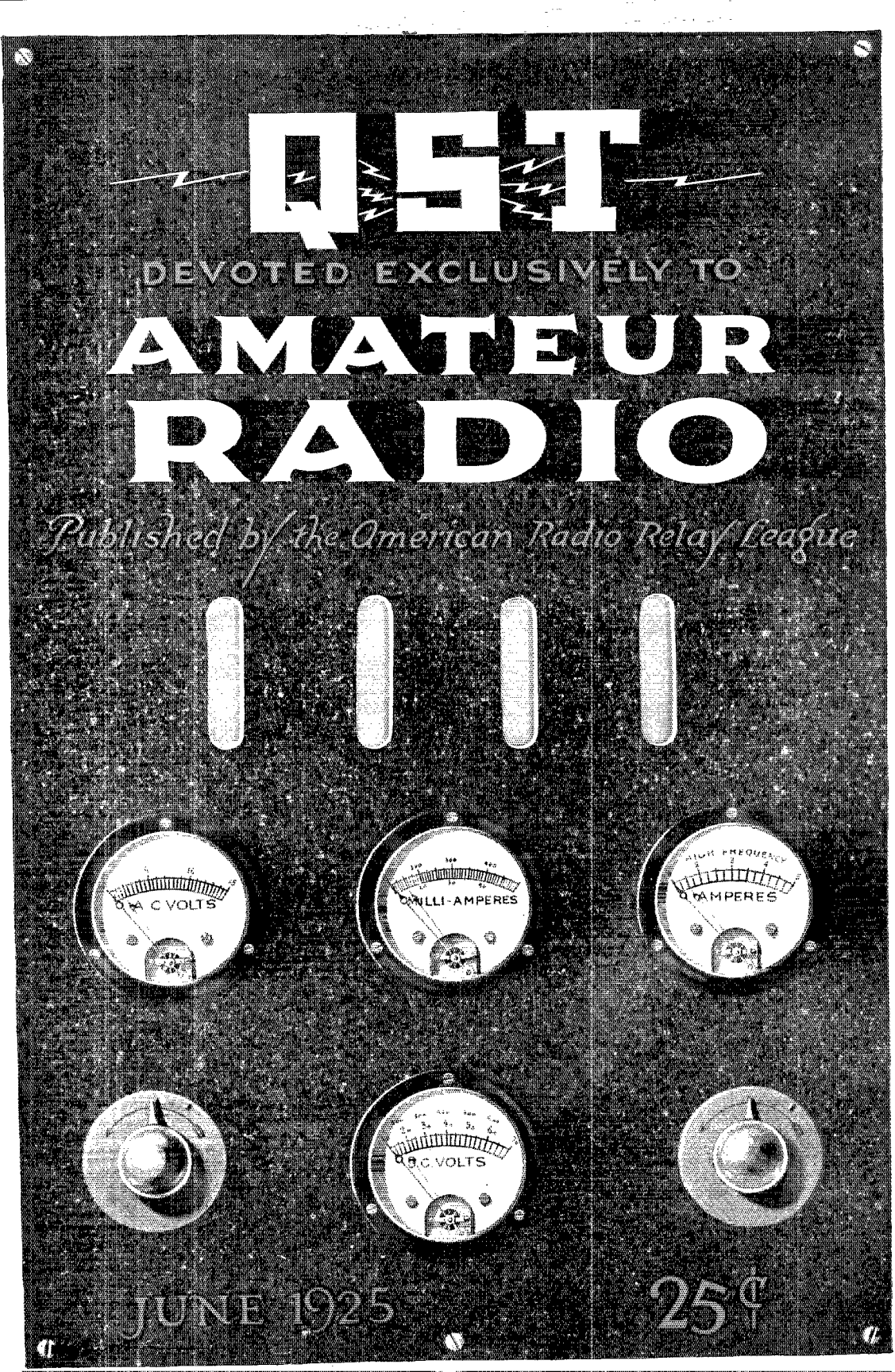
QST

DEVOTED EXCLUSIVELY TO

AMATEUR RADIO

Published by the American Radio Relay League



JUNE 1925

25¢

Only Four Strings

a horse-hair bow, and a resonant box —yet under the hand and out of the soul of an artist what a world of ecstasy, of rare delight . . . of sadness, too, ... comes from these simple instruments. *Only Bits of Metal*, glass encased, and an incoming antenna current delicate as a fairy foot-fall—yet in a Cunningham Radio Tube these combine to trap the artist's world of music and release it to eager millions. Both in the violin and in the Cunningham Tube it is quality of material, knowledge of design, and skill in manufacture which produce tones of almost uncanny purity.

Since 1915—Standard for all sets

Types C301A, C299, C300, C11, C12 in the Orange and Blue Carton

Price $3.00 Each

Cunningham RADIO TUBES

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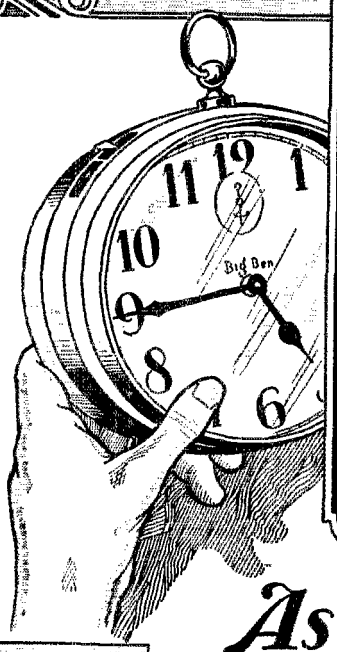
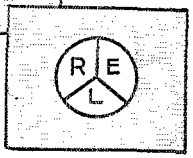


As positive as Big Ben

Cutlass Stator Plate exclusively an Ultra-Lowloss feature



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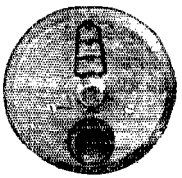
Design of lowloss coils furnished free with each condenser for amateur and broadcast wavelenghts showing which will function most efficiently with the condenser.



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Simplifies radio tuning. Pencil-record a station on the dial—thereafter, simply turn the finder to your pencil mark to get that station instantly. Easy—quick to mount. Eliminates fumbling, guessing. Furnished clockwise or anti-clockwise in gold or silver finish. Gear ratio 20 to 1.

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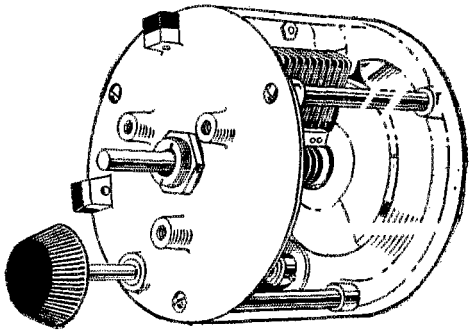

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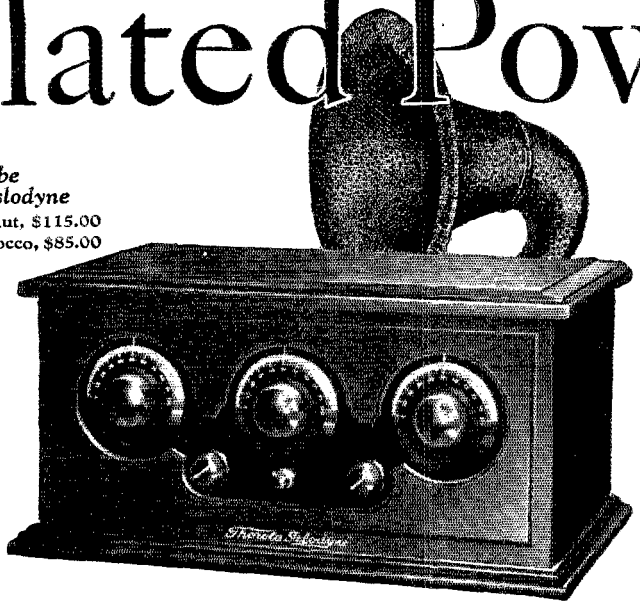
5-Tube
Thorola Islodyne
Model 55, Walnut, $115.00
Model 50, Thorocco, $85.00



MEMBER R.M.A.

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You know radio conditions lately. "Improved" arrangement. Trifles. Evasion of difficulties—not elimination!

But inter-action, scrambled signals, fading, distortion, *uncertainty of reception* now yield to Thorola Isolated Power, exclusive in Thorola Islodyne Receivers. It is another Thorola triumph. Thorola Low-Loss Doughnut Coils make it all possible. Their self-contained field isolates power, ends magnetic "spray" and pick-up of signals by the coils. Angular placement and roundabout wiring are needless.

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Thorola

I S L O D Y N E

QST

The Official Organ of the A·R·R·L

VOLUME IX — JUNE, 1925 — NUMBER 6

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S. Kruse, Technical Editor — **Edwin C. Adams, Advertising Manager**

L. W. Hatry, Department Editor — **F. C. Beckley, Assistant Editor** — **David H. Houghton, Circulation Manager**

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THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites. Correspondence should be addressed to the Secretary.

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EDITORIALS

Shall We Change?

WE have found it a very helpful thing to solicit through the pages of *QST* an expression of opinion from A.R.R.L. members on various weighty problems that occasionally arise. We have a hard one this time: we would like to know the sentiment about a proposal to change the name of our League.

The League was founded originally as a United States association. At the request of Canadian amateurs it was expanded to take in the Dominion in its operating territory; and the same thing is true of Cuba. The Canadians, through their Canadian General Manager, have self-determination in all domestic matters, merely being governed by A.R.R.L. policies. Necessarily the Canadian Section of the A.R.R.L. through its Canadian organization must look after its own legislative and regulatory matters. The A.R.R.L. Constitution is so drafted that the Canadians at their option may separate from the rest of A.R.R.L. and form and maintain their own Dominion organization. Leading Canadian amateurs, however, assert that they don't want to think of this, that they will always want to be part of the A.R.R.L., and that the League ought to make slight readjustments in its organization so as definitely to include Canada on the same basis as the United States. And why not Mexico, too, if the Mexicans should want it, they ask, so that A.R.R.L. embraces all of North America?

The United States has no copyright on the word "America." Correctly used it refers to the whole of the New World, including North, Central and South America. Thus the name of the A.R.R.L. is applicable in all correctness only to an amateur organization embracing all of the Americas. On the other hand, since the word "America" does not mean exclusively the United States, it can be applied in some measure of correctness to an organization embracing other territory than the U. S. A. alone. Again, however, many people think of America as meaning the United States primarily, and this idea seems especially prevalent in Canada, so that from this standpoint, too, our name is not an altogether happy one.

In international affairs the A.R.R.L. represents the amateurs of the United States, its Possessions, Canada, Newfoundland and Cuba. For this reason if for no other its name should be correctly indicative of the territory it covers.

Now what, if anything, should we do about our name? Does Mexico want to come in and, if so, should we call ourselves the North American Radio Relay League? That makes a fearfully long title, and besides we don't do so much actual relaying any more; why not North American Radio League or North American Radio Amateurs, Inc.? Can anybody think of a shorter one? And can anyone suggest a name that would apply to an organization primarily of Canadian and United States amateurs and still be indicative of the territory embraced? We mean, for example, that we do not think such a name as Amateur Radio League would be satisfactory, because it is very desirable that the countries included be indicated.

And while we're talking about such things, what about the possibility that our A.R.R.L. may eventually become fully international itself? There are many signs in that direction. We have a growing foreign membership, now quite appreciable, and often have been invited to organize divisions amongst our members in the countries of other continents. Of course, we have not done so, but the day may come when it will be more desirable. What then? Would our members like to see A.R.R.L. become a sort of International Amateur Relay League if success were assured, or would they prefer the tight little organization that confined its efforts to things closer to this country?

Comments are cordially invited.

Rank Yank Rudeness

WHEN fellows in another land go to the trouble of sending us a card reporting our signals at a respectable distance, why don't we do them the courtesy of an acknowledgment at least? We don't, and we're acquiring rapidly a most unenviable reputation for discourtesy.

Headquarters receives many foreign letters commenting in righteous indignation on this condition. The Victorian Division of the Wireless Institute of Australia discussed our dilatoriness at a recent meeting and had their secretary write us about it, citing some of their experiences. One of their members, a well-known 'round-the-

world DX man, has received only one reply to over three hundred report cards sent, while another who sent eighty reports in one mail did not receive a single acknowledgment. Naturally this treatment has finished these amateurs, as far as rendering reports to American stations is concerned. It is the same story in every country. Enthusiastic amateurs build short-wave tuners and start copying our stations at distances from 5,000 to 10,000 miles, and, being anxious themselves to help the game, go to much trouble and expense to report their receptions. And nary a response do they get for their pains!

American carelessness, American impoliteness! Do we want these things said about us, fellows? Every one of us with an active station receives many report cards, and often it takes time and some money to acknowledge them. But it is a part of the game and a responsibility we undertake when we engage in amateur radio. We ought to acknowledge them. But it is a part of the every amateur who goes to the trouble of reporting our sigs, even if he is only in the next state; and when these reports come from a foreign country we have a double duty, for we are also the representatives of the A.R.R.L. in international amateur relations. Foreign report cards have done much to help international amateur communication. Buck up, gang, and give our fellow hams in other lands a hearty QSL.

—Kenneth Bryant Warner

Obituary

Pittsburgh loses one of its leading amateurs in the death of Parke Graham Lambert, 8CEI, and the League loses a most ardent supporter. 8CEI was one of the Assistant Division Managers of the Publicity Service and rendered very efficient help in P.R.R. Emergency work. At the time of his death he was a student at the University of Pittsburgh. We hate to think that we will no longer hear his friendly call on the air.

Bruce Cole, 8BZL, of Grand Rapids, Mich., was electrocuted through accidental contact with a high tension wire while repairing a radio antenna. He was a real amateur, very well loved in Michigan and had done some very excellent work on low power.

We regret to record the death of Carlton Taft Caswell of Framingham, Mass. He was owner of station 1BT, and one of the pioneer amateurs of that vicinity, for he had operated prewar 1MD. He was an enthusiastic amateur and a hearty worker in behalf of amateur radio.

Belgian amateurs are now licensed by their government and operation there will be secret no longer. In addition they have adopted through common consent a system of calls consisting of one letter and one figure; i. e., W2, B3, etc. *QST* is certainly glad to be able to announce that Belgium is one of the progressive countries that has recognized its radio experimenters.

QST de Advertising Manager

HOW many of you fellows have noticed the new line running at the bottom of *QST*'s advertising pages—"Say you saw it in *QST*—it identifies you and helps *QST*." We hope you all have, and have acted upon it.

QST has a larger percentage of year-round enthusiasts among its readers than any other radio magazine. But unless your enthusiasm manifests itself in a practical way through the purchase of apparatus from *QST*'s advertising pages in the summer months, and the recommending of "*QST*-advertised" products to your B.C.L. friends, advertisers will drop out of *QST* or reduce their space during the warm weather. This will mean a smaller magazine, and consequently less reading matter.

The coming three months give you a splendid opportunity to experiment, overhaul and rebuild. Traffic is lighter, and most everyone has more leisure for radio. The weather is good and warm, and you can string up a new antenna in comfort during the day, and work in the shack all night without having to hug an oil heater.

The reading pages of *QST* will give you ample and up-to-date material for experiment and reconstruction. A station that was the latest thing last winter will need a lot of overhauling to be top-notch this fall.

So get your sets and stations in shape this summer. Fill your wants from *QST*'s advertising columns whenever you can, and if you can't, write to the manufacturer and tell him how many sales he is missing by not advertising his product in *QST*, where it will be read by all the worth while amateurs and experimenters.

Here's something to shoot at. L. O. Doran of the SS West Jester heard CB8 while off the coast of China, a distance of about 12,500 miles.

International Amateur Radio Union Formed!

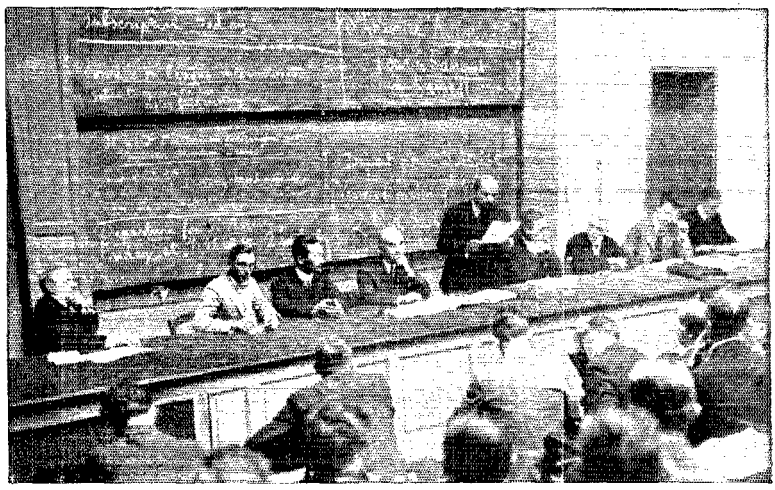
Twenty-Three Nations at Paris Congress Unanimously Agree. Union Devoted to Two-Way International Communication. Maxim President; Headquarters at Hartford. Membership Now Open.

By K. B. Warner, International Secretary-Treasurer

THE International Amateur Radio Union, the dream of years, came into existence on April 17, 1925, when the delegates of twenty-three nations met at the *Faculte des Sciences* in Paris in the First International Amateur Congress. The Union has adopted a constitution, its officers have been elected, and four national sections have been formed and recognized. Its objects lie along lines that will promote and co-ordinate two-way radio communication between the amateurs of the various countries of the world. Membership is by individuals, and anyone interested in the objects of the Union can become a member. In each country from which there are 25 or more members, there is to be a National Section, like divisions in the A.R.R.L., each with its National President, and these National Presidents, with the Executive Committee, constitute the Board of Directors of the Union. Our A.R.R.L. president, Mr. Hiram Percy Maxim, u1AW, was elected International President; Mr. Gerald Marcuse, g2NM, Great Britain, is the International Vice-President; the Councillors-at-large are M. Jean G. Mezger, f8GO, France, and Mr. Frank D. Bell, z4AA, New Zealand; the writer was elected International Secretary-Treasurer. These five officials constitute the Executive Committee or Bureau of the Union.

In that one paragraph is told the result of months of preparation and a week of feverish activity at Paris. The whole story is much too long to tell in our limited space. The chief point is that the transmitting amateurs of the world—our own kind of fellows—got together and formed an international league very similar to the A.R.R.L. in this country, "of, by and for the amateur." And everything looks rosy.

The opening session of the Congress convened on the afternoon of April 14th, as a joint meeting of the Radio Amateurs and the International Radio Legal Committee, which was having its Congress at the same time, with a total attendance of around 250. The gathering was welcomed by M. Edouard Belin, president of the *Radio-Club de France* and well-known inventor of the systems of teleautography that bear his name, and by General Ferrie. Thereafter the "juridiques" held their congress separately, meeting with us again only at the closing session, and we regret that we know nothing as yet of their



THE AMATEUR CONGRESS IN SESSION. The Bureau sits at the long table. Left to right: M. Tirman, president of the Legal Congress; Lloyd Jacquet, u20Z, and Leon Deloy, f8AB, interpreters; M. Belin, president of the Amateur Congress; M. Beauvais, Secretary; Jean G. Mezger, f8GO, interpreter; Mr. Maxim; Mr. Warner; a stenographer.. (Photo Delano, Paris.)

work. Late that first afternoon the Amateur Congress had its first separate meeting, at which M. Belin was elected president of the Congress, Messrs. Maxim and Marcuse vice-presidents, M. Beauvais secretary, and the writer as second secretary. The rolls were opened for membership on the sub-

A LITTLE INTERNATIONAL GROUP, in the courtyard of the Faculte des Sciences, with seventeen nations represented. (Photo-ROL, Paris.)

committees which were to consider the various subjects of business, and the rules of the Congress determined, it being decided that business would be conducted on the basis of one vote per country represented. By the following day the sub-committees were formed and thereafter they met every morning until their work was completed, while there were meetings of the full Congress in the afternoons to receive and act upon their reports.

The American delegation had arrived in Paris several days before the start of the Congress and had made a preliminary study of the situation. It seems necessary to record here the unfortunate fact that the French officials who had arranged the Congress were not contemplating that the Union to be formed there would be primarily an association devoted to two-way telegraphing amateur activities. We were not sure just what they did want it to be, but there were present at the Congress many engineers, many BCL's, and many other kinds of radio folks who were interested but little in two-way short-wave amateur telegraphy, and we fear many of them were disappointed at the kind of a Union that was formed. It has become, however, exactly what the transmitting amateurs of the world set out to accomplish. We must record another discovery too: we had been told that the European amateur, particularly the French amateur, was an altogether different variety than the American ham; that he was generally a scientist, a man of years and position, and almost invariably wore a beard; he was supposed to be interested only in research and would never make a "brass-pounder" like we know them! This was all wrong; the French amateur when we really found him, and all the rest of them, are just like ourselves, a noisy, happy bunch of keypushers of our own age, tooting whistles and discussing circuits, and talking "*QST* English," bless 'em! And so we are happy to record that we found the hams from all around the world all alike in complete agreement as to what they wanted, and looking to Mr. Maxim to lead the way.

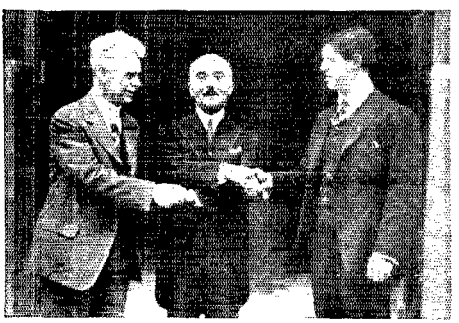
The most important work of the Congress centered in Sub-Committee No. 1 on the formation of the I. A. R. U. It was here that the real amateurs of the Congress got together and worked, there being about fifty members of this committee. The following nations were represented by the delegates noted:

Argentina	Mr. Repetto
Austria	Mr. Fischel
Belgium	Mr. Deloor, P2.
Brazil	Mr. Lacomb, 1AC
Canada	Maj. Borrett, 1DD
Czecho-Slovakia	Dr. Kamil Sule
Denmark	Mr. Perroux, f8BV
France	Mr. Lefebvre, 8GL
Finland	Mr. Perroux, f8BV
Germany	Mr. Kraus
Great Britain	Mr. Marcuse, 2NM
Hungary	Mr. Grenkamp-Kornfeld
Italy	Mr. Salom, 1MT
Japan	Mr. Usami
Luxemburg	Mr. DeGroot
Netherlands	Mr. Tappenbeck, PCTT
Newfoundland	Mr. Reid, 8AR
Poland	Mr. Odynier
Spain	Mr. Moya, AR1
Sweden	Mr. Svensson, SMYY
Switzerland	Dr. Merz
Uruguay	Mr. LeGrand
United States	Mr. Maxim, 1AW

Twenty-three nations! This Sub-Committee elected Mr. Maxim its chairman, and Mr. Jean G. Mezger, f8GO, its secretary, and started work. By its second session it had agreed unanimously that there should be a Union, that it should be an organization by individual memberships, that it should have for its chief purposes the co-ordination and fostering of international amateur two-way communication, and that its headquarters should temporarily be located in the U. S. A. Then the A.R.R.L.

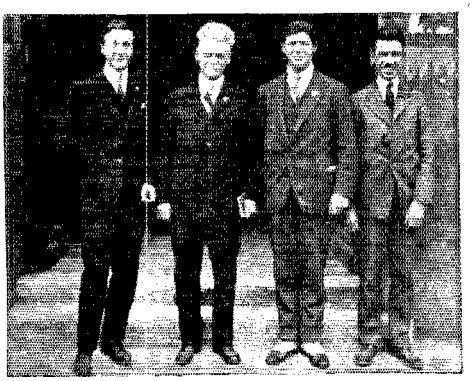
delegate was requested to prepare a constitution along these lines for the consideration of the committee. Then the fun began! Messrs. Maxim and Mezger and the writer went into retirement at the Hotel du Louvre, and by late that night a constitution was ready. But there had to be a copy for each official delegate. With lots of hams available, that was easy. A bunch of English amateurs commandeered a flock of typewriters and tackled the English edition, while a group of French hams translated the constitution and batted out the French edition, and by morning the job was done. But those fellows went without a wink of sleep, didn't have their clothes off that night, and ought to be taken in as honorary members of the Boiled Owls.

The next morning, the 17th, every delegation had a copy of the constitution, and consideration began. Nineteen countries were represented at this meeting: Argentina, Austria, Belgium, Brazil, Canada, Denmark, France, Finland, Germany, Great Britain, Italy, Japan, Netherlands, Newfoundland, Poland, Switzerland, Spain, Uruguay and the United States. Section by section the constitution was examined and adopted, and then it was unanimously approved and adopted as a whole by the nineteen official delegates. That afternoon the Sub-Committee reported to the full Congress and its report was unanimously approved, whereupon M. Belin, the chairman, declared the constitution unanimously adopted by the First Congress.



HANDS ACROSS THE SEA. M. Belin, president of the Amateur Congress, shaking hands with Messrs. Maxim and Marcuse. (Photo Barratt's, London.)

This constitution provided that the first bureau of officers of the Union was to be elected by the amateur delegates attending this Congress, and so on the morning of 18th of April there was a large gathering for that purpose, nineteen countries being represented. Here the officers reported in the first paragraph of this article were elected, in a strictly ham meeting reeking with international goodfellowship. For instance, even tho New Zealand was not represented at the Congress, the fellows there felt that the representation on the Executive Committee ought to be divided and some consideration given that splendid lot of amateurs off in Australasia, so they elected Bell



FOUR MEMBERS OR THE I.A.R.U. EXECUTIVE COMMITTEE. Left to right: M. Mezger, France, Councillor-at-large; Mr. Maxim, U.S.A., president; Mr. Marcuse, Great Britain, vice-president; Mr. Warner, U.S.A., secretary-treasurer. (Photo Barratt's, London.)

of z4AA as one of the Councillors. In the election of the other Councillor there were originally proposed MM. Mezger, Perroux and Lefebvre, all of France. The French amateurs withdrew to select a single candidate and then presented M. Perroux, but M. Perroux is a commercial radio engineer and the Bureau was obliged to declare him ineligible to office in the Union, whereupon M. Mezger was proposed and elected.

At the conclusion of the election the Secretary-Treasurer opened the roll for membership, Mr. Maxim becoming the first member. We are pleased to say that at this writing we already have 112 paid members. More about this subject later.

There were other sub-committees of the Congress, dealing with tests, wavelength distribution for international co-ordination, international auxiliary language, and calls and intermediates. We regret that we haven't copies of their reports, but they will be available as soon as published in France. Some of the committees were of amateur membership, some were not. Their reports, altho adopted unanimously by the Congress, are not binding upon the Union. They will be made the subject of an early study by the Executive Committee.

Late on the afternoon of 18th April the closing plenary session of both congresses convened, and ratified all the actions taken. At this meeting late arrivals were present from Russia and Indo-China, raising the total of countries represented to 25. In the

closing moments of this meeting a great bowl of flowers, provided by Dr. Merz, the Swiss delegate, was presented to Mr. Maxim by M. Belin amid immense applause, in the name of the transmitting amateurs of the world; and that night every ham wore one in his buttonhole at the banquet at the Hotel Lutetia, which, by the way, was a

THE FIRST MEMBER. Mr. Maxim paying his dues, to become Member No. 1 of the I.A.R.U. (Photo by 4BQ.)

beautiful affair. And another example that amateurs are the same the world over: During the time that the work was going on the hardest in the drafting of the constitution and making the report for Sub Committee No. 1, the writer missed three meals in a row and must have acquired a lean and hungry look. At any rate, just as the Congress closed a delegation of Belgian and French amateurs presented him with an immense ham sandwich, some three feet long and weighing all of ten pounds, all dolled up in the ribbons of Belgium, France and the United States. (See Fig. 1). That sandwich had an interesting end; the next night another little international "congress" took it to a little sidewalk restaurant across from the hotel and there it was dispatched *muy pronto*, washed down with good beer, which didn't happen to be against the law there!

The American delegation consisted of Mr. Maxim, principal delegate; Mrs. Maxim, acting as our interpreter; Jimmie Morris of 4IO and Gordon L. Hight of 4BQ, representing the Southeastern Division of A.R.R.L.; Lloyd Jacquet of New York City, editor of "Amateur Radio;" and the writer, alternate delegate. Then of course there was Major Bill Borrett, c1DD of Halifax, the accredited Canadian delegate; and Loyal L. Reid, c8AR of St. John's, representing Newfoundland. We all had a wonderful time—Paris in springtime!—and only wished that more of the gang from North America could have been with us. There were visits to the extremely interesting laboratories of M. Belin at Malmaison, to the Eiffel Tower FL, to the great station UFT at Ste. Assise, and to Versailles. And the pretty little French girls everywhere, "calling CQ very QSA," as one of the gang put it. Before we leave France we must tell one on Jimmie Morris: he wanted to ask his way of a gendarme but couldn't think of the right word and called him "Jardiniere." Imagine the emotions of that French cop upon being called a flowerpot! Thereafter Jimmie was not heard to strut a single word of French!

Great thanks are due M. Belin for his very able chairmanship of the Congress and for his kindness in conducting the delegates thru his establishment; and to the French committees headed by Commandant Mesny and Dr. Pierre Corret which made all the arrangements for the holding of the Congress. To Commandant Mesny in particular too much praise and thanks cannot be given.

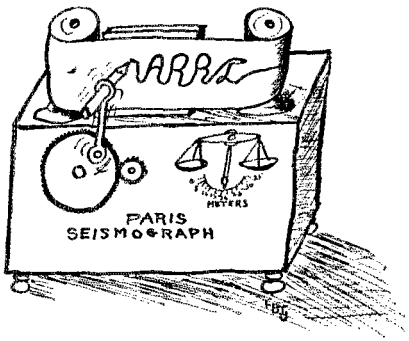
On the way back home the American delegation, with the exception of Mr. Jacquet who remained in France on an extended vacation, visited London and were the guests of the Radio Society of Great Britain at a delightful dinner at the Hotel Waldorf, the night before sailing for home. Here we met the flower of the British radio world and many of Britain's leading hams. Here too we met Capt. Rex Durrant, of GHH1, Mosul, Mesopotamia, well-known on the

THE FAMOUS HAM-SANDWICH, presented to the Secretary-Treasurer to even up for lost meals. In the center, pointing, is Mr. Deloor of Belgian P2, who made the presentation. (Photo Barratt's, London.)

amateur air here. Capt. Durrant is a flier in the R. A. F. and set out for the Paris Congress by 'plane, a mere hop of 4,000 miles, but was forced down fourteen times by bad weather enroute and only arrived at Marseilles the last day of the Congress, so proceeded on to England. He would have made the twenty-sixth country!

Jerry Marcuse, old 2-N-Emmer, A.R.R.L. Traffic Department Manager for the British

Isles, made our five-day stay in England one never to be forgotten. He took us to visit the Mullard lamp works (British for tube factory), the General Electric research



"PRONOUNCED VIBERATIONS"

laboratories, the Croydon airdrome, took us for luncheon to 2NM, gave us a charming dinner at the Victoria and to the theatre afterwards, and in general did himself proud. We are very grateful for the wonderful reception given us by him and the other British amateurs.

Before we left France a mass meeting of the French members of the Union was held, to organize and elect their national president, more than the required minimum number of members having joined; and a

THE AMERICAN VISITORS AT G2NM. Left to right, seated: Mrs. Maxim, Mr. Mezger. Mr. Maxim, Mr. Marcuse, Mr. Warner, Mrs. Marcuse. Standing: Mr. Hight, Major Borrett of Canada, Mr. Reid of Newfoundland, Mr. Morris, Mr. Nicholls of g2CC. (Mr. Jacquet remained in France for a visit and does not appear in the photo.)

similar meeting of the British amateurs was held in London while we were there. In both cases a meeting of four members of the Executive Committee of the Union was called by the president and the sections and their presidents officially recognized. Thus we can report that there are already in existence four sections of the I.A.R.U.:

UNITED STATES SECTION
H. P. Maxim, u1AW, National President
CANADIAN SECTION
A. H. K. Russell, c9AL, National President
FRENCH SECTION
Jack Lefebvre, f8GL, National President
Edouard LeBlanc, f8DE, National V. P.
R. Audureau, f8CA, National Secretary
BRITISH SECTION
E. J. Simonds, g20D, National President

QST has been named the official organ of the Union, we are proud to say. We can announce no new plans now, but hope to be able to present soon a sizeable section devoted to the affairs of the Union. Many kind and complimentary things were said

"MISS SUZANNE TAURENWERFER," Manager of our Maritime Division, as she appeared at a fancy-dress ball on the S.S. "Berengaria" on the return trip. If the Canadian amateurs only could have seen their Bill!

about *QST* by the amateurs of every nation, for which we are very grateful and which we hope we may continue to merit.

MEMBERS WANTED!

Now for a bit of snappy business talk. The constitution of the Union is printed in full at the conclusion of this article. Read it—it tells you all about the organization and its aims. The membership roster is now open and applications are invited. If you believe in world peace and understanding, you ought to be a member. If you're a transmitting amateur as well, you must be a member.

The Union is the great force that in future will co-ordinate our international relations, arrange tests, assign intermediates, represent the amateur at interna-

tional communication conferences, subdivide wavelengths and hours if that becomes necessary, work for the removal of restrictions upon amateur operation, and in general endeavor to advance two-way private communication. To do these things it needs membership and funds. The dues are but $1—US per year. Surely everybody can afford that. Dues have nothing to do with A.R.R.L. membership or *QST* subscription—that is entirely separate. We want members—lots of them. This invitation is addressed to every reader of *QST*, wherever he may be, but particularly to the thousands of A.R.R.L. members in the United States and Canada. Come on in, fellows, and get your little membership certificate and that satisfied feeling which comes with knowing that you've done your part to help the good work along. We ought to get umpty-ump thousand members from North America in thirty days, but to do that every real ham who reads this will have to "join up." Clip the handy little application blank (or copy it on a card if you don't want to cut your copy of *QST*), pin a dollar bill to it, drop it in the mailbox, and you're set. QRO, QRQ!

APPLICATION BLANK

Executive Committee: 1925
International Amateur Radio Union,
1711 Park St., Hartford, Conn., U.S.A.

Sirs:

I am interested in the objects of the International Amateur Radio Union and desire to become a member. I agree, if elected to membership, to abide by the Constitution and regulations of the Union. I attach $1.00 covering my first year's dues.

.....
(Name)

.....
(Street or Box Address, etc.)

.....
(Town) (State)

.....
(Country)

(Remittances should be made payable to The International Amateur Radio Union.)

CONSTITUTION OF THE INTERNATIONAL AMATEUR RADIO UNION

ARTICLE I — NAME AND OBJECTS

1. The name of this organization is The International Amateur Radio Union, hereinafter called the Union.

2. Its objects shall be the promotion and coordination of two-way radio communication between the amateurs of the various countries of the world; the advancement of the radio art; the representation of two-way radio communication interests in international communication conferences; the encouragement of international fraternalism; and the promotion of such additional activities as may be allied thereto.

ARTICLE II — MEMBERSHIP

1. Any person interested in the objects of the Union shall be eligible to membership. Applications for membership shall be submitted to the Executive Committee of the Union and a majority vote of the said Executive Committee shall elect to membership. The said Committee may refuse to elect to membership any person who, in their opinion, would be an undesirable member; *provided*, that any person who is refused membership may have his case reviewed by the Board of Directors of the Union upon the recommendation of two or more members of the Executive Committee, and the Board of Directors may, in its discretion, reverse the action of the Executive Committee.

2. Members shall comply with the requirements of the Constitution and of such regulations of the Union as may be adopted from time to time.

3. A member may voluntarily terminate his membership by written communication to the International Secretary. If all his dues and other indebtedness to the Union have been paid, the resignation shall be accepted.

4. Upon the written request of twenty-five or more members that, for cause therein stated, a member of the Union be expelled, the Executive Committee shall consider the matter, and if there appears to be sufficient reason, shall advise the accused of the charges against him. The accused shall then have the right to present a written defense, or to secure a hearing before a meeting of the Executive Committee or authorized representatives of the Executive Committee, of which meeting he shall receive notice at least sixty days in advance. Not later than sixty days thereafter, the Executive Committee shall finally consider the case, and if in the opinion of two-thirds of the members of the Committee a satisfactory proof of the undesirability of the accused as a member has been established, and he has not in the meantime tendered his resignation, he shall be expelled from membership.

ARTICLE III — SECTIONS

1. In each country represented in the Union, from which there are twenty-five or more members of the Union, there shall be formed a Section of the Union, which shall be known as "——— Section, International Amateur Radio Union."

2. The members in any country not possessing a total membership in the Union of at least twenty-five, shall temporarily be attached for administrative purposes to a neighboring country which shall be specified by the Executive Committee. Whenever the total membership from such a country attains a total of twenty-five or more, a Section shall be created in that country as provided in Paragraph 1 of this Article.

3. In each Section of the Union there shall be a National President, elected by popular vote of the members in that country. Nominations for this office shall be solicited by the International Secretary through the columns of the official organ of the Union, under regulations as to the eligibility, dates, etc., to be determined by the Executive Committee. The election shall be by means of ballots mailed from the headquarters of the Union.

4. The National Presidents shall hold office for a term of two years, or until their respective successors have been duly elected.

5. Whenever a vacancy occurs in the office of National President, an election for his successor shall be held as quickly as possible, under the same general regulations as apply for regular elections.

ARTICLE IV — OFFICERS

1. The officers of the Union shall be an International President, an International Vice-President, and an International Secretary-Treasurer.

2. The first officers of the Union shall be elected by the amateur delegates present at the International Amateur Congress held in Paris in April, 1925, one vote to be assigned to each country represented. They shall assume office immediately upon election, and shall hold office for two years or until their successors are duly elected.

3. Except for this first election of officers, the officers shall be nominated and elected by the Board of Directors for two-year terms, under regulations as to eligibility, dates, etc., that shall be determined by the Board.

ARTICLE V — MANAGEMENT

1. The affairs of the Union shall be managed under this Constitution by an Executive Committee, consisting of the officers of the Union and two Councillors-at-large.

2. The first Councillors-at-large shall be elected by the amateur delegates present at the International Amateur Congress held in Paris in April, 1925, one vote to be assigned to each country represented. They shall assume office immediately upon election, and shall hold office for a term of two years or until their successors are duly elected. Their successors shall be nominated and elected for two-year terms by the Board of Directors, under regulations as to eligibility, dates, etc., that shall be determined by the Board.

3. Whenever there is any vacancy in any office in the Executive Committee, it shall be filled by special election by the Board of Directors, under such regulations as they may determine.

4. The Executive Committee shall direct the investment and care of the funds of the Union, shall make appropriations for specific purposes, shall act upon all questions of admittance or expulsion of members, and in general shall direct the business of the Union, either itself or through its officers and committees. It shall arrange the place, time and program for the biannual Congress and shall handle all affairs relating thereto, either itself or through its appointees.

5. It shall be the particular purpose and duty of the Executive Committee to devise ways and means for the encouragement of international two-way amateur radio communication, by the management of tests and relays, by the promulgation of rules and regulations to co-ordinate international amateur operation, by encouraging and assisting the development of amateur radio in countries where assistance is desirable, by arranging for adequate representation of two-way amateur communication interests at international communication conferences, by endeavoring to secure a removal of legal restrictions prohibiting amateur operation in certain countries, and by kindred methods.

6. The Executive Committee shall meet in person at the call of the International President when possible and desirable. At such meetings three members of the Committee, present in person or by proxy, shall constitute a quorum, and action shall be determined by the concurring vote of a majority of the members present. In general, however, the determinations of the Executive Committee shall be made by post, through the agency of the International Secretary-Treasurer and under the direction of the International President, and action shall be determined by the concurring vote of a majority of the whole membership of the Committee. The International Secretary-Treasurer shall acquaint the entire membership of the Board of Directors with the actions taken by the Executive Committee, and such actions shall then become binding upon the Union; *provided*, that if three or more National Presidents within sixty days after such announcement of action by the Executive Committee formally protest the same, the Executive Committee shall cause the International Secretary-Treasurer to submit the question in point to the entire Board of Directors by post, and unless it is within one hundred and twenty days thereafter ratified by a majority of the Board of Directors, the action of the Executive Committee shall be deemed reversed.

7. The International President shall have general supervision of the affairs of the Union, under the direction of the Executive Committee. He shall preside at meetings of the Executive Committee and at the Congresses, and shall direct the work of the International Secretary-Treasurer in the determination of Executive Committee affairs by post. He shall be, ex-officio, a member of all committees. The International Vice President shall be responsible for such matters of general supervision as may be delegated to him by the International President. In the absence or disability of the International President, the International Vice President shall act in his stead.

8. The International Secretary-Treasurer shall be the general manager of the affairs of the Union, under the direction of the International President and the Executive Committee. He shall attend all meetings of the Executive Committee and all Congresses and record the proceedings thereof. He shall collect all moneys due the Union and deposit them in the name of the Union in a depository satisfactory to the Executive Committee. He shall certify the accuracy of bills or vouchers on which money is to be paid, and shall draw and sign all checks. He shall invest such funds as may be ordered by the Executive Committee. He shall have charge of the books and accounts of the Union, and shall furnish the Executive Committee from time to time such statements and reports as may be required. He shall conduct the general correspondence of the Union, and shall keep full records. Under the direction of the International President he shall canvass the Executive Committee by post to determine the action of the Union on current matters. He shall be in responsible charge, under the International President and the Executive Committee, of all property of the Union. He shall, with the approval of the Executive Committee, employ such clerical force as may be necessary and shall be responsible for the work of all employees of the Union. Under the direction of the Executive Committee, he shall be the general manager of any publications owned by the Union. He shall prepare and submit at each Congress of the Union a comprehensive report on the progress and status of the affairs of the Union. He shall perform such other duties as may be assigned to him by the Executive Committee. He shall furnish a bond satisfactory to the Committee, the expense of same to be borne by the Union.

9. The National Presidents shall have general supervision of the activities of the Union in their respective countries. They shall be responsible for carrying out in their respective countries the plans and policies of the Union. They shall represent their respective countries in the Board of Directors, and to this end shall keep themselves informed on the needs and desires of their members, in order that they may faithfully and intelligently represent them. They shall have the right to appoint such assistants as they deem desirable, to handle such portions of their duties as they may desire. So far as possible, they shall attend all Congresses of the Union, but shall be authorized to send an alternate of their own selection to act in their stead at the Congresses.

10. No person commercially indentified with the radio industry shall be eligible to serve as a member of the Executive Committee or as a National Presi-

dent. All members of the Executive Committee and all National Presidents must be members of the Union.

ARTICLE VI — BOARD OF DIRECTORS

1. The officers of the Union, the Councillors-at-large, and the National Presidents of Sections of the Union together shall constitute the Board of Directors.

2. The Board of Directors shall meet in biannual Congress in April of each odd-numbered year, at the call of the Executive Committee. The Executive Committee shall select the exact dates and the place, shall plan and announce the program, examine and authenticate credentials, and in general administrate the Congress.

3. At the Congress, the Board of Directors shall receive the reports of the officers, elect and instruct the new officers and Councillors-at-large; act upon such matters as may come before it; and in general delineate the policy of the Union for the ensuing two years. The rules of order of the Congresses shall be so arranged as to permit free and open discussion of international amateur radio matters.

4. Members of the Board of Directors present in person or by alternate or by proxy to a number representing one-third of the membership of the Board, shall constitute a quorum at any Congress. The actions of the Congress shall be determined by the concurring majority of those present, but if less than a majority of the whole membership of the Board is present the actions taken shall not become binding upon the Union until they have subsequently been ratified by a majority of the whole membership of the Board.

5. If the finances of the Union, in the opinion of the Executive Committee, permit it, the traveling expenses of the International President and the International Secretary-Treasurer to attend the Congresses shall be paid by the Union.

ARTICLE VII — A.R.R.L.

1. Until otherwise determined by the Board of Directors by the amendment of this Constitution, the headquarters of the Union shall be located at the headquarters of the American Radio Relay League in the United States of America. Until otherwise determined by the Board of Directors by the amendment of this Constitution, the magazine of the American Radio Relay League, "QST," shall be the official organ of the Union.

2. The provisions of this Constitution relating to the formation of Sections of the Union and the election of National Presidents shall not apply in the United States and Canada. The United States portion of the American Radio Relay League shall constitute the United States Section of the Union and its president shall be deemed the National President of the Section within the meaning of this Constitution. The Canadian Section of the American Radio Relay League shall constitute the Canadian Section of the Union and the A.R.R.L. Canadian General Manager shall be deemed the National President of the Section within the meaning of this constitution.

ARTICLE VIII — DUES

1. The dues for membership in the Union shall be one dollar ($1.00) per annum.

2. Members in arrears shall be carried on the records of the International Secretary-Treasurer for ninety days. If by the end of that time they have not renewed their membership, they shall be dropped from the rolls.

ARTICLE IX — AMENDMENT

1. This Constitution may be amended by a two-thirds vote of the Board of Directors, at any Congress. At the initiative of the Executive Committee it may be amended at any time by post by a two-thirds vote of the Board of Directors.

4BL at Lakeland, Florida has worked 8 stations in the 1st district, 6 in the second district, 1 in the third, one in Porto Rico, two 5's, 9 sixes, 3 sevens, 7 eight's, 9 nines and a Canadian when using one UV-201-A with an input of 3.3 to 9.9 watts, on 40 meters!

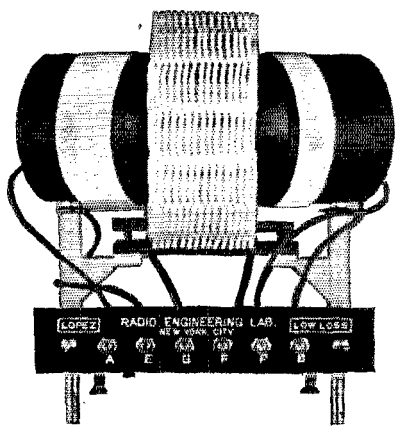
The Lopez Tuner

TO be a pioneer in the field of radio apparatus and still, after a period of a year or more, be one of the head liners requires some sound engineering work and good design on the part of some one. This is the case with the low-loss tuner manufactured by the Radio Engineering Labs. of New York City.

The tuners are available in three sizes; the broadcast unit which covers a wavelength range from 225 to 600 meters with a secondary shunt condenser of 500 μμf; the amateur size which tunes from 40 to 205 meters with a shunt condensed of 250 μμf, and the Amateur Special type which covers the 20 to 80 meter band with the same size condenser across the secondary.

The secondary coils in each of these tuners are four and a half inches in diameter and are wound with large double cotton covered wire. The secondary is firmly tied together in many places with a string binder and in addition is held in the bakelite clamp. It doesn't particularly matter about losses in the primary and tickler coils so they are wound on bakelike tubing. The primary wire is number 12 while the tickler is wound with number 20 D.C.C.

The whole unit is in one piece and is held against the set panel by means of two Number 10 machine screws threaded into the aluminum frame. The secondary coil will thus always be at least 3 inches from



the panel. Variable primary coupling is provided, and this is highly desirable so that the unit can be used efficiently on different types of antennas.

We are only sorry that the tickler is not at the primary end of the secondary. This isn't so all fired important on broadcasting wave length but it certainly does make a difference on ham waves.

Giving the Coil and the Condenser a Rest

By R. S. Kruse*

FOR some unknown reason it seems to be *QST*'s privilege to jog tuner development every time the thing shows a desire to sit down and fall asleep. Just at the proper moment some member comes along with the necessary impulse.

A pair of years since we had gotten to the point where everyone worried about the circuits in the receiver and nobody gave a whoop about the stuff the circuits were made of. Along came Hassel with his classic "Short Wave Tuner Design," which upset the entire tuner-designing game and forced attention to half a dozen things nobody seemed to have seen. Curiously enough one does not hear so much of "Short Wave Tuner Design" as of the follow-up article "Low Loss Tuners." This second article was "the bunk." I wrote it myself and know that it was a mere re-write of Hassel's principles illustrated by pictures of 3 tuners built by Hartford amateurs in accordance with Hassel's principles. The fame of the article depended on our title "Low Loss Tuners." How the ad. men did jump at that phrase "Low Loss!" They've worked it to death, it's been applied to all sorts of queer apparatus, also it has brought along the best coils and condensers we have yet seen.

Where the Coil and Condenser Stand

The variable condenser is good these days; more than half of the receiving variable condensers are so good that one can forget their losses entirely and pick a suitable one on mechanical requirements alone.

The coil has a way to go. Many "funny wound" coils are living on their appearance. They will not last long. Meanwhile well designed coils are here and more are coming.

Give Them a Rest

Very well then, why not forget the coil and the variable condenser while we see if the rest of the set is good?

What, for instance, is the excuse for—
Left-handed dials
Scales on ticklers and rheostats
Moving coils
Complicated panels
A fixed wavelength-range
Un-cushioned sockets
Interlocking controls.

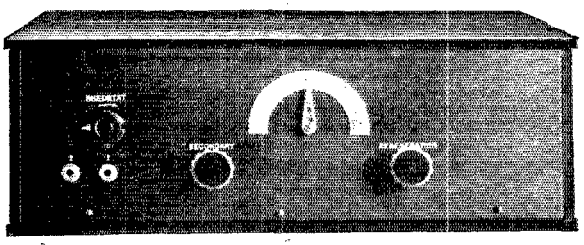
A set can be made without any of these things. We always like to illustrate tuner discussions by means of the simple regenerative-detector and audio amplifier. Partly we like to do this because such a set is understood by everyone and partly because it will—as always—give many more complex sets a hard fight.

Schnell's Tuner

With some of these things in mind our Traffic Manager built a tuner that dodges every one of the difficulties mentioned and is a mighty pretty piece of work in addition.

The photographs and the diagram tell most of the story but do not show how all of these things have been done.

The scale (notice there is only one) is right-handed so that the ordinary run of humanity can use it. The same sort of scale on a dial would be left-handed and therefore would have to be turned around. It does not matter, though, because this set isn't equipped with dials, it has an Honest-to-goodness *pointer* whose position can be seen at a glance without getting down and "squinching" at the little figures on the beveled edge of a left-handed dial.



THE DIGNITY OF SIMPLICITY
Not a single unnecessary thing on the Panel.

The tickler and the rheostat have no scale at all. Why in the name of Heaven should they have scales? Of course all the direction books sent with receivers tell you to "Set the rheostat at 7" and "Set the tickler at 5," but everyone knows that both these things are invariably set by ear and not by eye.

The coils are interchangeable, without a soldering copper. At the same time they do not depend on a trick plug arrangement

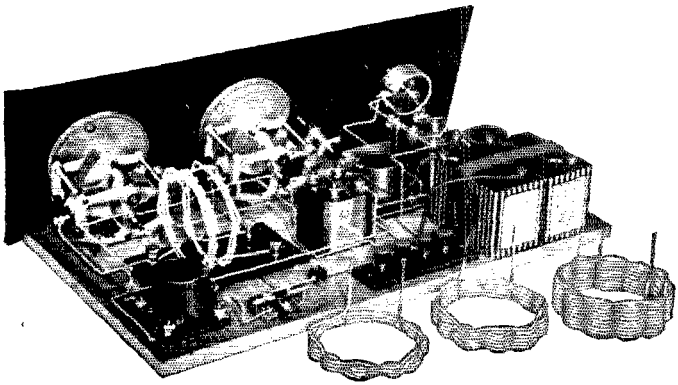
* Technical Editor, *QST*.

that may make contact. Regular binding posts are used.

The sockets are cushioned where it's necessary and not where it isn't. The cushions are real sponge-rubber cushions, too, not little rubber-band or leaf-spring arrangements that let every vibration through.

The Stationary Coils

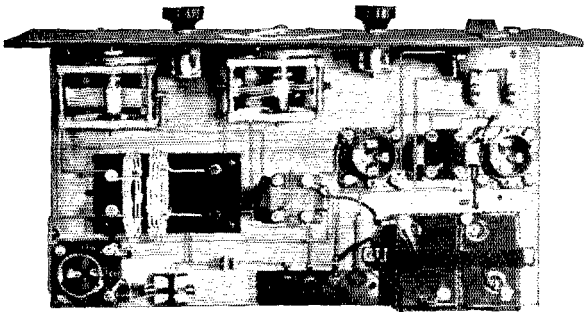
The coils all hold still while the tuner is being worked. There is no flip-flap tickler coil with flexible leads to break off. The tickler holds still and so does the secondary



THE "WORKS" AND THE SPARE COILS

tuning calibration. Of course this sort of a tuner needs a regeneration control and it is provided very simply by using the "throttle-condenser" scheme, in other words by using a variable bypass condenser.[1]

Another form of this idea was used in the



TOP VIEW SHOWING ALL WIRING

CR-17 Grebe tuner shown in our last issue. It is a very pleasant thing to be able to operate a smooth-running condenser instead of a lop-sided tickler of the usual home-brew variety. The best of it is that this throttle-condenser arrangement does not change the secondary tuning a bit; the two controls are perfectly independent of each other.

There is no moveable primary for either the broadcast or the amateur set. In the case of the broadcast set the primary is fixed, while the amateur set may use either a fixed 3-turn primary or else the condenser-coupling arrangement. Personally I do not care for the condenser-coupling idea. Others like it very well. For the broadcast range it is not a success for several reasons.

Those Lorenz Coils

We can see in advance that there will be lifted eyebrows at the sight of the Lorenz coils. Wait — they are better than they seem. The wire used in this case is white paraffined annunciator wire having a *triple* cotton covering. Therefore the turns of the coil are widely spaced. At their closest points they are separated by the diameter of the wire. Such coil shows up rather well as compared to the usual Lorenz coils and is not bad compared to a spaced wire.

However—don't use ordinary wire.

The Fixed Condensers and the Gridleak

Nobody ever seems to worry at all about the gridleak or the fixed condensers. We have heard that "so-called tube noises really originate in poor connections." (This man is selling solder and flux). We have heard that "so-called tube noises originate in the sockets." Personally I've found that they are either real tube noises or else they start in the fixed condensers and the gridleak. They NEVER start in poor connections, a

[1]This scheme was first used by Grebe, we believe, in their receiver.

moron can tell a loose-joint noise from a tube noise.

This agrees with my notes from the Traffic Manager; it pays to select the grid-leak very carefully indeed and it pays to get a handful of fixed condensers—and use two of the best.

This is not especially a "razz" for the manufacturer, after all he has to make what the public wants. If they insist on cheapness they are going to get it. Perhaps a bit later folks will be willing to pay enough for leaks and condensers so that all of them ought to be good. Right now these things are too cheap, and even at that there are some makes that are very good. Still—the only way to be sure is to try many of each. In the set shown here over 150 gridleaks were tried, and only about 10 were perfectly quiet. Most of these were of one make.

The Tubes

Nobody needs to be told that the uniformity of receiving tubes is a thing we dream about, but usually can't buy. It seems that increased production and decreased quality have run together in many factories. Again—it pays to try a lot of them. The sets shown here were tried with 50 or 60 different tubes of one make, and some 4 were found to be good, meaning that they were both quiet and effective. So there is such a thing as a noisy tube and we can't blame it all on the sockets, the solder, the condensers and the day of the month.

Making the Tuner

The particular tuner we have been talking about may be of sufficient interest to encourage many to make a similar one. Very well, a few suggestions are in order.

Since the original tuner was constructed for short-wave C.W. reception it is not especially adapted to work at 200-600 meters where radiophone is to be copied with the tube non-oscillating. It will work perfectly well over that range if the capacity coupling scheme is abandoned in favor of a primary coil and the throttle-condenser scheme is used in the form suggested by Fig. 2. However, it has then become another tuner, so different that re-design is in order. Next month we will present an extremely simple 200-600 meter tuner which has advantages over such a re-design.

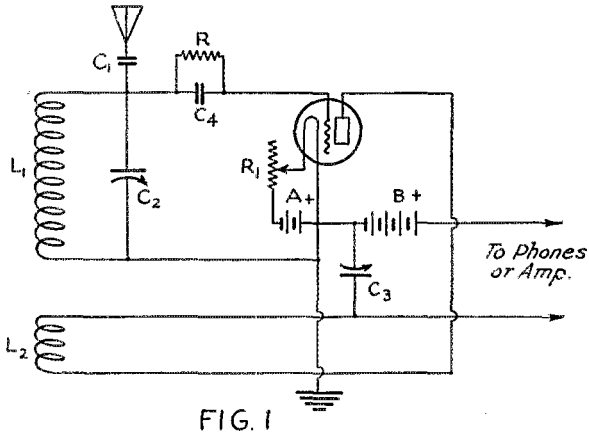


FIG. 1

Fig. 1. The Circuit, our old faithful friend the regenerative detector with an audio amplifier.

C1. Antenna coupling condenser. Two pieces of aluminium or brass sheet spaced 1/8" to 1/4". Size of sheets 1/2" x 1/2".
C2. Bremer-Tully variable condenser cut down to 5 plates.
C3. Bremer-Tully variable condenser, capacity at maximum setting 250 micro-microfarads.
C4. Carefully chosen mica grid condenser, 250 micro-microfarads capacity.
R. Carefully selected gridleak of 7-8 megohms. The leak and condenser should be so chosen as to permit tube to go in and out of oscillation with a soft hiss and not a click.
R1. General Radio 10 ohm Rheostat.
L1. Secondary coil. See note below.
L2. Tickler coil, 4 turns. Tickler should be so spaced from secondary as to give good control over tuning range, using the entire scale of the condenser C3. If the tube will not oscillate the tickler connections are probably reversed.

Note—The coils are wound in the usual Lorenz fashion using white paraffine annunciator (not ordinary thin D.C.C.) wire. The details are given on page 2 of Feb., 1924, QST. The form uses 11 pegs set in a piece of bakelite on a circle 3¼ in diameter. A photo of the winding form appears on p. 39 of the September, 1924, issue. Wavelength ranges with different secondary coils are as follows:

Secondary turns	Wavelength range	Tickler turns
19	58—113	4
10	35—70	4
6	23—45	4 or 3
3	15.4—26.1	4, 3 or 2
1	??—12	3 or 2

Going back to the original tuner we find that the construction is pretty well explained by the photos and the diagram, but a few details need to be mentioned. The detector socket is cushioned, as has been mentioned. The connections are made with small strips of very thin copper which is extremely flexible and does not transmit vibrations to the tube. The other sockets are not cushioned because there isn't any particular need for it. The little board on

which the coils are mounted permits the use of binding posts without requiring any wiring to be run beneath the main base of the set. This small base does not come off

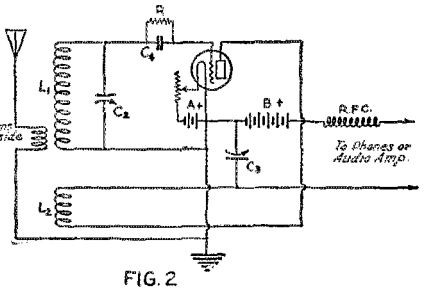
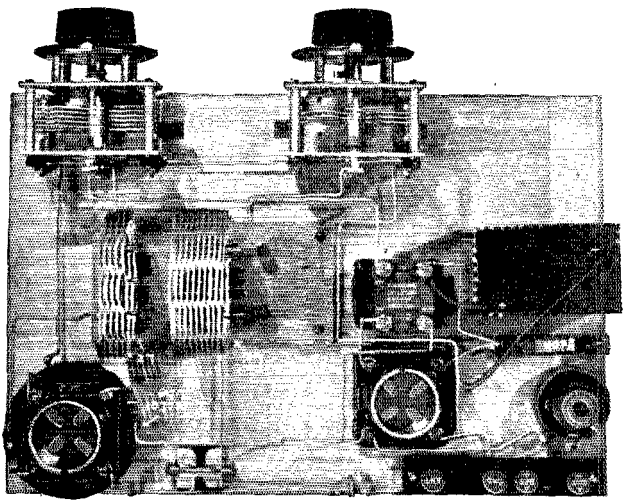


FIG. 2

MODIFIED FOR BROADCAST RECEPTION FROM 200-600 METERS

Everything is the same except the coils, the condensers and the radio-frequency choke r.f.c.
L1—Same kind of winding but 50 turns of No. 22 D.C.C.
L2—Same kind of winding but 11-16 turns.
C2—500 micro-microfarad variable condenser.
C3—1000 micro-microfarad variable condenser.
R.F.C.—3" tube wound with 200 turns of any wire smaller than No. 22. This coil must be 6" from L1 and L2.

when the coils are changed; it stays while the coils are removed from the binding posts.



