australia: 2cm. New Zealand *2ac*, 4aa, 4ag, 4ak.

5SL, 618 Ash St., Pine Bluff, Ark. One tube Super-Regenerative. Cards QSL'd.

1cx, 2akd, 2cgb, 2ha, 2wr, 2xo, 3aeq, 3ats, 3qw, 3tr, 3wf, 3yv, 4hw, 4ke, 4kk, 4on, 4ou, 4sb, 4ax, 4ye. No log on 5's. 6aam, 6amr, 6av, 6awe, 6bbk, 6bvk, 6bmw, 6cac, 6chl, 6chx, 6cms, 6ji, 6ku, 6li, 6or, 6uf, 6vt, 6zh, 7af, 7afn, 7agf, 7ajf, 7ak, 7alg, 7amm, 7amw, 7app, 7apw, 7arb, 7bdw, 7bgu, 7bll, 7bma, 7bmw, 7bmy, 7bn, 7bnc, 7bni, 7boc, 7bos, 7bqi, 7bse, 7baw, 7bzi, 7cei, 7cec, 7eck, 7ekm, 7eko, 7et, 7eux, 7evh, 7ewl, 7ada, 7adi, 7dbi, 7dd, 7ddt, 7ddx, 7ded, 7dgh, 7dhh, 7dia, 7dm, 7dmx, 7dmd, 7dnk, 7dqt, 7drs, 7dsa, 7dwr, 7eb, 7fg, 7hhw, 7hsw, 7ii, 7ik, 7kt, 7oz, 7ps, 7re, 7ri, 7ta, 7wz, 7xe, 7zo, 7zz. WGH. Nines too numerous. Porto Rico, 4je.

Calls Heard 5KC Plaquemine, La.

CW—1dd, 1sf, 1te, 1ahe, 1xw, 1xav, 2aay, 2bqb, 2evj, 2evw, 3lg, 3agi, 3auv, 3bdo, 3buu, 3bva, 3xx, 3xav, 4ai, 4bx, 4db, 4dt, 4dx, 4lk-phone, 4io, 4kk, 4pd, 4qt, 4sa, 4ua, 4ur, 4vc, 4zao, 4alu, 6apw, 6bij, 6bra, 6bur, 6cae, 6cek, 6cey, *6cx*, 6eb, 6er, 6es, 6hv, 6tt, 6vq, 6yn, 6yx, 6abm, 6aey, 6aik, 6ajn, 6am, 6apr, 6apt, 6apw, 6art, 6aua, 6bma, 6boc, 6bre, 6co, 6emi, 6eta, 6ewe, 6exm, 6evi, 6dbo, 6dcr, 6dow, 6dgo, 6dnd, 6dnh, 6doo, 6dsk, 6ca, 6ny, 6oa, 6tg, 6vc, 6zd, 6zt, 6aua, 6aci, 6afu, 6agz, 6ahq, 6akd, 6aob, 6ar, 6asz, 6att, 6baw, 6bhe, 6bga, 6bji, 6boa. Canadian: 3ad. Mexican: 1b, 1f, 1s.

u5AJH—Box 715, Abilene, Tex.

1abf, 1agh, 1ati, 1awer*, 1bdt, 1bgu, 1bku, 1bsd, 1comp, 1gr, 1ow, 1sw, 1vi, 2aay, 2avw, 2axf, 2bbn, 2bgs, 2bgo, 2bqw, 2bvc, 2cag, 2evj, 2pd, 2xa, 3ade, 3acc, 3aih, 3bg, 3bhv, 3cei, 3at, 3tr, 3zw, 4bq, 4du, 4jr, 4sa, 4si, 4sz, 4ti, 4uk, 4vi, 4uau, 6ac, 6age, 6cef, 6chl, 6esa, 6eto, 6czx, 6zp, 7fd, 7ia, 7ah, 8amr, 8atp, 8ahu, 8bko, 8bvn, 8emi, 8ocj, 8cwp, 8fm, 8nb, 8ze, Mex.: 1b, 1s, 1x. Can.: 1ar, 2ax, 2be, 2cg, 3ly, 3xi, 4eb (?). New Zealand: 2ac, 4aa, 4ag, 4ak.

6AB, Box 494, Blythe, Calif.

