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TESTS**

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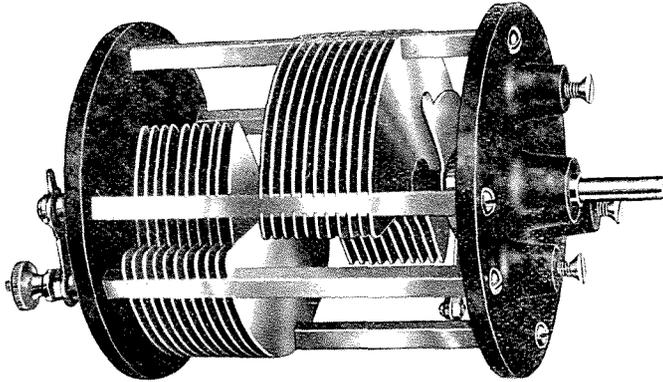
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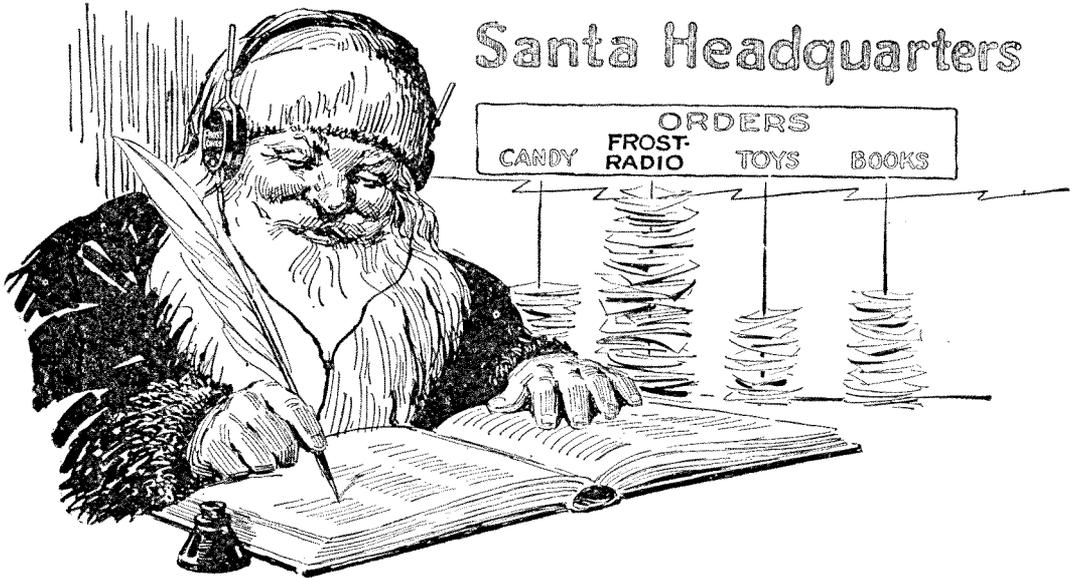
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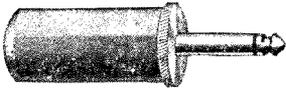
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The American Radio Relay League, Inc., is a national non-commercial association of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, for orderly operating, and for the practical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

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a board of seventeen Directors, elected every two years by the general membership. The officers, in turn, are elected by the Directors from their number. 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.

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QST

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

VOLUME VI

DECEMBER, 1922

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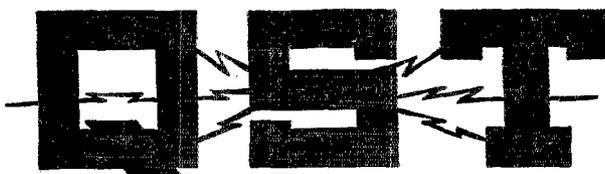
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THE AMERICAN RADIO RELAY LEAGUE, Inc.
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The Old Man

This photographic study was designed by Mr. M. B. Grogan, Publicity Committee Chairman, The Milwaukee Amateurs' Radio Club (Local Section, A.R.E.L.), in the studio of the Grogan Photo System. The picture is supposed to portray "T.O.M." all dressed up in his "Sunday-go-meeting" clothes in the act of listening in for a few minutes while waiting for his O.W. to get ready to accompany him. From the expression on his face we think he is getting either an earful of regular QRM or some Rotten Broadcasting.



A Magazine Devoted Exclusively to the Radio Amateur

QRV for the Tests?

AMATEUR Radio all over the world recently took up a notch in its belt, rolled up its sleeves, and for the last several months has been quietly but energetically at work preparing for the big International Amateur classic, the Transatlantic Tests. In the United States and Canada on this side, and Britain and France on the other, in particular, amateurs have been busy for it is these countries which will chiefly participate.

found. At this writing the exact limits of the band of wave lengths in which European amateurs will transmit are not known, but this information will be broadcast thruout the country by the A.R.R.L. Operating Department shortly before the tests begin.

At the request of the League, the Wireless Society of London has accepted responsibility for the arrangements in Great Britain and appointed a sub-committee to



By the time this issue of *QST* reaches our readers the final details will be known to all amateurs. Elsewhere in this issue tables appear giving the schedules, the first ten days of which are occupied by American and Canadian transmission, with Europe listening, and the last ten days *vice versa*. North American transmission is divided into free-for-all periods and individual periods for the better stations making the mark in the October preliminaries. The European transmission periods will be divided equally each night between British and French amateurs, for which another table will be

deal with the matter, consisting of Major H. Hamilton, D.S.O., Commander C. F. Phillips, A.M.I.E.E., Mr. P. R. Coursey, B.Sc., A.M.I.E.E., Mr. G. G. Blake, M.I. E.E., and Capt. Norman Lea, B.Sc., A.M. I.E.E. This committee is receiving transmission entries, assigning places in the schedules, and will be the recipient of the sealed code letters from this side and the official judges of British reception. In addition the Wireless Society of London is arranging for transmission by amateurs from two special stations being constructed near London. The Manchester Wireless

Society, affiliated with the Wireless Society of London, is now almost ready for tests from their 1 k.w. tube station at Baguley, call letters 2FZ, and have also made application for license for a second station at Swinton, near Manchester, to work alternately with the first one. The British men are going about their organization in their usual thorough manner and every indication is that they will be successful.

In France an executive council has been formed of representatives of the three national societies having amateur members, known as the *Comite Francais des Essais Transatlantiques*, with offices at 19, Blvd. de la Republique, Versailles. The committee consists of Messrs. Dr. Pierre Corret (of *la Societe Francaise d'Etude de T.S.F., des Amis de la T.S.F.*, and the *Radio-Club de France*), president; Hemardinquer (S.F.E.T.S.F. and A.T.S.F.), secretary; Deloy (S.F.E.T.S.F. and A.T.S.F.); Givelet (R.C.F.); Jacquot (S.F.E.T.S.F. and A.T.S.F.); Le Mee (A.T.S.F.); Rousset (S.F.E.T.S.F. and A.T.S.F.); Waddington (S.F.E.T.S.F. and A.T.S.F.). The good wishes of General Ferrie, Inspector of the Military Telegraph Services, and the particular interest which he takes in the transatlantic tests for the study of short wave lengths, have afforded this committee the good fortune of the technical advice of Messrs. Jouaust, Mesney and Clavier, of the Military Telegraphic Laboratories.

The French committee has made an urgent appeal to all French amateurs for their participation, no matter how small their means of reception or transmission may seem to them. French transmission hopes center chiefly on 8AB, which has been completely rebuilt and now has three new towers and a 1 k.w. tube set using 25 cycles A.C. unrectified on the plate.

The commercial radio companies have displayed a very kind interest in our amateur activity and it is expected that their

high-powered stations at WII, New Brunswick, MUU, Carnarvon, Wales, and UFT, Saint-Assise, very possibly will broadcast reports of the reception in the respective countries. Details will be announced later in this country by amateur broadcast.

The British already are at work. At this writing we have just received a cablegram from Mr. W. W. Burnham of London advising of the reception on a Burndept-III 3-valve set as recently described in *QST*, of C.W. signals from U.S. stations 2ZK, 100 watt C.W. set at New Rochelle, N.Y., and 2HJ, Port Chester, N.Y., 150 watts. These stations were heard on Sunday morning Oct. 29th, in the Preliminaries, and the transmission has been verified. Mr. Burnham also reports signals from two uncertain stations whose call letters he believed to be 5VL and 9CT. We are unable to confirm these but are inclined to believe that they represent 5HL or 5JL, and 9CTE, all of whom have good C.W. sets and were on at the times in question, the 9 being heard on Oct. 31. Altho the exact identity may never be known, it shows that *the 5's and 9's are getting over!* Mr. Coursey further reports the reception in London of 2EL and 2AJL, verified, and Mr. W. R. Burne cables from Manchester the unverified reception of 1CX. We're going over big this year, fellows. Possibly our success will be so great that at the conclusion of the tests the Traffic Manager will arrange for direct two-way communication between the most successful American station and the leading contender in Europe, with our respective countries maintaining quiet and listening in, while, for the first time in history, amateur trans-ocean operation takes place!

To do these things requires a very full measure of co-operation, and every reader is now asked to turn to our Editorial section and carefully study the message of the month.

K.B.W.

The Transatlantic Finals

By F. H. Schnell, Traffic Manager

FOR the purpose of getting you started right on the Final Transatlantic Tests, which are given in Greenwich Mean Time (G.M.T.), we present some examples of your local standard time converted to G.M.T. and we urge a careful study of these examples that every one will understand exactly what must be done to avoid possible confusion. An explanation of G.M.T. appeared in October *QST*, page 42, and no further details will be given here.

You should, without the slightest difficulty, be able to convert your local standard time to G.M.T. from the following table.

*The midnight referred to may be the beginning of December 12th in England while in the U. S. or Canada it is still December 11th, according to our local standard time. Therefore, we suggest that you take a spare clock and move it ahead 5 hours if you use E.S.T., 6 hours for C.S.T., 7 hours for M.S.T., and 8 hours for P.S.T. Be governed by this clock and remember that a new day begins at MIDNIGHT, G.M.T. All tests will start at Midnight G.M.T. which is 7:00 P.M. Eastern Standard Time. For Example: Midnight to 0015 G.M.T. of December 12th is the same as 7:00 P.M. to 7:15 P.M. December 11th E.S.T. Since

G.M.T.	E.S.T.	C.S.T.	M.S.T.	P.S.T.
*Midnight	7:00 P.M.	6:00 P.M.	5:00 P.M.	4:00 P.M.
0100	8:00 P.M.	7:00 P.M.	6:00 P.M.	5:00 P.M.
0200	9:00 P.M.	8:00 P.M.	7:00 P.M.	6:00 P.M.
0300	10:00 P.M.	9:00 P.M.	8:00 P.M.	7:00 P.M.
0400	11:00 P.M.	10:00 P.M.	9:00 P.M.	8:00 P.M.
0500	Midnight	11:00 P.M.	10:00 P.M.	9:00 P.M.
0600	1:00 A.M.	Midnight	11:00 P.M.	10:00 P.M.

most of our tests are carried on between Midnight and 0600 G.M.T. we point out that there is no A.M. or P.M. in G.M.T. Up to 1200 G.M.T. (noon) the hours are reckoned as such but instead of writing one o'clock as 1:00 P.M., it is expressed as 1200 G.M.T. 3:14 P.M. would be written 1514 G.M.T., etc.

QRO First Ten Days QRO

Six hours, from midnight to 0600 G.M.T., have been divided into two periods; the first, midnight to 0230 G.M.T., for the "free-for-all," and the second, 0230 to 0600 G.M.T., for the individual transmitters who qualified for the final tests by covering a distance of 1200 air-line miles or greater in the preliminary tests, Oct. 25th to November 3rd.

WII on 13,600 meters at 0700 G.M.T. to be on the safe side, as MUU is rather hard to copy through the other high-powered stations. This has been arranged for through the kindness of Mr. W. A. Winterbottom, Traffic Manager of the Radio Corporation of America.

France will report result of reception of American and Canadian amateur signals each day at 0710 G.M.T. (2:10 A.M. E.S.T.) via UFT on 14,300 meters which will be repeated back by WSO on 11,500 meters.

An alphabetical code has been arranged which will be used in reporting call letters of stations heard. This code is given for the benefit of all amateurs. The French code is given also, which may be used because of the better understandng of it by

TRANS-ATLANTIC TESTS

Free-for-all schedule of American and Canadian amateur transmitters.

TIME	Tues. 12th	Wed. 13th	Thurs. 14th	Fri. 15th	Sat. 16th	Sun. 17th	Mon. 18th	Tues. 19th	Wed. 20th	Thurs. 21st
Mid-0015	C	1	2	3	4	5	6	7	8	9
0015-0030	1	2	3	4	5	6	7	8	9	C
0030-0045	2	3	4	5	6	7	8	9	C	1
0045-0100	3	4	5	6	7	8	9	C	1	2
0100-0115	4	5	6	7	8	9	C	1	2	3
0115-0130	5	6	7	8	9	C	1	2	3	4
0130-0145	6	7	8	9	C	1	2	3	4	5
0145-0200	7	8	9	C	1	2	3	4	5	6
0200-0215	8	9	C	1	2	3	4	5	6	7
0215-0230	9	C	1	2	3	4	5	6	7	8

Time shown in Greenwich Mean Time. Dates shown are in December, 1922. Numerals indicate radio inspection districts, the letter "C" standing for all Canadian Amateurs, who for the purpose of these tests are grouped as one district.

The procedure will take the form of a call address to "Test," calling three times and signing three times, repeating as often as necessary or desired during the period of time assigned to each district. Example: TEST TEST TEST de 6ZX 6ZX 6ZX.

Every licensed American and Canadian amateur transmitter is invited to participate in these tests. Regular League traffic shall be carried on without interruption or fear of jamming other stations.

English stations will report back to us through MUU on 14,200 meters, Carnarvon, Wales, at 0700 G.M.T. (2:00 A.M. E.S.T.) which report will be re-transmitted by WII on 13,600 meters, New Brunswick, N. J., a minute or two later. Listen for

French amateurs. Thus it will be seen that in American and English code, 6ZAC would be transmitted SIX ZED ABLE CAST; in French code, SIX ZOE ANDRE CAMILLE.

QRT Last Ten Days QRX

We hope it will be unnecessary to make individual request of any amateur, A.R.R.L. member or not, to keep his transmitter absolutely silent during the last ten days of the tests, December 22nd to 31st, inclusive, midnight to 0600 G.M.T., when we listen for French and English amateurs. In the name of good sportsmanship we ask every American and Canadian amateur to QRT during our reception periods. We want an absolutely silent air—100% so. (See editorial pages, this issue.)

Alphabetical Code

AMERICAN and ENGLISH

A—Able	N—Nan
B—Boy	O—Oboe
C—Cast	P—Pup
D—Dog	Q—Quack
E—Easy	R—Ram
F—Fox	S—Sail
G—George	T—Tare
H—Have	U—Unit
I—Item	V—Vice
J—Jug	W—Watch
K—King	X—Xray
L—Love	Y—Yoke
M—Mike	Z—Zed

FRENCH

A—Andre	N—Noemi
B—Berthe	O—Octave
C—Camille	P—Pierre
D—Denise	Q—Quimper
E—Emile	R—Rene
F—Francois	S—Suzanne
G—Georges	T—Therese
H—Henri	U—Ursule
I—Irene	V—Victor
J—Jeanne	W—Wagon
K—Kepi	X—Xavier
L—Louis	Y—Yvonne
M—Marie	Z—Zoe

Because of the limited number of transmitters in France and England, two periods have been set aside for their transmission. Each period is of three hours duration, one for France and one for England, alternating each night. At this writing the wave lengths of the European transmitters are not known, but this information will be broadcasted by our amateur stations in due time. We believe a wave length of 180 to 200 meters or thereabouts will be used, with a possibility of 440 meters in one or two instances.

We do not care to know the call letters or code letters of any transmitting stations, although a copy of call letters and code words will be kept under seal at A.R.R.L. Headquarters for verification of any reception by any American or Canadian amateur, who is requested to report his reception by wire (night letter) to A.R.R.L. Headquarters immediately after the conclusion of the tests each night. Upon verification of such report WII will transmit a message to England and France at 2000 G.M.T. (3:00 P.M. E.S.T.) using the American and English alphabetical code. 2FZ, England, would be sent TWO FOX ZED.

The schedule of English and French Amateur transmission periods is given in the table at the bottom of this page, in which "E" represents British amateurs and "F" the French amateurs.

Summary

Following is a summary of the foregoing:

December 4th to 9th, amateur broadcasting of wave lengths to be used by English and French stations and other information received too late for this issue of QST.

December 12th to 21st, from midnight to 0230 G.M.T., "free-for-all" transmissions.

December 12th to 21st, from 0230 to 0600 G.M.T., individual transmitters.

December 13th to 22nd, 0700 G.M.T.,—MUU on 14,200 meters and WII on 13,600 meters broadcast results of English reception of American and Canadian amateur signals.

December 22nd to 31st, from midnight to 0600 G.M.T.,—All U. S. and Canadian amateur transmitters QRT and QRX for reception of English and French signals, and report daily to A.R.R.L. Headquarters results of any reception for verification.

December 22nd to 31st, 2000 G.M.T.,—WII on 13,600 meters will transmit results of our reception to England and France, which will be repeated back by MUU on 14,200 meters.

Schedules of French and English Amateur transmitters—A.R.R.L. Trans-Atlantic Tests, December 22-31, 1922.

	Fri. Dec. 22	Sat. Dec. 23	Sun. Dec. 24	Mon. Dec. 25	Tues. Dec. 26	Wed. Dec. 27	Thur. Dec. 28	Fri. Dec. 29	Sat. Dec. 30	Sun. Dec. 31
Mid. To 0300	E	F	E	F	E	F	E	F	E	F
0300 To 0600	F	E	F	E	F	E	F	E	F	E

"E" represents English Amateurs.

"F" represents French Amateurs.

Time—Greenwich Mean Time.

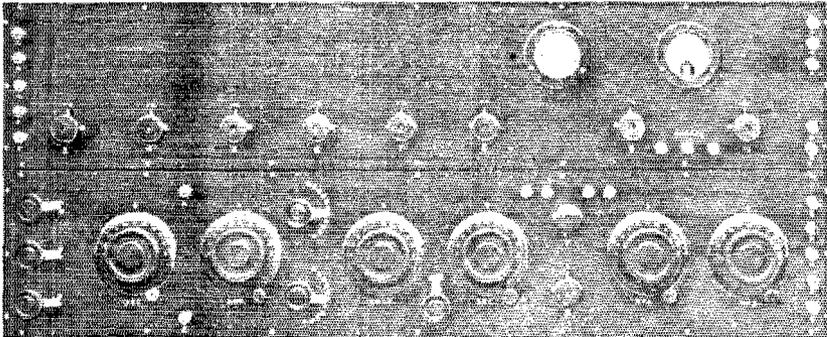
Notes on a Super-Heterodyne

By C. R. Leutz

DURING the past five years considerable expert engineering effort has been directed towards finding an efficient and satisfactory method of amplifying radio frequency energy at short wave-lengths. A glance at the characteristic curves of the present available detector tubes will show that a very weak signal cannot be rectified efficiently or completely, and in view of this point additional audio frequency amplification would not be of assistance. All detector or rectifier characteristic curves indicate that the resultant audio frequency current is approximately proportional to the square of the impressed radio frequency voltage. Therefore, the efficiency of the detector decreases rapidly with decrease of signal until a stage is reached at which the detector almost ceases to function.

special tubes with a view to reducing the internal capacity by special design, and they have designed special transformers; but the efficient results in each case have been confined to a narrow band of wave-lengths, for example 300 to 700 meters. Any attempt to increase the effective working wave-length band, particularly toward lower waves, has resulted in failure. It is obvious that if the receiver is to have a commercial value a range of wave-lengths from say 100 to 850 meters must be available with a minimum amount of adjustments and with uniform efficiency over the entire wave-length range.

In December, 1919, Major E. H. Armstrong gave publicity to an indirect method of obtaining short wave amplification, called the Super-Heterodyne. The idea is to reduce the incoming frequency which

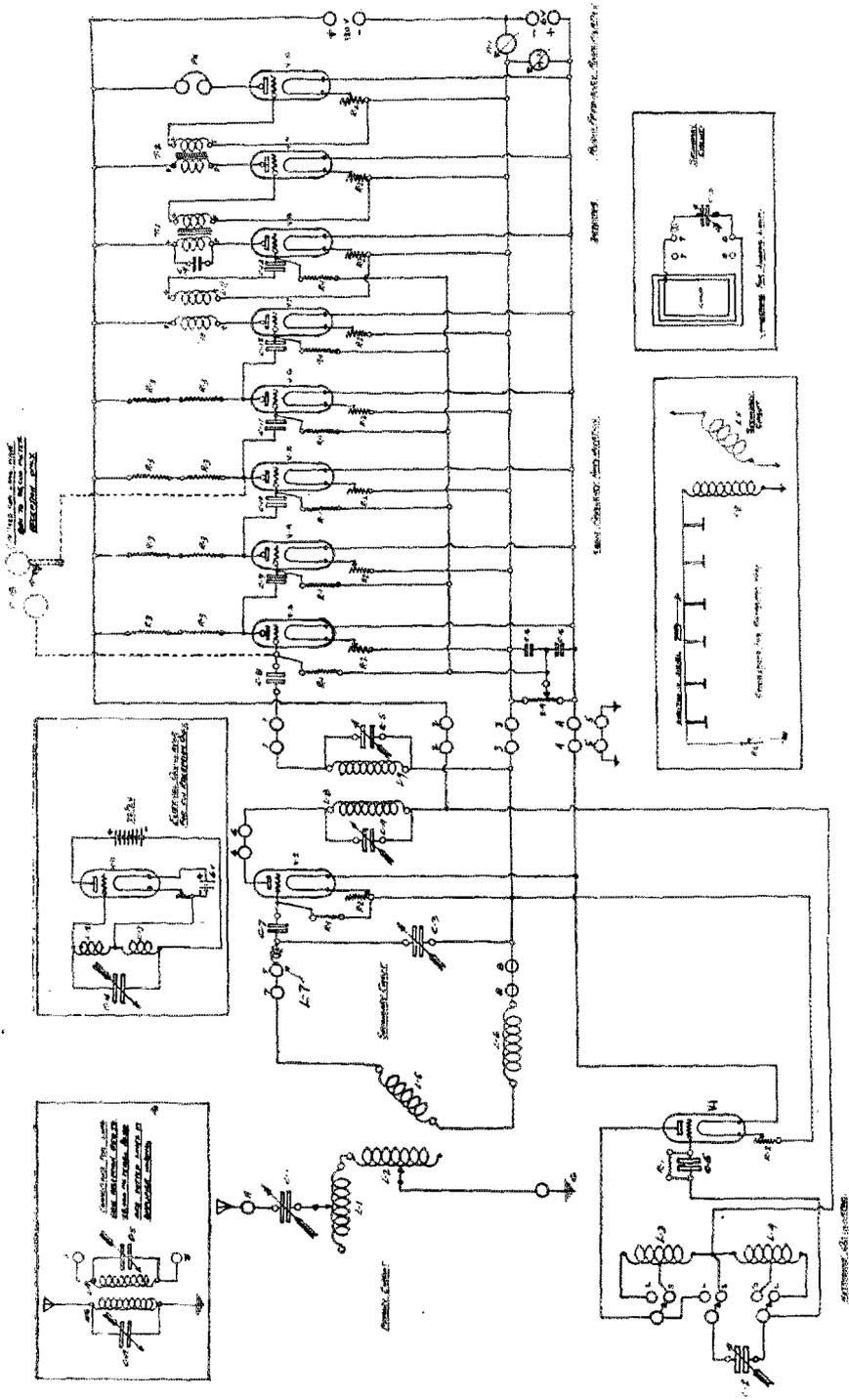


Front View of the Completed Set

Many types of amplifiers have been devised to magnify the radio frequency energy before applying same to the detector and many have worked very well on long wave-lengths, with either resistance, inductance or capacity couplings. However, most attempts to use the same method of coupling for extremely high frequencies corresponding to wave-lengths of 50 to 200 meters have been complete failures. There is a good reason for this: the low capacity reactance existing between the structural elements of the amplifying tubes acts as a short circuit around the coupling medium, and prevents a difference of potential being transferred to the next tube. This short circuit can be eliminated by tuning with a parallel inductance but this leads to difficulties in the form of complicated adjustments and local oscillations. The French and English have constructed

may be, say 1,500,000 cycles (200 meters), to some suitable super-audible frequency which can be amplified efficiently, then passing this current thru a radio frequency amplifier and finally rectifying and carrying on to one or two stages of audio frequency amplification if desired. Transformation of the incoming signal frequency to the amplifier frequency is usually accomplished by a heterodyne oscillator and rectifier.

This action can be readily understood by referring to the wiring diagram. The primary circuit, C-1 L-1 L-2, is tuned in resonance to the incoming signal frequency, say, 1,500,000 cycles. The secondary circuit, L-5 L-6 L-7 and C-3, is tuned to resonance to the incoming signal frequency, coupling between these two circuits being adjusted between L-2 and L-5. V-2 is a rectifier or usual detector tube and V-1 with the associated parts is an external



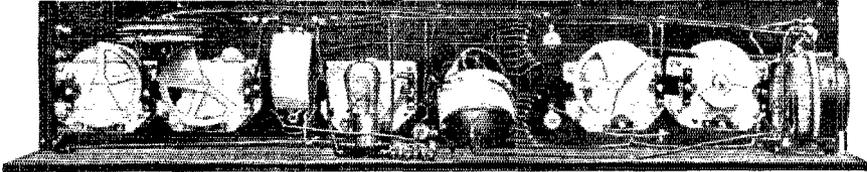
heterodyne oscillator. V-3 to V-8 is a resistance coupled radio frequency amplifier designed to operate efficiently at a frequency of 100,000 cycles, corresponding to 3,000 meters, the last stage of this amplifier (V-8) also acting as a detector-rectifier. The amplifier on the input side is coupled to the first detector by the tuned circuits C-4 L-8, and C-5 L-9, and on the output side to the detector and audio-frequency amplifier tubes. L-7 is in inductive relation to L-4 of the heterodyne oscillator.

Now assume that the heterodyne oscillator is tuned to 1,400,000 cycles or 1,600,000 cycles; either position will produce a beat frequency of 100,000 cycles with respect to an incoming 200-meter signal. The combined currents of 1,500,000 cycles and 1,400,000 cycles (or 1,600,000) are then rectified by the detector V-2 to produce in circuit (C-4 L-8) a direct current with a superimposed 100,000-cycle component. This

rements are 180° out of phase or in phase, a minimum when 90° out of phase.

In ordinary heterodyning the initial phase difference will vary for each wave train from spark transmitters, as the initial phase difference depends on the sparking at the transmitter. The frequency of the two currents are practically the same, and the length of the wave-train is small compared with the time required to form a complete beat at audible frequencies. Different wave trains are therefore rectified with different degrees of efficiency and the plate current becomes irregular, resulting in a rough note. However, the beat frequency is high in the super-heterodyne, several beats per wave-train being established, and the phase angle between the two currents changes thru a number of cycles and the initial phase difference need no longer be considered.

The adjustments for I.C.W. and telephony are a combination of the previous



Rear View of the Tuner

100,000-cycle component is then amplified by V-3, V-4, V-5, V-6, V-7, and rectified by V-8, and the resultant audio frequency note amplified by the audio amplifying tubes V-9 and V-10. In the case of continuous wave reception, the best method of obtaining the audible note in the phones is to employ a second heterodyne adjustable to 1,000 cycles on either side of the amplifier frequency of 90,000 to 101,000 cycles, and loosely couple this to the amplifier circuit. It is also possible to receive continuous wave signals by producing oscillations in the amplifier, of a slightly higher or lower frequency than the amplifier tuned transformer wave-lengths. Oscillation and also regenerative amplification can be controlled by the special condenser C-13. This special condenser obviously must have a very small minimum capacity or it will be difficult to stop the amplifier from oscillating.

On this set reception of spark and telephone signals can be carried on with equal efficiency and without any distortion, which is odd inasmuch as heterodyning a spark or telephone signal with an ordinary regenerative receiver will result in loss of note or tone. The efficiency of rectification of the incoming signal when heterodyning depends upon the phase relation with the local current. The efficiency of the rectification is a maximum when the two cur-

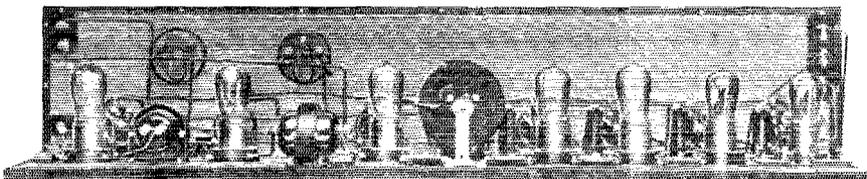
mentioned adjustments for spark and C.W. reception, bearing in mind that the amplifier circuits should be damped slightly to prevent distortion.

The present equipment being used is shown schematically in the wiring diagram and actually in the photographs. The radio frequency amplifier circuit is designed for 3,000 meters. Special attention has been paid to the effective design of the receiver circuits. L-2 and L-5 consist of a 180° coupler and give a 180° scale movement to a 90° coil relation. The condenser C-3 has shaped plates to give a straight line wave-length variation. The maximum capacity of this condenser is very low and the values of inductance large in order to develop the largest possible potential on the detector grid. In view of the fact that a loud signal is produced with only a fraction of a volt on the detector grid, the ratio of L to C is important. To keep the high frequency resistance low, the coils are designed to have very low values of distributed capacity and the condensers are of special design having only $1/10$ the resistance of the ordinary condensers. The inductance L-5 is used in parallel to C-3 to give the first wave-length range of 150 to 450 meters, and L-6 is connected in series to L-5 and both in parallel to C-3 for the second range of 310 to 850 meters.

As the mechanical distance between L-8 dyne V-1 are not used of course for long wave reception. and L-9 is increased the tuning becomes sharper and a very high degree of selectivity can be obtained. The output resistors R-3 (about 100,000 ohms) can be replaced by iron-core chokes of proper value. The resistors can also be replaced by inductances and capacities tuned to 3,000 meters, giving the additional advantage of having the amplifier reject all frequencies but that to which it is tuned. The last stage of radio frequency amplification is coupled by the tuned transformer L-10 L-11. A potentiometer is provided for the common grid leaks (about 5 megohms) on the radio amplifier tubes proving a means

Material increases in signal audibility can be had by inserting a variometer in the detector plate lead, at post 6, 6, tuning the plate for regenerative amplification. In place of tuning the plate it is also possible to provide inductive coupling between the plate and grid of the detector V-2 in the usual manner.

The results obtained with this unit have been very satisfactory. The antenna used was 125 feet long and fifty feet high located in New York City. On 600 meters, spark signals from NGE (Miami) NAU (San Juan) NAR (Key West) NAW



Rear View of the Amplifier

to adjust the characteristic curves to a point where maximum amplification is obtained without chance of the amplifier oscillating. The complete equipment is built in two units each entirely shielded with 10-oz. copper. The phone cords are also shielded with Belden-Braid. The shields are connected to the negative side of the filament battery.

To use a loop the links are taken out at posts 8 and 7 and loop inserted there, using C-3 to tune. For long wave reception, a large inductance is connected in place of L-9 for the secondary and that coupled to the antenna, the resistance-coupled amplifier then working direct as a R.F.A. without the heterodyne, in which work it operates well down to 850 meters. The long wave reception would not be possible if a tuned radio-frequency amplifier were employed. The first rectifier V-2 and hetero-

(Cuba) NAP (Pensacola) NAO (New Orleans) VCE (Cape Race) and ships around the Canal Zone were received with sufficient audibility to be heard fifty feet from the telephones. On 360 meters radio-telephone signals from KYW (Chicago) WOC (Davenport) WWJ (Detroit) WHB (Kansas City) WSB (Atlanta) WHA (Wisconsin) were received with the same signal audibility. On 200 meters, a continuous stream of 8th, 9th, 4th and 5th district amateurs were heard. All these results were obtained in the late summer with unusual heavy static conditions.

[These data, photographs and drawings of this design were supplied thru the courtesy of the Experimenters Information Service of 220 West 42nd Street, New York, who have available for distribution complete sets of blueprints covering the entire construction of this equipment.—Ed.]

“Notes on the Design of Small C. W. Transformers”

By A. H. Babcock, 6ZAF

UNDER this caption, there was printed in the July issue, p. 29, an article that calls for more extended notice. The theory of the action of small C.W. transformers is so simple that there is no excuse whatever for any misunderstanding of this subject.

The ideal transformer would consist of one or more coils of wire surrounding or partially embedded in a laminated iron

core; where the coils would have zero resistance and the iron would be free from losses. Obviously these ideal conditions can not be realized in practice; but that a well designed transformer approaches very closely to the ideal is evidenced by the fact that large transformers often test up to 99 per cent. efficiency.

Neglecting the very low resistance of the primary coil, the only opposition to the flow

of current is the reacting electro-motive force induced in the primary coil by the rapid reversals of the magnetization of the core, which are due to the alternations of the supply current.

When the secondary coil is open, just enough primary current flows to produce the magnetization necessary to generate a reacting e.m.f. equal and opposite to the voltage of the supply circuit. This is called the magnetizing current. When the secondary coil is closed, an additional current, called the load current, flows in the primary coil. The magnetizing effect of this load current is exactly equal and opposite to that of the secondary current; hence under all conditions the combined magnetizing action of the primary and secondary coils produces just that magnetization of the core which will make the reacting e.m.f. of the primary coil equal to the voltage of the supply circuit to which the primary of the transformer is connected.

Evidently then the first step in transformer design is to determine the primary turns necessary to generate an e.m.f. equal to the supply circuit voltage; and then to determine what the primary current will be so that the proper size wire may be used in the primary coil, and thus prevent excessive heating. The fundamental equation for any transformer or reactive coil is:

- Let E=the induced e.m.f. in volts.
- F=the total magnetic flux.
- B=the lines of force per square inch.
- A=the cross section of the magnetic circuit in square inches.
- N=the cycles per second.
- T=the number of turns of the primary coil.

Then:

$$E = \frac{4.44 \text{ NFT}}{100,000,000}$$

which is the most important formula used in the design of transformers.

The next step is to determine the total flux. Long experience shows that if we assume 50,000 lines per square inch for the ordinary iron used in the design of small 60-cycle transformers, we will be on safe ground. Then.

F=50,000 x A, and for a 60 cycle circuit N=60

Substituting these values in the fundamental equation we have

$$E = \frac{4.44 \times 60 \times 50,000 \times AT}{100,000,000}$$

from which

$$E = \frac{AT}{7.5}$$

therefore, for any given primary voltage, the product of the number of square inches

cross section of the iron and the number of turns, is always the same. Evidently, then, we may make the number of turns large, and have a small core; or if the core is made large, the number of turns becomes small. In the first case it means more work winding on a lot of turns; and more expense, because copper wire, especially in small sizes, is more expensive than iron.