A BREADBOARD SET, THE ANCESTOR OF THE FINAL SET

This set used only one step of audio amplification. The "velvet verniers" of the National condensers here shown were abandoned for one reason only—the builder's preference for a pointer as against a dial.

Oh yes—very little "spaghetti" is used on the wiring because it has been laid out so that there is no danger of short-circuits.

At Last—An Approved Lead-In Bushing

THE Underwriters' Laboratories have consistently refused to investigate the matter of lead-in tubes and bushings for radio purposes on the premise that almost everyone used ordinary porcelain wiring tubes for lead-ins and as these porcelain tubes are not approved in general wiring they should not be approved as radio devices. No one knew what was approved in the way of a lead-in—a specific lead-in device—until the M. M. Fleron & Son company of Trenton, N. J., undertook to convince the Underwriters that there was no reason why there should be any "fire hazard" when using their lead-in bushing. At our instigation they fought the matter out and we now have at least one lead-in tube which is approved by the Underwriters' Laboratories. It seems to us that a bushing

of the Pyrex bowl type should be approved also, but the Fleron bushing is the only one we know of which has been officially accepted.

In addition to being an approved device the Fleron bushing is a most convenient device. The over all length of the bushing is 14 inches. The head of the bushing is moulded from special Black Body porcelain, and is made up of one inch tongue and groove porcelain sections. There are ten of these sections. The brass rod in the center of the bushing is threaded all the way. When sections are removed the fibre end washer is screwed up tightly against the last section, holding the whole unit together. For soft wood the bushing requires a five-eighths inch hole while for hard wood the hole should be eleven-sixteenths of an inch.

Note the "drip loop" to keep rain from coming down the lead-in and entering the house.

The Radiodyne Receiver

By W. Turner Lewis*

THERE is a marked lack of information on the design of broadcast receivers which use only the C-299 or UV-199 tubes. The "Radiodyne" model WC-12, a product of the Western Coil & Electrical Company, is a six-tube broadcast receiver using the tubes in question.

The Circuit

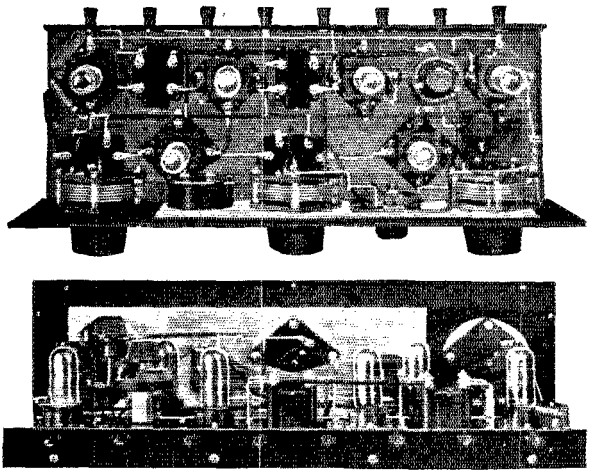
The circuit uses two stages of tuned *R.F.* amplification, a detector and two stages of audio amplification. This is not an unusual combination but the particular manner in which the circuit is designed is somewhat unusual.

The first radio-frequency amplifier stage cannot be made to oscillate. This is not accomplished by neutralization but by reducing the plate inductance, so that there is no possibility of oscillation.

The plate coil of the second radio-frequency tube is large enough so that oscillations will take place if desired. Free oscillation of this second tube is kept under control by means of a 400 ohm variable resistance which, as will be noticed from the diagram, is in the *tuned grid circuit* of the tube.

Thus it is possible to make the second tube work near the oscillation point, gaining amplification thereby, while the first tube prevents radiation.

With this preliminary explanation the details of the set will be considered.



TOP AND REAR VIEWS OF THE RECEIVER

The Antenna Coupler

Inductive coupling is used between the antenna and the grid coil of the first radio-frequency amplifier tube. This idea is carried straight through, using loose coupling in each pair of coils. In other words each of the tuned grid coils is loosely coupled to the preceding plate (or antenna) coil.[1]

The antenna inductance is a 30-turn spiderweb coil and this coil is mounted on the bent end of a small shaft which can be turned by a knob so that the distance between the antenna coil and the grid coil of the first tube can be varied. The arrangement thus becomes a small "Variocoupler". This variocoupler and its controlling knob is mounted *inside* the cabinet as it is not adjusted frequently. A pointer on the variocoupler shaft moves between two engraved indications, namely "Soft-sharp" (when loosely coupled) and "Loud-broad."[2] (when closely coupled.)

The R. F. Amplifier

All of the coils in the set are of the conventional self-supported spiderweb type. After experimenting with various types of coils the conclusion was reached that these coils were economical and efficient, principally because of their smaller fields which decreased inter-stage coupling, doing away with the necessity of mounting the coils at a particular "minimum coupling position".*

* Director of Research, Western Coil and Electrical Co., 300 Fifth Street, Racine, Wisconsin.

1. This scheme was first described in our pages by Mr. M. B. Sleeper under the title, "Something New in Radio Frequency Amplifiers", page 8, April, 1924, issue. However, the idea is used by many manufacturers of tuned R.F. sets, although most of them do not admit it. Some of the supposedly neutralized sets are kept from oscillating by this same means, the alleged neutralization device being needless or ineffective.

2. Perhaps the Technical Editor is needlessly prejudiced. However, he is firmly convinced that the solution of the most of our complaints about interference is to be found in the gradual elimination of the tuner with conductive coupling. This conductive coupling argument works both ways; if it is bad at the transmitter then it is bad at the receiver—and it is much easier to cure in the second case. Why, for instance, should a high-priced neutrodyne receiver use an input tuner that taps the antenna connection directly off the input coil? Most of them do it.

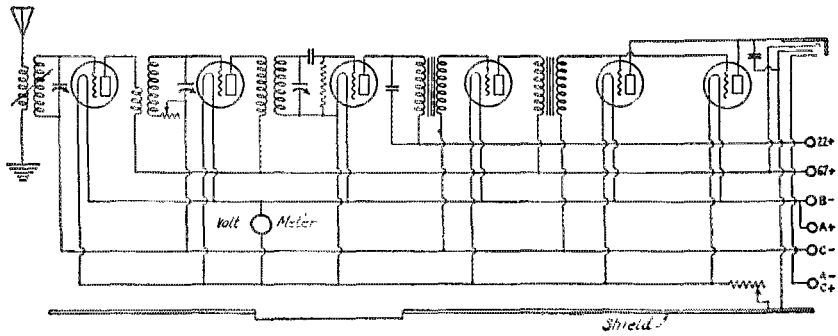
3. As we have said before, the whole question isn't answered by making good coils. One must then see if these good coils do not become hopeless when used in the set. Frequently a poorer coil, with a more compact field, is the best one for the set. It is a knotty problem.

The grid coils of the two *R.F.* tubes and the detector are all of approximately 112 turns and each is tuned by a variable condenser so that they respond to the entire broadcast band of wavelengths, that is from 230 to 560 meters.

As has been mentioned before the plate inductance of the first radio frequency amplifier tube (the first tube in the set) is reduced so that oscillation is not possible. Contrary to the usual scheme this coil is coupled to the grid coil of the second tube *quite loosely*. However the coupling is sufficiently tight so that the plate coil is somewhat affected by the tuning of the tubes are used in parallel in the second stage. This is necessary because a single tube would be overloaded when working with the energy represented by a signal that has passed through 4 tubes. The operation of tubes in parallel in this last stage results in very much more perfect reproduction than has hitherto been customary with these small vacuum tubes.[4]

Shields and Connections

The shield (see photograph) extends only across the radio-frequency amplifier and stops short before reaching the detector



RADIODYNE WC-12

THE CIRCUIT OF THE RECEIVER

second grid circuit, thereby securing better operation at the higher waves than would otherwise be possible.

The various radio frequency transformer inductances are mounted on treated hardwood spools. These spools are mounted underneath small micarta panels which also carry the terminals of the coils and serve as shields to protect them from harm.

Regeneration Control

As has been stated, the regeneration of the second tube is under control of a variable resistance in the tuned grid circuit. This resistance is constructed so that its operation is very smooth and does not introduce objectional noises.

The Audio Amplifier

The audio amplifier employs 3 of the small vacuum tubes but is only a two-stage amplifier. The explanation is that two circuit. It is connected to the negative "A" battery terminal.

The various terminals of the set are not crowded together but are distributed along a terminal strip which extends along the full length of the set.[5]

Protection for the Little Tubes

Trying to operate a 6-tube set using "one ninety nines" without a voltmeter is like trying to drive an automobile at night without headlights. A filament voltmeter is provided so that the operator may know at all times that he has exactly three volts on the filaments. To prevent "monkeying", the filament rheostat is placed inside the cabinet where it can be reached readily by lifting the cabinet lid but is not a constant temptation to children and others who would turn up the tubes and spoil them.

In addition to this, cushioned sockets have been used to give the tubes mechanical protection and excessive plate currents have been forestalled by making provisions for suitable negative grid biases.[6]

4. Having been over this ground, and having tested the WC-12 for several months, the Editor is able to endorse this emphatically.

5. Good! What's the profit of the customary crowded terminal strip?

6. It does not seem to be appreciated that the main business of a "C" battery is to protect the tubes and the "B" battery. The market persists in regarding the "C" battery as something designed to help Burgess or Ever-ready sell more batteries. This isn't true, in fact the best way to help these 'olks along is not to use the "C" battery, then you will need many more "B" batteries.

Form 772a of the Department of Commerce entitled "List of Abbreviations to be used in Radio Communication" contains a complete list of the "Q" abbreviations used in both amateur and commercial work. These forms can be obtained from the Department.

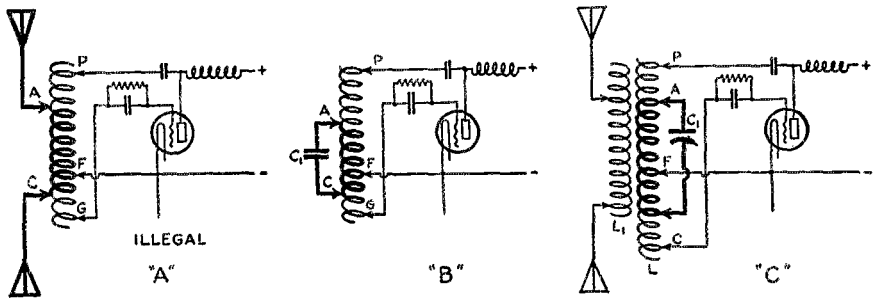
Adjusting The Transmitter

By John M. Clayton*

SO often we hear some fellow say, "I can't make a Meissner outfit work at my station. The only circuit I can get to oscillate on 78 meters is a Colpitts, but the Hartley works splendidly on 80 meters." We also hear that a Hartley circuit works OK in Louisiana but will not operate in Wyoming. The Meissner circuit, (which should work best in Germany Hi!) gives splendid results in many foreign countries and practically all of the U. S. only to fail in one State! If handled intelligently any of the well known transmitting circuits can be made to oscillate satisfactorily on *any* but the shortest wave lengths. On the very short waves (less than 5 meters) some circuits can be handled a bit more easily and are a little less difficult to put in operation, but any of them can be made to oscillate and put power into an antenna.

The trouble is *not* in the circuit; either the apparatus is not handled properly or it is not designed for the particular circuit in which it has failed to operate. A certain circuit, for example, may require more plate inductance than your particular helix affords. You don't add the additional turns, the tube fails to oscillate and the circuit is banned as one which will not work in your particular state or location.

In connection with this article we have picked the inductively coupled Hartley circuit. It is as flexible as any of them and with the right constants it can be made to oscillate at any wave length from the highest down to 5 meters and less. There is nothing wierd or mysterious about any coupled circuit. In Fig. 1 we show the development of the inductively coupled Hartley from a conductively coupled circuit. At "A" we show a directly coupled circuit. *This circuit is now illegal.* The adjustment for wave length is made by varying the number of turns between clips A and C. The greater the number of turns between A and C the higher will be the wave. The filament tap F is usually set in the middle of the inductance and in general there will be more turns between A and F than between F and C. The plate current to the tube will be largely dependent upon the ratio of turns in the plate P-F and grid G-F coils. The more turns you have in the grid coil, as compared the plate coil, the higher will be the amount of feedback and the larger the plate current. The wave length is practically independent of any variation of the P and G clips.



DEVELOPMENT OF INDUCTIVELY COUPLED HARTLEY

FIG. 1

Any circuit to be oscillatory must have inductance and capacity and will have resistance. That is exactly what this directly coupled affair has. The antenna-counterpoise capacity is the capacity required to make the antenna circuit oscillatory (this is represented by capacity C' of "B" in Fig. 1). The leads from the antenna and counterpoise to the inductance have inductance themselves and they also have resistance. So the antenna-counterpoise system can be replaced by a condenser and the circuit (Fig. 1B) represented By C1 and the inductance between clips A and C will be a tuned circuit. By a proper selection of turns between A and C and a suitable capacity in C1 the circuit at "B" will become an excellent oscillator. On very short wave lengths this condenser C1 is not needed as the distributed capacity and distributed inductance of the leads are sufficient to make the circuit an oscillator without any shunt capacity as represented by C1 in "B" or the antenna-counterpoise capacity of "A".

* Assistant Technical Editor

In practical operation we replace the fixed condenser C1 by a variable condenser. This makes adjustment of the transmitter much simpler. This condenser is shown in the circuit "C". Here we have coupled the antenna and counterpoise to the oscillator (the primary circuit) by means of an inductance L1. The inductance L1 plus the capacity of the antenna and counterpoise shunted across it determines the wave length of the secondary circuit. If this circuit is in resonance with the primary circuit power will be absorbed from the primary and radiated from the antenna. The coupling between L1 and L is variable

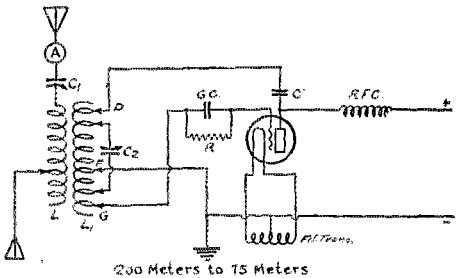


FIG. 2

and the wave can be sharpened considerably by selecting the proper value of coupling. We now have two tuned circuits. The primary circuit is tuned by means of condenser C1 and the clips A and C and the secondary circuit is tuned to resonance with the primary by means of the clips on the inductance L1.

We have two objects in mind when tuning a transmitter. The first is to get the maximum *steady* output from the tube, and the second is to adjust for highest efficiency, that is the highest ratio between antenna—input and input to the plate of the tube. The maximum output is indicated by the maximum antenna current at a particular

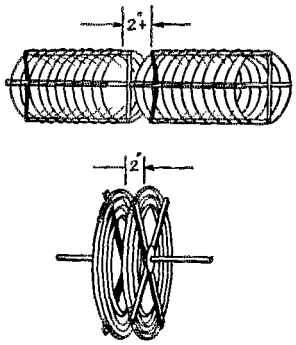


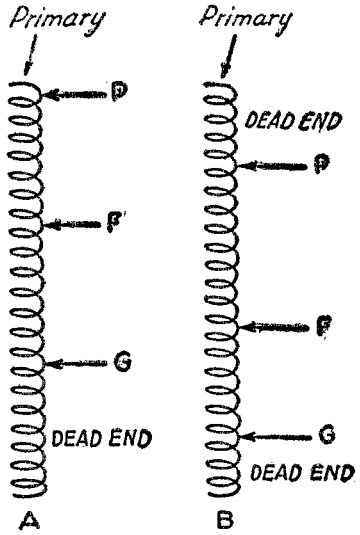
FIG. 3

wavelength. When operating the antenna below the fundamental, as is customary nowadays, the antenna current is going to be only a small fraction of what it is when operating at or above the fundamental, with the same power in the antenna. Decide on what wavelength you want to use and adjust for maximum steady antenna current at this wavelength. The maximum *steady* output is usually not the hope of every amateur. We all, it sems, like to overload plate and filament, tighten coupling and do anything else possible to add an extra tenth of an ampere to the antenna current. The result is a floppy note which takes a mind reader and contortionist to copy. We know several stations that push a nice, steady, clean-cut signal into the headset with only an audibility one tenth of that produced by a lot of the other gurglers whose notes run all over the lot; the weak boys can be copied solid for hours while we can't even get the sign of the loud floppers.

In Fig. 2 we show three forms of inductively coupled Hartley circuits. In "A" of this figure we have a shunt condenser C2 across a portion of the primary L1. This condenser is a necessity on the 150-200 meter band and is usually useful on the 75 to 85 meter band. Right around these wave lengths, however, there is a point where this shunt condenser ceases to be useful or desirable. The major portion of the inductance between the condenser clips

will generally be above the filament center tap toward the plate clip. Also if there are a large number of turns between the grid and plate clips there will usually be a correspondingly large number of turns between the two clips which connect the condenser across the portion of the inductance.

Below 75 meters the shunt condenser should be eliminated. The distributed capacity of the primary inductance and of



DEAD ENDS

FIG. 4

the connecting leads furnishes sufficient capacity in shunt with the inductance to make the primary an oscillatory circuit. (Fig. 2-B). This capacity is so large that when we get down in the vicinity of 5 meters it is necessary to use variable stopping and grid condensers (Fig. 2-C) in order to keep the total circuit capacity as low as possible.

When adjusting the transmitter first get the primary into action. Disconnect the antenna and counterpoise clips from the secondary and loosen the coupling between primary and secondary as much as possible. The filament clip should be set somewhere near the midturn of the primary inductance (Fig 2.) Start with a lot of turns in the plate circuit, setting clip P about 8 or 10 turns away from the filament clip. Set the grid clip G somewhere below the center-tap clip G; say 4 or 5 turns. Turn on the filament of the tube and adjust for proper filament voltage. If you have a variable source of plate supply, reduce the plate voltage considerably below normal. Press the key and measure the wavelength with a wavemeter or by means of your receiver. The plate current will be dependent upon the ratio of turns in plate coil to turns in grid coil. The higher this ratio the higher will be the plate current. Condenser C2 controls the wavelength. The greater the capacity in C2, the higher is the wavelength. When using the shunt condenser a variation in the plate and grid turns does not vary the wavelength materially, but when no shunt condenser is used (Fig. 1-B and 1-C) it will be necessary to shift both plate and grid turns at the same time when adjusting for wavelength as these adjustments are not independent. The wavelength, when the shunt condenser C2 is omitted, is governed mainly by the number of turns in the grid coil.

If the measured wavelength is lower than desired, increase the capacity of the shunt condenser or move the grid clip away from the filament clip. Conversely if the measured wavelength is too high decrease the shunt condenser capacity or move the grid clip in toward the filament tap. After you have juggled the grid clip and the shunt condenser until you are on the wave desired, couple the secondary (antenna) coil tightly to the primary. (See Fig. 3 for examples of tight coupling). Connect the antenna and counterpoise clips to the secondary and tune the secondary to resonance with the primary. This is done by varying the number of secondary turns and the capacity of the series antenna con-

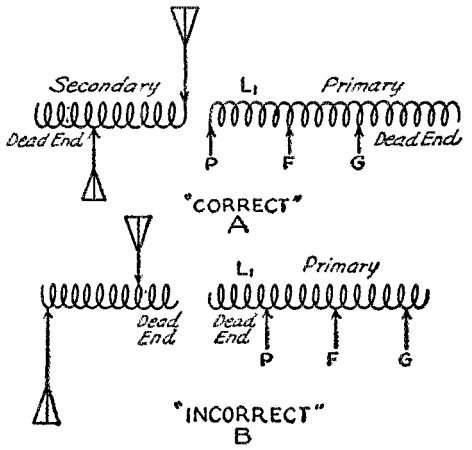


FIG. 5

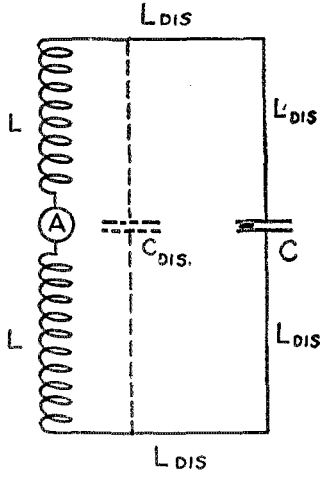
denser, C1. Resonance is indicated by the maximum deflection of the antenna ammeter pointer. Now bring the tube up to normal input by increasing the plate voltage to normal and setting the plate clip P further in toward the filament clip, at the same time making any compensating adjustments of condenser C2 or grid clip G to keep the wavelength the same. When the plate clip has been set at the point at

which the plate current is normal finally readjust the grid tuning so that you are still on the original wave you started with, and forget the primary.

If the antenna circuit is in exact resonance with the primary and the coupling between the two circuits is very close the tube will oscillate very unstably or may refuse to oscillate at all. There are two things which can be done to remedy this condition. Either loosen the coupling between the primary and secondary or slightly detune the secondary circuit. The latter is the most desirable. If the coupling is only reduced and the circuits are in exact resonance the least change in antenna constants will cause the circuits to go out of resonance and the tube will stop oscillating with a bang. If the coupling is kept fairly tight and the antenna detuned almost anything can happen to the antenna and the tube will still oscillate. The antenna should be detuned until the antenna current has dropped to about nine-tenths of its original value.

Some Precautions

There are a number of things which may cause trouble. In the first place the radio



WHERE ULTRA HIGH FREQUENCY OSCILLATIONS START

FIG. 6

frequency chokes should be kept as far away from the field of the inductances as possible. The choke *must not* be a honeycomb coil. They are the bunk as R. F. chokes anyway. Use a single-layer cylindrically-wound coil on a cardboard form. A choke consisting of 250 or 300 turns of number 28 or 30 D.C.C. magnet wire on a 2 or 2½ inch tube is OK on all but the shortest wavelengths. Below 20 meters you will need a small choke consisting of about 20 turns of small wire space wound on a half-inch wooden dowel. Keep the choke near the plate terminal of the socket but at right angles to the field of the primary inductance. Also below 20 meters small R.F. chokes in series with the filament leads (Fig. 2-C) are desirable. These chokes should consist of 20 turns of No. 20 magnet wire space wound on a half inch form.

A grid condenser having a fixed capacity of .002μfd. will be satisfactory for all wavelengths down to 20 meters. Below 20 meters a *small* variable condenser is necessary. At 5 meters a 3 plate vernier condenser is all that is needed.

The only advice in regard to the grid leak is to start with a leak having a high resistance and as the tube input is increased, decrease the resistance of the leak. Start off with 10,000 ohms and come down in steps of 2,500 ohms. The grid leak may be connected directly across the grid condenser on the high wavelengths. At 5 meters and below the leak must not be connected across the condenser for the capacity of the condenser is so low and the distributed capacity of the leak so high, the leak may be acting as the grid condenser! Connect the leak directly from the grid of the tube to the filament, with a small R.F. choke in series with the filament side of the circuit. (Fig 2-C). This choke should consist of 30 or 40 turns of very small wire around a pencil.

Try to avoid any unused turns (dead ends), especially in the primary inductance. They are not so terribly important in the secondary unless the natural period of the unused turns happens to fall within the tuning range of the transmitter, but in the primary they will play the dickens with the set. A standard R.C.A. helix should be cut into 3 sections, having an equal number of turns, to operate successfully on most of the amateur wavelengths. The sections should be independent of each other and, for the shorter wavelengths, at least, they should not be coupled to each other when not in use. All three sections in series plus a shunt condenser will be necessary for the 150-200 meter band. Two sections with or without a shunt condenser will be needed for the 75-85 meter band; the same two sections without shunt condenser for the 37.5-42.8 meter band and one section alone for the 18.7-21.2 meter wavelengths. For waves shorter than these a special helix having a small diameter and only two or three turns will be necessary. If you *must* have unused turns in your helix have the dead ends in the primary at one end of the helix (Fig. 4-A) instead of at both ends (Fig. 4-B). If you have unusued turns in both primary and secondary coils keep these ends away from each other as shown in Fig.

5-A instead of toward each other as in Fig. 5-B. If the unused turns are toward each other it will be difficult to determine the correct coupling value between coils due to the high electrostatic coupling caused by the unused turns.

It is possible for almost any circuit to oscillate at several different frequencies at the same time. The current generated at the higher frequencies may not show up on

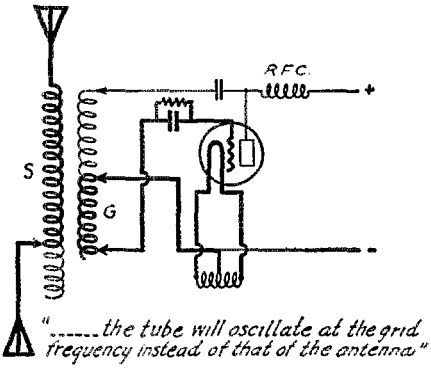


FIG. 7

any of the meters in the circuit but this high frequency oscillation is there just the same and it is taking part of the energy away from the fundamental oscillation and robbing the antenna of some of its power. In Fig. 6 we show a coil L together with shunt condenser C. This circuit will resonate at a certain ferquency. It will also be resonant at a frequency to which the condenser caused by the distributed capacity of the inductance and distributed inductance of the leads are tuned. At this frequency the condenser C acts as a short circuit (due to its high capacity as compared to the distributed capacity of the coil) and the inductance L acts as an open circuit. Hence there will be no current indication on the ammeter A, but the power in the short wave length will be there just the same. Care should be taken that this same condition does not exist to a harmful extent in your transmitter. The leads should be short and direct to minimize their inductance and they should be well spaced to keep the capacity between them as low as possible.

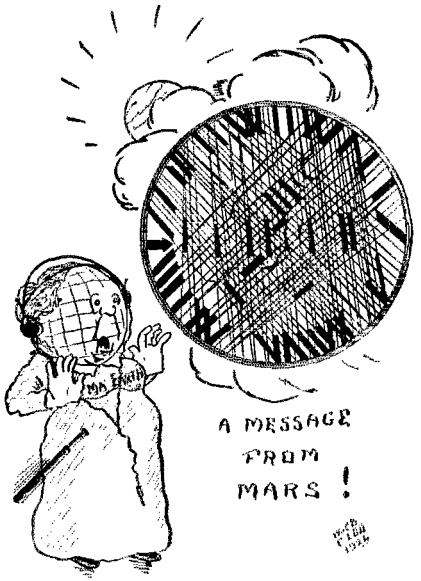
If the grid circuit (Fig. 7) happens to have a natural wavelength near the wave length of the secondary circuit the tube will oscillate at the grid-circuit frequency, instead of the antenna-circuit frequency. Also, if the natural period of the primary helix as a whole is in the tuning range of the transmitter, care must be taken not to try to operate the transmitter on this wave.

If the coupling between the primary and secondary coils is too close a variety of things happen. As previously mentioned the oscillation of the tube will be very unstable. In addition key clicks will *inevitably* be passed into the antenna. Oscillations of two frequencies can occur. It is possible to adjust the transmitter so that the antenna current is high on a definite wavelength and then find that, on keying, the current in the antenna will fall off and the wave length may be shifted as much as ten meters. The remedy is obvious—*loosen the coupling*. See Figure 2 again. The distance of one inch for helical inductances and 2 inches for spiral inductances is an absolute minimum. In general better results will be secured with even looser coupling than this.

THIRD NATIONAL
A. R. R. L. CONVENTION
at
CHICAGO
August 18th, 19th, 20th, 21st, 1925.

FELLOWS — Just a few more weeks before the **National Convention.** Are you getting ready to come. Everything will be held under one roof.

Write to Wm. E. Schweitzer, Chairman, 4264 Hazel Ave., Chicago, Ill., for your reservation.



CAN YOU READ THE MESSAGE?

NRRL-A.R.R.L. Contact

By F. E. Handy*

WHEN the U.S.S. Seattle sailed from San Francisco on April fourteenth she carried with her Lieutenant Schnell from A.R.R.L. Headquarters. Just before her departure the transmitters and receivers that had been carried across the continent were taken aboard and put into active operation. The twenty, forty and eighty-meter transmitter was first to get on the air. Many Pacific Coast Amateur and Naval Stations were "worked" from San Francisco. Most of this work was done on forty meters. As soon as possible the one kilowatt, crystal-controlled transmitter working on 27.2 and 54.4 meters was installed. Both transmitters are now in operation nightly.

NRRL spends several hours each day in conductcing tests with NKF. The work is done on schedule. The wavelength and time are known in advance. Schedules change frequently and so frequently that we will not attempt to outline any of them in these pages. Between schedules a watch is kept and communication is maintained with amateurs all over the country.

At this writing the "Seattle" is at the dock in Honolulu. During the first part of the trip from San Francisco many West Coast Amateurs were worked. Thus far NRRL has maintained consistent communication with all parts of the United States.

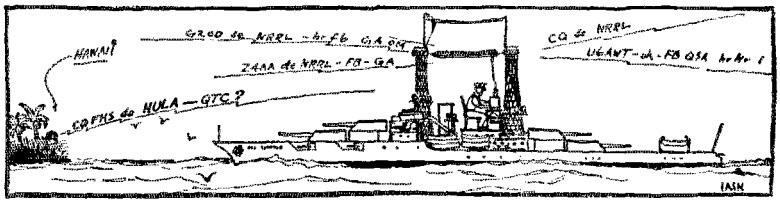
It is too early to predict just what may be expected of the different wavelengths. The majority of reports received from different sections of the country indicate that the forty-meter signals are widely heard, probably because most of the listeners have been using that wavelength.

Twenty meter signals from NRRL were copied April 20 at 1 P. M. by c3HP of Port Arthur, Ontario. At 3:45 P.M. the same day 8BDG at Schuylkill, Pa., copied NRRL on twenty meters calling 6XAG. The time given is Eastern Standard and the signals copied by 8BDG came over in full daylight all the way.

On forty meters 1CMX, 8ALY, 2WB, 9XI, 6CGW, 6AWT, 6CMQ, 1PY, NKF, NPG, a2DS and z2AC have been worked at night. 5QP, 1UW, 2CJE, 4XE, 8CID, 2WR, 3EM, and 7OK have reported hearing these signals.

7RL and NKF have worked NRRL since the 54.4 meter transmitter has been operating. 3AJD and 3EM report copying the crystal-controlled set. The best report, however, comes from g5NN who copied good signals on this wavelength April 26. g5NN is in London, England, some 7500 miles from the Hawaiian Islands.

There are many indications that NRRL will have a worth while log to bring back with a record of hundreds of stations worked and heard. About two dozen amateurs are logged in an average watch at NRRL on the forty-meter band alone. When Schnell left Hartford he promised us that he would give us some strong signals. He has kept that promise and it is possible for any of us to use a wavemeter with a single tube receiver and listen to some real long distance communication. Those of us fortunate enough to own transmitters can give him a call with a good chance of establishing communication if "FS" and "WG" are not busy with a schedule.



The history of NRRL is in the making. Every one of us can do something to make it a complete one. Everyone hearing or working NRRL is urged to send reports to the Naval Research Laboratory, Bellevue, D. C., and to send a copy of the report to League Headquarters in Hartford for our record. Please include the wavelength and time of reception and as complete details as possible in your report.

Another familiar "fist" will be heard pounding the key at NRRL. Just as we write this report an amateur radio message is received via 1XU.

"SANTA MONICA, CALIF 6AGK NR 1
TO ARRL HARTFORD CONN
ORDERS RECEIVED NAVY DEPARTMENT DETAIL ME ACTIVE DUTY USS SEATTLE CONNECTION NRRL STOP WILL JOIN IT HAWAII STOP INFORM 1XAM STOP END
(Signed) WILLIS 6TS"

* Acting Traffic Manager, A.R.R.L.

The message speaks for itself. Now we have two well known operators afloat on a battle wagon. The League is proud of NRRL and its operators. Next month we will continue the story of NRRL. Don't forget to send us your report.

2AAY took a long list of stations heard and worked direct from NRRL. In the first eight days of operation every U.S. Inspection District was worked except the third and fourth. Stations in England, Australia, and New Zealand were worked in addition to those in this country. The report follows:

April 13 to 23 (Two days out for sickness).

Stations worked: 1CMX, 1PM, 2WB, 5AEC, 6AGK, 6AHP, 6ASR, 6CGW, 6AWT, 6BUR, 6CC, 6CP, 6CMQ, 6ZH, 6ZO, 7DJ, 7HP, 8ALY, 9XI, NPG, NQW, g2KF, z2AC, a2DS.

Stations heard on 40 meters: 1CMP, 1AAC, 1AF, 1BYL, 1OW, 1PL, 1PY, 1XAV, 1YB, 2AWF, 3AB, 3OU, 4AU, 5ATX 5AK, 5BM, 5FX, 5IM, 5NW, 6AGE, 6ANO, 6AWE, 6BAD, 6BBV, 6BCM, 6BMW, 6BQR, 6BVL, 6CDP, 6CIG, 6CIP, 6CFZ, 6CLZ, 6CQZ, 6CST, 6HM, 6IM, 6JI, 6NO, 6QI, 6TS, 6UW, 6CEF, 6CGW, 6CMQ, 6NO, 6OI, 7GB, 7GJ, 7MH, 7NX, 7UV, 8DO, 9BHT, 9BJT, 9BMH, 9BRX, 9CAR, 9CAP, 9CIP, 9DAT, 9BAP, 9DED, 9DFH, 9DGX, 9DHH, 9DPX, 9DQ, 9UQ, 9XN, NKF, NERK-1, z4AG, m1AA.

RCC

THOSE amateurs who were hams "back in the dim ages before the war" remember the nights when real friendships were made by wireless—when you felt that you really *knew personally* a hundred or more fellows all over the country. You knew them because you had actually conversed with them by the hour. Working a station and saying "nil hr OM pse QSL crd cul 73" does not lead to those friendships—and yet that is the kind of communication that the air is full of now. Let's have more *real* visiting on the air, more conversations, more message handling—less calling of stations when we haven't anything to say to them.

In order to promote friendly conversations between amateurs and to get away from these momentary contacts which consist only of a request for a QSL card and "cul 73," the Rag Chewers' Club has been organized.

THE RAG-CHEWERS' CLUB

How to get in:

1. "Chew the rag" *with a member of the club* for at least a solid half-hour. This doesn't mean a half-hour spent in trying to get a message over through bad QRM or QRN, but a solid half-hour of conversation or message handling.

2. Report the conversation by card to the Rag Chewers' Club and ask the member station you talked to to do the same. When both reports are received you will be sent a membership card entitling you to all the privileges of a Rag Chewer.

How to stay in:

1. Be a conversationalist on the air instead of one of these tongue-tied infants who don't know any words except "cuagn" or "cul," or "QRU" or "nil." *Talk* to the fellows you work and get to *know* them.

2. Operate your station in accordance with the radio laws and A.R.R.L. practice.

3. Observe rules of courtesy on the air.

4. Sign "RCC" after each call so that others may know you can talk as well as call.

How to get out:

1. Call a fellow and then say something like, "*Wl nil hr OM cul 73* ....-.-".

2. Call anybody if you are so dumb that you can't make some conversation.

3. Fail to QSR promptly a single message —either by radio or by mail.

4. Call CQ for more than one minute without listening for answers or call CQ more than five times without signing.

The following stations are already operated by members of the R.C.C.: 1DQ, 1OX, 1OA, 1KP, 1ID, 1XAQ, 1ES, 1MK, 9KW, 4JR, 2AFG, 1ASN, 1BAO, 2CRP, 9AEK, 8ZU, 1BHW, 8BYN, 2CPD, 2AFG, 3UT, 9BAA, 4VQ, 2EG, 2AFC, 3BVZ, 8AWS, 1VC, 3ZI, 3XAN, 2AEY. Additional lists of members will be published in later issues of *QST*. A complete file of QRAs will be kept for the information of members.

Work one of these stations for half an hour and become a member.

Address correspondence for the R.C.C. to Rag Chewers' Club, care F. C. Beekley, 1KP, A.R.R.L. Headquarters, Hartford, Conn.

What Size Wire?

By F. J. Marco*

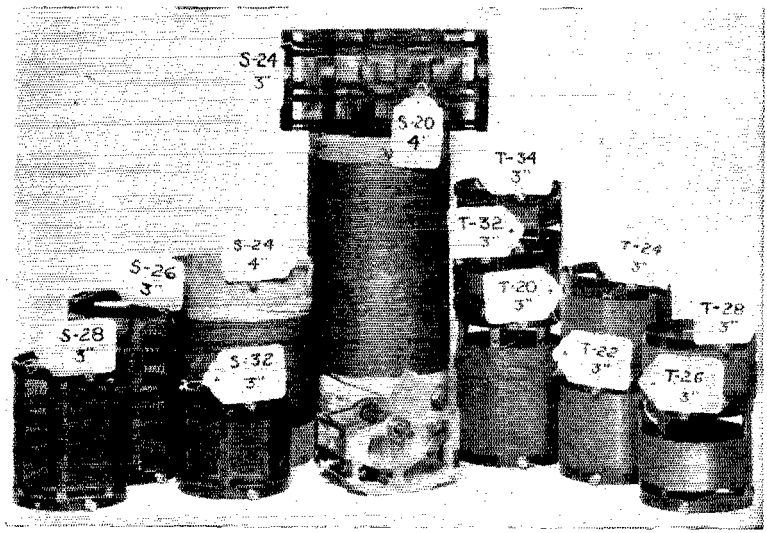
RADIO literature of the past year has left the amateur, the novice, and even in some cases the engineer, unless he has actually investigated matters for himself, in a general muddle as regards the best commercial size wire to be used in broadcast receiver inductances. A year ago the very heavy wires were the thing—witness the clumsy No. 12 Lorenz coils—and only Pickard's very excellent articles on page 39 of Sept. 1924, *QST* and page 26 of October, 1924, *QST* saved a lot of us from raiding the street car company's property for trolley cable!

With these considerations in view and also, luckily or unluckily (as it may be) faced with the problem of making some decision in the way of correct sizes of wire for commercial receiving coils, the author has conducted a rather superficial bit of investigation shown graphically in the curves, photograph and data herewith.

Briefly, the problem was to design an inductance covering the present broadcast spectrum, 1500 to 545 kilocycles (200 to 550 meters) with a variable condenser of 250 M.M.F. maximum capacity, the resulting tuned circuit to have the lowest practical resistance within a reasonable value. Inasmuch as usually three such inductances must be put inside a fairly small cabinet with considerable metal around and near the coils, diameters of over three inches were hardly permissible, for, although apparently better on the laboratory table, large coils are sometimes much worse inside a cabinet. (Another boost for the breadboard receiver.)

Double silk covered wire, ranging in size from No. 20 to No. 34, was used and a number of duplicate inductances, both tight and space wound, constructed. The apparent inductances at 550 meters were necessarily the same, 362 microhenries, thus making the wavelengths tuned at maximum capacity, all the same. On the three inch coils, bakelite tubing, 1/16 inch thick and "blanked out" to form a seven ribbed skeleton framework coil form was used, as is shown in the photograph. The two four inch coil forms, wound for comparison, were made of thin cardboard tubing.

The method of measurement was the familiar Bureau of Standards "Resistance Variation Method" which, although the subject of much adverse comment in recent months, really gives consistent and reliable results if due precautions are taken. The resist-



COILS AND CONDENSERS USED IN MAKING THE MEASUREMENTS

The numbers on the tags refer to the method of winding and the size of wire. Thus T22 means "Tight wound, No. 22 D.S.C.", and S-24 means "Space wound, No. 24 D.S.C." The spaced windings are all made with spaces equal to the diameter of the wire. The condenser is a Bremer-Tully type L11, capacity at maximum setting, 250 micromicrofarads.

* Engineering Department, Bremer-Tully Mfg. Co., 532 S. Canal St., Chicago, Illinois.

ance values thus obtained are of course total circuit resistances, that is, coil plus condenser (at the particular setting) plus meter resistance. By subtracting any two from the total the value of the third can thus be had. This is easy in case of the meter; we can assume its resistance constant over the spectrum but since no reliable method of measuring radio frequency resistance of condensers has yet been developed (except by comparing them with a standard of assumed "zero" resistance) we must call our ordinates "Circuit Resistance" rather than "Coil Resistance." Since the same condenser was used in all measurements this was entirely fair and furnishes a comparison, at least, of coil resistance.

It was necessary to use an efficient receiving condenser rather than the laboratory standard in order to get down to 200 meters (Minimum capacity of the standard is 50 M.M.F.). The resistance of the condenser used was slightly less than that of the standard when checked, due probably to the necessarily low values of capacity used in the standard for comparison (Low on scale). In passing it is interesting to note that only a very small portion of the total circuit resistance lies in the condenser unless a very poorly designed product is used. This has been stated many times recently and although the author hardly believes that "low loss is bunk!", it is only fair to state that almost any of the better grade of "rod," "strip" or "pillar" insulated condensers when used with the same coil give very nearly the same circuit characteristics.

The foregoing has been in the way of explanation to show objects and reasons; let us now proceed with the discussion.

In Fig. 1, the numbers at each end of the curves refer to the size of wire used. Note that for a given frequency, sizes above No. 28 increase the resistance quite rapidly, while below this size the difference is not so marked. At the lower frequencies the heavier wires are the best, as is to be expected, but the other end of the curves tell a different story! For these particular coils, size No. 20 at 200 meters was somewhat worse than No. 26 and No. 28: note how the curves cross. The other sizes follow in regular order. Even heavier wires are very poor at the higher frequencies, and better, of course, at the lower. A space wound four-inch solenoid of No. 24 D.S.C. wire is shown at "A" for comparison.

Fig. 2, shows relative values for space-wound coils. These are not as much better as they should be, as the length diameter ratio gets rather bad for three inch coils of these values of inductance. Here we see that the heavier wires are better all over the scale, indicating that spacing has helped them a lot. The ratio of thickness of insulation to wire size, of course, has a material effect on the height of the curves. This is shown by comparing the resistances of No. 32 wire coils in Fig. 1 and 2; the tight-wound coil is actually better for this size of wire. The increase of resistance due to

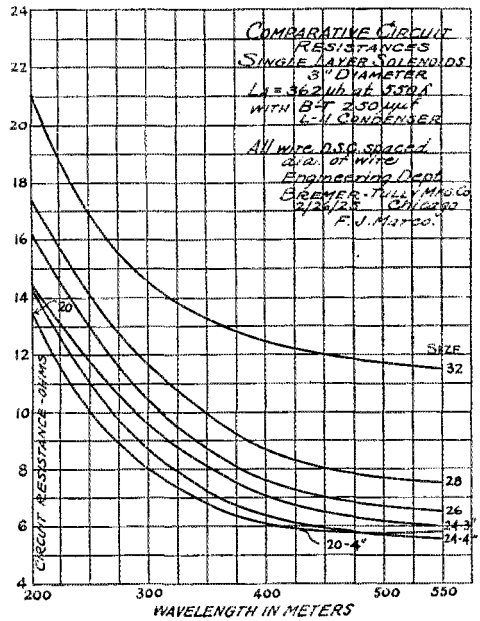


FIG. 2

greater length of wire, in this case more than compensates for the gain due to spacing. This is true only for the very small sizes.

The No. 24 four-inch coil is slightly better than the No. 24 three-inch at low frequencies due to more favorable length diameter ratio, but becomes relatively worse at the higher frequencies due to greater distributed capacity loss (voltage per turn higher).

The No. 20 four-inch coil is worse at 550 meters (than the No. 24 four-inch) again because of poor L/D ratio—but is better at 200 meters for the same reason as before. These latter coils, are, of course, totally impossible commercially but are merely shown to improve the perspective of the situation.

In summary, it would seem that for tight-wound three-inch solenoids to cover the broadcast spectrum with a 250 M.M.F. capacity no practical advantage commensurate with commercial size would result in using wire larger than number 26 or 28 D.S.C. Considerable harm might result in using much heavier sizes.

For space wound solenoids of small diameter in identical situation No. 20 to 24 would probably be slightly better when space does not limit. Whatever the case, space winding seems to be a far greater step in the right direction than does increasing wire size. That is, *for a given available*

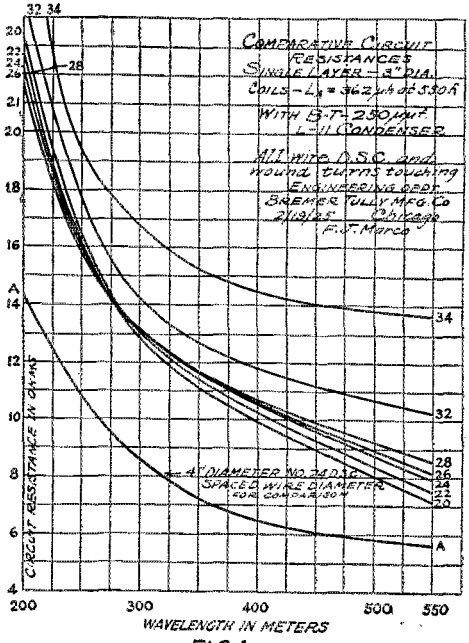


FIG. 1

volume of coil, finer wire, space wound, gives a better coil than heavier wire, tight wound.

All this leads up to a matter which may or may not be of practical importance but which has been bothering a few of us out here for some time. Why not rate our circuit resistance in *averages* over the broadcast spectrum rather than at some arbitrary point? That is, merely take the *average height* of the resistance curve between 200 and 550 meters and call this figure the "Broadcast Spectrum Average Resistance."

This figure gives a far better perspective of the situation than merely saying, for example, "9 ohms at 300 meters." We do not know if the curve is steep or flat, while the "B.S.A.R. equals 8 ohms" shows relative merit immediately. Take the area under the curve, divide it by the base line, in other words, integrate it, and you have the "B.S.A.R." This manner of rating coil, condenser, or circuit resistance was first suggested by W. W. Harper of Chicago and seems entirely logical and far more valuable than the present method. Can it not be adopted?

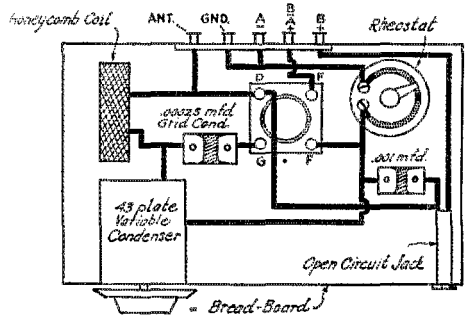
In order to compare the effectiveness of the skeleton coil-form a self-supporting solenoid, fairly efficient, was constructed, and measured. When the skeleton form was inserted, as a support to the coil an increase in resistance of about one percent at 200 meters was noted. At 550 meters the difference was impossible of detection. This is almost negligible, but, when a *solid* piece of tubing (not "blanked out") was inserted the increase was nearly seven per cent at 200 meters and tapered off to almost zero at 550 meters. So it *is* worth while!

A heavy coat of "coil dope"—(collodion dissolved in amylacetate) had absolutely no *measureable* effect on either resistance or distributed capacity of even the best of the inductances. On the contrary, when undoped coils were allowed to stand several days in damp weather the resistance compared to doped coils was materially greater.

All the coils herein shown when tested in a *regenerative* receiver gave, as nearly as the ear could judge, identical volume on distant stations but the selectivity thru locals appeared to be slightly better with the lower resistant circuit. Now what does that prove?

Regarding That Long Wave Receiver

ON page 25 of the March 1925 issue we described a long wave receiver which could be used to copy high power stations in learning the code. We have recived numerous requests for the cir-



cuit of this receiver in the so-called "picture diagram" form and are presenting it herewith.

—*J. M. C.*

On April 9th 3VX at Audubon, N. J., worked two way with z4AG on 40 meters. 3VX was using two UV-201-A tubes with 400 volts on their plates! F.B.

The Navy-MacMillan Expedition

By R. H. G. Mathews*

ONCE more amateur radio has an opportunity and best of all in a project in which nothing but amateur radio could achieve the desired result. Commander Donald B. MacMillan, whose last Arctic expedition made radio history with Don Mix and WNP, sails again for the North in June. This time the plan is more ambitious than that attempted by any previous explorer.

It is Commander MacMillan's intention to explore that great unknown area of a million square miles near the pole to prove definitely or not if land lies within this area, and if there is land to find out something of its characteristics. These things will be accomplished by two amphibian airplanes which will accompany the expedition. Commander MacMillan is taking two ships, his little favorite, the Bowdoin, which he himself will command, and in addition the Neptune, a Scottish whaler, which will be skippered by Commander Eugene F. MacDonald, Jr., president of the Zenith Radio Corporation, who will also be second in command of the expedition.

Radio will play an even more prominent part this year than last. Both ships will be radio equipped—the Neptune with regular ship equipment and the Bowdoin with a short wave transmitter and receiver designed and built to meet those special conditions which are encountered in operation on the wave bands centering about 20, 40, 80 and 160 meters. This equipment was designed and built by K. E. Hassel and H. Forbes of the Zenith Laboratories together with John Reinartz of 1XAM who will accompany the expedition as operator.

The Bowdoin's transmitter consists of a panel-mounted 250-watt tube with the necessary accessories connected in accordance with the circuit shown on page 33 of February *QST*. The circuit labeled "original circuit" will be used.[1] Interchangeable inductances are provided to allow use of the various wavelengths mentioned. Losses have been reduced by the use of glass supports, proper placement of wiring and so on. The power for the set is supplied by a 32-volt storage battery charged by a Delco gas engine generating outfit. A 32-volt motor drives the 2,000-volt D.C. generator which supplies plate power.

The antenna is a 45-foot stranded gold plated wire running from the ship's deck to the cross trees of the main mast. Pyrex insulation is used.

In tests at the Zenith Laboratories in Chicago this set was operated under the call of 9XN using a replica of the Bowdoin's antenna. The antenna current was about 2 amperes. Traffic Manager Schnell at NRRL reported strong signals 1,600 miles West of San Francisco when 9XN was operating at 40 meters. The set also reached New Zealand 4AG in daylight, being reported very strong and steady.

Airplane Transmitters

The airplanes are also radio equipped. The airplane transmitters demanded special consideration since it may be necessary to operate them after a forced landing when a wind driven generator would probably be out of commission. A small outfit has been developed which uses dry cell power entirely. These sets use a UV-201-A tube and operate at 40 meters. These sets can operate with either key or microphone.

THE BOWDOIN, which again goes North with short-wave radio equipment.

* Manager, Central Division, American Radio Relay League, 1358 Estes Ave., Chicago.

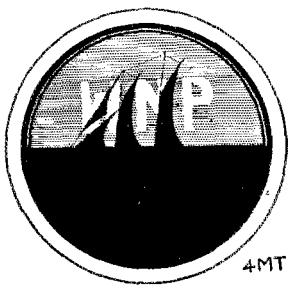
[1] According to our latest information from the Bureau of Navigation, Department of Commerce, this circuit is definitely forbidden for amateur use. The Bowdoin is of course a special case and is permitted to use direct coupled equipment. Others should use the regular inductively coupled Hartley circuit shown in page 13 of our March issue, the Colpitts circuit shown on page 14 of that issue, or else the circuit of 6TS shown on page 16. If it is desired to use the same circuit as on the Bowdoin, it must be inductively coupled as shown in the lower half of Fig. 1, page 33 of our February issue.

Re-broadcasting

An attempt will be made to retransmit the voices of the plane observers from the Bowdoin, to pick them up in the United States and then to retransmit them for the second time on the usual broadcast wavelengths.

Amateur Communication

After MacMillan and MacDonald pass the 66th degree they will be in 24 hour daylight which necessitates the use of a short wave. Twenty meters has been chosen. It is hoped that many amateur stations will be equipped for communication on this wave in order to insure continuous contact with the expedition.



— Thoughts —

To facilitate the installation of such equipment Mr. Reinartz has been retained to advise anyone interested in the construction of a station suited to the purpose. He may be reached in care of the Zenith Radio Corpn., 332 South Michigan Ave., Chicago.

Official Wavelength Stations

THE A.R.R.L. Official Wavelength Stations that have been appointed by Messrs. D. C. Wallace and C. M. Jansky, Jr., are as follows:

1	NKF	27	9ZA
2	1XAM	28	7GE-7ZX
3	6BQB	29	1IV
4	7BK	30	9EIB
5	5MN	31	7GQ
6	9AAL	32	2DS
7	z2AC	33	1BZQ
8	2WC	34	6BGM-6CVO
9	9ZT-9XAX	35	2XI
10	1MK	36	9IG
11	8GU-8XC	37	7ACI
12	9XI	38	1ZL-1AVW
13	1CK	39	2CLA
14	1AWW	40	6ZE
15	3BE-3ZW	41	6TS-6XAG
16	8AA	42	8GZ-8ZG
17	8EQ	43	9BKG
18	8APV	44	6XAD-6ZW
19	4XE	45	z2NM
20	5ZAV	46	6TI
21	9DXN	47	c3NI
22	9EGU	48	c9AL
23	6ZH	49	6CDN
24	5AKN-5XHB	50	WNP
25	2MU	51	6CGW
26	4BY	52	NRRL

The number is now so large that everyone can use these O.W.L. stations to spot calibration points on wavemeters and tuners. As we have explained before—there will be no schedules, the stations will simply carry on their regular work on the 5, 20, 40, 80 and 150 meter bands, announcing the wave they are using at the close of each sending. For instance, 9ZT will finish up.

"u 9ZT 76" or "u 9ZT 180" or "u 9ZT 42"

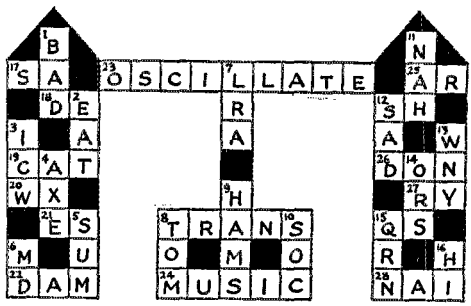
This is *not* the same thing as the Bureau of Standards system, since there are no regular schedules and there is no attempt to secure the extreme accuracy that is provided by WWV, 9XI and 6XBM. The O.W.L.S. can be depended on to 1% however in most cases and 9ZT-9XAX checks them up regularly to see that their waves are correct.

All correspondence regarding O.W.L.S. should go to D. C. Wallace, 54 Penn. Ave., Minneapolis, Minn.

WWV and 6XBM Schedules

WE have no new schedules from the Bureau of Standards so refer those interested to page 34 of the March issue and page 21 of the May issue.

New schedules will probably be printed next month.



The prize for the cross-word puzzle was won by Robert E. Barrett, 1CRZ. Above is the correct solution.

The Motional Impedances of an Electrodynamic Loud Speaker

By A. E. Kennelly *

THIS article is virtually an abstract of a recent paper by Professor K. Kurokawa[1] of Waseda University which, not having been published in Europe or America, has not had a full opportunity of being presented to English-speaking readers. Comments on the subject have been however, added by the present writer.

Fig. 1 is an axial section of the essential working parts of the loudspeaker under discussion. A cylindrical electromagnet produces a nearly uniform strong radial magnetic flux in a annular air gap. A cylindrical coil C is suspended in this air gap, from the center of the diaphragm D. Telephonic alternating currents, being led through the coil, produce therein a vibromotive force, which sets the diaphragm D in corresponding vibration. A horn, represented in Fig. 2, is mounted over the aperture above the diaphragm.

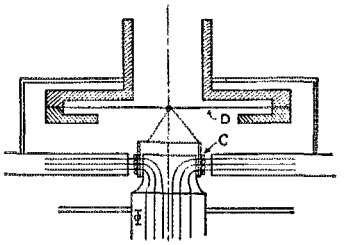


FIG. 1 DIAGRAMATIC SKETCH OF ELECTRODYNAMIC LOUD SPEAKER

Impedance tests were made of the suspended coil, using the connections of Fig. 3. A triode oscillator supplies an alternating testing current of adjustable frequency at S, to the Rayleigh bridge of equal arm. A balance is obtained at each of a suitable number of impressed frequencies, first with the excitation removed from the magnetising coil C', and then with a steady exciting current, measured on the anmeter A. Several different strengths of excitation were used in different series of tests.

Fig. 4 gives the graph of damped impedance, or the impedance without excitation, using 2 milliamperes in the suspended coil C. It will be seen that the impedance graph is substantially a rising straight line, making about 20° with the reactance axis. It commences at 9.2+j 1.4 ohms, for the lowest indicated frequency of 200.7~, and it ends at 10.7+j 7.5 ohms, at the highest indicated frequency of 1412~. If there were no extra energy losses in the instrument as the frequency is increased, this damped impedance graph should be a vertical straight line.

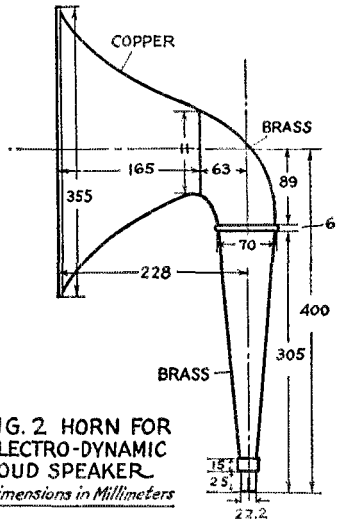


FIG. 2 HORN FOR ELECTRO-DYNAMIC LOUD SPEAKER
Dimensions in Millimeters

The free impedance diagram of the instrument is shown in Fig. 5, using 1 ampere of exciting current from the battery B, Fig. 3, with 2 milliamperes of alternating current in the suspended coil, and with the cap over the diaphragm removed. As the impressed frequency was varied from 200.7~ to 1412~, the impedance pursued

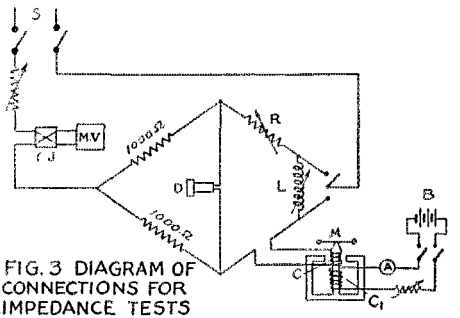


FIG. 3 DIAGRAM OF CONNECTIONS FOR IMPEDANCE TESTS

*Professor of Electrical Engineering, Massachusetts Institute of Technology.

1. "An Electro-Dynamic Loud Speaker and its Motional Impedances" by K. Kurokawa, Denkigakukai, No. 427, March, 1924, pp. 1-17.

the circular path shown, reaching the maximum value of 203+j 0 ohms at or near 620~.

Fig. 6 shows the "motional impedance," or vector difference between the free and

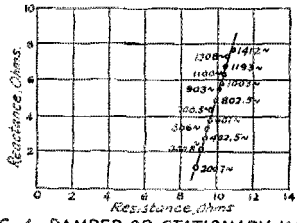


FIG. 4 DAMPED OR STATIONARY IMPEDANCE GRAPH OF THE VIBRATOR A.C.=2M.A. T=19.0°C
Excitation Removed

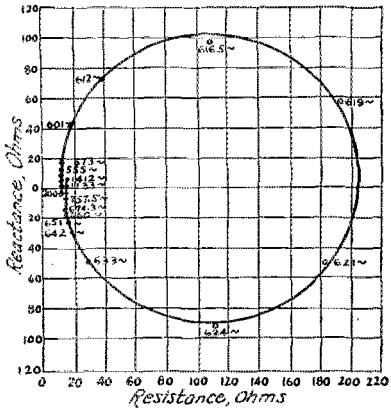


FIG. 5 FREE IMPEDANCE GRAPH OF THE VIBRATOR D.C.=1A A.C.=2M.A *and* T=19.0°C.

the damped impedance of the suspended coil, not only for the one-ampere excitation of Fig. 5; but also for the excitations of 0.5 and of 1.5 amperes. These graphs are circles passing through the origin, and with their diameters on the horizontal or resistance axis. The dotted circle indicates the effect produced by replacing the cap but without the horn, using 1.0 ampere of excitation.

In the case of an ordinary telephone receiver, with a stationary winding mounted on the poles of a permanent magnet, the motional impedance graph is also very nearly circular;[2] but the circle is depressed through an angle that commonly varies between 30° and 120°. In this loud-speaker telephone, with its suspended coil, the graph is any one of an infinite series of circles, depending upon the direct-current excitation. All these circles have zero depression angle. Their diameters are respectively proportional to the flux-densities set up in the annular air gap, and if the magnetic circuit of the cylindrical electromagnet remained remote from saturation, they should be proportional to the exciting current strengths.