1abf, 1ajw, 1apu, 1ati, 1boa, 1bu, 1ke, 2al, 2brb, 2by, 2cel, 2cjb, 2cjp, 2erp, 2rk, 2za, 3agi, 3aoj, 3bgs, 3bhv, 3bng, 3bpc, 3buu, 3bvn, 3cdu, 3chg, 3cjin, 3ekl, 3dd, 3hd, 3ie, 3af, 3ot, 3pp, 3qv, 3zc, 4bq, 4gh, 4gw, 4jr, 4my, 4pb, 4ru, 4ua, 5aan, 5aro, 5aac, 5abc, 5abf, 5aek, 5aex, 5ag, 5agn, 5and, 5av, 5aja, 5ajb, 5aig, 5aji, 5akd, 5akf, 5aka, 5am, 5amu, 5amw, 5ana, 5ani, 5ap, 5aph, 5api, 5ash, 5asd, 5awv, 5be, 5bi, 5bwt, 5bx, 5ed, 5ez, 5gu, 5hl, 5hu, 5hw, 5ij, 5ke, 5lh, 5ll, 5ls, 5nw, 5oc, 5pa, 5qs, 5sd, 5se, 5vu, 5wa, 5wi, 5xa, 5yd, 5act, 7afp, 7ajb, 7alk, 7bz, 7gi, 7ks, 7kz, 7lh, 7ls, 7mp, 7no, 7ok, 7ot, 7oy, 7ov, 7ay, 7to, 7aa, 7aam, 7acc, 7alp, 7aly, 7apn, 7bbf, 7bfe, 7bit, 7bip, 7bpu, 7bse, 7btf, 7bcp, 7ced, 7cep, 7ese, 7dae, 7dal, 7dbm, 7dbo, 7dc, 7dm, 7dgl, 7dgp, 7dki, 7dsk, 7dwj, 7ez, 7hm, 7nt, 7pi, 7tp, 7st, 7ue, 7ug, 7vg, 7wz, 7ze, 7ad, 7aad, 7apu, 7avv, 7ado, 7adq, 7aey, 7afp, 7ahq, 7aim, 7akd, 7aka, 7amb, 7amw, 7amx, 7an, 7ape, 7aad, 7atl, 7aue, 7avv, 7axs, 7ayv, 7bbj, 7bci, 7bdf, 7bfg, 7bio, 7bjk, 7bkl, 7bbl, 7bmc, 7bmk, 7boa, 7bob, 7bof, 7bnp, 7bjk, 7brq, 7bvk, 7bvw, 7bwx, 7byl, 7bzj, 7cax, 7ccs, 7cdc, 7ced, 7cdw, 7cea, 7cee, 7ceg, 7eid, 7eov, 7ecm, 7epv, 7euc, 7ewf, 7evd, 7eyx, 7dad, 7dap, 7daw, 7dbz, 7ded, 7dew, 7dng, 7djp, 7dio, 7dit, 7dof, 7dpx, 7drt, 7dun, 7dvi, 7dvr, 7eam, 7eel, 7ee, 7efh, 7efj, 7ejy, 7eky, 7ely, 7oa, 7pw, 7rt, 7wo, 7xi, 7zt, 7iar, 7cqr, 7cily, 7ead, 7eaw, 7ean, 7cgr, Mexican: 6x, 42by, 6lx, nse, 49k, chgo.

Heard by 6MA, 2611 Derby St., Berkley, Calif.

U. S. 1aac, 1abt, 1bgu, 1bis, 1bsd, 1emp, 1fg, 1ii, 1ke, 1sf, 1vi, 1xam, 2aay, 2axf, 2ana, 2brb, 2cci, 2chk, 2cvu, 2pd, 2wr, 3adb, 3alx, 3bdo, 3cjin, 3ekj,