For a practical application, let us assume we have a core on which we wish to wind a primary coil for a 115 volt supply circuit; and that the core cross-section measures 10 square inches. Transposing the simplified equation gives us now

$$T = 7.5 \times \frac{E}{A}$$

which says that for a transformer to be used on a 60-cycle supply circuit, the primary turns are found by multiplying the supply circuit voltage by 7.5 and dividing the product by the number of square inches of the cross section of the transformer core, measured at right angles to the laminations, and at the part of the core that is enclosed by the coil. By substituting, we now have

$$T = \frac{7.5 \times 115}{10}$$

and our primary coil then has 86 turns.

The next question is what size of wire to use. To determine this it is necessary to decide upon the capacity of the transformer. Let us assume that the load will be two U.V.203 tubes, both plate and filament. Then the plate circuit will require 2 x 1000 x 0.15 = 300 watts; the filaments 2 x 12 x 6.5 = 156 watts, allow for transformer losses 14 watts, and the primary coil input becomes 500 watts;

from which the primary current is seen to be 4.35 amperes. If we allow 1500 circular mils per ampere (which is a safe allowance), the wire must be 6500 circular mils, which is #12 B&S.

The proper number of turns for the other coils may be determined directly from the primary turns, as follows. Since the primary voltage is 115 and the number of turns 86, the volts per turn is equal to 115/86 or 1.337, and the volts per turn is the same for all coils of any given transformer. Hence, to compute the number of turns for any other coil, divide the volts of that coil by the volts per turn: for example, the plate circuit e.m.f. is 1000 volts and 1000/1.337 = 748. The filament circuit e.m.f. is 12 volts and 12/1.337 = 9.

The plate current is 0.15 amperes per tube or 0.3 if the tubes are in multiple, and the circular mils = 1500 x 0.3 or 450, the nearest largest size wire being #23.

The filament current is 6.5 amperes per tube or 13 if the tubes are in multiple, and the c.m. = 1500 x 13 or 19,500, the nearest commercial size to which is #6. If the filament coil were wound in a single layer, outside the other coils, it would be perfectly safe to use #8 B&S.

All the foregoing has been based on the assumption that a core was available. Now let us determine what to do when we have no core, but expect to cut up some sheet iron and make a core.

By transposing our original simplified equation we obtain

$$A = 7.5 \times \frac{E}{T}$$

which says that the area of cross section of the core required is equal to 7.5 times the volts per turn. If the volts per turn are about 1 to 1.5 the number of turns will be about right. Then for a good, safe and convenient design, the area required will be between $7\frac{1}{2}$ and 11 square inches.

Caution: Be sure to cut your plates long enough and space the legs of the core wide enough apart so that the coils and their insulation can be placed in position.

The same equations can be used for other frequencies by changing the 7.5 to 12 for 25 cycles, and to 9 for 50 cycles.

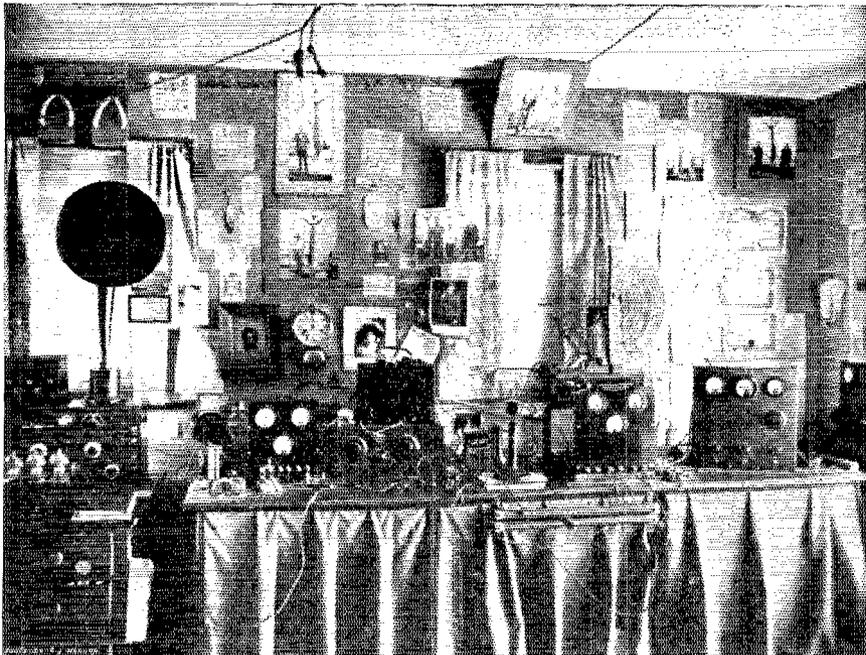
Some More Records

6XAD, the experimental station of Major Lawrence Mott, O.R.C., Signal Corps, at Avalon, Catalina Island, Calif., has added new laurels unto itself, in that its C.W. signals have been heard by engineers of the Amalgamated Wireless, Limited, in Australasia. The headquarters of this company are in Sydney, Australia, and they are in daily communication with Carnarvon, Wales. Major Mott intends a series of tests with

the engineers of the Australian station during the coming winter, arrangements having been made to this end.

This distance appears to be roughly 6,600 miles, which to the best of our belief is the world's amateur long-distance transmission record.

6XAD continues to do the remarkable work for which we gave it credit in our columns recently. Really it is amazing how this one station reaches out into places



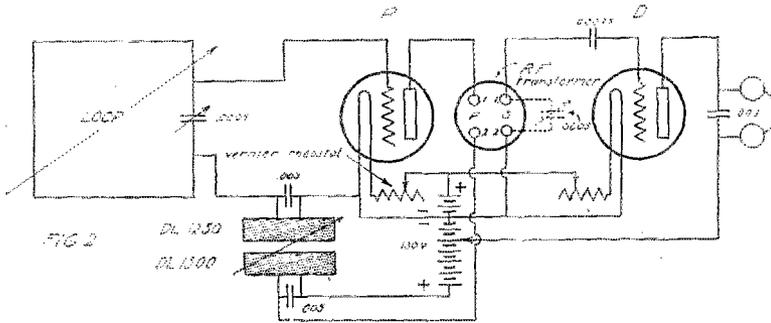
The Operating Table at 6MOTT

frequency by varying the coupling between the two honeycombs. In fact the writer prefers the inductively coupled circuit to the capacity coupled one inasmuch as the latter is not as flexible as the former. The coupling adjustment between the honeycombs is, however, quite critical but it can readily be handled if a vernier control is provided.

To those unfamiliar with the action of a super-regenerative circuit it may be well to give a few hints on its operation. After the set has been connected as per Fig. 1, it is best to determine first whether the high frequency circuit will oscillate. To do this remove the DL-1250 from its mounting; leave everything else connected as shown in the figure. The two variable condensers should be turned thru their scale length to determine at what settings of the condensers the plate and grid circuits are in resonance. This procedure is the same as on a tuned-plate regenerator, so no difficul-

With the set connected as shown in Fig. 1 and adjusted for C.W. reception, the writer had no difficulty in raising a station two blocks away. Signals were reported as QSA. The other station's oscillating receiver could be plainly heard while the test was being carried out. So it is apparent that we may still experience interference from nearby receivers even tho loops are used. Furthermore the experiment helps to show why it is possible to receive C.W. with the super circuit. It must be remembered, however, that the coupling between the honeycombs must not be reduced any more than is absolutely necessary to heterodyne the C.W. By the use of a vernier rheostat in the filament circuit of R, the proper adjustment for C.W. may be more readily attained.

For those who want substantial proof that the super works for DX reception, a list of calls heard in about five days of listening, is given herewith:



ty should be experienced from this source. To determine whether the low-frequency circuit will oscillate, insert the DL-1250 in its mounting and couple the honeycombs closely. If a high pitched squeal is not heard, reverse the connections to one of the honeycombs. This should correct the trouble. Once the low-frequency circuit is oscillating you are ready for business. Adjust the two variable condensers to settings that you know bring the plate and grid circuits to resonance. Decrease the coupling between the honeycombs slowly. As this is done a point will be reached where a hissing sound is heard in the phones (similar to the sound in an ordinary regenerator when the latter approaches the oscillating point). Just below where this hiss becomes a roar, is the best adjustment for fone, QSA I.C.W. and spark, altho the latter comes in very badly distorted. For C.W. and QRZ I.C.W., the coupling between the honeycombs is reduced so as to pass the point where the roar occurs. When this is done, the high and low frequency circuits both oscillate at once. This fact was proven in an experiment conducted by the writer.

1AEU, 1AJP, 1AJU, 1AZU, 1BKQ, 1BUT, 1CCZ, 1CHJ, 1CMP, 1CPN, 1ES, 1FB, 1II, 1VY, 1XP, 3ALN, 3APR, 3AT, 3BGT, 3BHM, 3BIT, 3BNU, 3BUP, 3BVL, 3BZ, 3CA, 3CBN, 3EM, 3HG, 3LP, 3MH, 3MK, 3TJ, 3ZO, 3ZU, 3ZZ, 4BX, 4DC, 4EA, 4FT, 4GH, 8AB, 8ADR, 8ADH, 8AFD, 8AHR, 8AIO, 8ALT, 8ATU, 8AQO, 8AWY, 8BDB, 8BPH, 8BVR, 8BXH, 8CUR, 8DAK, 8OW, 8SB, 8SP, 8UE, 8UC, 8WR, 8ZZ, 9ARA, 9BYA, 9EI, 9II.

Fig. 2 shows an interesting circuit developed from Fig. 1. It will be seen that a radio frequency transformer is substituted for the two inductances shown in Fig. 1. The idea in substituting the R. F. transformer was to try to get rid of the tuned plate circuit of the first tube (one variable adjustment) and at the same time avoid the use of a tickler. It was found necessary, however, in order to cover wave-lengths from 180 to 360 meters to shunt a variable condenser across the secondary of the transformer as shown by the dotted lines. The introduction of this variable adjustment of course counteracted the advantage of eliminating the tuned plate of the first tube.

The circuit has possibilities, however, as a wave-length band of about 50 meters can be covered without adjusting the condenser across the secondary. The writer suggests that someone try a transformer with looser coupling between the primary and secondary.

Signals were nearly as QSA on this arrangement as on the set described above. The control is of course very simple there being only two controls over a rather broad wave-length band. The writer advises the trying of the circuit in Fig. 1 first, inasmuch as it is quite simple and can usually be relied upon to work. Fig. 2 should only be tried after the action of the super-regenerator is more clearly understood.

The circuit shown in Fig. 4 of July QST was tried but it did not come up to ex-

pectations. First of all, every time a variable element is adjusted it sounds as tho 14 different heterodynes are going at once, and secondly it is very critical. The locally-generated beats drown out all weak signals. The circuits shown in Figs. 3 and 4 of September QST were also tried. Fig 3 is OK but the squeal of the variation frequency makes the reception of weak signals difficult. Fig. 4 is OK for 200 meter work but the writer was unable to obtain the super effect above 270 meters.

The writer did not try connecting a one-stage audio amplifier to the circuit shown in Fig. 1 but there is little doubt that it can be done, altho the writer can't see the use of audio amplifiers when signals nearly break the fone diaphragms when no audio stages are used.

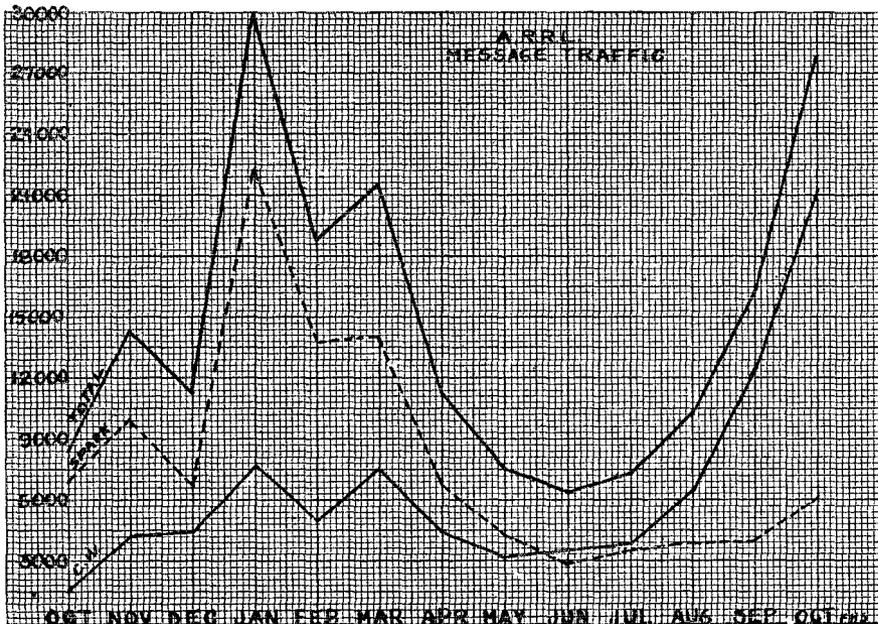
A. R. R. L. Message Traffic

By F. H. Schnell, Traffic Manager

ABOUT a year ago we thought it would be a good idea to know how many citizen messages we handled every month. It was in October, 1921, that as accurate count was started as could be obtained through the offices of the Division Managers of the number of stations handling traffic, on spark and C.W., and the total messages

handled in each division month by month. These data have since been gathered every month.

From these figures the accompanying curves were taken to show graphically just where we stand; also is shown the progress made by C.W. stations, which have out-classed the spark stations in message traffic handling.



The figures at the left indicate the number of messages handled. The months are from October, 1921, to October, 1922, the last being included to show the enormous increase in traffic over October, 1921. Total messages are represented by the heavy upper curve; spark, because of its damped wave, the dotted line of course; with C.W., the continuous wave transmitter, represented by the continuous curve.

The slump in traffic during December of last year is due to the fact that ten days of the best part of the month were given over to the Trans-Atlantic Tests when practically all message-handling was at a standstill. Except for this, no doubt the rise to the highest peak in January would have been a steady one from November.

The drop in February may be accounted for in several ways. Upon learning that C.W. stations were more successful than spark stations in the Transatlantic Tests, a great number of stations saw the possibilities of C.W. more pronounced and ceased operation with their spark stations, installing C.W. Then, too, came the overwhelming interest by the public and amateurs were inclined to abandon their regular work for fear of causing too much interference to the inexperienced listener.

March saw a gradual return to the game

with a decided increase over the previous month for C.W. traffic. April, as usual, came with the interest in radio overshadowed by the interest of the great outdoors, where almost every radio amateur spends his time in recuperating from the effects of a hard winter's work. That drop is to be expected every year when static again becomes King of the Ether. Had hundreds of radio dealers who decided to sell radio apparatus when the boom came, known or foreseen the summer season and bought accordingly, many of them would still be in business and those who are still here would not have most of their capital tied up in apparatus, which has been on their shelves for many months, hard to move.

Slowly, but steadily, C.W. has been dethroning the spark and in June the good old spark had to relinquish the honors to C.W. Youth will be served, even in radio. From June to the present month the spark has made a strong effort to come back, but those efforts have been brushed aside by the ever-rushing progressive C.W. stations to whose numbers many spark stations are converted every month.

The only question that remains is "How many months will it be before spark stations disappear entirely?"

Comment les Appeler?

(How shall we call them?)

By Lloyd Jacquet, 2KT

FRENCH amateurs are getting the unmistakable radio bug. Here they were tickled to death by getting into communication with fellows in the same city, and then with other hams in surrounding "departments." And even after a few really good hams, such as SAB, 8AC, and a few more, have developed DX stations, they couldn't believe that they could ever reach England, or Holland, or Spain for that matter.

At present, there are only Dutch, English, Spanish and French amateurs to muss up the ether of Europe. Imagine what will happen when the whole large family get going at once! It appears, however, that the French amateurs have so far been the champions in long distance communication, and they have reached out in all of the above mentioned countries, besides Germany, and Italy.

Now there is one thing which is worrying the French methodical and scientific mind, and which is causing considerable thought in amateur radio circles, and which, further, has caused their own amateur society to appoint a commission to

study the question. And the big question is this: How shall we tell who is who, when the Americans, the English, and the French are transmitting? In other words,



supposing 8AA in the U.S. is calling 20M in London, will 8AA in Paris answer 20M in N. J., U.S.A.???? Or will 20M, whoever he happens to be, be flattered or insulted because 8AA won't give him a tumble?

There may arise international complications, which these diplomatic French amateurs are anxious to avoid from the beginning. Now, they have suggested a very sensible answer to the problem.

They have looked over the method used by American and Canadian operators, to distinguish between communications from either kind of stations, and frankly, they do not like it. It is done this way, as many of us know: American stations use the word "de" between their call and the station called, if working in their own country. If they are in communication with a Canadian station, they will say "aa" and in answer will get "fm." Canadian stations working between themselves use a "v." Don't you see the number of various signs that would have to be made up to accommodate all of the amateurs in the world? You would need a regular text book on "transmitting etiquette," besides your book on rules and regulations and the call book.

But here is what the S.A.T.S.F. has to say about that. Let the amateurs in each country use the initial of the name of their country, to precede their call, when they are calling a foreign station. Thus, U.S. stations could prefix their call letters with the letter "A" for America, the French "F," the English "E," the Canadians "C," the Dutch "H," the Spaniards "S," and so on. Thus, if you heard stations A1BKQ de F8AB, you would know that 1BKQ in the U.S. was being called by 8AB in France. This would not in anyway affect the official call letters, and would provide a method of determining exactly what station was called.

Besides, the French believe that it could be possible to take all of the amateur calls, pool them together, and do exactly what the nations did at the London Convention: allot certain numbers and series to various countries. This would mean the calling of an International Amateur Congress, and the complete reassignment of all call letters the world over. Thus, all of the call letters which could be had by combinations including 1AAA and 9ZZZ, (which would amount to several hundred thousands) could be distributed to various countries very much in the same way that the letters of the alphabet were passed around to the various nations for commercial and military calls. This last method, though the best, is probably not the most practical, for it would certainly upset things here in the U.S., where everything would have to be done over again. Hundreds of thousands of records would have to be fixed over again, and many of us would not like to give up pet call letters, which we have possessed ever since there were radio inspectors.

Don't forget that the French amateur looks forward to international radio communication between amateurs of various countries as a certainty, and that he believes that it will come true and be a daily feat very shortly. He is anxious to get things straightened out from the beginning. And there is no use of us sitting back, and saying that we can't do anything about it. It is our place more than anyone else's, to see to it that radio amateur law is made and enforced. It is our duty to advise, point the way, and take the initiative.

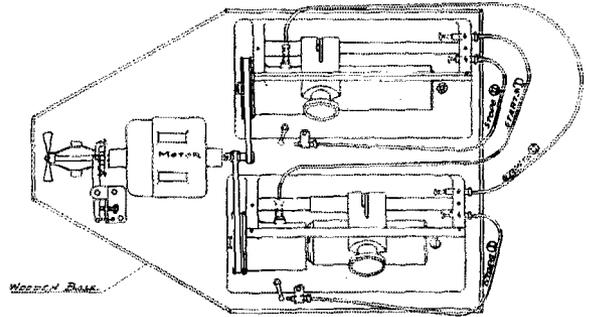
How about some suggestions from you lawyers? How about getting down to business, and preparing material for that first International Amateur Congress, which is just as sure to take place as the exchange of messages across the Atlantic and Pacific?

[Editor's Note: Our A.R.R.L. Operating Department has the matter of international identification under study and expects to have a well-considered plan to put forward shortly. Mr. Deloy's proposal, as presented to American amateurs by Mr. Jacquet, is an excellent one, one which can be adopted at any time without legal complications, and one which is vastly superior to any system of arbitrary "intermediates" made up of numerals, accented letters, etc. It has the disadvantage, however, of lengthening the call materially and of increasing the possibilities of misreading a faint signal. Personally we favor a somewhat similar scheme of using the initials of the nations as the actual intermediate. For example, suppose we let U represent the United States, use C for Canada, Q for Cuba, G for Great Britain, F for France, N for Holland, A for Argentina, etc. Then U.S. amateurs working each other will use "u" for an intermediate instead of "de," as, for example, 6ZAC u 1BKQ. Similarly Canadians might use "c": 3BP c 3GN; the Frenchmen "f": 8AA f 8AB; the British "g": 2FZ g 2JK. Then when stations of different nationalities are working, the intermediate can consist of a combination of the two national intermediates, the called nationality first, followed by the national calling, the same as the order in which the calls themselves are given. Thus, a U.S. station calling France might use "8AB fu 1BHW," and the reply would be "1BHW uf 8AB." By this process the nationality of all calls would be instantly discernible if one knew the countries for which the single letters stood. At the present time, however, international law prescribes the use of "de" and the permission of our respective governments probably would have to be got for the change. What do our readers think?—K.B.W.]

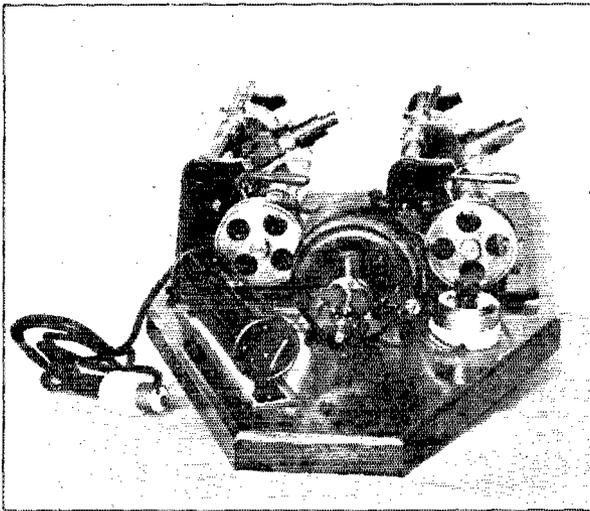
Recording Signals

THE Columbia Graphophone Co., makers of the "Dictaphone," etc., recently prepared an adaptation of their machines for use at the radio station of the "New York Times" for recording high-speed radiotelegraph signals which we understand has worked very successfully.

The Dictaphone is a device used in business establishments for recording office dictation of correspondence, etc., upon wax phonograph cylinders, the records being transcribed at leisure and at any desired speed by the typist. Two such dictating machines were arranged upon a common base as shown in our



illustrations and fitted with automatic stops whereby upon completely filling one cylinder the recording would automatically be switched to the other drum which meanwhile had had a fresh cylinder put upon it by the attendant, and so on.



The telephone receiver is attached direct to the speaker casting on the machine in place of a speaking tube, and accordingly the signals are recorded. The machine is run at a high speed of 150 or more r.p.m. for receiving, and then slowed down for transcribing by the typist who understands and reads the signals.

Now to rob some office having dictaphone equipment!

K.B.W.

Some C.W. Experiments and Results

By L. W. Hatry, 5XV

IT'S the Ed's fault, absotively, and ye may lay it to that! After that editorial of his in the August number of our gug-glorious organ, entitled "Your Pen in Hand" whose else could it be? Anyway, after reading that I decided that even my dope ought to get across with such a dearth of material. So—but enuf foolishness—to biz—

If you have a high powered C.W. set

(anything over 5 watts) this article will most likely not be of interest to you so pass it up; but the bird with a fiver or with the intentions of putting one up will find this of some help—perhaps.

Notice Fig. 1 (professional touch, eh, wot?) In starting out with my C.W. experiments I used a W. E. "J" tube as the power tube. Now among other things I wanted to use as little material to make

this set as possible, hence the very elementary arrangement in Fig. 1. I did not want to buy a grid tuning condenser so I made the grid inductance have 42 turns and seemed to hit it right. Using B batteries on the plate with a voltage of 250 I obtained 0.3 amp. antenna current and worked 5JB at Hot Springs, Ark., and 5ZAT at Oklahoma City, Okla. Both distances are over 300 miles and were done in June with heavy QRN prevailing. This communication was overheard by 9AIY in Milwaukee, which of course is a consider-

coupling till set just oscillates or just quits and then retune grid tuning condenser for best antenna current, with a final adjustment of the grid-plate coupling.

The next thing I did was to try the hookup in Fig. 3 to see if it was better than the one in Fig. 2 and can say that if my meter didn't lie then Fig. 3 cost about .2 amp., as it brought my antenna current down to .6 with A.C. plate voltage.

And the next thing I tried out was the arrangement of Fig. 4, hoping to see my meter show a raise in radiation. It did

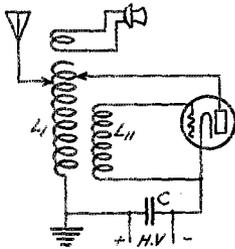


FIG 1

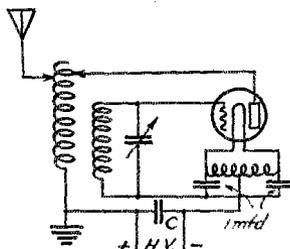


FIG 2

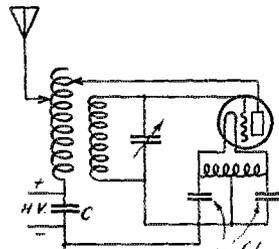


FIG 3

ably greater distance. Daily work with Galveston and Houston, 65 to 85 miles, was done regularly at any time. Radiation did not seem to change any with an increase of wave-length to 250 meters. Also with this arrangement there is not a very critical point for the plate adjustment on L' . L' is 25 turns of 7x22 bare copper aerial wire on a 4" form. Using the shorted turn method of modulation I was heard faintly in Galveston on voice in the daylight—I did not try the fone at night, QRN being too heavy.

My next step was using the circuit in Fig. 2 and reducing my grid inductance to 32 turns to tune with the variable. I increased my wave-length to 275 meters approx., too. Despite what seems to be obvious changes for the better my radiation did not increase in the least. So I stuck in a U.V.202 instead of the J (the J quit anyway) and raised my antenna current to 0.5 amp. with 300v. plate batteries and .80 with 550 A.C. Again I experimented with both Figs. 1 and 2 with neither better than the other except that Fig. 1 is the more economical arrangement. With Fig. 2 the plate tap off L' is critical to the turn. In tuning, set the aerial clip, then set the plate clip same place and adjust the grid tuning condenser for best antenna current; then adjust the plate clip for best antenna current and follow up with loosening grid-plate

not, tho, and in considering this the fact that my set is only a 5-watt is, I believe, the whole reason. With a higher powered set an increase would show, no doubt. These things I found; that the r.f. chokes 1 and 2 are very critical; that is, No. 1 is, for No. 2 is absolutely useless and if No. 1 is out the set won't work. No 2 should be left out. I won't hazard a guess as to what use No. 2 would be in a higher

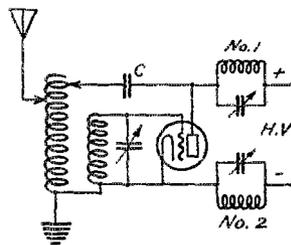


FIG. 4

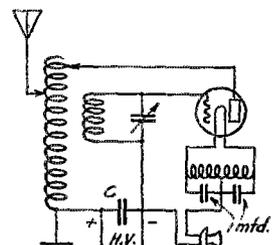


FIG. 5

powered set but I believe it would not be necessary. I found that the stopping condenser C has to be a husky with decent plates, as it has to carry a real current. At first I used a Somerville .002 1000v. tested C.W. condenser which only cost 60¢ and which is as good as the next for a by-pass across the H. V. transformer as in Fig. 2, and ruined it. It did not puncture (its voltage rating is conservative at 1000v.) but it got so hot that it could

not be touched and melted the tinfoil used in it. So I stuck in a U.C.1014 which has a 2 amp. rating and had no further trouble. For the boy building his own I would say use glass and copper foil or plates, as it makes a good efficient condenser. As I said before, the condenser for a by-pass in Fig. 2, C, can be one of those Somerville paper ones and should be subjected to this treatment before using as it will avoid any chance of the condenser acting uppish; dip in melted paraffine until thoroly permeated and then squeeze flat and tight until cooled, when you will have a compact unvarying capacity with better insulation.

Another thing tried was the modulation method in Fig. 5 and it showed up better than the shorted-turn method with the same radiation and was reported much clearer. It requires a low-amp microfone. Also it is best not to use one of the microphones requiring 12 volts or more. In

fact the N-S or Skinderviken microfone buttons, mounted, work fine with it.

As a final touch it must be said that Fig. 1, simple as it is, is as good as the rest and costs the least. Build like this: L' 20 turns #14 wire at least, L" 40 turns #20 wire and inductively coupled to L' with coupling variable in any degree. L' is 4" diameter and L" 3 inches.

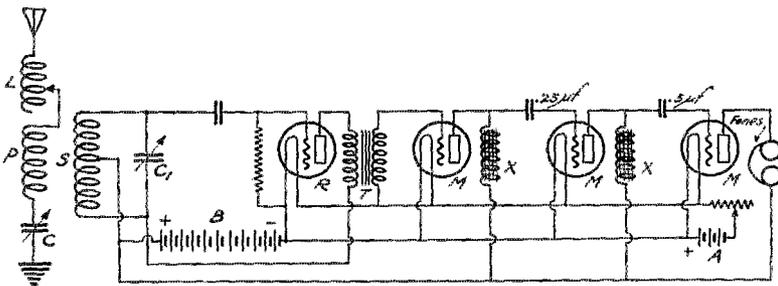
Oh yes, forgot to tell you. Aerial was originally a 4-wire flat-top with 3.3-foot separation of wires and cage lead-in. Changed to a 4-wire cage with 7 ft. cross pieces and cage lead in and my antenna current increased from .8 to 1.3. Went over old aerial for defects and found everything F.B. so use your own judgment. Me, I'm a booster for the cage now. And say, you birds putting up aerials, separate those wires wide. 5 ft. separation of wires in a cage is .1 amp better than 3 ft.

Darn, forgot again. A grid condenser and leak does not improve in any of the above cases on my set. S'long.

A French Amateur's Circuit

In our May issue we reported the rather remarkable reception on Feb. 5th of the spark signals of station 1ARY in Paris on a regenerative detector and three stages of audio amplification. The French amateur, Mr. G. Perroux, used a one-wire aerial 35 ft. long stretched horizontally across the court of a building at a height of 5 ft. and had an oblique lead-in 65 ft. long slanting back upon the horizontal part, with this end of the aerial point

Mr. Perroux' is a real amateur station—one in which experiments are constantly going on and in which the apparatus in use hardly remains the same from one day to the next. The circuit diagram shows the hook-up used at the time 1ARY was copied. No radio-frequency amplification is used, but a regenerative detector and three stages of L.F. amplification in a circuit in which the reaction is controlled by unusual methods.



E.S.E. So unusual is such reception that we have waited eagerly for information on the equipment or methods used, in the belief that if they showed anything out of the ordinary the innovations possibly might be the reason for the performance and therefore worthy of careful study. We were not disappointed, for "La T.S.F. Moderne" recently contained a description of the set from which we abstract the following.

The antenna load coil, L, is a 3-inch cylinder 6 inches long, the winding having 10 taps, while the actual primary, P, is a basket-wound coil of 42 turns on a 2-inch center. The secondary, S, is a similar basket-weave of 31 turns on a 2½-inch center, tapped at the 16th turn. Fine tuning is accomplished by the air variable condensers, which have a maximum capacity of .0007 mfd. Very loose coupling is used

between P and S, the usual separation being 8 to 10 inches.

There is nothing unusual about the amplifier, the first stage being transformer coupled and the remaining two reactance-capacity coupled, the reactances consisting of the secondaries of small spark coils.

The actual tuning of this apparatus is done in the ordinary manner but the method for obtaining and controlling the reaction is quite unusual. The secondary, S, has a center tap going to filament (via the B battery), and so acts like a heterodyne or oscillator coil, with half of its inductance in the grid circuit and the other in the plate circuit. Now normally this circuit would oscillate continually but the antenna-ground circuit acts as the secondary circuit of a miniature transmitter and extracts energy from the secondary circuit faster than it can be generated—if the coupling between P and S is tightened—so that the tube does not oscillate. By choos-

ing a convenient value of coupling, any desired condition may be obtained; the tube may be brot right to the limit of regeneration without oscillation, for the reception of damped or modulated signals, or it may be permitted to oscillate for heterodyne reception and the amplitude of oscillation will be controllable by the value of P/S coupling.

The operation of this system insures resonance between primary and secondary, for it is only at resonance that the control of the primary over the secondary will be evident; and resonance will be very sharply defined, with the sharpest of tuning. In fact this circuit should "balance out by clicks" in a manner that would delight the heart of old man Groves himself. There are many pretty possibilities in its use and we recommend it to our "circuit-hounds" who are looking for something promising to develop.

—K.B.W.

Saving your Neck

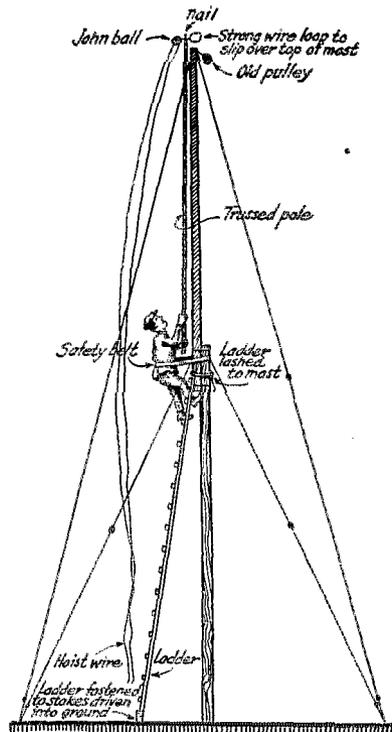
By Norman R. Hood, 7ZO

DURING the past year I have read of instances where at least three amateurs have been killed and more hurt shinning slim sixty-foot "two-by-four" masts to replace a broken aerial hoist rope. Why a hundred and seventy-five pound ham should take a notion to shin such sky-scrappers is more than we know, but they will do it and they will get hurt. In order to save some other ham's neck I am writing this, the method many broken ropes have been replaced at 7ZO and the final method in which broken ropes can happen no more.

Seeing the rope break from the pulley of a nice fifty-footer is as bad as four five-watters going west in parallel. As a general rule our masts are not any too sturdy and when a rope parts it is either shin the mast, risking our neck, or take the mast down and replace the rope and then the tremendous task of raising the mast again with our limited hoisting facilities. Several ropes have parted at various stations owned by the writer, but they part no more. The stranded wire clothes lines which can be had for less money than a rope of equal length would cost has solved the problem at 7ZO. Yes, the ohm chasers and high frequency bug hunters will say that wire hoist lines will reduce your overall aerial efficiency but is it not better to reduce this than to reduce yourself to a soggy mass at the base of a wrecked 2 x 4 mast?