In the case of one-ampere excitation, the results show that the four characteristic constants of the instrument were

Force Factor A = 9.64 x 10^6
Mechanical Resistance to Vibration r = 479
Equivalent Mass of Vibratory system m = 10.17
Elastic coefficient of Vibratory system c = 149.2 x 10^6

dynes per abampere (or C.G.S. unit of current) in the suspended coil. (An abampere = 10 amperes)
dynes per cm. per sec.
grammes
dynes per cm. displacement
These are all real quantities, or are devoid of slope.

As has been already observed, the force factor A depends upon the flux density B in the annular air gap, at the position occupied by the suspended coil. It may be shown that if a is the mean radius of the winding in this coil, and N the number of its turns,

A=2aNB dynes per abampere

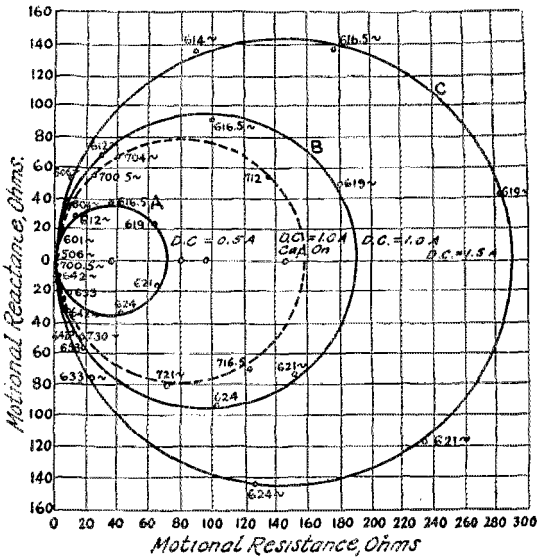


FIG. 6 MOTIONAL IMPEDANCE CIRCLES
CIRCLE A *for D.C.=0.A, A.C.=2M.A and T=16.5° C*
CIRCLE B *for D.C.=1.0A A.C.=2M.A and T=19.0° C*
CIRCLE C *for D.C.=1.5A, A.C.=2M.A and T=15.5° C.*
DOTTED CIRCLE *for D.C.=1.0A A.C.=2M.A and T=14.5°C. with the dust proof cap.*

[2] "Electrical Vibration Instruments" by A. E. Kennelly, New York, 1924.

It will be seen in Fig. 6, that the frequency of resonance for the diaphragm and suspended system was close to 620~ with the cap removed, and all three values of excitation. With the cap replaced, but without the horn, the broken circle shows that the resonant frequency was changed to 714~; while the diameter of the circle (for 1-ampere excitation) was reduced from 194 to 160 ohms.

Fig. 6 also shows how highly selective such a suspended system is to frequency in the absence of the superposed horn. The mechanical or motor power developed in the vibration of the suspended system, at any frequency, is simply I^2r in watts, where I is the effective current in the coil in amperes, and r is the resistance component of the vector motional impedance in ohms. Thus for heavy circle B in Fig. 6, with one-ampere excitation, the coil current I being 2×10^{-3} amperes, the resistance r was 194 ohms at the resonant frequency of 620~; so that the mechanical power expended in producing vibration at this frequency would be $4 \times 10^{-6} \times 194 = 776 \times 10^{-6} = 0.000,776$ watt. At the frequency of either 600~ or 642~, the resistance component r on the same circle is only about 10 ohms, so that the mechanical power would then be about $4 \times 10^{-6} \times 10 = 0.000,040$ watt. The acoustic power, or

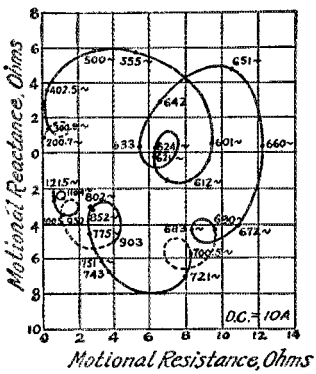
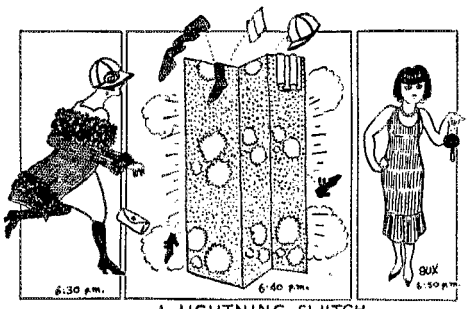


FIG. 7 MOTIONAL IMPEDANCE GRAPH OF ELECTRO-DYNAMIC LOUD SPEAKER WITH HORN D.C.=1A, A.C.=2M.A and T=17°C

power put into emerging sound waves will be only a certain fraction of the total mechanical vibratory power, and the magnitude of the acoustic efficiency cannot be discerned from the motional-impedance graphs. It would be reasonable to assume, however, that the acoustic efficiency would be nearly constant over a wide range of frequencies.

We may infer, then, from Fig. 6 that in the absence of the horn, such a suspended system produces mechanical vibratory power (and accompanying acoustic power) roughly in proportion to the direct-current excitation, except for magnetic saturation; also that a relatively large amount of vibratory power would be developed for resonant frequencies between, say, 614~ and 626~, and much less for the frequencies outside those limits. In other words, it would give relatively loud sounds near 620~ pitch, and relatively feeble sounds at frequencies remote from 620~, assuming both the direct-current excitation and the alternating current in the suspended coil to be kept constant. This selective quality of sound reproduction is associated with the mechanical resonance of the suspended system.

Fig. 7 shows the effect of mounting the horn on the cap, retaining 1 ampere of excitaion. The motional impedance at 620~ has fallen to 6.5 ohms, and the graph contains eight internal loops. Each of these loops represents a separate acoustic resonance, presumably of air columns within the horn. It is evident that the acoustic system, including the horn, has many resonant frequencies, none of which markedly preponderates. For the impartial reproduction of sounds, the complex motional-impedance diagram of Fig. 7 is manifestly superior to the simple circular diagrams of Fig. 6. The motional resistance in Fig. 7 varies from 3 ohms at 500~ to 1 ohm at 1100~, passing through 12 ohms at 660~. Between 550~ and 730~, it is not less than 5 nor more than 12.2 ohms. While, of course, an ideally impartial sound reproducer should have one and the same motional resistance at all acoustically useful frequencies, the effect of the horn is in this case to improve the behavior of the system as a vibratory motion producer over a frequency range. There is still much to be done before a simple and comprehensive theory of horns is worked out; but much can be learned of their acoustic behavior by a study of motional impedances.



A LIGHTNING SWITCH

Steadying Our Notes

By R. S. Kruse*

Incorporating suggestions from 4GL, 1BHW, 5ZA, 2EB, also JN and ML at 2UD

WITH the coming of the tube we have found a cure for a large portion of the fading difficulty. However, the brother of fading is still with us. We call him "Swinging", and at present have no abbreviation for it, *but we need one*, for swinging is getting more bothersome every day. The reason for this is not hard to see, but may as well be outlined. With ordinary tube sets we can stand a slight amount of swinging. As

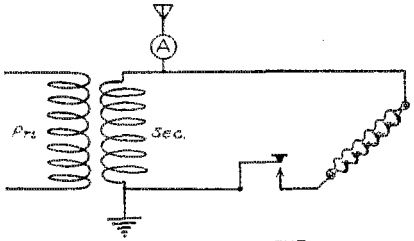


FIG. 1 HARD TO BELIEVE

long as the plate supply is not D.C. but carries 60-cycle growls, commutator whines, synchronous-rectifier-hash or boiling-electrolytic-rectifier-mush, it is not so vital to keep the note absolutely steady. These noises broaden the wave and make it easier to hold the signal despite minor swings. But these wave-spreading noises are beginning to go out of use. Partly this is because ordinary fairness demanded that we consider the unhappy B.C.L. who lives on the same block, and partly it is the result of the discovery that a "real C.W." signal "gets out" better than "almost C.W." The proportion of real "C.W." sets is growing, and their fluting is daily replacing the trills of the older type. With the use of "real C.W." comes the need for making our waves very steady, for the tremendous "punch" or "real C.W." is lost the moment it shifts the least bit off the wave for which the receiving tuner is set.

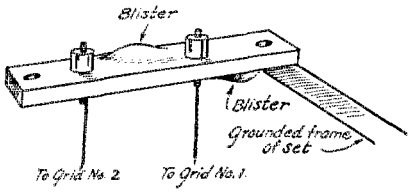


FIG. 2 THE TROUBLE WAS LOCATED

About a year ago we were still willing to chase a pure C.W. signal all over the tuner, because it was still a novelty, but now when a signal starts to imitate everything from a tube to a piccolo we simply drop it and hunt for a steady one. The fellow that intends to use "real C.W." will shortly find it necessary to take supreme care in keeping the wave steady in order to get anyone to listen to him.

There seems to be 6 reasons for swinging C.W. waves as follows—

1—Swinging antennas
2—Poor connections
3—Poor insulation
4—Wavering plate voltage
5—Wavering filament voltage
6—Wrong keying methods
7—Overheated tubes

Swinging Antennas

It is not easy to keep an antenna steady enough in a wind. It is best to give a good deal of thought to keeping every part of the antenna as far as possible from grounded things or things of large size. Where some part of the antenna or the lead *must* pass near such a thing the wire has to be stretched tightly and kept so by the use of a spring or weight working on the hoisting rope. A cage top is much less given to violent "flopping" than is a flat top. A one-wire top is steadiest of all. (That's the only virtue it has.)

Poor Connections

We always rave about good connections, but our sets do not live up to our talk. We *do* allow poor connections to exist. In the spark sets this made occasional fireworks but did no great harm. But in tube sets a poor grid connection or an arching plate-contact-spring in the socket will make the wave run around like a Japanese dancing mouse and produce about the same effect on the nerves of the audience.

Our tubes are not beyond criticism, and the disreputable UV-203 especially needs to be watched, for it is inclined to develop loose connections inside and also between the base pegs and the wires that pass through them and are supposed to be soldered to them. The UV-203-A is enormously better.

Poor Insulation

It is hard to believe that insulation is n.g. when there is no visible flashover. It is hard to believe that one can take a battery-operated C.W. set (a true C.W. set) and key it with a key connected across the helix in series with a dirty antenna insulator, a 2-megohm gridleak or a foot of moist wood, Fig. 1. Yet perfectly good C.W. signals have been sent on test with just such ar-

* Technical Editor, *QST*.

rangements. If the leakage through such things affects the wave, it follows that if these leaks are making poor contact they are causing the wave to flutter and the copying operator to swear. The cure is to eliminate the leaks; to use glass or well glazed porcelain for antenna insulation and lead-ins; to inspect the insulation of the set with the utmost care, and not to believe the wave is good till you have tested with a

They need scrubbing
FIG 3

receiving operator who is *honest* rather than *kind*. A sooty antenna insulator, a moist helix frame, a forgotten pencil line drawn when the set was built—any of these things are capable of causing the wave to do queer things.

It is hard to make insulation too good. While not directly in line with the matter of shifting waves, an excellent illustration of this is provided by a tube set using two UV-204 tubes which utterly refused to produce an antenna current of more than an ampere although the plate supply was at 1800 volts D.C. After everything from the antenna insulators to the counterpoise joints had been inspected, the trouble was located in a terminal strip, which carried the two grid wires spaced about two inches from a ground post. This strip, Fig. 2, was made of the best grade of a widely known and trusted sheet insulating material, yet the removal of the posts to a strip of maple well boiled out in paraffin at once raised the antenna current to 6 amperes. Whether the trouble was due to capacity or leakage does not signify here—the remedy was to use good insulation and not too much of it. And paraffined wood is *good!*

Even a properly insulated set and antenna does not stay that way. Perhaps your recent decrease in antenna current is not because the tubes are "going Republican", but because the dust cloth has been getting too much rest. Antenna insulators also do not stay good forever, even porcelain needs replacing. Commercial operating companies have long been doing this, but we are slow in adopting the idea. If the antenna current is failing and the wave "wabbling", perhaps it is not because the ground connection has corroded, but because the city smoke and dust has been painting grid leaks all over the antenna insulators. They need a hearty scrubbing.

The same remarks apply to the lead-in insulator and to any sway-guy or straining insulators in the antenna system. It does no harm to look at the strain insulators in the mast guys once in a while.

Wavering Plate Voltage

If the plate voltage of an oscillating tube is changed, the emitted wave changes a trifle and this trifle may shift the tone in the copying operator's headset entirely out of hearing. The plate supply should accordingly be as steady as possible.

If the plate voltage is obtained from a generator it should be driven by a motor that is too large for the job. If the motor is small and the speed *does* change, the matter can be faked up by such a contraption as shown in Fig. 4. Such things are noisy and troublesome if the motor is a large one, also the owner of a large M.G. set can afford more a perfect device—the shaft governor, Fig. 5. For a direct current motor which should be shunt or compound wound the governor is built so that the contacts are closed above a certain speed and the connections are made as in Fig. 5. Adjustments are as follows.

A—Set the two rheostats so that a large part of R1 and a small part of R2 is in circuit and start the machine.

B—Put the load on the machine and increase R2 until sparks at the governor contacts show that it is fluttering rapidly.

C—Throw the load off the machine and adjust R1 until the machine again runs at the same speed with the contact "fluttering" constantly and without any "hunting" of the motor that can be noticed.

D—Test the adjustment by throwing load off and adjusting one or the other resistance till this does not vary the speed appreciably.

Properly adjusted, this arrangement will also take care of a large amount of line

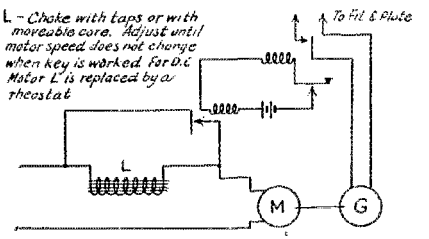


FIG. 4

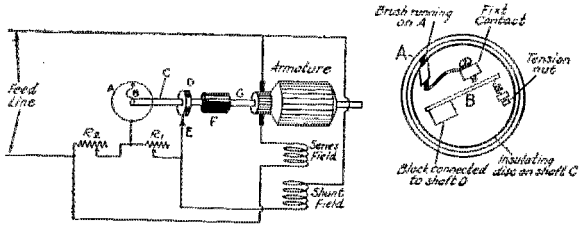
voltage variation. When used on a line the voltage of which is not steady the generator should be self-exciting or have a separate exciter driven from the same shaft. It should *not* be excited from the wavering line which drives the set. The same device may be applied to an induction motor in a somewhat more wasteful manner. The governor contacts are so built that they *open* above the desired speed instead of closing and the connections are made as shown in Fig. 6. The effect is to cut in series reactance above a certain speed. Since this connection requires handling the

load current, it may be necessary to equip the governor with heavy silver key contacts or to install a relay. If the motor is a two or three phase affair a corresponding number of relay contacts, pairs of relay contacts and reactances will be needed, and the device becomes clumsy. Better get a **big** motor in the first place.

Having done all we can with the motor, it is next the generator's turn. The machine should really be compound wound so that the terminal voltage does not drop as the load is increased. If a shunt machine is used, it is often possible to add series field windings over the shunt field coils, but it must be remembered this has to be done right or else not at all; the insulation of these coils from the rest of the windings and from the frame needs to be *very* carefully done or there will be destructive fireworks. Inside the coil itself the insulation need not be unusual, and ordinary D.C.C. wire of small size will answer.

While at the generator it is a good idea to take a hard look at the commutator and brushes *while the load is on.* If they are not acting properly the commutator needs cleaning up and possibly the brushes need fitting. If a voltmeter across the high voltage generator is not steady the trouble is in the commutator, brush rigging or armature winding itself. Oil on the commutator or dirt in the neck of the armature can be removed easily, but a damaged winding will call for rewinding.

If it is utterly impossible to make the motor run steadily, or if the generator can-



A Governor contact ring
B Spring and speed controlled brush
C Shaft carrying B and connecting it to D
D Slipring
E Brush
F Insulating Collar
G Main Shaft

FIG. 5

not be compounded properly, or if we are getting plate power from a transformer-rectifier on a line that is not steady—in short, if we are compelled to operate with unsteady plate voltage—then we are compelled to use a tube circuit which will change wave very little under these adverse conditions. That means a primary circuit in which there is a fairly large capacity and a rather small inductance. This isn't much of a trick at 200 meters, but becomes harder and harder to do at shorter waves.

For 200 meter operation the primary circuit should have a capacity that is certainly not below .0005 microfarads. The larger this capacity is made, the less the wave length will vary with changes of the applied plate voltage. At the same time the tube set will be found to oscillate more easily with a small capacity than with a high capacity; as it is easier to get the necessary plate and grid couplings where inductance is used. A compromise will have to be made by using a capacity somewhere between .001 and .0005.

The next best method of avoiding the wabbling of the wave due to use of an unsteady plate voltage is to operate the set with a master oscillator and power amplifier, designing the master oscillator circuit along the lines previously suggested for the entire set. If plenty of power is provided in the master oscillator (that is to say about 1/3 of the power of the amplifier) and the capacity inductance ratio is kept up, the master will be reasonably steady. Since it controls the frequency the emitted wave will also be steady.

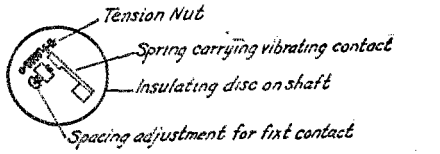
Both of the methods suggested are complicated, and therefore the best way out of the business of unsteady waves is to secure a reliable and steady plate voltage supply.

Wavering Filament Voltage

As far as we were able to find out at 3ABI, the effect of an unsteady filament current is not to change the wave length very greatly, but to simply change the antenna current. The effect upon the receiving operator is almost as bad, as the signal sounds as if it were fading violently, hence it is very hard to copy.

It is quite common to have difficulty with the filament voltage dropping whenever the key is depressed. Several methods are possible to compensate for the drop and they have been decribed in previous issues. K.B. of 1BHW suggests that it may be an advantage to so adjust these compensation devices that when the key is up the filament is burning about the same amount above normal. This should not detract greatly from the life of the filament if it injures it at all. It will, however, give the advantage that when the key is down the filament current is several percent above normal and the output consequently much greater, while at the same time the reduced filament current when the key is up serves to lengthen the life of the tube. This idea cannot be carried very far, since the effect will then be to *introduce that*

very filament flicker that we are trying to avoid. The simplest adjustment of all is, of course, that which is obtained by adjusting the filament voltage to normal when the key is up, then depressing the key and again adjusting until the filament voltmeter stands at the same position. It



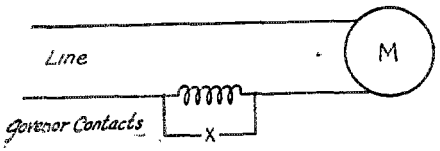


FIG 6

should then be possible to work the key up and down without having the filament voltmeter move.

Keying

Any keying scheme that causes key thumps is dead sure to cause an unsteady wave. Therefore most of our pet keying schemes are "out" and we had better start using the plans shown by Turnbull on page 39 of our July, 1924, issue.

Our recent description of 9EK also carried some good suggestions.

Overheated Tubes

Some amateurs never seem to get over the idiotic notion that the *biggest antenna current* is the most important thing. Anyone suffering from this disease is bound to overload tubes, getting large and unsteady outputs.

Put it down as a good rule that the wave is *dead sure to be unsteady if the plate is more than dull red.*

As long as rotten plate supplies are used such unsteady waves can be read, but people are getting pretty sick of them—they'd rather listen to a low power but *steady* signal than to some wabbly, stuttering roar caused by a UV-204-A, a 6000-volt transformer and a lad with more cash than cooperativeness.

The American Sales Agency, who have been handling a lot of amateur transmitting equipment, have moved their office from 38 Park Row, New York City to 21 Warren Street, New York City.

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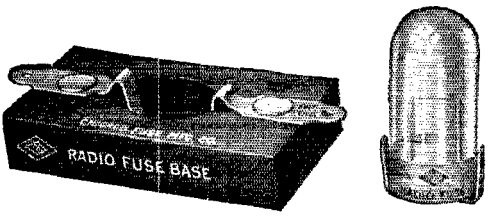
u1ID established contact with bz1AB, Rio de Janeiro on April 30th. u1ID on 37½ meters and bz1AB on 40.

A "B" Battery Fuse

THE fuse manufactured by the Chicago Fuse Company is an excellent item for the experimenter. It is intended to be used in series with the negative B battery lead of a receiving tube and prevents burnout of the tube filament in case the B battery voltage is accidentally applied to the tube filament. A number of these fuses have been tested and all were found to give adequate protection to a UV201A tube when 22 volts were connected directly to the filament terminals, with the fuse in series. The fuse blew instantaneously, not even giving the tube a chance to show any heat at all. All fuses tested uniformly and all melted at a current of 200 milliamperes.

The fuse proper is separable from the base, or mounting, and is a very neat looking glass enclosed accessory. In order to replace a blown fuse it is only necessary



to pull out the bad fuse and plug in a new one. The device will not only afford protection to receiving tubes but will also prevent accidental short-circuits of the B batteries themselves.

CENTRAL DIVISION CONVENTION
(2nd Annual Hoosier State)
under the auspices of Indianapolis Radio Club
at
INDIANAPOLIS, IND.
July 10th and 11th, 1925.

Indiana Hams, here is your opportunity to meet each other face to face again. AND don't forget to invite the fellows from the neighboring states.

Everybody in Indianapolis is planning to give everyone the best time possible, so COME one, come all.

Write to A. S. Burns, City Hall, Indianapolis, Ind., for details and reservations.

Computation Charts

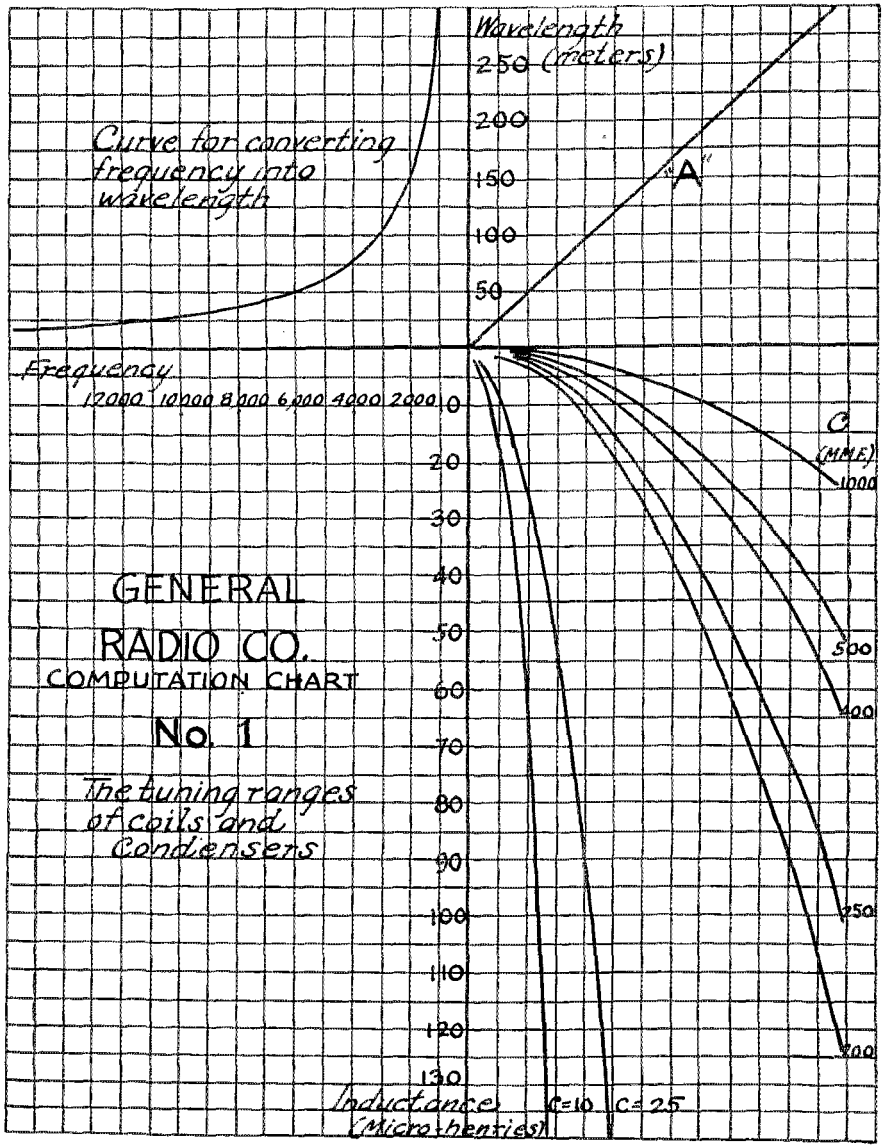
By R. S. MacArthur*

COMPUTATION charts are a well-known means by which even quite complicated formulas can be reduced to a simple graphical solution. Two such charts are shown herewith.

The first gives the proper combinations of inductance and capacity to be used for tuning over various ranges of wavelengths, the second is for the painless calculation of inductance coils.

The Tuned-Circuit Chart

The first chart contains scales of wavelength, frequency, inductance and capacity. The curve in the upper left part of the sheet can be used to convert frequency to wavelength or wavelength to frequency.



* General Radio Co.

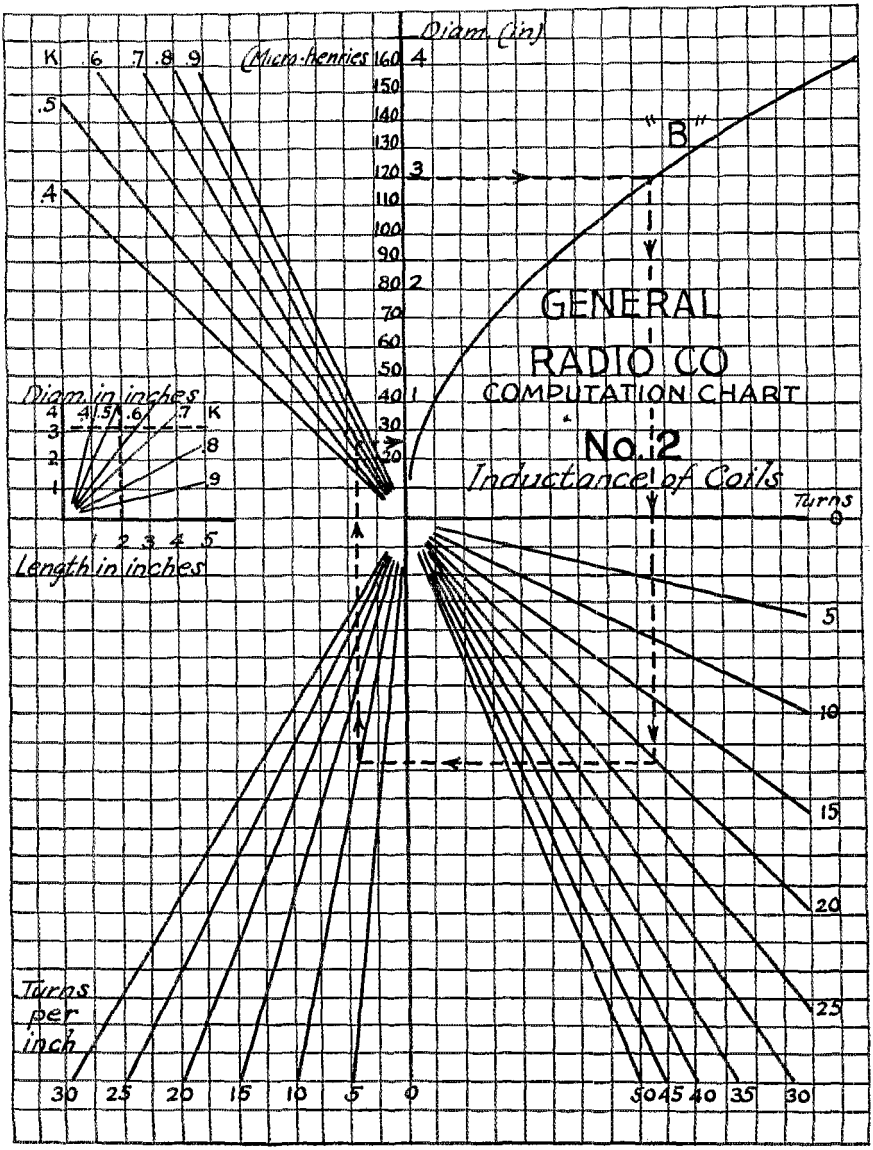
To find the frequency corresponding to any given wavelength, start on the wavelength scale, follow the horizontal line from your wavelength to the left until it meets the curve, then follow down the vertical line to the frequency scale and read off the frequency. For example, we find that the frequency corresponding to 120 meters is 2500 kilocycles. 6000 kilocycles corresponds to 50 meters. To find the wavelength corresponding to a given frequency reverse the process.

Further uses of the chart can best be illustrated by examples.

Example 1:—

Find the wavelength range of a condenser and a coil if the condenser has a maximum capacity of 500 micro-microfarads, a minimum capacity of 25 micro-microfarads, and the coil has an inductance of 40 microhenries.

Starting from 40 on the inductance scale go horizontally to the right until you meet the "C 25" (meaning 25 micro-microfarads) curve, then go straight up to the sloping line "A" and then horizontally to the left until you meet the wavelength scale. We meet this scale at 60, and therefore know



that the minimum wavelength the circuit will tune to is 60 meters.

We now start again to find the maximum wavelength the circuit will tune to. Starting at 40 microhenries again we go to the right until we meet the "C 500" (500 micro-microfarad) curve, then up to the line "A" and left to the wavelength scale as before. We get 223 meters for the maximum wavelength.

Therefore we have found out that the circuit will tune from 60 meters to 223 meters—and we have used no mathematics at all.

Example 2:—

Find the coil that will tune down to 25 meters with a condenser whose minimum capacity is 25 micro-microfarads.

From 25 on the wavelength scale project to the right until you meet the line "A", then drop down to the "C 25" curve and then go to the left and read the inductance scale. The value in this case turns out to be 7 microhenries.

The Inductance Chart

The painless inductance calculator is based on a Bureau of Standards formula that we need not repeat here. This formula applies *only to single layer solenoids* (coils wound on a straight tube).

This chart greatly facilitates the "cut and try" process of designing coils, as the trial designs can readily be checked and the effect of changing the design in various ways can be observed quickly.

To find the inductance of a coil we must first know its diameter, number of turns, length of winding and number of turns per inch. Suppose that these have been found to be as follows: diameter three inches, length of winding two inches, number of turns 20, therefore the turns per inch are 10.

First use the smaller chart to get the value of "K". Go to the right from 3 on the diameter scale and at the same time go up from 2 on the length scale and notice where the two lines meet. In our example they will meet about halfway between the ".5" line and the ".6" line, therefore the value of K is about .55. We are now ready to proceed.

On the main chart start from the "Diam" scale at 3" and go right to the curve "B", then down to the line "20 turns", then left to the line "10 turns per inch", then up to a place halfway between the "K .5" and the "K .6" line, and then right again to the inductance scale. The inductance is found to be 25 microhenries.

Other coils are worked out in the same way. When a design is wanted for a coil which will have a particular value of inductance a few such trials will indicate the final design.

The Low Power Report

WITHOUT the blare of trumpets or the vaunting of banners the low-power work has carried on. The list below shows a number of interesting accomplishments.

	Trans. Stn.	Rec. Stn.	Date	Dist. Miles	Tube	Plate Voltage.	M.A.	Watts	Miles per Watt
9AD	Geneva, Switzerland	1PL	Jan. 1	3800	?	200	?	?	?*
g5SI	Shrewsbury, Eng.	1PL	Feb. 15	3300	15.w.	250	9	1.95	1700**
5AQW	Enid, Okla.	5AJH	Mar. 24	300	201	20	2.5	.05	6000
8KW†	Buffalo, N.Y.	1YB	Mar. 16	355	201a	60	10	.6	570***
8KW†	" "	9BPW	Mar. 2	600	201a	50	8	.4	1500
8KW†	" "	5XAU	Mar. 3	1137	201a	80	15	1.2	960
8KW†	" "	8BAU	Mar. 9	320	201a	34	6	.2	1500
c1AI	Millerton, N.B., Can.	g2NM	Feb. 28	3100	202	300	40	12	258
7HB	Cottage Grove, Ore.	7FT	Feb. 7	260	202	60	5	.3	870
7HB	" " "	7FT	Feb. 7	260	202	12	?	?	?
8DOC	Kenmore, O.	6CGO	Jan. 25	1687	202	160	3	.48	3375
9CGL	Attica, Ind.	9DMS	?	1¼	199	7	?	?	?
1VC	Pittsfield, Mass.	1AZD	Jan. 13	6	3-202's	1.5	2	.003	2000
8ATZ	Salem, Ohio	8BRD	Dec. 14	260	201	120	?	?	?
9CDV	East Grand Forks, Minn.	4SB	Sept. 23	1525	60w.	80	9	.72	2120

* Two receiving tubes. ** Mullard, 15w. input. *** Loop transmission. † 40 Meters

A number of our low power reports were not included in this paper for one of the following reasons; because the transmitting circuit used was a conductively coupled one, because there was no attempt to adhere to the form of report requested in May, 1924, *QST*, on page 36, or else because the handwriting in the letter was unreadable.

Edwin Miller, 8KW is the star. Between March 1st and 14th he worked 29 different stations at distances between 300 and 1100 miles. All this was done with a 201-A tube using plate voltage between 34 and 90 and with no input greater than 1.7 watt. The circuit is shown in the diagram, Fig. 1. It

is the usual coupled Hartley and helps verify our reiterated assertions that it is unnecessary to hunt for freak circuits. It is not necessary to use No. 14 wire: bell wire is of a good size and will be well spaced by its triple cotton covering; also it is much easier to handle. The condenser is one of the small fixed mica type used in receivers. If an antenna series condenser should be necessary it can be any of the ordinary receiving variable condensers.

Mr. Miller did not stop with low power in the transmitting antenna, he tried it with a small loop. The circuit is shown with constants in Figure 2. In two days he worked 2WC, 1YB, 1II and 1CMX with an input never greater than three-quarters of a watt.

The beauty of this sort of work is not only that the results, if any, are generally spectacular, but that the apparatus required is inexpensive, easy to assemble and adjust. No resonance indicator is necessary in the antenna circuit. Stick the headset in series with the B battery and plate, jam the antenna coil close to the primary and, if an antenna series condenser is used, it is varied until the tube stops oscillating and starts up again. Midway between the points where oscillation stops and starts is approximately the resonant point. Then the coupling can be loosened until the set starts oscillating and the only indication of resonance is a click, or the antenna can be coupled closely and adjusted enough off tune to allow the set to oscillate freely. The latter will often be the better of the two adjustments, by the way.

Of course you know nothing of your power unless you have both a voltmeter and milliammeter in the plate input circuit. A 25 milampere meter and a 0-100 voltmeter are an excellent combination. However the voltmeter can be dispensed with where the usual B batteries are used as you obtain a very close approximation of their actual voltage by their ratings.

Another thing useful in doing low-power work is picking out the proper time and wavelength for it. At one time the writer experimented with receiving tubes with B battery plate supply and found that best work and between 3 A. M. and daylight for results could generally be obtained in daylight for short distance work and between 3 a. m. and daylight for distance work at night. The sole idea is to hit on a period when the air is least occupied and there is best chance for a weak signal to make itself heard. Pick out a wave that is the freest from RM, no matter which of the wavebands you work in. This is about 150 meters in the 150 to 200 band, and no particular wave in the 75-80 meter band. In this latter band it is a question of finding a time of the night or morning when there are fewest hams on the air. The work listed above was done, in the main, on the 75-80 meter band.

Further reports on this low power work should follow the form of the above with the addition of the name of the town in which the receiving station is located. Reports covering plate voltage greater than 45 that have no information on the input in milamperes to the plate are useless unless extremely long distances are covered. Legibility in your report is as important as good work.

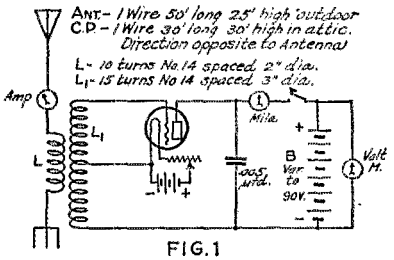
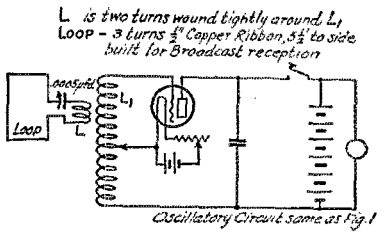


FIG. 1



LOOP USED ON 40 METERS
FIG. 2

How about it fellows? We lead the world in amateur high-power transmission, can't we also lead them in low-power?

[L. W. H.

The Wouff-Hong trophy which is to be awarded to the best amateur station in the sixth district, Pacific Division A.R.R.L., should have a whole flock of applicants. The award will be made annually starting with the November convention in Santa Barbara. There are four points which will be used in judging the stations: Log (35%), Consistency of operation (25%), DX in miles per watt (20%), and neatness and arrangement and percentage of "home-made-ness" of apparatus (20%).

J. Kenneth Bolles, our Head Ink Slinger and Manager of Current Radio Service has left. Jake accepted a position with three Baltimore newspapers for whom he will do promotion work. We all certainly did hate to see him leave. Good luck, OM.

The new Publicity Manager who will take his place is Bill Murray. Meet him in the Who's Who Department in this issue.

Short-Wave Low-Power Arc Transmitters

By Samuel Cohen*

IT is rather interesting to note an introduction of amateur arc transmission in the January issue of *QST*. It brings early recollections of some of the work that has been conducted by the writer in the hope of developing a continuous-wave arc transmitter suitable for short-wave transmission.

Due to certain difficulties that have been encountered in the operation of the usual

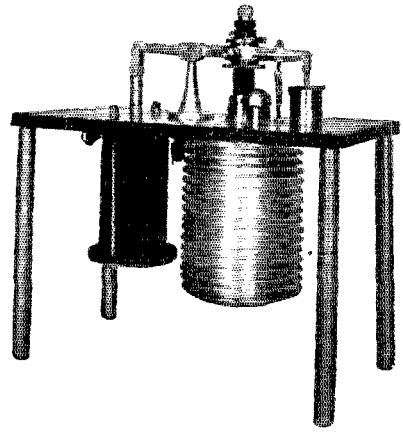
CONTROL PANEL OF THE ARC TRANSMITTER

arc converter, it was impossible to work this type of generator at low power.

Although this problem was attacked during the early development of the arc, it was not until 1917 that a low-power commercial arc converter was successfully developed. The final arc transmitter is shown in the accompanying photograph. Another illustration shows the arc converter and also a photograph of the arc generator dismantled.

*Vice President and Chief Engineer General Instrument Corp.

The arc converter itself consisted of two tungsten electrodes immersed in denatured alcohol containing 10% solution of aqua ammonia. The arc converter was an automatically controlled one. The solenoid to the left is mechanically connected to the control lever through its core. The damping dash pot is used to prevent the lever from rising too rapidly at the instant of starting, thus preventing the arc from being extinguished.



THE AUTOMATIC ARC CONVERTER ITSELF

Below the panel can be seen the large electromagnet that moves the upper electrode and the corrugated alcohol container in which the arc operates. The magnet plunger extends up thru the panel and connects with the walking beam, the right end of which carries a plunger operating in a small dashpot to keep the arc from "chattering". The upper electrode of the arc is provided with a clutch and with thumbscrew adjustment.

In a home-made arc much of this machinery could be omitted and hand adjustments used.

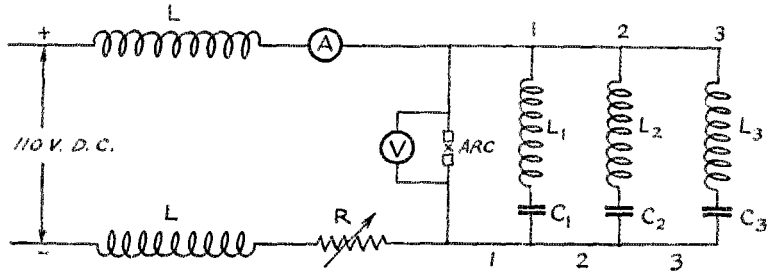
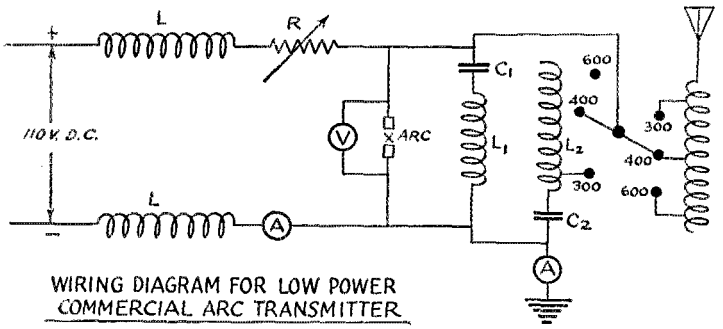


FIG 1

With this type of automatic arc, it is only necessary to close the line switch and

the arc automatically adjusts itself by means of the solenoid adjusting magnet to the proper length for most efficient operation. This length is maintained according to the applied voltage, and whether the voltage either increases or decreases the arc gap is maintained at its optimum position. The automatic regulating feature is a radical departure over existing general arc transmitters, namely, critical adjustments and the requirement of a certain amount of skill on the part of the operator to obtain best results. With this type of arc, the same results can be obtained by any operator, as all adjustments are self regulated.

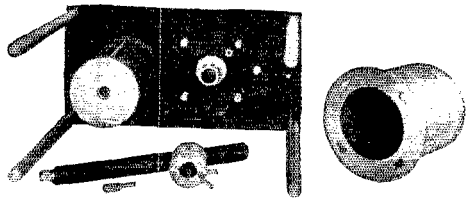
The arc transmitter herein shown and described was successfully operated on 110 volts direct current as the supply source, and with certain modifications signal transmission was accomplished on 225 meters.



WIRING DIAGRAM FOR LOW POWER COMMERCIAL ARC TRANSMITTER

The short wave transmission was accomplished by the utilization of harmonic circuits in connection with the arc converter.

The connections of the harmonic circuits is shown in Fig. 1, Circuit C_1 L_1 being the fundamental of 900 meters, L_2 C_2 tuned to 450 meters and L_3 C_3 is resonant to 225 meters. The antenna is coupled to L_3.



THE ARC CONVERTER TAKEN APART

A typical circuit used in the commercial transmitter is shown in the accompanying wiring diagram, Fig. 2, wherein three distinct wavelengths can be secured with two variable coils and with a common control switch. The circuit L_1 C_1 is tuned to the fundamental wave of 1200 meters, while the circuit L_2 C_2 and the antenna circuit are tapped so as to tune 300, 400 and 600 meters.

Editor's Note

For a home-made arc simpler construction will answer. The tungsten points can be taken from spark coil vibrators, altho these will not last long. Larger tungsten points can be bought. It will be remembered that Mr. J. A. Willoughby's arc (Jan. *QST*) operated with carbon electrodes, and these can be used here also, altho probably not as satisfactorily.

Announcement of Midsummer Short-Wave Tests

By the Traffic Department

THE "gang" has signified that it wants some summer tests on short waves. Here they are! ! ! Here is that chance to participate in some worth while chance to participate in some worth while A.R.R.L activity. These tests are world-wide in scope. Every short wave receiving station and every short wave transmitting station in the entire world is cordially invited to take part. If you haven't got a short wave transmitter and receiver NOW is the time to start building one. A few changes in your present transmitter and a little time spent in adjusting the circuit are all that is necessary for the *twenty* and *forty* meter tests. The *five* meter equipment may take a little more time and ingenuity. It will be well worth the trouble. The longest distance that we know of that has been covered by five meter signals is the distance from New York to Hartford. There's a wonderful possibility that YOUR station will be the first to be heard on the other side of the world on five meters. Besides the opportunity to distinguish yourself in some spectacular and record breaking work, there is a real purpose behind these tests.

Our own John L. Reinartz has started us off by doing some real development work. He summarized this work in his article "The Reflection of Short Waves" which appeared in the April *QST*. Since this article appeared there has been much discussion on the subject. Some of us have not agreed entirely with his theory of radio transmission. If his theory is correct it means that by using the right wavelength, suited to the right time of day, we may cover any distance desired with absolute certainty and with very low power. These tests will create new data on short wave transmission. The Reinartz theory will be confirmed or disproved by sufficient new data. At any rate we shall have fresh information in quantity and it may be possible to draw certain definite conclusions that will be of value.

We are going to give detailed schedules this month as well as to make a first announcement of the tests because we want to give our friends in New Zealand and South Africa a chance to do their part. We want transmitting and receiving stations in every part of the world to join us in some tests which may contribute valuable knowledge to the art of radio communication. Both the experimenter and the DX man can participate to advantage.

Dates of 48 Hour Tests

July 18-19	**Test on 38-42 meter band**
July 25-26	" " 25-26 " "
Aug. 1-2	" " 4.8-5.3 " "

LOCAL STANDARD TIME

A.S.T., E.S.T., C.S.T., M.S.T., P.S.T., GMT., etc.

(If you are on daylight saving time send your tests one hour later than this schedule.)

Restricted Period

0100-0130	1-1.30 AM
0500-0530	5-5.30 AM
0900-0930	9-9.30 AM
1300-1330	1-1.30 PM
1700-1730	5-5.30 PM
2100-2130	9-9.30 PM

Free-for-all Period

0130-0200	1.30-2 AM
0530-0600	5.30-6 AM
0930-1000	9.30-10 AM
1330-1400	1.30-2 PM
1730-1800	5.30-6 PM
2130-2200	9.30-10 PM

Transmissions

Any transmitter may enter the free-for-all period. Each station is requested to use a self-assigned code word for identification. Mail this to Headquarters as soon as the test is over that your station may be given due credit for its part in the tests. Your own call and intermediate should be inserted with the test signal. "PVDMY PVDMY TEST g2SZ PVDMY" etc., should be sent during the period of transmission. Be very careful not to transmit during the restricted period of the next time belt. Adhere closely to your standard time. It is requested that Official Relay Stations handle their traffic on the 75-85 meter and the 150-200 meter bands during the tests. Using the "five-point" system there should still be plenty of time left to devote to the tests.

Transmitters for the restricted period will be selected by A.R.R.L. Headquarters. There will be a few good and powerful transmitters in each time belt selected for this work. They must be capable of putting a lot of power in the antenna, and of consistently keeping the schedule noted herewith. There must be no failure on their part. Foreign stations for this work will be selected by A.R.R.L. representatives in the different countries.

Receiving stations may be readily built from information in past isues of *QST*. Be sure that your five-meter receiver is oscillating on five meters by using measurements of the standing waves with Lecher wires. If you are listening on six meters you will probably report "no signals" consistently throughout the tests. Twenty- and forty-meter receivers are common enough. The bread-board type of receiver will be excellent for the purpose.

A continuous watch for the whole period of each test is desirable. Two or three operators at each receiving station will simplify matters and a considerably "fatter" station log can be sent in. In your log state the time (local and GMT) call letters, code word, wavelength, note, audibility, and local weather conditions, for each reception. Make reports at the close of each test while the information is fresh. Mail reports July 20, July 27, and August 3rd.

The proper procedure is to listen on forty meters during the two days of forty meter tests, to copy and LOG as many signals as possible on the forty-meter band. Four hours later refer to the log and listen for THE SAME stations which you can find by referring to the log. Try to note general changes in signal strength from four-hour-period. We are anxious to know just when signals are strongest from a given station and when they are weakest. A half-hour transmitting period should give opportunity to hunt all the stations logged during the first period, check their signals and locate new stations.

Stations sending tests are urged to keep note of the operation of their transmitter. Keep the wavelength constant as possible, be sure that the wavelength is steady and does not wabble all over the lot. Keep the power in the antenna as constant as possible during the tests. Observe your time

carefully and do not transmit except during the free-for-all period. When you send your code word to Headquarters, make note of the plate input power. Don't forget to report your EXACT wavelength.

Send all reports to Traffic Department, 1711 Park St., Hartford, Conn. The value of the report depends on detailed information regarding certain stations. The information contained in the report is gonig to count just as much as the quantity of stations logged. It is better to have a lot of information of ONE station than a long list of calls heard and no details of the different transmissions.

Recognition will be given the best stations transmitting as well as the stations sending in the best and most valuable reports.

New England Division Convention

ADJECTIVES fail us in trying to properly report the convention held at the Hotel Bancroft, Worcester, Mass., April 3rd and 4th, under the auspices of the Worcester County Radio Association. The first to arrive was that live "bunch" from Vermont, followed by that active Providence Radio Association, who can always be relied upon to be heard as well as seen. New Hampshire and Maine had good representation, and Massachusetts showed its support by having the largest delegation of all.

Promptly at 1.30 P. M., Friday, the convention was called to order by Chairman C. J. Green, who welcomed the delegates with appropriate words, after which the meeting was taken in charge by City Manager A. H. Carr. Under the direction of Carr this meeting proved of great interest to all those present, bringing out a number of discussions for the good of the Division.

Late in the afternoon trips were made to the three Super-stations in Worcester: 1XZ, 1YK and 1BKQ. At 1YK Mr. Newell was kept busy calibrating Wave-Meters, and from the number that received his attention should make it easy for the New England "Hams" to keep within their wavebands.

There was so much "Ham-festing" all around that it was all one could do to spare the time to get a "bite" of supper for fear something would be missed.

The evening entertainment was so satisfactory that it filled the banquet hall: what with real comedy movies, R.C.A. "World-wide Wireless" film, Liars' Contest, Cracker-Eating Contest, Stunts by Radio Clubs, etc., no one wanted to go to bed. Again the Providence Radio Association showed its versatility and won the first prize for the best stunt. Anyone who wishes to know how to handle traffic please write them. Hi! The day ended by a number of the fellows scattering all over the city to operate sets to their hearts' content.

For once the committee in charge had sympathy for the "gang" and did not start too early Saturday morning, and realizing that most of us would need awakening, the privilege of the fine Y. M. C. A. swimming pool was extended to the visiting delegates and taken advantage of by a large number.

The greatest treat of all was in the afternoon when John Reinartz, 1XAM, talked for an hour and a half on "Short-waves" and the interest was so great that during all that time one could have heard a pin drop. With the information given by Mr. Reinartz, the New England fellows should be able to communicate with Mars on 5-meters.

Professor Elliot H. White, of Dartmouth College, who is also Director for the New England Division, gave a most enlightening talk, and anyone present who does not understand Ohm's law now should quit the game.

And what about Vacuum Tubes, fellows? Didn't Professor Hobart H. Newell, of Worcester Polytechnic Institute, cover that subject thoroughly? Let us hope he will find time to write a good article in the near future for our *QST*. This most interesting afternoon closed just in time for everyone to rush out and wash their hands, put on a clean collar and return for the Banquet, which started promptly at 6.45 P. M., with Dr. H. Eugene Watkins acting as Toastmaster. During the "eats" that versatile amateur, Lee Bates, entertained us with his Radio Band of High Frequency Syncopators, and you may believe it or not, this old reporter could not make his feet behave. Some very good remarks were made by Radio Inspector Butterworth, Reinartz, Hebert and Houghton, the later two representing A.R.R.L. Headquarters. After the dinner A. H. Carr, who has been supervising the contests, began to act the part of Santa Claus by distributing the largest number of prizes we have ever seen at any convention. As a matter of fact there were so many that we lack the space to give the names of the fortunate ones. But we want to thank, in the name of the convention, all the different manufacturers for their kind donations.

The closing event of the convention, and one which made a very strong impression, was the holding of a conclave to confer the degree of the Royal Order of the Wouff Hong on about 150 members of the League. The Worcester boys who did so well last year in Springfield again showed their histrionic talent. It would be hard to equal their performance.

Oh! by the way, we were forgetting. The Providence Radio Association obtained the convention for 1926. Start saving now, fellows.

—*A. A. H.*

Checking up Wavemeter Methods

By F. Austin Lidbury*

QST has recently presented several hurry-up methods of getting rough wavemeter calibrations. Many of our members seem to be under the impression that these methods are exact. Mr. Lidbury has made a careful investigation to show just how far they can be trusted.

THE question of wavemeter accuracy is going to be of much greater importance at the extremely short waves than it was at 160 meters. The same *percentage* of inaccuracy at 80 meters means twice the error in kilocycles that it represented at 160. At 20 meters the error is 8 times as serious, at 5 meters it is 32 times as serious and so on. After all, it isn't the percentage error but the kilocycle error that counts in practice.

My guess is that as the lower wave-bands fill up amateurs will have to use a degree of accuracy in such matters as they have not yet begun to think about.

It is therefore important to review some of our hurry-up methods to see wherein they lack the necessary accuracy and why so frequently a sending station is clear off the wavelength the operator thinks he is using.

The Half-Wave Method

The method proposed by Reinartz on p. 18 of February *QST* is not free from objection. Of course the scheme itself is alright but taking a 247-W wavemeter and simply dividing the scale by whatever one wishes does not work out at all accurately at low waves. The author stated that his wavemeter checked to better than 3% plus or 3% minus, which is a total latitude of 6%. Such an error can represent a great change of frequency at the very short waves. My own 247W does not even do this well.

The Resonance-Coil Method

An attempt to use the resonance-coil method given on page 28 of March *QST* gave discordant results. It was therefore decided to measure carefully the relation between fundamental and harmonics for a number of different coils to see if it was not possible to hit upon a coil design that could be trusted.

Where the Method Fails

The test results which follow seem to put this method out of the running as an easy way of calibrating with any accuracy.

The results indicate that of the three coils shown on p. 28 of March *QST* only the medium sized one would give results near those desired. If there were a definite best ratio of length to diameter one might lay out a set of instructions that would work. In any case, if it were thought worth while, one could give specifications for particular coils that would be usable if they were built closely to specifications.

However, it is doubtful if this is worth while as the coils would have to be checked and adjusted separately and it is as easy, and more accurate, to calibrate from driver harmonics in the usual fashion.

All this is opinion, the test results follow so that everyone may make his own decisions.

The Tests

The method employed was to set the resonance coil near an oscillating receiver as described in the original article, finding the resonance points of the coil by tuning the receiver and watching a milliammeter in the plate circuit of the oscillating detector.

When a point was found the wavelength was determined with the aid of a heterodyne and a General Radio Precision wavemeter.

Where the range of the driver (75-225 meters) permitted, the wavelength was determined for several different harmonics of the driver. This gave a high order of accuracy in the determination of the more remote harmonics of the coil. The accuracy may be taken as ¼ of 1% except for the 5th harmonic which is accurate to better than 1%.

In order to facilitate the zero-beat setting of the driver and the receiver an audio amplifier and loud speaker were connected into the plate circuit of the oscillating detector.

The following coils were used:

1.—9⅝" long x 1⅜" diameter D.C.E. No. 30, on glass tube.
2.—The same coil as 1, but paraffined.
3.—5½" long x 2¾" diameter S.C.E. No. 30, on bakelite.
4.—6¼" long x 3 7/16" diameter D.C.C. No. 30, on ice cream container, paraffined after winding.
5.—4⅜" long x 4½" diameter D.C.C. No. 30, on heavy cardboard.
6.—3 3/16" long x 3 7/16" diameter D.C.C. No. 30, on ice cream container.
7.—Same as 5, but with coil reduced to 4" length.
8.—108 turns Lorenz wound D.C.E. No. 30, 2⅛" long x 2⅜" mean diameter, 9 pins.
9.—Same as 5, but coil further reduced to 3¼" length.
10.—Same as 5, but coil further reduced to 2½" length.

* Niagara Falls, N. Y. Member Experimenters Section, A.R.R.L.

11.—1¼" long x 4" diameter, D.S.C. something-or-other, probably about No. 26. This coil was taken from the secondary of an old Federal tuner.

Tabular results are shown below.

Coils are put in order of ratio of length to diameter, which appears to be the governing factor. It will be noted, however, that the optimum ratio does not appear to fall at the same value for different sizes of coil.

It was interesting to note how little the resonance points of coil No. 1 were affected by soaking in paraffine. (Coil No. 2.)

Finally, observing the changes in coils 5, 7, 9 and 10, which are the same except in length, a coil was wound on the same form, 3¾" long x 4½" diameter, D.C.C. No. 30. Its fundamental was 180, its 2nd harmonic 90, its 3rd harmonic 60.1, its 4th harmonic 45.1, its 5th harmonic (not determined to the same order of accuracy) 36.3. These figures correspond in the last table to 100, 100, 100, and 101 respectively; so that in this case the harmonics are multiples of the fundamental within the limits of accuracy of the measurements.

No attempt was made to build a coil of smaller diameter which would have this relation between its harmonics, though doubtless it could be done, if worth while.

Coil No.	Length Diameter Ratio	Fundamental	Ratio of Harmonics to Fundamental 2nd	3rd	4th	5th	Percentages observed wavelengths of harmonics bear to the theoretical ratio 2nd	3rd	4th	5th
Ideal Coil	.....		.500	.333	.250	.200				
1.	7	76.4	.567	.434	.350	.302	113	130	140	151
2.	7.	76.8	.568	.424	.350	.304	114	128	140	152
3.	2	109.9	.552	.395	.308	.253	110	118	123	126
4.	1.82	160.9	.543	.378	.290	.243	109	113	116	121
5.	.97	200.6	.518	.347	.263	.212	104	104	105	106
6.	.93	108.1	.492	.330	.246	.197	98	99	98	99
7.	.89	188.4	.509	.341	.255	.207	102	102	102	103
8.	.79	58.3	.475	.306	* *	* *	95	92	* *	* *
9.	.72	166.7	.487	.326	.243	* *	97	98	97	* *
10.	556	139.9	.465	.303	* *	* *	93	91	* *	* *
11.	.312	63.3	.424	* *	* *	* *	85	* *	* *	* *

** Not accurately determinable.

Method of Making Resonance Coils

Wind firmly and closely a coil of somewhat greater length than diameter, using No. 30 D.C.C. on a heavy tube. Start with 4½" on a tube of about 4" diameter. It is not necessary to use paraffin, though that would be desirable. Set up near oscillating receiver, as described in March *QST*, Page 28, and find fundamental resonance point on receiver. For anything like accuracy the use of milliammeter instead of 'click' will be found necessary; couple the coil to the receiver as loosely as possible. Set up driver some feet away and using low power tune driver until of the same wavelength as receiver is oscillating at; tune to zero beat. Read wavelength of driver by wavemeter.

Throw power off driver, and find second harmonic of resonance coil on receiver as described in article in March *QST*. Somewhat tighter coupling will now be necessary. Start driver again using higher power and tune both up and down until squeal is again heard in receiver; driver will probably now read at somewhat higher wavelength on wavemeter. If so, remove a few turns and repeat; if it reads lower, insufficient turns have been used to begin with.

Repeat this procedure until you do not have appreciably to change the wavelength of the driver in order to get zero beat with the receiver whether the latter is oscillating at the fundamental, or second harmonic of the coil. When both these points give zero beat with the same wavelength of driver, proceed to check the 3rd, 4th and 5th harmonics of the coil in the same way. If not more than 1% change in wavelength of driver is necessary, the resonance harmonics of the coil will be accurate to 1%.

Example: A coil 4" in length was wound on a heavy cardboard form 4½" in diameter. The fundamental wavelength was 188.4. Wavelength of driver to give zero beat with receiver set on second harmonic of coil was 192. Turns were removed until these two wavelengths coincided. Coil was then 3¾" long. Fundamental was 180.0. Wavelength of driver to give zero beat with receiver set on second harmonic of coil was 180.0; for third harmonic 180.3; for fourth harmonic 180.3; for fifth harmonic 181.7 (setting of receiver for fifth harmonic is a little difficult, and it would be better not to use this point). These readings correspond to the following resonance points for the coil:—

Fundamental		18.0
2nd	harmonic	90.0
3rd	"	60.1
4th	"	45.1

The slight divergencies on the 3rd and 4th are within the limits of error of the measurements.

It will be understood that the beat note is between the wave at which the rceeiver is oscillating in each case and the fundamental, 2nd, 3rd, etc., harmonics of the driver.