3gc, 3hb, 3iy, 3ms, 3qv, 3wb, 3zw, 4bq, 4kl, 4rr, 4tj, 4xe, 4aag, 4aat, 4ail, 4ajj, 4ame, 4amw, 4awx, 4be, 4cn, 4dw, 4ek, 4hl, 4lh, 4mi, 4oq, 4ot, 4ov, 4ph, 4ql, 4qy, 4rh, 4se, 4uk, 4za, 4beb, 4rv, 4vr, 4afn, 4ajy, 4eo, 4zb, 4gr, 4ij, 4ku, 4lj, 4nx, 4ol, 4sy, 4ada, 4ah, 4aja, 4aju, 4alf, 4amr, 4bau, 4bbr, 4bkr, 4bku, 4bxh, 4byn, 4cei, 4eko, 4coj, 4eyi, 4dae, 4dhw, 4dqr, 4er, 4gz, 4pl, 4so, 4afu, 4axx, 4bht, 4bji, 4bko, 4bku, 4bm, 4bmz, 4bnk, 4hof, 4brx, 4bo, 4cap, 4cem, 4edq, 4eee, 4eji, 4eie, 4ekb, 4epm, 4etr, 4ewo, 4ewx, 4ddp, 4ded, 4dev, 4dfh, 4dft, 4dfz, 4dng, 4dpx, 4dqu, 4dsa, 4dvp, 4eak, 4eas, 4efh, 4efm, 4efz, 4eky, 4ela, 4eld, 4em, 4es, 4hk, 4jc, 4nm, 4vz, 4xpb, 4xi, 4yb, 4zd. Can. 3bq, 3fc, 4cr, 4an, 4cn, 4go. Govt. nfv, nkf, wgh. Mex. 1b; New Zealand 2ac.

Calls Heard by SVC-8ZAH, Pittsburg, Pa.

4je, 4ol, 5ac, 5adh, 5ajh, 5acl, 5alj, 5ame, 5amw, 5cy, 5ka, 5ph, 5ay, 5rh, 5uk, 5wy, 5za, 5zas, 5xav, 5xaw, 5xco, 6adt, 6agk, 6ahp, 6alk, 6apw, 6arb, 6aro, 6awt, 6ber, 6bdt, 6beb, 6bft, 6bjx, 6bka, 6bqa, 6bqr, 6bur, 6cae, 6cax, 6cej, 6eft, 6efz, 6ego, 6eci, 6eji, 6cmu, 6cni, 6css, 6eto, 6fy, 6ij, 6iv, 6oi, 6vc, *6ub*, 7ahi, 7fd, 7hq, 7ij, 7mf, 9bjj, 9cjs, 9ded. Canadian: 1ar, 1bq, 1dd, 1ef, 6gf. British: 2kf, 2od, 2sz.

8BFE, 282 Union Ave., Williamsport, Penn.

4ai, 4co, 4io, 4jr, 4kc, 4mi, 4nj, 4si, 5ac, 5ahj, 5ail, 5ain, 5amg, 5amh, 5ek, 5if, 5mi, 5oq, 5ov, 5ox, 5ph, 5rh, 5sd, 5se, 5zas, 5zav, 6aao, 6adt, 6agk, 6akz, 6arz, 6ase, 6bfh, 6bij, 6bka, 6blw, 6bqa, 6bra, 6buh, 6cnl, 6css, 6eto, 6ij, 6of, *6ux*, 6vc, 6xbw, 7afe, 7co, 7gb, 7jq, 7ot, 7aad, 7eau, 7aio, 7ahw, 7art, 7axx, 7hdw, 7hga, 7hio, 7bkr, 7bmu, 7buk, 7bva, 7ekb, 9ekl, 9eic, 9ep, 9dfz, 9dli, 9dms, 9dqu, 9dtk, 9dwa, 9eas, 9efo, 9efz, 9ek, 9eld, 9hk, 9ny, 9ti, 9vz, 9xi, 9zt. Can: 1ar. English: 2jf, 2kf, 2nm.

9AAD, Chicago, Ill.

1abf, 1aws, 1aid, 1ajw, 1aez, 1asi, 1asu, 1ati, 1avx, 1awe, 1aws, 1aww, 1bce, 1bgi, 1bhu, 1bhm, 1bqi, 1bsd, 1bvl, 1bwj, 1cdq, 1eme, 1fh, 1ga, 1gc, 1gv, 1ig, 1ow, 1pl, 1py, 1sf, 1sl, 1sz, 1vi, 1zab, 1zi, 2aan, 2aay, 2ann, 2awf, 2axf, 2az, 2bbn, 2bgo, 2bm, 2bum, 2bvg, 2cel, 2cjin, 2cmn, 2cpa, 2cty, 2evw, 2evs, 2czz, 2dn, 2fk, 2ku, 2ld, 2mu, 2pd, 2ade, 2adp, 2auv, 2ava, 2ave, 2bco, 2by, 2bmn, 2bmz, 2bof, 2bss, 2btu, 2cag, 2chg, 2cin, 2ekl, 2fs, 2st, 2vz, 2xx, 4bq, 4ch, 4eq, 4fz, 4gw, 4jr, 4ke, 4mi, 4ni, 4pd, 4pk, 4qr, 4rr, 4si, 4ti, 5adh, 5aef, 5ae, 5agi, 5ags, 5ajh, 5aji, 5ame, 5amh, 5amw, 5ari, 5be, 5cn, 5hl, 5ke, 5lu, 5mi, 5nw, 5ot, 5ov, 5ph, 5ya, 5vu, 5vy, 5xat, 5xau, 5zas, 5zav, 6ac, 6adt, 6ajh, 6alk, 6apw, 6arz, 6bgi, 6bka, 6blw, 6bqr, 6bur, 6cae, 6cf, 6rv, 7zb. Can: 2az, 2cg, 3aa, 3aac, 3fe, 3ag, 3iy, 3vh, 3at.