Pulleys also come in for their share of grief. Wire ropes will invariably "climb" the wheel in a small pulley so the familiar

strain insulators with which we break up guy wires make excellent pulleys. They



are sometimes known as Johnny Balls. They offer a smooth-running surface for the wire rope, and no chance to get out. If the insulator breaks, your aerial remains up due to the fact that the wire to which the insulator is fastened is looped thru the hoist wire. This method has been used at 7ZO now for three years, the same set of Johnny-Ball pulleys, the same wire rope hoists, and the same set of masts have stood three bucking winters and look as tho they could remain three more winters. Before this method was taken several ropes were replaced in the following manner, the last one put up being the wire rope, and since then have forgotten about this side of amateur grief.

The masts at 7ZO are 4 x 4, being 48 feet high, about the average height of most of our masts. This method of replacing ropes is applicable to masts up to 50 feet in height, and higher according to the genius of the owner. A ladder is placed reaching up to the first section, which is 24 feet. The ladder is nailed to stakes driven into the earth at the base of the masts and then lashed to the mast at the top of the first section. A strong 25-foot

bamboo pole or a pole made from lattice strips trussed so as to be stout is used to push the pulley and rope to the top of the mast. A strong wire loop which will slip down over the top of the mast and catch on the old pulley is made, with the wire extending about a foot into which is tied the john-ball or strain insulator. The wire rope is then threaded thru the hole in the insulator. This is fastened to the top of the bamboo pole with a single nail driven in just far enough to hold good. Mount the ladder to the top of the first section. Strap the safety belt around you and the mast. Then hoist the pole towards the top of the mast, sliding it along one of the top guy wires to steady it. Raise it slowly over the top of the mast till the wire loop is exactly over the top of the mast and let it slide down slowly over the top section. Let it slide down the mast until it catches on the old pulley fastening, and then, with a quick jerk, pull the pole loose from the loop, the nail pulling out and the pole coming free; leaving the loop, the john-ball pulley and your new wire rope nicely set at the top of the mast. The old pulley will remain dangling at the mast head, a beaten foe, and your skin will be safe.

The Radio Lizz

By Howard F. Mason, 7BK

NO, this is not a sequel to "A Kiss by Wireless," or "The Radio Garter." Radio on a flivver is entirely practical, and if the job is done right, will bring results that are worth bragging about, so we're passing along the dope.

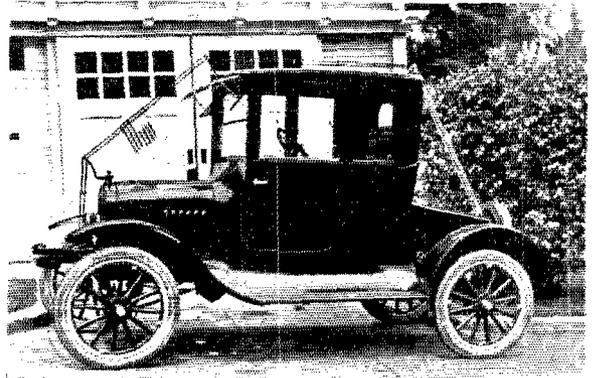
This installation was made several months ago by Mr. F. J. Brott, 7AD, of No. 10 Walk No. 1, Madison Park, Seattle. You will remember 7AD as the pioneer amateur of the Northwest, having done some mighty fine DX work in the past; consequently he is the man for the job, and he has boiled "flivver radio" down to a practical basis.

Referring to the pictures, the loop may be seen completely surrounding the car. It is made of three turns of small stranded rubber-covered wire, the total length being seventy-eight (78) feet. Disks of bakelite 2" in diameter, spaced every nine inches, hold the turns apart, and form the neatest looking little cage you ever saw. Special brackets support the loop in six places.

The receiver is located just inside the rear window, at the driver's back. A long slender, loud-speaker horn is fastened to

the top of the car, crosswise above the receiver in such a position that the opening is right above the driver's head. This receiver was especially designed for use in the car, and is therefore interesting.

It consists of a single-circuit tuner with tickler regeneration and a two-step audio-frequency amplifier. This seemed to be the best circuit to use, as it gives good signals regardless of the character of the road. As the radio set was made a permanent part of the Ford, it was necessary to make the



Miss Lizz—See the loop antenna?

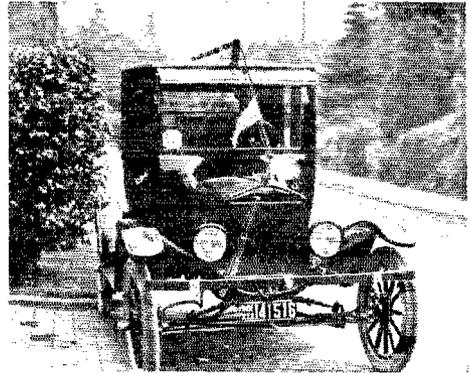
receiver as small as possible. Its outside dimensions are 5½ in. high 18 in. long, and 4 in. deep excluding controls. From left to right are: primary tuning condenser dial, tickler dial, inductance switch, detector and amplifier rheostats, and amplification switch. A connecting block six inches long, with spade terminals mounted on it, connects the various loop and battery leads to the set, utilizing the five binding posts at the bottom.

There is nothing unusual about the wiring diagram of the receiver, except that it is very necessary to have the same connections in the loop circuit as shown, if good results are to be obtained. The regular car battery is used for filament heating, the negative side of which is normally grounded to the frame.

Now, having looked over the installation, let's take a ride with 7AD, and see how this radio on a flivver differs from radio on the farm. Don't say that it won't work because the loop has too much iron in its field. It *does* work. In fact, it might just as well be tin in the field, as far as results are concerned. In the first place, when the engine is started, you hear QRM that sounds like four spark coils all going at once. It is. However, it does not drown out local signals, but it is necessary to stop the engine when receiving any station twenty or more miles away.

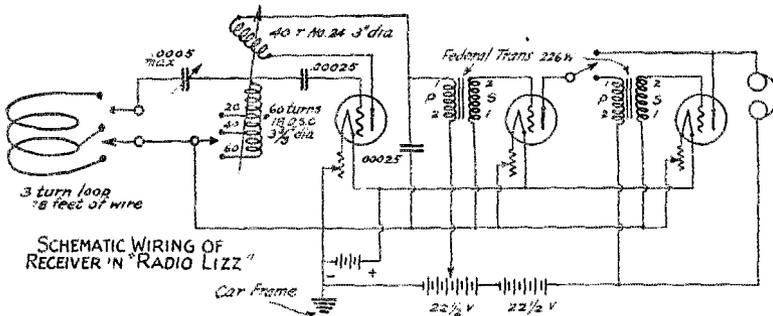
I did not ride far before I was convinced that the Radio Lizz was taking me

tion. Here was a good example of a "dead hole." From the above it would appear that a fellow's good or poor receiving results may be due to his location and if he would move up the street half a block, results would be different. On another occasion, signals were just as loud beneath a sixty-foot wet clay-bank as they were in the open. For long distance reception, it is absolutely necessary to get off of a



street where there are overhead wires, as the shielding effect is very great. Best DX results are obtained in a high open position, such as on a hill or a wooden bridge. In all cases the loop is very directional.

By way of receiving results, many amateur stations have been heard up to 1,000

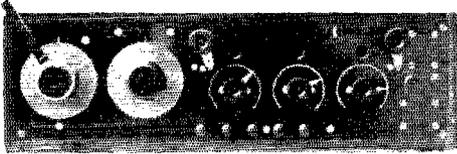


off the trodden path and offering exceptional opportunity for the study of many of the curious things about this radio game. When going along a straight street, signals fade nearly out and then come in very QSA from 2 to 4 times in a block. For some reason signals are louder as a street intersection is passed. On one occasion, a fellow was having trouble getting broadcasts on his crystal set. The Radio Lizz was parked in front of his house and it was found extremely hard to receive signals from the local sta-

miles away; commercial and broadcasting stations are also QSA. Results seem to duplicate those of a similar receiver on the average antenna, with the advantage that you can pick out any location you wish from which to do your receiving.

Regarding the directive effect of the radio flivver, it sure is the berries for locating stations. In one test, Mr. Brott located a station in Seattle within a half an hour, the first hearing being taken seven miles from the station. Here is the procedure and there's nothing to it. By some

accident or otherwise, it happens that when reciprocal bearings are taken on a station, an absolute minimum is not obtained on both sides. If the station should lie on the left hand side of the car, an absolute minimum will be obtained, but if the station to be located is to the right of the car, its signals will be heard QRZ even tho the



loop be at right angles to it. This feature is attributed to the fact that the loop does not lie wholly in a vertical plane, as may be seen in the photo, but is off the center line of the car where it runs underneath. This also makes the iron in its field unsymmetrical. At any rate, altho we can't dope it out, this unilateral feature helps a lot in locating a station quickly.

The first bearing, using minimum signal, is usually taken from some spot, preferably on a hill, where there is a good view of surrounding country. Then, by sighting along the windshield, some land-

mark may be spotted and used as a reference when other bearings are taken. Having located the approximate district the unknown station is in, it is only necessary to drive along the street until his signals either go completely out, or nearly so and come in again. If the former obtains, he is to the left. If the latter, to the right. It is then necessary to go back to the dead spot, and turn up the side street and drive until his signals fade again, repeating the same procedure. After this is done two or three times, his signals will fade out and come in, in the same block, and then all you have to do, is back up a short distance and you are right in front of Mr. QRM's house whereupon you may enter and inflict the necessary punishment, or give him a ride down to the R.I. to get a license.

Here is another thing about the Radio Lizz, which proves that it is drawing the attention of many now interested in radio. Look closely at the wire of the loop, just above the radiator cap, and you will see that the insulation is actually being worn off the wire by curious passers-by who stop to feel of it, when the flivver is parked on a busy street. This is an actual fact.

Mr. Brott is now experimenting with an I.C.W. transmitter to be installed soon on his Radio Lizz, which will probably make it the most practical portable station of its kind in the country.

A Five-Watt C.W. Set

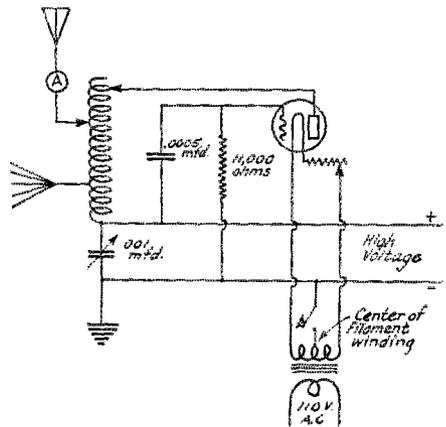
By George Milne, 2AFP

HAVING had so many requests for information on the five watt set which did such good work at this station on a single wire aerial, I thought that it might be of enough interest to the gang to warrant publication in QST.

The circuit is slightly different from any that I have seen so far. It is a modified Colpitts, in which instead of feeding the positive side of the high-voltage directly to the plate, it is fed to the plate thru the inductance. Previous to obtaining such good results with one five watt, I had been using ten watts but had burnt out one tube. While waiting for a new one I kept on using the one I had left and found to my surprise that, altho the antenna current was less, the range was much better. I had made a few changes in the circuit and it seems that I just struck the right constants "more by accident than by good management." I have taken the old set apart so can't help out with a photograph.

The circuit used is as shown. The inductance was a Radio Service and 19 turns were used. The grid condenser was a

Dubilier mica insulated, .0005 mfd. The grid leak was an 11,000 ohm graphite rod.



The part that I had most trouble with was the series condenser in the ground lead.

This was a 43-plate Mesco but when using 750 volts it sparked thru because of having the voltage directly across the condenser. I finally fixed this by immersing the whole condenser in a jar of oil.

The only difference in the hookup is, as I have stated, that the positive high voltage is fed to the bottom of the inductance instead of directly to the plate. The key is in the filament circuit. By placing it here a higher voltage can be used without overloading the tube, as the tube only works when the key is pressed. The voltage used was 750, A.C. rectified by a 24-jar chemical rectifier using the "bridge" connection. Antenna current was between 1.5 and 1.8 amps with one tube and about 2.4 amps with two tubes in a single wire antenna 80 feet long and 32 feet high. I have not as good a location as most of the bunch seem to think. I have mountains on three sides about $\frac{1}{4}$ of a mile away and the

aerial is entirely surrounded by trees. In fact it is what I call a *punk* location so that the DX can not be blamed on that. Ground connection was made to the city water pipes.

I am using this circuit now with a 50-watt tube and get 4 amps into a five-wire flat top with a four-wire counterpoise. I won't guarantee this hookup to be better than any that is out but it has proven better than either the English Feed-back or the Hartley, giving between three to seven-tenths of an amp. higher antenna current on the 50 watter. Sigs with one five watter were reported from Minn., N.D., Iowa, Alabama, and Florida as well as 1050 miles out on the Atlantic.

I hope this will be of some benefit to the fellows using one tube and would like to hear from anyone who tries it, as to results obtained.

A Brush with the Cops

By F. B. Ostman, 2OM

LATE in this past summer we had three successive nights of good DX weather—good considering the summer. DX was busting through all evening from 5 P.M. on, and the desire to work 'em was so great that we couldn't hold the key, regardless of the fact that local broadcast listeners were being jammed on their \$2.98 sets.

The third night the local phone listeners decided things were going too far. The concert was good, and they had no trouble guessing who that QSA spark was. We're the doormat here for all locally directed mail, complaints, etc., being known as WNY, NAH, WCG, KUVS, KUSM, in fact anything that's QSA-very on their Woolworth sets. I suppose we deserve this for having spark instead of C.W., anihw....

Right in the midst of hammering out a TR to 1CNI, in pops our local detective. Of course we finished said message, and had to shut off the gap; old boy Officer had to rub his eyes to get the glare away of the open sink gap spark before starting to tell what his mission was.

I thought at first that he had come up from headquarters for some information regarding the installation of a set, as I had heard that the policemen were going to get an outfit. However, 'twas otherwise. The dialogue went something as follows:

Officer: We've had three complaints tonight by telephone, saying that you fellows were breaking up the concerts from Newark. The chief sent me up to inquire if you wouldn't discontinue operating, which

would please Mr. M—. We realize that we have no jurisdiction over this radio business, but the chief sent me up, and it was my duty to come.

2OM: Well,—er—you see we haven't operated during the early evening since last March, and we had some important traffic we wanted to clear. Besides, we don't feel that we should have to sit up until midnight before we operate our transmitter. We have been co-operating with the phone listeners for the past months, and as soon as we operate a little, they go up in the air and want us to close up. You know any well made receiver in town here should be able to tune out our signals and receive the phone concerts without interference. The trouble is caused by these fellows with \$25 and \$15 receivers....

Officer: I don't happen to know what kind of sets two of these comolainers have, but I understand that Mr. M—'s set cost between \$800 and \$1000.

2OM: (Not knowing who Mr. M— is) Either this man M— was stuck when he bought the set, or he doesn't know how to tune it.

We then talked with Mr. Officer for about half an hour, showing him our side of the game—how we've worked to perfect our receivers, and how the game is being ruined by sets that we discarded before the war. We showed Mr. Officer the outfit, how it works, the cards, switches, receiver, spark and C.W. sets, motor generator, talked about oscillations, etc., until the poor fellow walked out in a whirl,

thoroughly siding with us, how great radio was, and what a set we had, etc., etc. After he left we had a good laugh, and went on pounding brass. You know what a lot of radio four hams (there were four of us in the station at the time) can tell a guy in a short space of time. All the fellow could do was "yes, yes, yes." Every-time I think of it I have to laugh.

Next day, Mr. Officer sees Mr. M— in town and tells him we said he either got stuck with his set or he didn't know how to tune it. Mr. M— goes off the handle, and exclaims that he'll pay those kids if they could come up and teach him how to tune his set.

Let me explain here. Mr. M—, although we did not know it at the time, is first assistant deputy motor vehicle inspector of our state, being second man under the governor. The following evening Mr. M— rolls around in his big limousine to 20M's ranch.

No doubt he was sore; he showed it. He is a fellow I guess that's used to dictating orders, understand, and being told where he gets off completely upset him.

Even before he would listen to reason, he threatened to have the radio inspector close us up. Why, the expert from the G— company, whom he bought his set from, and who installed it, told him we were on about 385 meters, and not even licensed. If this is true, I wonder what is happening to our old friend G—.

It happened that just about a week before this I had called on our radio inspector, Mr. Batcheller, as traffic supervisor for the Executive Radio Council, 2nd District, regarding a proposed plan we had outlined whereby amateurs in the district would stand by for a couple of hours in the evening so no interference to phone broadcasters could be blamed on amateurs.

Our inspector was entirely adverse to any such arrangements, stating that if after

the new legislation before Congress was passed, interference still continued, some arrangements might be made to stand by. Now with phone broadcasting going on later each night, the listeners would expect it always; he requested us to continue with our present regulations. **HOT DOG!**

Knowing our position and where we stood, we politely told Mr. M—that he could go as far as he liked. Mr. M— said if he could secure no satisfaction from the radio inspector he would bring the matter to the attention of his friend Senator E—. I again told Mr. M— we were a licensed station, operating in every respect within the law, and doubted whether he could close us up.

Understand, such threats as he made were absolutely out of order, and naturally got US sore. After making this last remark, playing his last card as it were, and seeing he could not alter us, he began to take an interest in our side of the game. He spent at least two hours at the station and left in a decidedly different mood, even offering us cigars, and promising to have the car around for us the following night, when we were to go to his place, see his set, and try to tune our signals out.

The following night: At about 8:15 Mr. M— arrived. I had retuned the spark transmitter to 200 meters as sharp as it goes—on full power with five inch coupling, which seems best. I showed Mr. M—the tuning on a standard U. S. Navy S. E. 965 wave-meter, and tried to explain that the transmitter was tuned to our legal wave, etc.

Leaving 2AJA, a local man, at the station to work the transmitter, we left to see Mr. M—'s set. We arrived at Mr. M—'s palatial home—it was really that. We could not see his antenna in the darkness but he explained it to us.

His receiving outfit consisted of a G—a single-circuit tuner and a two-step amplifier, Western Electric loud talker, etc., all



mounted in a music cabinet, all very neat. WJZ at Newark was giving his evening concert, and while 2OM was working on full power, five inch coupling, less than $\frac{3}{4}$ mile away air line, "SW" of this station tuned our signals out so completely they could not be heard through WJZ. Signals from WJZ were so strong that the Western Electric made them too QSA for comfort in the room. Not so bad for a single-circuit receiver, but give the transmitter credit, too; it must have been a little sharp. I would like to state here that no three-circuit receiver in town has trouble tuning out 2OM when listening to broadcasting on 360 meters, and a large number of these sets are home-made.

Mr. M— was very much puzzled why *he* couldn't do that, and we explained to him

the much repeated story of poor receivers, etc. We advised ("we" being three ops from the station, SF, SW, SL) that he exchange his single-circuit tuner for one of the three-circuit type, which would tune more sharply, and allow him (one not adept at tuning) to eliminate all interference he might get from local amateurs.

Mr. M— returned to the station with us. We told him of the A.R.R.L., the DX covered, trans-atlantics, trans-cons in 6½ minutes, etc. We expect him to join the Ridgewood Radio Club this winter. In fact he is so taken up with our amateur game that he forgets the concerts; he is anxious, he says, to learn the code, and might put up a big club station on his five acres in Ridgewood. He's got the jingle, we know, and he might turn out to be a second Mr. Beale.

A Chat about Variable Condensers

By Norman A. Woodcock *

TEN years ago, when "broadcasting" as it is now known was practically non-existent, and vacuum tubes were in an early stage of development, much apparatus was used which has since been relegated to the scrap-pile. This class includes magnetic detectors, straight spark gaps, anchor spark-gaps in the antenna, spark-coils, Leyden jar condensers, and many other pieces of apparatus now obsolete.

There is, however, another class which includes apparatus which has been used in radio work since the early days, and which is still doing duty in our most modern radio installations. This apparatus, tho performing its original functions, has been so developed and improved as to be almost beyond recognition in comparison with its original prototype. Exception to the above must be taken in certain cases—a striking example being that of the common variable condenser usually used in receiving apparatus. Tho millions of these condensers have been made, the majority of them are "Chinese copies" of preceding condensers, and contain faults which should have been eliminated years ago. To all appearances they worked fairly well, so apparently not much attention was paid to their improvement. Conditions have changed greatly during the last decade, and the increasing use of highly sensitive circuits, together with tremendous amplification, has shown up defects in condensers not even suspected by radio fans or even commercial operators in many cases.

To deal with a specific instance—let us consider the increasingly popular loop or frame aerial. The usual method of tuning is to place a variable condenser either in series with or across the loop. No matter how well the loop is designed and built, maximum efficiency cannot be obtained unless a correspondingly efficient condenser is used. The total energy picked up by the usual small loop is so small in the first place that the ordinarily negligible loss in the condenser becomes of paramount importance in this case. In fact there is no doubt that the poor results so often obtained in loop reception are in many cases due to the use of cheap and badly designed condensers. This should be kept in mind when buying a variable condenser for this purpose and care should be taken to select one in which losses are at a minimum.

As information and literature dealing specifically with condensers are not readily available, a few points may be noted as a guide to be used when purchasing or building variable condensers for radio work. It is not easy to select a really efficient variable condenser off hand, but as a general rule, the mechanical construction is a good place at which to start.

The frame should preferably be entirely of metal. It should be rigid in order to secure permanent alignment of the plates, and if possible a type should be selected which is free from all insulating bushings. These latter are a flagrant source of trouble resulting from leakage due to moisture.

*Engineering Dept., Allen D. Cardwell Mfg. Corp.

etc., forming a conducting film over the surface.

Another desirable feature rarely seen is a condenser arranged so that the rotor is inherently grounded—thus eliminating the body capacity-effects so noticeable in regenerative and similar work. Further advantage is that such a condenser may be mounted on a metal panel if desired, without affecting its capacity in any way.

Whilst a certain amount of dielectric, such as hard rubber or bakelite dielecto must of necessity be used to insulate the movable and fixed plates from each other, this should be reduced to a minimum to avoid losses. The best possible construction would be where the dielectric was so located as to be entirely without the electrostatic field of the condenser.

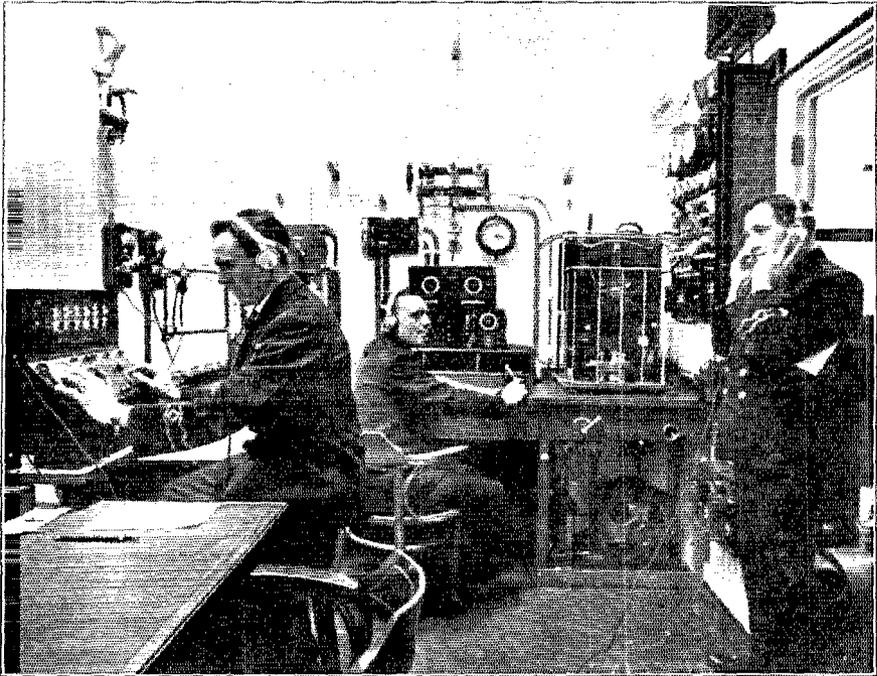
To secure the greatest flexibility in tuning, a condenser should be chosen which has a wide minimum to maximum range; whilst the actual capacity should be reasonably close to that stated by the maker.

There are some variable condensers now on the market rated at 500 micro-microfarads capacity which actually measure 397 micro-microfarads.

The above hints should enable anyone to build or purchase a really efficient condenser whilst it may be emphasized that any efforts made to secure this end will be more than repaid by the enhanced results in operation when the set is completed.

REMEMBER!

The success of America in the Transatlantic Tests demands QUIET AIR during our listening periods. Read the schedules on page 10 and the leading editorial this month. Pass along the word. *We must make good.*



The Static Room of the Great Liner "Majestic"

This is a photograph of the radio room of the world's biggest ship. On the farther side of the room are the two transmitters—the 2000 mile continuous wave transmitter at the left of the operator in the armchair, and at his right is a spark set with a range of 300 miles. The third operator is at the key. On the right stands the chief operator, listening to telephone messages, while the second operator is shown at the left operating a Marconi radio compass. On such equipment depends the safety of the 5100 people carried by the "Majestic"—4100 passengers and 1000 crew.

Photo by Ewing Galloway.

Listening for Europe

By Paul F. Godley, 2ZE

A year ago this month Paul Godley was in the British Isles as the special representative of the A.R.R.L. in our Second Transatlantic Tests. Establishing a listening station at Ardrossan, Scotland, in a ten-night vigil he copied many American amateur signals and gained for himself enduring fame in amateur circles. Here, then, is a word of advice on the Third Tests from the man who succeeded last year.—Editor.

THAT A.R.R.L. men should need encouragement in connection with their preparations for the reception of radio signals from European amateurs this month is unthinkable and yet I hope that what random thoughts are here set down may come as an encouragement to some one. First of all let it be understood that American amateurs will hear European amateurs during these tests. And, so let it be known that if two-way communication is not established, American amateurs will not have justified the great confidence which European amateurs have in their ability to perform. There has come to me only a smattering of information concerning plans of men in England, France and Holland. They are making plans, however, and there is little doubt that insofar as receivers are concerned at least they will be better outfitted this year than last. In connection with transmitters it will be remembered that several stations rating under 50 watts in power were heard in Scotland. We have many, many stations which rate 250 watts on this side and the British will perhaps have at least two or three. So, barring very bad luck with regards to meteorological conditions, complete success is to be expected under which circumstances it ought to be the ambition of every going A.R.R.L. man to get in on these epoch-making tests.

About Receivers

Regardless of results obtained in Europe last year both by the British and myself, there is still ground for considerable speculation as to the type of receiver which may be used most effectively by the average amateur. If you feel yourself fairly familiar with the operation of multi-stage amplifiers, either straight radio frequency or of the super-heterodyne type, I should not hesitate to recommend one or the other, always choosing myself the last-mentioned. The British seem to pin their faith upon the multi-stage radio frequency, partly, perhaps, because of the general tendency in Britain toward this type and partly, no doubt, because of the lack of publicity which had previously been given to the super-heterodyne method, for, it will be remembered, it is a 100% American method. I have tried them both. The

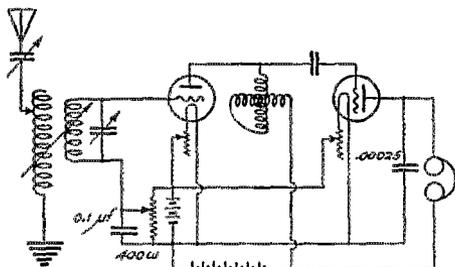
latter is selected because of its greater efficiency for a given amount of tuning; because of the simplicity of its control once it is going properly; and because of its great quietness in operation. Fairly complete instructions which can be readily absorbed by any who have had experience with multi-stage amplifiers have already been printed in the pages of amateur periodicals within the last two years. If no experience has been had with this type of equipment, I should not recommend it as a good bet. It takes too much time for one to become sufficiently familiar either with a multi-stage radio frequency outfit or a super-heterodyne outfit to make it advisable for him to alter his plans for receiving at this late date. For it has been my experience that the greatest contribution toward successful results with receiving apparatus consists in the operator's thorough familiarity with the receiving apparatus which he is to use. From observation it is my opinion that as many operators will receive signals during the coming tests on the regenerative type of receiver as on the multi-stage amplifier types, and it is based partly on the fact that altho it was my good fortune to receive a total of twenty-seven or twenty-eight different amateur stations in Scotland last winter, several British amateurs at the same time received signals on apparatus of much simpler construction.

A rather simple and desirable addition to the regenerative receiver might be one stage of regenerative radio-frequency amplification as shown in Figure 1. This device is slightly different in its operating characteristics from the conventional regenerative receiver, but considerable increased sensitivity is to be experienced, and to one who is familiar with regenerative receiver operation no great difficulty will be encountered in mastering its little peculiarities. One or two stages of audio frequency may be used, tho I would suggest that as good results will be had where no audio frequency amplification at all is resorted to. Audio frequency amplification tends to emphasize static and signals from nearby stations and in many cases has been known to rather deaden the sensitivity of the ear to weaker impulses, while if full dependence is placed

in the regenerative amplification for signal strength, it is quite certain that the operator will at all times have his receiver in the most sensitive condition.

About Antennae

It has always been our habit to think of the very high antenna as the best for receiving great distances. Barring inter-



ference such as harmonics from high power stations, broadcasting stations, static, and ship's spark stations, this would be true. But far greater selectivity is to be had where an antenna of medium height is used, and by medium height I mean something in the neighborhood of 40 to 50 feet. This fact has been very forcibly demonstrated to me during the past few days where some reception tests were made upon a "T" type antenna having a vertical height of about 100 feet, and a flat top of about 60 feet. Signals of great intensity were received upon this antenna, but the reading of them was a far more difficult matter than was the case with the weaker signals obtained on a smaller antenna. No matter what the strength of the signal, if due to interference it is unreadable, it is of no value.

Of course, those who find it possible to erect a Beverage Wire should by all means do so. I doubt very much whether any great difficulty will be encountered by anyone in so adjusting this wire as to give him quite remarkable reception over long distances. To get the most out of it calls for a careful study of the observed actions after it has been placed in operation. It should be encouraging, however, to know that even the top wire of a barbed-wire-fence frequently gives far better reception than a fairly elaborate and carefully constructed amateur antenna. This can only be true, of course, when the weather is dry, but insurance against wet weather is possible thru insulation. Quite complete details on Beverage Wire construction have already been printed in this magazine.

About Selection of Tubes

There is nothing which will more completely defeat the reception of extremely

weak signals than an inherently noisy receiver. Great care should be given to the insulation of the antenna and to securing it in such fashion that it does not swing in contact with *any* nearby tree, antenna support, or building. Similar care should be taken to see that the receiver circuits thruout are in perfect order, and finally considerable attention should be given to the selection of the tubes which are to be used. The gassy vacuum tube is one which amateurs have long favored. It is truly a remarkable device, but too many of them show tendency toward a chronic noisy condition. In making tests for sensitivity of tubes in *all cases tests* should be made on extremely weak signals only. A tube which frequently appears to be most sensitive actually may not be due to its inherent noises. Ever present noises tend to deaden the sensitivity of the ear in the same way as the louder signals previously spoken of. The ideal receiver is one which is *deadly silent* during periods of no signal. One thing in favor of the regenerative radio frequency arrangement above mentioned lies in its greater freedom from inherent noises. The selection of the vacuum tubes and their placement in the super-heterodyne receiver is of particularly great importance. In the multi-stage amplifier, noises are quite apt to multiply rapidly. To get eight or ten tubes working in a truly silent fashion is no mean task but those who aspire to use a receiver of this type should not pause until they have been able to get true silence.

About Geographical Location

It is quite likely the most success will be had by those men in the eastern section of the United States, tho I should not be at all surprised if some hard working ham in Chicago, Denver or Dallas is able to list himself as a lucky listener. If any are able to take up temporary quarters near the seashore I should recommend this. It has been my observation that signals coming in from out to sea are frequently much stronger nearer the water's edge than but a few miles inland. It most certainly is a fact that the strength of signals from American transmitting stations located nearer the seacoast was uniformly greater than the signals from stations of like power located further inland and it is to be assumed that if this is a rule, it works equally well both ways. This by no means indicates that inland amateurs will be entirely left out. Success in their efforts will only go to show that their determination and faith and patience is the more creditable.

If memory serves me, there were in Scotland, England, Holland, Germany and France, nine amateurs who received sig-

nals from America in last year's tests. There are in these countries a total, perhaps, of 1,000 real radio amateurs. On a percentage basis, then, the close of the reception tests should find in America

about 250 amateurs who have heard signals. If there are four times this number I shall not be surprised. If there are less than that number, I shall be greatly disappointed.

A Spark Set that will Hold its Own

By H. S. Morris, "WD" at 8BDA

SO much has been said concerning the continuous wave method of transmission in recent months that one almost forgets there is such a thing as spark, but such is not the case. The few articles on spark that are published relate to expensive high-voltage transformers, sink gaps and Dubilier condensers, which the average amateur cannot afford. The following is a description of the spark transmitters used at 8BDA which have proved very efficient, all apparatus being home-made save the transformers and rotor disks.

It was found by experiment that the most efficient type of oscillation transformer was the "split" type, it giving an increase of three amperes over the regular type, just doubling the indication on three different local spark transmitters. Few amateurs know of this type of coupling and still fewer use it, tho once tried always used.

The only difference in the split type O.T. is in the primary which consists of two brass or copper ribbons three feet long, each arranged to form a semi-circle about twenty-two inches in diameter. The transformer and gap are connected to one end of each of the ribbons while the condenser is connected to the other ends, thus connecting all apparatus in parallel. There are several marked advantages this type of coupling has over the regular type.

1. First and most important, it does away with all leads in the primary oscillation circuit, making the complete primary active on the secondary.

2. It enables the use of a condenser of larger capacity for a given wave-length

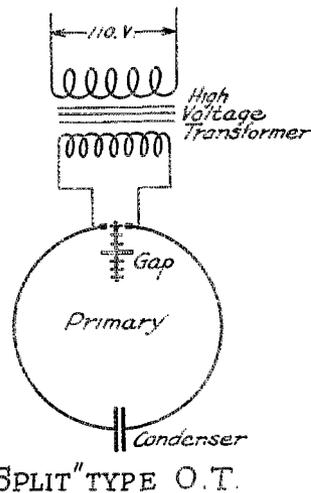
3. As all apparatus (transformer, gap and condenser) is connected in parallel, it gives a balanced circuit with the same amount of inductance and ohmic resistance on each side.

4. It has six feet of active primary while the regular type has but three or four feet, the rest being taking up in useless leads.

5. It makes possible an easy arrangement of apparatus, for both looks and efficiency.

The secondary of the O.T. is of the regular pancake type of twenty feet of brass ribbon, one and one-fourth inches

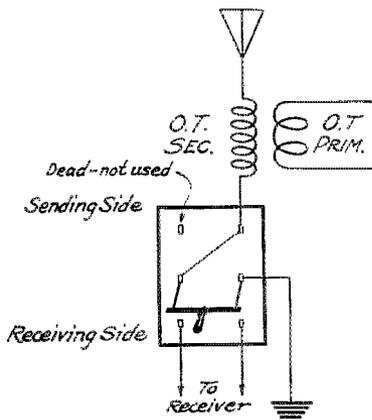
wide, wound on bakelite eighteen inches inside diameter. To insure still better insulation the aerial lead-in was brought in thru the roof directly over the transmitting apparatus and the O.T. secondary suspended from it in mid-air with no other support, thereby making one-hundred percent insulation.