To make coils to go further down the scale it will be necessary to have a driver capable of oscillating as low as the fundamental of the coil in each case. Smaller diameter coils must be used; a 2" or 2½" diameter might next be tried.

Summary

1.—In general, the harmonic frequencies of resonance coils are not integral multiples of the fundamental frequency.

2.—Coils whose length is great as compareo with their diameter resonate at wavelengths longer than ½, 1-3, ¼, etc., of the fundamental wavelength.

3.—Coils whose length is small as compared with their diameter resonate at wavelengths shorter than ½, 1-3, ¼, etc., of their fundamental wavelength.

4.—By building coils of somewhat greater length than diameter, and removing turns between measurements, a point can apparently be found at which the harmonics which are usable for the calibration described in March *QST*, Page 28, (i. e., the second, third, fourth and perhaps the fifth) will correspond to ½, 1-3, ¼, 1-5 of the fundamental within 1%.

5.—A method of making such coils is suggested.

Experimenters Section Report

A Special Short-Wave Antenna

By Greenleaf Whittier Pickard*

NOW that the manuscript for my eclipse paper is safely in the hands of the printer—and the coil problem has subsided to a safe and sane amplitude, I have one or two suggestions which may keep a member or so of the Experimenters Section out of mischief for a while.

Some time before the war, H. Beggerow suggested the following arrangement for a Zeppelin antenna. This antenna consist of two wires of unequal lengths, one wire (A-B) is made equal to ¼ the desired wavelength while the other (A-D) is made equal to ¾ the desired wavelength.

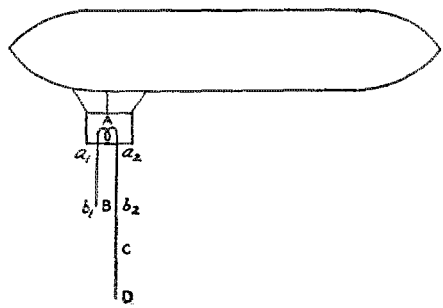
Oscillations are impressed on the system at A; nodes of potential will occur at A and C. The parts a_1-b_1 and a_2-b_2, so far as radiation is concerned, neutralize each other, and the part B-D forms a simple linear oscillator.

Now that the war is over let us see if we can find a more peaceful use for Berrow's antenna. First, let us turn it upside down and see how it looks. Now we have a linear oscillator D-C-B, energized by way of the Lecher-wire-system A-B. This part of the circuit will act as an oscillator free in space, well separated electrically and physically from the rest of the system, including the driving circuit E. The portion A of the antenna circuit is a potential node and, as it should be, it is at ground potential.

At 20 or 40 meters only that low potential part of the circuit near A would be in the shack, the rest being outside. At 5 meters the whole thing becomes quite small, but still it keeps the radiating part of the system well away from everything.

Now that we are down to 5 meters, a very pretty and important piece of research awaits the experimenter; the determination of the plane of polarization of short waves at the receiving point.

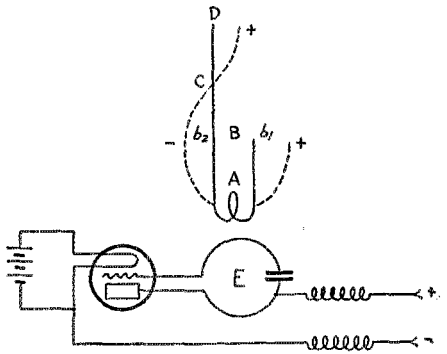
Radio transmission is a purely optical matter; we are merely working in the extreme infra-red, instead of the visible spectrum, and the same laws apply. Our waves travel in the atmosphere, a slightly ionized gas, which from an optical viewpoint is



merely a slightly leaky insulator or dielectric. This dielectric is subjected to two nearly steady fields; the Earth's magnetic field amounting to about half a Gauss, and an electric field, which at the earth's surface is about 1 volt per centimeter. Plane-polarized light waves, passing through a dielectric parallel to a magnetic field, experience the Faraday effect, that is, the plane of popularization is rotated. Similarly, plane polarization waves passing through a dielectric subjected to an electric field experience the Kerr effect, which is also a rotation of the plane of polarization.

* Chief Engineer, Wireless Specialty Apparatus Co., Boston, Mass.

In a preliminary note[1] Messrs. Nichols and Shelling have very recently pointed out that the Faraday effect may be very large indeed at certain transmission frequencies, turning the plane of polarization through a right angle at a rather moderate distance from the transmitter—500 kilometers for a



100 meter wave—and, when thus rotated, the usual modes of reception produce no signals.

All that you men need to set up in a linear resonator, tuned to 5 meters and so arranged that it can be rotated, and find, with this simple piece of apparatus, the position of maximum reception, which is the angle of the plane of polarization in the arriving wave. The little detail of coupling this resonator with a 5-meter receiving circuit I leave entirely to you; offhand it does not seem difficult.[2]

Before passing this suggestion along to a pigeon hole, the wastebasket or an experimenter or two, I wish you would read the Nichols and Shelleng article, and let me know if you are in agreement with me as to the importance of the problem. McMillan had rather poor transmission to all points south; he was working near the north magnetic pole, and his waves went parallel with the earth's magnetic field in all directions. When he goes up there again the knowledge gained by such work as I have outlined might be extremely useful.

Propagation of electramagnetic waves over the earth.

Joining the Experimenters Section

For a number of months we have not printed the requirements for membership in this section. Many letters of inquiries have begun to come in, therefore we will repeat.

Absolutely the only requirements are an interest in experimental radio work (either receiving, measurement or transmitting) and a willingness to concentrate on some particular problem or problems.

The procedure when joining is simply to address a postal card, or better a letter, to "Experimenters Section, American Radio Relay League, 1711 Park Street, Hartford, Connecticut" stating that you wish to join. You will then receive the appropriate blanks. Please do not put anything else in this first letter. The details may be put in the letter in which your blanks are returned.

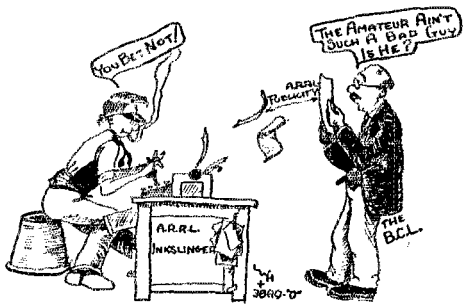
[1]Propagation of electromagnetic waves over the Earth. Science, March 13, 1925, pages 288-290.

[2]The R.F. transmission line used in the work of Messrs. Jones, Grignon and Hudd would serve here See their article in May QST.

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.

6LJ worked z4AG for two hours April 6th on 40 meters. 9ZT repeats this on April 11th.



SOAKUM MORTUUM

Skeleton-Frame Helical Coils

By Charles Sprague Hazard, M. E.*

THE ever-inquisitive amateur is constantly on the lookout for any little improved detail of construction which will increase the range or the selectivity of his receiver. Radio engineers have gone very thoroughly into the investigation of the electrical losses which occur in each piece of the apparatus thru which the radio frequency currents must pass on their way out of the transmitter and into the other fellow's headset or loudspeaker.[1]

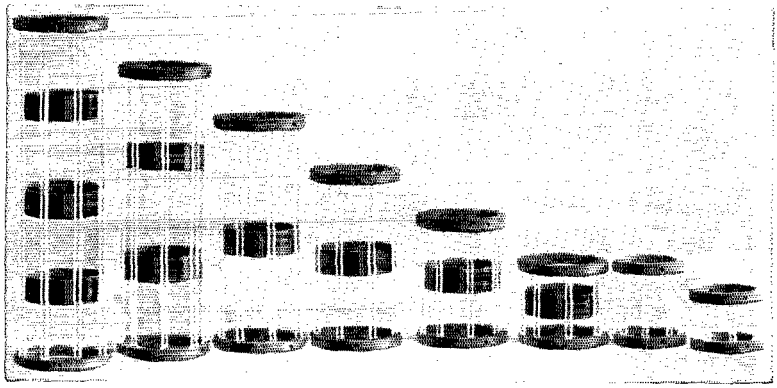
Manufacturers of radio apparatus have advertised this or that article as "Low Loss", "Lowest Loss" and even "No Loss", so that when engineers develop a unit that is really a little more efficient there are no new words left in the dictionary with which to describe it.

Most of the recent efforts to produce a low-resistance inductance have centered upon various forms of the old-fashioned spider-web (Lorenz) coil. The idea behind these coils was that by criss-crossing wires the coil could be made entirely self-supporting, thereby avoiding the losses which would probably take place in supports of bakelite, fibre or the like.

Such coils do not accomplish exactly what is expected of them. Due to the various angular positions of the wires in these coils, various conflicting magnetic fields are set up and the effective field of the coil is only the resultant of these crossed fields.[2]

The familiar helical coil wound on a skeleton frame has long been used for transmission and is not entirely new in reception. However the amateur who has really dug into the theory of the electrical losses in his inductances will be interested in some of the newer forms of coils and coil forms which are refinements of the familiar helix.

In Fig. 1 is shown the construction of a glass-and-rubber coil form furnished in various lengths (all of the same diameter) and suitable for either receiving or transmitting coils. The lengthwise members are of round "Quartzite" glass rod held in moulded rubber end rings. The intermediate re-inforcing rings do not touch the wire but fit inside the coil-form, touching only the glass rods. These re-inforcing rings are of thin bakelite-dilecto tubing.[3] A coil can be wound on these



THE BRUNO SKELETON COIL FORMS

The forms are furnished in the lengths shown and also in any other desired lengths. They are useful for both receiving and sending coils.

* Chief Engineer Bruno Radio Corporation, 300 Water Street, New York, N. Y.

1—We wish that the general arrangement of the sets were given as much thought. There are too many sets that require the use of jointed wrenches and rubber screwdrivers—Tech. Ed.

2—This is another way of saying that it takes a great deal of wire for a certain inductance. This means that the coil is big, its field spread out so as to include much of the other material in the set. These things increase the resistance and the tendency toward troublesome feedbacks and pickups. That, in general, is why the Tech. Ed. is inclined to believe in the helix or the torus.

3—In general it seems that bakelite-dilecto is much less desirable for coil forms than is moulded bakelite, unless the latter has been loaded with some undesirable filler or coloring matter. Some rather casual measurements seemed to show no effect whatever from bakelite-dilecto and even "moulded mud" tubes when they were slipped inside coils with a clearance of 1/8" or more. The coils discussed by the author provide an even greater clearance. When the experiment was repeated with close-fitting tubes there was a very emphatic bad effect with "moulded mud", a smaller effect with bakelite-dilecto, and very little effect with a good moulded bakelite tube. We were much surprised to find that one "moulded bakelite" tube tripled the resistance of the coil—until we warmed the tube up and found that it was merely mud in disguise.—Tech. Ed.

forms just as easily as on the familiar oatmeal box, with the prospect that the finished coil will be better electrically, especially for amateur transmission at short waves and for the short-wave re-broadcasting.

In order to determine in advance the winding needed for a particular wavelength we can make use of the familiar formulas. The inductance of the coil can be determined from Nagoaka's formula:

$$\text{Inductance in micro-Henrys} = \frac{.03948\ R^2 N^2 K}{b}$$

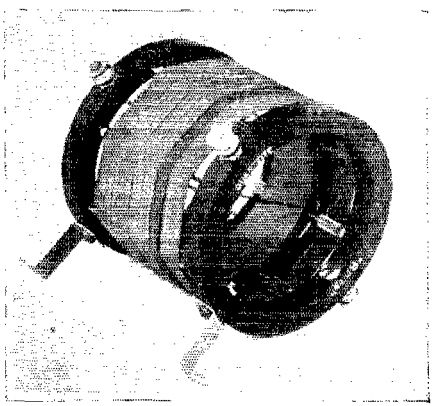
In this formula:
R is ½ the coil diameter in centimeters.
b is the length of the coil in centimeters.
N is the number of turns in the coil.
K is the constant that depends on the shape of the coil.
When the coil's length is equal to the diameter K = .6884.
When the coil's length is twice the diameter K = .8181.
When the coil's length is ½ the diameter K = .5255.

To find the greatest wavelength to which the coil will tune with a given tuning condenser we use the familiar wavelength formula:

$$\text{Wavelength in meters} = 1.884\sqrt{LC}$$

Where
L is the inductance of the coil in microhenrys (Found by Nagoaka's formula or otherwise).
C is the maximum capacity of the shunt tuning condenser in micro-microfarads.

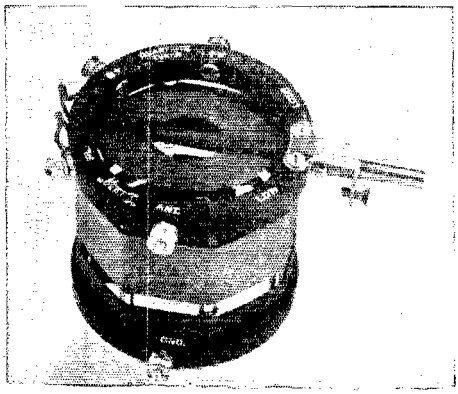
By the proper use of these two formulas a coil may be designed for any given



AN R.F. TRANSFORMER WOUND ON THE "QUARTZITE" FORMS

maximum wavelength. The minimum wavelength will depend somewhat on the shunt condenser used and somewhat on the covering and size of the wire in the coil.

In the manufactured coil several additional precautions have been observed. The windings are of wire covered first with cotton, to provide spacing between turns and then with silk to make a coil less affected by moisture. The binding posts



A COUPLER WITH A QUARTZITE FRAME
The tickler is wound through a slot in the insulating shaft and "doped" to make it self supporting. The insulating shaft prevents hand-capacity effects.

have been so spaced that there is ample room between terminals, removing any worry as to leakage between terminals and also making it materially easier to connect the coils into a finished set. Any metal parts near an inductance are (justly or unjustly) always under the suspicion of the critical radio public, therefore the metal parts have been made few and small and a special pancake tickler construction has been adopted in the case of the coupler.

Another good radio man "passes on." A. L. Budlong, "Bud", our Assistant Traffic Manager, and Miss Mildred Havican were married on April 25th. F!B!—The list of available and unengaged fellows at Headquarters fastly dies out!

By means of a portable transmitter the Coyote Amateur Radio Club of the University of South Dakota broadcasted the details of the South Dakota State Basketball Tournament direct from the basketball court. Station 9XBP (a 100-watter) was set up in the building in which the games were played. A receiver was set up in the studio of WEAJ and by means of a simple code to indicate the various plays, the plays were transmitted almost instantaneously and broadcast by voice from WEAJ. 9XBP used their regular transmitter on 120 meters.

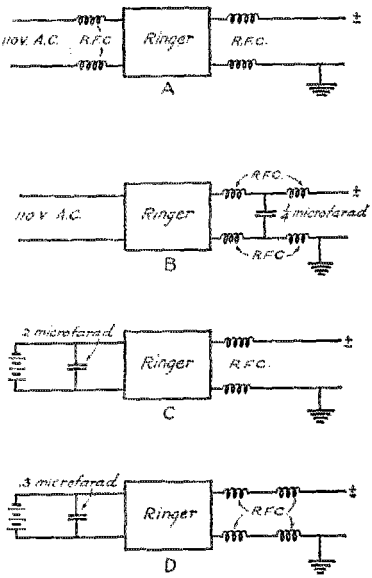
Ringing Machine Radio Interference*

By H. R. Fritz†

THERE have been numerous complaints of interference with radio reception from telephone ringing machines. Such complaints are generally justified as repeated instances have come to light where radio receiving in the immediate neighborhood of telephone offices has been made practically impossible on account of the noise introduced by the nearby ringing machine.

The ringing machines which have been responsible for the most of the interference are of the type in which the alternating current for ringing purposes is derived by the interruption of a direct current from local batteries or from rectified alternating current supplied by the local lighting circuit.

The interruption of the current is effected either by a comutating device or by vibrating spring contacts. Of these two



types the vibrating contact interrupter machines have been the worst offenders, especially those using a rectified alternating current supply.

There have been a few instances of interference from dynamotor and motor-driven types of ringing generators, but such machines are not in general use in the small telephone exchanges. This discussion is confined in the main to the vibrator type of interrupter.

On account of the abrupt manner in which the current is interrupted by the vibrating contacts, the alternating ringing current wave contains frequencies which extends into the radio frequency range. These radio frequency currents are transmitted to the office wiring and out on the subscribers' lines. From there they are transmitted into nearby radio sets by induction.

The method which has been found most effective in suppressing interference is one in which the radio frequency components are prevented from being transmitted from the ringing machine into the office wiring or back into the supply leads. This is accomplished by inserting in the ringing and supply leads, immediately adjacent to the ringing machines, a radio frequency blocking filter.

As the interfering currents differ so greatly in frequency from the ringing current frequency, it has been found possible to use a very simple filtering arrangement. In all of the cases so far investigated, this filter has generally consisted of one or more radio frequency choke coils connected in series with each side of the ringing leads and occasionally in the supply leads.

The important point to remember is that the choke coils must be of the radio frequency type. A type of coil which has been found very effective is an air-core choke coil having an inductance of about four milhenries. For the great majority of cases a coil having from three to five milhenries inductances will prove satisfactory. In order to reduce the disturbed capacity between turns, the coil should be loosely wound.

As the radio frequency choke coils are connected in series with the ringing leads, they must be wound with a wire of sufficient size to carry the ringing current without heating. For most small offices the coil should have a rating of at least ½ ampere continuously and be able to carry a load of two amperes for a short period of time. The total resistance of the coil should not exceed about five ohms in order that the voltage drop in the coil may not seriously affect the low-frequency ringing output of the machine.

No specific radio frequency choke coil can be recommended at present but the manufactures of telephone equipment who also manufacture radio equipment, should be able to furnish a coil having approximately the characteristics mentioned.

*Reprinted from the July 26, 1924 issue of "Telephony".

†Transmission and Protection Engineers, Southwestern Bell Telephone Co.

Attempts in the past have been made to use ordinary telephone frequency choke coils, such as are used in cord circuits and substation ringers, but such coils have not produced the desired results. The reason for this failure is that such coils have a high capacity between turns and act as condensers instead of inductances at radio frequencies.

Experience with about a score of cases of interferencne involving almost every variety of ringing machine, has demonstrated that there is no single arrangement of choke coils and condensers that will prove effective in every instance. However, in all of the cases so far encountered some arrangement has always been found which has effectively reduced the interference so that a receiving set could be operated in the same building with the ringer.

For the purpose of illustration, four arrangements which have been successfully used are shown in the diagrams.

It is not to be presumed that either or all of the arrangements shown will be equally satisfactory for all cases of interference. Individual experiment alone will determine which is the best arrangement in each instance.

Fig. A represents a vibrating type of ringing interrupter in which rectified alternating current, supplied from the local lighting circuit, is used. This type of ringer is very common and produces particularly vicious interference with radio receiving sets. It will be noted that one radio-frequency choke coil in each of the 110-volt supply leads and in each of the ringing leads was required to suppress the interference.

Fig. B represents a ringer similar to that shown in Fig. A but manufactured by a different concern. In this case two choke coils in each of the ringing leads and a bridging condenser of .25 μf. capacity was used. An arrangement similar to Fig. A was not quite as effective as the one shown.

Fig. C represents a vibrating type of ringing interrupter for which the energy is supplied from a dry-cell battery. A choke coil in each of the ringing leads and a 2 μf. condenser bridged across the battery leads were sufficient to suppress the interference.

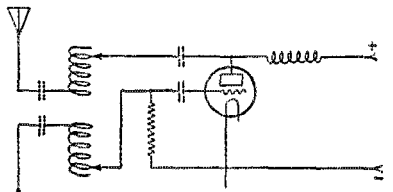
Fig. D represents a commutator type of interrupter supplied with energy from a battery. In this case two choke coils in each of the ringing leads and a .3 μf. condenser across the battery leads proved most effective.

In applying the choke coils and condensers to any type of ringer, it is of the utmost importance that this equipment be placed as near the ringer terminals as is physically possible. Experience has shown that if only a short length of office wiring extends between the ringer terminals and the coils or the condensers, the interference still persists.

(We understand that the Western Electric Co. is manufacturing R.F. Chokes designed for the uses mentioned in this article.—Ed.)

Reinartz Circuit Approved

WE are informed that the Bureau of Navigation, Department of Commerce, has made a special ruling with regard to the circuit shown on page 37 of our May issue over the title "Hartley-Reinartz."



HARTLEY-REINARTZ

Under the name of the "Reinartz-Zenith circuit" this ruling approves the circuit mentioned for amateur transmission at all waves. The approved form uses antenna and counterpoise series condensers having a capacity not exceeding 50 micro-microfarads. Reinartz says that satisfactory condensers may be made of two metal plates 2 inches square (4 square inches) spaced 1 inch apart in air.

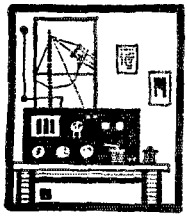
NKF reports working Australian 2CM on the morning of April 20th on 20 meters. The first 20 meter communication between the U.S. and Australia we believe.

Announcing the arrival of a new junior op for station 5ZC, Frank M. Corlett, Junior who first called "QST" (but *not* CQ) at Beaumont, Texas on February 16, 1925. Congrats to both Franks.

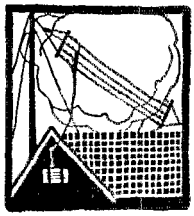
And a 10 pound brass pounder and loud speaker arrived at the home of Mr. and Mrs. A. H. K. Russell on March 1st. An OM, too!

Change in International Intermediate

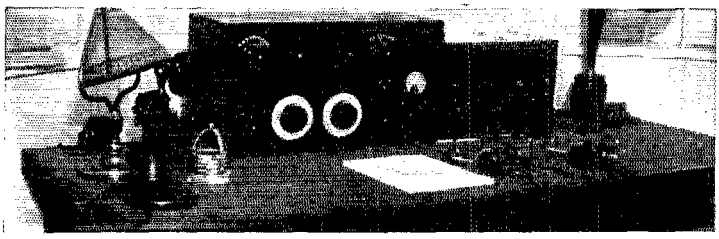
E-Spain (releasing their present S which will probably be assigned to one of the Scandinavian countries.)
L-Luxembourg.
CR-Costa Rica.
BZ-Brazil.



Amateur Radio Stations



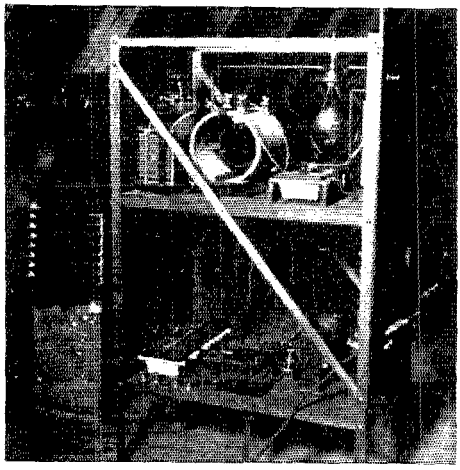
3OT Ambler, Penna.



The aim of 3OT has always been to make his appratus neat and commercial looking and at the same time efficient. The station was designed and constructed by Mr. Irving B. Smith, Jr., of Ambler, Penna. It is operated by Mr. Smith and has been heard quite consistently over a three to four thousand mile radius. The best two way communication has been with z4AG. Over 100 cards have been received from European stations within the last few months alone.

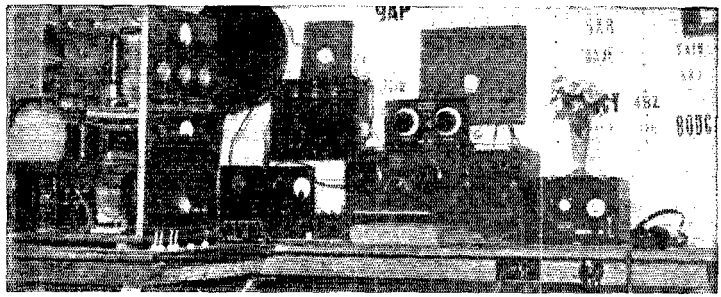
The antenna is a 50-foot cage with 50-foot cage lead-in. Under the antenna and ten feet off the ground is a 14-wire counterpoise spread out 100 feet across at the far end. The transmitter is directly under the antenna and is operated by remote control. Plate supply is from a 3-K.W. spark transformer rewound to give twelve thousand volts. The rectifier is contained in a cabinet and kept from freezing by two 40-watt lamps controlled by a mercury thermometer relay.

A Mullard 0/500-watt tube is used in the transmitter. Inputs as high as 1500 watts have been used, with the plate of the tube only dull red. The entire transmitter with the exception of plate transformer, rectifier and filter is mounted on a panel. Filament and plate supplies are run on different power lines. The transmitter is controlled from the operating table through a system of relays. A small panel set in the table top contains a toggle switch which controls both the plate and filament supply. An old automobile cutout operates the filament line and a telegraph relay which is shunted by three Dubilier .002 μfd condensers is used to key the set. With an input of 1 K.W. the antenna current on 200 meters is 8 amperes while on 40 meters 2 amperes is put into the antenna. As the radiation resistance is quite high these currents represents quite a lot of power into the antenna.



The receiver is the conventional low-loss type having a tuning range from 20 to 140 meters. A three stage audio frequency amplifier can be used with the receiver. Two antennas are available for reception. One of the antennas is a 600-foot Beverage wire and the other a single 200-foot strand. On good nights 3OT says the European hams can be copied several hundred feet from the Magnavox.

4JE, San Juan, Porto Rico



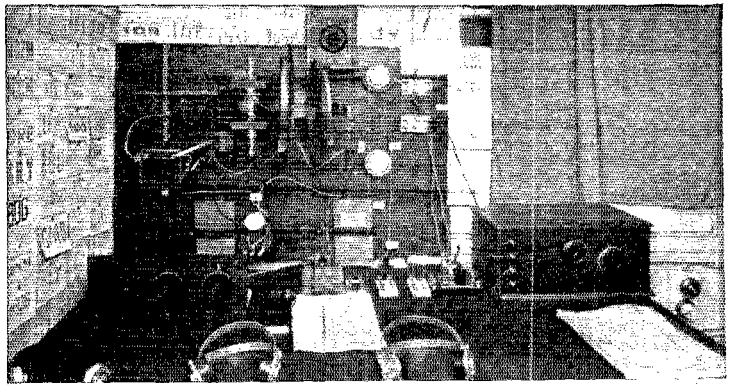
This neat looking outfit is owned and operated by Joaquin Augusty, Pershing Avenue, No. 25, Sauturce, San Juan, Porto Rico, and is the pioneer station in Porto Rico.

The antenna is a six-wire cage affair 18 inches in diameter, fifty-five feet high and seventy feet long. Both a counterpoise and a direct ground are used. The ground wires are buried one foot and run in a fan direction from the station. The original transmitter was a 10-watt C.W. set (directly to the right of the main transmitter). Using 10 watts 4JE immediately became famous. Since then the 100-watt panel transmitter has been installed. A motor generator is used for plate supply, through a good filter. Starting box for the generator is immediately below the main transmitter.

There are two receivers; one is a Grebe C-R 9 and the other a special "4JE" low-loss. A.W.E. 7-A power amplifier is wired in so that it can be used on either receiver. The General Radio wavemeter sits alongside the receiver so that received signals can be measured accurately and quickly.

4JE has over 1,000 reports of reception of his signals, including cards from England, Hawaii, Australia and Chile. His station is typical of a traffic handling station —everything arranged for best efficiency plus ease of operation.

g2NB Newark, England



Station g2NB is owned and operated by Noel G. Baguley of Newark, England. The station was erected in December, 1924. The transmitter is of the vertical breadboard type and consists of one Mullard type 0/150 tube in a loosely coupled "reversed feedback" circuit. Plate supply is obtained from a high tension transformer feeding 1300 volts into a chemical rectifier. No filter is used as Mr. Baguley found that by carefully regulating the filament voltage, by means of a primary rheostat, he was able to get a note which sounds like D.C.

The antenna is 35 feet high and 68 feet long, a 14-inch cage tapering to 8 inches at the lead-in, which is also a cage. The counterpoise is a four wire fan type 60 feet

(Concluded on page 61)

Who's Who in AMATEUR WIRELESS

Additions to the Headquarters Staff

IN January 1924 we told the story of all the Headquarters gang. Since that time there have been five additions, meet them:

A. L. BUDLONG

Arthur L. Budlong. Not half as serious as this picture. Bud joined the gang in February 1924 as Editor of Current Radio, our newspaper syndicate service. He has graduated to Assistant Traffic Manager and is in charge of all Emergency Railroad work. Signs 1ASN and hails from Washington, D. C. A whang at dizzy receiving circuits and hates the girls. (P. S. Hates 'em worse than ever now—see "stray" on page 55.—Ed.)

John M. Clayton, ex 5ZL and now 1DQ, hails from Little Rock, Arkansas. Joined the Headquarters gang on October 11, 1924. He is Assistant Technical Ed and Editor of Current Radio. (Clayton wrote these "biographies"—therefor his needs some editing. Anyone may well be envious of his history in Amateur Radio—from 1911 to date. There's too much to it to get it on this page but we might say he was a director of the League in 1920 and was Manager of the Delta Division from 1920 to 1923. Clayton was one of first fellows to be run in the *QST* Who's Who Department. See the March, 1920, issue. More details of his private—and public—life may be found there.—Ed.)

J. M. CLAYTON

In charge of the Information Service we have L. W. Hatry, ex 5XV from Port Arthur, Texas. Hat signed up on September 17th, 1924 and his job is to answer stacks of correspondence on "why my receiver and transmitter won't work." Yes, he has freckles galore and red (or is it auburn) hair. In addition to being busily engaged at his work he is also otherwise engaged. He signs 1OX up here.

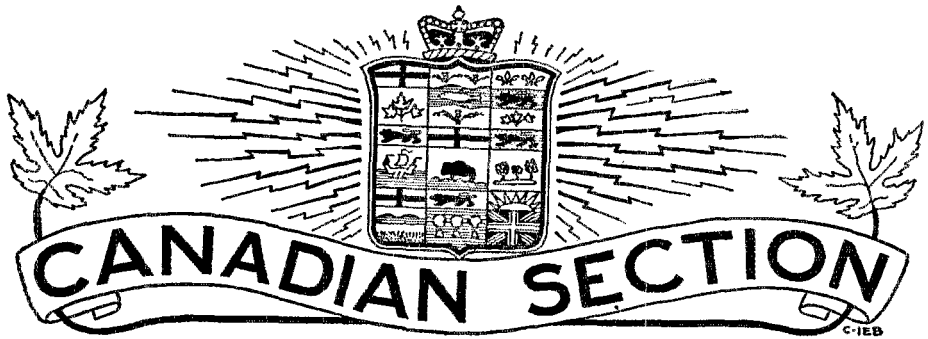
L. W. HATRY

As acting traffic Manager during Schnell's absence with the Pacific Fleet we were lucky enough to get F. E. Handy from the Westinghouse people. Handy hails from Maine, originally, and owned and operated 1XAH-1BDI at the University of Maine. He has been with Westinghouse for nine months in their training course at KDKA, WBZ and the Radio Engineering Department at East Pittsburg.

F. E. HANDY

W. C. Murray came to us on April 13th of this year. He is the new Lord Potentate of the Ink Slingers and Manager of Current Radio. Bill has had a world of newspaper experience both in New York and Hartford. He came from Boston many (but not so many) years ago. Married and has one youngster—a girl. Bill is not a ham yet but is open to conviction.

W. C. MURRAY



NEWS has just come to hand at this writing that the C.G.S. Arctic, is going north again this year and that the equipment for radio on the vessel will include a short wave transmitter as used last year with such good results. At the present time, the operator is not known but he will be a prominent Canadian amateur in all probabilities.

The set used last year was a 240-cycle I.C.W. equipment with an input of about two kilowatts operating generally on the waves between 125 and 150 meters. This year there is every likelihood that the waves of 80 and 40 meters will be used in place of the 125-meter band but 120 meters flat will probably also be used during the night time to communicate with Canadian amateurs, this being the Canadian special wave for the Trans-Canada relay route.

The Arctic is expected to sail a little earlier this year than she did in 1924 and will probably leave Quebec before the end of June. Her voyage will take her over to Greenland and up to Ponds Inlet and all the other Mounted Police posts in the Arctic Circle. Regular schedules will be arranged and will probably be published in the July *QST* so that the best results may be had from the equipment. With the growth of 20- and 40-meter work during daylight the Arctic will furnish an excellent opportunity for daylight DX and it is hoped that very valuable results will be achieved.

A few words in passing on the subject of the all-Canadian trans-Continental wave of 120 meters recently issued by the Dominion Government will be of interest. This is the result of the Wednesday night "prayer meetings" on 125 meters incorporated last winter by the division managers in Canada. This has been so successful in getting the amateurs across the country on the air at a time and wave length known to all that the Government has honoured the custom by apportioning the special wave above mentioned to be used for this work only. Those of our foreign readers who wish to hear Canadian amateurs are advised to listen in every Thursday morning at 5:30 Greenwich time. Reports of reception on this wave length by the various stations concerned would be much appreciated.

A last minute message from Bill Borrett at the I.A.R.U. conference in Paris states that he is very busy and working nineteen hours a day at the conference and that he has practically no time to operate or to do anything except fight with the other delegates for his views. Full reports are hoped to be received in time for the next issue of *QST*.

The following waves are authorized for use for the coming year by Canadian amateurs: 4.69 to 5.35, 18.7 to 21.4, 37.5 to 42.8, 75.0 to 85.7, 150 to 200. 120 meters is also authorized for Canadian stations operating across Canada and for intercommunication work between Canadian stations only. It is not to be used for communication with stations in the United States. I.C.W. and radiophone are restricted to the wave band between 170 meters and 180 meters.

AMATEUR RADIO STATIONS

(Continued from page 59)

long and it also has a cage lead-in. The normal antenna current on 92 meters is 1.7 amperes.

The receiver is a low loss tuner employing Lorenz type coils, a D.E.V. low capacity detector and occasionally one stage of audio amplification. Since g2NB got on the air he has worked 142 different American and Canadian stations in seven U. S. districts, 3 Canadian districts and Porto Rico. GHH1 at Mosul, Mesopotamia and every European country possessing an amateur transmitting station has been worked.

Calls Heard

Blair E. Estes, Guam, M. I.

U.S.A.: 2rk, 2xi, 3ju (?), 4sa, 5abn, 5ac, 5acl, 5afu, 5ah, 5akn, 5apu, 5atk, 5ca, 5ct, 5cv, 5ew, 5gg, 5lr, 5oaa, 5ox, 5sd, 5uk, 5zai, 6aak, 6abm, 6aea, 6afh, 6afq, 6ahp, 6akw, 6aky, 6alv, 6ame, 6anb, 6anw, 6apw, 6ar, 6arb, 6au, 6awt, 6axl, 6baw, 6bbo, 6bbq, 6bg, 6bhz, 6bik, 6bir, 6bjl, 6bjn, 6bjx, 6bmo, 6bmr, 6bmu, 6bph, 6bpf, 6bra, 6bva, 6bve, 6bur, 6buw, 6bz, 6cae, 6cah, 6caq, 6cbb, 6cc, 6ccg, 6cew, 6ccy, 6ceu, 6cga, 6cgc, 6cgo, 6cgw, 6cgy, 6chl, 6chn, 6chs, 6chu, 6cix, 6clu, 6clv, 6cm, 6cmg, 6emo, 6cms, 6cmu, 6cqu, 6cro, 6cso, 6cto, 6cua, 6cvs, 6dbh, 6dn, 6dza, 6ea, 6eb, 6eo, 6ew, 6fy, 6hur, 6ja, 6jd, 6jp, 6jw, 6jx, 6kb, 6lj, 6mp, 6mq, 6no, 6nx, 6ody, 6oi, 6on, 6py, 6qi, 6rn, 6ua, 6ujq, 6ut (or 6ue), 6vc, 6vq, 6wp, 6xad, 6xar, 6xi, 6xo, 6zh, 6zbt, 7abb, 7afo, 7df, 7fq, 7gr, 7gj, 7ij, 7kf, 7ls, 7mf, 7uj, 8bau, 8bda, 8pl, 9ad, 9ado, 9bhx, 9bji, 9cfi, 9ce, 9dap, 9dqu, 9eu, 9ph, 9zt. Can.: 5ba, 5go. New Zealand: 2ac, 2ap, 2ae, 2ag, 3al, 3ju, 4aa, 4ag, 4ak, 4cm. Australia: 2ay, 2bk, 2bg, 2cp, 2em, 2ds, 2gr, 2me, 2rq, 2ua, 2ww, 2yg, 2yi, 3bd, 3bg, 3bq, 3ef. Navy: a5v, nfv, nhv, nirx, npo, nqg, ihk. Commercial: ane, hva, ihu, ket, kgi, lpx, xda.

James Steffensen, Ehlersvej 8, Hellerup, Denmark.

1abp, 1aea, 1aid, 1ajo, 1ajx, 1aki, 1all, 1ana, 1auc, 1axn, 1bcr, 1bei, 1bkf, 1blb, 1bpb, 1cab, 1cc, 1ci, 1ckq, 1dd, 1ow, 1rd, 1rqo, 1wl, 1wy, 1xz, 1yd, 1zt, 2abd, 2ag, 2auc, 2blm, 2bqa, 2brc, 2cel, 2cji, 2cns, 2epd, 2cvj, 2cxl, 2cyw, 2fc, 2ku, 2tp, 2wr, 2xi, 3auv, 3bdi, 3bg, 3bva, 3bwt, 3ca, 3cdv, 3cjn, 3cn, 3oq, 4tv, 8adc, 8ago, 8avd, 8xav, 9dmj, nerk1, wjs. Canadian: 1eb, 2bn. New Zealand: 4aa. Australian: 2yi, 3bd, 3bq. Phone: kdka. Commercial: wgh, wir, wiz, lpx.

g2KW, W. R. Burne, Thorold Grove, Sale, England.

1aac, 1aap, 1aar, 1aay, 1abf, 1ad, 1aea, 1af, 1agw, 1aid, 1aja, 1ajg, 1ajo, 1ajp, 1ajw, 1ala, 1alr, 1all, 1am, 1amf, 1ana, 1aqm, 1are, 1ary, 1asu, 1ata, 1atj, 1aur, 1avf, 1awe, 1aww, 1axz, 1ayn, 1aza, 1azr, 1azw, 1bal, 1bcc, 1bcm, 1bcr, 1bdx, 1bes, 1bgq, 1bhm, 1bhn, 1bic, 1bis, 1bkq, 1bkr, 1bpb, 1brd, 1brx, 1bsd, 1bsm, 1bst, 1bvb, 1bvl, 1bvs, 1bw, 1bz, 1bzp, 1cab, 1cak, 1cav, 1ccx, 1ce, 1ci, 1ck, 1ckp, 1ckq, 1ckv, 1cme, 1cmp, 1cot, 1cr, 1cri, 1da, 1dl, 1ef, 1er, 1ez, 1fd, 1gs, 1gv, 1hn, 1id, 1ii, 1kc, 1kx, 1lw, 1mc, 1ml, 1my, 1ow, 1pa, 1pi, 1px, 1py, 1qp, 1qs, 1qv, 1se, 1sf, 1sw, 1sz, 1vj, 1wl, 1xae, 1xam, 1xav, 1xm, 1xu, 1xw, 1xz, 1yb, 1yd, 1za, 1ze, 1zs, 1zt, 2aay, 2abt, 2aco, 2adm, 2af, 2ag, 2agb, 2agd, 2agi, 2agu, 2agw, 2ame, 2atf, 2awf, 2ay, 2azy, 2bbn, 2bco, 2bg, 2bgg, 2bgo, 2bhu, 2big, 2bm, 2bo, 2bqu, 2bqw, 2brb, 2brc, 2bsc, 2bsr, 2bug, 2by, 2byw, 2cbg, 2cbl, 2cbn, 2ce, 2cee, 2cei, 2cep, 2cg, 2cgb, 2cgi, 2chu, 2cje, 2cjx, 2cri, 2cul, 2cvf, 2cvj, 2cvu, 2cxe, 2cxy, 2cy, 2cyu, 2dd, 2dn, 2ds, 2dx, 2eb, 2eq, 2gk, 2gu, 2kg, 2kl, 2kn, 2kx, 2lc, 2ld, 2mc, 2mu, 2pd, 2qh, 2qv, 2rk, 2tp, 2uc, 2wr, 2xq, 2yq, 2zh, 3ah, 3ahw, 3adb, 3adp, 3adq, 3ajd, 3alx, 3bay, 3bco, 3bdo, 3bdr, 3bm, 3bng, 3bnu, 3bqp, 3bss, 3bta, 3bva, 3bwj, 3bwt, 3cdl, 3cdv, 3chc, 3chg, 3cjn, 3ck, 3ckj, 3cwn, 3dh, 3hh, 3bg, 3hs, 3hw, 3jl, 3jw, 3kq, 3ld, 3lg, 3mb, 3mf, 3oq, 3ot, 3qv, 3wb, 3yo, 3zp, 3zw, 4bq, 4bx, 4eq, 4fs, 4fz, 4ig, 4io, 4jr, 4ku, 4mb, 4mi, 4my, 4ox, 4qg, 4qw, 4sa, 4ti, 4tj, 4ua, 4wn, 4wr, 4xe, 5aot, 5aqw, 5am, 5hl, 5ok, 5mi (?), 5rw, 5sd, 5uk, 5zai, 6ame, 6awt, 6bdm, 6cjc, 7bkf, 8acm, 8add, 8adg, 8ago, 8aly, 8amr, 8apr, 8aro, 8att, 8aod, 8bkh, 8bq, 8buk, 8bwg, 8cbd, 8cca, 8ccr, 8ced, 8che, 8ckf, 8cko, 8cm, 8cse, 8dm, 8doo, 8eb, 8hsd, 8kc, 8mc, 8nl, 8sf, 8sp, 8tr, 8uf, 8um, 8vq, 8xb, 8xp, 8xe, 9aam, 9bcj, 9beo, 9bht, 9bhy, 9cjc, 9bma, 9bpb, 9abf, 9dqu, 9dmj, 9efz, 9ejt, 9eld, 9on, 9vq. Canadian: 1ar, 1bq, 1dd, 1ef, 2az, 2be, 2bn, 9al. Cuba: dz. N. Z.: 4aa, 4ag. Aussie: 2ds, 3bq, 3yi. Mespot: ghh. Special: fl, lpx, nkf, nerk, pox, wgh, wjs, kdka, wgy. There is still room on my wall for a few cards. Am on 95 meters.

Casablanca, Morocco, Africa.

1ajo, 1all, 1af, 1aja, 1ajg, 1ajx, 1anr, 1ban, 1bes, 1bcc, 1bv, 1csw, 1cmp, 1cg, 1ces, 1cal, 1dg, 1er, 1fl, 1id, 1my, 1tax, 1xf, 1zt, 2amo, 2axf, 2aay, 2ag, 2ad, 2bv, 2bgi, 2bgw, 2bcw, 2bm, 2bnu, 2bgg, 2bts, 2bss, 2bgu, 2cvf, 2cf, 2cxw, 2egu, 2chc, 2clm, 2cvj, 2cgb, 2du, 2ds, 2eb, 2gk, 2jw, 2le, 2mc, 2pd, 2rk, 2ta, 2ud, 2va, 2wc, 2xam, 2xg, 3adg, 3ajd, 3bu, 3bdo, 3chc, 3dho, 3lw, 3nf, 3og, 3ot, 3tf, 3tp, 4apv, 4bg, 4fm, 4mc, 4sa, 5ac, 5cu, 5kc, 5lh, 5nw, 5osc, 5oyv, 5sd, 5uk, 5yh, 6cug, 8att, 8aby, 8avl, 8abs, 8bdu, 8bfe, 8bt, 8cwo, 8cyi, 8cs, 8do, 8die, 8dme, 8doo, 8er, 8eji 8epo, 8efz, 8fm, 8kc, 8nc, 8rr, 8tr, 8vg, 9bwp, 9bcd, 9dmi c2bg, nkf, mbx.

J. R. Mohler, U.S.S. Litchfield, c/o Postmaster, San Francisco, California.

Copied while anchored in San Francisco Bay, 8, 9, 10, 11 es 12 April.

1aa, 1af, 1abf, 1ajx, 1cgc, 1cmp, 1pl, 1sk, 2ach, 2acs, 2acu, 2afs, 2cjb, 2crp, 2cwd, 2cr, 2rk, 2ry, 2xaf, 3ab, 3ach 3avk, 3ba, 3bnu, 3bqp, 3bva, 3bwj, 3bx, 3hh, 3qt, 3wx, 4er, 4fm, 4io, 4ll, 4rm, 5af, 5acl, 5adz, 5aex, 5afb, 5agp, 5ahd, 5aiu, 5ahw, 5ame, 5apm 5bx, 5fh, 5gq, 5lg, 5ms, 5rg, 5sd, 5vf, 5xau, 5zas, 6's too numerous, 7's too numerous, 8abl 8awj, 8bbp, 8bcv. 8boe, 8boy, 8bqi, 8brb. 8cx, 8chk, 8dnr, 8doo, 8gm, 8gz, 8kc, 8ry, 8uk, 8vt, 9ai, 9ala, 9amx 9axb, 9axq, 9bbr, 9be, 9bis, 9bka, 9bjk, 9bjz, 9bm, 9bof, 9bpm, 9bso, 9byg, 9caa, 9caw, 9cdo, 9cht. 9cia, 9cjt, 9cks, 9clg, 9cpm, 9cro, 9cv, 9cxx, 9cyd, 9cyo, 9daw, 9dbz, 9ddp, 9ded, 9dlc, 9dwy, 9ek, 9et, 9eiq, 9elb, 9hp, 9lo, 9nv, 9oo, 9rw. Mexican: 1b, bx, 9a, oaaa (gv qra as Mexico City). Japan: 1aa. Naval nkf, nqg, nerk 1. Commercial: wgh, kel. Canadian: 3acu, (3cqv?), 8ni, 3ws, 4aa, 4ah, 4eo, 4fz, 4gt, 5af, 5ba, 5bm, 5bz, 5gf, 5hp. April 14th z 2ac.

1RR, Plymouth, Mass.

England: 2kf, 2kw, 2nm, 2sz, 2od, 2jf, 2dx, 2ec, 2tf, 2wa, 2lz, 2wj, 2nb, 2kz, 2li, 2sh, 2rb, 2ko, 2fu, 2vw, 5mo, 5uq, 5qv, 5ab, 5rz, 5nn, 5aq, 5bh, 5pz, 5lf, 5xn, 5ba, 5sz, 6nf, 6td. France: 8ab, 8dp, 8ea 8bf, 8go, 8tk, 8ee, 8ct, 8gm. 8ssc? Holland: onn, oll, onl, oba. pc-1. Belgium: 3ad, 3bn. 4yq, 4yz. Italy: 1mt, 1co, 1er, 1rg. Spain: car2. ear6. Denmark: 7ec, 7bn. Mexico: 1aa, 1af, 1-n, 1-x. Sweden: smxa. Porto Rico: 4je, 4rx, 4sa, 4oi. Cuba: 2mk, 2lc. New Zealand: 4aa. Brazil: wjs.

1HN, 92 Brookline Ave., Hartford Conn.

4ai, 4bl, 4bq, 4bw, 4bx, 4by, 4cl, 4cr, 4ea, 4eg, 4eh, 4eq, 4er, 4fs, 4fz, 4gl, 4gw, 4hr, 4hw, 4it, 4iu, 4iz, 4je, 4jk, 4js, 4ke, 4kl, 4ku, 4lo, 4ma, 4mb, 4mi, 4my, 4nt, 4oa, 4og, 4pe, 4ph, 4pk, 4rm, 4sa, 4sh, 4si, 4st, 4sx, 4tj, 4tn, 4tv, 4tw, 4ua, 4uk, 4ul, 4xe, 5ac, 5ag, 5bj, 5ce, 5ck, 5et, 5dm, 5gf, 5gu, 5hj, 5hl, 5hy, 5ik, 5in, 5ka, 5kc, 5lh, 5ls, 5lu, 5nj, 5oq, 5oq, 5ot, 5pv, 5qd, 5rv, 5sd, 5se, 5ty, 5uk, 5up, 5vc, 5wo, 5wp, 5xa, 5xl, 5aaq, 5abd, 5abj, 5acf, 5adh, 5ado, 5aeq, 5aex, 5afu, 5agq, 5agv, 5ahj, 5ahw, 5aic, 5aih, 5aiy, 5ajg, 5ajm, 5aky, 5alj, 5alr, 5alz, 5amg, 5amr, 5aot, 5apt, 5apy, 5arb, 5arj, 5asb, 5ash, 5asj, 5asz, 5atf, 5atp, 5zai, 6ac, 6ao, 6ar, 6cc, 6ea, 6eb, 6ew, 6fy, 6gg, 6ji, 6kc, 6kr, 6lh, 6mh, 6ms, 6ne, 6nf, 6nx, 6ny, 6of, 6oi, 6pl, 6rn, 6ut, 6vc, 6vw, 6xi, 6zh, 6aao, 6afg, 6afh, 6afq, 6agb, 6agk, 6aha, 6aib, 6ain, 6aiv, 6aji, 6ajq, 6alf, 6alj, 6alw, 6amm, 6aoc, 6aol, 6apw, 6ase, 6aur, 6awt, 6bad, 6ban, 6bdi, 6bgc, 6bhw, 6bin, 6bir, 6bjj, 6bka, 6blw, 6bni, 6bpf, 6bqh, 6brc, 6brf, 6bsc, 6buf, 6bur, 6but, 6cbb, 6cci, 6cdv, 6cej, 6ceq, 6cfs, 6cgc, 6ogo, 6cgw, 6chl, 6cmc, 6cmi, 6cmu,

6enl, 6erx, 6eto, 6ess, 6ewi, 6eyz, 6ezx, 6xad, 6xat, 6xby, 7df, **7di**, 7dj, 7ge, 7ij, 7ku, 7lq, 7lr, 7ls, 7mp, 7qd, 7rw, 7uq, 7acm, 7afo, 7aif, 7ais, 9be, 9ck, 9ej, 9ek, 9ep, 9er, 9es, 9ev, 9fj, 9fn, 9gs, 9hn, 9ih, 9kb, 9mc, 9mn, 9of, 9on, 9ph, 9qd, 9se, 9vz, 9wv, 9xe, 9zd, 9abf, 9abn, 9acq, 9adk, 9adx, 9adz, 9afz, 9ahd, 9aim, 9akn, 9aky, 9amj, 9amw, 9and, 9anx, 9aoo, 9apa, 9apm, 9arr, 9auw, 9axx, 9azj, 9bcd, 9bdu, 9bfi, 9bfp, 9bfx, 9bga, 9bht, 9bhx, 9bib, 9bis, 9biz, 9bji, 9bjl, 9bkk, 9bkr, 9bmv, 9bnk, 9bob, 9bou, 9bpb, 9bph, 9bpm, 9bru, 9bva, 9bvi, 9bwb, 9bxj, 9bxt, 9bye, 9cbz, 9ces, 9cdp, 9cea, 9cfd, 9cfi, 9cgm, 9ckb, 9cko, 9cme, 9cnq, 9coc, 9cof, 9cpm, 9cpo, 9cri, 9csg, 9csr, 9ctg, 9cul, 9cuo, 9cvf, 9cvl, 9cxx, 9cxy, 9cyk, 9czv, 9daw, 9dbz, 9ddg, 9ddk, 9ddv, 9ded, 9del, 9dev, 9dga, 9dge, 9dhb, 9dhq, 9dhr, 9diw, 9dix, 9diy, 9dkc, 9dlj, 9dlw, 9dmj, 9dms, 9dmy, 9dnw, 9dpj, 9dpx, 9dru, 9dtk, 9dts, 9dun, 9duw, 9dvr, 9dvu, 9dwz, 9dxn, 9dxw, 9dxy, 9ear, 9eas, 9efw, 9ega, 9egg, 9ehm, 9eht, 9eib, 9eji, 9ejt, 9eld, 9eli, 9ell, 9elt, 9ept. Canadian: 5ba, 5ge. Costa Rican: sj. Cuban: 2mk, ber. Danish: 7ee. Dutch: onl. English: 2ec, 2kf, 2kz, 2mk, 2od, 5gf, 5nn, 5rz, 6gh, 6nf. French: 8ab, 8bf, 8eu, 8ssc. Mexican: 1n, 1aa. Spanish: ear6.

1BIS, Claremont, New Hampshire
(40 meter band only.)

4au, 4bl, 4dm, 4du, 4pd, 4rr, 4sa, 4ua, 4xe, 5aah, 5aaq, 5abn, 5aec, 5aeq, 5ags, 5anh, 5aqy, 5aur, 5fv, 5in, 5ls, 5ml, 5nj, 5ox, 5ph, 5se, 5uk, 5uv, 6age, 6agk, 6ano, 6bjj, 6bqb, 6bur, 6eft, 6cfz, 6cig, 6cto, 6df, 6lj, 6oi, 6qi, 6ts, 6xbn, 6zd, 7mf, 7ml, 7uv, 7uz, 9age, 9aij, 9ape, 9apm, 9axb, 9axx, 9ayf, 9azr, 9bbh, 9bdw, 9bfp, 9bht, 9bib, 9bie, 9bmc, 9bmx, 9bnf, 9bol, 9bpy, 9bqe, 9btf, 9bzg, 9cap, 9cgd, 9cgk, 9cgn, 9cii, 9cip, 9cjd, 9cml, 9cmp, 9coc, 9csz, 9eva, 9evc, 9evr, 9dat, 9db, 9dct, 9ddv, 9ded, 9dpj, 9dpx, 9dyy 9eel, 9efz, 9eih, 9ell, 9mm, 9nv, 9qd, 9rz, 9sr, 9sz, 9ti 9xi, 9xn, 9zd, 9zt.

3VX, C. H. Jenkins, Audubon, N. J.
(40 meters only.)

1aci, 1alq, 1als, 1ams, 1asf, 1atj, 1axi, 1bcc, 1bcr, 1big, 1bnl, 1bqk, 1ccp, 1cmx, 1ga, 1hn, 1rd 1so, 1vd, 1zt, 2aci, 2aey, 2bgi, 2cla, 2cpa, 2xi, 4bl, 4jr, 4rr, 4ua, 5aah, 5aav, 5abn, 5ac, 5aeq, 5alj, 5am, 5apu, 5apv, 5aqy, 5in 5ka, 5ls, 5nw, 5ox, 6aoi, 6cjj, 6avj, 6bes, 6bur, 6cgw, 6cnl, 6ji, 6ui, 6ts, 6xag, 6xbb, 7bc, 7mf, 7nx, 7uz, 8aa, 8alf, 8anl, 8aub, 8avj, 8ayk, 8bof, 8boy, 8brc, 8byn, 8cid, 8ccr, 8eyk, 8ex, 8dem, 8kw, 8pl, 8rv, 8vx, 9aia, 9aud, 9ayi, 9ayk, 9bol, 9bht, 9bnf, 9bqe, 9bzg, 9bzj, 9cip, 9cxx, 9deh, 9dpx, 9dqu, 9eak 9nv, 9xax, 9xi, 9xn. (Transmitter for North Pole Exp.) 9za. Canadian: 3en, 3ms, 3qs. New Zealand: *4ag*. (Best DX worked on 40 L.) Others: orz, ugk, qra? pse, qsl, my. sigs.

3BNU, Bethlehem, Penna.

1dl, 1gc, 1lj, 1ve, 1xz, 1zt, 1ajc, 1azd, 1bbp, 1bhi, 1bkl, 2bw, 2abd, 2ait, 2axp, 2bee, 2chu, 3td, 3ud 3aai, 3abh, 3apr, 3bmn, 3bwt, 4oi, 5lr, 5ls, 5ph, 5zai, 8eu, 8fb, 8anb, 8bcp, 8bcv, 8bdv, 8bfe, 8bth, 9co, 9hn, 9mn, 9ach, 9ads, 9agl, 9asv, 9bmh, 9cfs, 9dwx. Canadian: 2ec, 3mv.

4DM, Burgess Isle, Bokeelia, Florida.

1aao, 1abf, 1adn, 1af, 1ajx, 1ana, 1aoc, 1asv, 1ata, 1bes, 1bv, 1bzp, 1cab, 1cmp, 1cpc, 1cri, 1fd, 1hn, 1ii, 1ow, 1py, 1sk, 1wl, 1xam, 1xu, 2aey, 2afn, 2axf, 2bfr, 2by, 2byn, 2cft, 2cjb, 2cjd, 2clg, 2cns, 2cub, 2cxe, 2cyw, 2kf, 2tp, 2zs, 3acf, 3apv, 3bco, 3bfe, 3bg, 3blp, 3mbs, 3bsf, 3bta, 3bwj, 3chg, 3ckj, 3sn, 3tr, 3xr, 3zo, 4bw, 4ch, 4du, 4dv, 4eh, 4eq, 4er, 4ez, 4fm, 4fj, 4ft, 4gw, 4hs, 4iu, 4jd, 4jr, 4jy, 4mc, 4mi, 4pi, 4qc, 4qy, 4sb, 4sh, 4si, 4ti, 4tj, 4tr, 4tv, 4ua, 4uc, 4ux, 4vq, 4vs, 4wo, 4xe, 5aax, 5add, 5amg, 5and, 5aom, 5asb, 5atp, 5bp, 5ce, 5eo, 5di, 5ka, 5lm, 5lr, 5ls, 5ni, 5on, 5ph, 5po, 5ql, 5qv, 5qy, 5rg, 5ue, 5up, 6afg, 6cae, 6chl, 6qi, 6ts, 8acn, 8acy, 8alo, 8anb, 8aow, 8atz, 8aul, 8awx, 8axg, 8bau,, 8bcd, 8bch, 8bd, 8bmt, 8brc, 8bwb, 8bzt, 8cck, 8cft, 8cjp, 8cmp, 8cmw, 8cp, 8cvh, 8cx, 8dgd, 8dgv, 8dkr, 8do, 8duj, 8er, 8jj, 8jz, 8kb, 8ks, 8pl, 8rv, 8uk, 8xav, 9abw, 9afz, 9aud, 9avj, 9awu, 9bji, 9bna, 9bpb, 9cci, 9cfi, 9cvo, 9cvr, 9cxc, 9cxx, 9cyd, 9czn, 9dct, 9ded, 9del, 9dkc, 9dlw, 9dou, 9eih, 9ek, 9elb, 9hp, 9xh, 9zd, 9zw. Holland: onl, f8go, f8ssu, ilco, i1mt, i1no, g2fm, g2fn, g2jf, g2nm, g2sz, g5pu, m1aa, m1af, m1b, m1j, m1k, m1n, c1ei, c3bd, c3co, c3fu, c3mv. Cuba: 2mg, nkf, nfv, nal, nat (spark—hi).

5LG-5SC, Alamogordo, New Mexico.

1alw, 1awy, 1bsp, 1cak, 1cpc, 1ga, 1qm, 2gk, 3bnu, 3ll, 3oe, 3rs, 4eq, 4fj, 4fz, 4io, 4jy, 6aak, 6cuq, 6im, (mni others), 7abb, 7gy, 7lj, 7nh, 8ah, 8apn, 8awa, 8btl, 8dgl, 8uf, 9ctd, 9dau, 9dyt. Canada: 3kq, 4ac, 5go. Mexico: 1aa, 1af, 1k, 9a. Miscellaneous: ch9tc, q21c, b3ad (QRA?) wjs. Will QSL to any of above.

6ALV, 1926 Park St., Alameda, Calif.

Canada: 1ei, 3ws, 5ef. Mexico: 1aa, 1af, 1k, (9a). New Zealand: 1dz?, 2ac, 4ag. Australia: (2ay), (2bk), (2cm), (2yg), 2yi, 3bd, 3ef?, (5bg), 5bm? France: 8bn? Java: ane, nirx, qra? Indo-China: hva. 200 watts input on 82 meters, qrk?

7PP, 310 Ross St., Portland, Maine.