9DVT, Laocga, Ind.

6aao, 6ac, 6agk, 6aib, 6ajf, 6aji, 6akw, 6alk, 6ame, 6ao, 6apw, 6arb, 6avr, 6ber, 6bdt, 6bji, 6bvg, 6bwl, 6cej, 6ego, 6ehl, 6eiz, 6cmf, 6cms, 6css, 6cni, 6cto, 6fy, 6ch, 6ji, 6ij, 6of, 6oi, 6rn, 6rv, 6tt, 6vc, 6xad, 6zp, 7ahi, 7co, 7gm, 7jq, 7ot, 7mf, 7to, 7zu, 7cam, 7can, Canadian: 1ar, 3aa, 3ac, 3ms, 3xi, 4ci, 4gt, 5ha, 5go. Mexican: 1b, *1e*, 6f. English: 2nm, 2sz, 5fi. New Zealand: 2ac, 4aa, 4ag, 4ak. Australian: 2cm, 3bq. P. R.: 4sa.

9BGA, 646 Adams St., Oak Park, Ill.

1aac, 1abp, 1aen, 1agg, 1aid, 1ana, 1asi, 1ati, 1avw, 1bce, 1bgi, 1bhm, 1boa, 1bqi, 1cab, 1cak, 1eln, 1eme, 1est, 1iv, 1ke, 1lw, 1ma, 1mo, 1mv, 1ou, 1ow, 1pl, 1py, 1sf, 1sw, 1sz, 1vc, 1ze, 1zi, 1zab, 1xam, 2aay, 2aco, 2bco, 2bkg, 2brb, 2cjin, 2cmn, 2coe, 2cpa, 2czz, 2erp, 2cty, 2eyw, 2czz, 2ag, 2av, 2bm, 2br, 2by, 2fk, 2kf, 2ade, 2adq, 2alk, 2auv, 2ava, 2baq, 2bmn, 2bof, 2bss, 2btu, 2ccx, 2civ, 2che, 2chk, 2cjin, 2ekj, 3iw, 3jo, 3lg, 3ll, 3rv, 3wb, 3yo, 4cl, 4cs, 4fz, 4gw, 4io, 4jk, 4jr, 4ke, 4mb, 4mi, 4ay, 4ni, 4pd, 4si, 4tj, 4xe, 4xx, 5aaj, 5acl, 5adh, 5aef, 5afu, 5ad, 5aiu, 5amu, 5am, 5be, 5en, 5ek, 5hl, 5lu, 5ph, 5ru, 5se, 5to, 5uj, 5zai, 5zas, 5zav, 6adt, 6agk, 6alk, 6gg, 6bnh, 6bqr, 6cgv, 6cmu, 6cni, 6cto, 6ab, 6ac.

HRD and WKD at Canadian 32B St. Catherine, Ont.

4bq, 4ch, 4io, 4mb, 4qf, 4tj, 4vn, 4ze, 5aag, 5aef, 5ajk, 5ahj, 5aji, 5am, 5ek, 5hl, 5in, 5jf, 5lu, 5mi, 5nw, 5ox, 5uj, *5se*, 5xi, 5xat, 5xav, 6adt, 6agk, 6ahp, 6alk, 6ame, 6arb, 6avr, 6awt, 6blw, 6bny, 6buh, 6cgo, 6efz, 6ego, 6egv, 6chl, 6css, 6cto, 6cvm, 6iv, 6oi, 6zp, 7afn, 7sy.