At the present a separate aerial is used for receiving, doing away with all switches in the aerial circuit, but before this was arranged much energy was lost thru the aerial switch even tho the best grade of marble base switch was used. To do away with this the switch was connected as shown in the accompanying diagram and found to work very satisfactorily. As seen, the aerial lead is connected directly to the O.T. secondary, which is *very* important in transmitting, while the switch is placed in the ground lead where insulation is not so important. When the switch is on "sending," the receiving apparatus is completely disconnected. While on "receiving," the aerial connection is made thru the O.T. secondary, thus adding inductance to the aerial receiving circuit, which is highly desirable, as it has been

proved here that an aerial designed to transmit on two hundred meters is not long enough to give best results in receiving the same wave-length.

It was found that when using a low-voltage (15,000 V.) non-resonant Acme transformer, best results were got with a ten-tooth Benwood rotor with a comparatively high tone. With a higher voltage



(25,000 V.) Thordarson transformer, the best results were obtained on a five-tooth (every other tooth cut out of a ten-tooth disk and stationary electrodes arranged at an angle so two teeth would line up at once.

As both gaps were belt driven much trouble was experienced with the rotor bearings wearing out. At last this was

solved by using a ball-bearing bicycle hub as a bearing for the rotor disk. The drum of the hub was clamped tightly between two blocks of wood and mounted on a base. The rotor was then mounted on one end of the axle and the pulley on the other end. This turned out to be the ideal bearing, being noiseless, durable, practically no vibration, and as near frictionless as possible to get.

As to condensers, probably the most practical home-made condenser is the so-called "milk bottle type," it having the advantage of being cheap, easily made, oil immersed, easily replaced when blown, and hard to blow. For a 1 K.W. about twelve pint milk bottles are used, each filled to within about one-and-a-half inches of the top with a strong solution of salt water, then filled on up to the top with oil brushing. All bottles are then placed in a metal tank and salt water poured in until it becomes level with the salt water in the bottles and then covered with about an inch of oil. One connection is made on the metal tank, thereby connecting to the outside salt water, while the other connection is made by running a small piece of copper ribbon or wire into each of the bottles, connecting with the inside salt water. The novelty of this condenser is that when one bottle is blown another extra bottle can be inserted in its place in a few seconds.

Beer bottles have been tried but on account of the impurity of the glass do not work as well as milk bottles. Theoretically the best kind of bottles would be whisky bottles, as they have more kick in them. Hi! At present a plate glass condenser is used.

An Armstrong Single Tube Super-Regenerator

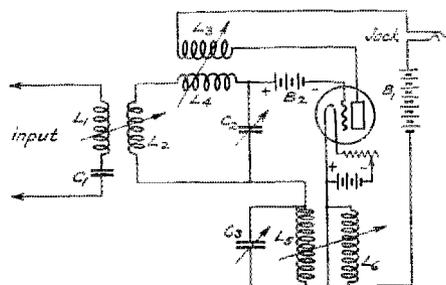
— Fourth Prize in QST's Contest —

By William Englebretson

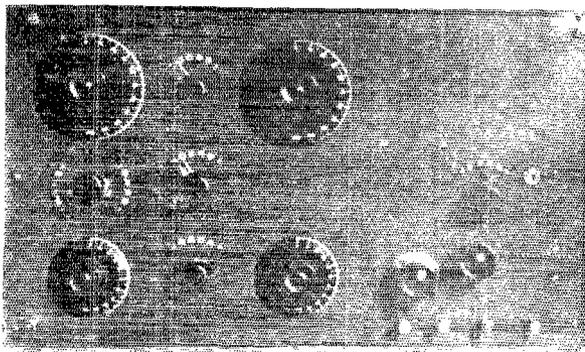
SO much has been written and said about the Armstrong super-regenerator and its good and bad qualities that the amateur does not know which way to turn for advice. Anyway, the only practical knowledge one can obtain about this circuit is in the hard school of experience. The writer has been through the mill and has burned much midnight oil in trying to dope out the new circuit and now blossoms forth with the following article, in which he hopes to make clear the results of his experiments.

Armstrong secured super-regeneration by any of three methods: first varying the positive in respect to the negative resistance; second, varying the negative in re-

spect to the positive resistance; third, varying both.



All these circuits were tried and it was found that a two-tube circuit worked well using either of the first two methods but that using one tube and the third method equal results were obtained. This may be accounted for in the fact that the second tube merely generates the variation frequency and does no amplifying in itself. By putting all this work on one tube the



expense of a second tube is saved. Everybody seems to object to the single-tube circuit, claiming the variation frequency is hard to control. This was not found to be the case.

The circuit described herein is a modification of that shown in Figure 3 of July QST. It differs from that used by Armstrong, being a two-circuit instead of a single-circuit tuner. This is a distinct advantage as it makes for sharper tuning—a necessity with the "super" on account of the terrific amplification obtained. The circuit uses no separate detector. Though the variation frequency is within audibility, it is so weak as to be scarcely noticeable.

For C.W. reception and phone, the circuit is all that can be desired. Local stations come in on C.W. with a roar that makes it almost impossible to wear the fones, while distant ones have a flute-like sweetness which sends thrills up the spine of the most hardened ham. Of course the broadcast stuff comes in with a roar. Turn up the dial to around three-sixty any evening and listen to the excitement. You hear two or three to every degree of the scale from Schenectady to Denver and back again. Sparks are not amplified to as great a degree as C.W. signals. The variation frequency seems to tear them apart so that they sound scattered, but most of them are quite readable. They require more negative grid voltage and different adjustment of the circuit. Hand in hand with this goes the remarkable freedom from static. Lightning discharges re-

semble sparks in that they consist of free oscillations. These are chopped out periodically and are not heard. This may sound contradictory to the first statement about sparks but it must be remembered that when fishing for sparks special and careful adjustment of the circuit is necessary. When ordinarily adjusted for C.W. reception sparks are not heard at all.

The parts required for the tuner are as follows:

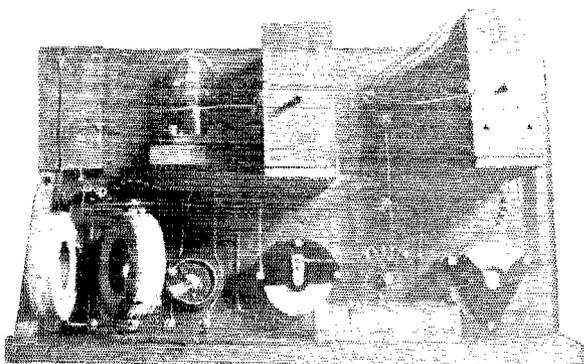
- L1 and L2—Variocoupler, 24 turns primary, 24 turns secondary.
- L3 and L4—Variocoupler, 24 turns secondary, 75 turns tickler.
- L5—1250-turn Honeycomb Coil.
- L6—1500-turn Honeycomb Coil.
- C1—Variable Condenser, .001 maximum.
- C2—Variable Condenser, .0005 maximum.
- C3—Series of fixed condensers giving values .0005, .001, .0015, and .002 mfd.
- S—Series-parallel switch.

T—U.V.201 and socket.

B1—90 Volts.

B2—1½ to 6 volts, variable.

The assembly of these parts can be seen in the accompanying photographs. In the lower left-hand corner can be seen the large coils for generating the variation frequency. They are controlled by a special cam arrangement, though it works just as



well to have them on the front of the panel and work them by hand.

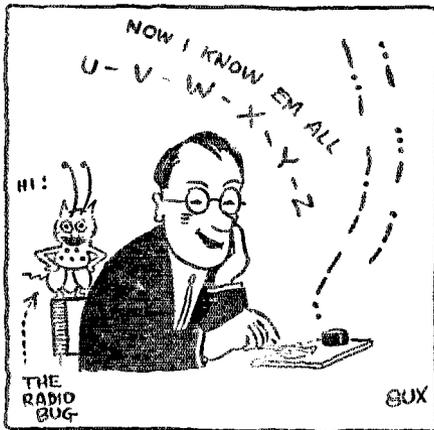
Now for a few hints on operation. The coils are brought together until the variation frequency manifests itself in a weak, high-pitched squeal. Then increase tickler almost to maximum. The circuit may then be tuned as in an ordinary two-circuit tuner except that on the lower wave-lengths the tickler must be turned back to keep the

(Concluded on page 39)

A Ham What Am

By One of Them, Whose name is Concealed
Because his Wife might read this

THE Depths of Wild Debauchery to which certain Amateur Operators will Descend when they have A Chance to spend a Night in the City of New York, are almost without Any Bottom whatever. Not very long ago a Certain Meeting took place in New York, and it seems that After the Meeting was Over, certain of these ops Got Together with some other Congenial Souls, and the Festivities Continued well into the Graying Dawn.



The Atmosphere was Heated to a great extent with several Discussions as to just why Fred Schnell was so Blamed Partial to C.W., said ops. being all Old Time Spark Men who have Little Use for the Evacuated Glass Case Method of Transmission. These men, who are all Good Members of the Second District Council and the A.R.R.L., carried this Discussion up and down Park Row, across City Hall Park, and pretty well all over Lower New York. The visit to City Hall Park brought all Activities to a standstill, while the Little Group stood in Awe at the foot of "Civic Virtue." The sight of this Colossal Figure, standing there in the Moonlight, brought Dim Memories to one of the men of a Turkish Bath, located Somewhere in the Vicinity. While On the Hunt for this place, one of Them became Lost to the Rest by Deftly Dodging into the Subway. It turned out, Later On, that he was the Wisest One of the Lot.

Finally the Bath was Reached, and after a preliminary Disrobing Act, which cannot be Illustrated here, the Loyal Four found themselves Thrust Bodily into a Glass Enclosed Room, where the Temperature ranged well up on a Par with a "P" Tube

carrying Three Thousand Volts on the Plate. After Seating themselves Comfortably, the Gang continued the Heated Discussion as mentioned Above. This time the Tank was Heated both Figuratively and Literally. The rest of the Course is more or less of a Blurred Dream, with Dim Ideas of hearing such Terms as "Five Hundred Cycle-Sink Gap-Sixty Cycle-Sharp Wave-Decrement—and Schnell, Schnell, Schnell." This seemed to Keep Up for a Long Time, but Eventually the Clan found themselves on the Brink of a Silver Sheet of Water, and the Next Moment they were all Madly Swimming for the other end of the Tank in the Icy Cold Water. Long before the Other End was reached, they all knew Exactly where they Were, and Sleepiness gave way to a Real Effort at Having A Good Time in the water. Exhibitions of Fancy Diving, Races and Various other Forms of Aquatic Athletics were Indulged In until a Late Hour, and were stopped only by a Growing Tendency on the part of the other Inmates to quite Forcibly Object to the Hilarity by the Pool.

Things Quieted Down for a little while after this, and the Hardy Mariners found themselves Wrapped and Sheeted like so many Egyptian mummies. Cigarettes and other Forms of Dissipation were Indulged In until Two of the Pharaohs became Involved in a Deep Discussion on Religion. This soon had its Affect on the Other Members, and after the Discussion had Gone On for Several Hours, the Remaining Duo decided to Call it a Day and Go To Bed. This was Received with Howls of Derision from the Others, but Finally all were Padding quietly down the Corridor to their Respective Couches.

There is Little More to be Told. There were Other Arrivals during the Night, and if the Sleep of the Four Horsemen was Totalled Up, we Venture to Remark that it would not have Exceeded One Hour for the Whole Night. During the Few Minutes between the Arrival of the Last Guest and the Milk Man, though, there was a Short Lapse, and it was at this time that the Night's Rest was Secured. Upon regaining Consciousness the First Thing that Assailed Our Ears was a Sentence Something like This: "Wynell can't Schnell give us Spark Guys a Square Deal and Lay Off this here C.W.?" They were Still At It.

Moral: It's hard to Find any of the Old Gang Flocking Together anymore, but did You ever hear of a Gathering of Broadcast Listeners doing anything as Wild as This?

An Electrolytic "A" Battery Charger

By J. A. Miller, 3LF

FOLLOWING is a description of an electrolytic rectifier for battery charging.

First take a board 14 in. x 2 in. x 1/2 in., and fasten to it a sheet of lead and a sheet of aluminum, each eleven inches square and one-sixteenth of an inch thick, so that they will hang with a space of two inches between them, as shown in the diagram. If the metal is stiff enough, nothing further is necessary. However, it may be desirable to insert a wooden separator between the plates, but if this is done it should be fastened to the top cross board and no nails or screws should be used between plates and separator.

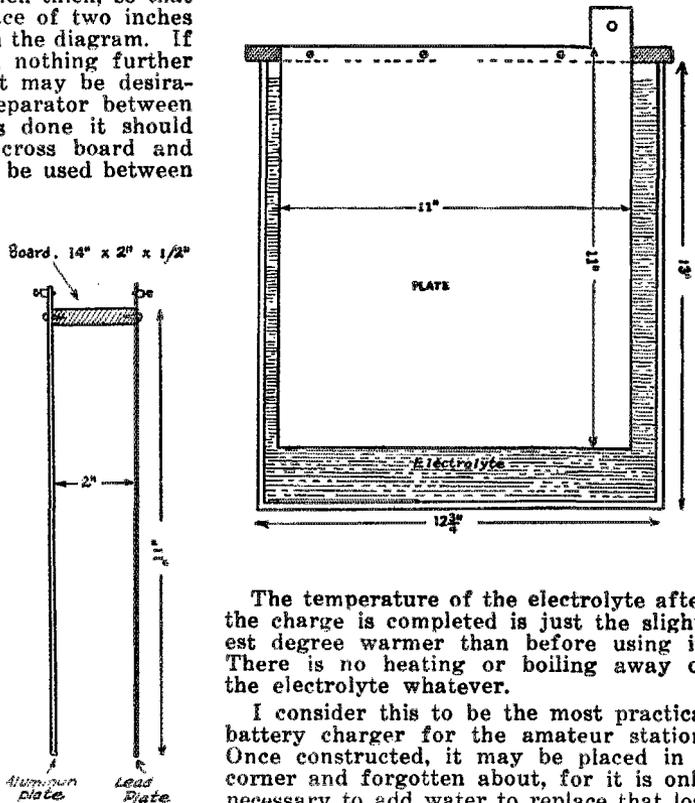
A six-gallon crock, of the "home-brew" variety, thirteen inches deep and twelve inches in diameter (inside measurements) should be filled within two inches of the top with water, and "20 Mule Team" borax added until no more will dissolve.

The plates should then be placed in the crock, and the board to which they are fastened will keep them about two inches from the bottom.

Then connect to it the filament-heating windings of a C.W. transformer and let the current run through the rectifier until the plates are formed.

The above is an exact description of the rectifier in use at my station (3LF) and it certainly does deliver the goods. I use it to charge my ten-volt storage battery, at a rate of five amperes, over night. The next morning the battery is fully charged,

and the charging rate has evidently "tapered off" as it progressed, for there is hardly any current flowing in the circuit after the charge is complete.



The temperature of the electrolyte after the charge is completed is just the slightest degree warmer than before using it. There is no heating or boiling away of the electrolyte whatever.

I consider this to be the most practical battery charger for the amateur station. Once constructed, it may be placed in a corner and forgotten about, for it is only necessary to add water to replace that lost by evaporation.

It may be operated from the low tension windings of the C.W. transformer or a transformer can easily be wound to meet one's needs.

AN ARMSTRONG SINGLE TUBE SUPER

(Concluded from page 37)

tube oscillating. This applies for C.W. and phone reception. For spark, the filament temperature must be decreased a little and more volts brought into the grid circuit.

Various experiments have been made to obtain a filter which would eliminate the variation frequency without reducing or

distorting the signal frequency but none have been satisfactory as yet. The writer believes that with two stages of amplification coupled through a satisfactory filter, wonderful results could be obtained.

(The Third Prize Article, by Leon W. Bishop of 1XP, introducing a new idea in the generation of the variation frequency, will appear in the next issue of QST.—Ed.)

QST's Subscription Contest Ends

By the Contest Manager

That is, it ends for the fellows who couldn't quite make the grade and qualify with the minimum of 25 subs, tho they worked hard in most cases and have won our sincere appreciation, if not a prize. But we venture the opinion the lucky ones will get a considerable kick out of this contest for the next few months when they look at that prize resting peacefully

writing friends all over the country, never losing an opportunity of bringing QST before a prospect and extracting his two dollars while he had him in his power, and even going so far as to *advertise* for subs in the local newspaper. Which accounts for the fact he rolled up a total score of 151 and qualified for a \$75 prize. FB Corlett, OM!

F. M. Corlett	151 subs	\$75 prize
A. C. Koch	55 subs	\$25 prize
E. Raguse	36 subs	\$10 prize
K. B. Lloyd	33 subs	\$10 prize
D. W. Pinkerton	33 subs	\$10 prize
A. E. Rowland	30 subs	\$10 prize
H. E. Watkins	30 subs	\$10 prize
W. W. Filson	27 subs	\$10 prize
S. W. Beyland	26 subs	\$10 prize
F. D. Fallain	26 subs	\$10 prize
W. C. Burns	25 subs	\$10 prize
W. L. Gardner, Jr.	25 subs	\$10 prize

on the operating table and think of the fun they had in working for it. Wasn't it worth while? From the letters we got from contestants it seemed that way to us and we certainly got lots of real, genuine pleasure in watching the subs come in from day to day, tho of course, that was what the contest was for. Towards the last there were several surprises in the shape of a whole sheaf of subs coming in from some unexpected source, like those of Mr. Lloyd who mailed us 31 all in one batch the last day and almost the last hour of the contest, while Mr. Koch tried the "gently but firmly" plan of sending us two and three subs every day as regular as clockwork till we got to know and salute his notepaper as soon as it came in the room.

Right from the start, Frank Corlett had the jump on the whole gang but he went after the subs on a systematic basis, calling head work and foot work into play,

There were 121 contestants in all that got one or more subs, but by far the largest majority of these didn't make the required 25 minimum and by the rules of the contest, we were compelled to let them go unrewarded. Twelve qualified for prizes.

A couple of fellows got over 20 (why, oh why didn't they send in just a couple more so we could qualify them), eleven more between 10 and 20, twenty between 5 and 10, forty one between 2 and 5 and thirty four who got but 1 sub each. Yet each and every one of them helped QST and the A.R.R.L. along just that much and we hope they will live to see and conquer the next contest sometime between now and the next hundred years. The grand total of all subs received up to the time of closing the polls was 934. Again we say, FB all hands, and a whole flock of tnx for your great work!

Our Christmas Number

This month's QST sees the greatest number of pages we've ever printed, fellows; it has cost us several hundred dollars more but—Xmas is coming and we want to give you a well filled issue for a present. We are wkg nite and day to *keep* QST the premier amateur publication. In return, we *must* have the whole hearted support of our members and readers.

Advertising supports the magazine and

makes possible the large number of depts with a wealth of reading matter; advertisers depend on your patronage to make their investment pay. Therefore, it's up to the gang to keep behind QST, to everlastingly push QST, to patronize QST's advertisers and to tell your friends about QST with a subscription blank ready to flash at the psychological moment.

MERRY XMAS & HAPPY NEW YEAR

EDITORIALS

de AMERICAN RADIO RELAY LEAGUE



All Set!

WHEN this issue of *QST* reaches our readers but a few days will remain before the start of the greatest event in the history of amateur radio, the Third A.R.R.L. Transatlantic Tests. The arrangements are almost completed at this writing, and we are sure we are going to be vastly successful, barring perfectly rotten weather. In the next few days thousands of amateurs, both in this country and abroad, will be putting the finishing touches on their transmitting and receiving set, preparatory to this season's classic.

Now we have a message for you, men. These tests are at once an opportunity and a duty. An opportunity to show our prowess, to enjoy our great game of amateur radio, to get personal records of the efficiency of our individual sending and receiving sets, and to increase the strength and prestige of our A.R.R.L. And by their very happening, these tests also carry to us a big burden of responsibility. We must make them a success and we must conduct ourselves in an orderly manner, or their value is worse than lost. The message of the month, then, fellows, to all U.S. and Canadian amateurs:

Get in on the transmission periods. Do your part; don't miss this chance to have your signals heard over bigger distances than you have ever accomplished before. Remember that 5- and 10-watt sets were heard in Britain last winter and that quite a few signals were copied this year in the prelims. But play the game fairly; follow the schedule carefully, transmit when your district sends and don't stop over; shut down when your time is up and give the other fellow a chance. Remember the novice listeners, too, and explain to them that the unusual QRM is a temporary thing. They will understand, when they are told that we're putting our signals over to Europe.

And then the reception tests, the last ten nights! To us the receiving effort is the most interesting. It will be brand-new amateur history, and more far-reaching in the influence it will have on the advancement of regular international amateur communication than any of us can visualize today. Do you realize that for the very first time in history there will be some

powerful British and French amateur stations trying to talk to us? We *must* copy them, fellows. Copy them and open the door to regular two-way transocean work, or get the grand raspberry from all the world. To copy them involves three things: the apparatus; the ability and persistency; and co-operation amongst ourselves. We have the apparatus and we know we're born operators, we American and Canadian hams, and we feel sure that signals are going to be heard on ordinary regenerative tuners. So we must stick at it, night after night, and copy everything we can. The British amateurs did it last year and we must do it this year or admit they are better men than we, for their transmitters promise to be plenty good enough.

The other thing, the main thing necessary for our success, is co-operation among ourselves. The amateur air in North America must be absolutely quiet during these tests. We are all going to make "ether-combers" out of ourselves, and during the test hours on each of the ten nights, thousands and thousands of operators will be straining their tubes and ears and bending every faculty to the search for the faint signals from far-off Europe. What a wonderful opportunity it is going to be for an amateur! Do you realize that 200 meters hasn't been quiet in this country since we first heard of wave lengths? And now our great organization is bending its effort all over the country to a real piece of co-operative work—the silencing of the amateur ether in order that the signals of our European comrades may be received, in order that we may repay them for their kindness in making records for us last year. Let us get into the spirit of this thing thoroughly, fellows. Let it not be said of us—oh it *must* not—that we failed to copy Europe because our men wouldn't play the game and refused to keep quiet air. Let not one solitary individual mar the perfect working of amateur radio. We want the air **ABSOLUTELY** quiet for the listening periods, as one transmitter can spoil the chances of his entire section of the continent, and we shall require of our members absolutely the fullest measure of the co-operative spirit for which our great League is famed throuth the world. Remember that not all of the amateurs of

the country are members of the League, but we ask their co-operation too and invite them to participate in the tests. Tell them the story and enlist their aid. Amateur transmission during these international tests can be interpreted as nothing short of a QST to the world that the sender is either ignorant or a rotten sport. We don't want to be considered either. Let us play the game, and get our neighbors to do it with us.

Full power in the first ten days; absolute quiet the next ten; and the highest embodiment of the spirit of team-work; *and success is ours!* Best o' luck, O.M.!

K.B.W.

A Nuisance

SAY, who is this station CQ, anyway? Every night we hear hundreds of fellows trying to connect up with him, and very anxious they are to do it because they call him many times; in fact, it's somebody so important that they risk violation of the law and call ninety times and sign every five minutes and so on. And they never get him!

Where's the end to this thing, gang? We thought we saw the demise of useless CQ-ing in our last April Fool's Day Party but it is much like burying the Hon. John Barleycorn. It's getting worse now every night, and the C.W. stations in particular are flagrant offenders. It's an easy bet that 50% of our QRM is caused by foolish CQ-ing. The wild wails of the CQ Hounds are delaying traffic, busting up actual communication, jamming concerts, burning up wasted juice, and making monkeys out of the sending operators.

The CQ call should not be canned altogether but its abuse should be stopped at once. CQ is an international abbreviation, designed to enable a ship to determine what land or ship station is nearest to it to receive its traffic. It was never meant as a general QST and it has no business being used in that connection. We believe that the moderate use of this signal in connection with traffic *on hand to move* is very valuable and helpful, as for example, "CQ msgs NYC" or "CQ ttc east," and we recommend its use in short calls with the sending station's call frequently interspersed. Used in this manner we have found CQ a most helpful thing, and it has helped us to move traffic at times when we have completely failed by trying to raise certain stations we heard—they were QRW but others in the locality we wanted were QRX and answered.

But this is the only proper way to use CQ. It is disgusting to hear stations call CQ so many times one can't keep track of them, fade in and out several times

before they sign off (or do they ever sign?), and then start all over. See here, you CQ Hounds: amateur radio is a busy game and we can't spend ten minutes waiting for one call sign. And does it never percolate thru that ivory top-piece that if your signals are reaching out at all, they'll be heard in the first short call, so that all the other wrist-exercise is just a plain nuisance that the rest of us don't propose to put up with? Cut it out, you—you're spoiling the game.

Understand, now, we're not demanding that CQ cease, but it should be used mainly by stations who have traffic to move. The other fellows with empty hooks should QRX and listen for the CQ's of fellows who have messages in their direction, and get *their* opportunity to work by answering and taking the traffic. The day has passed when we can grant one man the joy of burning up empty-ump minutes with an interminable wail, and we think good amateurs should refuse to answer such wild calls. If the situation doesn't speedily improve we will consider it our duty to start a Morgue of "dead ones" who fraternize with this CQ-call, with a report of just how many times the nuisance-call was used, so that all the rest of us may judge what kind of birds these ether-burners are.

Down with dumb-bell CQ-ing!

K.B.W.

About This Lid

LAST month we proposed a division of hours in crowded communities as a remedy for interference between amateur transmitters and novice listeners. Of course if there isn't any interference there is no need for division. And that leads us to say a word about C.W. transmission.

The right kind of C.W. won't interfere. Where it would be really brutal to open up on a big spark earlier than an hour at which broadcast listeners had had ample time to enjoy their evening, the quiet C.W. can work the evening thru without bothering anyone. We wouldn't be at all surprised to know that this fact has had more to do with the conversion of spark owners to C.W. than has the inherent technical advantages of the latter method! Starting promptly at dusk there is a flock of C.W. stations on the air, and by the time you have neatly stored away your evening meal and slipped on the cans they are all there, chirping away in quiet efficiency, bothering no one, and getting thru. Any sparks? Almost none! Many an evening we've listened from 7 to 10 and logged a hundred C.W. stations in many districts, and in that time heard not over two sparks. Decency really requires the sparks to observe a time division as proposed in our editorial columns last month, and C.W. sets using unrectified A.C. on the plate are almost in

that class; but the filtered C.W. sets have things their own way and their owners are benefiting by their foresightedness—they can work right now like we used to do with our big sparks in the Nights of Yesteryear!

So the point isn't so much that we must have hours in which amateurs shouldn't transmit as it is that, in recognition of the big number of people who want to listen on 360 meters, there should be hours in which we don't *interfere*. The test for determining whether any station or class of stations should be permitted to work all evening long is to be found in the answer to this question: does its operation interrupt broadcast reception? The local clubs of the country are the ones to determine this, and we are proud of the way they are taking hold of the problem.

Every time we write an editorial about C.W. we receive a flood of classified ads offering spark sets for sale. We're not trying to drum up business now but we ask you, who wants a spark set when they have to wait until 10:30 to open up and when with a couple of bottles they can start at 7 o'clock?

How happy a solution it would be if all our stations were like that! Then there would be no need for formal local agreements. Some cities are that fortunate right now, and of course in these cases there isn't any need to get the radio public together to propose dividing hours. It's ever so much better to avoid these formal restrictions if possible, and in some towns we know the necessity for it has been eliminated completely, by both the amateur and the novice agreeing to be decent about the matter. The situation looks a whole lot better today and we are sure that it will take care of itself if our members will be guided merely by the policy that the broadcast receivers should be permitted to copy without interference during the hours of the evening which count with them.

K.B.W.

National Radio Week

DECEMBER 23d to December 30th, inclusive, is National Radio Week, a time in which all the friends of radio are asked to boost it. Will you do your share?

The purpose of National Radio Week is to stimulate interest. The broadcasting stations are going to put on special programs and the listeners are going to get their non-radio friends over to their sets and show them. "Get another fan if you can" is the slogan. And "Make this a Radio Christmas." Radio can be given a big boost, the number of enthusiasts doubled, and some life put into radio business. In fact the success of Radio Week will probably give as merry a Christmas to the poor dealer as anyone else.

Now if all these people can help to boost radio during this week, how much more we amateurs can do! Of course we do all the time, but let's try harder during this particular week. There is someone that each of us can tell about the possibilities of radio and thereby bring into the fold; within the reach of all of us is a novice listener who needs a helping hand; and all around us are folks whose interest in radio, in order to continue, demands that they be told about *amateur* radio. What better service can we, the amateurs, do than to find those of our novice neighbors who are beginning to drop out because the broadcasts no longer are interesting, and explain to them the limitless possibilities of amateur work, the branch of radio in which the *real* fun is to be had? We can't go out and get new broadcast fans but we can do even better, by preventing the making of a knocker and converting the right men into enthusiasts of the kind that count.

Make another amateur if you can!

K.B.W.

Broadcast Stations Co-operate

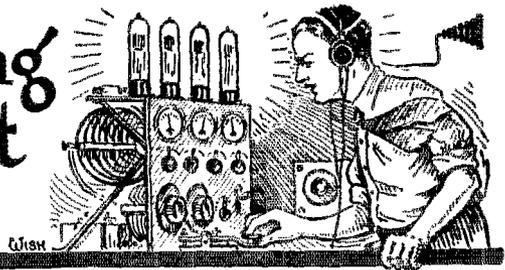
WFAA, the *Dallas News and Journal* broadcast station on Tuesday, Thursday and Saturday nights has been running an hour's program, 11 P.M. to midnight. When the A.R.R.L. announced its tests schedule on the Transatlantic Tests, WFAA requested WRR, the City of Dallas station, to help them out of a hole. WFAA had already made arrangements for their artist for several weeks in advance and did not want to get in a mix-up nor did they want to broadcast during the A.R.R.L. tests. WRR gladly came to the rescue when they found that the amateurs were to derive the benefits, and gave WFAA their 8:30 to 9:00 P.M. time on those nights in order that WFAA might run its musical schedule from 8:00 to 9:00 instead of from 11 to 12 during the tests, WFAA already having 8:00 to 8:30 as their schedule. In addition to changing their schedules to help the amateurs during the ten-day test, both WRR and WFAA made several announcements concerning the changes and stating they were made, gave the schedule of the various districts, told their listeners just what the tests were for and asked them to consider when hearing so much telegraphing during the ten day test that to the amateur radio men and to the A.R.R.L. in particular they were indebted in a large measure for the present development and high efficiency of radio apparatus.

To WFAA and WRR and the radio staff of each station the A.R.R.L. is indeed indebted. They are both A.R.R.L. members being true members they showed the spirit of co-operation.

F.M.C.

The Operating Department

F. H. SCHNELL, Traffic Manager
1045 Main St., Hartford, Conn.



Of particular interest is our message traffic report for this month. It begins to bear fruit as result of our extensive re-organization plan which was started some time ago.

In spite of the fact that 610 A.R.R.L. Official Relay Stations reported, we have plenty of room for many others, and those A.R.R.L. members who have stations capable of handling traffic are invited to communicate with the nearest assistant division manager whose address appears on page 3 of this issue. We want more men and stations, but we want good reliable ones.

Traffic honors for this month go to a C.W. station again.

* L. E. Furrow, SFT *
* Troy, Ohio *
* Central Division *
* 561 messages *

TRAFFIC REPORTS FROM A.R.R.L. OFFICIAL RELAY STATIONS

CENTRAL DIVISION—C.W.: SFT, 561; 9II, 352; 9UU, 214; 8ZAG, 157; 8AIM, 139; 9CP, 126; 8BDO, 118; 8IJ, 146; 8ZZ, 118; 9AJH, 107; 8AXB,

Message Traffic Report By Divisions OCTOBER

Division	Stns.	C.W. Msgs.	M.P.S.	Stns.	SPARK Msgs.	M.P.S.	Stns.	TOTAL Msgs.	M.P.S.
Atlantic	99	3037	31	46	1472	32	145	4509	31
Central	72	5175	72	37	1469	40	109	6644	61
Dakota	23	1514	66	5	89	18	28	1603	57
East Gulf	31	1668	56	13	779	60	44	2447	55
Hawaiian	1	24	24	1	6	6	2	30	15
Midwest	46	2621	57	19	862	46	65	3483	54
New England	28	2314	83	11	515	47	39	2829	72
Northwestern	13	336	26	10	282	28	23	618	27
Ontario	17	295	17	2	46	23	19	341	18
Pacific	31	627	20	23	572	25	54	1199	22
Roanoke	36	2158	60	3	356	119	39	2514	64
Rocky Mountain	11	667	61	3	40	13	14	707	50
Vancouver	2	36	18	5	91	18	7	127	18
West Gulf	12	826	69	5	40	8	17	866	51
Winnipeg	2	38	19	3	8	3	5	46	9
Total	424	21336	50	186	6627	35	610	27963	46
C.W. Messages,		21,336—76%							
Spark Messages,		6,627—24%							
Total,		27,963							

We present a new baby—the Hawaiian Division and its report. Watch it grow!

Among the divisions which have showed a decided increase in traffic we find the East Gulf, Midwest, New England, and Ontario Divisions. The Roanoke still holds its enviable position with the others.

No doubt, the Trans-Atlantic Preliminary Tests will cut into our traffic for next month, but we must keep after that 50000 mark. Its our aim, men, and nothing short of that will be acceptable.

98: 9AAP, 44; 8CGX, 34; 9CCM, 78; 9DCR, 68; 9AFN, 56; 9DQU, 136; 9DFB, 64; 9BHD, 53; 9DWW, 60; 9APS, 378; 9BJT, 59; 8AB, 56; 9DDY, 55; 9BLC, 52; 8ZE, 52; 8QK, 59; 9ALW, 50; 9ALU, 46; 8ZAF, 44; 8CAZ, 42; 8ANB, 38; 9ASD, 34; 9BIZ, 32; 9RTA, 30; 8CMI, 26; 9DBV, 26; 8AWU, 23; 8BGL, 22; 9AMQ, 22; 8BNH, 17; 8BJC, 16; 9BCH, 16; 8BRO, 14; 9GJO, 14; 8AND, 11; 9DYN, 11; 9BRK, 10; 8CAK, 7; 8BYE, 6; 9AKU, 6; 9EJ, 5; 8YN, 5; 9BAW, 5; 8AZE, 5; 9BLU, 5; 9ALR, 4; 8BWS, 4; 9ARM, 4; 8AQC, 2; 8FL, 2; 9CLZ, 1; 9CSK, 1; 9BAC, 1; 8RE, 310; 8BWA, 105; 9RAC, 1; 9ALR, 4; 9DCU, 2; 9BLC, 2; 8YB, 7; 9ZN, 412; total, 5175. Spark: 8AUX, 212; 8AWU, 200; 8AIZ, 174; 8UC, 133; 8EB, 74; 9WX, 74; 8CMI, 69; 8RXC, 57; 9ME, 44; 9CP, 37;

9AVK, 33; 9DZH, 30; 9ASJ, 27; 9BV, 23; 8CGX, 18; 9MC, 16; 9DEL, 16; 9CA, 14; 8BAH, 14; 9DGC, 32; 8CKV, 14; 8FT, 10; 9DHG, 28; 9BHR, 10; 8FI, 6; 8BEJ, 14; 8ZF, 6; 9DWM, 6; 8YN, 4; 9CIV, 3; 9DXG, 3; 8ZF, 2; 9AFK, 33; 8DEL, 15; 9DXT, 3; 9YB, 10; total, 1469.