1aa, 1ajx, 1ala, 1alw, 1bdx, 1cmp, 1cpl, 1fn, 1in, 1qm, 1rr, 1wa, 2aqh, 2axk, 2bo, 2br, 2by, 2cee, 2cvj, 2dg, 2dn, 2gk, 2jf, 2mc, 2mu, 2rk, 2wr, 2xi, 2xq, 3apv, 3bau, 3bnu, 3cc, 3ck, 3gk, 3hg, 3hw, 3ih, 3kc, 3ni, 3ot, 3vh, 4dw, 4fz, 4gf, 4gt, 4ll, 4rm, 5aai, 5aci, 5afu, 5ail, 5ajj, 5akn, 5aqf, 5aqu, 5aqw, 5asz, 5atu, 5ba, 5bl, 5ch, 5cn, 5co, 5ct, 5ed, 5fm, 5hi, 5hu, 5jf, 5ku, 5lh, 5lr, 5ox, 5rq, 5sd, 5uv, 5zai 8acm, 8acy, 8aes, 8ah, 8aly, 8aqm, 8aul, 8awt, 8awv, 8biu, 8bk, 8bzl, 8cen, 8cwu, 8czy, 8dal, 8dgv, 8dk, 8fu, 8jq, 8nu, 8rv, 8uk, 8uq, 8xe, 8zd, 8zt, 9acq, 9adg, 9aem, 9agl, 9aim, 9arv, 9avj, 9bal, 9bhx, 9bkk, 9bkr, 9bnf, 9bpn, 9bpy, 9bru, 9cak, 9caw, 9cdn, 9cdv, 9cfi, 9cii. 9cit, 9cj, 9co, 9cpo, 9cnb, 9cuv, 9cv, 9cvo, 9daw, 9ddp, 9ddv, 9dg, 9dge, 9dhe, 9dkc, 9dmj, 9dmz, 9dqu, 9dun, 9dwx, 9dxy, 9eam, 9eas, 9eep, 9ejy, 9ev, 9lz, 9rt, 9xbp, 9zd. kdka, nkf, (nrrc qra???) wgh.

7AJE, Port Angeles, Wash.
(March 23 to April 23.)

40 meters: 1aac, 1ban, 1ii, 1pm, 1py, 1se, 2bgi, 2bur, 2wb, 3bwj, 4rr, 5abn, 5jf, 5ka, 8aly, 8avl, 8awk, 8cer, 8cwk, 8ks, 8pk, naj. 20 meters daylite: 1bdx, 1ckp, 1cmp, 1cmx, 1ow, 1xav, 1xu, 1yb, 2mu, 2xi, 3apv, 4dm, 6agk, 6ajf, 6bve, 6cto, 6df, 6kf, 6ts. 6ui, 6xaa, 6xag, 8buk, 8gz, 8nb, 8xc, 9bdf, 9cip, 9cxx, 9dat, 9dbz, 9ded, 9zt, nkf. Canadian: 4cr. 80 meters—India: ane. New Zealand: 2ac. South American: ir. Australian: 2bk, 2yg, 3ot, 5bg.

8BDG, 102 Center Ave., Schuylkill Haven, Penna.
(Daylight, 20 meters.)

4dm, 4sa, 4xe, 5aaz, 5and, 5xau, 6agk, 6xag, 9bdw, 9cip, 9dpx, 9xax, 9zt, n-orz. Nrrl calling 6xag at 3.45 p.m. April 19, 1925.

(Night, 40 meters.)

4za, 5and, 5asi, 5co, 5in, 5ml, 5ty, 5vf, 6apk, 6cto, 6cqz, 6im, 7gb, 7ll, 9afe, 9bib, 9bmx, 9cip, 9cku, 9cuo, 9dvx, 9dwx, 9kd, 9uv, 9xn, clar, c2cb, c3en, csba, mlb—z-4ag—kel,—nkf.

9EIH, Milwaukee, Wis.

1aac, 1aao, 1aap, 1aff, 1alw, 1ams, 1ana, 1ars, 1asy, 1awe, 1awy, 1axa, 1bdn, 1bdx, 1bep, 1bgt, 1bhm, 1bnl, 1bs, 1buo, 1bvl, 1bzp, 1ccx, 1cu, 1dg, 1do, 1ga, 1jm, 1ka, 1kc, 1kp, 1my, 1pi, 1pm, 1ow, 1rd, 1rr, 1sw, 1uw, 1wr, 1yb, 1zt, 1zz, 1xu, 1xz, 1xam, 1xav, 2aan, 2abc, 2ach, 2acf, 2aep, 2adk, 2aey, 2af, 2afg, 2afn, 2amj, 2atf, 2awf, 2bee, 2bgi, 2big, 2bkr, 2btq, 2bur, 2bw, 2ckk, 2cla, 2clg, 2cpd, 2ctf, 2ctq, 2cty, 2cua, 2cub, 2evj, 2cwj, 2gc, 2gx, 2fb, 2ku, 2ld, 2mm, 2mu, 2rm, 2tr, 2qh, 2ud, 2wb, 2zv, 3ach, 3acr, 3apv, 3auv, 3bct, 3bmn, 3bmt, 3bqp, 3buy, 3bwj, 3cgc, 3cjn, 3ds, 3gb, 3jw, 3kg, 3ll, 3mf, 3mq, 3oe, 3tp, 3tr, 3uw, 3vx, 3zo, 4cr, 4du, 4it, 4iu, 4iz, 4kl, 4oa, 4rc, 4rr, 4sx, 4tn, 4tr, 4xe, 5acq, 5adn, 5adt, 5ado, 5aec, 5aej, 5agz, 5ail, 5apu, 5aqi, 5aqy, 5arb, 5atu, 5aur, 5aux, 5ce, 5hu, 5jf, 5ka, 5lh, 5nj, 5ox, 5wy, 5zai, 5zas, 6ahp, 6akw, 6avj, 6bad, 6bhz. 6bmw, 6bur, 6cgw, 6cto, 6df, 6fz, 6ji, 6oi, 6qi, 6uw, 6vc, 6wp, 6xg, 7gb. Canadians: 1eb, 2fo, 3abg, 3az,, 3cc, 3en, 3fu, 3mv, 3nf, 3kq, 3xi, 3xx, 5gf, 9al.—nkf, nerki, nrrl. FM—9eih.—E. Hodson, Milwaukee, Wis.

i1ER, (5) S. Efemia 19. Milano, Italy.

1alw, 1blb, 1cmx, 1cmy, 1cri, 1ka, 1pc, 1xj, 1xx, 2bjg, 2bjx, 2cdv, 2cis, 2dd, 2hg, 2le, 2uk, 2wb, 2xl,

2zv, 3bms, 3hj, 3kz, 3lw, 3zo, 4ll, 4jy, 4tv, 4yz, 8abs, 8aul, 8ba, 8ln, 8xe, 1af, 1eb, 8uk. NKF qsa. KDKA: on 68 mts at 23.15 qsa.

A. C. Simons, Wellington Road, Lines, England.

1ac, 1af, 1ab, 1cu, 1ed, 1cx, 1ii, 1fn, 1pl, 1xu, 1abs, 1agc, 1alx, 1ams, 1ana, 1are, 1arh, 1asf, 1atj, 1axi, 1bhm, 1boq, 1cki, 1ckp, 1cmx, 1ini or 1ana, 1xam, 2by, 2dx, 2iz, 2to, 2we, 2aay, 2acp, 2agw, 2anm, 2bgi, 2cft, 2cjc, 2cth, 3adb, 3apy, 4sa, 4tv, 4xe, 5xau, 8dz, 8nb, 8buk, 8clc, 8tve, 9ad, 9cu, 9dq, 9ny, 9zt, 9aud, 9gep, 2cpa, clar, c2fo.

z3AL, W. M. Dawson, 263 Wills St., Ashburton, N. Z.

(One valve only. March 1st to 25th, 1925.)

United States: 1em, 1cmp, 2ag, 2by, 2cjx, 2le, 2rk, 3lw, 3sn, 2te, 4kl, 4ku, 5atx, 5ha, 5ka, 5ox, 5za, 5zai, 6awt, 6bik, 6bbq, 6bhz, 6bra, 6buw, 6bir, 6bep, 6cgw, 6cto, 6chx, 6cgo, 6cgc, 6cso, 6cbb, 6dah, 6ew, 6km, 6uc, 6xad, 7akk, 7afw, 7apo, 7df, 7mf, 7ls, 7uj, 7wj, 8acm, 8ahy, 8akm, 8aly, 8bnr, 8bch, 8czy, 8gz, 8jj, 8ks, 8uf, 8xe, 9aio, 9dwb, 9dwx, 9bwu, 9ev, 9gz, 9zt. Canadian: 1ar, 4gt, 5go, 5ba. Mexican: 1b, 1k, 1n, 1x. British: 2kz, 2lz, 2od, 2sz. Dutch E. Indies: ane (radio service govt. lab. Bandoeng, Java). Short wave commercial: ket, kgi.

9TC, Major R. Raven-Hart, Los Andes, Chile.

(Jan. 28 to March 31.)

WJS (Jan. 28, Feb. 3).

2cgi, 3cc, 3ot, 4jy, 4ku, 4my, 5apu, 5cv, 5ew, 5li, 6lr, *5ox*, 5qy, 5sd, 5zai, 6agn, 6alv, 6cnl, 6lj, 8acm, 8pl, 9cap, 9dqu. Mex.: 1aa, 1b.

Alvaro S. Freire, 1AB, Rua Oswaldo Cruz 46—Icarahy, Nictheroy—E. do Rio, Brazil.

(Heard during March between 28 and 104 meters.)

American: 1abf, 1af, 1alx, 1apc, 1ary, 1axn, 1bes, 1bkl, 1eic, 1ii, 1pl, 1xam, 1xu, 1rr, 2ag, 2agw, 2bac, 2by, 2cgi, 2cjb, 2cns, 2cub, 2rk, 2rm, 3ckg, 3mg, 4ku, 4sa, 6cso, 8brc, 8uf, 8xav, 8yv, 9zt. British: 2kz, 2lz, 2nm, 2od, 2xz. French: 8sm. Holland: Onl. Argentine: a8, aai, ad9, afl, af4, bal, cb8, db2, mal. Chile: 9tc. Miscellaneous: wgh, 2xi, nkf, pox, 1px, rdw, 1or, wjs, ur, dl, kdka, kfkx.

CB8, Carlos Braggio, Buenos Aires, Argentine.

1rd, 1af, 1bkr, 1bdh, 1aki, 1bes, 1cme, 2af, 2afp, 3adq, 3bus, 3xm, 3ot, 4eq, 4xe, 4my, *4tw, 4ua, 5ew, 5lu, 6rn, 6chx, 6bph, 6nx, 6bip, 7ls, 8doo, 8gz, 2lr, 8blc, 8ry, 9ktj, 9bm, 9dtk, 9rt. Canada: *1dd, *3xl. England: 2od, 2sz, 5ls, 6ry. Holland: Onl.

g5KO, 24 Leazes Terrace, Newcastle-on-Tyne, England.

1aac, 1aap, 1aea, 1af, 1afw, 1aid, 1air, 1akz, 1ana, 1anq, 1aqm, 1ary, 1atj, 1auc, 1aur, 1axn, 1axz, 1ayi, 1ban, 1bbe, 1bcc, 1bcr, 1bdb, 1bdh, 1bdx, 1bgq, 1bhw, 1bkq, 1bkr, 1bnt, 1bsd, 1bwx, 1bzp, 1cab, 1cf, 1cfv, 1epn, 1ere, 1ctb, 1da, 1dl, 1er, 1fd, 1ga, 1gk, 1gs, 1hn, 1ii, 1js, 1kx, 1ky, 1my, 1pl, 1qb, 1sf, 1sk, 1sw, 1sz, 1ve, 1xm, 1xz, 1yd, 2aan, 2aay, 2awq, 2aif, 2alx, 2amo, 2ap, 2arv, 2atz, 2auc, 2azy, 2bae, 2beo, 2bg, 2bgg, 2bgi, 2box, 2bq, 2bqc, 2bu, 2bum, 2bw, 2by, 2cdv, 2cee, 2cci, 2cep, 2cis, 2cjb, 2cjx, 2cla, 2cns, 2cpo, 2cub, 2cvf, 2cvj, 2cvp, 2ds, 2eq, 2fc, 2ig, 2ke, 2lc, 2lx, 2mu, 2mw, 2tp, 2wr, 2wu, 3aic, 3aih, 3bav, 3bco, 3bjp, 3bw, 3ca, 3cdg, 3cdv, 3cf, 3chg, 3hq, 3hs, 3jo, 3oq, 3vw, 3zi, 4aj, 4bq, 4bx, 4eh, 4eq, 4rr, 4sa, 4sb, 4tj, 4uk, 5ail, 5amw, 5uqy, 5hz, 7bd, 8acm, 8acx, 8ada, 8adg, 8afn, 8aly, 8bit, 8cbp, 8ced, 8chp, 8ctk, 8die, 8dif, 8djb, 8fu, 8jz, 8tr, 8uf, 9arh, 9aue, 9bbj, 9caw, 9ccs, 9cea, 9cip, 9cmb, 9cvs, 9dkv, 9dlz, 9dmj, 9dpr, 9dsg, 9ell, 9xbp, wgh, nkf, kdka. Canadian: 1ai, 1ar, 3fe, 3nf. Brazil: wjs. Chile: 9tc. Argentina: cb8. New Zealand: 4aa, 4ag, 4ak. Australia: 3bq. Mesopotamia: ghh. Unknown: 1px, xox.

S.S. "Ogontz", 1850 miles E. Boston.

1aac, 1adg, 1ajg, 1alp, 1ama, 1ana, 1anh, 1apk, 1are, 1atj, 1bdt, 1bhn, 1bie, 1bjo, 1btt, 1bvb, 1cab, 1cme, 1ef, 1gv, 1hn, 1kc, 1lw, 1pl, 1sw, 1wl, 1xz, 1xak, 2axf, 2bgg, 2bgq, 2brb, 2bsc, 2by, 2cqz, 2cty, 2cvu, 2cwj, 2eb, 2gk, 2me, 2mu, 2qs, 2rk, 3ade, 3adq, 3aha, 3ajo, 3anj, 3avk, 3bdo, 3bg, 3bjp, 3bmn, 3bp, 3bso, 3cgs, 3cjn, 3gk, 3hh, 3ly, 3mf, 3ot, 3sf, 3zt, 4do, 4gw, 4jr, 4tj, 4xe, 5ags, 5aqw, 5ca, 5se, 6ahp, 6apw, 6auf, 6bot, 6cgo, 6ea, 6gt, 6vc, 7abb, 7mf, 8adk, 8ago, 8aly, 8aol, 8bjv, 8byn, 8cse, 8kc, 8pl, 8tr, 8vq, 8xb, 8zy, 9aim, 9bcd, 9bfg, 9bmx, 9cem, 9cjc, 9cjy, 9cvo, 9dct, 9dfu, 9dng, 9epz, 9ep, 9oa. 3000 miles E. N.Y.: 1gs, 1xe, 2cvu, 2cyq, 2rk, 3chc, 3cjn, 6ahp, 8cse, 8cyl, 8vq, 9caj.

F. N. Leverrier, A2BK, "Lorette" Wentworth Rd., Vaucluse, Sydney, N.S.W., Australia.

1aaj, 1all, 1arq, 1bes, 1rd, 2by, 2rk, 3bmu, 3hg, 3lw, 5afu, 5akn, 5asd, 5lr, 5ox, 5ph, 5sd, 5uk, 5za, 6ac, 6afh, 6agn, 6akw, 6alv, 6anb, 6aoi, 6awt, 6bgc, 6bmw, 6bnr, 6brt, 6bur, 6buw, 6cbb, 6ccb, 6ccy, 6cgo, 6cgw, 6chf, 6cix, 6cmg, 6cmu, 6cqe, 6cso, 6cto, 6cvi, 6cw, 6cwi, 6ea, 6eu, 6ew, 6jp, 6oi, 6qi, 6rn, 6vc, 6wp, 6zbt, 6zh, 7aj, 7akk, 7df, 7fq, 7gq, 7ij, 7lr, 7ls, 7uj, 8acm, 8cwi, 8nb, 8uf, 9ado, 9and, 9bcj, 9bhk, 9bku 9cfi, 9cvo, 9dmj, 9dqu, 9xi, 9zt. Canada: 5ba, 5go, 5hc. Mexico: 1b. Java: ane, nkf.

g2BOA, Chiswick, London, England.

Heard on 40 meters: 1aaj, 1aci, 1acp, 1af, 1ajg, 1alk, 1alx, 1ams, 1aow, 1are, 1arh, 1atj, 1atq, 1aw, 1axi, 1bcr, 1blx, 1boq, 1bsm, 1bvl, 1ccp, 1cmp, 1cmx, 1cth, 1cu, 1cuj, 1cx, 1fn, 1ga, 1ii, 1ixf, 1kc, 1kz, 1my, 1ow, 1pl, 1py, 1rd, 1yd, 1xam, 1xav, 1xu, 1yb, 2aay, 2agu, 2agw, 2awf, 2awg, 2axf, 2bgi, 2brb, 2bsl, 2eft, 2cje, 2ckp, 2cla, 2cpk, 2cta, 2cth, 2cts, 2cul, 2cyw, 2czr, 2id, 2mu, 2rjp, 2rm, 2we, 2xi, 3ab, 3acf, 3adb, 3adp, 3apv, 3bmn, 3bta, 3bwj, 3kf, 3ou, 3ur, 3vx, 4dm, 4sa, 4sb, 4ta, 4xe, 8bau, 8biu, 8boy, 8brc, 8brk, 8cmi, 8dau, 8dme, 9nv, 9zt, nkf. Canadian: 1ar, 1ed, 2be, 2fo. Heard on 20 meters: 1ccx, 1cmp, 1xu, 3apv, 4dm, 4sa, nkf.

John Hollywood, Red Bank, N. J.

Daylight: 4cl, 4du, 4ez, 4jr, 4ma, 4qy, 4rr, 4si, 4ta, 4ua, 4vl, 4vq, 4xe, 5aec, 5aeq, 5aqy, 5aur, 5fv, 5ph, 5rz, 5sd, 5zas, 9afo, 9aps, 9auc, 9aud, 9bht, 9bie, 9brx, 9cap, 9cfo, 9cgn, 9cip, 9cql, 9cvr, 9cyd, 9cxx, 9dct, 9dlj, 9dlo, 9dqu, 9aek, 9eet, 9eht, 9fk, 9kd, 9mn, 9nv, 9ny, 9uq, 9za. Night: 6agk, 6ahp, 6awt, 6bhv, 6cgw, 6clv, 6cto, 6no, 6sf, 6tl, 6ts, 6rn, 7ax, 7dc, 7nx, 7si. Argentine: 1px, 1pz. Bermuda: nerk1. Canada: 1ar, 1co, 1af, 2ax, 3abg. Denmark: 7ec. Cuba: 2lc. England: 2fm, 2kf, 2od, 5ma. France: 8ct, yz. Hawaii: 6ceu. nrri. Holland: onl. Italy: 1co. Japan: ja2. Mexico: 1aa. New Zealand: 2ac. Porto Rico: 4sa. Spain: ear2, ear6.

Belgian 4YZ, Verviers, Belgium.

1aac, 1aad, 1aap, 1ae, 1af, 1ajg, 1alw, 1axa, 1axn, 1ayn, 1bes, 1blb, 1bvl, 1bzp, 1cab, 1cbg, 1cmx, 1cre, 1cri, 1da, 1dd, 1ds, 1mv, 1ow, 1py, 1qm, 1rd, 1rr, 1sw, 1xm, 2aan, 2acf, 2adk, 2agi, 2avg, 2bct, 2bgd, 2bjp, 2blm, 2bm, 2bsr, 2bum, 2buy, 2bw, 2byw, 2cdn, 2cdv, 2cgi, 2cnk, 2cdp, 2cty, 2cxy, 2cyu, 2fz, 2kq, 2le, 2rk, 2wb, 2xq, 3adq, 3avk, 3awu, 3bau, 3bqp, 3bwl, 3cgn, 3ckg, 3kz, 3sm, 4er, 4iz, 4je, 4jy, 4kl? 4oi, 4ok, 8abs, 8doo, 9awu, 9chg.

2AAN, 19 Marshall Road, Yonkers, N. Y.

6aao, 6adt, 6afg, 6agn, 6arn, 6awt, 6bgc, 6bkx, 6bhz, 6bur, 6cdg, 6cqe, 6cso, 6css, 6qi, 6ua, 6wt, 7dd, 7jq, 7ls, 7uq, 7vz, c5af, c5bz, d7ec, f8ae, f8ba, 8fbf, 8ct, 8dp, 8fq, 8gk, 8gm, 8go, 8rf, 8sm, 8tk, 8vaa, g2cc, g2dx, g2bz g2fm, g2fu, g2jf, g2kf. g2kz, g2lz, g2nb, g2nm, g2od, g2sh, g2sz, g2wj, g5bv, g5ib, g5lf, g5ma, g5nn, g5pu, g5pz, g5rz, g5uq, g6gh, g6hr, g6nf, g6nh, g6np, g6ry, g6td, g6uv, i1co, i1re, mlaa, mlaf, mlb, mlk, mln, mlx, m9a, npc1, npb3, noba, noll, nonl, 74sa, rlor, sear3, sear6, sa wjs, lr, Mosul ghh.

5APG, Oklahoma City, Okla.

All on 40 meters.

1axa, 1ayi, 1bep, 1cmp, 1kc, 1my, 1ow, 1pm, 1rd, 1xa, 1xav, 1xu, 2aay, 2adm, 2bee, 2bgi, 2brb, 2cb, 2cla, 2cpa, 2gk, 2gh, 3ab, 3ckg, 4cl, 4dm, 4pd, 4xe, 6agk, 6ase, 6avw, 6aji, 6ajp, 6bad, 6bjj, 6bur, 6cgw, 6cig, 6cto, 6hm, 6li, 6pa, 6rv, 6ts, 6ui, 6xbn, 6zbn, 7nx, 7uv, 8aly, 8apo, 8bau, 8bgn, 8brc, 8byn, 8cbp, 8cbl, 8dw, 8ei, 8jj, 8ks, nkf. Canada: 2fo, 3fc.

Communications

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

The Naval Reserve

921 Pennsylvania Ave.,
San Monica, Calif.

Editor, *QST:*

"Any institution that develops self-reliance, self-respect, initiative, intelligence, executive ability, and useful knowledge to large numbers of young men is peculiarly valuable and important to the welfare of the nation." That is exactly what the Naval Reserve is!

The aims of the organization are patriotic, and in the interests of peace. It was organized for the maintenance of a body of citizens which can be depended upon in case of a national emergency. The requirements for enrollment are: (1) The applicant must be a citizen of the U. S. and must furnish proof of citizenship. He should show a birth certificate. (2) He must pass a physical examination. (3) He must be at least eighteen years old. The promotions and the benefits that the reservist derives from the force are in direct ratio to the efforts and the enthusiasm that he puts into it.

Here in Santa Monica we have a very active and co-operative division. In addition to the yearly fifteen days cruise which reservists may take if they desire, we take a week-end cruise to Catalina Island. These cruises are thoroughly enjoyed by all who participate in them. On these cruises we receive practical, constructive training in the elements of seamanship, and we usually spend not a little time in target practice.

It should be borne in mind that everything is entirely voluntary. All that is required is that the reservist shall fight for the country in the event of a national emergency. Attendance at drill, altho highly desirable is *not* compulsory. Uniforms and equipment are issued soon after enrollment. We are told that if sufficient A.R.R.L. members enroll in the Naval Reserve we will be given high frequency apparatus for experimental and instructive purposes.

Here is a chance for the A.R.R.L. to put over the biggest thing we have ever attempted. Let's go fellows!

—*Edw. N. Willis, 6TS*

Wavemeter Calibration

SS Katrina Luckenbach,
New Orleans, La.

Editor, *QST:*

I am submitting the following idea with the hope that it may be of value to the gang.

A much simpler method of calibrating a wavemeter is to take two points—obtained in the usual manner—and plot them on a piece of *logarithmic* scales cross-section paper, plotting wavelength against dial divisions. A straight line thru these points will give a curve from which the wavelength can easily be read for any condenser setting, *providing the condenser is of the straight capacity line type.* (Note—The idea is absolutely no good unless the plates of the condenser are of the shape mentioned —Asst. Tech. Ed). The accuracy of this method should be sufficient for the transmitting amateur, though I have not tried it at the shorter wavelengths. However it will be of value in determining the approximate positions of the harmonics if calibrating by the old method, thus reducing the possibility of getting them mixed up.

A good paper for this work is that of the Eugene Dietzgen Company No. 378—A, five inch base, No. 378—B, ten inch base. The condenser dial should have one hundred divisions in order to facilitate the plotting.

The solution of the problem of reducing condenser plate resistance seems to be in silver plating the rotary and stationary plate assemblies as whole units, not coating the plates separately. If a condenser which is good mechanically is given a good coating of silver in this way it will be almost as good as if the units were cast in one piece.

—*John F. Teunisson*

Pure Aluminum

3335 33rd Ave., South,
Seattle, Wash.

Editor, *QST:*

Referring to the communication on the subject of pure and impure aluminum in the April, *QST*, several of the advertisers in *QST* are undoubtedly selling commercial grade aluminum without so stating. The main difference between commercial aluminum and that which is made with a guaranteed purity is that with the commercial stuff you may be lucky and get a good piece or you may be unlucky and have to throw all of it away. You will have to pay more for the aluminum with a guaranteed purity but will not have to throw away any of it. When cleaned in lye there are no streaks or black spots.

—*Howard F. Mason, 7BU*

Page Mr. Ford

15 Vernon Place,
Stamford, Conn.

Editor, *QST:*

Here is a short spasm entitled "Finding the Inductance of the Filter Choke." It was prompted by the pitiful inquiries we receive almost daily. Such as "My choke is 10 inches long and 2 inches round and weighs 7 pounds 3 ounces. How many henries will it have at 300 meters?" After carefully explaining how to go about finding this information, the return mail brings a reply like this, "Thanks very much for the information. There is just one little point that is not clear. After you have gotten the Henries how do you find the inductance?" F'heven's Sake!

—Edward W. Berry,
Engineering Dept. ESCO.

Standard Base Tubes

1109 Eighth Ave.,
Fort Worth, Texas.

Editor, *QST:*

Referring to your article in the February *QST* entitled "A Little Free Advice" we wish to call your attention to the fact that the Roice Tube Company saw the need of a standard base for the type 199 tube and has been making a Roice Type 199—A tube using the standard base for some time.

—James R. Curtis, 5AQC

Inchulation

Reedley, Calif.

Hon. Ed., *QST:*

In yearning to comment in your admonishable magazine may I propound in recent "Stray" in re which declare "Pie-wrecks" small custard cup with hole in bottom make excellent insulator for lead-in (or out as case may be).

Now, Mr. Hon. Ed., Pyre-Ax custard cup do not come furnished with hole so as per fidelant ham what am myself start and set about to drill said mon-included hole. By unfortunate coincidance three cup are broken by myself before Precision Machine Co., contract to attach hole. Precision Mach Co break two cup before finishing one which, Ohell, I am break on sidewalk on journey homeward. Not unfastened however I am remember system of Mr. Houdide which drive small wood splinter in chair arm by quick force I erect two cup on rear of barn and with six shooter firearm attempt to shoot hole in cup only succeeding to break them after which I bury broken pieces and unfortunate rooster fowl which are killed meanwhile.

Since and now I use old style moulded mud insulator and sputter when I see accursed pirex custard cup.

—Topo Hongo, Opr jIOU

That Long Wave Receiver

Pleasantville, N. Y.

Editor, *QST:*

Just a few lines to tell you I am having a lot of fun with the high wave single circuit set described in your March issue. Incidentally it was the first set I ever built. I am getting some wonderfully even, slow code. With a 201-A tube had volume enough to get a faint signal through a Magnavox, and could hear them with fones twenty-five feet away. Never had any idea of the possibilities of a single tube before. Should you print a further article on learning the code may I suggest that it would help if you inked in the wiring on the photograph of the set so that the wiring would show?

In case a honeycomb coil is not handy, the primary of an audio transformer will work fine.

—Beecher Ogden

One Cure for QRM to B.C.L.'s

6604 Tyler Ave.,
St. Louis, Mo.

Editor, *QST:*

Two neighboring B.C.L.'s recently came to my house to investigate the QRM I was causing. I am using an inductively coupled hartley circuit, two 5 watters and a m.g. set and I am working on 80 meters. We tried various things but 'twas no use, I could not clean up the squeals the neighbors got in their receivers while I was operating. Even with my antenna and counterpoise disconnected the QRM was still bad on broadcast waves.

It occurred to me that possibly there might be some R.F. getting back into the power lines. The neighbors and I are on the same power line. I put a R.F. choke in series with the grounded side of the 110 volt line, re-wired the set so that none of the power leads came near the R.F. circuits and placed a R.F. choke in series with the negative high voltage lead. I then went back over to the neighbor's house and Joy Be, the QRM was gone! Evidently the power lines were feeding interference from my set into the neighbor's house.

—Edw. Goodberlet, 9BCY

Two Letters Regarding the McCaa Anti-Static Device

343 East 195 St.,
The Bronx, New York City.

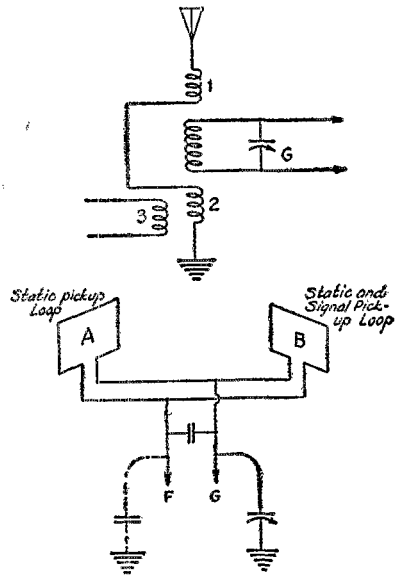
Editor, *QST:*

An explanation of the theoretical action of the McCaa anti-static device may be given in this way:

The energy in the aerial is composed of static (X) and signal (S) forces. This energy is equally divided and made to act oppositely on the receiver (G) through suitable coupling of 1 and 2. The energy in 1

is (X+S); in 2, (-X-S). A separate force S is coupled to 2 from 3. The resultant in 2 is (-X-S)+S or -X. The forces in 1 and 2 combining in G are, (X+S) (-X) or S. That is, the static forces balance out and only the signal force remains.

But S in 3 is secured by coupling through a repeating tube to the same aerial as is



used with 1 and 2. There must therefore be a static component to the force in 3 and the ratio of static to signal energy in 3 must be the same as the ratio in 1 and 2. Making S in 3 equal to S in 2 necessarily makes X in 3 equal to X in 2. Being opposed the forces in 2 and 3 neutralize and the resultant force in G is that from 1 alone or X+S. That is, signal and static forces are present in the receiver in the same ratio as in the aerial.

A static eliminating system devised by the writer and in which this lack of balance is avoided utilizes two loops; one is adjusted with its plane of winding at right angles to the line of direction of the transmitter; it picks up a negligible amount of signal energy: the other loop is arranged with its plane of winding at some angle less than 90 degrees to the line of direction; it picks up much more signal energy than the other loop. But both loops receive practically the same value of static energy. When their respective forces are opposed, the static can be balanced out and the signal force in the loop not at right angles to the transmitter will predominate. It is necessary to balance out the "capacitative pickup" effect of the loops by connecting an adjustable condenser from the grid side of the receiver to the ground; this condenser having a value approximately equal to the capacity of the "filament side" of the receiver to ground.

—*John R. Meagher.*

April 28, 1925.

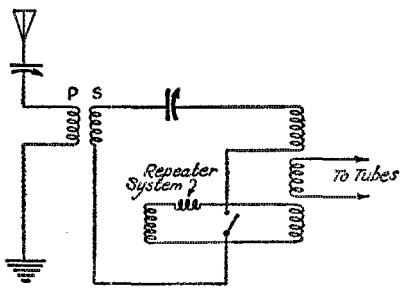
Editor, *QST:*

Regarding Mr. Meagher's letter, I cannot help you much as I have studied it without his circuit diagram and therefore I get the Xs and Ss and 1, 3 & 2 all mixed up. However, I believe he refers to his former statement that the repeater tube will receive static and signal in the same ratio from the detuned antenna.

First of all the end result in the telephone denies the above and there is a reason.

By detuning the antenna we shift the predominant cyclic frequency of the static oscillations in the antenna to a longer wave or lower frequency. We give them a frequency to which the input circuit of the repeater is untuned. The decrement of the static wave train is largely that of the oscillator and it is usually high, so that it is representative of a broad band of frequencies at the short wave lengths, while the static oscillations in a loaded antenna set to long waves have a lower decrement and are representative of a more narrow band of frequencies.

Whether a component of the static wave train is present at signal frequency when the antenna is detuned depends upon the degree of detuning and the decrement, and whether the repeater circuit responds to it depends upon the coupling of the repeater. Certainly the static component at signal frequency is not of the same strength as when the antenna is tuned, hence the input to the repeater has different signal and static ra-



tio impressed on it. The degree of detuning determines the strength of the static component at signal frequency as does the decrement of the static wave train. The wide detuning used in repeater systems and the extremely loose coupling is largely responsible for the freedom from static in the input circuit.

Instead of putting the repeater system *in* the antenna it may be put in a secondary system coupled to the antenna. The secondary, if made quite "stiff," presents much lower decrement for static oscillations and

very much better anti-static action can be obtained. Similarly, if placed on a loop, low decrement static is found and the action is really very good.

Whether S receives its energy magnetically from P or whether it is a loop, the closed circuit presents lower decrement static than the static wave train in the antenna. The above as well as the plate circuit arrangement shown in my last letter may be published if you so desire.

Have read and reread this and don't know whether I have made myself clear. Please pardon the muddle as I am very tired tonight.

—*D. Galen McCaa*

"Nil Hr—CUL 73"

23 East 34th Street,
Bayonne, N. J.

Editor, *QST:*

It is indeed a pleasure to work with someone that isn't DX crazy and willing to chat a bit. This business of "U Q.S.A. hr nil cul 73" certainly gets my goat. I am a great one for receiving QSL cards and always like a fellow to send one whether he is 50 or 5,000 miles away. I always QSL to stations outside of my own district but lately I can't seem to get a card from any of them. Have worked two c-5's and one u6 but can't get a card or letter from them.

Anytime that you hear me and want a quick qsr to a local address just give me a call. Have a phone right on the operating table and will fone msgs immediately.

—*R. B. Wehrly, 2CRP*

An Invitation

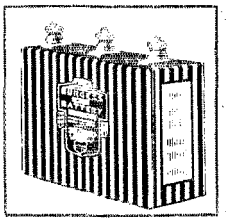
Bishop, Calif.

Editor, *QST:*

I would like to tell the radio gang that there is an invitation open to any of them who are planning to take their vacation this summer in the "high Sierras" and are going in by way of the Owens Valley and Bishop to stop at the Radio Shop. There are always a bunch of radio people around and besides talking radio we can tell them where the fish are biting and where they can find deer to shoot at.

—*Frank Parcher*

BURGESS
RADIO BATTERIES



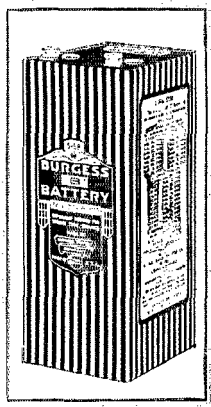
Burgess 'C' Batteries improve reception economically.

Quality at *Every* Price

Cabinet or table space many times determine the size and type of radio batteries selected by the user.

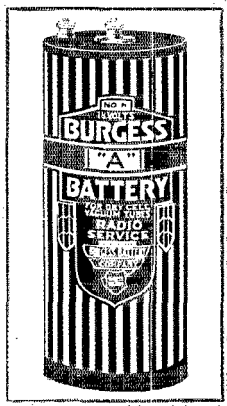
Burgess manufactures a battery for every radio circuit and tube. Your choice of any one of many types involves no sacrifice of economy or service hours. The value and quality of Burgess Radio Batteries are constant—your satisfaction assured.

"Ask Any Radio Engineer"

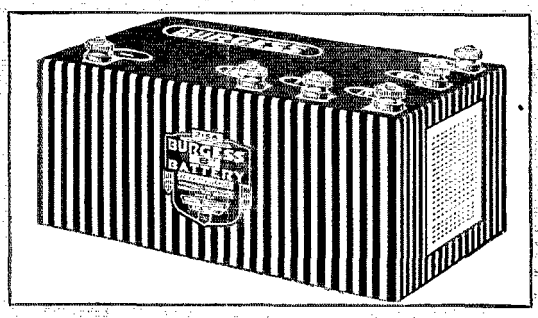


One of several sizes of Vertical 'B' Batteries.

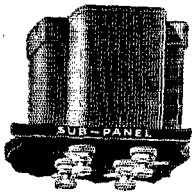
BURGESS BATTERY COMPANY
Engineers DRY BATTERIES *Manufacturers*
Flashlight · Radio · Ignition · Telephone
General Sales Office: Harris Trust Bldg., Chicago
Laboratories and Works: Madison, Wisconsin
In Canada: Niagara Falls and Winnipeg



Standard Burgess Radio No. 6 'A' Battery "Over Twice the Life."



Burgess block shape 'B' Batteries are made in numerous types and voltages.



SUB-PANEL MOUNTING TYPE THORDARSONS NOW ON SALE

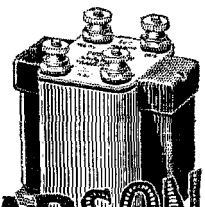
They permit a neater assembly, the shortening of leads and the concealing of wiring—as in factory built sets. Same ratios—same prices—as standard type Thordarsons. If dealer cannot supply order from us.

"Best by competitive test," says Zenith

"In the early Fall of 1923 we made numerous experiments of all existing types of transformers and finally adopted Thordarsons as the best by competitive test. The immediate result was improvement in the tone quality of our sets and comparative freedom from trouble due to the uniformity of your transformers.

"A radio set is only as good as the transformers that are used therein. We can, therefore, truthfully say that the superiority of Zenith sets is due to the superiority of Thordarson Transformers. We congratulate you upon the good product you are manufacturing."

—from a letter dated February 28, 1925 written by Zenith Radio Corporation Chicago



UNCONDITIONALLY GUARANTEED

THORDARSON

Super AMPLIFYING TRANSFORMERS

Standard on the majority of quality sets

TYPES AND PRICES

Thordarson "Super" Audio Frequency Transformers are to be had in three ratios: 3-1, $5; 3½-1, $4; 6-1, $4.50. Thordarson Power Amplifying Transformers are $13 the pair. Thordarson Interstage Power Amplifying Transformer, $8.

Write for latest hook-up bulletins—free. Unconditionally guaranteed by the world's oldest and largest exclusive transformer makers. Thordarson Electric Manufacturing Co., Chicago—transformer specialists since 1895.

ZENITH
KENNEDY
Radiodyne
THERMIODYNE
LILTRADYNE
MURDOCK
OZARKA
Ajaustikon
MICHIGAN
Deresnadyne
MASTER RADIO
ADLER-ROYAL
Howard
Pathé
HARTMAN
AUDIOLA
EAGLE
GLOBE AND MANYOTHERS

KIC-O
STORAGE "B" BATTERIES

"B" ELIMINATOR SIMPLICITY

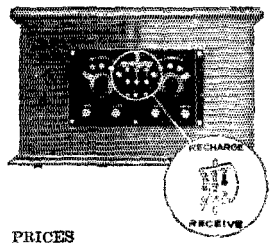
PERMANENT ALKALINE STORAGE BATTERY RECEPTION

KIC-O MULTI-POWER UNITS operate from your lighting line and eliminate the replacing of dry cell "B" batteries .... usually saving their cost in the first six to twelve months of service on Neutrodyne and Super Heterodyne sets.

Its RECHARGER is attached to back.

We have a 100 volt Multi-Power Unit Complete at $32.50

To receive simply throw switch down. To recharge throw switch up—disconnect no wires—no fuss—no worry. Leave it plugged into any 110 volt lamp socket.



PRICES
Multi-Power Units
(No Recharger required)

130 volt Type P.U.	$43.50
100 volt Type P.U.	35.00
100 volt Type C.U.	32.50

BATTERIES
P. Z. indicates panel type with switches
C. Z. is plain type without switches

Voltage	Type PZ	Type CZ
130	$36.00	$33.00
100	27.50	24.50
70	21.50	18.50
45	16.00	14.50
22½		7.50

CHARGERS

Type K-1 Single Unmounted	$1.50
Type K-2 Single Mounted	3.50
Type K-3 Multi-Polar Mounted	5.00
KIC-O Special Charger Chemicals (One Cell)	.50

DEALERS! EVERYBODY!
Write for complete details.

KIMLEY ELECTRIC COMPANY, Inc.
2665 Main Street Buffalo, N. Y.

The 100% Self-Shielded Transformer

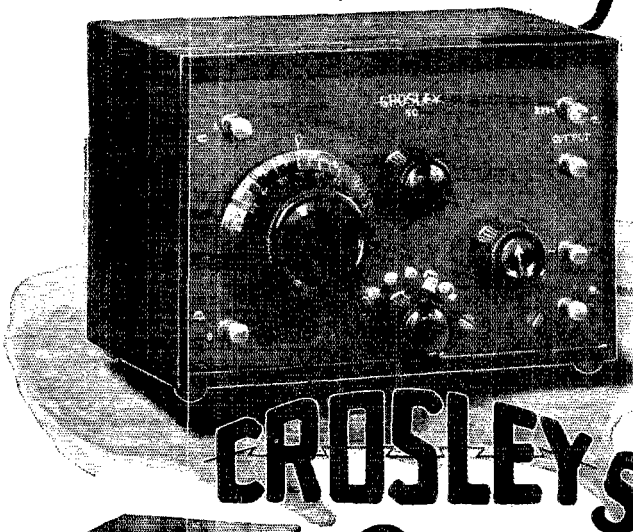
has made a big hit with both set makers and set manufacturers because of its small size, its amazing volume and most of all, because of its **pure undistorted tone.** It is half the size of other transformers, but its results are unsurpassed. Absolutely new and scientific design and construction. Ratios 1 to 3, 1 to 4, 1 to 5 $3.50. Ratio 1 to 10 $4.50.

SEND FOR BULLETIN No. 94. Read all the exclusive features of this and other Premier Parts. Tells how to get free hook up diagrams beautifully printed in two colors.

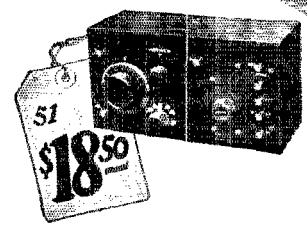
PREMIER ELECTRIC COMPANY
3811 Ravenswood Avenue CHICAGO

PREMIER Quality Radio Parts

The Wonder of Radio!



Crosley owns and operates station WLW, Cincinnati, the first remotely controlled super-power broadcasting station.



CROSLEY 50
One tube set

$14.50
Add 10 per cent west of Rocky Mountains

This is the latest refinement of the marvelous set that enabled Leonard Weeks of Minot, N. D. to catch the messages of MacMillan's North Pole expedition when sets costing ten times as much failed.

In this set Crosley has developed the famous Armstrong regenerative circuit. This circuit does with one tube what it takes three tubes to do in others.

This set will bring in stations from all over the country. It is simple and easy to operate. With accessories the total cost should be under $25.00. Crosley keeps the cost down with his "radio-for-the-millions" ideas in production.

Recent letters from enthused owners of the Crosley one-tube 50 report good reception at these distances:

Mrs. J. E. Martin at East Palestine, O. hears KGO at Oakland, Calif.
O. W. Bryant at Sunset, Texas gets WLW at Cincinnati, KDKA at Pittsburgh and Hollywood, Calif.
L. R. Pratt, Hammond, Ind. hears 5NO, New Castle, England.
Eugene Barnhouse at Brookfield, Mo., hears Montreal and Winnipeg, Canada.
Paul J. Hall at Osceola, Neb. hears 2LO at London, England.

Crosley manufactures receiving sets which are licensed under Armstrong U. S. Patent No. 1,113,149, and priced from $14.50 to $65, without accessories.

2-Tube Crosley 51
Same as wonderful Crosley 50 with additional tube amplifier. Local and nearby stations on loud-speaker always and distance up to 1500 miles under average conditions. Much greater range with head phones.

Special Sloping Front 2-Tube Crosley 51
Same as Model 51, with cabinet holding all dry A and B batteries $23.50.

2-Tube Crosley 51 Portable
The Crosley 51 in a black leatherette case, with nickel trimmings. Space for batteries. $23.50.

Crosley Musicone
A marvelous new development of loud-speaking principles. Diffusion of sound creates perfect reproduction of *all* tones. $17.50.

3-Tube Crosley 52
A larger set for those who want greater reception range on the loud-speaker. Operates on three tubes, using wet or dry batteries. Consistent loud-speaker range 1500 miles or more.

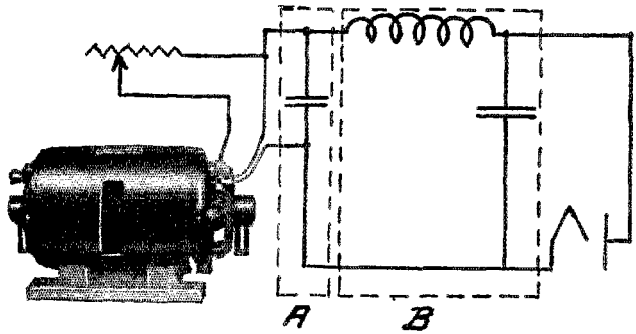
Special Sloping Front 3-Tube Crosley 52
Cabinet contains dry A and B batteries. Same efficient detection and reception as regular 52. $35.

3-Tube Crosley 52 Portable
Same as other 52 models, but in a black leatherette case. Easily carried. All batteries inside. $35.

Prices quoted above do not include accessories. Add 10 per cent west of Rocky Mountains.

The Crosley Radio Corporation
Powel Crosley, Jr., President
618 Sassafras Street, Cincinnati

No 7 of a series of 10
"FILTER FACTS"
Follow them thru monthly



The T type of filter is one of the simplest and most economical of filters. For the generator it is ideal. Properly built it is the most effective of the "smoother types." That is, its filtering effect is not critical. It functions at all frequencies above the cut-off or resonant point. The lower this cut-off point and the sharper and more rapid the reduction beyond this point the better the filter is. This means that as large condensers and chokes as is practical, from an economical standpoint, should be used. A general idea of the functioning of this type may be obtained by considering it is to be divided into two parts. Part A is a condenser across the generator terminals. Its effect on the plate circuit is small. Its effect on the minute ripples in the generator is tremendous. It breaks them down, lowering them from a minute to a negligible amount. Part B takes what little disturbance is left and reduces it as explained in No. 5 of this series. One or two, one mfd. condensers and a one to ten henry choke makes a good filter for telegraphy and telephony work. Larger condensers and chokes will of course increase the filtering effect. The very best of results for telephony may be obtained with one to four one mfd. condensers and any standard "ESCO" motor generator set.

ELECTRIC SPECIALTY COMPANY

TRADE **"ESCO"** MARK

225 South Street — Stamford, Conn.

Real DX means maximum miles per watt, and that it what "ESCO" generators are built for.

YOU TELL 'EM, BUICK--

or Flivver, or Franklin, or Fiat! Tell the whole durn road that your boss is a member of the A.R.R.L., by wearing on your radioator the new A.R.R.L. Automobile Emblem.

5 x 2½", heavily enameled in gold and black on sheet steel base, holes top and bottom for easy attachment.

Watch them multiply on boulevard and by-way!

Postpaid to League Members only at 50c—that's all!

The American Radio Relay League, Hartford, Conn.

Laboratory Equipment

Complete apparatus including: TANGENT GALVANOMETER, WHEATSTONE BRIDGE, all necessary wire and RESISTANCES and a FIVE LESSON COURSE IN TAKING RADIO MEASUREMENTS. Instruments accurately calibrated and mounted. Price $3.90. Send $1.00 with order to

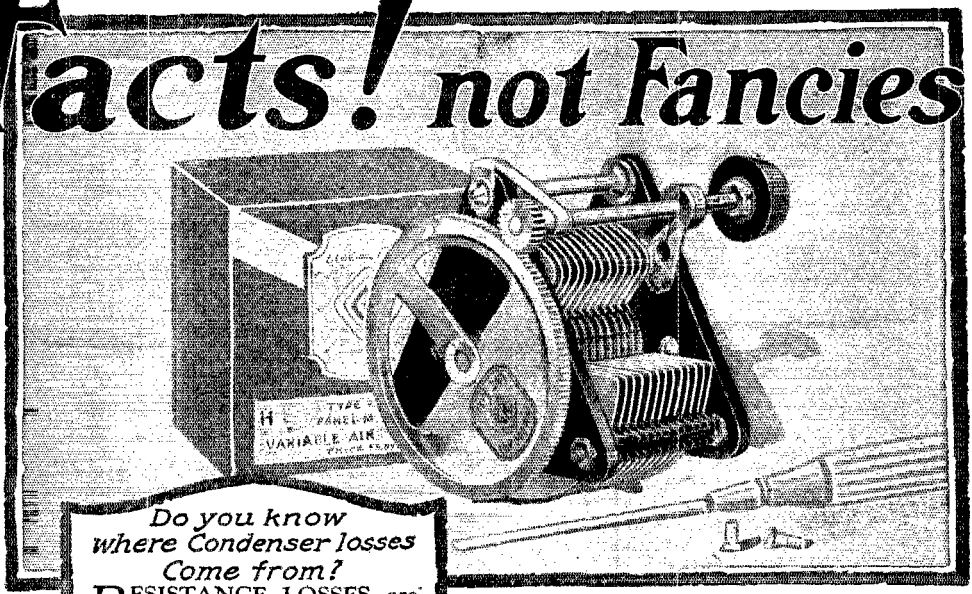
DELTA INSTRUMENT CO.,
923 South 24th Street, Fort Smith, Arkansas.

Jewett Quality Products

The Superspeaker. The Superspeaker Console, The Vemco Unit, The Superspeaker Highboy, The Parkay Cabinet, The Micro-Dial

Jewett Radio & Phonograph Co.
5674 Telegraph Road — Pontiac, Michigan

Facts! not Fancies!



Do you know where Condenser losses Come from?

RESISTANCE LOSSES are the losses which most seriously affect the efficiency of a condenser when at working radio frequencies. They arise from poor contacts between plates and from poor bearing contacts. Soldered plates and positive contact spring bearings reduce these losses to a minimum.

Eddy current losses occur in metal end plates and the condenser plates themselves. While not so serious as resistance losses, they increase with the frequency, and therefore should be kept as low as possible.

Dielectric losses are due to absorption of energy by the insulating material. Inasmuch as they vary inversely as the frequency, they have less effect upon the efficiency of a condenser at radio frequencies than any other set of losses. The use of metal end plates in short-wave reception to eliminate dielectric losses is never justified, because they introduce greater losses than well-designed end plates of good dielectric.

The design of General Radio Condensers is based on scientific facts and principles, not on style and fancies.

Specially shaped plates always in perfect alignment give the uniform wave-length variation which permits extremely sharp tuning.

Rotor plates are counterbalanced to make possible accurate dial settings.

In 1915 the General Radio Company introduced to this country the first Low Loss Condenser, and ever since has been the leader in condenser design.

Lower Losses and Lower Prices make General Radio Condensers the outstanding values of condenser design.

Licensed for multiple tuning under Hogan Patent No. 1,014,002

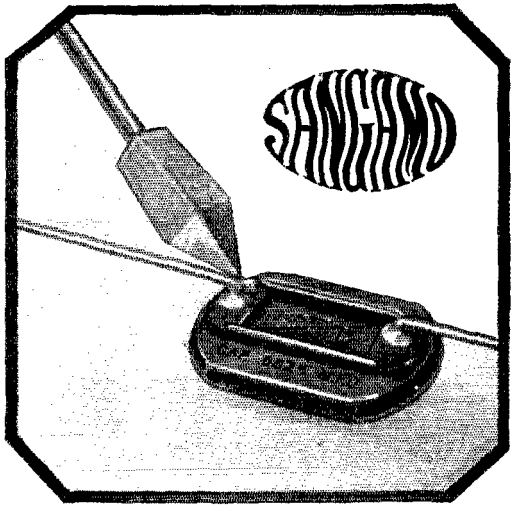
Type 247-H, with geared Vernier Capacity, 500 MMF. Price $5.00

Type 247-F, without Vernier Capacity, 500 MMF. Price $3.25

GENERAL RADIO CO.
CAMBRIDGE, MASS.

GENERAL RADIO
Quality Parts

SANGAMO
Mica Condensers



HEAT

doesn't change their capacity

No matter how often the hot soldering iron touches Sangamo Mica Condensers, their capacity remains unchanged. Sangamo condensers are solidly molded in smooth brown bakelite, made without paraffin, and so thoroughly heat- and moisture-proof that they can be boiled in water for hours without affecting the capacity. Strong, too; dropping on concrete will not hurt them.

Sangamo Mica Condensers are the most accurate condensers you can buy, and they stay accurate. In reflex circuits especially, this sustained accuracy helps to make a set *reliable*, and not as variable as the weather. They are made by a company with a world-wide reputation for building accurate electric meters.

Notice the neatness of these condensers; they harmonize perfectly with other finely finished radio parts and clean-cut workmanship.

Made in all standard capacities with or without resistor clips, and sold at surprisingly reasonable prices for high quality.

SANGAMO *Accurate* Radio Parts

Sangamo Electric Company

Springfield, Illinois

RADIO DIVISION, *50 Church Street, New York*

SALES OFFICES—PRINCIPAL CITIES

For Canada—Sangamo Electric Co. of Canada, Ltd., Toronto.
For Europe—British Sangamo Co., Ponders End, Middlesex, Eng.
For Far East—Ashida Engineering Co., Osaka, Japan

1320-B

Look for the name PYREX

FOR EFFECTIVE INSULATION

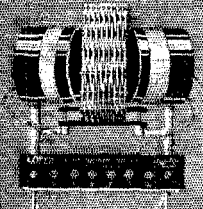
Because of certain distinct electrical and physical properties, PYREX is far superior to other glasses and insulating materials. Comparative values of PYREX and ordinary glass at 500 kilocycles are as follows:

	Dielectric Constant	Phase Angle Difference
PYREX	4.9	.24
Ordinary Glass	6.8 to 8.0	.4 to .6

For better reception, buy PYREX Antenna Insulators, Lead-ins, Pillar Supports, etc. PYREX is used by U. S. Government for the most exacting service.

CORNING GLASS WORKS
Industrial and Equipment Division
Corning - - - New York

LOPEZ
Low Loss Tuner



50% of Amateurs use the
LOPEZ LOW LOSS TUNER
Says an official of a prominent Radio Association.
Broadcast or Amateur type price $10 at dealers or direct Write for circular on Tuner Facts.

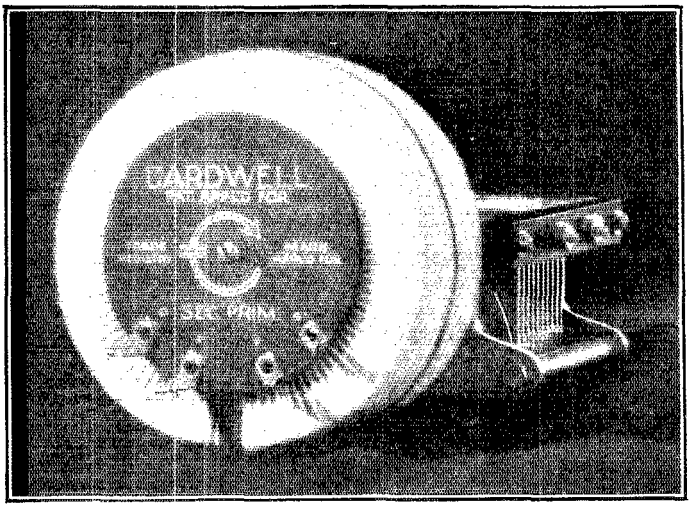
Costs More—Worth More
A. C. LOPEZ & CO.
40 West 33rd St. New York City

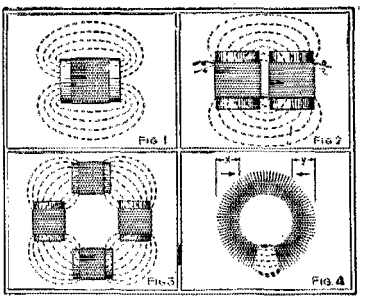
SUPER-INSULATED WIRE CO.

115 Sandwich Street, Plymouth, Mass.

Manufacturers of Fine Magnet Wires, Resistance Wires, Radio and Litz Wires.
Enamel, Cotton and Silk Insulations.
Special combinations of Litz Wires made up on request, also other wires, according to specifications.

Prompt Deliveries





General Theory of the Toro-Tran

Figure 1 shows how the field of the ordinary coil extends into space and increases losses due to stray field. Figure 2 shows a "double series" winding, which restricts the field somewhat. Figure 3 shows a "four series" winding and the field almost enclosed. In Figure 4 (the Toro-Tran) the field is entirely enclosed and the losses due to stray fields are eliminated.

Note that a stray signal passing through the coil at "X"—not introduced from the aerial or the tube—is balanced out at "Y" by the reversed polarity of the winding. This rejects undesirable signals, while the concentrated internal field builds up the tuned signal. Hence maximum distance and selectivity.

—and now the TORO-TRAN!

CARDWELL, whose pioneer "low-loss" condenser established new standards of radio efficiency, is now introducing the Toro-Tran*—the ideal *balanced* coupling inductance for all radio frequency work.

*TRADE MARK
Registry applied for

The Toro-Tran eliminates signal energy picked up by ordinary coils from nearby stations. It eliminates magnetic feed-back in multi-stage radio frequency circuits, thus removing the most active factor in causing howling and distortion, and thereby increasing selectivity and distance. It rejects almost entirely the interference effects caused by electrical power machinery, elevators, door-bells, arc stations, etc.

The Toro-Tran winding confines the field to the inside of the coil, a small area, and thus avoids one of the greatest causes of loss known to radio receivers—that of stray magnetic fields, which result in the absorption of signal energy and reduce the efficiency of the receiver tremendously.

Note these unusual advantages in assembly and operation

1. Compactness. The coils do not require spacing or angular mounting. They occupy less space than your condensers.
2. Permit exact nullification for tube and stray capacity without guesswork or tedious testing.
3. Closed magnetic field eliminates magnetic feed-back in tuned radio frequency amplifiers.
4. Low distributed capacity, due to air spacing of each winding and to low voltage-drop per turn of small diameter wire.
5. Maximum coupling and high ratio of voltage increase due to concentrated field with zero leakage.
6. Absence of all supporting insulation in the field of the coil. This is one of the greatest loss factors in the ordinary circuit and is not remedied by "skeleton" or so-called "low-loss" windings.
7. Ease of neutralizing oscillation due to tube capacity by means of rotating control, which anyone can "balance."
8. Low capacity between primary and secondary, affording maximum transfer of energy to succeeding grid circuit.

The Toro-Tran has a lower "circuit resistance" (i.e., effective resistance as assembled in a set and not as isolated in the laboratory for theoretical measurements) than any inter-stage tuned transformer made and has a correspondingly higher amplification factor, its ratio exceeding ten.

To appreciate the many remarkable advantages of the Toro-Tran, write for our two free booklets: "The Torodyne Circuit" and "The Most Interesting Radio Frequency Transformer Ever Invented."

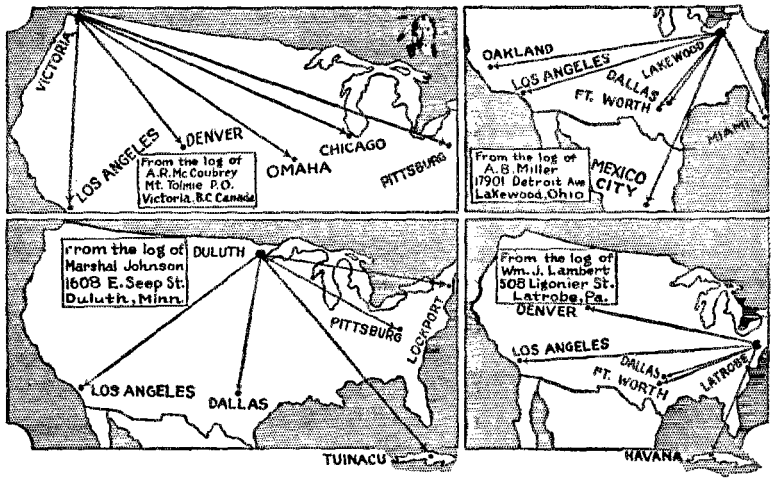
Toro-Trans are ready to mount in any tuned radio frequency circuit. Replace your ordinary coils with Toro-Trans. You will be astonished with the results. Most .00035 mfd. variable condensers will tune them, but by using Cardwell Condensers you get maximum efficiency.