DAKOTA DIVISION—C.W.: 9AUL, 19; 9BJV, 83; 9AJF, 21; 9BOV, 15; 9GD, 12; 9DGE, 15; 9DR, 408; 9AUA, 101; 8AWM, 817; 9BKP, 45; 9BBF, 15; 9BTT, 57; 9BKJ, 30; 9YAJ, 190; 9APW, 125; 9BAV, 4; 9AOR, 14; 9ADF, 2; 9EA, 2; 9YW, 14; 9ASF, 11; 9AVZ, 8; 9BRI, 16; total, 1514. Spark: 9FH, 1; 9FN, 8; 9ZC, 32; 9DKQ, 30; 9BOF, 18; total, 89.

EAST GULF DIVISION—C.W.: 4BF, 102; 4JY, 76; 4IZ, 32; 4JZ, 18; 4LH, 12; 4BQ, 202; 4IV, 51; 4MN, 70; 4EB, 321; 4HW, 101; 4KF, 87; 4CY, 26; 4KU, 12; 4CG, 15; 4MB, 10; 4KM, 3; 4AS, 35; 4BY, 73; 4EL, 7; 4GE, 1; 4LA, 10; 4FQ, 58; 4JK, 51; 4KI, 15; 4FE, 16; 5XA, 55; 5BQ, 18; 5ADE, 6; 5ZAS, 1; 5XAE, 8; 4XK, 5; total, 1668. Spark: 4QT, 17; 4MZ, 10; 4FB, 146; 4HS, 204; 4BI, 22; 4MY, 88; 4ON, 10; 4BW, 8; 4FD, 26; 4GN, 24; 4EG, 94; 5XA, 129; 5XAE, 1; total, 779.

MIDWEST DIVISION—C.W.: 9EX, 12; 9CFI, 31; 9BHN, 30; 9CCV, 34; 9DEF, 4; 9CKM, 20; 9ANQ, 76; 9ADG, 274; 9DUN, 75; 9DSD, 75; 9ABV, 102; 9CCS, 12; 9AON, 327; 9DXN, 12; 9CTR, 17; 9BEN, 176; 9AQZ, 22; 9FM, 34; 9DZY, 118; 9BDS, 18; 9AAU, 6; 9YM, 20; 9AQR, 21; 9BCR, 5; 9DJB, 1; 9AOU, 141; 9BSZ, 120; 9ARZ, 118; 9BHG, 85; 9DKY, 62; 9DZQ, 55; 9FK, 44; 9AMI, 32; 9CLQ, 41; 9BCF, 27; 9DSL, 15; 9HK, 45; 9DMH, 16; 9DVI, 6; 9CBS, 18; 9YU, 50; (9DSM, 9ATC, AD7, 9EW, 9VE, 175), total, 2609. Spark: 9FS, 28; 9DCV, 17; 9YU, 20; 9RR, 75; 9AHZ, 2; 9BKE, 21; 9DJR, 19; 9BMN, 152; 9ANO, 36; 9FK, 22; 9HK, 36; 9CS, 20; 9FK, 32; 9DNC, 88; 9DSM, 9ASO, 9DPB, 9CGS, 9HG, 300), total, 826.

NEW ENGLAND DIVISION—C.W.: 1CBP, 41; 1GV, 177; 1BKQ, 223; 1FB, 146; 1SD, 82; 1II, 38; 1CPN, 220; 1QP, 71; 1AJU, 42; 1FV, 35; 1ZE, 210; 1XM, 177; 1CUT, 32; 1CJD, 28; 1ADN, 51; 1BRQ, 109; 1AXB, 16; 1ASF, 172; 1BVH, 16; 1AGK, 42; 1BDU, 15; 1AGH, 50; 1AYQ, 45; 1AW, 46; 1AYU, 57; 1BOQ, 14; 1BY, 9; total, 2314. Spark: 1BV, 67; 1AHT, 2; 1AW, 21; 1BK, 11; 1ONI, 264; 1LZ, 40; 1BRG, 7; 1BJS, 17; 1CR, 23; 1AYU, 13; 1BOQ, 40; total, 515.

PACIFIC DIVISION—C.W.: 6CC, 19; 6ATC, 12; 6BV, 21; 6FH, 56; 6EC, 2; 6ZB, 3; 6AJH, 40; 6BJY, 30; 6XAS, 2; 6APW, 42; 6BKB, 12; 6AK, 10; 6ZX, 31; 6CU, 47; 6BPZ, 5; 6BQC, 12; 6ALU, 32; 6BRG, 5; 6EB, 20; 6BA, 50; 6BJC, 8; 6BQZ, 6; 6BJX, 16; 6BQG, 2; 6BEG, 10; 6JD, 15; 6KA, 20; 6FT, 23; 6EN, 48; 6SR, 28; 6ZD, 6; total, 627. Spark: 6CC, 42; 6TC, 6; 6TU, 44; 6FH, 20; 6AHE, 60; 6AJH, 31; 6BJU, 37; 6BBD, 15; 6BPZ, 40; 6IU, 6; 6AWI, 9; 6UP, 55; 6KE, 15; 6AIC, 8; 6GL, 20; 6ADG, 1; 6PL, 3; 6ADL, 50; 6OD, 38; 6ALD, 12; 6BAJ, 5; 6AAK, 32; 6OL, 28; total, 872.

ROCKY MOUNTAIN DIVISION—C.W.: 9ZAF, 173; 9AMB, 138; 9DTM, 88; 9XAQ, 13; 8DTE, 43; 9RXA, 7; 7AFW, 3; 7LU, 130; 7ZO, 53; 7ZV, 5; 6ATQ, 14; total, 667. Spark: 6BKE, 21; 6ATH, 10; 6APL, 9; total, 40.

WEST GULF DIVISION—C.W.: 5IX, 161; 5VA, 49; 5ZH, 37; 5SF, 168; 5DI, 120; 5QL, 10; 5XY, 12; 5RR, 6; 5VO, 3; 5XV, 37; 5XAD, 60; 5ZA, 226; total, 296. Spark: 5ZC, 6; 5YK, 10; 5ZAE, 18; 5HC, 4; 5AEW, 2; total, 40.

WINNIPEG DIVISION—C.W.: 4HH, 16; 4BV, 22; total, 38. Spark: 4AS, 3; 4CE, 3; 4EZ, 2; total, 8.

ATLANTIC DIVISION—C.W.: 2CGS, 24; 2BFE, 8; 2CKL, 23; 2AFP, 73; 2AJF, 15; 2AJA, 36; 2BRB, 55; 2BOI, 6; 2BNZ, 97; 2ALY, 88; 2CMS, 20; 2HW, 10; 2ANM, 20; 2AJW, 26; 2BRC, 137; 2AWS, 69; 2AZC, 28; 2BSC, 18; 2BJO, 7; 2KP, 20; 2BQS, 4; 2BIP, 12; 2XI, 2; 2AQB, 23; 2KU, 6; 2PJ, 6; 2QB, 9; 2MZ, 37; 2UE, 30; 2AFL, 30; 2CTK, 1; 2SAU, 10; 2CMQ, 50; 2CG, 40; 2AFC, 61; 2FC, 61; 2CGK, 18; 2OF, 34; 2BJP, 8; 2AER, 32; 2AOS, 8; 2AEQ, 12; 2BNL, 22; 2ABQ, 4; 2AWF, 44; 2NZ, 224; 2TS, 21; 2AVE, 63; 2BRE, 48; 2AHK, 7; 2CSE, 8; 2CUU, 11; 2ATU, 39; 2NB, 47; 2AXN, 111; 2BMM, 48; 2BUX, 38; 2ASL, 37; 2CTN, 25; 2AMM, 48; 2BQB, 12; 2FR, 26; 2BLU, 8; 2ZO, 116; 2BIQ, 6; 2BNU, 150; 2LP, 54; 2MB, 52; 2GK, 18; 2VW, 23; 2PM,

3; 2ANJ, 37; 2SM, 30; 2ZE, 24; 2OW, 3; 2BJX, 15; 2AGO, 34; 2AIO, 65; 2AKW, 5; 2CON, 45; 2ALT, 11; 2AJD, 46; 2HG, 40; 2APT, 4; 2PZ, 45; 2BHM, 57; 2ALN, 27; 2IL, 27; 2QV, 33; 2FS, 22; 2BB, 16; 2AGR, 20; 2SCNB, 4; 2JJ, 4; 2OD, 5; 2LR, 35; 2ZV, 8; 2BPF, 3; total, 4575. Spark: 2BQZ, 39; 2AJA, 8; 2OM, 140; 2SQ, 119; 2CJX, 64; 2KJ, 30; 2AXK, 40; 2JL, 10; 2GDK, 56; 2BSC, 11; 2BJO, 7; 2UA, 30; 2AEG, 41; 2DI, 163; 2CEV, 43; 2BOW, 5; 2BZU, 4; 2CEB, 3; 2KU, 6; 2MZ, 2; 2AXQ, 5; 2AAW, 55; 2BM, 44; 2SCHY, 6; 2COA, 8; 2CAD, 12; 2ARS, 26; 2MN, 6; 2AEP, 30; 2AAF, 21; 2CS, 5; 2ARB, 48; 2AYM, 24; 2BQA, 31; 2CUG, 4; 2ZS, 3; 2QN, 24; 2UD, 46; 2CEJ, 51; 2ZD, 55; 2HY, 2; 2VH, 19; 2CDI, 12; 2AC, 29; 2KM, 4; total, 1895.

NORTHWESTERN DIVISION—C.W.: 7ADP, 7; 7AGF, 24; 7AGV, 6; 7DP, 36; 7BV, 15; 7LY, 6; 7LR, 19; 7NN, 28; 7OE, 16; 7OO, 6; 7SC, 42; 7TH, 26; 7TQ, 14; 7WM, 56; total, 336. Spark: 7AW, 27; 7BG, 23; 7BK, 90; 7FR, 8; 7GE, 47; 7GH, 12; 7IM, 25; 7NC, 2; 7OJ, 27; 7TW, 21; total, 282.

ONTARIO DIVISION—C.W.: 3ACJ, 2; 3XX, 2; 3KP, 19; 3GK, 4; 3JK, 6; 3JI, 61; 3AL, 84; 3CO, 8; 3JT, 3; 3AW, 1; 3KO, 17; 3DS, 26; 3YH, 2; 3DH, 45; 3JE, 2; 3SX, 5; total, 295. Spark: 3FO, 27; 3GE, 19; total, 46.

HAWAIIAN DIVISION—C.W.: 6ZAC, 24. Spark: 6ZAC, 6.

ROANOKE DIVISION—C.W.: 8SP, 174; 8AFD, 37; 8AUE, 30; 8BPU, 20; 8CAY, 5; 8AMD, 2; 8BKE, 32; 4OL, 86; 4EA, 180; 4FT, 252; 4BX, 167; 4NT, 97; 4ID, 15; 4DC, 13; 4DQ, 10; 4NV, 4; 4EN, 6; 4GH, 134; 4KC, 63; 3MK, 234; 4JL, 50; 2ZZ, 126; 3APR, 11; 3RIL, 101; 3CA, 62; 3BMN, 29; 3AEV, 43; 3AUI, 22; 3IW, 20; 3BVL, 19; 3BZ, 18; 3BHL, 17; 3BLE, 5; 3MO, 3; 3SK, 1; 3TJ, 10; total, 2514. Spark: 8BDA, 348; 8IC, 4; 3AOV, 4; total, 356.

VANCOUVER DIVISION—C.W.: 4DQ, 23; 5CT, 13; total, 36. Spark: 5DX, 55; 5CN, 31; 3EC, 3; 9BD, 1; 5EJ, 1; total, 91.

ATLANTIC DIVISION
C. H. Stewart, Mgr.

EASTERN PENN.: Traffic in general has taken a decided increase over previous reports and more stations are reporting due to the efficiency of the Form No. 1 which was supplied to the various recently appointed official relay stations. Section No. 1: The D.S. is steadily increasing his list of stations for appointment as relay stations and reports good work being done by 3AWH, 3AWF, 3BUL, and 3AKR. No. 2: Owing to the failure of D.S. George H. Wise, of this district to forward reports since his appointment, it was necessary to cancel same. The new D.S. for Second Penna. District is Oscar A. Hiskey, 3BNU, Bethlehem, Pa., formerly city manager, who will take care of all relay work in this section. Mr. Hiskey has shown excellent work in traffic handling and organizing his city. No. 3: No report. Scranton is well represented by the following stations: 8RH, 8AJA, and 8BIQ, who is city manager. No. 4: The D.S. only reports the messages of 3ZO. We would like to have reports from the various towns in the 4th who we are sure have done good work. 3LP has two operators on the job in clearing traffic. No. 5: No report received from this district. Unless some action is forthcoming from this district some change will have to be made. There are numerous stations in this district doing very good work, but no reports have been received. Credit cannot be given to the district un-

less the stations come across with their reports. Harrisburgh, York, and Lancaster are large traffic centers and we need their reports. No. 6: According to the D.S. this district was void of traffic this month, but many stations are under construction that should prove efficient in handling DX traffic. SANE has 10 watts of C.W. going, and has expectations of increasing it to 100 watts. Louisburg Radio Club installed 5 watts of C.W. 8BIR's spark is waiting the arrival of a new condenser. 8XN is having trouble getting adjusted to his special wave, and probably a new antenna will help. 8DT is installing C.W. and locating new stations in Williamsport. 3FR appears to be the only DX station in Allentown, all others have turned to the broadcasting craze.

PHILADELPHIA: Philadelphia is showing more pep than ever before. We desire to thank those stations who have shown interest enough to make out reports and push things along in general.

Section No. 1: Successful relay work has been accomplished by 3VW, 3KD, 3GK, and 3FM. 3HX building a new receiver. No. 2: Stations desiring appointment in this district communicate with city manager, D. C. Boggs, 147 Pelham Rd., Germantown. No. 3: 3ANJ has increased to 100 watts C.W. and is very consistent at 200 miles. Let's have reports from more stations in this district. No. 4: 3FS, 3QV, and 3SM, are the only stations doing DX work. These are regularly on the job. The city manager has other prospects in view.

A note of warning is sounded to all traffic officers who fail to make out their monthly reports. This means a cancellation of their appointment as we cannot afford to lose the individual station report sent to them each month and cast aside. Co-operation is needed from each and every station, so let's have that traffic report on time.

WESTERN PENNA.: State College is now on the air with $\frac{1}{2}$ k.w. C.W., and will have a report for the coming month as they maintain continuous 24-hour watch.

DISTRICT OF COLUMBIA: It looks like a hot time in the old town this winter. Already things are buzzing quite lively and there is talk of three times as much. 3KM threatens us with a coffin and sink gap, and then builds a receiver that will pick up nothing but C.W. 3ZW hopes to reach 6ZAC with his new 500 watt C.W., and we think he will. 3LR is doing great work and is using a two foot loop exclusively for traffic work. There are a number of 10, 15, and 50 watt sets working very nicely. 3BHM has worked 6XAD with a 50 watter. If we only had another 3ZY this winter, traffic wouldn't know it had stopped in Washington. 3JJ opened up with two 50 watters and after considerable trouble with bad tubes, managed to get out in good shape.

MARYLAND: Baltimore stations are lining up for real relay work for the coming season. Practically all of the old DX fellows are on the job, and many new ones are heard nightly clearing traffic. 3AC has forsaken the rock crusher at last. He is now doing still better work on a 5 watter. 3AJD continues to be the most consistent Baltimore C.W. station. His 15 watts apparently carrying equally well in all directions. 3UC has overhauled the old spark and should do good work. He still has a bad case of his old CQ-itis. 3EM will be on with a new 50 watt outfit soon and may increase later to 100 watts. 3APT has moved to the suburbs and has already reached out nicely. 3WF has been ill, and is temporarily out of the game. 3SQ and 3BUC are capable of real DX, but are not on often. 3HG has been struggling to keep traffic moving with one 5 watter until a larger set can be installed. The A.D.M. is unable to line up any stations outside of Baltimore, and is anxious to get in touch with any DX men in other parts of the state who are interested in A.R.R.L. work. Letters should be addressed to George L. Deichmann, Jr., Park Heights and Bancroft Park, Baltimore, Maryland.

NORTHERN NEW JERSEY: 2AWL feels justly proud of the fact that he received a report from each district superintendent under his supervision. Some reports from city managers are short but this is because of late appointments and vacancies still existing. Traffic is picking up and moving fast. A number of our best stations who helped move summer traffic are closed—operators being away to school and college. 2BQZ burned out his transformer but will be back stronger than ever as he has no OW now and says he will have more "jack." 2OM in operation only 10 nights out of past month, cleared 140 messages and could have handled more but for the fact that too many stations jam things in with CQ's and unnecessary sending.

EASTERN NEW YORK: Dr. Cyriax reports on account of work attached in appointing the district superintendents and city managers in this section, reports have been deficient. A large number of the stations have just been appointed, so that reports from them are incomplete. Newly appointed officials promise better reports next month. H. S. Colins, 2AJW, our Long Island district superintendent, has turned in a splendid report from stations in his section. 2UA, Decker, reports his section in bad shape and requests co-operation from all stations throughout his territory, and hopes to have the old Hudson River bunch at it again soon. (Lend him a hand men FBO). Staten Island shows plenty of pep with station 2NZ. Elmer Roy Raguse, taking just honors for the month with 224 messages, leading the Northern

section. Reports from Brooklyn are missing.

WESTERN NEW YORK: Mr. Benzee's report is very gratifying as the same conditions exist in his sections as in 2DI's. Some big traffic stations operate throughout western New York, the only thing necessary is to get them to report. Reports from Utica indicate that everybody in that town is reconstructing their transmitters. We regret to learn that 8AWP of Syracuse has procured a divorce from the amateur game and is now a full fledged broadcaster as WLAH (we have still heard 8AWP on 200 meters, and we also doubt very much if we will lose him entirely FBO). 8AXN leads western New York with 111 handled on two 5 watters, which is excellent work. Olean, N. Y. is well represented by a raft of DX stations. 8BUX one of them, on 50 watts, has been reported by 6XAD and hopes shortly to be QSO for traffic to him. If there are any stations in Allegany county will they please make themselves known. Chas. Nichols, turned in only a slim report, but says he has dug up a number of stations now who promise to show something next month.

Traffic Report. Northern New Jersey leads my section with 1437 messages handled. Eastern New York second with 1113. Western New York third with 798—a grand total of 3348 messages. For the northern section you will note this is a decided increase over last month. Much credit is due 2AWL for the way he has been whipping Northern N. J. traffic in shape.

CENTRAL DIVISION R. H. G. Mathews, Mgr.

This report will be in the nature of a resume of the work of the Central Division so far this fall.

OHIO: Ohio handles the bulk of the Central Division traffic. An excellent organization exists in this state, which includes a great many high class long distance stations. The report was received too late from district 1. A nice report was received from 8QK, formerly 8AFY. QK uses C.W. and phone. No report from district 2, but individual reports arrived from 8IJ and 8CMI who are both doing good work. 8IJ handles considerable traffic with 8FT on daylight schedules. 8CMI, will report on Marion stations and their traffic until the district superintendent wakes up enough to take charge of his duties in collecting traffic reports. P. A. Marsal, superintendent of district 3, reports that many of the relay stations in his district seem to have gone south or west or somewhere during September as he received only four message reports. District 4 seems to be the most wide awake of any part of the state. Although hindered very much by the many broadcasting stations

which are on continuously from 7:00 A.M. until 1:00 A.M., the district stations have managed to handle a nice bunch of messages, and the best of it is that they report their traffic too. Cincinnati radio clubs are living up again after an all summer shut down. Greenville is showing some signs of life. Several new stations are blooming forth and will soon blossom into full fledged relayers under the able guidance of district superintendent L. E. Furrow. 8FT has been doing most of his relay work on C.W. since his spark set was partially broken down and could not stand heavy traffic handling. District 5 has very few stations outside of Columbus. The Columbus stations are doing good work but they are getting a little lax in reporting their work. Only two stations this month turned in their reports to superintendent M. F. McDowell. 8TJ has just completed a new station in a better location.

INDIANA: In Northern Indiana, the assistant division manager has been confronted with a problem that has existed in northern Indiana since the formation of the League. The stations there are few and widely separated due to the fact that all the towns are rather small and in addition this year he has had the added handicap of a great many of his better operators having gone away to college leaving only a very few good stations in operation. E. E. Pippenger, Goshen, Ind., is now attending Purdue University, address 208 Wiggins St., West Lafayette, Ind. No October report due to change of address from Goshen to Purdue. On the job at 9YB and working up his end of the state. No reports from Ft. Wayne pending the appointment of a new city manager there. 9CP is doing good work with both spark and C.W. Other active stations are 9DTJ, 9AIU and 9BLC. 9BLC is in the hospital. 9CP clears most of the DX traffic, while 9AIU clears most of the Indiana dope. The following operators are at Purdue University: 9FS, 9DEK, 9VL, 9AGR. In Southern Indiana approximately the same condition exists as in northern Indiana, the large cities apparently being dead as far as radio relay work is concerned. J. E. Hall of Seymour, Indiana, newly appointed assistant division manager for southern Indiana has not had time to work up his territory or get in a report as yet.

MICHIGAN: The Upper Peninsula has been dead, but the southern Peninsula with Detroit and other large cities, has been very much alive and especially active. The Special wave length route has been organized across this part of the state. We are now organizing a new route from Grand Rapids through the Traverse City thence to the Upper Peninsula, where we have developed a good relay through that territory. A new trans-state route will be in effect shortly via Ann Arbor, Jackson,

Battle Creek and West. We need more daylight schedules.

ILLINOIS: The newly appointed assistant division manager, N. C. Smith, has been unusually successful in putting pep into his organization and renewing the activity which has been allowed to die out for the past few months. 9NQ the only relay station in Galesburg is out of commission on account of condenser trouble. C. M. Schalkhauser reports three stations, 9LF, 9PQ and 9XAF ready for operation. 9AZF, 9DAY, 9RH are all spark but no messages. 9CTF, 9AHQ, use C.W. but not messages. 9AMK, spark, is in charge of Mendota. 9EJ, C.W., is in charge at Carthage. 9BIZ, C.W., is in charge at Toulon. Stations in this vicinity report too much broadcasting after 9:30 P.M. Stations wishing to clear west will find ready outlet through 9AJH. 9CCM is doing remarkable work on one tube with a spark coil attachment. 9DDY, another trick C.W.-squeak-boxer, is working 2AWL on schedule. 9WX spark is fighting power company as well as BC QRM but hands us a good total. 9BTA seems to have a receiver as he is logging 6KA, 6XAD, 6PD and 6BES. Why not some traffic? 9BJT, C.W. handled lots of traffic with ten watts C.W. 9CA, district superintendent, says he is forever blowing bubbles but they are all in the dielectric. Traffic is being handled by 9BYX, 9CLZ, 9CFK and 9ASL. There is lack of interest in traffic handling in Roodhouse. 9ASL is just appointed city manager. No cards came back from official relay stations in Marion. 9AFN has been doing all the relay work of importance during the month. 9BQW has been doing good but not consistent work, and with a double amount of power will do some work this winter. 9DVW still has his single can of TNT, and is making a few fifty watters look sick, getting 300 miles per watt, approximately. Can ya 'magine ut? 9DJO is on with the watts again, and is starting out in earnest. 9BRO canned his spark for a 5 watt and is now bent over the task of telling the world. 9BHD is sure knocking 'em dead with his fifty watts. He has worked every district and Canada during the last month. 9ALW is coming fine. He burned out a half k.w. in the spring and started to monkey around with a couple of bottles. Well, he still has them and hasn't said a darn thing about a spark set for months.

WISCONSIN: B. A. Ott, says that he will have more time in the future and will have a better report for next month. 9ALR with four fivers is on regularly and doing consistent work. 9AFK has broken out with a 100 watt C.W. set in addition to the 1 k.w. spark equipment and has reached both coasts, Canada and the Gulf with one 50 watter. 9DXT has a 1 k.w. sink spark and will soon blossom out with a

50 watt bottle. 9DEL has been on the air consistently and has made a name for himself by his work on the lake shore. 9BAC has a perfectly good 10 watt C.W. set tied up awaiting the erection of a new mast. 9DHK will tickle the air with a five watter. Station 9BDD is operated by Wm. Crouch and owned by the Waukesha Radio Amateur Club (affiliated). Its operating hours are from 4:00 to 10:00 P.M. and any messages coming from the south, west or north for Milwaukee or any other nearby city may be handled through 9BDD. 9YAD is now in complete operation.

DAKOTA DIVISION N. H. Jensen, Mgr.

Recent appointments made in this division are as follows: Orville Wheelon of Pierre, district superintendent of South Dakota (to succeed Charles Norton who has gone to Ames, Iowa), F. B. Christopherson, city manager of Sioux Falls, So. Dakota; E. J. Krusel, city manager of Superior, Wisconsin; M. G. Goldberg city manager of St. Paul, Minnesota.

The D.M. has been almost swamped with letters the past month from amateurs all over the division, reporting amateur activities, reporting about new stations starting, and making inquiry about conventions, trans-Atlantic tests, and other matters. This is an indication that amateurs are still very much alive and that amateur relay work is on the increase. Minnesota district No. 2 did some exceptionally good work the past month.

MINNESOTA: Official relay stations are requested to send in reports, etc. promptly after the 15th of each month to the district superintendent, because he must have his report ready for mailing on the 19th at the latest. Report whether you have handled any traffic or not, as it will help to get a line on what is going on and to get a report on the real conditions in the district.

City manager Hayes of Duluth, 9GW, reports that interest in relay traffic is picking up wonderfully. Duluth now has four DX stations handling traffic, all C.W., and they are on the job, so come on with your traffic. These stations are 9ADF, 9CO, 9GW, and 9EA. A new broadcasting station, WMAT, has started up and is giving some trouble, as he is working on 220 meters. (How come 220 meters?—T.M.) This may pass before 10 P.M. but after 10 P.M. we ask the broadcasting stations to "please note the U.S. Radio Laws." We are trying to keep the air quiet for the broadcasting stations the early part of the night, and are not doing any traffic work before 10 P.M., and if the broadcasting stations would try to co-operate with us, there would be much improvement for all concerned. WJAP, who previously gave some trouble by broadcasting after 10 P.M. is

now a real good fellow. He is off the air after 10 P.M. 9PN has a new C.W. and spark set ready and is pounding out in great shape. 9PN has been worked from 9ZC several times lately, and that is a hard jump to make. The greatest trouble now is to get an outlet to the west coast. 9AOR is still with us and is doing good work. 9BAV has remodeled his station and is going strong.

There are five 250-watt tubes in operation in the Twin Cities at present as follows: 9BLY, 9IG, 9AUL, 9AUJ and 9DGE, as well as 9AWM. Very good daylight routes have been organized out of the Twin Cities. 9ARZ, 9AWM, 9AML, to the south, 9MF and 9XT to the north, and 9CL to the east can all be worked in daylight. Through 9CL, traffic goes to 9MC and 8UE. Thus, a complete daylight route out of Minneapolis to the east coast. 9DR has worked stations in California seven times the past month and still continues to handle a great amount of traffic with his two fifty watters. 9AWM is doing great work with his 250-watt bottle.

SOUTH DAKOTA: C.W. appears to be crowding the "rock crushers" out. 9BRI with ten watts is doing good work. He has abandoned his spark and works 9AVZ every noon clearing local traffic. 9AVZ is attending school at 9YW and is often heard operating that station. 9YW is doing good work and has been reported in California a number of times. 9AIG is trying to get a five watter to "work" while waiting for his fifty watt tube. 9YAK, 9DKQ and 9BOF are all doing good work, and a new station, 9CGA is reaching out in good shape. Another new station, 9CCY, will be going soon with 10 watts. The second South Dakota Convention will be held at Sioux Falls on December 28th and 29th, 1922.

NORTH DAKOTA: City manager, Bert Wick, of Fargo, 9AEJ, reports that 9GK is doing good work and that this station operates after 11 P.M. on Tuesday, Thursday, Saturday and Sunday evenings.

EAST GULF DIVISION
B. W. Benning, Mgr.

GEORGIA: Dist. No. 1: 4BQ has been burning things up this month and has been reported in every state in the U. S. and every province in Canada. 4IV and 4MN are doing good DX work. 4FB is taking OM Pope's place and traffic is pouring through that city. This bunch of stations in district No. 1 are all connected with daylight schedules and the majority of their traffic is handled before 5 P.M.

No. 3: This new district includes the following counties: Fulton, DeKalb, Campbell, Clayton, Henry and Rockdale. This takes in Atlanta and the nearby cities that are handling the majority of the traffic in the state. Message traffic has been pouring through Atlanta lately and in spite of

a continuous broadcasting schedule, the local spark stations are doing good work. The outstanding traffic report of the division comes from 4EB in Palmetto who has been busy with daylight work.

No. 4: Some new appointments have been made in this district during the month. Jones of 4GN is now district superintendent. 4AS has been appointed city manager and reports that things are beginning to pick up in the relay line. 4DH has just returned from the Pacific coast and is getting his new station into commission. 4GN and 4FD are still going strong but are having a hard time on account of various break downs and QRN. 4EL and 4BY have been having a hard time holding things down in Savannah with no help from 4GL. Old Efficiency says he will be on the air by the first of December.

SOUTH CAROLINA: Business is picking up in this state and before many more moons the other states of this division will have to look up to it. 4EG is still working on the personnel and getting his districts in line for winter work. The following stations are all doing good work and are on the air every night: 4EG, 4LA, 4FQ, 4JK, 4KI and 4FE.

ALABAMA: No. 1: 5BQ has established connection with 5XA which is considered quite a feat for this section of the state. 5ZI is changing his location. 5ADE is reaching out nicely and handling traffic, but is not an A.R.R.L. member, and is not keeping a log on his work. No. 3: Traffic is going in and out of Mobile in fine style. 5XAE is on the air with 100 watts C.W. and is reaching out all over the country. They have established connection with 5XA. 5JZ is still fooling away with spark and has actually succeeded in handling one message with this antiquated method.

District No. 4 was made primarily for station 5XA but will later take in enough territory to handle any new stations that might spring up in near-by counties. 5XA is now going in full blast, having all 5 transmitters in operation, and handling traffic on 4 of these. The radio inspector has just left 5XA and all of the operators are in possession of new licenses. A.D.M. McIlvaine says that any station working 5XA and has trouble in copying them to ask for a QSY on 200 meters for spark, 250 meters for 500 cycle spark, C.W. or I.C.W. or 375 for spark. They have the station arranged for quick shifting and no doubt it will prove a blessing for the East Gulf stations who have so much trouble in copying them due to constant swinging.

FLORIDA: More stations are on the air and more messages are being handled. This is partly due to improving weather conditions, but is mostly due to the increased efforts of the men themselves. District No. 1 reports practically nothing doing. 4BP spark has stepped out and

worked some real DX, but has handled no messages. 4EZ is out with a burned out transformer, but promises to be on the air soon. No. 2: This section is showing more activity than ever before. 4BF, 4JY, 4IZ, 4JZ, 4LH, and 4XK, C.W. and 4MZ, spark, are all handling messages, and 4NU has a C.W. station almost ready to turn loose. We regret that we are to lose our star station, 4BF, temporarily. His outfit is now located at 4JZ. No. 3: 4BH, $\frac{1}{2}$ k.w. spark and 10 watts C.W. is the only active station here, but he is having difficulty in reaching out. Several C.W. stations are under construction. No. 4: 4DL is heard consistently and has handled a number of messages, while 4BC continues to do good work on spark. 4OI, of Porto Rico, is heard nightly working real DX and handling traffic with the states.

HAWAIIAN DIVISION

C. J. Dow, Mgr.

6ZAC worked 16 stations, fifteen of which are mainland stations, and over 2300 miles DX.

6TQ in Honolulu has a 20 watt C.W. going strong, and we are good QSO there now. 6ASR also has a C.W. and is QSA at 6ZAC, although QRM from trolley lines prevents his working DX until after midnight. We will have a large bunch of biz to report next month, as 6TQ just came into a commission QSA and hasn't had a chance to do anything yet. No stations have been located yet on islands other than Oahu and Maui.

MIDWEST DIVISION

G. S. Turner, Mgr.

The Midwest Division is now completely reorganized. The men are beginning to work together and results are being accomplished, as can be seen by glancing through the following reports sent in by the assistant division managers. They, and their men are to be given credit for the work they have done.

NEBRASKA: The district is now completely reorganized following the appointment of Lou Chansky, 2141 S. 35th Ave., Omaha, Nebra., as district superintendent of northern Nebraska. Relay stations are requested to mail their reports early to their respective city managers or district superintendents. Stations located within the city limits of Omaha or Lincoln should report to their city manager, and not to their district superintendent. Rural stations report direct to their superintendents. Mr. Palmer of Lincoln takes state honors with 83 msgs. 9YU reports handling fifty messages for the past month and also working 7SC in Seattle on one 5-watt tube. As the Nebraska report must reach Kansas City by not later than the 21th of each month it is necessary for all reports to be

in Omaha by not later than the 20th. 9EW, Nebraska Route Manager, reports that stations will be actively engaged in relay work in Valentine and Norfolk. This should help greatly in getting traffic across the district in daylight, as Norfolk is in consistent daylight range of Omaha and Valentine. A large number of stations in Omaha are handling a large volume of traffic.

It is absolutely necessary that we receive an accurate report of the number of messages handled by Nebraska relay stations, so kindly get in touch with your city manager or district superintendent at once. Station owners desiring appointments as official relay stations, must communicate with relay officers at once. Remember fellows, a membership in the League is required to hold any office in the League.