Order from your dealer or direct

CARDWELL TORO-TRAN WITH BALANCING POTENTIODON	$ 4.00
Cardwell .00035 Condenser for tuning	4.75
Cardwell .00035 Vernier Condenser	6.25
Cardwell .00035 Dual Condenser (two-in-one)	8.00
Cardwell .00035 Triple Condenser (three-in-one)	12.00
Cardwell Audio-Trans (compound audio transformers)	10.00

The Allen D. Cardwell Manufacturing Corp.
81 Prospect Street, Brooklyn, N. Y.

Through the Locals ALL-AMAX Reaches Out



Every ALL-AMAX Set, wherever it may be, brings to its owner his choice of all the beauties in the air. Every day come more and more letters to our office telling of the almost unbelievable long distance reception which has rewarded the owners of ALL-AMAX.

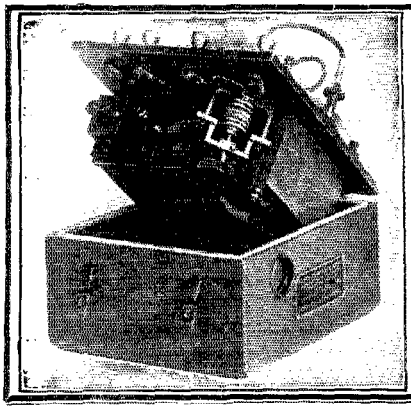
Remember, too, that ALL-AMAX is completely mounted on panel and baseboard. Simple photographic instructions make wiring easy.

ALL-AMAX SENIOR, three tubes and detector . . . . . Price, $42.00
ALL-AMAX JUNIOR, one tube and detector . . . . . Price, $22.00

ALL-AMERICAN RADIO CORP., E. N. RAULAND, President, 2642 Coyne St., Chicago

MEMBER RMA

ALL-AMERICAN



RADIO SPARK TRANSMITTERS (75 WATT, PORTABLE)

Made for U. S. Army Aeroplanes

This is a tuned spark coil transmitter, with a wave length of 100-300 meters. The set is made of the finest of materials and the essential parts are the spiral tuning inductance, the induction coil, sending condenser and spark gap. Can easily be converted into spark gap. Can easily be converted into spark coil CW set. Brand new, in original cartons.

ORIGINAL GOVERMENT COST, $47 EACH

OUR PRICE $5.75 EACH

AMERICAN SALES COMPANY
21 Warren Street **New York City**

DURHAM
Grid Leaks

Used by Eagle, Howard, Thompson, Zenith and others. Fit all sets. Sold on guarantee.

50c *Metallized* Fixed Leaks 18 sizes; under ¼ meg., 75c; over ¼ meg., 50c.

Glass Sealed Variable Leaks 3 sizes fit all sets; 75c each for 1/10, 5 and 10 megs. **75c**

At dealers or postpaid

DURHAM & COMPANY, Inc.
1936 Market Street • Philadelphia, Pa.

PATENTS

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MUNN & CO.

PATENT ATTORNEYS

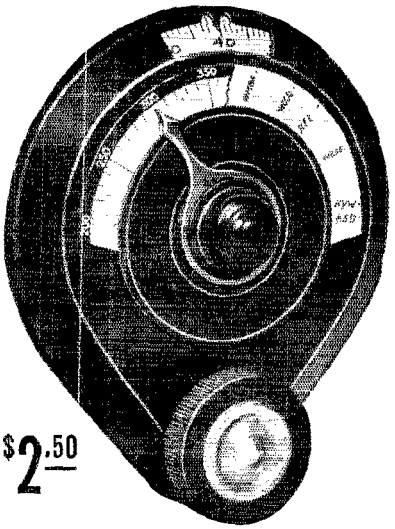
Associated since 1846 with the Scientific American

840 Woolworth Building, *New York City*
521 Scientific American Bldg., *Washington, D.C.*
410 Tower Building, *Chicago, Ill.*
363 Hobart Building, *San Francisco, Cal.*
218 Van Nuys Building, *Los Angeles, Cal.*

Books and Information on Patents and Trade Marks by Request.

A New B-T Product

A "Better Tuning" Control



$2.50

Exclusive features fully protected by patents pending

Hairline Control, Easy Action, Simple Mounting.

Knob, Dial and Pointer rotate in the same direction with a reasonable tuning ratio.

No side strain or pull on shaft to wear out bearings or destroy alignment of your condenser or coil.

Reads 0 to 100 or 100 to 0,—settling the argument as to "clockwise" or "anti-clockwise" instruments.

Registers dial numbers, wave lengths, or call letters.

Improves the tuning as well as appearance of any set.

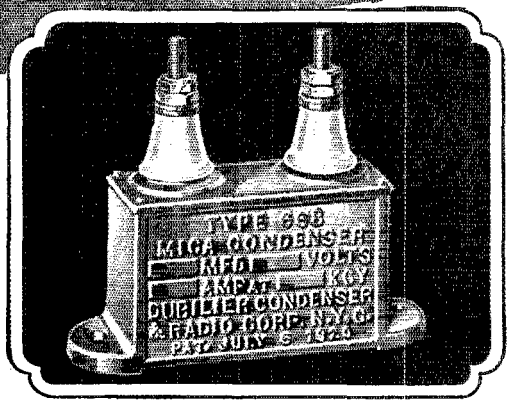
The new Tuning Control is distinctively a B-T product. It is of the same sensible design and careful construction that has characterized radio parts bearing the B-T name.

You should know about the *new B-T Socket.* Send your name and address for circulars on this and other new B-T developments.

Bremer-Tully Mfg. Co.

532 S. Canal Street **Chicago, Ill.**

amateur transmitting condenser



For amateur transmitting stations—the Dubilier Condenser No. 668. It may be used as a series antenna condenser; a plate blocking condenser or a grid coupling condenser in tube transmitters of 500 watts or lower.

Capacity .0001 to .075 Mfd. operating voltage 1000 to 3000 volts continuous at a current of 5 amperes—radio frequency of 750 to 1000 kilocycles.

Dubilier

CONDENSER AND RADIO CORPORATION

Music Master *Resonant Wood Insures Natural Tone Quality*

Connect Music Master in place of headphones. No batteries. No adjustments.

Prices of all models slightly higher in Canada.

Music Master Makes any good set BETTER

Music Master transforms mere radio reproduction into artistic re-creation. Mere assertion? No! Plain fact—because:

THE piano's sound board, the violin and 'cello, and Music Master's amplifying bell are all of wood—because wood produces *natural* tones.

Heavy cast aluminum eliminates over-vibration, develops sound without distortion and imparts a *unique* tonal brilliance.

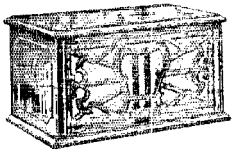
This balance of resonant wood and non-resonant metal preserves, reproduces and re-creates the natural qualities of instrument and voice—and makes

Music Master the Supreme *Musical Instrument of Radio*, for which there IS no substitute.

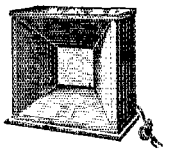
Buy Music Master and be safe—buy Music Master and improve your set—buy Music Master and exchange mere radio receiving for the artistic enjoyment of radio re-creation.

Model VI, 14" Wood Bell $30

Model VII, 21" Wood Bell $35



Model VIII, Mahogany Cabinet with *full-floating* Wood Bell $35



Model V, Metal Cabinet, Mahogany Finish, Wood Bell $18

Music Master Corporation

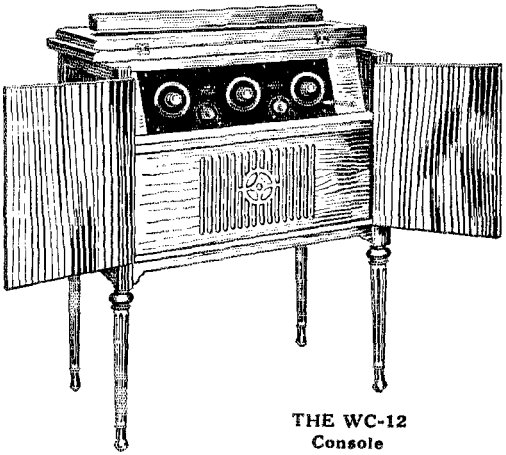
Makers and Distributors of High-Grade Radio Apparatus

Tenth and Cherry Streets

Chicago PHILADELPHIA *Pittsburgh*

Canadian Factory: Kitchener, Ontario

Music RADIO Master REPRODUCER



THE WC-12
Console

"Average Reception"
That's What Counts

It's the way distant stations come in on "average nights"—yes, even on "bad nights" that determines the value of the set you buy. It's *not* its performance on *ideal* nights.
The Radiodyne surprises even the expert with its amazing selectivity—its exceptional tone clarity and unusual volume. The Radiodyne is not a prima donna that suffers from temperment.

A Few
RADIODYNE
Type WC-12 Features

Tunes Sharply Thru
Local Stations
Uses 6 Dry Cell Tubes
Receives from Great Distances
Has Wonderful Volume
Exceptional Clarity
Batteries self contained in beautiful two-toned Mahogany Cabinet

Models Priced from $65 to $250

Everyone a Radiodyne **Everyone Worth the Money**

Write for Booklet

WESTERN COIL and ELECTRICAL CO.

305 Fifth Street, Racine, Wisconsin

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

WL Radiodyne

"The Voice of the Nation"

Popularity
of Summer Radio Is Increasing

The use of Kellogg transformers in your set will prove a delight in clear, powerful reception.

Kellogg radio frequency transformers are of the low loss, high efficiency type. No "dope" to hold windings in place. Minimum amount of insulating material. No. 603 for selective tuning. No. 602 when exceptional selectivity is not desired.

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Individually Fused Sockets Insure your Tubes
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Single or any multiple
At Your Dealers or
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WE REPAIR ALL STANDARD MAKES OF TUBES **$1.50**

U.V. 202 Repaired. $3.00. All tubes guaranteed to do the work

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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.

.....1925

American Radio Relay League,
Hartford, Conn.

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

.....

.....

.....

Station call, if any .....

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

Radio Clubs of which a member .....

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

..... Thanks?

HAM-ADS

IMPORTANT NOTICE! NEW RATES ADVANCED CLOSING DATE

Effective with May QST, the HAM-AD Advertising Rates are TEN CENTS A WORD. Name and address to be counted, each initial counting as one word. These rates are shown on QST Rate Card No. 6, in force with the May issue.

The closing date for HAM-ADS is now THE TWENTY-FIFTH OF THE SECOND MONTH PRECEDING DATE OF ISSUE. For example, all HAM-ADS for the June issue must be in this office not later than April 25.

Hereafter no HAM-AD will be accorded any particular or special position.

Rates for the QRA Section remain the same; 50c straight. See heading of that section for details.

THORDARSON 650 VOLT POWER-FILAMENT TRANSFORMERS $6.90. CURTIS-GRIFFITH, FORT WORTH.

In addition to our regular stock of Radio motor generator sets we have on hand at all times new and slightly used motors and generators in all sizes. Write us for prices on anything you are in the market for both alternating and direct current. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

INTENSIVE SPEED PRACTICE TESTED AND FOUND FB. SPEED INCREASED FROM 25 to 35 PER IN TWO EVENINGS. If interested ask for information. Dodge Radio Shortkut, Mamaroneck, N. Y.

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.

WRITE US ABOUT NEW "S" TUBE DELIVERY. STATE RADIO CO., 286 COLUMBIA RD., DORCHESTER, MASS.

WHY BUY DRY B BATTERIES TO THROW AWAY WHEN THEY ARE USED UP. AN EDISON ELEMENT STORAGE B WILL GIVE REAL SATISFACTION AND LAST A LIFETIME. EASILY RECHARGED AND ELECTRICALLY INDESTRUCTIBLE, THE MOST POPULAR SIZE, 100 VOLT UNIT COMPLETE WITH LID, HARD RUBBER FRONT PANEL, SERIES-PARALLEL SWITCH, SEALING OIL, AND FULL STRENGTH CHEMICAL ELECTROLYTE, SECURELY PACKED IN WOOD BOX FOR SHIPMENT, $12.00 EACH. 50 VOLT UNIT $6.75. KNOCKED DOWN 100 VOLT UNIT, $10.75. INCLUDES TYPE A DRILLED ELEMENTS, OAK RACK, CONTAINERS, PURE NICKEL WIRE, PERFORATED SEPARATORS, FULL STRENGTH CHEMICALS, SEALING OIL, HARD RUBBER FRONT PANEL, SWITCH, BINDING POSTS, ETC. QUANTITY PRODUCTION EXPLAINS THESE LOW PRICES. LARGEST SIZE LIVE TYPE A ELEMENTS 5c PER PAIR DRILLED. WIRED WITH NO. 18 SOLID PURE NICKEL WIRE, 7c. ¾x6" HEAVY GLASS TUBES 8c. 1x6" 4c. NO. 18 SOLID PURE NICKEL WIRE 1½c PER FT. NO. 20, 1c PER FT. PERFORATED SEPARATORS 1/8c. 78 CELL RACK (100 VOLTS) $1.95. A FEW 100 VOLT EDISON ELEMENT STORAGE B BATTERIES FOR SALE USING 5 G ELEMENTS, 3000 MILLI-AMPERE CAPACITY IN 1x6" CONTAINERS, $15.00 COMPLETE WHILE THEY LAST. PRICES ARE F. O. B. PHILADELPHIA. WRITE FOR COMPLETE LIST. J. ZIED, 530 CALLOWHILL ST., PHILADELPHIA, PA.

Bargains in Cardwell, General Radio, Dubilier, Daven, EIS, RCA, Phenix, Freshman, Precise, Hammarlund, and other high class apparatus. R. P. Barrows, Columbia Road, Portland, Maine.

WOW! Regular $50 Crosley Tirdyne sets for $37.50. Send $10 with order. Henry Garsombke, 778-28 Ave., Milwaukee, Wis.

REMBLER, GIBLIN and DeForest coils, new, mounted, only few left as follows: — 100-150-200-300-400-500-600 turns half list price. Postage extra. Geo. Schulz, Calumet, Mich.

9AEL selling out. Real bargains. Mail card for list.

HAMS!! Two tube Reflex set $18.00 UL1008 Oscillation Transformer, $9.00, key $1.50, Radio Power filament transformer $6.00. General Radio wave meter, $8.50; all brand new. James Crummy, Glenshaw, Pa.

Sell—500 volt motor generator $40. Other transmitting parts. Grebe CR8 with RORK amplifier $65. Excellent condition. Archie Schultz, Clarkson, Nebraska.

FOR SALE — Remler Detector Panel, $2.50; Murdock Oscillation Transformer, $2.50; Loose coupler, 3000 meter, $10.00; Lead-in Wall insulator, $1.00; Spark gap, $1.00. Two inch spark coil, $8.00; Plate glass condenser, $1.00; 32 volt ¾ kilowatt imperial direct current generator and switchboard, $50. Herbert Gettert, Muscatine, Iowa.

SELL—New Tresco 170-25000 meter tuner and detector for $50 or trade for 10 watter apparatus. Omnigraph with 15 dials, buzzer, and key $15. 8DSF, Fairgrove, Mich.

CARDWELL 5 to 1 AUDIO TRANSFORMERS $4.00. CURTIS-GRIFFITH, FORT WORTH.

Introducing the Arn receptacle for baseless tubes. Does not contain any metal, 75c complete. A. Mallins, 89 Webster Ave., Brooklyn, N. Y.

MASTER CODE IN FIFTEEN MINUTES — 10 WORD SPEED in three hours. These world records made by our students. New 1924 Honor Roll tells code learning story as reported by TWO HUNDRED students all now licensed; some in each radio district; copy free on request; method $2.50; kills hesitation; Dodge Radio Shortkut, Mamaroneck, N. Y.

Sell — two "S" Tubes, one 0-500 milliameter, one 0-15 AC voltmeter, one 0-5 Antenna meter. All Jewell instruments and brand new. One Radio Corporation OT. three fifty watt tube sockets. This apparatus goes to highest bidder. No trades. John Cain, Jr., Cain-Sloan Co., Nashville, Tenn.

FOR SALE — 9EIT — COMPLETE STATION CHEAP. 20 WATT TRANS. T. S. NICHOLS, 500 SOUTH FIFTH STREET, MOBERLY, MO.

MY TRANSMITTER complete for $90. Motor generator, Field Rheostat, practically new. Write for list. P. T. Perdue, Salem, Va.

Tube Repair Machinery, complete outfit, including very efficient high frequency bombardment outfit. Priced very low. Will also give buyer the benefit of our experience in tube repair and manufacture. E. F. Raab Electric. 918 Elm Street. Toledo, Ohio.

Twenty dollars buys set of fifteen Giblin-Remler Coils, Triple Coil Mounting, Series-Parallel Switch, two General Radio Variable Condensers. C. H. Brown, Edgewood Arsenal, Edgewood, Md.

Robbins and Myers and Esco R. Battery Charging motor generator sets motor 220 V. 2 and 3 phase generators 175 Volts 1 amp. $20.00 each with single phase motors $30.00 each. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

BARGAINS—New Apparatus: 3 M-4 Magnavoxes, $12 each. Magnavox TRF-5 set, $65; Day-Fan OEM-7, $65; Crosley 51, $14; Crosley 52, $24. Horace R. Brokaw, Neshanic Station, New Jersey.

Bargain! Brand new Precise multiformer, $15. J. H. Walker, Jr., 1000 San Antonio St., Los Angeles, Calif.

ROICE 5-WATT DX BABY $3.00. CURTIS-GRIFFITH, FORT WORTH.

AMRAD NO. 2796 LIGHTNING SWITCHES. Mounted on 5½ in. porcelain posts. Post-paid $1.50. State Radio Co., 286 Columbia Rd., Dorchester, Mass.

MAY I call your attention to a Grebe CR9 for $39., CR5, $21., RORK two stage $19.50. A. Fada 160 at $51, and plenty of fifty volt meters at $65. Everything absolutely good. All offers considered. Money order, check or stamps. John Richards, 351 Belleview Blvd., Steubenville, Ohio.

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.

Wavemeters Range 20 to 95 meters and 80 to 220 meters with curve $8.50. State which. Let us calibrate your meter; it only costs you ten cents per point minimum of ten points plus postage. Guaranteed accurate within 1%. We build 'em like Qst wants 'em. Willard McCulla, 9CR, Waukegan, Ill.

ARE YOU AMBITIOUS TO BECOME ORS—ASK FOR LATEST HONOR ROLL—Read reports from many students who by little effort won that certificate of proficiency. Method $2.50. Kills hesitation. Dodge Radio Shortkut, Mamaroneck, N. Y.

SHORT WAVE TUNER—1ZE has a short wave tuner built by Schnell. Guaranteed perfect and will percolate down to 25 meters and up to one hundred and fifty. First fifteen dollars takes it—less tubes. Irving Vermilya, Mattapoisett, Mass.

TRANSMITTING AND RECEIVING ACCESSORIES. PYREX GLASS SOCKETS $1.35. SEND FOR COMPLETE LIST. J. F. DAVIDSON, 6CEK, BOX 216, KINGMAN, ARIZONA.

CROSLEY 2-step audio with two tubes $12. Three circuit set (1 tube) $10. Carl Sipe, Somerset, Pa.

FOR SALE—2 Demonstrator Baldwin Speakers, $17.00 each; 2 New Weston Voltmeters; other apparatus cheap. Kenneth Jones, London Mills, Ill.

Robbins-Myers 500 V., 100 watt, 110 V., 60 cycle MG., new, $30.00. Might trade. 5APT, Pawnee, Okla.

NAVY TYPE CW 936 TRANSMITTER AND RECEIVER COMPLETE. CAN BE USED FOR BROADCASTING. INCLUDES RECEIVING AND TRANSMITTING CABINETS, POWER AMPLIFIER, LOUD SPEAKER, TWO GENERATORS, SWITCHBOARD, REMOTE CONTROL BOX, PHONES. ANTENNA SWITCH AND TWO PHONE TRANSMITTER. MADE BY WESTERN ELECTRIC. SACRIFICE. GENUINE. GUARANTEED. MACKSOUD RADIO LAB., 84 WASHINGTON ST., NEW YORK.

For Sale—Long Wave Honey-comb Receiver with Det. Amplifier. Many Other Bargains. Write for Prices. E. Stone, Houghton, Mich.

AND STILL THEY COME—Complete 30-200 Meter Transmitter, equipped with Jewell & Weston Meters; RCA, Dubilier & Cardwell Condensors; Tubes; 200 Watt Acme Transformer; etc. DX RECORD BREAKER. Picture & Information solicited—$70.00. UV203's $18; 35-225 Meter Wavemeters—Guaranteed within 1% $7; UV216's $4.50; Acme 2Mfd 750V. Filter Condensors $2.50; Murdock Quick Changeover Switch $2.50; PT537 $5. Other MONEY SAVING values. 3BOV—S. Strobel, 3923 N. 6th St., Phila., Pa.

RADIO CALL PINS, u9FZ.

SUPERHETERODYNE parts for I.E. Model C.7 complete, also one Jewell Wavemeter 200-600 with buzzer new. Will consider a good Neutrodyne Receiver in exchange; what have you? Address H. C. Petzwal, 1111½ 19th Street, Sacramento, California.

SELL COMPLETE TEN WATTER CW. AND PHONE KENOTRON RECTIFIER, WAVEMETER, RCA TRANSFORMER. SYKA, 739 FORWARD AVE., PITTSBURGH, PENN.

PRECISION WAVEMETER type 224, 75-23,500 meters, as good as new. Has been in a laboratory about one year. Will let it go at sacrifice price of $110.00. Earl Swain, 4047 N. Capitol Ave., Indianapolis, Ind.

LOOK! While they last and brand new. Crosley Trirdyne Special and 5 tube Standardyne. List $60. Price $52.50. Mastertone guaranteed tubes, $2. Try the new Majestic Speaker at $18. Smaller size $8. Niagara Radio Lab., Box 536, Lockport, N. Y.

NO LOSS PRICES—WIRE NO. 12 ENAMELED SOLID COPPER $6.75 PER THOUSAND FEET—75c PER HUNDRED. FOR THAT RECTIFIER 99% ALUMINUM PER SQUARE FOOT 85c; CHEMICAL PURE LEAD PER SQUARE FOOT 85c. HAVE PLENTY OF 4000-1A "S" TUBES AT $10 EACH. SPECIAL "S" TUBE SOCKET $1.25. ROICE 5-WATT DX BOTTLE $3.00; ROICE 201A's $2.00; HARP 201A's—THIS IS A GUARANTEED BARGAIN OM—$1.59. JEWELL METERS, ANY RANGE—MILLIAMMETER $6.95—VOLTMETER AC $6.95. CARDWELL LOLOSS .00025 $3.85—AND DON'T FORGET THE CARDWELL TRANSFORMER AT $4.00 IS AS GOOD AS THE CONDENSER. FOR A MORE COMPLETE LIST OF "NO LOSS PRICES" WRITE FOR "THE HAM LIST." CURTIS-GRIFFITH RADIO, 5AQC—5RV, 1109 EIGHTH AVENUE, FORT WORTH, TEXAS.

200-20,000 METER receiver including radiotron $25.00; two step amplifier $18.00. Smith, 4416 Market, Philadelphia, Pa.

CODE MADE EASY and interesting. Alphabet in 15 minutes. Original. New Rhythmic Memory system. Copyright, $1.00. Cheques $1.10. Dept. Q, Kwikkode, 724 Beresford Ave., Winnipeg, Man., Canada.

SPOKEN ESPERANTO FOR BEGINNERS—Class textbook, 92 p.—56c. 2, $1.00. Norman Frost, 12 Ash Place, Cambridge, 38, Mass.

9AP SELLING OUT. Write for list.

HAMS: Wear your call letters in SOLID GOLD on a miniature 50 watt tube! A RADIO CALL PIN on your coat lapel identifies you as a regular operator. $2.50 p.p. 9FZ, R. G. Ballard, 1522 W. Sunnyside Ave., Chicago, Ill.

MONEY REFUNDED AFTER THREE DAYS TRIAL IF NOT SATISFIED. GENUINE ELECTRON TUBES. TYPE 201 A-199-200. PRICE $1.10, PARCEL POST PREPAID. CASH WITH ORDER. MACKSOUD RADIO LAB., 84 WASHINGTON ST., NEW YORK.

Every radio amateur who builds his own set wants engraved on the panel his name, trademark, dial markings, etc. You can do it for him if you own a Rapid Engraving Machine and make several dollars an hour doing it, part or whole time. Free particulars. Be first to own one and coin money. Write to-day. Branch Tool Co., Dept. J., Forestdale, R. I.

ESPERANTO! Learn Esperanto and communicate with Radio Fans all over the world. Our free sample lesson contains over hundred illustrations and demonstrates how easily this language can be learned. Send for it now. Benson School of Esperanto, Inc., 20 Mercer St., Newark, N. J.

WHAT'S IN A NAME? PLENTY. WHEN IT IS "THE FORT WORTH RADIO SUPPLY COMPANY." IT MEANS SERVICE; ALL ORDERS SHIPPED THE SAME DAY THEY REACH US. HONESTY; OUR STOCK EMBRACES ONLY THOSE TESTED AND APPROVED HAM PARTS THAT YOU SEE IN THE BEST TRANSMITTERS. EXPERIENCE; FIVE YEARS OF MERCHANDISING FULLY EQUIPS US TO GIVE YOU WHAT YOU EXPECT FOR YOUR MONEY, AND LAST BUT NOT LEAST, A TRUE REGARD FOR THE FRIENDSHIP AND PATRONAGE OF THE WORLD WIDE AMATEUR TRANSMITTER. WHAT DO YOU THINK OF THIS LINE UP? JEWELL METERS, AMRAD S TUBES, RADIOTRON FIVE AND FIFTY WATT TUBES, AND SOCKETS, SEVENTEEN FIFTY VOLT TEST FILTER CONDENSERS, .002 MIKE PLATE AND GRID CONDENSERS, LARGE AND SMALL GRID LEAKS, ACME PLATE, POWER, AND FILAMENT TRANSFORMERS, CARDWELL, GENERAL RADIO AND KEMLER VARIABLE CONDENSERS. OHIO BRASS INSULATORS AND NUMBER TWELVE ENAMELED ANTENNA WIRE.

ALLEN BRADLEY RADIOSTATS, FORMICA TUBING AND PANELS, CHEMICALLY PURE SHEET ALUMINUM, AND SHEET LEAD, AND LOTS OF OTHER ITEMS, TOO NUMEROUS TO MENTION. WHEN YOU THINK OF RADIO, WRITE THE ONLY HAM STORE IN THE FIFTH DISTRICT, AND BE ENTIRELY SATISFIED. FORT WORTH RADIO SUPPLY COMPANY, 104 EAST TENTH ST., FORT WORTH, TEXAS.

IF YOUR NEUT'S GOING BACK ON YOU—Rebuild it to this Kladag Coast to Coast Circuit, using same old panel, almost same parts, but no Nightmare of Neutralization. Twenty-two feet of gold sheathed wire, with only extra part and simple, complete instructions $5.00, prepaid anywhere. Nothing more to buy. Over a thousand "converted" Neuts are daily bringing in clean resonant volume from Coast To Coast. Details—10c. 48 page meaty catalog of PARTS ONLY—10c. KLADAG RADIO LABORATORIES, KENT, OHIO.

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnigraph Mfg. Co., 13M Hudson St., New York.

MAKE $120 WEEKLY IN SPARE TIME. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. OZARKA, 853 Washington Blvd., Chicago.

STORAGE "B" batteries at dry cell prices. Purchase a rechargeable "HAWLEY" storage "B" battery. Non-sulphating or buckling of plates, which means clearer enjoyable reception with unlimited life. Sold in complete knock-down units which requires no former experience to put together. These units contain everything for the actual construction of battery such as large size tested Edison elements, special molded flat bottom glass cells (not ordinary test tubes), punched insulating fibre board for support of cells, pure, annealed solid nickel wire Rubber stoppers, perforated hard rubber separators, full strength chemical electrolyte. With all orders there is included free an 8 page illustrated folder showing simple putting together making of charger and chargings. Prices of units as above—22 volt $2.95; 45 volt $5.75; 90 volt $8.95; 100 volt $9.95; 120 volt $11.60; 135 volt $12.75. 150 volt $13.90; 200 volt $17.50. Special voltage units put up at no increase in price. Complete sample cell, 35c prepaid. Complete non-heating "B" battery charger $2.75. Extra special 100 volt whitewood cabinet at $2.75 only. Also "A" batteries at attractive prices. Order direct or write for my literature, 30 days' trial offer and guarantee. Orders shipped same day received. No waiting. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

WHILE THEY LAST—Reinartz's original short wave articles in September, October and November numbers of Amateur Radio. Sent postpaid for 50 cents or free with a subscription $2.00. Executive Radio Council. 136 Liberty St., New York, N. Y.

MOTORS—New G.E. ¼HP $12.50 ½ HP $28.50 1 HP $45. GENERATORS Radio Transmission 500V $28.50 Battery Chargers—Farm Lighting generators all sizes. Lathes, Drill Presses, Air Pumps other Garage and Shop equipment. Wholesale Prices. New Catalog. MOTOR SPECIALTIES Co., Crafton, Penna.

B STORAGE POWER WITHOUT A HUM, RIPPLE OR RATTLE AT LOWEST PRICES EVER OFFERED FOR ASSEMBLED AND WIRED UNITS USING GENUINE LIFETIME EDISON ELEMENTS. 22 VOLT UNIT, $2.95. 45 VOLT UNIT, $5.00. 100 VOLT UNIT, $9.50. 135 VOLT UNIT, $12.25. SPECIFICATIONS: OAK RACK, HEAVY FLAT BOTTOM CONTAINERS, TYPE A ELEMENTS, PERFORATED SEPARATORS, PURE NICKEL WIRE, HARD RUBBER PANEL, CLIP TO VARY DETECTOR VOLTAGE, POTASH AND SEALING OIL. NOTHING EXTRA TO BUY. HOOK ON YOUR CHARGER AS SOON AS YOU GET IT AND THROW AWAY YOUR DRY Bs. YOUR MONEY BACK IF NOT SATISFIED. SPECIAL COMBINATION OFFER: 78 PAIR TYPE A ELEMENTS (DRILLED), 78 ¾ x 6" CONTAINERS, 78 SEPARATORS AND 60 FT. NO. 20 PURE NICKEL WIRE, $5.95 F. O. B. PHILA. DO U NEED A TRANSMITTING STORAGE BATTERY? LET ME QUOTE. ANYTHING AND EVERYTHING FOR THAT EDISON ELEMENT STORAGE B. J. ZIED, 530 CALLOWHILL ST., PHILADELPHIA, PA.

Complete Transmitter for sale. Phone or code. Four new tubes furnished. Kenotron rectified. Compact, portable, panel mounted. Factory parts. High class throughout. Parts cost $180. Make an offer. Gerst—2674 West 25th Street, Cleveland, Ohio.

For sale, two brand new UV 203 fifty watters at $23.00 each, also two used about five hours each $19.00 each, one used about fifty hours at $12.00. Want 1500 volt meter. Willard McCulla, 9CR, Waukegan, Ill.

CUT PRICES ON NEW APPARATUS. RADIOTRONS—receiving $2.55, 202's $7.45. Write me for prices on anything you want. Jim Lisk, 902 South Elizabeth, Lima, Ohio.

TESTED GALENA CRYSTALS 50c pound bulk. Buskett, Chemist, Joplin, Mo.

SELL—GREBE CR-3A, $25.00. O. Luhring, Hampton, Iowa.

Edgewise wound copper ribbon the only really satisfactory antenna inductance .350" wide; 3¼" diameter, 10c a turn; 4¼" outside diam. 13c turn; 5¼" outside diameter 15c turn; 6¼" outside diameter 17c turn; 7¼" outside diameter 20c turn, prepaid any number turns in one piece; Geo. Schulz, Calumet, Mich.

TRUE TONE HARP 201A TUBES $1.59. 5AQC-KFRO-5RV, FORT WORTH.

WANTED VIBROPLEX FORBES 2227 PINE, EVERETT, WASHINGTON.

DID YOU KNOW THE CODE BUT SOMEHOW FAIL TO PASS? Latest Honor Roll with reports from many Previous Failures who quickly and easily obtained Amateur License mailed on request. Method $2.50, Kills Hesitation. Dodge Radio Shortkut, Mamaroneck, N. Y.

Generators, new, rated at 275v, 120 watts but will give output up to 500 volts, $8. UC1831 Condensors, $2. UC1015, $2. Vt14 tubes $1. Vt1, $5. Vt2, $5.50. 3amp. chokes $1. R. Wood, 38 Way Ave., Corona, N. Y.

For sale or trade—DeForest D7 Reflex. Western Electric 518W horn, Crosley 3B. Want Fifty Watt stuff. Elmer Lawton, Plymouth, Ill.

LEFAX READERS. Special Sheets to fit your Binders. No charge. R. P. Barrows, Columbia Road, Portland, Maine.

IN THE GOOD OLD SUMMER TIME. THAT'S THE TIME TO PUT UP THAT GO-GETTING AERIAL. HAVE GOT THE NEW PYREX INSULATORS ON HAND. BROADCAST SIZE, 45c, TRANSMITTING SIZE, 7¼", $1.50, 12¼", $3.50. PYREX STAND-OFF INSULATORS, 3", $2.75. 7", $3.00. 12", $8.00. REMEMBER, NOTHING TAKES THE PLACE OF GLASS FOR OUTDOOR INSULATION. GROUND SWITCHES. 100 AMPERE, 5" BREAK. $3.15. PORCELAIN PEDESTALS FOR SAME, 80c PAIR. O.B. GLAZED PORCELAIN INSULATORS, 5", 75c. 10", $1.50. NO. 12 "DYNEX" SOLID COPPER ENAMELED WIRE 1c FT. 500', $4.75. "DYNEX" HOOPS FOR THAT CAGE. 8", $2.50. 18", $3.00. 30", $3.50. DYNEX KEM RECTIFIER ELEMENTS. 1" x 4", 6c EACH. 1" x 6", 7c EACH. 1½" x 6", 8c EACH. 1/16" LEAD & ALUMINUM 90c SQ. FT. PYREX-GAROD SOCKETS, $1.50. CARDWELL TRANSMITTING CONDENSERS, $15.00. ALLEN-BRADLEY RADIOSTATS, $6.50, TYPE 210, FOR 10 WATTERS, $4.00. "S" TUBES WITH SOCKETS $10. MERSHON CONDENSERS $8.00. NO. 16 D.C.C. MAGNET WIRE, 75c LB. NO. 16 COTENAMEL 75c LB. "DYNEX FOR DX." E. J. NICHOLSON, 8BIN, (THE EIGHT THAT PAYS THE FREIGHT) 1407 FIRST NORTH ST., SYRACUSE, N. Y.

BUILD YOUR OWN FULL WAVE B ELIMINATOR from our unmounted parts. Kit $12.50. With cabinet and panel add $2.50. With two special A tubes add $3.00. Transformer 220v center tap secondary and six volt filament winding $5.00. 50 henry choke $4.00. Two Mfd salvaged condensers 75c each. THE RADIO CLUB INC. LaPorte, Ind.

Motor Generator Bargains. Robbins and Myers 110 V. 60 cycle single phase generator 500 Volts 200 Watts $45.00. Esco motor 220 V. 60 cycle 3 phase 1750 R.P.M. Generator 400 Volts 100 Watts $25.00. General Electric Motor 110 V. 60 Cycle single phase Generator 750 V. 400 Watt $60.00. Esco motor 220 V. 60 cycles single phase A. C. generator 500 Volts 200 Watts, $40.00. Esco motor 220 V. Direct Current Generator 500 V. 200 Watts $35.00. 1000 V. 400 Watt 1750 R.P.M. Generators only $60.00. 750 Volt 200 W. 3400 R.P.M. Generator only $30.00. All above machines are ring oiled and prices include field rheostat. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

WRITE FOR SPECIAL AMATEUR DISCOUNT. STATE RADIO COMPANY, 286 COLUMBIA RD., DORCHESTER, MASS.

FOR SALE: 1 15 watt transmitter complete, $100. Radio Corporation and Acme stuff. 5 watters. "S" tubes, meters and all. Kenton E. Quint, Orono, Maine.

PURE ALUMINUM and lead rectifier elements, holes drilled, with brass screws and nuts per pair 1/16", 1" x 4", 13c, 1 x 6, 15c, 1¼ x 6, 17c, 1½ x 6, 19c, single elements half price. Sheet aluminum 1/16", $1.00, 1/8", $1.90. Lead $1.00 square foot all prepaid. Geo. Schulz, Calumet, Michigan.

Navy Dynamotors manufactured General Electric 24/1500 volt .233 ampere 6000 R.P.M. 750 volt tap. Ball bearings. Triple commutator. Very pure DC 672,000 commutations per minute. Original boxes $45. Limited number slightly used guaranteed perfect $25.00. Adapted for belt drive $3.00 additional. Pulleys with endless belt for any speed driving motor at cost. IDEAL FOR 32 VOLT PLANTS. MOST SATISFACTORY RESULTS BELT DRIVEN. VERY QUIET IN OPERATION. HUNDREDS now perking. Operate on 6 volts generating 300-400 volts, 12-700-800, etc., Crocker-Wheeler 24/1500 volts 450 watts 6500 R.P.M. 100 segments $45.00 Slightly used $35.00. Holtzer-Cabot 12/500 .07 ampere $18. Navy Flame Proof Keys with Blinker Light $2.00 Prepaid. Henry Kienzle, 501 East 84 Street, New York.

Sell transmitter, "S" Tubes, Plate transformer. Donald McDonald, Waseca, Minnesota.

ARE YOU ANCHORED AT 10-15 PER — ON REQUEST WILL MAIL LATEST HONOR ROLL WITH REPORTS FROM MANY OLD METHOD KEY AND BUZZER HAMS WHO IN A FEW HOURS DOUBLED SPEED. METHOD $2.50. KILLS HESITATION. Dodge Radio Shortkut, Mamaroneck, N. Y.

BARGAINS NAVY receiving tubes, $1.00. Storage Batteries 6 volts 80 amperes, $4.00—120 amperes, $5.50 Edison B Batteries, 50 volts $5.75. Hoffman Electric Co., 824 North Fifth St., Philadelphia, Pennsylvania.

EDISON ELEMENTS LARGE SIZE WITH STAMPED ON CONNECTOR 5c PER PAIR. ALL OTHER PARTS CARRIED IN STOCK. 300 AMPERE HOUR EDISON A BATTERIES PERFECT CONDITION $45.00. GET PRICE LIST. ROMCO BATTERY CO., 146 WEST 68TH, NEW YORK CITY.

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BEST CASH OFFER takes Zenith, 1R, 2M. 9BR, 2712 Milwaukee Ave., Chicago.

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FOR SALE: UV203 Tube, $15.00. UV203A Tube used about 30 hours, $25.00, 5-UC490 Filter Condensers, $1.75 each. Baldwin "G" phones $8.00. Baldwin "C" Unit $4.00, 12 honeycomb coils and mounting $10.00, 2-WE hand microphones $3.50 each, Stevens "Favorite" .22 rifle $5.00, Navy coupler, $5.00. 9AFU, Robbins Foster, 909 Hayes Ave., Racine, Wis.

TRADE—100 Watt transmitter for Diamond or what? Harry Malwitz, Brillion, Wisconsin.

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Telefunken 30 Watt Power Tubes on hand for immediate delivery. Fil. 10 volts 2 amp. Plate 1000 volts .07 amp. Extra large elements, excellent for short wave transmission, $16.50. Arthur Beyer, 106 Morningside Drive, New York City.

UC 1831 Radio Corp. 4000v. variable transmitting cond. with dial. Postpaid, $2.00. STATE RADIO CO., 286 Columbia Road, Dorchester, Mass.

BARGAIN: Stahl Sink. Perfect condition, cost $60, sell $35. 1 BOQ.

FOR SALE — 2 Demonstrator Baldwin Speakers, $17.00 each; 2 New Weston Voltmeters; other apparatus cheap. Kenneth Jones, London Mills, Ill.

Will sell or exchange receiving apparatus guaranteed perfect condition for transmitting junk. Write for list. Irwin C. Kodar, 825 East 161 St., Bronx, N. Y.

For Trade:—We have twenty Cameras or Kodaks to trade for Radio Sets or Parts Rexford De Tompkins, Ottawa, Ill.

AMATEUR RADIO EXCLUSIVELY. WE SPECIALIZE ON BUILDING AND SUPPLYING HAM EQUIPMENT. SUCH LINES AS CARDWELL, ACME, ESCO MOTOR GENERATORS. THORDARSON PLATE TRANSFORMERS. PYREX SOCKETS AND INSULATORS. POWER TUBES. ANY TYPE, GOOD METERS THAT DO NOT COST MUCH ARE JEWELL. A HIGHER GRADE METER AT A LITTLE HIGHER PRICE, WESTON. WE BUILD PRACTICALLY ANYTHING THAT IS "HAM RADIO." TRANSMITTERS OF NEARLY ANY TYPE. WAVEMETERS TO KEEP CHECK ON THE OUTFIT AND KEEP THE INSPECTOR "FROM THE DOOR." IF PLANNING TO REBUILD GET OUR ESTIMATE. WE CAN BUILD AT PRACTICALLY THE SAME PRICE IT WILL COST YOU TO DO IT. THE SHORT WAVE RECEIVER USED HERE GETS DOWN TO 10 METERS AND THE PRICE IS RIGHT. WE ALSO CHANGE OVER ANY TYPE RECEIVER TO USE THIS CIRCUIT OR BUILD THIS SET FOR YOU IF YOU HAVE THE PARTS. "YOU NEED ONLY ONE PAIR OF HANDS ON THIS SET." DON'T FORGET A GOOD INDUCTANCE COUNTS ON SHORT WAVES. WE MAKE THEM FOR ANY TYPE OF SET OR CIRCUIT FOR TRANSMITTING. FOR MICKS, SPEECH AMPLIFIERS, POWER UNITS, "S" TUBES AND UNITS, NEARLY ANYTHING IN THE HAM LINE DROP US A LINE. "IF IT'S HAM LET'S HAVE THE PROBLEM." SEND US YOUR INQUIRIES. ESTIMATES GLADLY GIVEN. QSO. THOS. ENSALL (ENSALL RADIO LAB.,) 1208 GRANDVIEW AVE., WARREN. OHIO.

EQUIPMENT, like new, prepaid. Jewell Meters, 1, 2.5, 5, 10 Thermocouple, each $6.50; 50, 300, 500 Milliameters, $4.50. 15, A.C. Voltmeter $4.50; 50, 1000 D.C. Voltmeter, $4.50 and $.50; 1, 5, D.C. Ammeter $4.50. Weston Meters, 3 Thermocouple $8.50, 100, 200 Milliameters, $8.50. 12, 15, D. C. Voltmeter $8.50, 1 D.C. Ammeter $8.50. Tubes—UV203A, $22.50, 203, $15.00, 50 Watt special $15.00, UV201A, $2.00, UV200, $2.00. Transformers, UP1016, $15.00, UP1368, $12.00, UP1658, $5.00, Acme 300 watt $12.00, 2, 1636 Reactors, $3.00. Advance Sync Rectifier, $20.00, 250 Watt, 1000 Volt New Motor Generator, Westinghouse, $58.00. Grebe CR-13, $44.50. Radiola VI for Super $20.00. Dynamotor 12—350 DC volts worth $50. Sell $15. Shortwave receiver two tubes worth $50. Sell $18. $8.50 N and K Phones, sell $4.25, .0005 Acme Vernier $2.50, GE det. and two step $12. .00035 Remlers new style, $3.50. Set $12.00 All American Push Pull Transformers, $6.00. New WE Pancake Speaker, $20.00. Harold Quick, 8COI, 349 W. Colvin, Syracuse, N. Y.

SALE — PRACTICALLY NEW 500 VOLT WESTINGHOUSE M-G. WRITE FOR PARTICULARS. 6CQT.

WHO WANTS Paragon RA10 and DA2 at seventy-five dollars. Clifford Hamill, 176 Highland St., Port Chester, New York.

$305 Westinghouse 20-Watt V.T. Transmitter, Model T.F. New, includes four 5 watt Radiotron vacuum tubes, one desk microphone, one telegraph key and 100-watt motorgenerator unit. With $112 DeForest Honey Comb receiving set, detector and two step amplifier with 10 volt Edison storage battery. All absolutely new. $447 worth of equipment. All for $235. Reason for selling compelled to discontinue game. All letters answered. Coca Cola Bottling Co., Beeville, Texas.

EDISON B BATTERY SUPPLIES. LARGEST SIZE TYPE A ELEMENTS 4c A PAIR, DRILLED 5c A PAIR, WIRED IN PAIRS 8c. PURE NICKEL WIRE 1c A FOOT. PERFORATED RUBBER SEPARATORS FOR BATTERIES 1/3c EACH OR CUT YOUR OWN SEPARATORS FROM SHEETS 5 3/16 x 5⅞" 3c A SHEET. CHEMICALS FOR 5 LBS. BATTERY SOLUTION, ENOUGH FOR 100 VOLTS 75c. EDISON 300 AMPERE HOUR A BATTERIES IN PERFECT CONDITION $58. ALL ARTICLES POSTPAID. SEND REMITTANCE WITH ORDER. BERNARD STOTT, 60 PALLISTER AVENUE, DETROIT, MICH.

Generators, ball-bearing 30v input, output 300v $8. W. Electric, 151 East 108, N. Y.

BARGAINS—ALL AMERICAN SUPERHETERODYNE TRANSFORMERS. TYPES R-120, R-110, $4.30 each. Frank Johnston, Wing, Illinois.

GREAT SUMMER FOR DX HOUNDS—LOW WAVES, DAYLIGHT WORK, KNOCK QRN. GET 9ALD'S "HAMALOG" AND PICK OUT WHAT YOU NEED. A new antenna of course, of No. 12 enameled, only 75c per 100' or $6.90 per 1000'. No. 14 enameled 55c per 100' or $5.00 per 1000'; 1/16" x 3/8" edgewise wound copper strip for inductances, 6" diameter 12c per turn, 4" 10c per turn, excellent inductance clips 20c; Real transformer iron, cut any size, 11c per pound plus small cutting charge; 9ALD RENTS OMNIGRAPHS. SEND FOR THE DOPE; RADIOSTATS FOR PRIMARY FILAMENT CONTROL, $6.50, E-210 BRADLEYSTAT FOR 5 OR 10 WATT SET, $4.00. Bargains, real keys, 1/8" removable silver contacts, $2.25; 5 watt grid leaks $1.10, 50 watt $1.65; 284-W microphones $3.75; UC-490 1 mfd 1750 volt filter condensers $2.50. Look—2mfd 3000 volt filter condensers $5.50; JUST GOT LOTS OF UC-1831 VARIABLE MICA CONDENSERS, $9.00 VALUE, ALMOST GIVEN AWAY AT OUR NEW PRICE, ONLY $1.80, GET SEVERAL! Have you tried 9ALD on an order yet? Join the rest of them, get your stuff from a real ham house. The HAMALOG is waiting for you free. E. F. JOHNSON, 9ALD, Waseca, Minn.

MOTORS $2.98, Good, Practical, twentieth horsepower, 115 volt alternating-direct current. ORDER NOW. PAY POSTMAN. Perry Trading Company, Dept. T6, 815 Lake, Racine, Wis.

FOR A SUMMER RADIO: A NOISELESS SILENT B THAT TAKES CARE OF ITSELF HOWEVER LONG THE VACATION. ELECTRICALLY WELDED FOR ABSOLUTE QUIET. SIZE FOR EVERY SET. 54 VOLTS $8.25. 100 VOLTS $15.00. 130 VOLTS $18.75. 150 VOLTS $21.50. COVERED CABINET OF WAX FINISHED FUMED OAK. RUBBER MAT. LARGEST LIVE EDISON ELEMENTS ELECTRICALLY WELDED TO PURE SOLID NICKEL CONNECTORS. GENUINE EDISON ELECTROLYTE (THAT'S NO LYE). PACKED TO REACH YOU SAFELY. SINGLE CELLS 15c FOR THAT BIG SET YOU NEED A B TO MATCH ITS APPETITE. A 2,000 MILIAMP HOUR DOUBLE CAPACITY B IN HEAVY FLAT BOTTOMED GLASS JARS. 105 VOLTS $24.00. SINGLE CELLS 17c PARTS, 19c READY TO WIRE, 24c ASSEMBLED (WELDED CELLS) 21c CONNECTORS WELDED ON. DISCOUNTS 500 VOLTS UP. 3ML PARTS TO MAKE A REAL B. LARGEST PEPPY EDISON ELEMENTS PAIR 5c, DRILLED 6c, WELDED TO PURE SOLID NICKEL 7¼c. G ELEMENTS 3c PAIR, 2 POSITIVES 1 NEGATIVE 4c. 1500 MILIAMP HOUR G CELLS 15c PARTS, 17c READY TO WIRE. 22c WELDED AND ASSEMBLED. 3000 MILIAMP HOUR SUPERCELL FOR THE MAN-EATING SUPERHETS 27c CELL PARTS READY TO WIRE, 33c WELDED AND ASSEMBLED. ANNEALED GLASS TEST TUBES INDIVIDUALLY WRAPPED ¾ x 6" 3c, 1 x 6" 4c. SHOCKPROOF ⅛" THICK HEAVY GLASS JARS, FLAT BOTTOMED 1 x 6" 4c, 1¼ x 6½" 5c. PUREST SOLID (NOT PLATED OR ALLOY) SOFT NICKEL .032 WIRE 1c FT. .034 1¼c FT. PERFORATED HARD RUBBER SEPARATORS ⅓c EACH. NOTHING BUT REAL EDISON ELECTROLYTE (CHEMICALLY CORRECT COMBINATION OF LITHIUM AND POTASSIUM) WILL ENABLE YOU TO REALIZE THE FULL CAPACITY OF YOUR EDISON ELEMENTS. $1.25 TO MAKE 5 LBS. SOLUTION. DON'T STARVE IT. CHARGE IT—WITH A WILLARD COLLOID RECTIFIER 50 VOLT SIZE $2. JUMBO $3. 100 VOLT FULL WAVE COLLOID $4, JUMBO SIZE $6. HANDLES 100 VOLT B ALL IN ONE BITE. UTILIZES BOTH HALVES OF CYCLE. HIVOLTAGE TUNGAR CHARGER SHEET 50c. EVERYTHING FOR THAT EDISON. B. FRANK MURPHY, 8ML, 4837 ROCKWOOD ROAD, CLEVELAND, OHIO.

THE SERVICES OF A REGULAR RADIO FACTORY ARE AT YOUR SERVICE DURING THE SLACK RADIO SEASON. WE ARE NOT BCLs BUT KNOW THE AMATEUR GAME AND CAN BUILD HONEST TO GOODNESS EXPERIMENTERS APPARATUS. CALIBRATE OR BUILD WAVE METERS, OR BUILD AND DESIGN MOST ANYTHING ELSE YOU WANT. OUR FACILITIES INCLUDE FULL MACHINE SHOP EQUIPMENT AND ENGRAVING MACHINES. OUR SUPERINTENDENT IS A SWISS WATCHMAKER AND KNOWS RADIO AND HOW TO MAKE THEM. WE ARE DEALERS IN BAKELITE AND CAN GIVE YOU LOWEST PRICES ON THAT SPECIAL TRANSMITTING PANEL DRILLED AND ENGRAVED. ALWAYS GLAD TO ESTIMATE. ADDRESS CLENDINNING RADIO PRODUCTS, INC., 78 WATTS STREET, NEW YORK CITY.

Our set of calibrated Radio Laboratory Apparatus is indispensable to the constructive radio amateur. With this set of fully mounted instruments is furnished a Five Lesson course in Scientific laboratory operation that will enable any "Ham" to measure Radiation, Test Tubes, Calculate resistances, and balance heretofore unmanageable circuits. Price $3.90. Send $1.00 with order to Delta Instrument Company, 923 South 24th St., Fort Smith, Arkansas.

FOR SALE—General Electric United States Army Air Service, double current generators and dynamotors. 12 volt. battery drive—550 volt output, each equipped with a Dubilier filter system, $20.00 each. Westinghouse Navy Dynamotors, 30 volt drive—400 volt output $20.00. All generators guaranteed new. United States Navy Submarine chaser, Western Electric Type, CW936 transmitters and receivers, complete with tubes, wired for CW—ICW—phone—outfit is brand new—first check for $225 takes it. Navy battleship receivers, type CN240—1000-10,000 meters, bargain, $30.00. Western Electric power tubes ¼ KW type "I". Same tube is used in their broadcasting stations, $115.00. Their 50 watters, $32. General Electric Type 203A 50 watters, at $32. General Electric Type UV204A—250 watt tubes $110. United States Army Signal Corps short wave receivers, with built-in tube socket, range—50-225 meters, brand new, $75. These were built by the Marconi Company of America. Signal Corps precision heterodyne wave meters built by General Radio Company special $40. 1 Esco Motor Generator—motor 60 cycle, single phase 110-220 volts—generator 1400 volts—500 watts equipped with 200 watt winding for filament excitation—will sacrifice guaranteed in perfect condition, $130. Western Electric Navy 5 watt "E" tubes, $7.00. "J" receiving tubes $6.50. 1 Grebe type CR13 short wave receiver brand new, never used, will sacrifice. Cost me $95, will sell $48. Arthur Faske, 1515 Eastern Parkway, Brooklyn, N. Y.

OM—After traffic any time. Don't say QSR? Just QRV? and the old pencil will be grabbed. Not afraid to talk either! Rag-chewing just as long as the rag lasts. Nobody too close! The man who doesn't know anything but CQ can have the DX. QRA in QRA section. QTC? QRV om u1OX—1DQ k. Member RCC.

Q R A SECTION

50c straight, with copy in following form only: CALL—NAME—ADDRESS. Any other form takes regular HAM-AD rates.

9FZ, R. C. Ballard, 1522 W. Sunnyside Ave., Chicago, Illinois.

1KP— F. C. Beekley, West Suffield, Conn. (half way between Hartford, Conn., and Springfield, Mass.)

6APD—Chandler Brownell, 862 East 6th Street, Pomona, Calif.

1AAO—H. Hewitt Cooley, 460 Ward St., Newton Center Mass.

1ASN—A. L. Budlong, Glastonbury, Ct., address at Head quarters: 1DQ, J. M. Clayton, ditto; 1OX, L. W. Hatry, ditto, 1XAQ, 1OA, S. Kruse, ditto.

2API, Harold B. Churchill, Rumson Road, Little Silver, New Jersey.

9EQ. O. Luhring, Hampton, Iowa.

9 CUK. Edwin S. Elliott, 1320 Olive Street, St. Joseph, Mo.

9 BCN William Shirley, 710 East 5th St., Northfield Minnesota.

9 CXE Earl Koester, 6th and Prairie Sts., Northfield Minnesota.

8 DTO, C. H. WESSER, ALPENA, MICH.

8-CRM W. O. Gassett, 472 East Cecil St., Springfield, Ohio.

2IY—C. R. HORNBY, 31 BELMONT AVE., JERSEY CITY, N. J.

1 ABR—D. N. Craige, South Walpole, Mass.

8 A C B short wave transmitter at 8 C V A. H. J. Kuhlman, R. R. 16, Dayton, Ohio.

2XAA—Watson P. Dutton, Route 58, Box 30, Schenectady, N. Y.

G5LB—H. Cyril Foster, Hornby Castle, Lancaster, England. Would welcome reports or QSL cards.

8CKS—Carl Kope, 2097 Lincoln Ave., Lakewood, Ohio.

2KS—James L. Murray, 290½ South 20th St., Newark, N. J.

1ABM—H. M. Suss, 126 Warren St., Brighton, Mass.

1SL—D. S. Boyden, 72 Gardner St., Allston, Mass.

2MS—Paul Hoffman, 23 Lindhurst Place, Rockville Center, N. Y.

2JL W. A. Cohen, 126 Woolsey St., Astoria, Long Island, N. Y.

9CVC A. Palmer Baker, 1865 Fairmount Ave., St. Paul, Minnesota

2KG—John T. Guymon, 2382 Chauncey St., Astoria, Long Island, N. Y.

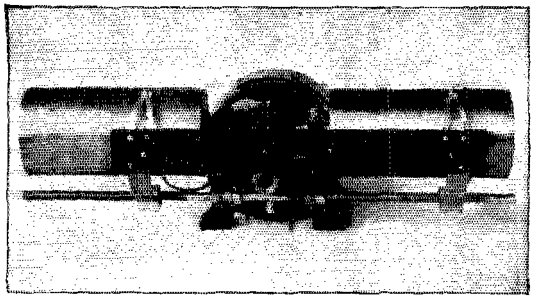
2LF, Fred J. Gutberlet, 1916 Grove St., Brooklyn, N. Y.

—FOR YOUR CONVENIENCE—

QST'S INDEX OF ADVERTISERS

IN THIS ISSUE

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS



PICTURES and WRITING by RADIO

Are you a brass-pounder, and find it getting just a bit stale; and would you like to take up something new in radio?

Or if you don't know code, wouldn't you like to be able to undertake the latest development, namely, writing and pictures by radio?

Watching the message or picture build up as it comes in out of the air is mysterious and fascinating.

The machines are simple, and easily understood, and they are not high priced.

Then there are the cash prizes every sixty days for the best suggestions. Somebody gets this money, why not you?

Send for illustrated description of the machines, and announcement of cash prize offer.

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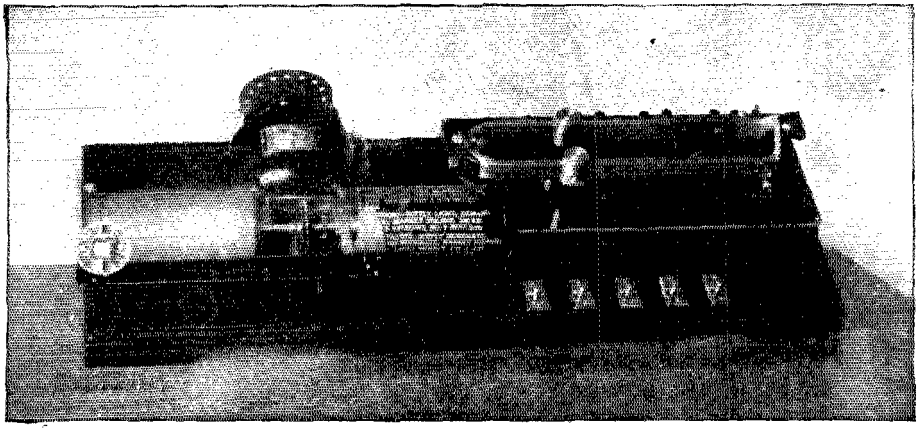
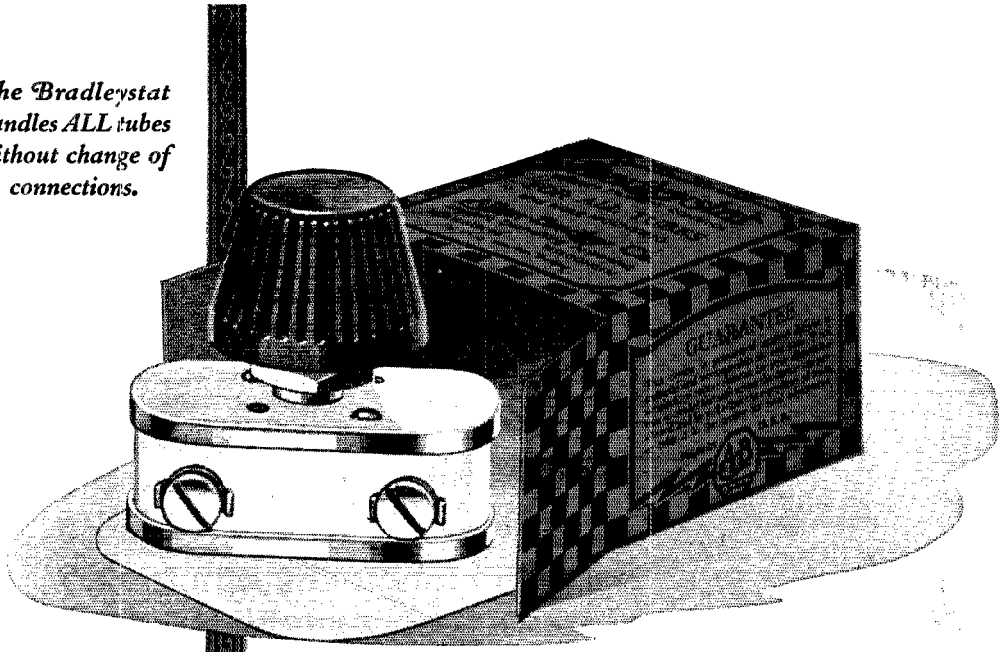


The Bradleystat handles ALL tubes without change of connections.



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PERFECT FILAMENT CONTROL

Two columns of graphite discs provide stepless, noiseless control.

Range of control is from ¼ to 100 ohms, sufficient for all tubes without change of connections.

One-hole mounting for panels. Table mounting for baseboards.

Extremely compact. Easily substituted for wire rheostats.

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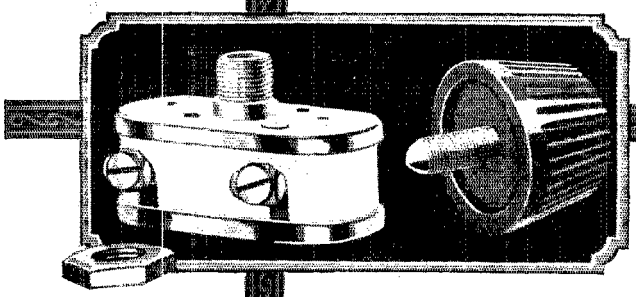
In Canada, $2.50

There are many rheostats —but only one Bradleystat

The smooth, noiseless, stepless control of the Bradleystat is the outstanding characteristic that places this remarkable filament rheostat in the front rank of perfect radio devices. Many attempts have been made to duplicate Bradleystat performance by using substitutes for the scientifically-treated graphite discs, but without success.

It is not strange that the Bradleystat maintains its supremacy among radio rheostats! It was developed by engineers who have designed graphite disc rheostats for over twenty years. Have you improved your set with Bradleystats? Try one, tonight.



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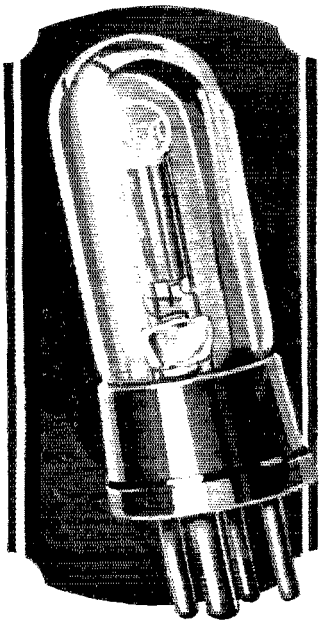
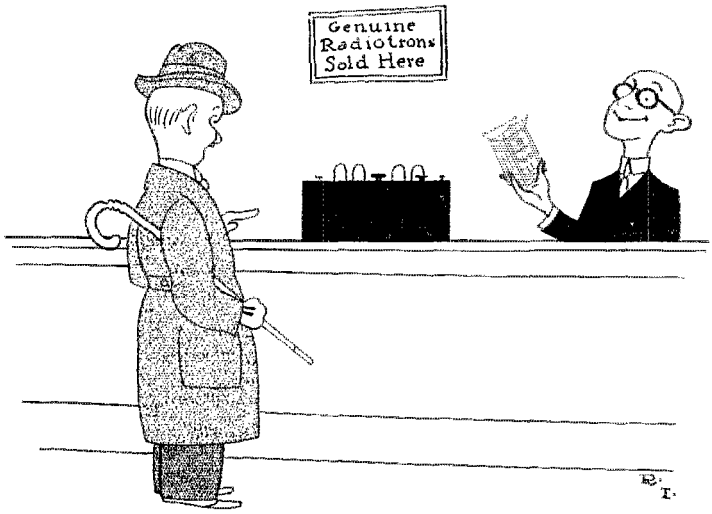


WD-11

WD-12
UV-199
UV-200
UV-201-a

Radiotrons with these model numbers are only genuine when they bear the name Radiotron and the RCA mark.



Do you believe in Names?

Do you buy things by name because the name tells the quality? Do you ask for a RADIOTRON, instead of just a "vacuum tube"—demand the standard by the name that marks it as genuine?

The most important part of a radio set is the tube, and you can't get the best out of any set without putting the best tubes into it. There's a Radiotron for every use, in every kind of set. Look for the name—and the RCA mark—and be sure it is *genuine.*

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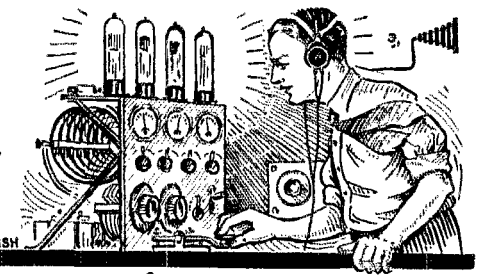


An Efficient Radio Relay Station

By John Hynes, 9BXV

THE first requirement of a good relay station is a capable operator. Without a good operator the best station is worse than nothing. The operator must know the code and customs of traffic handling very well, and must be skilled in the operation of the apparatus at his station. If this is possible, several operators should be connected with the station, so that the station may be in operation at all times.

The next requirement is a good, very reliable receiver. A reliable receiver must be had, even at the expense of some range. The receiver must be easy to tune and have a minimum of controls. The settings at which certain reliable stations are heard should be marked, so that when a message for a particular state is heard, the operator will know where to tune to find a good station in that state. Not more than one stage of audio amplification is needed on a receiver built for traffic handling. If you can't copy a man with one step don't handle traffic with him. It's too risky.

Requirement number three is an efficient, very reliable transmitter. The transmitter should be of fairly high power, fifty watts or more. Remember this station is built first for traffic handling. A five-watter is good for hamming around the country, and seeing how far you can work with low power, but it is not good enough for a station which makes a business of handling traffic, as you have to call too long and results are not sure enough. Someone will speak of remarkable results accomplished by one or two five-watters. Certainly, but this is the exception rather than the rule and I feel safe in saying that messages will be handled more swiftly and surely with higher power in the great majority of cases.

The next thing, the antenna system, needs very little said about it. Be sure to have it firmly tied down, and have the counterpoise pulled up tight, as QSS does not help in handling traffic. Also, don't use some freak antenna, with which you work ten miles one night and a thousand the next. Use a high cage or flat top which is fairly large. Of course, make the resistance of the antenna as low as possible. In selecting the wave to work on, bear two things in mind; how far do you reach consistently on this wave, and how many fellows are handling traffic near this wave?

Glancing back we find the requirements for a good relay station are a good operator and reliable set. One more very important requirement; membership in the A.R.R.L and an O.R.S. certificate which is the sign of a good station and of the real ham spirit in that station dealing's with others.

We hardly agree that the antenna system needs little said about it. There are still many things we must learn about antennas. Antennas should be worked at or below their fundamental wavelength for best results. When Mr. Hynes says that the resistance should be kept low he refers to the "copper-loss" resistance and the "dielectric-loss" resistance. The "radiation-loss" resistance should be as high as possible. A good antenna should have a high ratio of energy radiated to energy dissipated in heat losses. By using an antenna series condenser or working the antenna on "harmonics" (such as one-third the wavelength or three times the natural frequency of the antenna) we can work the antenna to best advantage. Read Ballantine's chapter on "Antenna Construction." —*F. E. H.*

The Five-Point System

By Paul Fenner, 6PS

IT looks like a new kind of puzzle, doesn't it? Well, it isn't, it's a game —our amateur radio relay game.

We hear the saying, "Don't criticize unless you have something to offer in the way of construction." Here goes, criticism first. Our relaying lacks system. One night we work so-and-so in Denver; give him a few messages and maybe do not work him again for a month. Why? There are several reasons. Some fellows have a habit of playing hide-and-seek with their trans-

mitter by shifting the wavelength every day. We do not log our reception. A wavemeter is as useful in connection with our receiver as it is necessary in connection with our transmitter.

Just telling the gang to do this and that doesn't work. Give them something interesting to play with and the good will naturally and automatically supplant the evil.

Here's the game that's worth trying—and worth trying hard. It's called the "Five Point System." The idea is simple. Every A.R.R.L. station in the country arranges to work four stations, one north, one south, one east, and one west. The directions are not exact, but general. The distances are not great. They are distances a fellow can work with absolute certainty. Now, having picked four stations write and get acquainted with the four owners. Arrange schedules. The schedules should be short, a half or quarter hour each day is enough. With the twenty and forty meter channels we can work right through the broadcast period. A fellow has no excuse for not keeping his schedule. In an hour one can call four stations, clear traffic, and be free to work other groups of "five pointers" or to do as one likes.

By referring to the sketch the idea may be seen at a glance. Five stars work together, five circles, five A's, and so on, all over the country. In some cases there may be no interlock such as the west B station working central B, and the east A station working central A.

With this system a fellow must use his clock, his wavemeter, and his log. Stations will improve by competition. Only the best relayers and amateurs will be able to keep up. If one station misses schedules his fellow "five pointers" will drop him and get someone more reliable.

Don't forget to write in and tell how the system works, fellows. Your suggestions are always welcome.

How did Fred Schnell work f8AB? He did it by arranging a schedule. The time of the schedule was fixed in advance. The wavelength to be used was known to both Schnell and Deloy.

Summer is with us again. It isn't quite as easy to sit down and make distance records as it was last January. We like to get out in the open more. But we can still spend some time at the old set. We can turn in a good report for *QST* now just as well as we did last winter. Perhaps we like to experiment. Whatever we do, let's use system.

Let's handle some traffic this summer and handle it in a way that will reflect pride to our station and the League. Don't make it necessary to mail so many messages to their destination. Arrange some schedules as 6PS has suggested. Use your clock and your wavemeter just as Schnell did, just as all commercial stations do. Send messages slowly and methodically. When a message is acknowledged as correct you can be conscious of a good job, well done. By using schedules the traffic can be handled in a quarter of the usual time. Less time will be spent in calling and listening. Interference will be reduced. We want a lot of short-jump relay routes of absolute reliability. Don't be satisfied with having just a daily schedule. Scratch around and get some traffic for that schedule. Make sure that *your* station originates its share of traffic and start only GOOD traffic.

Another advantage of handling traffic on schedule is evident when we consider how the assignment of different amateur wavelengths has divided us. Usually stations on forty meters work forty meter stations only; eighty meter stations work only stations on the eighty meter band. By arranging schedules and doing business in a business-like way with an accurate wavemeter and a clock we will be able to make full use of ALL our wavebands.

O.R.S. give this a try. Headquarters urges that you make use of this scheme. It may be altered to meet local conditions as seems necessary. O.R.S. are leaders in relaying. Even if you think the arranging of schedules is not going to improve present conditions, at least give it a try. If this doesn't look interesting send us something better. —*T. M.*

THE Brass Pounders' League has grown considerably. The high station this month was a station having two operators. Last month this station was at the bottom of the list of "Brass Pounders." 8GZ by consistent traffic handling has forged ahead and is now in first place.

A study of the stations represented in the Brass Pounders' League for May and June quickly shows just who we may put down as being in line for the Traffic Department Trophy. 8BYN has risen from fifth to first place. 5XA and 9DTK have slipped a bit but are with us still. Only four stations stayed in the League for two consecutive months.

It would not seem surprising to us at Headquarters if one of these stations finally won the prize. Some other stations by a spurt of work seem to get in the honor position but the consistent operators will come into their own after this sort of competition has been killed off as we are sure that it will be during the summer months.

All stations having 150 messages or more to their credit *must* send them to their Division Manager for counting. With a valuable Trophy in sight for consistent station operators we must know WHO is after the Trophy and keep an accurate count of messages. Division Managers will examine the messages to see that they

were handled in good form and to make sure that none stayed on the hook more than forty-eight hours.

Division Managers are instructed to check all reports of message handling in excess of 150 messages. We hope to be able to announce a new source of traffic next month. From now on we expect to see some real competition between three or four operators working for the Traffic Department Trophy.

Mr. H. C. Storck—8BYN
Columbus, Ohio
Central Division
492 Messages

There is still opportunity for everyone to enter the contest. It's really just begun in earnest. Every station has equal opportunity. The Brass Pounders' League members will be notified how they stand each month.

Let's show that our stations are doing consistent work by getting in the Brass Pounders' League and staying there. Don't forget to send your messages to your Division Manager if you wish to be listed among the Brass Pounders. The fellows who start some good messages will go far toward becoming honored members of the Brass Pounders' League and they will be on the road to successfully competing for the Traffic Department Trophy.

On another page of *QST* you will find information regarding the summer short wavelength tests that the A.R.R.L. is arranging. All members of the Traffic Department are expected to enter the tests and to use their short wave transmitters and receivers to bring glory to themselves and credit to the Traffic Department. Get your stations ready gang! Who will be reported first in Europe using the five meter band? Who will be the most consistent station on twenty meters? Everyone can enter the free for all period of the tests with a transmitter. Who will turn in the best report of reception on the different wavelength bands used for the tests? Remember that the information must be as complete as possible on each station heard. A report will be judged on the quality of the information contained in it as well as on the number of stations heard. Members of the Traffic Department are charged with the duty of representing America in the tests. Amateurs of every country where there are amateurs will take part in these tests. If everyone does his part in the tests information of positive value in advancing the knowledge of short wave communication will be obtained. The tests are of international interest. Let's do OUR part.

BRASS POUNDERS' LEAGUE

Call	Messages	Call	Messages
*8GZ	521	4FM	195
*8BYN	492	9DCX	194
6CSO	317	2AGQ	180
9XI	301	4DM	180
6CHS	276	8CYI	179
*9DTK	254	*5XA	178
9SR	241	9SE	176
9AVJ	226	9BOB	170
9VN	203	2AHK	170
6ANO	203	9CPM	168
6BLH	202	9CXL	167
9ST	202	3BLP	162
9BPN	201	1BCC	151

*Stations in the Brass Pounders' League Last Month.

ATLANTIC DIVISION
E. B. Duvall, Mgr.

ALTHOUGH messages are being handled in small lots, keen interest is evidenced by the reports from the different Traffic Department Officials. Most of the traffic was handled on forty meters.

The D.M. is still checking his file of O.R.S. The D.M. wants a postal card from every active O.R.S. in the division. Give the number of your certificate, the date it was issued, your call, name, and present address. State whether you are actively engaged in traffic handling or expect to be before next winter. Certificates of stations not responding to our repeated requests for information will be cancelled in wholesale fashion.

New certificates for District Superintendents and City Managers have been mailed to all active officials. Those who have not received one may get it by writing for it.

The D.M. wants to make forty meter schedules with all officials of the division.

DELAWARE — Layton reports two new transmitting amateurs. All stations are listening for NRRL. 3BSS burned out his last tube. 3WJ has been doing fine work using AC on the plates of his two five watters. 3AUN is using a self-rectifying circuit, but is unable to operate more than once a week. 3SL is moving. He expects to install a gas engine driving a generator to supply the power at the new address. 3SL reports that traffic is being handled on our upper waveband. The A.D.M. and 3BSS are looking for fifty watt tubes.

MARYLAND—3OU operates on forty meters. He works West Coast stations easily. 3PA and 3BUR continue their usual good work.

All Maryland district No. 4 stations are on short waves. 3KU and 3APV are using the twenty meter band with success. 3BML wants an O.R.S. appointment and should get in touch with the A.D.M. 3DW is on forty meters and has copied NRRL several times. He wants to keep summer schedules with traffic officials throughout the Atlantic Division. 3TF has been heard in Australia. 3MF continues to be reported by European listeners. 3BMO uses the eighty meter band. 3AHA has taken unto himself an OW. 3AJD has moved. 3CGC burned out both tubes. 3AEA has "junked" the motor generator set. He is using A.C. and doing well. 3FS is rebuilding. 3LG and 3TE-3XAQ report QRN heavy. 3AAM was heard in England using a 160 meter wavelength. 3QI does good work on this wavelength. 3AOJ has so'd his 100 watt transmitter. 3LL has installed a motor generator set. 3PH, 3WF and 3DQ continue to use 160 meters.

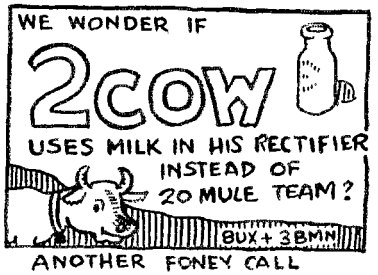
Traffic: 3OU, 27; 3LG, 12; 3CGC, 2; 3BUR, 9; 3PA, 8; 3AEA, 8; 3HG, 37; 3KU, 10; 3APV, 24; 3DW, 3.

DISTRICT OF COLUMBIA — Washington, the Mecca of sight seers, receives more visiting hams throughout the year than any other city excepting Hartford. g6UZ, a live wire Britisher, left his monocle and spats in England and visited the Washington gang. He proved to be a real brother ham. 3CKG and 3ZW work on twenty and forty meters. 3ZW is also installing a transmitter to work on our uppermost wavebands. 3BPP had more antenna trouble than one fellow should have. The mercury arc as a high voltage rectifier is gaining popularity

here in Washington. 3CKG and 3AB have permanently installed this type of rectifier. 3CDQ would operate more if she knew that high voltage, like a Ford, is harmless if handled right. 3JO laments the lack of interest in low wave traffic handling. 3BWT has transmitters working on 80 and 175 meters. 3BHV vowed to stay quiet until fall. On the contrary, he makes a greater noise than ever. "WH" of 3ZW has resumed schedules with 8IJ. Visitors entertained by the Washington Radio Club are 1ANB, 8BFF, 8CFT, 8AGU, 8EU and 3EH.

Traffic: 3AB, 35; 3BWT, 54; 3BPP, 14; 3JO, 2.

SOUTHERN NEW JERSEY — Raser is making a name for himself. He is responsible for the new organization of amateurs at Trenton. An interference committee has been functioning in behalf of the amateur and BCL. (Why not make it an ARRL Vigilance Committee?—D.M.) 3XAN uses a UV204A on 78 meters. 3XM must be keeping twenty-four hour schedules. A lot of traffic certainly gets handled. Showell is handling most of the traffic for his district. 3BWJ continues to be the star station for the state. He handles traffic on twenty, forty and eighty meters. 3AS kept his "hook" clear in spite of QRN. 3BA is handling traffic on 75 meters. 3CB does fine work with one UV202.



Traffic: 3ZI, 19; 3XAN, 31; 3CBX, 18; 3XM, 77; 3BTQ, 2; 3BRM, 9; 3OQ, 23; 3BAY, 2; 3BWJ, 6; 3AIH, 19; 3WB, 8; 3BEI, 4; 3EH, 4; 3AS, 28; 3CB, 9.

EASTERN PENNSYLVANIA—A few reports came in late this month, a practise that must be discontinued to avoid delay in reports reaching Headquarters. Late reports will not be recognized hereafter.

3BNU works Mexico regularly. 8CTZ has enrolled as Radioman Second Class, U.S.N.R.F. 8AVL used four of our wavebands. He was heard in Holland in daylight. 3TS got out well on 20 meters. 3LK has a new junior operator, a YL. 3BLP kept the motor generator until hot. 3BCL did fine work with an old five watter given him by 3BNU. 3AFW is a new and a good station. 3AUV was heard in Tasmania. 8BFE reported that traffic was scarce. 8EU has a new UV211. 8CNU and 8CIR are new Billtown stations. 8AHU is interested in several YL's. 8BQ gets out well with an indoor antenna. 3BVA worked England, France, New Zealand, Mexico, Porto Rico and all U.S. and Canadian inspection districts. 3BQP has been heard in Scotland when using a "trick" antenna. A lot of them are that kind, OM. 8RT experienced interference from high tension power lines. He resorted to a loop to lessen the noise.

Traffic: 8RT, 16; 8BQP, 20; 8ABN, 18; 3ZM, 6; 3BNU, 28; 3TS, 11; 8AVL, 16; 3BLP, 162; 3CDN, 8; 3BUV, 2; 3BLC, 5; 3AVM, 3; 3AFW, 12; 3BAQ, 3; 3MQ, 9; 3TP, 19; 3UE, 25; 3AUV, 35; 3QT, 28; 3ZO, 71; 8AOL, 10; 8RMI, 2; 8BPN, 5; 8BFE, 13; 8EU, 8; 8BQ, 16; 3HD, 24; 3BPM, 20; 3BCT, 12; 3BVA, 32.

WESTERN PENNSYLVANIA — 8DOQ handled six that got through. He reports 24 hour service to 7AFQ. 8AHK is using storage battery plate supply. 8AKI is rebuilding.

8ME, 8BHX, 8CL and 8BJT are suffering from the "YL" complex. 8BJT says traffic is light. 8BW is active. He complains that Pittsburgh stations are not to be heard when he has traffic. (How about that, Pittsburgh? Can't some of you fellows cook up a schedule with him?—D.S.) He is on 81 meters. 8CDC is one of the "ops" at 3OU. 8UT uses four "fivers" on 150 meters. 8JW is one of the "ops" at 8YJ-AJ. 8CEO has been sick. The Telephone Company removed the poles to which his counterpoise was fastened, but repairs have been made and everything is ok again now. 8ARC is minus a rectifier. He operates but little, exercising consideration for his BCL neighbors. 8DNF avoids trouble with B.C.L's by observing a quiet period from 6 to 10.30 P.M. He relayed a good number of messages. 8CNW, 8CKM, 8CES, 8DLI and 8BKH use microphones with their receivers for local work.

Any stations in the counties of Alleghany, Beaver, Washington or Westmoreland are requested to write D.S. 8CEO, A. W. McAuly, 309 Third St., Oakmont, Pa.

Pittsburgh: 8JQ uses a five watter or a 201A most of the time. He continues to work the West Coast as well as Mexico and Cuba. His traffic report is FB! 8BH is a "Ham" as well as an experimenter. He has a set working on forty and eighty meters. 8AGO, Manager of the Central Region of the P.R.S. Emergency System, has been busy organizing the "gang." 8AYW lost his antenna in a windstorm. 8PX and 8AKJ are planning to work NRRL on 20 meters. 8CCK is now on 75 meters. 8AUD gets many reports on his fone! 8CBH is on regularly. 8ADS and 8DSV are doing good work on C.W. and fone. 9BJA is working in Johnstown. 8CHC operates his station. 8BYI is operating at WHBO and 8ATB.

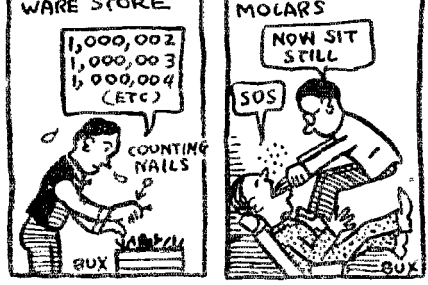
Myers was on the job on forty meters. No messages get stuck at 8BRC. 8CQL and 8CWW are on 40 meters and working the West Coast frequently. 8XC-8GU is active in the experimenters' section.

8BJV transmits on 77.5 meters. Good Pyrex insulators make a world of difference in his results. 8XBI is on Tuesday and Friday nights. 8BRM requests that stations accepting his traffic guarantee delivery or QSR. 8DKS is making an enviable record for consistency. 8DCV operates every day from 5 to 7 P.M. and from 3.30 to 7 A.M. 8ABS is QSO the West Coast regularly. 8DBL is busy planning to get down on 80 meters and will soon be QSO for traffic. His work this period has not been up to his previous record, but fierce QRN takes the life out of hams in the mountains, but the spirit is moving. Reliability is a great asset. 8BBP keeps a late schedule and shows good speed in handling traffic. 8CHC is operating station 8BJA.

Traffic: 8DOQ, 6; 8BW, 7; 8UT, 7; 8JQ, 30; 8BHJ, 19; 8AGO, 12; 8AYW, 4; 8ALE, 3; 8CCK, 8; 8ADS, 3; 8BYI, 1; 8CWW, 8; 8CQL, 13; 8BJV, 38; 8XBI, 12; 8BRM, 10; 8DKS, 17; 8DCV, 38; 8ABS, 19; 8DBL, 12; 8BBP, 6; 8BJA, 20.

WESTERN NEW YORK — Miller is on the job. 8DRJ and 8BXP used eighty meter wavelengths. 8AVJ worked on 40, 80 and 160 meters. 8APU is out of town.

Stiles has several active operators. 8CFV, 8UF and 8DDV are doing fine work and report regularly. 8LX is operating at 8BCW. He has returned from his Signal Corps Unit on a furlough. Our old A.D.M. has taken unto himself a wife. Congratulations! 8CCR has a tube "perking" on 80 meters. 8ADG has been doing good traffic handling work. 8AAD worked about a dozen foreign stations this month. 8CIS had trouble getting his big "bottle" oscillating on the higher frequencies. 8BCW usess a UV204A with 60 and 500 cycle plate supply. 8AOZ burned out his plate transformer.



Tappan reports that 8DER, 8DFK and 8AVD were the active stations in his district. Bostwick was forced to close his station for a short period on account of the pressure of studies and A.R.R.L. work. New O.R.S. at Ithaca are 8ZU, 8ADM and 8BLC. They keep noon schedules with stations East, West and South.

Young reports that 8AUH has returned from Flor-

ida. 8QM operates on 180 meters. 8VW is on nightly for traffic work. 8HJ works on any amateur wavelengths at will. He has worked every district but the sixth since March first.

Nelson's district handled a bunch of traffic. 8ALY worked every district, using forty meters. 8KS used forty meters. 8MC worked every U.S. inspection district and some foreign stations. 8DRB did some good work with a "fiver." 8CYI leads the traffic men again. 8NB worked every district on forty meters. 8BAJ is rebuilding.

Trago's district did well. 8NT used a 152 wavelength. 8CTK has changed the house wiring and now has a D.C. plate supply. 8ADE got out well with a single wire antenna. 8AWA and 8DHI poked out in great shape. 8AY and 8RV used forty meters. 8RV was heard again in New Zealand. 8BJ wrecked his transmitter. He now uses either a 500 cycle or a D.C. plate supply. 8QB spent his time on jazz and YL's. The A.D.M. appointed 8BSF, 8CTK and 8RV, Mr. John Eichmann and Prof. Benedict V. K. French as the first Vigilance Committee for Buffalo, N. Y.

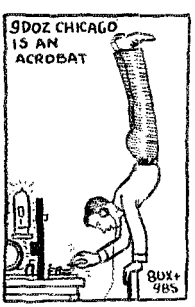
Fossberg reported five active traffic handling stations in his district. 8AXN worked everything he could hear with his big "bottle." 8DGA and 8BQA worked the west coast regularly. 8BOE worked his antenna on second and third harmonics with good results. 8BZF lost forty feet of his beautiful 100 foot mast. U.S.S. Sturgeon Bay is working "hams" and collecting information on short wave communication. Operator Lloyd will answer cards from anyone working "NITZ." He will also accept enlistments for the Naval Reserve, Tuesday night at the 174th Armory. Applicants may join at Dunkirk, Niagara Falls, Buffalo or Rochester.

Traffic: 8ADE, 11; 8ADM, 4; 8ADG, 6; 8AVD, 22; 8AVJ, 28; 8AFN, 20; 8AOY, 45; 8AWA, 10; 8AY, 16; 8AXN, 25; 8BAJ, 28; 8BGA, 16; 8BOE, 11; 8BXP, 13; 8BRD, 6; 8BZF, 5; 8CCR, 10; 8DFV, 5; 8CTK, 5; 8CYI, 179; 8DDY, 4; 8DFK, 10; 8DFR, 17; 8DGA, 5; 8DHI, 10; 8DME, 16; 8DRJ, 35; 8DSM, 11; 8HJ, 6; 8QB, 2; 8KI, 16; 8KS, 16; 8MC, 6; 8NB, 34; 8NT, 24; 8PJ, 5; 8RV, 28; 8UF, 13; 8VW, 10; 8ZU, 21; NITZ, 35; 8OX, 4.

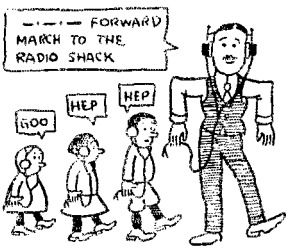
CENTRAL DIVISION
R. H. G. Mathews, Mgr.

KENTUCKY—More stations are on the job and more traffic was moved this month. 9APS, after selling his 250 watter and giving up radio, is back on the job with two "fivers." Hi! 9BNH has at last decided that a good voltmeter is cheaper than new tubes. 9RPB found no trouble in working West Coast stations with two UV 203A tubes. 9DWZ had trouble finding "fivers" that would handle 2000 volts, applied between the plate and filament. Louisville O.R.S. men had a meeting with 9ELL for the purpose of reducing QRM. 9MN and 9ELL are consolidated. They use twenty, forty, and eighty meters. 9HP is operated consistently. Several reports were received from Scotland. 9ARU is still using 150 meters. 9WU has some new tubes.

OHIO—Dist. No. 1: P. M. Barnes, 3321 Blancard, Toledo has just been appointed D. S. 8CCI has a two letter call. 8EQ. 8AA has been using twenty and forty meters with good results. 8BZQ is the active station at Van Wert. 8PU and 9ZY have dismantled their stations. 8FU seldom operates. 8BRU is using an indoor antenna. 8DND has a D.C. plate supply. Two more men on the job operating 8BGU and 8EX. 8BN is using the eighty meter band. A dozen active stations are operating in Findley. 8DHS spent the month waiting for a new mast. 8AOE is working on the lower wavelengths. 8OAE has rebuilt the entire station.



Dist. No. 3: No one has communicated over any startling distance this month. Evidently the fellows in this district have not tried twenty meter daylight transmission yet. However, some of the gang are getting ready for it. 8DRX has been doing good work on forty meters. 8BPN still leads in handling message traffic. Some of the Cleveland gang ought to give him a little competition. 8BPL is a new O.R.S. He turned in an excellent report. 8UK made a big noise with his new 250 watter. 8KC kept operating. YL's don't bother him because he's married. The Mahoning Valley gang have taken up the tweny, forty, and eighty meter wavelengths like ducks to water. We rap on wood whenever we



9AJW IS A PAPA 3 TIMES ALLREADY AND HAS SECOND OPS IN TRAINING -8UX + P.D.Q.

think of QRN. Radio work this past month has gone to the regions described in Dante's Inferno, as 8BVR has so aptly expressed it.

Dist. No. 4: 8DNQ is actively operating again. 8AYU did some daylight forty meter work. 8XAV at the University of Cincinnati, operates regularly. They have done some wonderful work. 8BFB used the forty and eight meter bands. All stations in the future who do not report regularly will lose their O.R.S. certificates.

Dist. No. 5: The D.S. tried to take the traffic honors. 8GZ, a two-man station, turned in the best report, however. 8BBH is busy with school work. 8DO is building a twenty and a forty meter transmitter. 8CBP did good work on forty meters. He is building a twenty meter set. 8PL worked the West Coast. 8GZ worked g2VW at noon, using a twenty meter wavelength and a 250 watter. 8BYN handled his League work in good shape and was heard several times in England on forty meters. The D.S. is making a McCaa Band selector. He wants to get in touch with other stations who intend to try traffic work through the summer with the aid of one of them.

Traffic: 8GZ, 521; 8RYN, 492; 8APR, 119; 8DPN, 55; 8XAV, 50; 8BFB, 43; 8AYU, 40; 8CCI, 33; 8CBP, 32; 8BPL, 31; 8BN, 30; 8BSW, 28, 8AVX, 25; 8BAU, 24; 8ANB, 20; 8DNQ, 17; 8DMX, 17; 8CTA, 16; 8PU, 16; 8DO, 15, 8DCB, 13; 8BZQ, 13; 8DRX, 12; 8PL, 10; 8KC, 8; 8UK, 8; 8TJ, 5; 8DSA, 4; 8ALW, 4; 8AA, 4. 8DKM, 3; 8BTC, 3; 8AWX, 2; 8DCF, 1.

ILLINOIS—Dist. No. 1: 9EIB is rebuilding his station. He has worked every U.S. inspection district and Mexico. 9AVH has been recommended for an O.R.S. appointment. 9BHT reports that traffic on forty meters is light. 9NQ sends in the usual report. 9AWU moved his transmitter. 9BZQ has a broken ankle which he got while vaulting at college.

Dist. No. 2: 9CTF sends in a good report and the messages to prove it. Sorry that you could make the Brass Founders' League, OM. 9DLO worked every district using an eighty meter wavelength. 9RQ worked the second, third, and fourth inspection districts using a single UV 201A tube. 9DXL worked the West Coast regularly. 9ELR lost a tube about the middle of the month. He has a new Ford car and lot's of YL's now. Joliet men are rebuilding. 9DZR suggests an Official Wavelength Band for message handling. The D.S. and A.D.M. approve the suggestion. 9ELF is moving. 9ARM is rebuilding his station. 9CA is Radio Engineer at the U.S. Veterans Hospital No. 53.

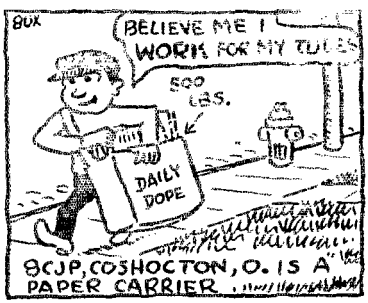
Dist. No. 3: 9MC has resigned as D.S. 9ATT is recommended as his successor. 9ATT has taken down his big antenna. Using a single wire aerial and counterpoise he seems to get out better in the daytime than at night. 9AHJ burned out his tubes. 9CSW, 9AFQ, and 9CMN mention nothing of general interest. 9CZL suffered the loss of his masts during the late storm. 9CLJ has a new 203A tube. 9BHX has dismantled his set. 9DQU is using the forty meter band. He worked New Zealand twice.

Dist. No. 5: 9BLO is rebuilding his new broadcasting station, WEBQ. 9BLO made a reputation for himself during the recent tornado. He gave the first-hand news of the disaster to the newspaper through 9AAW. The southern part of Illinois is disarranged and most everyone is doing relief work. We must have all the reports next month through, fellows. 9DQR is the active O.R.S. at Rockford. Brence reports increased activity but Waukegan amateurs complain that they cannot get traffic into Chicago. 9BBR is QSO the west coast regularly. 9CR is increasing his power. 9AGW worked both coasts using one five watter. 9DOU and 9OS have combined stations. 9ALW is rebuilding his transmitter. 9CEC is using forty and eighty meters. 9EHQ is busy with school athletic activities.

Dist. No. 7: O.R.S. certificates for 9RC and 9ZA-CD have been cancelled because of failure to report. Traffic handling in Chicago has shown a decided improvement since the contest for the cup offered by Mr. Harold Marquis of 9IX was announced. 9AIO has been busy with school work. 9DPC is moving. 9DWH worked every district with his "fiver." 9IX has arranged schedules all over the country. 9AZP worked 2AC. 9DWX handles some West Coast Traffic every night. He has been heard in New Zealand twice. 9AAW-ZW was operated by the junior operator this month. 9CFS was quarantined for a short time. 9APY is using the low wavelengths. 9QP tried the forty meter band. His not got rougher as he reduced his wavelength. 9BWP has ordered a new plate transformer. He is replacing old antenna insulators with new glass insulators. 9BNA was heard in England, France, Chile, Costa Rica, Mexico, and Canada. He had to invest in a new hat.

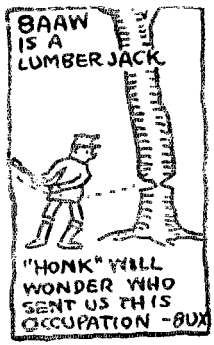
Traffic: 9VN, 203; 9IX, 191; 9CXL, 167; 9CFS, 78; 9CTF, 67; 9DLO, 62; 9AWH, 61; 9RQ, 54; 9BNA, 50; 9DWX, 42; 9DPC, 41; 9AIO, 40; 9AFE, 36; 9DQU, 35; 9BE, 34; 9APY, 31. 9AYB, 31; 9BHT, 28; 9DXL, 22; 9BBR, 22; 9EIB, 19; 9AGW, 17; 9ELR, 17; 9QD, 14; 9AAW, 14; 9PBH, 14. 9CR, 14; 9DQR, 14; 9ATT, 12; 9OS, 10; 9DZG, 10; 9CLJ, 10; 9DGA, 10; 9AWU, 9. 9CA, 9; 9AHJ, 7; 9BLO, 6; 9DZR, 6; 9AVH, 6; 9EMQ, 4; 9AFQ, 4; 9BIZ, 3; 9CSW, 3. 9CEC, 2; 9ALW, 2.

WISCONSIN—Dist. No. 1: 9DTK received little competition in traffic handling this month. 9BBY is working hard to win some prizes. 9BTK has been



operating with ex-9BEK. They worked all districts consistently. 9EHM sent in a good report. 9DB operates regularly now. 9ABZ applied for an O.R.S. appointment. 9AFZ lost two "fivers" last week. 9CII must be interested in certain YL's. 9RMV is rebuilding his station. He applied for an O.R.S. appointment. 9ATO burned out the high voltage winding of his plate transformer. 9EVL worked 4DT in daylight with a "fiver." He easily worked both coasts. 9CRA is still trying to make a tube oscillate on eighty meters. 9BKR says he is leaving YL's strictly alone. 9CAS operated consistently. 9AEE has a good wavemeter. 9NY has been using twenty and forty meter bands. 9HW spent some time in eliminating motor generator noise for neighboring B.C.L's. 9CVI arranged a schedule with 9AEK.

Dist. No. 2: 9SR used wavelengths of forty and eighty meters. 9BIB operated consistently and handled a lot of traffic. 9CWZ is working at Kenosha. 9DUJ was busy pushing a plow. 9CHE operated on both high and low wavelengths. 9OM used 76 meters for daylight work. 9AZA has planned a real "HE" set for fall. Official Relay Station reports are due on the sixteenth, City Manager reports are due on the eighteenth, and District Superintendents must report on the twentieth. 9VD will be operating an emergency transmitter tuned to 39 and 78 meters by May 15th. This replaces the 78 and 156 meter sets which have been on the job every Sunday morning since January. Our traffic must not suffer because of short wave work. Listen for 9VD Sunday mornings after May 15th. 9VD and his YL will journey through the Hudson and Atlantic Divisions from May 20th to June 4th.



Dist. No. 3: 9ALA has changed his circuit and worked some, using a 76 meter wavelength. 9AEU and 9DWH have a schedule. They exchange news for their school papers. 9DKA is a new station at Holstein. 9EMD is rebuilding. 9DCT worked nearly all districts in daylight using a forty meter wavelength. 9BVA sent in a small message report and no news whatever. 9BYJ is very busy at school. 9BYE is building a BCL tuner.

Dist. No. 4: 9DCX worked both coasts with a W.E. 216A. 9PJ and 9AB got fair results using a 200 meter wavelength. 9CVG used both forty and eighty meter wavelengths. 9BSO operated on schedule with a "B" battery plate supply. 9AZN is doing fine daylight work using a forty meter wavelength. 9AKY is another example of a good man gone wrong. Spring and a certain YL are the cause of his downfall. 9BKC was heard in England using a "fiver." 9BFI used an A. C. plate supply for one "fiver." 9AGD at Dodgeville was recently married. 9BLF tried a "bluebird fiver." It went soft; we guess that she sang too much. 9EIL has reduced the proportions of his transmitting coil to suit it to eighty meter work.

Dist. No. 5: 9ELI covered distances within the state consistently in daylight. He reached all emergency stations using a seventy-eight meter wavelength. 9DPR, Lee O. Blair, 602 Winter St., Superior, has been appointed Superintendent to succeed Bridges who resigned on account of the pressure of other duties.

Traffic: 9DTK, 254; 9SR, 241; 9DCK, 194; 9BSO 148; 9AZN, 140; 9BBX, 127; 9ELQ, 105; 9BIB, 76; 9DPR, 70; 9BTK, 58; 9CWZ, 57. 9ALA, 57; 9AEV, 51; 9EHM, 45; 9DVJ, 36; 9DB, 31; 9ABZ, 29; 9BKU, 29; 9AFZ, 23; 9CII, 21. 9CHE, 20; 9DKA, 19; 9BMV, 19; 9EMD, 19; 9ATO, 16; 9ELV, 15; 9EAR, 15; 9AZR, 14; 9OM, 13. 9PJ, 12; 9BKR, 11; 9VD, 11; 9CVG, 10; 9BLF, 9; 9DCT, 8; 9CAS, 6; 9AEE, 6; 9AKY, 6; 9BVA, 4. 9DHG, 4; 9NY, 4; 9BKC, 2; 9AQD, 1; 9HW, 1.

INDIANA—Dist. No. 1: 9AUC has a new latticed tower. He uses enameled antenna and counterpoise wire. 9DRS has been having tube trouble. 9CAP has been doing successful short wave work on several of the amateur wavelengths. 3EG reports that things are very quiet at Muncie. 9CXG is busy with his farm work. He says one wavelength is no better than another. 9BKJ also reports no luck with an eighty meter wavelength. 9EHU is a new O.R.S. He makes good use of the eighty meter wavelength band. 9DBJ had tube troubles. 9DLW has built some splendid B.C.L. receivers. 9DPJ used forty meters. 9AXE is a new O.R.S. who is rebuilding. 9CLN has a good radio phone transmitter working. 9AZK operated on forty meters.

Traffic: 9A9UC, 66; 9EHU, 62; 9APJ, 42; 9EG, 24; 9AXE, 21; 9CLL, 20; 9CXG, 12; 9AZX, 9; 9BKJ, 8; 9DRS, 6; 9CAP, 4; 9CLN, 3; 9DBJ, 1.

CLUBS

ILLINOIS—The Chicago Radio Traffic Association held its regular meetings of the first and the third Thursdays of the month. The wavemeter contest and competition for the cup offered by Mr. H. Marquis of 9IX is keen. A 50 watt tube is offered by the Association for the best wavemeter. At the last

meeting Mr. Love of the Chicago Board of Underwriters' Laboratories gave an interesting talk on the automatic telephone, explaining in detail how the different selectors worked.

INDIANA—The Indianapolis Radio Club, Indianapolis, Ind., was active.

OHIO—The DX Radio Club of Canton was reorganized. The new officers are: Don Ploesser, *President*, R. M. Fetzer, *Vice-President*, Louis Ripple, *Secretary*, Henry Spilman, Treasurer.

WISCONSIN—Mr. I. M. Myers of the Milwaukee Radio Amateur's Club, Inc. reports that a Hotel Service plan has been adopted. Amateurs of that club will place blanks in the various hotels for radio relay traffic handling. Catel and Knoff award the three prize medals to stations having the highest traffic totals. Hoffman of 9EK gave a fine talk in twenty meter communication at the Club meeting of March 26th. *The QS party was a success in every respect.*

The LaCross Radio Ass'n. has been affiliated with the A. R. R. L. The officers of the Club are: A. D. Sanial, President. 9AZN; Leslie Jenks, Secretary.

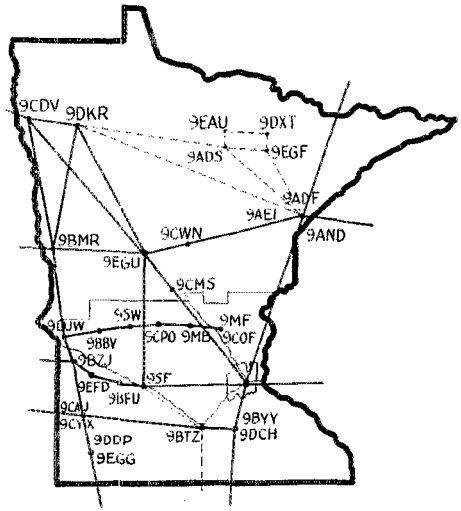
DAKOTA DIVISION
D. C. Wallace Mgr.

MINNESOTA—The fellows sent in some good reports this month.

Dist. No. 1: 9AYQ reports that traffic is very light on the 150-200 meter band. 9ADS kept daylight schedules with Minneapolis and Duluth stations. Interference caused B.C.L's is severe so he observes voluntary quiet hours. 9EEP did a good bit of work early mornings. 9EGF will be on regularly all summer. He is going after more traffic. 9AOG is a new O.R.S. His station used two UV201 tubes and he turned in a good report. 9DKR has been testing on forty meters and he turned in a good report. He handled the largest amount of traffic for the district. 9EGU has moved the antenna system and rebuilt the set. 9CMS has moved to Long Prairie where he is starting a radio shop. 9CDV burned another transformer.

Traffic: 9DKR, 31; 9EEP, 21; 9EGU, 19; 9ADF, 9; 9ADS, 6. 9EGF, 4; 9AOG, 3; 9AYQ, 2.

Dist. No. 2: 9CAJ and 9CYX uphold their reputation of being hard on "fivers." four more took the count this month. 9BFU sent in his report by wire telegraph. 9RD got very good results using forty meters. 9AXS has been very busy. 9BYY has dropped his wavelength to eighty meters. 9SF



MINNESOTA DAYLIGHT TRAFFIC ROUTES

and 9BVS have consolidated. They use one "fifty". 9BFO operates occasionally. 9EBC has had good success using a wavelength of 21 meters. 9DDB uses a dry cell battery plate supply. 9ACT is successfully using the lower wavelengths. 9RBJ worked all districts on forty meters. He is trying out several new short wave receivers. 9SW is seldom home long enough to operate much. 9CER also finds it hard to get any time at the key. 9BTZ is in regularly. 9CXO's new station works well. 9DDP is rebuilding. 9CGH uses the eighty meter band to advantage. 9BNF worked several foreign stations in the south. 9EGG found some time to try a twenty meter wavelength. 9JI has a real "HE" station. 9AIR has an accurately calibrated receiver. 9COF has been busy with his business. 9MF worked several foreign stations. 9EFD is interested in twenty and forty meter work. 9BBV has been busy with farm work. 9MB still uses our upper band of wavelengths. 9CPO worked across the Pacific regularly four or five times a week.

Traffic: 9MF, 76; 9AWM, 67; 9CPO, 26; 9EFD, 18; 9CYX, 17; 9CAJ, 10; 9SW, 9; 9DDB, 8; 9DDP, 7. 9BBV, 6; 9RD, 6; 9EBC, 5; 9COF, 5; 9BTZ, 3; 9EGG, 2. 9AXS, 2; 9BZI, 1.

Dist. No. 3: Nearly all successful men are working on forty meters or lower. BCL interference is thus minimized. 9XI leads the Division in traffic handling this month. They work on twenty and forty meters. Bill Zeidlick of 9CDV is one of the staff of eight operators. 9BPN has shown consistently high reports all season. 9SE and 9CPM sent in five reports. 9DAW worked nearly all foreign countries. 9ZT is the second station in the country to work across the Pacific on forty meters. He worked j1AA. 9APE, 9XAX and 9BMX are successfully operating five meter transmitters. Did some exceptionally twenty meter work. 9BTT has been heard in Japan. Traffic at 9DGE has dropped on the last month. 9IG was reported from good distances. He uses "S" tubes.

Traffic: 9XI, 301; 9BPN, 201; 9SE, 176; 9BOB, 170; 9CPM, 168; 9BPY, 71; 9IG, 68; 9ABK, 62; 9CIP, 49; 9DGE, 32. 9DPX, 31; 9BNK, 27; 9DDV, 17; 9DAW, 15; 9ZT-9XAX, 11; 9DYZ, 8; 9BTT, 8; 9APE, 8; 9BOL, 8; 9BQJ, 7; 9DEV, 7; 9DAO, 5; 9BMX, 4. 9BIS, 3; 9ASW, 1.

DELTA DIVISION
B. F. Painter, Mgr.

THE report for this month is small. There have been quite a few changes in the personnel of this division, which may have something to do with the size of the report. As soon as the new officials get on the job we will have more to say. 5KC has gone to sea for the summer. He resigned as A.D.M. of Louisiana and we have not yet appointed his successor. Janin, 5KR is the new Mississippi A.D.M. Rush, 5CN, is the new Tennessee A.D.M. The division has been in financial difficulties but we hope by the time this is printed everything will be clear. Tennessee has been taken out of the 5th Inspection District and placed under the 4th District Supervisor. This means the cancellation of all calls. New "4" calls will be issued in their place.

TENNESSEE—The Memphis gang hold weekly meetings at different ham stations. Sutton has been elected C.M. They are out for traffic handling. Willett, a new member, turns in an excellent report. 5AEK and 5FV of Nashville are both working.

MISSISSIPPI—Watch for 5AGM, a new O.R.S. working at summer R.S.A. camp. On June 1 it opens for traffic handling. 5AKP and 5QZ turn in interesting reports. They are going after real traffic. *The Meridian bunch is the livest in the division.*

ARKANSAS—The Little Rock C.M. reports for DOC Hunter in his absence. 5ABI broke his mast. 5HN uses a fifty watter on 80 meters. 5AIN is getting out on 180 meters. The Little Rock hams are going to call on their local B.C.L. Club and show them what they are doing.

Traffic: 5ARB, 40; 5AKP, 22; 5AGS, 13; 4AEQ, 5; 5AGZ, 15, 5ANN, 21; 5ARG, 15; 5AQY, 10; 5AUR, 70; 5AGN, 17; 5CN, 16; 5EK, 50; 5KA, 75; 5JV, 13; 5QH, 23; 5QZ, 20.

HUDSON DIVISION
E. M. Glaser, Mgr.

THE second District is well represented on the lower waves. Over fifty stations are on forty meters alone. Traffic is increasing on these wavelengths and the quality of the messages is very good. No more so-called "rubber stamp" messages are floating around. A great deal of rebuilding is going on.

The officials are all working hard and getting better co-operation. However, there are always some

fellows who spoil a good record. All reports must be received by the sixteenth of each month.

The Vigilance Committees are forming and many are in full operation. In New York City there will be a committee for each borough and another committee over the entire city to work on the more complicated cases of interference. All committees are to report to their traffic officer and give him a complete monthly report on the fifteenth of each month. This report should outline or summarize the work of the committee for the month. DO NOT FAIL TO DO THIS. It is the duty of every red-blooded amateur to give these committees his utmost support. Let's go!!

NEW YORK CITY—2CWR is busy helping BCL's. 2CYX is doing good foreign work and handling a good bit of traffic. The Y.L. does most of the operating. Marty is in W. Va. The "fiver" at 2CVL went "West". 2SM is doing fine work. 2BEE has been recommended for an O.R.S. appointment. 2BBX, who also has two operators, worked a few foreign stations. He was right there with deliveries on messages. 2CEI has also worked a few foreigners. 2CVU has not been very active on account of moving to Long Island.

2CTY is the most active traffic station in Brooklyn. 2CRB was heard in Europe using 12 watts input. 2KU did good work on forty meters. He will be at Springfield DOCK, L. I. this summer. 2ADC is using "S" tubes. 2WZ has changed his wavelength to 150. Why not go down to forty meters, John? · Work at 2BRB is confined to the twenty and forty meter bands. The South Sea Islands and other remote places have been worked. All O.R.S.'s must report or lose their appointment.

No news came in with the Manhattan report this month. Please send in some news. 2KR again takes honors for handling the most traffic. 2AEP is a new and active Queen's station. 2RB is busy at WFBH. 2AVE is using a "fifty" on eighty meters. 2ACZ has been recommended for an O.R.S. 2AKK operates a lot but because of the low power used, he is unable to handle much traffic. 2BQU is busy at College. 2CEP is attending a radio school. He expects to get a commercial ticket. 2CIS is erecting a new antenna. He expects to work on 20, 40, 80, and 150 meters. 2CEV is in South America.

Traffic: 2BEE, 42; 2BBX, 37-d13; 2CEI, 22; 2CVU, 26; 2CWR, 2; 2CYX, 84; 2CVL, 8; 2SM, 35; 2WZ, 48; 2ADC, 41; 2BRB, 14-d4; 2CRB, 57d1; 2KU, 26; 2CTY, 60-d3; 2AEP, 24-d3; 2CHK, 6; 2AQL, 1; 2LD, 36; 2KR, 85; 2BR, 17; 2CZR, 23. 2BSL, 1; 2AVE, 4; 2ACZ, 73; 2AKK, 5; 2CEP, 15-d1; 2CIS, 5.

NORTHERN NEW JERSEY—Dist. No. 1: 2CJX has dismantled his transmitter. 2CTQ worked the West Coast and found plenty of traffic. 2ADU has a fine receiver. He hears all continents except Asia. 2AWT will be home from College "brass-pounding" again soon. 2AJA burned out his 1000 volt generator. 2CYV and 2BLM have been recommended for O.R.S. appointment. 2ARB is rebuilding. 2CGS is chief "op" at WODA. 2BLM has worked "BW" at Honduras C.A. 2AJF does Vigilance Committee work for Passaic and a few surrounding towns.

Dist. No. 2: 2CDR reports that this is the first month that all reports arrived on time. 2BW had a good time at the first district convention at Worcester, Mass. 2BAW operated on a wavelength of 160 meters with a UV201. 2BMR is busy with h's business. 2WR operates on forty meters. He worked the West Coast during a thunder storm. NRRL and 2AG have been heard on forty meters. 2AXF worked the West Coast easily using a forty meter wavelength. 2PK has changed his transmitter to the twenty meter band. 2AFJ worked all districts. 2CRP handled a lot of traffic. 2AFC can be heard communicating with stations in all directions nightly. 2XBF of the local power company is experimenting with twenty and forty meters under the direction of 2ZB.

Dist. No. 3: 2CQZ claims that all good O.R.S. should use the 180 meter wavelength. 2AEK is the new second operator at 2CQZ. 2AMB is rebuilding. 2QS and the rest of the Plainfield bunch are on forty meters. 2AEY, the newest O.R.S. in the district, handled the largest number of messages. We're sorry to report that 2BGO has left the game.

Dist. No. 4: 2BZJ burned out a "fiver." 2CGK is busy with BCL work. 2CPD handled a lot of messages besides working almost every country in Europe. 2BUY receives cards from Europe daily. 2BGI, one of our star "DX hounds" worked good DX on forty meters. 2AUH was busy handling traffic. 2FC has not been operating much. 2CXY leads the district in traffic handling.

Traffic: 2CTQ, 26. 2CJX, 7; 2CYV, 5: 2AJA, 5; 2CGS, 8; 2ARB, 5; 2BLM, 8; 2ADU, 6; 2ATE, 2; 2WR, 6-d3; 2AXF, 10; 2AFC, 22-d4; 2CRP, 17-d15; 2BAW, 51. 2AFJ, 4; 2BW, 20-ds; 2ZB, 3; 2BIR, 4; 2CDR, 11; 2ACO, 30; 2CQZ, 28-d2; 2CRW, 3; 2QS, 11; 2AEY, 126; 2AEK, 20; 2AGI, 14; 2CYW, 4; 2CXY, 119. 2AUH, 26; 2BGI, 3; 2VUY, 14; 2CPD, 68; 2FC, 6; 2BZJ, 10.

EASTERN NEW YORK—Dist. No. 1: 2KX handled more traffic this month. 2AV is doing some good eighty meter work. 2CXB-2ABD are trying to increase the efficiency of their set. 2CLG has been recommended for an O.R.S. appointment.

Dist. No. 2: Peacox says that all the O.R.S's are on their toes for traffic handling. 2AAN is using a Deforest "ten". He likes it better than an overloaded "fiver." 2AHK used the 150 meter wavelength. He is the best traffic handler in the district. 2AJP blew his "fiver" and tried a bootleg tube. He has been recommended for an O.R.S. appointment. 2DD burned out Peacox's German "fifty" so he is now using five and twenty meters with a "fiver." 2DD and 2ADH get together every Saturday night to operate the transmitter. Operating doesn't begin in earnest until about 2 a.m. because they have so many funny stories to tell each other. 2CIL just got his set working nicely when folks decided that the cellar would be a better place for it. He can now sneak in by way of the cellar door and operate without waking the whole family. 2BQB has a new filter. He has been heard in New Zealand.

Dist. No. 3: 2SZ has been off the air for the greater part of the month due to the loss of a Kenotron. 2CDH changed his QRA. 2AGM is busy with school work. 2BM used a "fifty" and worked European stations regularly. 2ANM worked both France and Holland using forty meters. He was heard in England at noon.

Dist. No. 4: The A.D.M. recently made a visit to Newburg. 2AQR's home was made a temporary Headquarters. After the gang arrived a small sized convention was held. The A.D.M. wants to thank the bunch for the pleasant visit. 2CXG is using an eighty meter wavelength. 2AQR is a new O.B.S. 2CYM operates on 150 meters regularly. 2BSE, using a fifty watter and eighty meter wavelength, has been heard all over the country. 2AII has been sick. 2AGQ has worked Europe at last. 2AOX is a new station in Newburgh. 2CNP is too busy to operate regularly.

Dist. No. 5: Most of the fellows are using the forty meter band with fair success. We're sorry to hear that 2BY has been dismantled. 2ACS was heard by a ship near New Zealand. He worked only six Europeans this month. 2ADM and 2ACP have combined. They have a "peach" of a new shack. Using forty meters they have worked several Europeans. 2CPA is moving. 2CGJ is a new O.R.S. who is in touch with the West Coast regularly. 2PV has moved again. 2AWF kept the city on the map. He handled traffic for a Chicago firm three times during the past month, and got an answer through 9CBZ, 9NV, and 9EIN. They phoned the messages and got an answer in a very few minutes. All this work was in broad daylight. 2AWF, using forty meter wavelength, has worked every district and been heard in Europe. 2GK worked several European stations and also g6YM, the Cunarder "Samaria" three times during her recent trip across with a 45 meter transmitter on board. A special pipe antenna, 30 feet high and insulated with glass, has been erected for twenty meter work.

Traffic: 2KX, 39; 2AV, 38; 2AAN, 42; 2AHK, 170; 2AJP, 19; 2DD, 26; 2COV, 12; 2BQB, 101. 2BM, 46; 2AGM, 20; 2CDH, 15; 2CTH, 6; 2SZ, 2; 2ANM, 44; 2CXG, 56; 2AQR, 44 2CYM, 21; 2BSE, 2; 2AGQ, 180; 2ACS, 97; 2CGH, 40; 2ADM, 14; 2CGJ, 11; 2CPA, 10; 2BY, 7; 2GK, 5; 2AWF, 11; 2PV, 3.

MIDWEST DIVISION
P. H. Quinby, Mgr.

NEBRASKA—Dist. No. 1: This month's report indicates that activity is dimishing with the approach of the summer season.

9DUO has been operating with fair regularity. 9AWS doesn't seem to be able to get his circuit adjusted satisfactorily for short wave work. The 80 foot mast at 9CIM came down again and smashed his neighbor's garage. 9EGA has consolidated with

9NL. 9CJT operated regularly using wavelengths of twenty, forty, and eighty meters. 9DXY, 9EW, 9DUO, and 9CJT attended the Radio Short Course and Convention at Ames, Iowa. A report of this will appear in July QST. 9EW who has been inactive for some time, is operating again. 9BNU has burned out all the tubes he owned. 9EB sent in an interesting report. 9BYG at 9DXY heard j1AA and worked 6CGW using a forty meter wavelength.

Dist. No. 2: 9EAK did some good week-end work. 9CGQ burned out some tubes. 9DQC is very busy with school work. 9PN did some good work with his "fiver." 9BDU worked four "Zedders," one Australian, and was heard three times in England. 9DAC also did well with a UV202. 9AKS operates whenever possible. 9CBK used a UV201A as an oscillator for the transmitting set.

The Vigilance Committee for Lincoln is being organized. It is hoped that the little trouble which has been experienced will disappear now.

Traffic: 9NL, 58; 9AWS, 21; 9DUO, 28; 9CGS, 7; 9CJT, 6; 9BNU, 15; 9EB, 44; 9AKS, 55; 9EAK, 60; 9BOQ, 8; 9EHW, 6; 9DQC, 6; 9AFR, 26; 9CGQ, 6; 9DXY, 10.

MISSOURI—A general banquet and hamfest was held at St. Joseph on April 18th. One hundred amateurs were present, including three OW. The weather was rainy but everyone had a good time.