IOWA: Traffic has increased with the fall weather and reliable DX weather has been had for the relaying of messages. 9ARZ, 9AMI, 9DKY and 9BGH, have installed 50-watters. 9BSG and 9BIK will be going with 100-watters. 9BZI and 9BCF are also installing 50-watt sets. The following relay stations have been appointed as official relay stations for the state of Iowa; 9ARZ, 9CS, 9YA (P. A. Stover, operator in charge,) 9BSG, 9BGH, and 9AEQ. Other appointments will be announced next month and we reserve the right to cancel any of the above. 9CS will have, besides the old rock crusher, a 5-watt C.W. set. 9DMH has been doing considerable DX with a flivver coil C.W. set, covering 500 miles repeatedly. 9FK is laid up with a minus field in his sync motor and no condenser. 9DVI is on the job again—and has been reported 200 miles off the English coast. 9CES is clearing traffic in great style. 9BSG reports the traffic routes throughout the state in fine shape, and everything is ready for any and all tests. 9BSG is moving to Ames. 9ZAR is now open for traffic using 100 watts C.W. 9AOU wins honorable mention in Iowa for having handled the most messages, his hook having seen 141 come and go during October.

Right here we want to say a couple of words. A "b.e.l." with a \$500 outfit kept complaining about amateur interference and we happened to drop in on him one night. The offender proved to be an aerial mail station half a mile away. Another station in the same city had the same complaint to make. We visited him and NAJ almost knocked the phones off our ears. The two mentioned are only examples of the hundreds of complaints we hear of each month. You men who want to save amateur radio, visit these stations who complain so and set them straight. It is your duty.

MISSOURI: St. Louis, Kansas City, Cape Girardeau and Springfield, all have

good clubs fully organized and affiliated with the League, or they have made application. All clubs are wide awake and active. The K.C. bunch seem to have some trouble with the broadcasting stations. St. Louis broadcasting stations are all lined up and are working in harmony with the amateurs. The assistant division manager has personally taken up certain points in dispute and all have agreed to do nothing which interferes with amateur work. We feel that within a short time St. Louis will have two nights a week reserved for amateur work—Tuesdays and Thursdays. This is in the process of making at the present time.

Traffic Manager Schnell, who was in St. Louis October 9th to 11th, spoke over the radiophone from KSD and touched pleasantly upon the amateur problem in relation to the amateur.

It has been agreed that the spark station in K.C. will not take part in the special tests that are scheduled for the near future. Practically all of the best stations in Missouri are getting lined up preparatory for these tests. All the officers are working hard and everything is going to be in readiness. Relay work in K.C. is being done chiefly by 9FM, 9AQR, 9RR, 9BKK, and 9DJB. Daily runs have been established with stations in Kansas, Nebraska, Iowa and Illinois. One route operating daily via 9YU, 9BHN and 9BKK or 9BCR. A second route is being arranged for through 9YM via 9BMN and 9SJ to K.C. Stations 9DZY, 9DCW, 9AON, 9BED, are arranging routes with Little Rock, Arkansas; stations in Iowa and Illinois for St. Louis.

9DXN and 9AAU are being consistently heard on C.W. from Gulf to Canada and to the eastern coast. 9AAU is not doing much traffic work due to the fact that he is required to spend much time in organization work for the A.R.R.L. An arrangement is being made though, so that an operator can be on regularly this winter for real DX work. Nothing has been heard of stations in the northern part of the state. Please get in touch with your district superintendent. 9AON wins honorable mention for the number of messages he handled during the month of October, not only in the state of Missouri, but in the Midwest Division. His total is 327 on C.W. Very good work OM.

KANSAS: Kansas seems to be coming into its own this month as a handler of traffic. A bunch of stations are getting on the air every night and all have reported in good shape. The result is 761 messages handled this month while for the last few months the reports have been practically nil. 9PS has been sick part of the time, but he vows to come back strong next month to make up for lost time. 9ABV blew a few tubes which has kept him from doing his full share of the work.

Around K.C. the most active stations are 9ANQ, 9CKM and 9DPL. Stations in the north handling traffic are: 9CFL, 9BHN, 9CCV, 9DEF, 9AOG, 9CKM and 9ANQ. Daylight routes have been worked on in preparation for the coming tests. A fine route is in operation north and south via 9YU in Nebraska to 9BHN to 9AOG to 9CCS to 9DUN to 5AQ. A great deal more difficulty is experienced getting a daylight test through west. However, we plan to route all messages going west to the north or to the south of us.

The following additional appointments have been made: City manager of Kansas City, Kansas; L. V. Wells, 9ANQ, 2207 Richardson Ave. Official relay stations, 9CCS, 9DUN, 9DSD, 9DPD, 9CCV, 9CFL, 9BHN, 9DEF, 9CKM, and 9AQE.

9AOG wins honorable mention for handling the largest number of messages in the state of Kansas.

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

Hello, Gang! I see you are all with me insofar as this grand old game of ours is concerned. It is indeed gratifying to feel that every last one of you is squarely behind me in this division. Your messages of congratulations have helped to swell my own total for this month. I wish to extend my sincere thanks to Mr. Philip F. Robinson, who has given me such a wonderful start-off, and for his help—also Mr. Schnell, our Traffic Manager, who was good enough to call at the radio shack, 1ZE. I will do all in my power to put the first district over as the leader. I want you to know I am with you heart and soul with the old game for the love of it. Don't feel as though, "Oh, he's too busy, or he's too big to bother with me," for while I may be a six footer, I've got a great big heart for all of you. The little fellow with the little squeak box means just as much to me as the big fellow with a k.w. spark or a 1000 watt C.W. Drop me a line. Send in your reports regular, and before this winter is over, we will be the one division that is 100% A.R.R.L.

We must take our hats off to 1CNI this month and although he uses a "cement mixer," he handled 264 messages.

MAINE: 1FB reports that he will enter trans-Atlantics with 250 watts, 500 cycles I.C.W. FB, OM. Here's luck. 1FB worked 132 stations outside of first district, and has been heard at 7SC and 5XV. 1BRQ is reaching out and handled 67 messages.

VERMONT: No reports received from this section of the country, but there are hopes of receiving some good snappy ones from now on. R. P. Slayton at 1ARY has accepted the assistant division manager's place for Vermont. Here's good luck to him.

Billings is kicking over 5 TC amps on C.W. and 6.5 on spark, with more tubes and amps coming up. He is a dependable link in our organization in the eastern part of the division. 7AGF and 7HM are also reaching out on C.W.

IDAHO: No reports received. How come OM??? However, the same gang are going strong over there and shovelling traffic through 7JF, 7WG, 7AEM, 7OT, 7YA and 7LN. (Let's have a good report next month, OM—D.M.)

OREGON: Complete reports are lacking pending the appointment of a new assistant manager, however, a summary follows: Portland; 7DP, 7BB and 7JW are standing good watches on C.W. and clearing traffic with the usual speed. 7NA has left for Eugene and was last seen going down to the station with a five wattier sticking out of one pocket and a pair of cans out of the other. Nuff said.

Hooray! for Southern Oregon. 7TW, 7IW, 7TQ, and 7LR all on the job and QSR'ing everything in sight. FB. 7IW has been reported 1700 miles at sea on ½ k.w. spark, while 7TQ and 7LR are awake to the many advantages of C.W. 7HD at Seaside is consistent on his spark.

WASHINGTON: District No. 1: 7OJ, of Port Townsend, the new district superintendent, is consistent on his spark, but will soon have C.W. in. He has opened up the route to 5DX of Victoria, B. C. and considerable traffic is being forwarded. No. 2: 7KJ and 7NN continue doing consistent work. Walt. Hemrich, district superintendent, is our SUPER-DX fiend, and has handled traffic during the past month with 5DI, 9AOG, 9AON, 9PS and 6ZAC. FB. (Verily, the boy hath brains.—D.M.) No. 5: 7ZK and 7BJ are on regularly and QSR'ing traffic in this district. No. 6: Traffic is being moved with fair regularity to and from Tacoma, although no exceptional distances are being worked. 7WM with 50-watts of C.W. seems to be handling the bulk of the traffic, with 7AW and 7BG on spark helping out some. 7CE is back in the relay game. Welcome, OM. No. 7: D. S. Waskey, 7UU, (the boy that radiates ohms) reports for Seattle that the prelims. have turned everything upside down, and many stations are rebuilding and testing. Traffic has been moving fairly well. 7BK and 7IM on spark, being the star stations. 7BK got the C.W. going at last, and is now handling traffic on 20-watts of C.W. The set has only been in a week, and has worked rings around the old spark from the very first. No. 10: Acting district superintendent Maybee, reports no activity but is willing to help out anyone who shows signs of activity. Come on you Yakima fellows, let's go. No. 11: This district will be the mainstay for a dependable route east this season. 7TH at Walla Walla is in easy range with 7LU and 7ZO, and they in turn, with the middle

west stations. With this arrangement it is possible to QSR to Chicago in two jumps, which will make traffic fly. 7TH will handle traffic on schedule from 9 P.M. to 11 P.M. Monday, Wednesday and Friday nights. An old timer, F. A. Moor, of Walla Walla, is putting in 100-watts of C.W. 7HR is the call. 7CE of Pasco still handles the bulk of the traffic and experiences no difficulty in working the 6th district stations. Some trouble is encountered in working Puget Sound and Portland, mainly because of few being on the air (on spark, and QSS—DM.)

ONTARIO DIVISION A. H. K. Russell, Mgr.

At last the Ontario division to a large extent can stand on its own feet and handle traffic east and west through its own stations without routing the traffic through the northern United States. Thanks to the rapidly increasing use of C.W. among Ontario stations a constant stream of traffic is now flowing east and west, entirely through Canadian stations. The enforcement by the Department of Marine and Fisheries of the radio laws has led to the rapid abandonment, sometimes forced, of the spark transmitters.

The western Ontario district is coming too with a vengeance. 3GN, 9BS coming through fine on C.W. and 3DH who has just started up with 100 watts C.W. being QRK daylight in Toronto. 3BV is also QSA in Toronto, he being the city manager of Windsor. Byerlay promises that the western district will give the other Ontario ones an awful run for their money in traffic handling and we can well believe it. However, the central district has a big lead this month.

The central Ontario district has shown a startling increase in activity. More big C.W. stations are starting up every day. 3DS has been appointed city manager, as has 3TA. The former is QSA in Toronto and 3TA will likely follow suit. 3YH is a new man at the game, just two weeks old, and is already QSA Toronto, and is working hard on the code and will be a valuable man. 3XN was heard once in Toronto, but they are still a bit backward there. A city manager will be appointed soon, who may stir things up a bit.

The Niagara part of the district is very busy, 3KP being city manager and supervising the forwarding of traffic reports of the D.M. Toronto is simply alive with big sets. 3CO has two 250-watt Mullard tubes on the air with all the juice in the world and a beautiful aerial and is reported QSA in Los Angeles. 3GK is also a new one with 50-watts, and 3JT will be on with 15-watts. 3FO has quit his spark set, and 3GE is now on 175 meters with his 60 cycle set. He asks all who can get that low to listen for him. (Guess its the

bottles for D J though.)

The eastern district is the backward one of our trio, no stations having been logged to the east. 3LU is on the air with a couple of Mullards, but nil so far. 3HE has a new aerial up. 9BT is going now, but mostly phone broadcast. 3LL has 125' foot mast and 10-watts C.W. 2BG in Montreal has been logged in Toronto QSA and it is hoped to get in touch soon. (Too bad they can't send Scotch by radio 2BG, eh?)

PACIFIC DIVISION J. V. Wise, Mgr.

The most important item at this time is the laying out of the trunk lines. They are: A, B, and C. Trunk A from Arizona to San Diego and up the coast to the northern end of the division. B also originates in Arizona, from there to Los Angeles, up what is known as the valley route, through Sacramento to the northern end of the division. C has its origin in San Francisco, then due east along what is known as the central route east, namely; through Sacramento, Reno, etc. Stations whose location is on or near where two trunk lines cross can serve on the two lines, this to be specified on the official relay appointment in cases that warrant such service. This may be due to the lack of good stations or to their geographical location. The list of stations to operate on these trunk lines will appear in the next report. Thereafter, stations appointed will be listed in the first report sent in after the appointment.

In this division as in all the others, every state will have an assistant division manager. The districts are to be numbered, each state having its own districts. The assistant division managers will be named in an early report.

The districts of California hereafter will be: District B—District 1; C-2; D-3; etc. Districts unmentioned below have not reported for the month of October.

CALIFORNIA: No. 1: Little news. 6AJH is now a 20-watt tube transmitter aside from the old spark. 6AHF and 6AGK are building tube sets. No reports from Riverside county. No. 2: A splendid message report of a total of 737 reported from here this month. We have no other news of interest but we know the boys are on the job. 6UP leads the sparks, while 6EA leads the C.W. No. 4: A check from five sparks shows 436 messages. The air is clear, and traffic is going to every point on the compass in good time. The sad news has leaked out that 6DP has signed a life contract with a member of the weaker sex. No wonder we haven't been able to raise him for the last few weeks. No. 8: The only stations on the job are 6TC and 6CC. 6CC is now a 100-watt tube set and is working rings around the old spark. 6TC will also be lamp equipped shortly.

ROANOKE DIVISION W. T. Gravely, Mgr.

Behold our "box" for this month. Honors go to a spark station, and a good one.

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*****
*      SEDA 348 Spark      *
*  Morriss and Steacy     *
*  Parkersburg, W. Va.    *
*      3MK 284 C.W.       *
*      A. B. Brown        *
*      Norfolk, Va.       *
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This month marks the addition of Porto Rico to the Roanoke Division and steps have been taken to organize this district immediately. Mr. Luis Rexach, Box 319, San Juan, P.R. has been appointed Assistant Division Manager in charge of Porto Rico. Mr. Rexach's call is 4OI and he has been clearing traffic, nightly with the U.S. through 4FT at Wilmington, N. C. All traffic for Porto Rico should be routed through this division.

There are more good stations developing in Porto Rico and a movement has been started to hook up with South America. Porto Rico now has a Radio Club of over 300 members and it is natural to presume that we will soon be hearing a number of other stations there. All Porto Rico stations please communicate with Mr. Rexach and co-operate with him as he will report your activities each month from now on.

We are glad to say that our traffic for this month has reached and passed the 2500 mark, 2514 to be exact. However the saturation point has not yet been reached since this month several of our best stations suffered breakdowns or were handicapped from other causes.

The manager wishes to impress upon the Dist. Supts. the importance of more detailed report of the activities of their territories. We can't make an interesting report out of a few cards simply stating that so much traffic was handled. Give us some real dope on improvements you have made and other items of interest to the gang. Here's the story!

VIRGINIA: For the first time all D.S. sent in their reports on time. Now that you see how easy it is, keep it up. Heretofore dead portions of this state are now opening up in great style as the following shows.

1st District. This district is by far the most active one in the state. 3MK leads the division in C.W. traffic, handling that 100-watt set like a veteran. 3ACK lost his home in a fire recently but the radio shack was saved. No report from Newport News. How? Wake up fellows and lets have something. 3ZZ has the 500-watt set going now and is smashing all previous DX records. 2nd District. The old gang is back on the key now after getting its fill of broadcasting stuff and considerable work

is being done. Interest in the Transatlantic tests is running high. 3BMN of Petersburg reports a radio club formed there, known as the Old Dominion Radio Club with plenty of pep. Three new stations opened up at Petersburg 3SG, 100-watts, 3ATB, 20-watts and 3AHE 10-watts. Both 3AUU and 3BMN are now operating with 100-watts and are getting the traffic thru. 3rd District. 3MO is working on the low antenna but seems to get out all right. 3BVL and 3AJG are getting in the game now and handling much traffic. 3BIJ is getting out all around and working all over the state in daylight. Following stations are coming up and will be heard from: 3BQX, 3AJG, 3CDZ, 3NQ, 3AHN, 3BUL, 4th District. Very little to report from this district as the the D.S. is working day and night and gets very little time for the set. 3BLF, his station, is the only one in the district and he can only operate a short time after midnight. 5th District. 3IW blew up one fifty wattter and of course trfc. fell off. 3BOF is in the air now. 3EK was on for about a week but blew his tubes. 3AFW did some work with spark but failed to report. He is changing to 50-watt C.W. now and will do more work. 3CER at Ballston (Ex 4FF) has just hit the game with the Roanoke division and has 10-watts of C.W. 6th District. 3BHL, is back on the air and working regularly. 7th District. 3ZAA is installing C.W. which is almost completed and will be able to handle traffic over the northern route. 3ZX blew up his condenser, repaired that, and then shot the gap motor. Install C.W. and forget it O.M. 3ASP has opened up in great shape. Traffic has been handled with 3AEV at Danville in daylight with signals very good. 8th District. Fine work has been done by 3APR. Much daylight work is done. 3BZ and 3AEV at Danville are both working as much as business will permit. 9th District. 3RF is back in the game after moving station to a new location. 3BIY has decided to lay off the broadcasting and get back into the real work. 3BHS and 3BKX two new C.W.s are getting into shape. 3HL had a rope break and put the station out of commission but is now back and going strong. 10th District. 3AOV is still working spark. Get a C.W. O.M. and do some real work.

NORTH CAROLINA: Reports from this state were very meagre in detail consequently we cannot give dope. Take a little time off fellows and expand your reports.

1st District. This was probably the most active section in point of stations operating. 4DC at Greensboro reports the formation of a club there to take care of the situation. 4GX is out of game at present. 4LJ, 4NV and 4EN are all going strong with 4LJ leading. Much daylight work is done all over N. C. and Virginia. 2nd District. 4GH, 4KC, and 4DQ are the only active stations here. All are doing

much daylight work. 4GH is at home permanently and will be an even bigger factor in the traffic report from now on. 4DQ is covering good distances in daylight now being heard in Danville regularly. 4LP is off at school for the winter and 4IE is closed up also. 3rd District. 4ID is only man handling traffic here. 4XD was on for 5 minutes one night during the preliminary tests but qualified even in that short space of time. 4EU is working some now and has been heard as far as Danville in Daylight. We are certainly glad to note signs of activity around Charlotte. Big plans are being laid for the Convention there in February at which the Roanoke Division will be heavily represented. 4th District. 4FT is the banner station this month, working nearly every night with 4OI at Porto Rico. Considering the power conditions and other factors 4FT did some great work. He has only been at the game a comparatively short time but is now ranking with the best. 4EA suffered a breakdown which put him out of commission for the major portion of the month. 4BX rolled up a total of 167 despite the fact that one operator has been sick and the other off at school. The fact that one of the Daylight Transcons starts at Wilmington is a tribute to the activity of the two stations there, 4FT and 4BX. 4NT at Wilson has been very active this month.

WEST VIRGINIA: Here again the report must suffer from lack of detailed reports. The fellows all want to know what you are doing and we can't tell them unless you tell us.

The 1st District has apparently been the most active with 8SP leading. This station also handled the 1AW-6ZAC msg. 8AFD, 8AUE and 8BPU have all been active some of them being on nearly every night keeping this section open for traffic at all times. 3rd District. 8CAY is the only active station here and he is anticipating moving out of the state. (STICK AR'ND—T.M.) 5th District. 8BKE has been doing some fine DX work having been reported several times by 6th and 7th district stations. Somehow or other you W. Va. fellows seem to be able to get big DX almost at will. What's the secret O.M.? 6th District. This is primarily the spark district with 8BDA holding the center of the stage. Early every evening he can be heard knocking them off in true commercial style. This station has been reported in all districts. 8BDA says they started out to cop the highest honors this month or bust, and they did both, or at least they lead the division and the condenser busted, so the total had to stop at 348 mses. This is certainly F.B. and you are to be congratulated.

Dont forget that there is a valuable prize offered for greatest increase in traffic. This prize will be mailed to the winner as a Xmas present.

ROCKY MOUNTAIN DIVISION N. R. Hood, Mgr.

I wish the members of this division and others to take particular notice of the number of messages our division has handled this month. It certainly is gratifying to see our totals grow, and yet there are a good number of excellent stations that were not in operation in time to get in on the October report, and we may by next report put our message total well over 1000. Our organization now seems to be working smoothly. Due to a change in district superintendents in Utah, district 1 for that state was not included in this report. Mr. Baker was forced to resign due to his work in the Air Mail Service. 6ZM is now district superintendent of that district and your full co-operation with him is asked.

COLORADO: The last reports from the once famous 10-watt C.W. station 9DVA indicates that by December 1st a few states will be hearing from him again. Radio activities in Denver are very good and getting better. Denver alone has about ten powerful C.W. sets and handles about ninety percent of the traffic for the state. Denver was given the honor of a visit from the radio inspector and instead of the usual havoc that follows, Denver now has a number of real first class licensed operators. The broadcasting stations of Denver were also examined and tested by the inspector. Radio station 9XAQ of the University of Colorado has re-opened and is handling traffic with a small C.W. set until the 100-watter can be put into operation. The one time famous pre-war 9ZF of the Manual High School of Denver is going to re-open and discard the old time spark set for the more up-to-date type of transmission, C.W. For all the good stations in Denver, old 9AMB, 9ZAF and 9DTM, still hold the traffic records for Colorado.

WYOMING: 7AFW, 7DH, 7JQ, 7LU, 7ZV, 7OS and 7ZO all passed their first class license examination on the visit of the 7th district radio inspector. Message traffic holds up and gets better as time goes on. 7ZV is now on with 100-watts of C.W. with a sink rectifier. A daylight schedule is maintained throughout Wyoming.

UTAH: No report from district 1, due to change of superintendents as mentioned above. The A.D.M. was in Salt Lake and found many of our good men. 6AWH is monkeying with four steps AF amplification. Ouch! 6AFD is making working models of aeroplanes in the Air Mail Service, and wishing that he could get time for some DX on his amateur set. 6ZM is back on for A.R.R.L. traffic with 750-watts with 15 healthy amps. in his aerial. 6AEZ blew his tubes and then with his spark set blew all the light sockets and meters in the neighborhood so will be "down" for a while. Another reported to the A.D.M. while in

Salt Lake that due to the time he spends with his radio his "steady" has quit him. Radio is the ruination of many a good man. (Check!)

No. 2. Traffic did not come through as it was expected, but all official stations reported. (Hooray! D.M.) 6ATQ continues to do good work with his 5-watt set, working east with the same degree of ease that he works west, the eastern work being the hardest out here. The Snow College C.W. has taken form and probably will get in on the November report. Poor locations are holding 6ATQ and 6APL back. Both contemplate a change which will probably boost their traffic. 6BKE has the C.W. bug to the extent of 5-watts and as a side line is fathering a radio club in Richfield, from which, before the winter is out, we hope to have several good relayers.

WEST GULF DIVISION Frank M. Corlett, Mgr.

Despite the fact that reports from District Superintendents of Districts 1, 2, 3, and 4 of North Texas and District 4 of South Texas have not been received, this Division handled some messages according to the reports that were received from the *live* district superintendents. Now just why an OFFICIAL RELAY STATION would fail to report to his District Superintendent when all he has to do is fill out a blank post card that is provided for that purpose, stamped in everything, is beyond me. Those kind of official relay stations are not going to remain official relay stations in this division for they are sure to have their appointments cancelled. The District Superintendents also have a blank form to report on each month and there is no excuse for any of them failing to report to the Asst. Division Manager of their section.

We want reports each month from ALL A.R.R.L. MEMBERS who have a transmitting station and handle relay message traffic, not just reports from those stations that have been selected as Official Relay Stations. An OFFICIAL RELAY STATION is one which handles relay traffic consistently each month and REPORTS regularly each month and unless he fulfills those requirements he is not entitled to an OFFICIAL RELAY STATION appointment. Unless all member stations report their activities the division traffic officers will not know in every case that your station is regularly moving relay traffic and is entitled to an OFFICIAL RELAY STATION appointment. So snap into it fellows and lets hear from you each month. Our relay months are from the 15th to 15th. Mail your cards to your City Manager where you live in a city having a City Manager, to your District Superintendent in other cases and do it not later than the 16th so that he will have it by the 18th.

District Superintendents get your reports to your Asst. Division Manager not later than the 20th. Asst. Division Managers must make their reports to your Division Manager not later than the 25th so that the entire division report can be in Hartford on the 1st of the month. Now that's simple enough, lets show some team work, its not so much the individual effort nor is it our numerical strength that really counts but it is **EVERLASTING TEAM WORK.**

The **STAR STATION** for this Division this month is **5ZA** with a total of 226 messages handled.

The North Texas Section leads the Sections in number of messages handled with 488 to their credit, and, get this, District No. 5, Fort Worth and Tarrant County, Dallas and Dallas County are the only ones heard from, what would North Texas Section have done if Districts 1, 2, 3, and 4 had also made reports?????. To station **5SF**, Houston, Hendrix, Ft. Worth, Texas, goes the North Texas pennant for number of messages relayed 165, with **5DI**, T. B. Depew, also of Ft. Worth, second, with 120 to his credit, and **5IX**, Hans and Fritz Clitch, Dallas, third with 101. In South Texas Section **5XAD**, W. E. Gray, Orange, Texas carries off the honors with a total of 60 messages, **5XV**, L. W. Hatry, Port Arthur, Texas, comes second with 37, and **5ZAE**, Leavell D. Wall, District Superintendent District No. 3, third with 18. Spasmodically, it is first encouraging, and then discouraging conditions we have to report from this section. There are *many* good stations in operation and interest seems to be genuine throughout all four districts, but it is indeed puzzling to try to make a comprehensive and accurate report of the activities in these parts because contradicting statements are certain to enter into such a report under existing unstable conditions. Traffic is moving, but it is next to impossible to get the stations working to turn in reports for publication. There is no great friction between broadcast stations and amateur stations in our section other than the dissatisfaction which is caused by the long programs broadcast. No good DX traffic work can be done until after 10:30 P.M. and this condition has consequently eliminated some of our most able operators who attend school and can't keep late hours. The only stations in Southern Texas Section making reports this month are: **5XV**, **5XY**, **5RR**, **5VO**, **5HC**, **5ZAE**, **5AEW**, **5YK**, and **5ZK**. For the sake of comparison we give the following, a list of the active stations who are doing much traffic work but who fail to turn in reports: **5ZU**, **5AE**, **5NK**, **5XB**, **5JM**, **5BA**, **5XAD**, **5NN**, **5MT**, **5ADI**, **5ACF**, **5TM**, **5IM**, **5ACR**, and **5ZP**.

NORTHERN TEXAS: **5ZH** reports traffic from the south can be handled to north, northeast, northwest and the west

Pacific Coast. Traffic from north, northeast and northwest can be handled for all Texas and vice-versa. **5ZH** put two "bottles" to working September 19th and since that time communication has been carried on with 45 other stations. Present known range approximately 1300 miles. There seems to be a great deal of "listening to broadcast programs." There have been some excellent programs broadcast from the different places but the A.R.R.L. messages for tests and regular traffic will have to be put through too. Come on you fellows in this district that can handle traffic and line up some routes and put over some business. Mail a description of your sets and your transmitting and receiving range, to J. L. Martin, 605 East Fourth St., Amarillo, Texas. Mr. Key of Lamesa, Texas, reports that the radio fans there, although confined mostly to receiving, are making some splendid records. Come on you bugs and get lined up. Mr. Johnson at Memphis has under construction a combination 20-watt phone and C.W. with which he will get in on A.R.R.L. traffic when he brushes up some more on the code. (Them's the fellers we need.) Also a C.W. set under construction at Childress, Texas. **5VA** is City Manager for Dallas and County, all operators in this territory make reports to him. Traffic has picked up considerably in this section and has been going through regularly to the ninth district north and to **9AMB** who is in regular communication with the West Coast. All the messages east have to go through the ninth district or through Houston or New Orleans as there has not been a route opened up to the fourth district. **5IX** blossoms forth this month with a twenty watt C.W. using straight A.C. on the plates. He has been doing very consistent work. **5QU** comes back this month with his spark, but he is installing C.W. **5BN** is another new station in Dallas. He has a fine twenty watt C.W. **5ZC** has been too busy with A.R.R.L. correspondence to operate his station very much this month but says he will be on more from now on. **5VA** is still going strong and has received a report from Canadian **5CN** in Vancouver, B. C.

5QI has been heard in every district. **5SF** is stepping out too. **5DI** is handling traffic direct to California stations and has made a record of 2000 miles with his 20 watter. That's the dope, fellows, keep up the good work.

VANCOUVER DIVISION

J. T. North, Jr., Mgr.

W. D. Wood, the former manager of this division has gone away to college, but has allowed his station, **9BD**, to be operated during his absence.

The following new appointments have been made: S. V. Crompton, **5CZ**, assistant division manager; A. J. Ober, **4DQ**, district

superintendent of Alberta district; C. O. West, 5CN, Vancouver city manager.

5CN has been doing excellent work on spark, and has worked 4DQ of Vulcan, Alberta, and several southern California stations. His spark has been temporarily closed down by VAB, the Government station of this city, so he intends to depend entirely on his 50-watts of C.W. which is almost completed. 9BD, 5CN, 5DO and 5BQ are the only Vancouver stations open for traffic at present, although several are fitting out for the winter. 5AK has put up a new aerial and is raving to go, but has been held up by delay in orders and lack of time. 10AC, the BCRA's broadcasting station was heard in Prince Rupert by 5CX. 10AC uses 5-watts. That "ten" call is another of our national jokes, straight from Ottawa. 5AX, district superintendent of Prince Rupert district has taken out a special license 9BP. He has put up a fine 90-ft. mast and is installing 100-watts A.C. C.W., so will be open for traffic very shortly. 5CT, district superintendent of Duncan district, reports two stations in Victoria, 5DX and 9BG. 5DX is reaching out in fine style on $\frac{1}{2}$ k.w. and has worked several sixes. 9BG is unfortunately short of time. 5CT and 5DQ work each other on 5-watts A.C. C.W. 4DQ, district superintendent of Alberta district, reports 9AC the only active station at present. 9AC has been heard in Vancouver on one, so will be an important factor in trans-Canada routes. 4DQ handles most of his traffic with 7AGF, whom he works most consistently.

WINNIPEG DIVISION J. A. Gjelhaug, Mgr.

Mr. J. E. Maynard, assistant division manager for Saskatchewan, reports that things are beginning to move in the district now. Our new district superintendent, Paul Socolofsky, 4BV, at Loreburn has made a very good start this month and is doing very good work with his 15-watt C.W., working over 1000 miles regularly. At Moose Jaw we have now a very good relay station, 4HH. There are also many small C.W.'s springing up in that city. Among them is P. Bayley of 4EC trying to find ways and means to get a 10-watt C.W. in the air. 4AL has moved to Regina where he will help amateur radio along between intermissions for CKCK. 4DN also of Moose Jaw is going to be shooting the ether with more C.W. signs soon. He will have 5-watts self-rectified. Brass pounders in Moose Jaw seem to be numerous. They are even said to outnumber the broadcast listeners. 4CB is still waiting for parts for his transmitter but has hopes of being in the air soon. He says "if Ontario can be reached within amateur restrictions, 4CB is going to do it."

Vincent Thomas, assistant division manager for Manitoba, reports that amateurs in Winnipeg are getting more active. All stations are getting back on the air now, and three C.W. stations are under construction and should be going by winter. Manitoba Radio Association is well under way, and we expect big things doing soon. Real live bunch in this outfit—both REAL HAMS and broadcasters. CJCG and CJNC (newspaper stns.) are helping the Association through the medium of their stations and newspapers. Operators from both stations are on the Board of Directors. Ex. radio inspector is president. 4AS is now an A.R.R.L. member and is going right after the traffic.

Traffic to and from Winnipeg can be routed through 9YAF, 9ZC, 9AGN, 9GK or 9DOC. Hello! you fellows in western Ontario district, we are getting ready for that "ALL CANADIAN RELAY ROUTE." Stations are needed in Kenora, Ft. Frances, Ft. William, or Port Arthur; a good station in any of these places would help greatly to bridge the big jump from Winnipeg to the east. Let's hear from some of you fellows out that way.

Finishing and Graining a Radio Panel By Fred M. Myers

IT has been my experience with all radio panels of the variety now used, that they are either too glossy or full of small holes that make them unsightly for use on a good set.

The way I get rid of this is to grain the panel and apply an oil finish to it. The following is in my estimation the best way to do this.

The materials to be used are a piece of very fine sandpaper, a piece of fine steel wool (No. 0), some rubbing oil, and some rotten stone.

To begin, take the sandpaper and start to cutting on one end, being sure to work the long way of the panel. Cut just deep enough to go through the glossy finish and no more. As soon as the whole panel has been covered, brush off the dust and using the piece of steel wool remove all the small holes and blemishes, altho being careful not to round the edges of the panel.

Now dust off the panel and cover the surface with a thin film of the oil, rubbing it in thoroughly with a piece of soft rag. Using the same rag for rubbing, dust the panel with the rotten stone and RUB. You need lots of elbow grease at this stage of the operation. Clean off the panel with a rag and the panel will look 100% better than before.



INTERNATIONAL Amateur Radio

Porto Rican News

Porto Rico of course is national and properly does not belong in this international department, but it is a long ways from the United States and until we grow to the point where we have a West Indian Division we have no better place for the interesting news coming from that little island as its amateurs grind out radio history.



We take pleasure in presenting a photograph of the Board of Directors of the Porto Rico Radio Club, which is mutually affiliated with the A.R.R.L. and which club is the center of amateur activities in the island. In this photograph are, standing, left to right, Sr. Jose M. Maduro, 4KS, secretary-treasurer and director; Sr. Luis Rexach, 4OI, director; Sr. Enrique Camunas, 4LG, director; sitting, left to right, Sr. Jesus T. Pinero, 4KT, vice-president and director; Master Luis Rexach, jr., mascot; and, last but not least, Sr. Joaquin Agusty, founder, president, and director.

4OI continues to knock 'em dead and his signals have now been reported by 6BCA, Mr. Gerard Wilson, at San Jose, Calif., which surely makes him eligible for the Transatlantic Finals. 6BCA used detector only, on an aerial 20 ft. high—and his distance is about 4000 miles! In reception Mr. Rexach is doing excellent work too, and has copied the phone signals of 4FT in Wilmington, N. C., while the latter was using 15 watts. The modest goal of 4OI is 6ZAC—and he'll get there, too!

Hawaii QSO Again

Communication between 6ZAC and 6ZAF was resumed in the first week in October and A.R.R.L. relay traffic is again moving across that portion of the Pacific in volume. One of the first messages was an announcement to Traffic Manager Schnell on the resumption of QSO 6ZAC burnt out a bottle and was off the air for a few days but now OK again.

An Amateur in San Salvador

QST has a long and interesting letter from a gentleman in Santa Ana, El Salvador, C. A., who signs himself simply "Sparks." He describes his interesting long-wave reception, some short-wave transmission tests he has made, and states that he has developed a particularly efficient honeycomb circuit for short-wave receiving of which latter, by the way, we would be glad to hear more from him.

If these lines reach his eye, we would be glad to have him listen in on the Transatlantic Tests, the schedule for which is given elsewhere in this issue, and let us know what he hears.

American Amateur Terms

Our foreign correspondents are vastly puzzled over many of the expressions used by American amateurs, terms which we take for granted and the perplexity over which we have never stopped to consider. For their information we will explain a few of the most commonly used ones:

73—This is a signal taken bodily into radio from American land Morse practice, and means "best regards."