Dist. No. 1: 9ACI and 9DMJ have been operating on river barges. 9DMJ has a relief operator at his station. 9DLE is active. 9BRU lacks certain necessary apparatus. Both 9ZK and 9BEQ have a 250 watt "jug." 9IH, 9CGN and 9ELY are mentioned for consistent work. 9BDS is hunting for a permanent location. 9BHI operates regularly. Several stations are using forty meters with good results. The remaining stations are busy testing. 9CGN is the star traffic handling station.

Dist. No. 2: The traffic man's algebra is written WX—HX. 9RT, using a UV201A, was heard in England and New Zealand. The plate input was eighteen watts. 9CYK transmits with a bug key and a tennis racket. Some speed! 9ADH is a new Whitesville station. 9AYK reports more traffic moving on eighty meters. 9DIX bets on his 80 foot mast. They won a contest with some trees in the vicinity during a recent windstorm. 9BVK had the misfortune to lose his gutter-pipe mast. 9UI and 9DAE have had no luck with continuous wave transmitters. 9DZO and 9DAE are building stations with heavier equipment. 9ST came home from school and handled a bunch of messages. 9TJ did his share of message handling. He arranged, by radio, for the Kansas City fellows to attend the banquet. 9ZD made some tests using twenty and forty meter wavelengths. 9RR and 9ACK "crammed" two transmitters and a receiver into a "flivver" bound to the St. Joe banquet. At St. Joe it rained on the transmitters during the banquet and coming home 9ACX stepped on the receiver.

Clubs: The St. Joe Club's activities have been mentioned. The Kansas City club organized a Vigilance Committee. The newspaper announcement was badly written and as a result letters were received asking the committee to eliminate static, local broadcasting stations, and every kind of a radio pest except that one which we were particularly looking for. BCL's two hundred miles from K.C. wrote the committee. The S. E. Missouri Club with a membership centered around Cape Girardeau and Jackson are testing with portable sets working on twenty and forty meters. A station in Houston, Texas is assisting in the test work.

Traffic: 9CGN, 48; 9ZK, 30; 9BEQ, 20; 9DMJ, 19; 9DXN, 10; 9BHI, 10. 9DLB, 4; 9RT, 5; 9DOO, 4; 9AOB, 13; 9DKG, 6; 9DJI, 2; 9UI, 5; 9ADR, 12; 9DOJ, 2; 9TJ, 61; 9ELT, 30; 9ST, 202. 9RR, 17; 9AYK, 10; 9DIX, 3; 9DAE, 6; 9CRM, 7.

IOWA—The gang have been busy preparing the radio play which was given at the radio convention at Ames. 9BRS-9CLG worked both coasts consistently. 9BKV had trouble with BCL's. 9AVJ, and 9BKV were first, second, and third in Iowa message handling. 9DDK made some good distance records with a "fiver." 9DMS was heard by g2LZ. He usese a four coil Meissner circuit. 9DRT has a new transmitter using twenty and forty meter wavelengths. 9AMI and 9DKY operate one station using the call 9LQ. 9CGY is a new O.R.S. 9DAU has two good "ops." 9AVJ worked over eight hundred stations and handled a lot of traffic on all wavelengths. He worked all U. S. districts, Canada, England, New Zealand, and Australia. Only a couple of "fivers" were used. Can you beat that? 9CXX was heard in England and New Zealand. He worked Porto Rico, Mexico City, and the East and West Coast using twenty and forty meter wavelengths. 9HK is rebuilding. 9CS has poor results with his tube transmitter. 9LC, in one night worked Mexico City, Canada, the East and West Coasts, and he handled two messages with a New Zealand station. There was a large attendance of amateurs at the Iowa Radio Convention.

MEET A MIDWEST BUNCH! Left to Right—Top Row: 9RR, 9BSZ, 9CBY, 9DIP, 9CKF. Middle Row: 9BOG, 9DBK, 9DJD, 9ATN, 9ARZ. Bottom Row: 9AYE, 9CLQ, 9BPF, 9DXY, 9XBB.

Traffic: 9BEW, 96; 9BKV, 114; 9BPF, 32; 9BRS,-9CLG, 85. 9CZC, 87; 9CZO, 22; 9DEX, 119; 9DMS, 12; 9DRT, 14; 9DOA, 5; 9BCD, 52; 9DAU, 43; 9BZE, 7; 9AVJ, 226; 9CGY, 14; 9CS, 4.

KANSAS—Spring school work and QRN are reducing Kansas activity. 9DLM operates occasionally. 9BVN was the star station. 9BGX and 9BXG also handled a goodly amount of traffic. 9DMZ is a new station who made a good showing. 9DNG received his "S" tubes but has no oscillators yet. 9DNG, 9EHT, 9ZE and 9AJU, attended the feast at St. Joe. 9BGX used our higher wavelengths with good results. 9ACQ received a report from New Zealand. 9CUL worked both coasts. His transmitter causes the next door BCL no interference. 9CFI used a forty meter wavelength. He got a sixteen inch notice in the local papers about his work with foreign countries. He is in a position to arrange schedules using any amateur wavelengths above nineteen meters. If interested write him. 9CCS erected a drain pipe antenna.

Dist. No. 2: 9CVN used a "fifty" and made some records. 9AIM has a new flat-top antenna. 9BRD and 9BIO are rebuilding. Wichita stations are doing good daylight work on the forty meter wavelength band. 9CEA has added several more foreign countries to his list of records.

9CKJ, 9EBZ, and 9ECL visited the Lyons gang. They took an airplane ride, hunted some "CQ" birds, and went home with a whole bag full, and a box of empty shells. 9DDP lost his call. He will operate at 9AUN (an OW.) The Russell gang have commenced rebuilding.

Traffic: 9AFP, 8; 9BRD, 4; 9BIO, 7; 9CEA, 5; 9CVN, 11; 9BVN, 108; 9BXG, 57; 9BGX, 58; 9CVL, 21; 9CFI, 36; 9ACQ, 9; 9QW, 4; 9DNZ, 30. 9CCS, 6.

NEW ENGLAND DIVISION
I. Vermilya, Mgr.

B. H. CHASE, A.D.M. of Eastern Mass., has resigned on account of other work. Mr. Waldo Kelley, 1CPN has been elected to fill the office. No word has been received from OM Kelley since the convention.

Dick Chase, A.D.M. of Maine, has resigned. This is an invitation from your D.M. to get all O.R.S. men together. Pick your new man and notify me. He must be a live wire and have lots of pep.

EASTERN MASSACHUSETTS—1BCN joined the U.S.N.R.F. 1GA worked across the Pond in daylight on forty meters. 1BUO is now a full fledged O.R.S. 1ACC-1ZO handled a lot of traffic using only a UV202. With forty meters he worked both Europe and the West Coast.

1CMP took honors for traffic handling this month. 1CMP has also done some fine international DX using twenty meters at noon. 1AIR worked many Europeans. 1AXA "clicked" with the "George Washington" while she was at Bremershaven, Germany. 1AF-XJ got out well. 1ALL was busy. 1NV met with several mishaps that kept him inoperative. 1BZQ handled a bunch of traffic this month. 1AYX has been away. 1SE worked Holland in daylight.

Traffic: 1BCN, 1; 1GA, 99; 1BUO, 41. 1AAC-ZQ, 34; 1AHL, 8; 1NT, 5; 1SE, 7; 1CC, 19; 1UW, 6; 1ACJ, 13; 1COT, 10. 1LM, 12; 1AYN, 23; 1AYX, 4; 1BZQ, 76; 1NV, 1; 1KY, 51; 1BS, 78; 1ABR, 3; 1AF-XJ, 111; 1AXA, 22; 1OV, 10; 1AIR, 16. 1CMP, 126; 1ZW, 15.

NEW HAMPSHIRE—1BJF heads the list of traffic handlers this month. 1ATJ worked 8YOR on 38 meters. 1CKK worked g2CC and "LR" in Brazil.

Traffic: 1BJF, 80; 1YB, 52; 1AVL, 51; 1CKK, 15; 1ATJ, 7.

MAINE—Dist. No. 1: 1BNL has worked 5NW and 8KW in daylight using forty meters. 1KX is resigning ADM and ADPM jobs but will still be in the game.

Dist. No. 2: 1AUR is using an indoor transmitting antenna now. 1PD had a race with 1AUR this month for traffic honors. 1ACO is coming down to 80 meters.

Traffic: 1ACO, 12; 1ALK, 22. 1AUR, 8; 1BHR, 1; 1BNL, 51; 1BTT, 16; 1KL, 41; 1KX-1AXQ, 93; 1PD, 10; 1VF, 25; 1BUB, 53.

VERMONT—The report from district No. 1 indicates that this has been the best month for traffic work this year. A couple of stations really collected messages from friends and BCL's that helped the message total and others may profit by this example. 1BDX finds that his set works better since he blew a "fifty". 1AC reduced his wavelength and many stations are getting down toward twenty meters.

Traffic: 1YD, 129; 1BDX, 95. 1AJG, 17; 1FN, 10; 1AC, 9; 1ARY, 12.

RHODE ISLAND—1AWV is back after rebuilding again. 1AEI was heard with good strength in Canada. He found it hard to raise stations in the U.S. 1BCC is using forty meters. He is our champion traffic man this month. 1AID also handled quite a bit of traffic on forty meters. 1AWE, trying some of Reinartz's dope, succeeded in wrecking a number of tubes. 1OW is doing good work on twenty and forty meters. 1BCR handled in an

interesting report. 1LI is out of commission. 1IJ is another forty meter "bug." 1ABP has worked Europe eleven times. 1AOA is on regularly every afternoon and some mornings early. 1AFN worked France and was heard in Italy.

1II, 1OW and 1CMP have formed a combination. They accomplished wonders by establishing contact with Europe in daylight. 1AAP worked across in daylight last month. He has worked New Zealand.

1BVR has his "junk" operating in an outside shack. 2OM was a visitor recently. He spent a couple of excellent nights with the set. 1QV is moving to Mystic, Conn.

Traffic: 1OW, 10; 1GV, 5; 1BCR, 45; 1II, 2; 1AID, 27; 1BIE, 6; 1BCC, 151; 1AWB, 15; 1ABP, 27; 1AAP, 13; 1BVR, 63; 1AOA, 18.

WESTERN MASSACHUSETTS—Dist. No. 3: 1ARE has worked all districts using fory meters. He reports twenty meter transmission unreliable. 1CLN has a new transmitter and his signals are reported much stronger throughout the East. 1VC has been operating quite regularly.

Dist. No. 4: 1BSJ, Springfield C.M., requests station owners to forward their reports so that they will reach him on or before the sixteenth of each month. Springfield stations should report to him instead of to 1BLU or 1AWW. Many stations are using the twenty and forty meter bands. 1ABF had excellent results with those wavelengths. 1BSJ gets out well with two "fiver." 1PY has been reported in England five times this month. 1BVR operates every Sunday at his Westfield station.

Dist. No. 5: 1BIZ-1SZ "blew" a brand new 203A tube. This station is located at Northampton and is the logical outlet for Smith College. Readers having YL's at Smith College please note. 1KC and 1AKL are both on twenty and forty meters. 1CI worked Europe.

Dist. No. 6: 1BOM had four visitors from the Springfield Radio Association. He entertained them at his station on Shelburne Mountain.

District No. 7: Since the convention and the talk by Reinartz, everyone is reducing wavelength. 1AQM has been QSO a ship operator on schedule every evening of the ship's voyage across the Atlantic. The ship signed "LN" and used a 100 watt transmitter. 1AFC worked good DX with low power. 1BIP did some fine work during the fall and winter. His results were mediocre this month. 1YK uses a remotely controlled transmitter. 1ADN has moved his transmitter to Worcester. He works on this 75-85 meter band. 1BBP was troubled by a rough note from his motor generator set. He now reports that the trouble has been overcome. 1AKZ is working the West Coast. 1XZ used forty meters this month. 1CPN did good daylight traffic work. 1JV has moved to a new location. The Committee in charge of the Convention want to thank those who helped to make it possible.

Traffic: 1CPN, 30; 1AKZ, 14; 1AQM, 33; 1BBP, 7. 1BQK, 12; 1BKQ, 2; 1ASU, 42; 1DB, 12; 1AAL, 5; 1BIP, 6; 1XZ, 24; 1JE, 24; 1AFD, 14; 1VC, 21; 1ARE, 4; 1PY, 57; 1BSJ, 1; 1ABF, 83. 1BLU, 8; 1AWW, 25.

CONNECTICUT—Messages moved faster than usual this month. Our best stations are on twenty and forty meters. 1AVX reached out well. 1BFI is organizing a Radio Club for amateurs in Hartford. FB, OM! 1CPV has moved. 1FC has gone away for the summmer. 1APA is taking the right steps to get an O.R.S. certificate. 1AOS is at college. 1BHM is an active station in New Haven. 1AXZ was heard in NZ and five other countries. 1BM reported the usual activity. 1BGC has been helping the BCL's to alter their circuits so that they can eliminate his signals. 1IV gets out well on both forty and seventy-five meters. 1AXN handled more traffic this month than he has handled for a long time. 1AZR worked everything going using one fifty watter. 1ZL worked 6CGW, 6BJJ, e4CR and 4SA with an input of 18 watts. 1MK has been dismantled. The new 1MK will be located at the New Headquarters QRA, 1711 Park Street, Hartford, Conn, and will operate on two or more of our wavebands.

Traffic: 1CTI, 4; 1ADB, 41; 1BGO, 17; 1AXN, 53; 1AZR, 38; 1IV, 5; 1ZL, 8; 1AVX, 23; 1BFI, 4; 1CPV, 76; 1FD, 4; 1APA, 45; 1AOS, 8; 1MY, 52; 1APC, 5.

NORTHWESTERN DIVISION

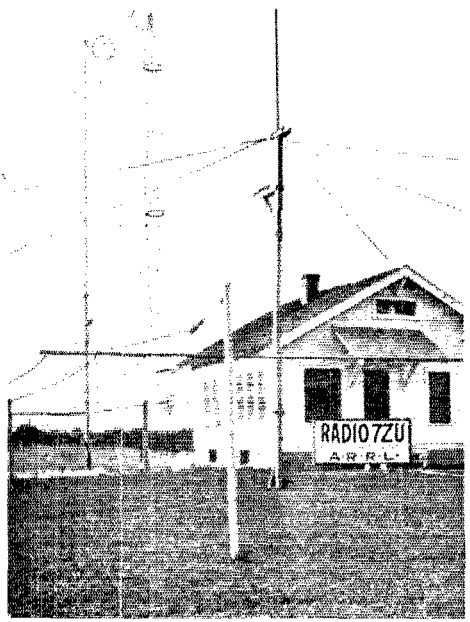
Everett Kick, Mgr.

MUST it be repeated to those O.R.S. who neglected to heed last month's gentle warning that certificates will be cancelled with no further warning? The D.M. wishes every O.R.S. to write him. He wants to know what stations will be in operation during the summer. Station owners not operating may, for the asking, have their O.R.S. certificates suspended until September. This is not compulsory but it is suggested to avoid cancellation of certificates for failure to report each month. When a certificate has been cancelled another will not easily be obtained.

WASHINGTON—S'matter, gang? Don't let a few sunny days and warm nights make you think summer is here! 7GR has worked NZ twice and Japan four times with 25 watts input. The DX weather *is not all gone yet.* Get the "low-down" by being down low. Then we will have good radio weather the whole year. How about those schedules that we mentioned last month? Have you tried the "five point" system? If you haven't you are missing something. Your A.D.M. is QRW and hasn't worked a station in two months, EXCEPT ON SCHEDULE TWICE A WEEK. It works FB and keeps the hook clear. 7DF takes the traffic honors this month for the entire division. He worked N.Z., Australia, and the Phillippines. Save up your old shoes and burnt out tubes for 7FD, fellows. Cigars will be appreciated by the gang. 7KU is using the Heaviside layer to suit his DX requirements by changing the length of his antenna. 7OT is doing fine on 40 meters. 7MA is also saving money to buy the gang cigars this fall. 7ADQ finds the YL QRM severe. 7DC worked N.Z. using forty meters. 7AIF is in Alaska. 7RH is at sea. 7WS-ZZ is on the job. 7AHA works the east coast regularly. 7NH and 7AFB get out well on 80. 7LH has found merit *in the use of short waves.* 7NO *is busy rebuilding.* 7GB, 7AFO, 7GY, 7PZ and 7AGI do good work whenever they operate. 7PZ was heard in NZ. 7FN and 7ABB report that traffic is light. 7RY is doing some research work. 7GE-ZX's new YL was born April 16th.

Traffic: 7DF, 102; 7AFO, 47; 7DC, 26; 7GR, 23; 7KU, 23; 7FQ, 21. 7GB, 20; 7ABB, 19; 7OT, 16; 7WS, 14; 7LH, 14; 7AHA, 13; 7AJY, 13; 7RY, 12; 7GE, 9; 7FN, 8; 7GY, 7; 7MA, 7. 7AJV, 2.

OREGON—7QD was the only O.R.S. appointed this month. Many new stations replace the old timers. Daylight work is in order, and many sigs are heard all day long on 20 and 40 meters. Few stations are using the 150-200 hands. 7LS has increased his DX to 11,000 miles. 7LI is a new sta-

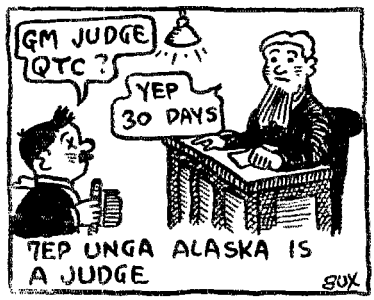


ONE OF THE BEST-KNOWN SEVENS

tion at Gold Hill. 7UJ has been in daily communication with an amateur on a ship bound for Japan. He relayed messages from the U.S. until the ship docked at Yokhohama. 7UJ uses only one "fiver." 7GQ was also QSO. 7MF and 7GJ have the highest message totals. 7LR has taken out a license for life. He is a married man now. 7OK lost his "fiver" but has a "fifty" on the way. 7KG reports good contact on forty and eighty meter bands. 7AKK, 7ADM, 7QD, 7MF, 7LS, 7GQ and 7NI work on twenty and forty meters.

Traffic: 7MF, 43; 7GJ, 40; 7GW, 27; 7OK, 21; 7LQ, 20; 7ND, 18; 7IW, 16. 7AV, 15; 7SY, 14; 7ALD, 13; 7VQ, 13; 7QD, 12; 7AKK, 3; 7KG, 2.

MONTANA—7EL handled *most* messages this month and worked all districts with spark coils C.W. 7GS moved this month. 7ACI has dismantled. 7NT has erected two new aerials. 7ZL has left the game. 7AFP bought 7ZL's M.G. He gets out FB. 7MB uses "SW" tubes successfully. 7MX had the "flu." 7DD uses 78 meters. 7HM is busy at school. 7MP found that RF chokes for high frequencies are critical. 7KZ handled several messages using



amplifier tubes as oscillators. 7HY and 7WP are working on their transmitters.

Traffic: 7EL, 26; 7KZ, 20; 7DD, 11; 7HM, 11. 7MB, 7; 7MX, 1; 7WP, 9.

IDAHO—The gang are doing excellent work. Let's keep the ball rolling! Use the short waves this summer. Miss 7SI leads the traffic handlers this time. 7ACF is using 80 meters. He said he raised a BCL across the street. 7AHS was busy melting fivers. His set now works ok on 80 meters. 7OL has moved to Delco. 7MU got married. We expect the YL on the air for Idaho. 7UH is rebuilding. 7GW has been away on a trip. 7QC is moving to parts unknown. 7GX uses an "S" tube rectifier. 7JF is among our best DX men. 7QP, who publishes that well-known paper called "Key Klicks" is "hollering" for more news. We need the paper immensely. Support him everyone. 7YA is still on the 150 meter band. 7RQ has a hard time raising station on 80 meters. 7VU worked Japan using a "five". 7OB worked all districts the first two days he was operating. 7KC is seldom heard as he is away so much.

Traffic: 7SI, 57; 7JF, 37; 7UH, 36; 7ACF, 27; 7AHS, 25; 7QC, 24. 7OB, 6.

PACIFIC DIVISION
M. E. McCreery, Mgr.

THINGS are moving well in the Pacific Division. Arizona has shown wonderful development. *6ZZ is to be congratulated on his success in* that state.

In the past the D.M. has been more or less lax in his attention to division affairs. He is definitely *settled now, having sold his business.* He expects to give the old Pacific Division a good going over. New activities are welcomed and new routes will be whipped into shape. More work is being done on forty meters. Active stations are expected to arrange schedules for traffic handling.

All active stations desiring to become O.R.S. should communicate with their local traffic officials or with the division manager.

Fred Schnell, Babcock, McCreery, and sixth district Radio Supervisors gave interesting talks at a meeting held in Oakland. Vigilance Committees and the Naval Reserve were subjects discussed at this meeting.

Vigilance Committees are being formed in Oakland, Berkeley and San Francisco. Complaints from BCL's will receive prompt attention and the adoption of voluntary quiet hours will be considered.

Willis, 6TS, of Santa Monica, is with NRRL. Amateurs should carefully consider the opportunities made available on joining the U.S.N.R.F. Let's make the Pacific Division lead the rest of the country in Naval Reserve work.

It has been reported that certain stations are refusing to accept messages from adjacent for Oakland and San Francisco. This situation will not be tolerated and O.R.S. appointments will be cancelled if necessary.

ARIZONA — QRN does not prevent good work in Arizona; it merely reduces the reliable distance over which messages may be handled. The Cottrell plant at 6ZZ does not make the slightest interference now. Rawls reports that QRN is worse in Phoenix than in any other place in Arizona. He has a new "fifty" working and has been heard in New Zealand, Australia, Porto Rico, the Philippines, Canada and in 46 states. He took forty-five messages from Eastern stations in two nights alone. 6AAM did good work with his "twenty." 6ANO handled a good bit of traffic with his "fiver." Mr. Blalack handled some traffic in Yuma.

Traffic: 6CSO, 317; 6AAM, 8; 6ANO, 203; 6ZZ, 4.

NEVADA — 6UO is using the eighty meter band. 6ATN has ordered a 1500 volt generator and will drive it with a gas engine. He works on forty and eighty meters. 6BEH and 6AJP handle traffic well. They use a dynamotor.

Nevada station owners are anxious to arrange some daylight schedules for traffic handling.

Traffic: 6UO, 7; 6ATN, 5; 6BEH, 3; 6AJP, 5.

SOUTHERN CALIFORNIA—Many of the gang are working on twenty and forty meters. Some of the bunch can change to any required band. Work with Australia and New Zealand has fallen off considerably. We hope to keep in contact all summer. San Diego fellows want schedules with Los Angeles men. Vigilance Committees have been organized and are getting things in line.

Dist. No. 1: Conditions in San Diego are good. The Silver Gate Amateur Radio Ass'n is active. Stations are keeping quiet hours from 8 to 10 P.M. in cooperation with the broadcast stations. 6CHX now operates Friday, Saturday and Sunday evenings. 6SB makes a "fiver" do consistent communication work. 6AHQ handles San Diego traffic. He was the first station in San Diego to work Hawaii. 6CGC is on occasionally to boost the figures in his traffic report. 6BAS had trouble with his motor generator set. 6ZH has a new counterpoise and antenna. 6CHS handled the greatest amount of traffic in this division this month. He works on forty and seventy-six meters. 6CNK worked all districts with twenty-two watts input. 6OP tried a 200 meter wavelength. He said that wavelength was so quiet it reminded him of a cemetery. He didn't want to be classified as dead, so changed his set back to eighty meters again. 6CGO has been experimenting. 6AIB moves traffic well in all directions. 6VD operates occasionally. 6BIK is planning two new transmitters to use on twenty and five meter wavelengths.

Dist. No. 2: 6AFG leads the gang in traffic handling. He's changing antennas. 6BQR is on forty meters. 6CBB had hard luck with his 250 watter. He is getting a new fifty watter. 6IH was asked by a BCL to send the following message via ARRL. "Piles cured without operation. (sig) Father." No wonder his tubes don't stand up. 6CSW works out well. 6AJI, 6BBV and 6BJX are rebuilding. 6RF spends his time with the RL's. 6OF is handling messages in spite of school work. 6CTO had a visit from some "friendly" neighbors. They brought a'ong a policeman who wanted to see his license. 6CM has arrived from San Francisco. 6US is busy supplying the wants of the BCL. 6AHP has been using forty meters. 6CSS is getting out fine. 6BUW is getting a quartz crystal for his eighty meter transmitter. 6BUR worked all districts using forty meters. 6AKW still keeps his schedules with NZ and 6VC. He is arranging a schedule with 6ASR (Hawaii.)

Dist. No. 3: The gang in this district are trying their hardest to put it on the map. Everyone is down on either forty or eighty meter bands. 6CMD has a regular schedule with 2CUB. 6ASV has been busy. 6JJ is planning to install a "fifty" soon. 6CGD is having trouble getting his transmitter to "perk" below 100 meters. 6CDG was heard in France.

Traffic: 6CHS, 276; 6CGC, 36; 6ZH, 30; 6AHQ, 23; 6CHX, 14; 6BAS, 13; 6SB, 9; 6CNK, 17; 6OP, 7; 6CGO, 5; 6AIB, 35; 6VD, 5; 6CBB, 27; 6AFG, 72; 6OF, 22; 6BQR, 10; 6CTO, 50; 6BBV, 28; 6BJX, 31; 6CW, 15; 6CSW, 47; 6AJI, 42; 6AHP, 4; 6BUR, 24; 6AKW, 29; 6ALF, 14; 6CMD, 26; 6AAN, 10; 6JJ, 12; 6CDG, 10, 6BES, 23; 6AQK, 16; 6RN, 52; 6BBQ, 76; 6LJ, 21.

CENTRAL CALIFORNIA—Dist. No. 4: Two stations did exceptionally good work. 6CLP handled most traffic. 6OI heads the list for DX. With a lone "fifty" he has worked J1AA in Tokio, 7QS on the SS West Jenaat in Yokohama worked a2BK, a2YI, a3BD, a5BG and z2AC. He clears a bunch of traffic and also sends press news to KFUH.

6AJZ burnt out his tubes. 6AMM has been hearing NRRL and j1AA. 6BMW reports having had difficulty in working Los Angeles stations. 6CKV is using forty meters. 6UF frequently worked the East Coast. 6UW mounted his motor generator set on four tennis balls to reduce the noise. 6NX burned out a tube while adjusting his set for twenty meter work. 6BON is experimenting. 6ZAH is busy with school. 6BDT was heard in South Africa. 6HC is manufacturing some water-cooled tubes.

6ALW has a new rectifier. 6CFI is ready for forty meter traffic. 6CLP handled most messages in this district. 6CJD is a new O.R.S. 6CCY lost a tube. 6AOI prefers the forty meter wavelength band. 6AME, using a "fiver," was heard in France, England, India, China and the Philippines. 6CJJ did nearly as well with his little tube. 6ADB handled a lot of message traffic. 6AFQ was busy at school.

Dist. No. 5: 6CW has heard GHH1 of Mosul, Mesopotamia. 6AWW burned out his tubes. 6DG worked five inspection districts. 6CPW is the sheik of the sand dunes. 6RW worked z2AC and j1AA. 6CKK is still using 174 meters. 6BQL operates whenever he gets opportunity to do so. 6BIF is rebuilding. 6BAA used two "fivers" with good results. 6AMS has done fine work with other coast stations. 6CSN has a schedule with 6ALS of Honolulu. 6CLV sailed for Alaska with the Packers fleet. He worked j1AA at Tokio with a UV202. 6HJ has trouble raising other stations. 6CHE is again an O.R.S. 6CSL blew some tubes. 6HH is busy at school. 6AWT worked Japan and a ship off the Chinese coast. He has now been heard in forty-three countries, fourteen of whom have been worked. 6CHL has worked j1AA several times. He has cards from France,, India, China, Japan and the Philippines.

Dist. No. 6: Amateurs in this district should send their reports to George Becker, Jr., 830 Fallon St., Oakland, Calif. 6CCT is high traffic handling station. 6BNV is on twenty and forty meters. 6BEZ is the possessor of a card from Macoa, China. 6BEZ is going to Europe this summer. 6CLB just rebuilt his station. 6CQG is building a transmitter, using a master oscillator power amplifier circuit. 6SR (his tube having departed) tied a piece of crepe to it. He will operate again as soon as Dad supplies the "long green." 6AVH worked j1AA with thirty watts input. 6BIP-TI are using two fifty watters in a self-rectifying circuit. 6GU handled most Berkeley traffic. 6QV is busy preparing for final examinations. 6AJF is also busy at college. 6CEG used the forty meter wavelength to good advantage. 6ARB and 6CKC were busy with their women. 6CLZ has been heard in N.J. and he worked 9CIP in the middle of the day. 6BFU-6IM worked a2BS on forty meters. 6ZX-6KR is building a new electrolytic rectifier.

Traffic: 6AJZ, 1; 6AMM, 4; 6BMW, 9; 6CKV, 32; 6OI, 34; 6UF, 2; 6UW, 8; 6ALW, 3; 6CLP, 100; 6CJD, 16; 6CCC, 1; 6AO, 2; 6AME, 5; 6CJJ, 1; 6ADB, 31; 6AWT, 15; 6HH, 3; 6CLS, 5; 6HJ, 6; 6CLV, 88; 6CSN, 39; 6BUF, 28; 6AMS, 11; 6BAA, 16; 6AVH, 4; 6CQG, 28; 6CEJ, 12; 6CLB, 17; 6UR, 2; 6CCT, 75; 6NH, 5; 6BNV, 16; 6BIP, 32; 6KR, 2; 6GU, 60; 6CDP, 8; 6CEG, 8; 6CLZ, 11; 6BQL, 2; 6CKK, 7; 6RW, 10; 6DG, 4; 6AWW, 12; 6CW, 23.

HAWAII — The Hawaiian Islands are again QSO with the mainland, due to the fact that the shorter wavelengths are in use. 6ASR, operating 83 meters, established a new DX record for Hawaii by working 1CMP. 6ASR is ready to handle all traffic for Hawaii and New Zealand. 6CST is doing his share in traffic handling. 6ALS worked the mainland. Some trouble was experienced with swinging signals. NRRL has been heard working on eighty meters.

Traffic: 6ASR, 15; 6ALS, 14; 6CST, 2.

ROANOKE DIVISION
W. T. Gravely, Mgr.

NORTH CAROLINA—Dist. No. 1: The fellows turn in good reports despite the QRN. 4OG did fine work on all wavelengths. 4AF was on the air during the Easter holidays. 4TW has moved and says his set isn't a portable one. 4LO is now using a fifty watter, 4RF is rebuilding.

Traffic: 4RF, 55. 4OG, 53; 4TW, 6; 4LO, 3.

Dist. No. 2: The star district reports by radio from 4MI to 4JR. 4TS is getting a new shack. 4PE is reaching out with his fiver. 4SX was heard in England. He handled a bunch of messages. 4GW is moving. Two "100 footers" will enable him to work the far places from his new location. 4NJ has trouble raising anyone. He says his wave is too sharp. 4MI is using 44 meters.

Traffic: 4MI. 93; 4NJ, 25; 4TS, 23; 4CW, 17; 4PE, 3.

Dist. No. 3: 4HR has a new MG set. 4RY uses ten watts input and 80 meters wavelength. He handles a good bit of traffic. 4JS did good work during the Easter holidays. 4JR works through the QRN as best he can. How well that is shown in the traffic report.

Traffic: 4JR, 122; 4RY, 40; 4JS, 15; 4TJ, 5.

Dist. No. 4: 4BX has been ill and in bed all the month. He says the doctor refuses to let him do a thing. 4NT-MA are working on forty and eighty meters daily from 5:45 to 7:00 p.m. 4RU has gone to Chicago. 4UN has been trying to get a steady D.C. note. 4RW is the traffic leader.

Traffic: 4RW, 30; 4MA-4NT, 18; 4UN, 3.

WEST VIRGINIA—8BLI is working on 79 meters. He is on daily after 9:00 p.m. and all of Sunday morning. Shoot him your traffic. 8AIP is experimenting with tube grid-leaks for the elimination of key clicks. 8ATP on 40 meters is stepping out high, wide, and handsome. Has stacks of foreign cards. 8BJG works on 75 and 40 meters. 8BLI is looking after installations for the American Foundation for the Blind. He has charge of this work for the local Boy Scout Council. Two sets have been installed and more are on the way. 8ASE-8AXG made a record for handling messages in his city. 8BSU-8AKZ worked the West Coast using a "fiver." 8BSK is experimenting. That's his hobby! 8DFM is planning a tour of the country. He will visit Western hams. "Mac" made some great records with us. The division that gets him will get one of our best.

VIRGINIA—Dist. No. 1: 3RT is a newcomer. 3AFX is getting out well. 3OL is trying to get license renewal papers made out to suit the government. 3SB is on the job despite discouraging results. 3MK has a good station. He uses one fifty watter with fine results. 3CKA uses two UV202's with a well-filtered rectifier. 3TI is using 3MK's "twenty watt" set while 3MK uses his transformer for supplying a 50 watter. 3CKK has completely rebuilt and is with us again. 3CUJU is erecting a 55 foot tower.

Dist. No. 2: 3BMN worked England, Mexico and the West Coast regularly. He handles a bunch of traffic. 3HM and 3UY are operating on 175 meters. 3APR is on nightly on 80 meters. 3CEL is changing to eighty meters.

Dist. No. 3: 3BGS handles his traffic with one five watter. 3BFE is on 76 meters three nights a week.

Dist. No. 4: 3BZ is using twenty meters now. He reports excellent results. 3CA gets g2KF on 45 meters much louder than on 80 meters. 3CKL has visited several hams in other parts of the division.

The D.S. at Norfolk called at the office of the R.I. and found that no complaints of QRM from hams had been filed there.

ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

UTAH—This state turns in a fine report. We welcome all new O.R.S. and wish them luck. New certificates will be mailed just as soon as possible.

Dist. No. 1: 6CJB is the only station in this district. 6CKI has turned in his O.R.S. certifictae for the summer.

Salt Lake City: There was some improvement in traffic handling this month. 6BLH handled most messages and takes top seat this month for Utah and the Division. 6BUH spent his time doing five meter work. Other men interested in five meter work in this section should get in touch with him. 6RM-6ZBS is again in operation. We expect this to be a traffic handling station. 6CRR is a new station. 6RV is awaiting his O.R.S. certificate. He is using the forty meter band. 6ZT has volunteered to install a few sets in homes of local blind people. The first set was received from the American Foundation for the Blind this month and has been installed.

A meeting of League members was held in Salt Lake City April 30th in an effort to build the organization here and to increase League activities. The following O.R.S. certificates have been cancelled: 6CKI, 6PE, 6APL and 6ZM. New O.R.S. are: 6BUI, 6RV, 6CRS, 6CRR and 6RV.

Traffic: 6BLH, 202; 6CRR, 57; 6RV, 13; 6RM, 2; 6BUH, 1.

COLORADO—Dist. No. 1: 9BVO was operating when possible. He will be more active when school closes.

Dist. No. 2: 9CDE and 9EAE handled most of the traffic. A new Colorado A. D. M. has been appointed.

Denver: 9WO and 9EAM are new O.R.S. 9EAM leads the state in traffic handling. 9EAM is one of Denver's most consistent stations. 9DQG and 9CAA have a joint summer station. 9CAA was on regularly. 9DED worked on twenty and forty meters. 9WO is operating on eight meters. 9CJY reports QRM from a certain YL. 9DUN gets out fine on eighty meters. 9EEA has a new 90 foot mast that makes the neighbors shudder every time the wind blows. Colorado cancellations: 9AMB. Appointments: 9CAA A.D.M. of Colorado, Denver C.M. 9CJY,, O.R.S. 9EAM, 9WO, 9CDW, 9ABC.

Traffic: 9EAM, 73; 9CAA, 62; 9DED, 26; 9WO, 8; 9BVO, 1; 9CDE, 10; 9EAE, 12.

WYOMING—7ZO has sold his transmitter and in the fall he will operate a new transmitter using twenty, forty and eighty meter waves. 7HX is operating consistently.

SOUTHEASTERN DIVISION
H. L. Reid, Mgr.

FLORIDA—It is not customary for us to complain of QRN, even though we have one of the worst QRN states in the Union. (Ask Don Mix, he knows!) The A.D.M. is grateful to his men for their splendid work in the face of the ever-increasing QRN, which is bad even on the shortest waves.

Individual mention of European work is discontinued. European work has become commonplace with practically every station in the state. Only foreign work of an unusual nature, such as extremely low power or long distance, will receive individual mention.

100% of Florida's stations have been on short waves for some time. Nearly all are using twenty and forty meter bands. The five meter band is being used somewhat for actual communication.

One year ago Miami was the deadest spot in Florida. Today Miami leads in traffic handling and in general activity. 4QY awards a monthly prize donated by the Burgess Battery Co., to the station handling most messages in his district. This prize is in addition to that given in the statewide "Station Conduct" contest. The Miami bunch holds regular meetings at 4FM, where their 'pep tanks' are replenished. 4FM is a new OBS whose broadcasts can be copied anywhere in the state in the worst kind of QRN. He handled most traffic this month. 4DM pushed him hard for the honors. 4VS has schedules with Jacksonville and Central Florida. He and 4IZ handled a bunch of traffic. 4NE and 4IG still have dependable contact with Cuba. 4DM, the Don Mix-Burgess station, uses several wavelengths and keeps a daily noon schedule with the home station, 9EK, on twenty meters. Schedules are also kept with Florida stations. 4QY is a good relay point for through traffic. He keeps a schedule with 4DM and Cuban 2BY.

Central Florida is alive with good stations. 4IU-4XE continues his short wave research work. He and 4WR are in actual communication using five meters. Much data is being obtained regarding high frequency work. 4TR is a new and active O.R.S. 4TV has a quarter KW tube on twenty meters. He has done good work at noon. 4JY also uses a quarter KW tube. He is installing a 1 KW twenty meter outfit. 4IZ reports an increased activity around Tampa. 4IZ was heard in Macoa, China, by R. Saraiva. 4BL has worked all distrocts and Porto Rico. 4IZ and 4OL are taking ship jobs. We shall miss them. 4QC and 4UA confine their work to forty and twenty meters.

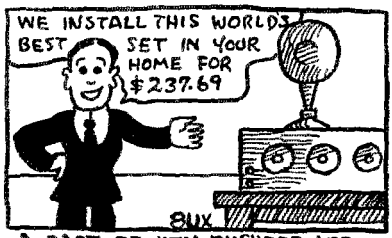
The Northern Florida fellows confine their work to the extremely short waves. A picked few stations are left for traffic handling. 4UK, 4KK and 4EZ handle most of this traffic. 4EZ has dependable contact with Georgia and South Carolina. 4UX keeps schedules with Southern Florida. 4UK, 4FS and 4DU are working on five and twenty meters. 4PI worked

Porto Rico in the daytime with a "fiver." 4FS has a code class of BCL's. They are displaying much enthusiasm. 4MS is reaching out and qualifying for an O.R.S. certificate.

Traffic: 4FM, 195; 4DM, 180; 4IZ, 107; 4TV, 54; 4TR, 52; 4VS, 85; 4FY, 42; 4QY, 24; 4IU, 27; 4UX, 25; 4KK, 21; 4EZ, 17; 4PB, 10; 4UK, 12; 4IG, 5; 4CH, 5; 4NE, 2.

ALABAMA—5DI and 5XA are the leading stations for the state. 5DI did good work with one operator. 5XA has several operators and moved a bunch of traffic.

Dist. No. 1: Traffic handling is still increasing. 5ACM is often QSO the West Coast. 5AEG is a new-



A RAFT OF KEY PUSHERS ARE RADIO SHOP MEN. 4MA RUNS A RADIO SHOP

comer. 5ADS won the best station contest of the Birmingham Radio Club. 5AMH is operating with an OM and an OW at the key. 5WS is rebuilding. 5VV is the same old veteran. 5ZAS and 5MI are operating on forty meters. They report working 200 miles with an input of 1½ watts. 5QP is a reliable traffic handler. 5ARI, 5ARJ and 5AEF are bringing Tuscaloosa to the front.

Dist. No. 2: 5AC is using the short waves. 5QF and 5AR are rebuilding. 5AOM is getting married. The YL's are taking this district by storm.

Dist. No. 3: Trum succeeds Brownell as A.D.M. Powell succeeds Trum as D.S. 5ATP and 5DI are new C.M.'s. Hallman is having difficulty keeping his mighty masts vertical. His eighty-five foot mast was blown down. 5AJP works on eighty meters regularly. 5ASU was heard on the West Coast. 5NL is working well. 5ADA is one of our best operators. Gantt is doing good work in Montgomery. 5ATP keeps a schedule with a Washington state station. 5AUJ, 5AUK and 5AUN are rebuilding their transmitters. 5AHK is a promising new station.

Dist. No. 4: 5XA's outstanding traffic work keeps this section of Alabama on the map.

Traffic: 5AAD, 6; 5ADA, 30; 5AEF, 8; 5AEG, 36; 5ACN, 3; 5AC, 24; 5ARI, 18; 5ASU, 6; 5ATP, 59; 5AMH, 54; 5AJP, 44; 5DI, 116; 5NL, 6; 5QK, 57; 5VV, 46; 5ZAS, 14; 5XA, 178.

SOUTH CAROLINA—QRN is with us again but it's not reducing our activities to any great extent. 4IT is on regularly handling his share of the traffic. A new transmitter has been installed at 4HW. 4RR-4VL is operating on twenty and forty meters.

Traffic: 4HW, 20; 4IT, 38; 4RR-4VL, 11.

PORTO RICO—4SA has succeeded in communicating with the United States at noontime, using twenty meters wavelength. He has copied several European amateurs on that wavelength at noon. 4JE is in touch with Europe nightly. He keeps traffic moving with the mainland also. 4KT is doing his part in handling traffic. 4BJ at Cantano is the star station for San Jose traffic. 4UR, 4RK and 4OI are on the air every night.

Traffic: 4SA, 17; 4JE, 13; 4KT, 3; 4UR, 6; 4RX, 5; 4OI, 11; 4BJ, 12.

WEST GULF DIVISION
Frank M. Corlett, Mgr.

NORTHERN TEXAS—5DW used twenty and forty meters for daylight work. He is noting stations operating off the amateur wavelengths. 5ADD, 5AKX and 5CC were busy with school work. 5NW was heard in France and Holland. 5NY has built a forty meter transmitter. 5AMB wants to test with someone on 40 and 20 meters. 5LI, using ing two "fivers" on 76 meters, was heard in England. 5AMS has a new 70 foot stick. 5AQL has been resting his ears from the Gulf QRN.

5AJT has not been in operation because of the pressure of his business. 5VU lost some antenna insulators in a hail storm. 5JF has built a new shack. He has organized an active Vigilance Committee. 5QV moved 137 messages "last" month. 5AFH admits there's only one YL for him now. 5ATX had trouble forwarding Texas traffic.

5UO is rebuilding. 5AMZ has his transmitter connected but hasn't made it oscillate yet. 5OQ needs some new tubes.

5ZH has been very busy. 5VD arranged a few schedules. 5AKF is the only active station at the top of the "panhandle."

Dallas: 5AJJ spends a lot of his time checking BCL complaints against Dallas amateur stations. 5HY worked all U.S. and Canadian districts. 5ACL worked 22AC twice this month. He has to mail some of his traffic for towns not having a radio station. 5AKN is getting a new plate supply for his transmitter. 5VF has a twenty, forty and eighty meter transmitter working. 5WC is having trouble with a four coil Meissner circuit. 5RG is touring California and Canada. 5CZ will handle the traffic in his absence.

Fort Worth: 5QI and 5NZ are busy with school work. 5OT operates a lot. 5RV has dismantled his station. 5AGQ worked a2YI the thirteenth of April. 5AQC has been busy with his business. 5AKQ is using an amplifier tube with good results.

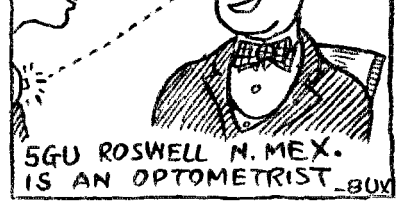
5CV has been studying preparatory to taking an examination for a commercial operator's license. Waco stations have been observing voluntary quiet hours from 8 to 10 p.m. 5AKZ operates week-ends only. 5AFU is still using the "fiver" put in when his "250" went west. 5AFU is learning to be a "Wire twister." 5ATX has been heard in England.

All reports are necessarily concise. When more *active* material is included it will be given as much space as it deserves. All reports that are printed in *QST* have to be "boiled down" in order that everyone be mentioned.

Traffic: 5JH, 12; 5CC, 2; 5NW, 2; 5LI, 14; 5ADD, 9; 5VU, 4. 5QY, 33; 5ATX, 9; 5AMG, 6; 5AKF, 13; 5AJJ, 18; 5HY, 40; 5ACL, 27; 5VF, 25; 5WC, 1; 5RG, 29; 5MZ, 6; 5AGQ, 22; 5AQC, 1. 5ASZ, 10; 5AKQ, 16; 5CV, 2; 5AKZ, 27; 5AFU, 11; 5ATX, 29.

SOUTHERN TEXAS—Nearly everyone is using the eighty meter wavelength. Daylight work on short waves makes communication through the QRN possible. The Radio Supervisor was in San Antonio giving examinations and inspecting stations.

The Bexar County Radio Ass'n sponsored a meeting of Southern "hams." Stations were visited, "eats" were provided and the fellows were entertained by



the speed contests and lying contests. Worth while prizes were awarded. The crowd was initiated into the order of "Knights of the Midnight Dial." No one regrets having passed through the ordeal. 5ZAI, 5APM, 5EW, SC3 of Fort Brown, and the A.D.M. of New Braunfels were present. Great credit belongs to Conroy and his committees for the manner in which they handled the meeting. Traffic Officials and transmitting amateurs had a fine meeting.

5EI and 5OX handled traffic regularly and over great distances. Galveston has two good stations in 5ZF-5AHH and 5AHM. 5AHM still does most of his work on 200 meters. Austin traffic is handled by 5ALR, 5FT and 5ZU. 5APM operates mostly during the early morning hours. 5MS changed for a five to a fifty watter. 5EW worked through the QRN on forty meters. 5HC, 5ACZ and 5UX did good work

in San Antonio. 5UX has erected his antenna again after a storm. 5ABJ has left the radio game without giving any reason. He wishes to extend his 73 to the gang.

Traffic: 5EW, 22; 5APM, 7; 5MS, 52; 5ACZ, 65; 5EI, 24; 5ZF-5AHH, 10; 5AHM, 7; 5UX, 6; 5HC, 12; 5ABJ, 6.

OKLAHOMA—Not much gossip of a scandalous nature came to light this month. The fellows are forming the excellent habit of reporting whether they handle any traffic or not. New men are getting in line. Interest is shown in forming railroad emergency routes. 5APZ asserts that he is still on the job. 5ADO and 5ANL upheld the honor of Dist. No. 1 Oklahoma. 5ANL uses the 150-200 meter band. 5ADO worked good DX, using an eighty meter wavelength. 5ABE was operating regularly. 5AGN melted the top off his "fifty." He is entering the "fourth" age of a ham soon. 5UJ had hard luck raising anyone. 5APG's "fiver" worked all districts on forty meters.

5ATV *is building a 40 to 130 meter* Browning-Drake neutrodyne. 5GJ unblushingly asserts that he is putting 500 watts in his antenna. 5JU is doing fine operating and organizing work. 5GO-DZ is arranging a 4 to 6 P.M. daily schedule. 5ASP joined the League.

Traffic: 5APG, 3; 5UJ, 7. 5ADO, 17; 5ANL, 16; 5GI, 31; 5ATV, 3; 5JU, 14; 5GO, 2.

CANADA

THERE has been a decided decrease in the DX aspirations of the gang and an equally decided increase in traffic in some of the divisions. A great many stations are on the forty meter band and a few are on the twenty meter band. Great things are expected this summer from the short wave transmissions.

The Winnipeg Division has lost its popular division manager, Jack Brickett, who has resigned because of ill health. Walter Pottle of Moose Jaw, Saskatchewan takes his place. All stations in the Winnipeg Division are requested to communicate with Pottle at *once* and to send him applications for appointment as official relay stations.

Bill Borrett, the I.A.R.U. representative of Canada is in Paris. He sailed the first of April and on arriving in England he visited the nearest London radio station, g5LF, and worked 1DJ of Halifax. $244.00 was contributed by the Canadian membership to send Bill across the pond. The A.R.R.L. has come to the rescue with the proposal that any unspent surplus of the $2,000.00 appropriated for this trip may be used to assist the Canadian representive. This amount is estimated at about $400.00 and it is sincerely hoped that the Canadian representative will be enabled to get away without spending all of this amount.

In conclusion let me urge the members in Canada to correspond with their division managers as much as possible letting them know exactly what is going on in their divisions. Lack of communication is the cause of much misunderstanding. A frequent exchange of communications by radio and mail is desirable.

MARITIME DIVISION
E. S. Campbell, Acting Mgr.

THE division has had a fairly active month in spite of bad working conditions. We have done our best to "carry on" while our D.M. was in Paris. Much QRM has been caused by stations CQing on the foreign wavebands. This is not playing the game fairly with stations who have "traffic East." Stations concerned will please note and show a little consideration for the other fellow.

We regret that one of our leading stations, 1BQ, has given up regular working. We miss his steady fist and clean-cut signals and wish him the best of luck in his future undertakings. The Thursday morning "family party" on 120 meters is still popular.

NEWFOUNDLAND—c8AR is attending the IARU conference in Paris. We expect great things from him when he returns. We wish him success in getting QSO stations outside Newfoundland.

PRINCE EDWARD ISLAND—c9AK cut loose and did some DX work. c1BZ is QRW with business. c1CO is using the 120 meter wavelength.

NEW BRUNSWICK—Good work was done by the few stations operating. c1EI worked u6's n'everything. The DX stations known when c1AF is on. He moves Westbound traffic well. c1AI did some wonderful low power work. c1AK has empty socket trouble. c1AM and c1AN are busy conducting tests. c1BO has trouble getting a decent plate supply. c1AB reports some new stations in his town.

NOVA SCOTIA—"Old Joe" (beg pardon!) c1AR has been doing his consistent transatlantic work. He is usually on the 40 meter band. He has worked many Italians this month. c1EB worked Spain, Italy, and the Rice Expedition in Brazil. A particularly nice piece of work was done by him and c1ED while c1AW was in the hospital in Halifax. Reports were sent to Mrs. 1AW every second night. Services like this make traffic handling worth while!

c1DQ has been doing good work on the eight meter band. c1AO is QRW with tests. One of our new station owners on the south shore got all "HET". He did good work just the same. c1AJ is moving to the U.S.A. He hopes to QSO the gang often. c1DJ was QSO f8FQ for an hour and a half. He and c1EB are experimenting on *very* low waves.

Will all the gang who have O.R.S. certificates please take a glance over them right now, and also on the 25th of each month? A faithful promise should be kept.

Traffic: c1AR, 12; c1EB, 9; c1AF, 10; c1EI, 14; c1AI, 8; c1DJ, 16.

ONTARIO DIVISION
W. M. Sutton, Mgr.

REORGANIZATION of the Ontario Division has progressed nicely and is nearly completed. We want more O. R. S. Application forms can be obtained from your A.D.M. The following are newly appointed and re-appointed O.R.S. in order of appointments: 9AL, 3NI, 9BJ, 3EFP, 3CK, 3VH, 3AZ 3PH, 3IA, 3ZD, 3ACO, 3FC, 3GG, 3BG, 3GL, 3XI, 3XX, 3ZB, 3VW, 3MV, 3CO, 3KQ, 3AEC, 3AA, 3FU, 3ABG and 3AEL. 3IA is a new OBS. We now have five in the division. 3AEC and 3ZB are new C.M's.

It is a long time since we had one of our stations in the Brass Pounder's League. 3MV made the grade with a little "fiver." (Vy FB, OM-D.M.) Let's try and put one station there every month. The Central Ontario gang are congratulated on their message handling this month. Our C.M. of Toronto has worked in the afternoon using twenty meters. 3AA has been the only station QSO N. Z.

EASTERN ONTARIO—3AEL is a new O.R.S. 3NF is on 75 meters. 3EN has a "fiver" working on forty meters. He gets out in great style. 3GV mourns the loss of his Mullard "30 watter." 3DO has an aerial at last. 3AF, 3VO and 3AFP have been heard on the 125 meter band and are also working on the shorter wavelengths. This report leaves the A.D.M. on the tenth of the month.

CENTRAL ONTARIO—3WV is rebuilding his station. 3WG has undergone an operation and is off the air for sometime. 3GL is a new O.R.S. working on 125 meters. Toronto came back to life

with a bang; handling more traffic than ever before. Great credit is due 3MV. With one "five watter" he connected regularly with the west coast and by consistent brass-pounding led the division in message handlings. 3MV is anxous to arrange a schedule with a station in Norfolk, Va. 3ACH is rebuilding. 3EL with 8 watts input worked 1000 miles using 80 meters. 3FC is QSO "sixes" on 40 meters. 9AL heard on twenty meters occasionally. 2TF and 3LY handled some traffic. 3CO-3ACU has the big bottles galloping nicely in tandem. 9BJ has a schedule with c5BZ. The Trans-Canada traffic is sliding through FB. 3VH has been busy getting the Toronto Vigilance Committee organized. (FB—D.M.) Traffic: 3MV-214; 9AL, 117; 3FC, 102; 3CO, 75. 3KQ, 82; 3BR, 46; 9BJ, 34; 3EL, 32; 3CK, 32; 3AZ, 25; 3LY, 10. 3TF, 8; 3WV, 5; 3PH, 5; 3VH, 4.

WESTERN ONTARIO—3KP has two new towners. 3ZD had tough luck with his faithful old "fiver". 3KA complains of QRM on 80 meters. 3DH and 3ZB are temporarily off with tube trouble. 3XX is on 40 meters with a fiver. He is getting out FB. 3VW uses batteries for plate and filament supply. 3FU has been heard in England.

All stations in St. Thomas are O.R.S. 3IA has everything going FB. 3ABG is a new station. 3ACO gets out fine. 3OM has quit the game. 3IA worked c5HC with one "fiver." He is installing "S" tubes. 3AA worked z2AC with an input of 80 watts. 3AEC copied both sides of the conversation. 3AA and 3AEC are O.R.S. 3MS is on 40 meters and does good work. 3XI makes the most QRM in Sarnia. He has worked LR on the Amazon. (Congrats, OM! —D.M.) 3YV and 3AD are heard occasionally. Things are quiet in Windsor. The A.D.M. would like to hear from every ham in Western Ontario and have a description of his station.

Traffic: 3XI, 35; 3AEC, 33; 3XX, 32; 3MS, 10. 3AA, 6; 3ZD, 4; 3DH, 1.

NORTHERN ONTARIO—3NI-3WS still works the west coast consistently on a lone "fiver." He has been unable to work Toronto, however. The station is now on 76 meters. He received a message from 3EN for a party in Fort William, phoned the message, and had a reply inside of 15 minutes. This was on 40 meters.

Traffic: 3NI-WS, 77.

QUEBEC DIVISION
J. V. Argyle, Mgr.

APRIL was an interesting month. Montreal amateurs were drawn closer together to protect their interests. Advertisements appeared in the newspapers, signed by a local lawyer, requesting complaints from B.C.L's against "amateur broadcasting stations." Counter-publicity was given us. Action was taken at two meetings which resulted in the lawyer being invited to hear our viewpoint. An agreement was reached by which six cases of QRM will be investigated by a vigilance committee within 21 days. The lawyer will give proper publicity to the findings of the Committee. The Division manager wishes to thank 2CT and 2HT for the loan of space and gifts of refreshments at these meetings.

2BE continues to do good work broadcasting code lessons for B.C.L's (all request numbers, too!) on Sunday afternoons. 2CG worked England, using a 39 meter wavelengths. 2BN has a new transmitter. He continues to do good Canadian work on Wednesdays. 2AM was heard in Italy. 2AU handled a good amount of traffic. 2AX was heard in India. 2FO and 2FI are using forty meters. 2BG, 2CG and 2CM are investigating the power leakage noise problem. 2BV is moving to a better location. 2CB has worked some "three's," using a loop transmitting antenna. 2CT has worked the Pacific Coast. 2HT is an old time operator who is with us again. 2DO has a fine phone transmitter.

VANCOUVER DIVISION
Wm. J. Rowan, Mgr.

TRAFFIC is moving satisfactorily in spite of much experimenting. 5BA is in touch with NZ and Australia. He handles much traffic. The QRM situation is very satisfactory. Vigilance Committee has been on the job in Vancouver but has had little to do. The chaps who cause slight interference observe quiet hours voluntarily. (FB, tnx—D.M.) Calgary and Victoria do not need committees as there are not enough active stations to warrant it.

5BA, 5AN, 5GF and 5GO have had a stab at 40 meter work. That wavelength works well east and west until ten p.m. P.S.T. Sixth district stations are as loud in daylight as at night.

The D.M. wishes to announce the appointment of Earle Chang 5GO as City Manager for Greater Vancouver. O.R.S. reports should be mailed to reach him before the eighth of the month following the operating month. 5HB can't raise stations when the hook is full but they come back by dozens when it's empty. 5DS operated but one night this month. 5BZ handled a bunch of traffic in two weeks of operation. 5HS suggests that traffic handlers call "CQ Vr" instead of spelling out Vancouver. 5AH is getting his fifty watter ready to work. 5CR is going to leave the 150-200 meter band soon. 5BM is a new O.R.S. 5AF and 5BJ have been suffering from local QRM, power leaks and violet ray machines, sometimes making reception impossible. 5BJ is on 125 meters. He works as far east as Toronto. 5BF has installed a 50 watt Northern Electric tube. Since 5GF bought one the number in use has been constantly increasing. One of the gang got a letter from the Radio Supervisor. A lady said she was getting "terrible" interference during broadcast period even with all the doors and windows closed. Subsequent investigation revealed the fact that the ham in question had been testing a particularly cautious loud speaker on local music with his window open. Hi!

5AS has been working in a power plant. 5HC has joined the ranks of the professional rock-crushers. 5HH has been heard in NZ. The A.R. R.L. has a "op" on Herchell Island. One of the engineers sent there to install a Government station is a ham. He was intending to install a transmitting set working on the short waves but, unfortunately, all the "junk" including the Government's was sunk with the "Lady Kindersley" in the Arctic Ocean.

5CT is busy getting his transmitter working on the ultrashort waves. 5HK is still a resident of Victoria.

Traffic is moving well throughout Alberta. 4DQ has been logged in NZ and Hawaii. He is QRW with the OW fixing a separate room for the apparatus. 4IO has a M.O. circuit perking. 4CW manages to hold aloof from the key. (In spring, etc. Hi!—D.M.)

Traffic: 4IO, 4; 4DQ, 13; 5CT, 11; 5BZ, 57; 5HS, 37; 5BA, 26; 5AN, 14; 5AF, 13; 5BM, 12; 5CE, 8; 5HB, 8; 5GF, 6. 5BF, 3; 5DS, 1; 5BJ, 1.

WINNIPEG DIVISION
W. R. Pottle, Mgr.

JACK BRICKETT has resigned as D.M. because of sickness. However, 4HH is not quitting brass-pounding by any means.

4AV burned out his German "thirty". Our guess is that German tubes don't like having English applied to their grid-circuits. 4FA and 4FC are using eighty meters. 4CB operates each Wednesday night from 10:30 p.m. to 1:00 a.m. He uses both 75 and 125 meters. 4AA is using two fifty watt tubes. 4AQ is a new low power station. 4DQ and 4IQ "chin wag" together most week-ends. 4IX is experimenting with microphones.

4AJ will be on for the summer when he returns from the University. 4FV now handles most of the Regina traffic. 4BR is doing development work on a new "super-het" scheme of his. Jacobson, "op" at 10-AB, is installing a transmitter of his own, 4RF is with us again: 4BB is busy with the YL's. 4EO gets out fine. 4ER and 4AO are working on the short waves. Ex-4EC is winding a generator. O.B. S. and O.R.S. will be appointed as soon as possible. Now is the time to get some of those harmonics and growls out of the set and to do some operating. We want as many stations on the air Wednesday evenings as possible. Let's go gang!