DX—"Distance," more exactly, long dis-

tance. The result of an old-time habit of abbreviating well-known words by using the initial letter and "x," as, for example, "weather" is commonly abbreviated "wx."

OM—"Old man," the common amateur term of fellowship. Used indiscriminately, doubtless too much if anything. Regardless of how disrespectful it sounds and purely because its logical, the feminine is "OW."

FB—"Fine business!" meaning "that's fine news, that's great," etc.

ND—"Nothing Doing," commonly used in testing, to mean that communication is too poor to make further attempt justified.

"On the air"—Listening in.

"Pounding brass"—Transmitting, manipulating the key.

CUL—See you later.

Are there any other terms that bother our correspondents?

Letters from France

This month we are fortunate enough to have two letters from France and we gladly present them both.

Dear Brother Amateurs:

I have been asked repeatedly and very flatteringly by the Headquarters of the A.R.R.L to write for *QST* a periodical report of what we French amateurs are doing. I will very gladly do my best to pick up for you the facts which may be of special interest to my far distant readers.

By far the most important thing at the present time is the preparation of the Transatlantic Tests. Half a dozen of us, representing the most important French amateur associations and magazines, met in Paris two weeks ago and formed ourselves into a "Comite Francais des Essais Transatlantiques" of which Dr. Pierre Corret, ex-editor of "TSF Moderne" was unanimously elected President. This committee is taking all necessary steps towards the realization of the tests and is also getting in touch with the British, Dutch, and other foreign amateur associations.

As for the actual prospect of success of the Tests, we will all do our utmost, but we must not be too optimistic and we must remember that this short-wave work is new to most of us and that it holds surprises, pleasant or otherwise, in store for us!

There are only a few really good short-wave receiving stations scattered over France. Those in the northern part seem to have a fair chance of success although already handicapped by their position compared with our British friends; but here, away down south, I am afraid OM QRN will again play us a bad trick!

As for transmitters, we will probably have half a dozen sets of 100 watts or

less, all C.W. on waves around 200. Personally I have been fortunate enough to obtain a license for a full K.W. tube set with AC on the plates, and at the time of writing these lines I am about to start replacing the old 500-watt set at 8AB by an entirely new set, including aerial, ground system and all! Be sure, OMs, that I will spare no effort to reach you as it would be one of the greatest joys in my life!

Best 73's to all American amateurs.

Leon Deloy, French 8AB.

Nice, Oct. 17 1922.

Versailles, Oct. 23.

Dear Friends:

As I told you, there is going on now at the Champ-de-Mars (near the Eiffel Tower), the first French radio exposition. It will end in a few days and has had a very great success. It has brought together 110 exhibitors and will probably have had at its close nearly 200,000 visitors. A particularly interesting point is that it numbers on its jury a number of radio amateurs: Mr. Deloy, who was unfortunately not able to come, Mr. Rousset, general-secretary for the French Society for the Study of Radio, and myself. I will send you soon more complete information on this subject, as well as photographs which I had made specially for my friend *QST* and which I will probably send as well to the "Wireless World" to show our British comrades that we also are starting "to get into the game."

I have already written you about the new law which is projected relative to radio, which the postal telegraph administration had submitted to the scrutiny of apparatus builders and of the French amateur societies. This project raised such a storm of criticism that the administration abandoned it and has replaced it by a projected decree which is very different, which was in its turn submitted to the constructors of apparatus under the amateur societies.

According to this new project, it is necessary for reception to make a declaration to the postal telegraph administration (it is no longer necessary to request an "authorization"); it is necessary to pay an annual tax of 10 francs, radiation must be reduced to a minimum in order not to interfere with neighboring stations.

As regards transmission, mention is made for the first time of "amateur stations." Up until now, we have never been anything but a question of stations for tests and experiments (for the builders of apparatus), and I felt that I was forced in "T.S.F. Moderne," to bring up the question of amateurs. Now they are talking officially of "amateur stations." It is nec-

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Who's Who in AMATEUR WIRELESS



LEON DELOY

In this, our overseas number, we take great pleasure in presenting a foreign amateur about whom we have heard a great deal—Monsieur Léon Deloy. We have told of his doings in our *International Amateur Radio* department and of his station, French 8AB, and we know he will figure prominently in the coming Transatlantics.

Born of French parents in Paris, February 4, 1894. 8AB, because of close acquaintance with his godfather, M. Camille Flammarion, the well known French astronomer and scientist, soon developed a scientific turn of mind. As far back as he can remember, Deloy was playing with accumulators, toy motors, and telegraph apparatus. In his own words he says, "I remember distinctly learning the difference between 110 volts and 4 volts by connecting my little four-volt motor to the house mains!" This indeed was a promising start.

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W. R. BURNE

One of our most prominent English amateurs is Mr. W. R. Burne, 2KW, about which we have heard considerable. Our readers will remember him from our May issue as being the chap who walked away with first honors in receiving by far the greatest number of U. S. amateur stations during the Transatlantic Tests of last year.

Mr. Burne was born May 4, 1901, at Gatlley, Cheshire, England, educated at Sale Grammar School, Manchester High School of Commerce, and took a short course at Victoria University. Being too young for military service during the war he joined the Officers' Training Corps. While at school he was deeply interested in radio and as soon as amateur restrictions were removed he again became the possessor of a receiving permit. Later permission was received from the P. M. G. to transmit. Never having had the advantage of any

(Continued on page 66)



Des Moines Radio Association

On October 6th the Des Moines Radio Association opened the A.R.R.L. Midwest Convention with an address of welcome by D. L. Shillinglaw in the absence of Governor Kendall. W. H. Fowler made a peppy response and immediately thereafter the following operators were introduced to the gang: 9AIZ, 9BYW, 9AAE, 9ERA, 9DZE, 9BGF, 9ASG, 9CTA, 9XAE, 9CHO, 9BXL, 9BIF, 9IY, and Professor Deal of 9DWI. This was followed by a paper on "Storage Batteries," by Mr. McCory, and another on a "New Type of Condenser," by Mr. Callbeck. Professor Deal described WOL. The second day Professor Blum read a paper on "Manufacture of Tubes," and descriptions of stations 9BIK, 9ARZ and 9AAE were given. At one o'clock the gang got together again and discussed A.R.R.L. traffic, with an explanation of the new report forms by the T.M. Following this Professor C. M. Jansky of the U. of M. spoke on the "Amateur Status and Legislation" and later described the C.W. set at the U. of M. The affair closed with a banquet at which were present about fifty hams from all over the state of Iowa.

St. Louis Radio Association

From October 6th to 11th the St. Louis Radio Association promoted a Radio Show which turned a few dollars into the coffers of the treasury. On the night of the 10th a banquet was held for the benefit of the amateurs who attended the show. About fifty were present at the banquet when the proposed plan of the A.R.R.L. to have quiet air from 7 P.M. until 10:30 P.M. was discussed. It was a general get-together for the interest of all A.R.R.L. men to renew the spirit of amateur radio in the Midwest Division.

Radio Council of Southern New England

New officers for the R. C. S. N. E. were elected on Oct. 11th as follows: Robert B. Easton, president; R. W. Farnum, vice-president; Harold E. Peck, secretary; E. M. Woodruff, treasurer.

West Philadelphia Radio Association

At a recent meeting of the W. P. R. A. the following operating regulations were adopted by this Association:

1. All spark coils must remain silent

after 10 P.M. unless given special permission by the Operating Committee.

2. Under no conditions shall a message remain at any station longer than a period of 24 hours.

3. There shall be no wilful interference with any other station.

4. Buzzer or chopper shall not be used after 10 P.M.

5. Transmission shall stop at any station when told to by Operating Committee.

6. Before testing, listen for a period of three minutes and do not test for a period longer than five minutes after 8 P.M.

7. All local work shall stop after 10 P.M. except for transmission or reception of messages (traffic).

8. All penalties imposed on any station by Operating Committee must be strictly adhered to.

9. All violations of these regulations by any station should be reported to the Operating Committee.

10. Penalties for violation of these regulations shall be made by the Association.

Y. M. C. A. Radio Club of Sioux Falls

The Y.M.C.A. Radio Club of Sioux Falls has started the ball rolling for the Second Radio Convention to be held in Sioux Falls on December 28th and 29th. A general committee consisting of Scott Wilson, "Pete" Christopherson, Harry Manning and Welton Rowley, has been selected to make all arrangements for the affair. The convention held last year on the same dates was pronounced a great success by all those attending, and it is the aim of the committee to provide even a better program this year. A registration fee of \$1.00 will be charged.

The club is now holding its meetings in the new "Y" building and it is believed that permission will be granted to hold the convention in that building. This will add a great deal to the success of the convention because the building is up-to-date in all respects.

At the regular meeting of the "Y" club, held on October 11th, new officers were elected for the coming year, and arrangements were made to start publishing the club paper, *The South Dakota Oscillator* in printed form. The paper will be issued every other week on Wednesday. Meetings

will be held every Wednesday evening and instructions will be given in code and in theory. New officers elected are as follows: Carl Jacobson, president; George Green, treasurer; Charles Christopherson, secretary; Harry B. Manning, editor of the *Oscillator*, and George Green, business manager of the *Oscillator*.

[The *South Dakota Oscillator* has been received at League Headquarters and we recommend it to any amateur in the Dakota Division, if he wants to keep up with radio, in that part of the country—T.M.]

Radio Club of Greater Kansas City

The R. C. G. K. C. has secured new Headquarters in the Sweeney Building, Union Station Plaza, Kansas City, Mo. The following officers were elected for the ensuing year: Robert R. Moore, president; George Shirling, vice-president; Bernadotte Anderson, secretary; Dr. J. L. McDonald, corresponding secretary.

Northern Wayne Radio Club

The meetings of the Northern Wayne Radio Club were resumed September 19th with an election of officers as follows: G. B. Morse, president; L. L. Fuller, vice-president; M. J. Vinkey, secretary-treasurer.

The club is in a membership drive to double its number and is making every effort to help the broadcast listener by adopting the A.R.R.L. policy of quiet air from 7 P.M. until 10:30 P.M.

Columbus Radio Club

The C. R. C. and the Mayor's Committee on radio adopted the following rules which were agreed to by all delegates:

All spark, continuous wave and amateur radiophone sets (regular and special licensed amateurs included) which are located in the city of Columbus, Ohio, or whose owners are members of the Columbus Radio Club, shall not transmit between the hours of 7 and 10 P.M. nightly, except Saturday. These hours shall be known as "quiet hours."

All broadcasting stations located in the city of Columbus or whose owners are members of the Columbus Radio Club, may transmit any night during the quiet hours, except as follows: There shall be no local broadcasting between the hours of 9 P.M. and 10 P.M. nightly during the quiet hours.

All testing of the transmitting sets of all local amateurs and broadcasting stations shall be done between the hours of 6 A.M. and 5 P.M. The time used shall be Columbus time. These rules cannot be changed without the consent of all participants of this agreement.

Radio Club of Hartford

On October 20th the R. C. H. opened its winter season with its first meeting at the Hotel Bond. Plans for local control

were discussed and it was agreed that a committee consisting of three men at least, be appointed as a "Vigilance Committee" whose duty it is to investigate all reports of interference from broadcast listeners before 10:30 P.M. The interference in Hartford is so infrequent that it was not thought advisable to adopt a hard and fast rule of an absolutely quiet air during the evening, but that stations may transmit whenever they desired provided no interference is reported by broadcast listeners.

"Michigan Radioist"

The *Michigan Radioist*, which is published under the auspices of the affiliated clubs of Michigan, is about the liveliest sectional organ we have seen. It is just brimming over with enthusiasm for the radio amateur and the A.R.R.L.

LÉON DELOY

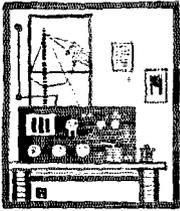
(Continued from page 61)

The first radio set Deloy ever saw was on a steamer in 1909. The following year he installed his own receiver with electrolytic detector and learned the code, copying the press sent every night from Eiffel Tower at slow speed, until in 1912 he passed the first class commercial examination, and in 1913 he passed his bachelorship. (Degree of B.S.; that is, he's still single. Y.L.'s take notice.) The real ham fun began when the transmitter was installed on his father's yacht in 1914. Later in the year Deloy joined the French Army and went to the radio training camp. In March, 1915, he was detailed to the Eiffel Tower station where he had the pleasure of being the first to call an American station (WSL). At "FL" this French amateur was the first in France to copy signals from NPL, KET, and the U. S. Navy arc at San Francisco.

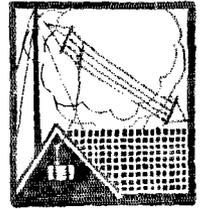
Mr. Deloy first came to our attention shortly after September 1917 when he was detailed to this country by General Ferrie and was attached to our Navy Department in the office of Capt D. W. Todd and later Admiral Bullard, Directors of Naval Communications, until August, 1919. During this visit he formed many close friendships with some of our boys prominent in amateur affairs and many stations were visited on both coasts and the Gulf.

Returning to civilian life, he at once installed a modern receiver at his home in Nice and did his best during the Trans-Atlantic in December of last year to hear some of the U. S. Amateurs. However, he only heard one station sending "TEST" and terrible static prevented his reading the call letters. Deloy took out the first amateur transmitting license in France and with his 500 watt C.W. established two-way com-

(Concluded on page 66)



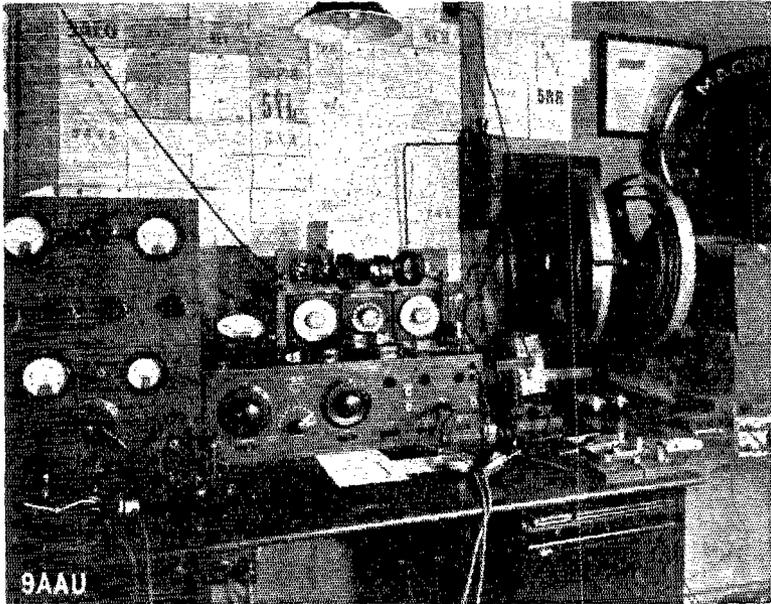
Amateur Radio Stations



9AAU, St. Louis, Mo.

9AAU is the station of Dr. Chas. L. Klenk, president of the St. Louis Radio Assn., located at 3148 Halliday Ave., St. Louis, Mo. Most of the apparatus and the arrangement of the station is shown in the photo, to which we need supplement but little.

The C.W. set shown to the left of the photo twitters along on four 5-watt tubes, pulling the juice from a 600-volt generator. As may be seen, the panel contains the full complement of rheostats and meters, as well as dials for wave-length adjust-



The aerial is of the T type, with the flat-top portion 55 ft. long and 60 ft. high, and is composed of eight wires with a down lead in the form of a cage. The ground consists of four 2-inch pipes eight feet in the ground.

This station is decorated with a good spark set consisting of a one-kilowatt Acme transformer, J-Ray gap, Dubilier condenser, and a husky oscillation transformer made of two-inch ribbon. Although this set is not to be sneezed at, Doc Klenk forgot to mention any records made with the spark, so we will turn next to the C. W. outfit.

Various keys or microphones may be connected in by means of the plug and jack arrangement and the set as a whole presents a very pleasing appearance. On voice, 9AAU has been heard in Haughton, Mich., Denver, Colo., and Orlando, Fla. The C.W. has been quite generally heard all over, San Francisco and Ketchikan, Alaska, being among the best records.

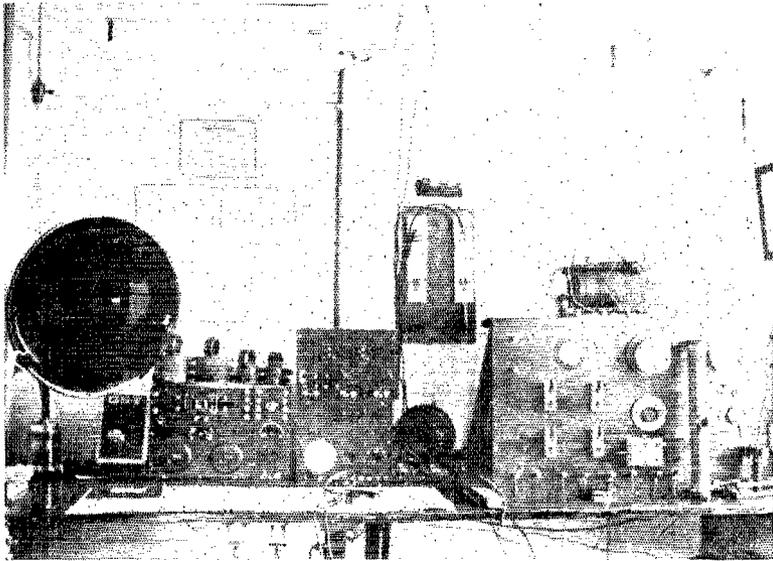
Practically everything in this station except the Grebe CR-9 is home-made. A glance at the wall proves that the apparatus at 9AAU works.

1XZ, Worcester, Mass.

1XZ is the station of Clark University, at Worcester, Mass. Although last season 1XZ was hampered by a poor aerial, traffic was handled into the 9th district by the operating staff. As might be expected, no trouble is experienced in getting operators for the station; the biggest trouble is keeping them away, especially during school examination week.

120 cycle synk set, all of which have been junked and replaced by three 50-watters, much to the regret of the local postmaster. The filaments are heated by a large storage battery and the plates are kept from freezing by a 1000-volt, 500-watt D.C. generator driven by a $\frac{3}{4}$ -h.p. motor. With nine volts on the filaments the tubes "perk" along merrily to the tune of 5.5 thermo-couple amperes in the aerial.

The receiving set is a Z-Nith and is used

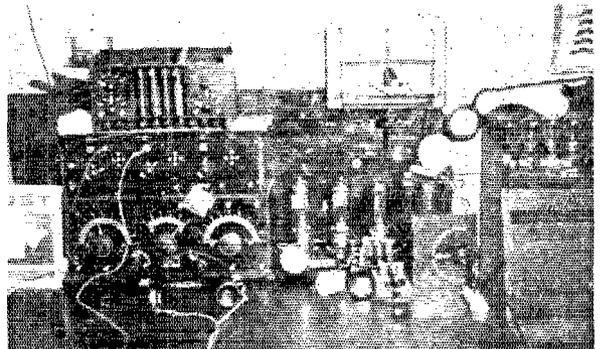


The transmitter consists of two U.V.204 tubes rated at a quarter kilowatt each, used in the reversed feed-back circuit. A very neat motor-generator set with exciter supplies 2000 volts which is fed thru a good filter the tubes. Keying is accomplished in the middle tap of the filament transformer.

The receiver is a Westinghouse, capable of tuning up to 3000 meter, and is used with two steps of audio-amplification.

The aerial that has been used was a six-wire cage, 80-ft. long and 30-ft. high. With the new sticks there is no doubt that 1XZ will be a common call in the log books of many amateurs.

with a detector and three-step mounted in the cabinet above. A "B" battery of 70-



8UE, Lancaster, N. Y.

8UE, owned and operated by N. Shaefer, at Lancaster, N. Y., is one of the C.W. stations often heard on the air.

8UE was formerly 8AGK and better known by its 25-cycle spark and later the

volts made of test tubes and Edison elements is used and proves very satisfactory.

Fine-mesh fence wire is used for the counterpoise and is made of one stretch 70-ft. long and 5-ft. wide directly under the antenna and 8-ft. above ground. The aerial is a "T" type, 70-ft. high and 78-ft. long, and consists of five wires on 16-ft. spreaders. In four weeks operation 8UE

was reported in every state east of the Mississippi river and many west. 8UE is QRV for ur msg's.

9ZL, Neenah, Wis.

9ZL, formerly 9GK, is owned and operated by Cornelius and William Quinn, of Neenah, Wisconsin, both of whom have had not a few years at commercial and amateur brass pounding.

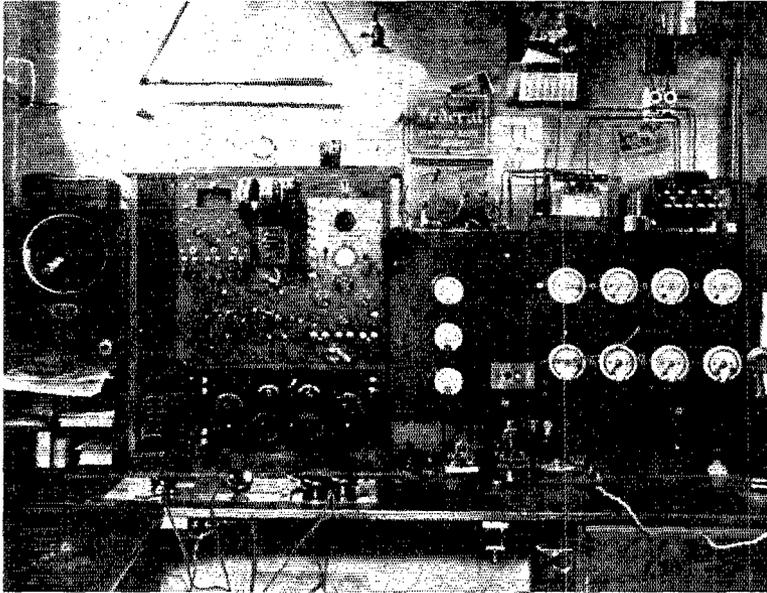
Many types of aeriels were experimented with, including the cage, and the fan type

power amplifier. This may sound like excess amplification, but the Quinn brothers have their station in a restaurant and an electric piano pounding ten feet away adds to the noise, so all the receiving power obtainable is appreciated.

LÉON DELOY

(Continued from page 61)

munication with British 2FQ this spring. 8AB has since been logged by British and Dutch amateurs more than a thousand miles distant.



was finally reverted to as the best because of its excellent radiating qualities. With 2½-amperes input into the fan antenna this station was one of the first to be reported by 6ZAC in Hawaii and has since been reported on several occasions.

Four 5-watt tubes are used with the Hartley circuit and by recent "diddling" the antenna meter has been coaxed up to 3½-amperes. On the transmitter panel may be seen the filament rheostats, antenna ammeter, filament voltmeter, and plate milliammeter. The voltmeter is arranged on a plug so it can be used with each individual tube for correct filament adjustment by plugging in jacks connected to the tube filament leads. A straight key, bug, and omnigraph (?) are used.

The honeycomb set shown at the top is used for long waves and a short wave regenerative receiver is used for amateur work. This latter set is equipped with two stages of radio frequency amplification in conjunction with a three stage Magnavox

Leon Deloy was asked a year ago by General Ferrie to take charge of the amateur part of the Societe des Amis de la T.S.F. and is also associate editor of *L'Onde Electrique*, and founder and president of the Radio Club de la Cote d'Azur but we expect his greatest fame will be when he establishes communication with American amateurs this coming winter.

W. R. BURNE

(Continued from page 61)

technical instruction in wireless, its study has been pursued as an amateur and a considerable portion of the gear is home-made. Unfortunately he was not far enough ahead for the first Transatlantic Tests in February, 1921.

A month before the second test Burne had the misfortune to hurt his foot and had given up all hope of entering the test. With a desperate effort and a true ham's determination he managed to rush together

(Concluded on page 69)

Strays



The Second District Executive Radio Council has "cleaned house" and got on a purely amateur basis, completely ridding itself of commercialism. This is the best news we have had in a long time and we offer our hearty congratulations. Mr. Arthur A. Hebert, 2MP of Nutley N. J., and incidentally A.R.R.L. treasurer, is president of the Council and Capt. Droste of the Signal Corps, a splendid amateur, is the new vice-president.

The Council, it will be remembered, has run the largest and most successful radio shows ever seen in New York; indeed it was the success of their last affair that awoke the professional promoters to the possibilities of radio exhibits. Their annual affairs are the culmination of all radio for the season, and success is assured when the affairs are in the hands of practical amateurs. This season instead of the public show the Council is going to have a three-day *amateur convention*, with a radio show for *amateurs*. The roof garden and adjoining Butterfly Room at the Hotel Pennsylvania have been obtained for March 1st, 2d, and 3d. The various clubs affiliated with and making up the council will have booths, there will be some historic radio exhibits, and a manufacturer's show of apparatus of interest to amateurs. In order to keep the crowd within bounds and not have a repetition of last year's terrific crush, tickets will be sent to the different Second District clubs for distribution. The convention will be open only to licensed amateurs and their friends. There will be 24 booths open to bona-fide radio manufacturers, but dealers will not exhibit.

The Council and the A.R.R.L., with their respective magazines *The Modulator* and *QST*, will keep open house and greet you there.

The classical New York radio show for the general public this year is the American Radio Exposition, which will be held at Grand Central Palace from Dec. 21st to 30th, inclusive. We have rather favored the idea of three big annual radio shows, in Frisco, Chicago and New York. This is the New York one. The management is going about things in a high-grade manner and every indication is that the affair will be a classic. The Second District Council and the A.R.R.L. will be on hand in Booths

14-A and 14-B, with Bill Crosby and his wicked gang from *The Modulator*, and Charlie Service, Fred Schnell and Ye Ed from League headquarters. All amateurs are invited to drop around and see us; we hope to have the latest red-hot Transatlantic news on tap. Folks interested in joining the League or a local radio club will be welcome and we will be glad to do our very best for anyone interested in radio.

Signal Report Cards

Have you got a good card for reporting signals heard? Send us one, will you? We want to find out what the best arrangement is, and will publish several of the best ones for general interest. We offer five pads of A.R.R.L. message blanks to the station sending in the best card by Jan. 1st.

In erecting Beverage wires, don't forget to determine the proper direction. Radio directions are along an arc of the great circle thru the points of transmission and reception. The shortest distance from us to England and France is *not* along a line running east, but from the Atlantic states is almost north-east and from the Pacific states is still further to the north. Stretch a string on a globe and you'll get a surprise. Then try your hand with the formula on page 12 of July *QST*, if you can work trigonometry, and lay out your antenna, remembering also that your compass probably points quite a bit to one side or the other of the true north. If you don't know this declination, ask a surveyor or consult a high school physics textbook.

How many of you have noticed in cutting off the filament of an audio amplifier how the signals suddenly increase for a second? Can anybody explain the effect? It isn't super-regeneration; but what is it, and has anybody any idea how that immense additional amplification might be made permanently available?

A contributor in the British "Amateur Wireless" points out that in the short time necessary to burn out a tube, one is spending money at the rate of \$50,000,000,000 a year. We can all live like millionaires, fellows, but only for a twentieth of a second at a time.

Read 'em and Weep!

M. B. Lowe, well known ship operator, reports French 8AB QSA 957 miles due west of FFU, on the west coast of France, using one stage audio.

1BNL at Saco, Me., reports that with one five-watt tube and an antenna current of a quarter of one ampere, he has been heard by 7IP, 7UF, XO5, and LS4 in Liverpool, England.

9AWM, at Sleepy Eye, Minn., logged 6ZAC of Hawaii calling 9ZN, and gave 9ZN a QSQ. 6ZAC heard 9AWM and called him, after which two eastbound msgs were handled and one westbound msg without a hitch. 6ZAC used one 50-watt and 4 amps. in the aerial while 9AWM used one 250-watt but only 900-volts on the plate.

6KA, 6XAD, 7ZO, and 5KC continue to be heard all over the east coast, according to dozens of reports we have been getting.

When 2GN on Long Island, using a 5-watt tube and plate supply from a Ford coil, can be copied in Winnipeg on one tube, we say it is not so bad. 9DDY, in Cabery, Ill., with the same kind of transmitter worked 65 DX stations in 11 states during October.

8ZY has heard these: 6ZZ, 6ZG, 6ZF, 6ZM, 6ZK, 6XJ, (6XAD), 6BSA, 6EN, 6KA, 7AD, 7ZU.

6ABX gets into N. Y. on 10-watts.

8ZZ was copied by twelve California stations during October.

9ZN's new 500-cycle I.C.W. is terrific on both coasts and readable thru heavy static at 6ZAC.

6ZAC reports the following heard on ten nights: 2FP, Can. 4BV, 4BQ, 5ACF, 5NK, 5TJ, 5SF, 5PX, 5XAD, 5ZAW, 5ZH, 5ZA, 8BUM, 8WR, 9AMB, 9ANQ, 9APH, 9AWM, 9AOG, 9BEY, 9BJI, 9DSM, 9GK, 9MF, 9XAQ, 9YAJ, 9ZAF, 9ZX.

We hear that the various 1AAW's will be on again for the coming transatlantics with the same spark heard by Godley at Ardrossan last year. You receiving stations in New England, swing a wicked loop. There is only one 1AAW and he is at Georgetown, Mass., at present using 5 watts C.W.

In the Reinartz article in October QST, the grid condensers are evaluated at .0025 mfd. in the first diagram and its description, whereas they should be .00025 mfd. For those having difficulty in getting this new circuit to oscillate, we suggest a shorter aerial or a larger choke.

And after all this arguing about soldering to water pipes, 9BAV comes along with the bright suggestion that if the water is shut off and the pipe drained, the soldering is easy with a blow torch and acid core solder. After the joint is made, the acid should be washed off with strong soap and water.

Letters continue to roll in regarding the dark horse of last year's Transatlantics, "1AAW." In our September "Communications" we published one such letter; now we have another from a chap signing himself "S. E. T." who says very frankly that our September contributor didn't tell the truth and that he, S. E. T., helped another bird operate station 1AAW somewhere in New Jersey with a 3 k. w. spark. Then we have a real line on a fellow in Maine who has plenty of money and therefore lots of noise-making apparatus but too much laziness to get a station license of his own, preferring to use anybody else's call, and 1AAW might have taken his fancy that particular night. Personally we think that it might have been 9AAW, as he fitted the specifications perfectly except for the numeral. It is one of those mysteries that probably never will be solved.

Many moons ago we to'd in QST how the shack of F. M. J. Murphy at 8ML, Cleveland, had been completely cleaned of all its valuable apparatus. Cleveland dailies recently chronicled the sequel. It seems that all last winter and spring a crop of illegal two-letter stations flourished in Cleveland, one "LX" in particularly raising Cain, and making life thoroly miserable for Cleveland amateurs with all the little tricks known to the Lizzie Lispers—except that he had a QSA like a half k.w. 8BK swung a wicked loop and got his general direction, and 8BDV chased up and down alleys listening for the crashing spark until finally the joint was located. Ensued a friendly call, whereupon 8BDV reported enough junk to operate Radio Central and corresponding in spots to the deceased from 8ML's shack. With 8UK and 8BK and two detectives, 8ML visited the radio museum and found that an 18-year old boy on a \$10-a-week salary had accumulated equipment for three ½ k.w. sparks, a C.W. transmitter in a cabinet with bakelite panels 5 ft. long, long and short-wave receivers and three step, motor generators in operating and post-mortem condition, and everything to demonstrate the stunts in Hopkin's "Experimental Science." The young prodigy was loaded into the perambulator and eventually came to trial. He had stolen goods before and now graces the Mansfield Reformatory, since which time there have been no more radio robberies in Cleveland.

9XZ rates the rubber ohm saw for signing off with "23 Old Man, Good Night."

T'was Ever Thus: "Ur CQ sigs hrd QSA vy OM."

9CS has a nifty card scheme which includes photos of his station.

Dern these amateur phones who pronounce their call letters while they gargle a sore throat. Can't tell who they are. Why not use the Navy phone code as Godley did in his reports from MUU last year: able, boy, east, dog, easy, fox, etc.? F'rinstance, "Eight able watch pup calling two oboe mike." Get more report cards, then, too.

Mr. C. A. Lowry, of Toronto, reports that he has noted a variation in reception in accordance with variations in the magnetic flux of the earth's crust as indicated on isometric charts prepared by the Canadian Government for the benefit of mariners. The possibilities of this matter will interest some of our more scientifically-inclined members.

Fred Terman, 6AE, old A.R.R.L. member, is at M. I. T. this winter and doubtless will be heard on the air from 1XM.

Lots of so-called "French" tubes on the market now, made by various people whose names do not appear on them. Most of them are gassy and so are fair detectors when you get a good one but almost all are irregular in characteristics and operation. Be careful what you buy.

At last the shy, bashful 2TS has fallen in love. He has been seen wandering around town trying to sell spare parts of his set. In fact, just as we are going to press, we learn that he was seen offering to exchange his whole set for a couple of theatre tickets!

Many of our readers have perhaps wondered at the values of the various condensers in the Radio Corp. book entitled, "Radio Enters the Home," so here they are:

W.E. type No.	Capacity	Voltage test
21AA	.85—1.15 mfd.	1000 A.C.
21R	.1 — .135 mfd.	500 A.C.
21U	.05—.068 mfd.	1200 A.C.

Radio Wives

Nowadays it isn't "can she cook—can she sew?" These up-to-the-minute radio flappers don't go by old rules. Can she tune an Armstrong souper? Can she climb a 75-ft. mast while hubby jams the key to see if the old spark radiates as much juice as the C.W.? Or one of the lesser credentials; does she know the code? She's got to so's she can listen to her husband's conversation with that pretty regenerative blond around the corner of the next state. And least of all recommendations: can she stand all that mess of junk surrounding a Fleming vacuum right plank bang in the living room?

—GADF

Overheard at Lunch

K.B.W.—Say Schnell, I would like to have a nice "cut-a-way" coat to match the hat I won on the Trans-Atlantic tests.

F.H.S.—All right, OM, we will have another series of Trans-Atlantic tests in December.

(K.B.W. will take on all comers to the tune of a new coat.)

GEN has been using two 50-watt tubes for over eight months with 3000-volts on the plates. The milliammeter reads up to 500 and is shunted to keep from blowing it to smithereens when the key is pressed. When transmitting, the room is lit up as if from a flashlight!

One manufacturer recommends "loafing coils" for those who hang around 360 meters.

No wonder 6AJF does such DX on 15 watts! The junk is mounted on a Ouija board!

For those who use a Magnavox in place of the cans, R. L. P. says that if the step-down transformer burns out a Ford coil can be substituted with equal results.

SZZ has a \$25,000 ground! It is composed of a five year's supply of copper color engraving plates, 250 in all, costing originally \$100 each.

Old brass or copper tubing secured at any garage can be bent, flattened, and drilled on the flattened ends to make many useful brackets and supports.

1GV, whom we hear on the air so much, is Mr. H. H. Tilley. Cards should be addressed care of Pitts Radio Store, Woolworth Bldg., Providence, R. I.

Spark is fast going west.

W. R. BURNE

(Concluded from page 66)

a four-valve set and heard 2FP at 2:33 A.M. on the first day of the test. This is the first official record of an amateur signal from this country crossing the ocean.

Mr. Burne is a member of the Manchester Wireless Society, an Honorary Member of the Liverpool Society and Bolton Society, and Honorary Vice-President of the Blackpool Wireless Society. A special transmitting permit has been granted the Manchester Society for testing to America and a big one kilowatt tube set is being installed by a committee on which Brother Burne is taking active part. The keen interest taken in amateur radio by this live-wire enthusiast is typical of many of the English amateurs who are up on their toes for this season's tests.

The Junior Operator

(A department formerly known as "With Our Radio Phone Listeners.")

Radio Directs Construction Job

Just over the crest of the Kaiser Range in the Sierras, at an altitude of nearly 10,000 feet, the Southern California Edison Co. is operating three continuous wave (C.W.) stations for the direction of the work of 4500 construction men. This winter 500 men will go into camp behind thirty miles of impassable snowdrifts to push forward during the winter the greatest piece of tunnel construction now in progress in the western hemisphere.



The headquarters station at Cascada is at an elevation of 5,000 feet and in a canyon 2,000 feet deep with abrupt walls on three sides. The construction camps are eight miles distant with unusually poor territory between. Three transmitters of one-half kilowatt, equipped for straight C.W., buzzer modulated, or phone, are used and work very well. The antennae are about 140 feet high and during the evening periods when orders are not being transmitted, entertainments from various broadcasting stations are received and the isolated men know the news of the world as quickly as other people read it in the newspapers.

WOC

One of the latest broadcasting stations to cover great distances is WOC, the station of the Palmer School of Chiropractic at Davenport, Iowa. This station has been heard on both coasts QSA and the selections we have heard here in Hartford from WOC seem better than the average. The printed weekly program is a beautiful booklet.

Receiving Aerials

It is a quite general opinion that a single circuit tuner cannot differentiate between stations on adjacent wave-lengths as well as a properly operated three circuit tuner. For this reason we have always favored this latter type, especially in congested communities, and in October published in this department some suggestions on how to get the most out of this type of set. However, there is another factor about which we have heard little but which seems to have an effect on the sharpness of tuning, and that is the design of the receiving antenna.

The ideal receiving system should tune to *one* wave-length, and all other signals on nearby waves, even tho of intense power and next door, *should not be heard*. When listening on 360 meters to a DX (distant) station your local broadcasting station on a wave almost the same should not be heard if you have an ideal receiving system, and amateurs in the same block could work at any time without you hearing them until you were almost exactly tuned to their wave. But ideals are seldom realized and we must compromise all the way thru. We cannot construct an antenna of zero height and length nor can we conveniently wind tuners with wire larger than fire hose in an effort to accomplish an ideal, but by knowing what we are aiming at we will come nearer the mark than if we had nothing to aim at.



The big bugaboo in radio (outside of QRN, QRM, "rotten fists," and a few other things) is *resistance*. Resistance is almost invariably a *loss*; and in receiving circuits it is worse than that for not only is the

signal strength decreased but the tuning is broader and interference becomes greater. Therefore our aim is to keep the resistance as low as possible.

It appears from what we have been able to gather that a long and high aerial, such as we often see installed for broadcast reception, makes tuning to one wave-length alone a difficult if not impossible operation. Experience is pointing out that for real selective reception the aerial should be much lower and shorter than we commonly find.

The reason for this is undoubtedly because of lower resistance. The resistance of an antenna is the result of many factors and the chief offender is known as "radiation resistance." This varies for different wave-lengths (see curves on pages 18 and 19 of April *QST*) and is at a minimum at a point roughly 50 per-cent above the fundamental wave-length of the aerial. A high antenna has high radiation resistance which is added to the other resistances and makes broad tuning. A long antenna has such a great fundamental wave-length that it is generally more than the wave it is desired to receive so only a small number of turns for coupling is allowable and a series condenser must be inserted to reduce the wave and this condenser must be used at low values. This condenser means more resistance.

On the other hand a short aerial permits the insertion of considerable inductance in the aerial circuit to get the desired wave-length, and this has an effect known as "stiffening" the circuit, making it much more selective and better able to differentiate between nearby wave-lengths. The simple single-circuit tuners so much in vogue for broadcast reception are designed to operate on a short low aerial and it is a fact that on the size of aerial they are intended for their operation is not particularly unsatisfactory. Most of the interference troubles experienced with such sets can be charged to the use of too big an antenna, as when used with high-capacity high-impedance antennas such tuners are almost worthless in point of selectivity.

Therefore, if your aerial is only thirty feet high and eighty feet long, don't worry, as you can get better selectivity than the chap with the high aerial a block long, and what slight decrease can be noticed due to the smaller aerial is more than made up in one step of amplification and the result is comparatively free from interference.

B.P.

Where to Get Your Call Book

The "Amateur Radio Call Book," put out by the Radio Directory and Publishing Co., 45 Vesey St., N.Y.C., contains the call list of amateur, special amateur, and broadcasting stations in this country and Canada. Data on the construction of a honeycomb

set is also included as well as a good size map in two colors, marking the location of broadcasting stations and showing the change in time and the area of each amateur district. The price is one dollar, post paid.

The Citizens Radio Service Bureau, of 416 S. Dearborn St., Chicago, Ill., have been putting out a call book of loose leaf form and accepting subscriptions for supplementing pages to be added after each district monthly. The cost of this service, however, has been so much that its popularity has suffered, so the publishers now have put out a call book containing U.S. and Canadian amateur calls complete to date, and selling for 50 cents.

The first issue of "Official List of Radio Stations of Canada," put out by the Department of Marine and Fisheries, Ottawa, is exactly what its name implies. It includes the commercial as well as amateur stations and should be authentic. The department has hesitated for two or three years as permission to publish such a book was made contingent on the list paying for itself. This year it is hoped that the demand will be sufficient to make it self-supporting and the price has been set at cost, one dollar, which includes all supplements. This very attractive book is made with a loose leaf binding so the supplements can be easily added.

The new Consolidated Radio Call Book, which contains amateur, government, and commercial calls, U.S. and foreign, will not be ready for several months to come. The price is \$1.50 and they may be obtained at most radio stores.

The much looked forward to June 30, 1922 edition of "Amateur Radio Stations of the United States" is now being proof read and will probably be ready for distribution about the middle of December. Copies may be obtained by sending fifteen cents (not in stamps) to the Superintendent of Documents, Government Printing Office, Washington, D.C.

When the Whitehall Viaduct district of Atlanta, Ga., was ablaze, WSB, two blocks away, first gave out the news and kept the listeners informed of the progress of the fire fighting.

LETTERS FROM FRANCE

(Continued from page 60)

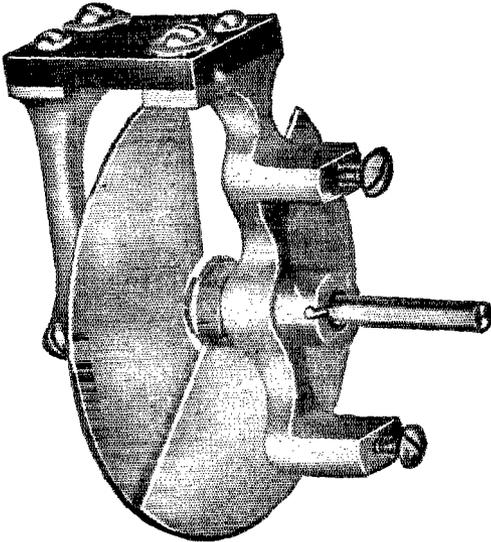
essary to request an authorization and to pay 100 francs a year. It is necessary, likewise for the first time, to have an operator's certificate delivered, after examination, to the applicant by the postal telegraph administration, the charge for which is 15 francs. Damped waves are prohibited, as well as I.C.W. Only continuous waves are authorized, actuated or mod-

(Continued on page 74)

NEW APPARATUS

This department is not conducted for the purpose of accordng free publicity to advertisers. It stands on its own bottom. Its purpose is to give QST readers accurate information on new products. Apparatus described here must be sufficiently interesting to give its description and interest to our readers. The contents of this department will be selected each month from the most interesting material at hand.

A VERY well made vernier condenser, made by the O. C. White Company, has been received at our office and presents several nice features. This condenser has a new type cone bearing with spiral spring tension which is not only self-centering but affords constant and positive contact. Thus the electrical resistance thru the bearing remains constant and all possibility of scratching noises

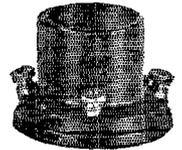


during adjustment is eliminated. The back vane may be adjusted for any air gap from one-fourth inch or less between plates, allowing greater or less ranges of capacity. Connected across a .001 microfarad condenser having a dial of 100 divisions, this vernier set at one-tenth of an inch spacing will have a capacity variation equal to one scale division; but it can easily be made to cover more or less than this by adjusting the air gap. The mechanical construction is at least equal to the electrical and we think many of these condensers will find a home in an amateurs' station.

The Alden-Napier Co. have brought out three new pieces of moulded apparatus that attract the eye. The moulded condensite and bakelite products are not melted by the heat of the tubes or soldering iron and are almost indestructible.

The "small space" socket, in addition to what its name implies, is free from excess metal, has readily accessible binding posts, and sells for such a ridiculously low price that a detector-two-step outfit can be fitted up for a dollar.

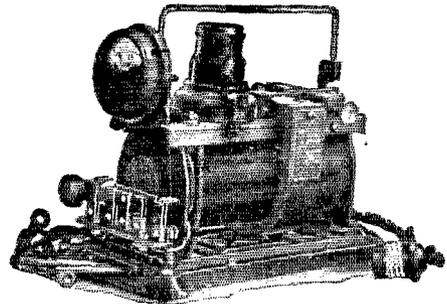
The "de luxe" socket is made of the same hard material and has a protected reinforced slot. The patent clip feature insures positive connection to the prongs of the tube as there is a wiping contact on both the bottom and sides as the tube slips into place. The illustration does not show this feature but we know it is important.



A condensite dial is also put out by this company. It is so shaped that the fingers of the operator do not hide the numerals and is a marvel for lightness and reduction of absorption losses.

The France Manufacturing Co., in addition to their well-known six volt battery charger, have brought out a B-battery charger and a combination A and B battery charger.

In the combination rectifier illustrated herewith, throwing a switch from A to B performs the necessary voltage change. The rectifier is equipped with carbon electrodes and utilizes both sides of the cycle for the heavy-current A-battery charging.



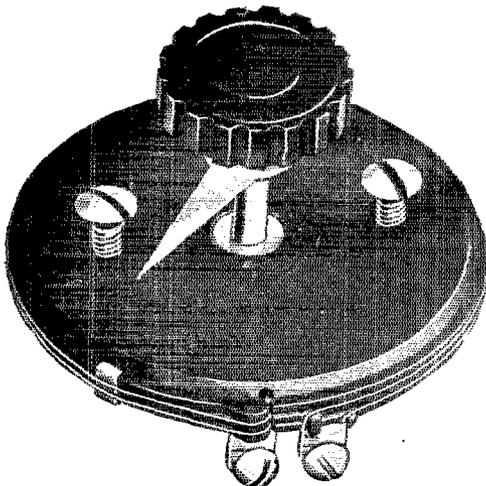
The high voltage for B-battery charging is obtained from a separate secondary winding on the transformer which not only allows voltages in excess of the line voltage to be produced but also eliminates metallic connection with the power circuit and the resulting dangers should the battery be

accidentally left connected to a grounded circuit. Batteries up to 120-volts can be charged at a rate depending on the size of ordinary lighting bulb screwed in the socket provided on the instrument.



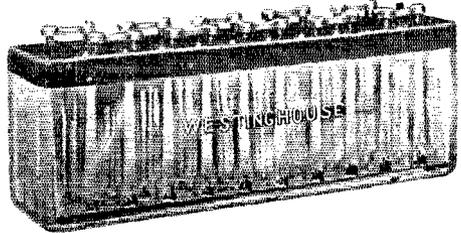
We must confess that we have been rather leary of these plugs that attach to the lighting socket and take the place of an outside antenna but a sample of the "Antenella" manufactured by Chas. Freshman Co. has been tried out with results far greater than expected. The plug is nicely made and with terminals on each side so that it may be pulled apart, turned over, and plugged in, thus connecting to the other side of the line thru one of the contained condensers without removing the wire from the binding posts or unscrewing the plug. For those who are unable to construct an outside antenna this plug may find favor, although it is hard to predict the results for any location. An individual trial is the only way to judge.

The Springfield Wire and Tinsel Co. have brought out a braided antenna cable made of 16 flat strands of copper braided into a hollow cable of about a half inch circumference. Because of its great high-frequency conductivity it has been "all the rage" for indoor loops, although an antenna



of this cable constructed by the writer at 1HX last spring has proven very satisfactory.

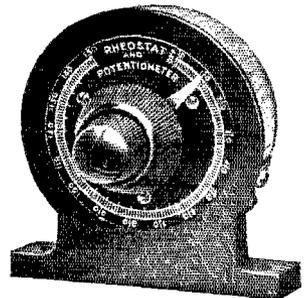
In the field of storage "B" batteries, we find the Westinghouse Union Battery Co. has a marvel of compactness which is built to serve indefinitely. The eleven cells are compartments in one jar, which is built of glass so that the interior of the battery is at all times clearly visible, which is handy when inspecting, charging, and adding water.



Some Interesting New Rheostats

A rheostat seems like an easy device to make so we are not surprised to find a new one nearly every time we pass by a radio store. Out of about 57 varieties we have picked a half dozen that are deserving of some mention.

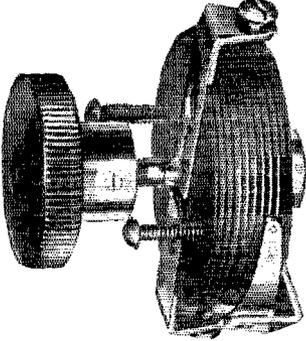
A refinement in receiving apparatus known as the "Pot-Rheo" has been brought out by the Acme Apparatus Co. and is a combination unit containing a potentiometer and rheostat mounted concentrically in the same base. The 4-ohm rheostat provides excellent filament control and the 200-ohm potentiometer may be used for fine variation in B battery potentials on a detector tube, grid potentials on amplifier tubes, or as a stabilizer, so essential for radio frequency amplification.



The Jewell Electrical Instrument Co. has put out a rheostat that carries out a new idea. It has four ohms resistance and is designed for exceptionally nice control of a single tube. The idea is to connect a master rheo in the storage battery lead and use it for coarse adjustments and the individual tube rheostats to control the individual tubes. When the storage battery voltage drops a little, only this master rheostat is adjusted to compensate for the drop. The individual rheostats need not be touched after once adjusted for the correct proportion of current to each tube, as the master takes care of the dropping voltage of a dying battery or the higher voltage that is generally found on turning on the juice the next evening. The sliding contact

under the two parallel wires makes possible a vernier adjustment of considerable range.

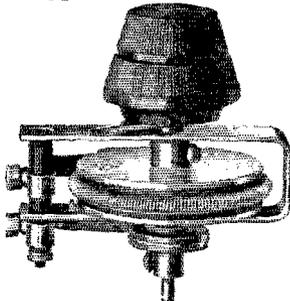
The Jenkins vernier rheostat comes mighty close to our idea of the right kind of a rheostat, there being no extra levers



or movements to throw in the vernier effect which for the most part are limited in range. This rheostat is vernier every inch of the way as the resistance wire is wound around the circumference of a threaded drum as shown in the illustration. Another novel feature is fact that pushing the knob breaks the circuit, so that when filament current is again required the knob is pulled and the circuit is closed at the same resistance as was previously found best.

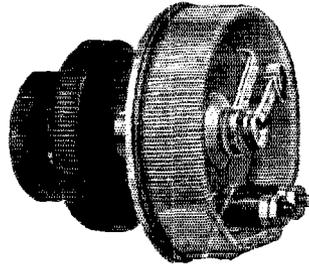
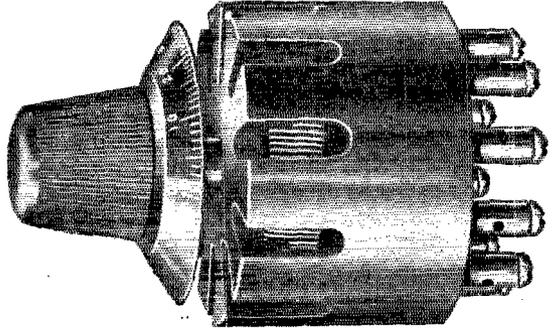
The Cutler-Hammer Mfg. Co., well known as rheostat manufacturers for many years, have entered the radio field and have brought out a rheostat designed along different lines. The spring contact fingers lie in the direction of travel insuring smooth, quiet, and positive regulation. Cone shaped knobs are provided for the vernier rheostat and "full off" and "full on" positions are found in both types.

The Klosner Amplitrol is of such unique design that once again we bring before our readers product of this company. With the Amplitrol it is no longer necessary to plug from one am-



plifier to the next, as the phones or loud speaker can be attached to binding posts and the knob of the Amplitrol controls the filament current and performs the necessary switching to any stage.

Not to be outdone by the others, old re-



liable Thor-darson has placed on the market a very rugged two-knob vernier rheostat. The fool-proof spring contacts and the base of stone go to make up a rheostat that

is not to be sneezed at.

After all, the best way is to look them all over, try out a few dozen, and then purchase one, but it won't hurt anyway to know what the latest fashions are in rheostats—hence the above.

—B.P.

LETTERS FROM FRANCE

(Continued from page 71)

ulated by the voice. The maximum power is 100 watts input. Wave length must be between 180 and 200 meters. All general traffic is prohibited; the station "may only communicate in a manner necessary to the functioning of the apparatus" (QRK? QSA QSB!!!) "to the exclusion of all communication having an actually useful or personal character."

If one wishes to carry on ordinary communication, the station is no longer an amateur station but a station "intended for the establishment of private communication." The maximum power in this case is less than 400 watts input and the wave length 150-200 meters. In addition to the 100 francs tax, it will be necessary to pay from 20 to 60 francs per watt input provided that the power input varies from less than 25 watts to 400 watts. A 400 watt sta-

(Concluded on page 91)

Radio Communications by the Amateurs

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



QSL By Card

Washington, D. C.

Editor, QST:

It becomes my duty as an amateur to ask if it is possible to give a little space in our valuable magazine to request the fellows to QSL by card if they hear a distant amateur. I believe the gang has been rather lax in the matter. Believe me fellows, when I get up in the morning and find in the mail that a guy in a distant state or city has heard my sigs QSA or the like, I can eat better and work better. The same thing works when I get home at night.

The gang ought to keep up the practice. It does not cost a heap of money to have some cards printed. A plain post card costs but one cent. Let's get busy and help the other guy. He can judge by the cards he gets that his transmitter is getting out. Let's start the slogan: "QSL BY CARD."

Radioly,
Jack Hillers.

[Editor's Note: He is right. We must not let up on this, for sending a card is rendering a fellow amateur a service and it may mean a record for him. We thought at one time that anything in excess of a watt per mile was a record but now we would hate to say what constitutes DX. However, a card even to a nearby station may be joyously received as a small set may have been used at the time and a "happy combination" hit upon. We wish also that persons receiving reports of their signals would be more appreciative and promptly acknowledge.]

The Glad Hand

Chattanooga, Tenn.

Editor, QST:

I have just returned from a trip to Detroit and drove back overland. It was my desire while in the north (Detroit, Toledo, Cincinnati, Louisville, etc.) to talk over some of my problems with others who might have had some experience that would help me. To my surprise I could not find anyone that was interested. This was because I did not know who to see and where to go. All that I was able to do was to drop into a radio store and ask for information. This they would not or could not give. Either they did not

know, which was usually the case as they were mainly beginners, or they only wanted to sell something and unless you wished to buy they had no interest in you.

Now I believe there are many of the old-time hams in that part of the country, just as there are here, who would be very glad to see you if you knew where to find them. The magazine *Adventure* has formed thruout the country what they call Camp Fire Stations where the so-called "adventurers" can drop in and get information and meet others of their kind. What do you think of the A.R.R.L. doing something of this sort for the traveling ham? I have no doubt there are many of the fellows passing thru Chattanooga whom I would be glad to see, but they do not know where to go. If QST could publish a list of places where they would be welcome, they could take the page with them. If you would like to take this up I would be glad to offer my office and station as a meeting place for those visiting Chattanooga:

Daytime: 424 Hamilton Natl. Bank Bldg.,
Telephone, Main 145
Night: 624 Carlisle Place
Telephone, Main 3978

Another suggestion: while coming thru the different towns I saw many antennas. I would like to have known whose they were. There was nothing to indicate whether they were relay stations or only broadcasting listeners. Why not have the call letters put outside so all who go by can read?

Yours truly,
Benj. F. Painter, 5MB
A.R.R.L. City Manager

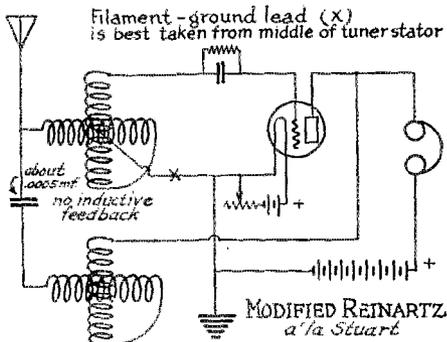
[Editor's Note: Mr. Painter's suggestions are fine, but to do the job thoroly we are afraid would take more space in QST than could be spared for the limited number of our members who travel regularly. His last paragraph proposes another scheme, however, which should solve both matters. Why not something to stand as an "A.R.R.L. Welcome Sign"? For example, a sign of standardized design reading "A.R.R.L. Station 5MB," which all of us knew meant that here was a ham's shack with the ham spirit inside where kindred souls may foregather and masticate the stocking. Further suggestions are requested from the gang.]

Another Reinartz Arrangement

Livingston, Mont.

Editor, QST:

I have something for your "Reinartz symposium"—the attached diagram will explain itself. Simply two variometers and one small fixed condenser constitute the whole thing, no switches, no variable condensers. It is so very simple that it seems foolish but I can tell you that it works surprisingly well.



The trial instrument that I am using with this circuit consists of two home-made ball-and-cup variometers, home-made fixed condenser (about .0005 mf.), a panel of wood backed with a sheet of zinc (grounded), and a base of wood. The variometers are rather larger than ordinary, 4½" rotors, and give me a range from something less than 200 to over 600. Spark, C.W. and phone seem to come in with equal strength, which is greater than I get with the spiderweb Reinartz. This results I suppose from the fact that this circuit does away with the shunt tuning condenser, accordingly to Reinartz' latest ideas. This set is handled with surprising ease and certainty.

Yours cordially,
J. E. Stuart.

F.B.!

Rocky Mountain Div. HQ.
1022 So. Ash St., Casper, Wyo.

Dear Friend Schnell:

My darn old battery went dead on me tonite while I was trying to entertain the wife with a radio concert, so we went back upstairs. I have just finished my weekly letter to the A.D.M.'s and then dug out my A.R.R.L. files to again read of the battle of the Rocky Mtn. Division. I read over the pile of files I have from the start. Everywhere thru the letters run the phrases "If we can," "I hope we can," etc., and then as I read the matter up to date it sure makes my heart feel good. It now sounds altogether different. All those fond dreams I had when we again started the ship towards the sea seem to have come about in some sort of a manner.

My plans seem to have fitted in OK and the co-operation I am receiving from the men gives me a lot more joy. Our stations are handling traffic by the hundreds of messages. Two broadcast stations have bent their energy toward relay traffic with their powerful sets. A daylite route has been opened and only needs a little polishing up to make it sound. Arrangements have been made with the railroad dispatchers over the country followed by our route that, in the event of another paralyzing storm like we had last May when all wires were out for three days, they are to call on us for assistance. We have a standing schedule with each other that when we are called upon we will call each other at 15-minute intervals until we establish communication and then handle the msgs. for the railroads for the safe operation of their trains. The Transcons will surely go thru this division. Good stations of large and small C.W. power are springing up all the time. The gang is "pepping up" and the sea looks smooth.

Gosh, O.M., what a wonderful age this old A.R.R.L. is living in. Just like a Frenchman, I could just kiss old Maxim for starting it, and can just barely imagine the satisfaction it must afford him to ponder over the struggle of the League and its approaching perfection. This is just a little rattling of a well pleased ham tonite, O.M. Must close now, with best o' luck and 73s to you and the gang.

Yours very truly,
Norman R. Hood.

Reinartz Super-Regeneration

Box 134-A, Route 6,
Omaha, Neb.

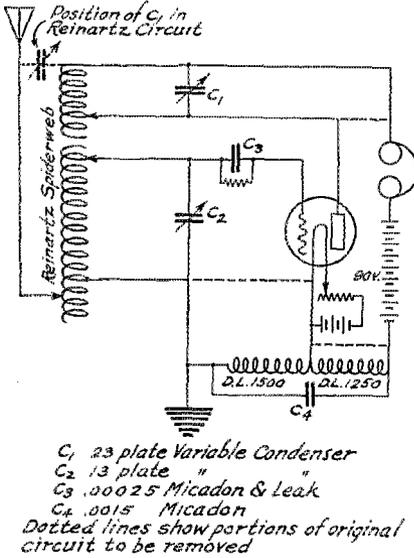
Editor, QST:

I have been watching closely the recent developments in super-regeneration. Have noted particularly the write-ups you have given it yourself. And in working along the lines of the one-tube set with the idea of incorporating the range and selectivity of the 3-circuit regenerator with the amplification of the super set, and obtaining over the whole a simplicity of adjustment and ease of control found only in the Reinartz circuit, we asked ourselves the obvious question—why not hook up a super set on our one-tube Reinartz, and if it doesn't explode see what selectivity we can get on it? Did it work? Oh Boy!

The Reinartz we used was that of last March's QST, without the one-stage amplifier. The super circuit we used was practically that originated by 3BID and described on page 17 of October QST, and the combination of the two made our two-stage look sick. The circuit is shown herewith; full lines show the present hook-up, while dotted lines indicate how the original Reinartz was changed.

During the Transatlantic Prelims, 2's,

3's, 6's and 7's came in like 9's on both spark and C.W., and it controls as easily as the original Reinartz if you are careful of your ears. Groves says it should work quietly but he may work near some boiler factory. We haven't the set working long enough to say much more about it, but we find the phone by-pass unnecessary, and the .002 variable across the DL's may be replaced with a fixed .0015 Micadon.



In operating, set your switches at the approximate wave and refine the tuning with condensers C-1 and C-2, as on the original Reinartz. It will be noted that the tube will give moderate sigs at very low brilliancy, and for the sake of your ears should be used thus until you find the high spots of the set. After tuning in your man you can increase filament current until almost any desired audibility is reached. The set has a marked R.F. characteristic in that it amplifies the tuned sigs all out of proportion to QRM and QRN. DX has been heard right thru local phone, spark and C.W.

The set is subject to much refinement as yet, and we stand ready to receive suggestions. With all due credit to IQP and 3BID, I beg to remain.

Fraternally yours,
 P. H. Quimby, 9DXY.

We Should Worry

120 W. King St.,
 Kitchener, Ont.

Editor, QST:

Yes. How does Beeswax get that way? "Who will save the amateur?" Well, well. In the first place, who told him that the amateur's circumstances were such as to warrant their needing such assistance?

Doesnt he know that the novice with brains has some idea of the rights of other people to the air, especially when these people are engaged in what amounts to research work destined to advance the science of radio? Does he really mean to insinuate that the American public are all boneheads?? I dont believe they are.

Give credit where credit it due; Radio News itself as a magazine is ahead of other periodicals of its class. As a "popular" magazine, I cannot see where anyone can kick on the technical articles, many being written by experts (NOT including the editor), but I feel sure that no amateur nor any person with any self respect or regard for the rights of others can agree with the editor's new policies regarding the amateur. If he (assuming that he still knows the code) would get on the air and hear the mob of C.W. stations there he would realize that amateur radio is just starting, not declining. If he would attend strictly to business and not go out knocking the amateurs and telling lies about them, he would rise a great deal in the estimation of the public. For instance, who does the would-be novice consult about installing a receiving set in most cases, but an amateur? Who usually helps him to get it working? Who made broadcasting possible? Yet the amateur is not recognized in the community! I have no kick coming on account of Mr. Gernsback's changing the style of Radio News so as to make it a better seller, because it is a business proposition with him and his company makes its living on the sale of Radio News, but a magazine can be made to sell without having to get up and knock everything in sight. My notion is that he is a shrewd business man but a --- poor editor.

Mr. Parkes is right. Let's ask the gang to quit knocking the novices, BCL's, RFL's, or whatever you want to call them. If they dont get interested in the code, they soon lose interest in radio anyway, as it is practically impossible to be sure of hearing a complete program from a distant broadcasting station nowadays due to carrier wave beat QRM, etc. and those who are interested only in the music (?) end of it seem to be getting disappointed, leaving the embryo amateurs, who listen down around 200 once in a while and wonder about the peepings that they hear there, as T.O.M. prophesied recently. This makes us feel optimistic.

In the next Junior Operator page, you should run a little article and cut about QRM traps to take mush from nearby C.W. stations out of receiving sets tuned to 360 meters. They work, and do it well.

Yours for amateur radio (C.W.),
 H. S. Gowen,
 City Mgr.. Canadian 3DS.

Filament Adjustment

128 Melrose St.,
Melrose Hlds., Mass.

Editor, *QST*:

Mr. Miles' query in the October number brings up a question whose principles do not seem to be very generally understood, i.e., that of ammeter vs. voltmeter control for vacuum tube filaments.

During the burning of a tungsten filament the metal gradually evaporates away from the hot filament and deposits on the cold glass bulb. This causes the blackening often observed in old tungsten lamps. During this process the diameter of the filament slowly decreases, thus increasing its resistance. Thus, for the same rheostat setting, the potential drop across the filament slowly increases, while the current thru, it slowly decreases, but the net result is that the filament temperature *decreases*. Since the electron emission, and, consequently, the operation of the tube, is a function of the temp., we restore this value by cutting out some of the external resistance (rheostat). If we regulate this change by maintaining constant current (ammeter) the actual temp. of the filament slowly increases, whereas, if we use a voltmeter, the filament temp. at constant voltage slowly decreases. Thus neither meter *alone* permits operation at constant temperature.

By combining the two, however, we may operate at const. temp. by making use of Langmuir's relation $V \times \sqrt[3]{A} = \text{const.}$ where the temp. of the filament is const. if the voltage-cube root of amperage product is maintained constant.

Since many amateurs will hardly care to go to a double meter expense in this connection, and since the application of this principle in practise is somewhat inconvenient (except in scientific work) it might be well to point out that if only one meter is to be employed, it is safer to use the voltmeter, since at const. voltage the temp. is slowly decreasing. On the other hand, at constant current the temp. is increasing and the life of the tube decidedly shortened in its later stages, since evaporation of the tungsten metal rapidly increases with increasing temp. until the melting point of the metal is reached, or the filament becomes too fragile to withstand vibration, etc. However, this effect is of much less importance in the case of the thicker filaments used in power tubes, and here the use of the ammeter might be advisable.

It may be well to point out, also, that the operating characteristics of commercial vacuum tube filaments may vary considerably with tubes of the same make and type, due to the short filament length, and the exigencies of large scale production, and that the condition of max. operating efficiency should be determined for each individual tube. Thus I have a UV-200 tube

which operates best at 3.3 volts and is generally used at 3.0 volts for nearby stations, while rated by the manufacturer at 5.0-5.4 volts.

Very truly yours,
Stanley L. Chisholm.

QRT for the Tests

2CFA, 205 Greenwood St.,
Brooklyn, N. Y.

Editor, *QST*:

Many is the time a man gets disgusted and would like to voice his sentiments to the general public. To be perfectly frank, I am going to ask you to publish this letter in *QST*, altho I feel sure you will get a great many more of a similar nature.

Amateur radio activity is a great thing in many respects but its control is far from being perfect and there still is the "ham" who is killing it instead of "lending a hand" to help things along. These preliminary tests for the coming second series of Transatlantic Tests have been ruined by a large number of men who seem to have a very selfish purpose in view. They apparently cast aside all rules and regulations which tend to put things on a systematic basis and thereby "gum up the whole works." Instead of standing by when their district is supposed to, during these tests, they open up with whatever they have and let her go with a CQ, a call of some kind, or chew the rag on full power with some bird about a block away. I started to log the various ones who were operating out of their turn but it was useless, as there were too many—that's the reason for the disgust. You can imagine listening in on amplification for DX signals only to have a number of men in your own district open up with 50-watt bottles, 1 and ½ k.w. spark sets. It's just plain ND. Many a fellow is going to miss getting cards from 1200 miles or more just on account of this local QRM.

Then too, aside from this, it seems that fellows are disregarding local work and working (or trying to) DX before 10 P.M. This is hurting A.R.R.L. traffic. You call a fellow with a "msg," morning, afternoon, or early evening, and you will not get a peep out of him—instead he is calling CQ about a hundred times or trying to work DX.

Please make another appeal to the real radio world to see if conditions can't be made better. I'm sure a great many others will join me in this feeling.

Yours for better and more systematic radio,

Clarence A. Kelting.

[Editor's Note: Please see our Editorials this month. The preliminaries are over but the finals come during December. Mr. Kelting is right—we need better co-operation, men. For ten days we're going to have plenty of transmission, and during

SOS--a la Wireless Willie

By Chas. A. Lowry

THE winter sun had set and the Citadel's bleak silhouette slowly faded, leaving the city to its war-time darkness. The dockyard gates closed and the sentries took up their posts by the tiny doors, thru which liberty-men and officers would shortly issue forth in little groups, on pleasure bent. Halifax had settled down for the night.

Halifax was, I suppose, much like all other strategic cities were, in those days; dark dismal streets, shop windows covered with black paint or heavily shuttered; street cars with blinds tightly drawn and not a street lamp anywhere. I wandered over to the Academy only to find a three year old movie film on the boards. The "Tally-Ho" and "Green Lantern" somehow failed to attract me that night. I wanted comedy and laughter to drive away from my thoughts the gruesome details of war, for I had just come in from patrol and was in a bit of a hump as a result. I decided to spend the rest of my short leave on board listening to the phonograph, or perhaps there might be others who, like myself, preferred the cosy wardroom to the muddy cobbles and fishy odors of Barrington Street; and it was with visions of a little game of stud or draw that I hastened to return to the little ship which for some months had been "home."

the changing tides suck at her wooden bottom, I thought; yet those same chains snapped like match-sticks when, a few weeks later, the fatal "Mont Blanc" went up. She was a repulsive sight, that old grey-hound, as she lay there, a black silhouette against the starry Dartmouth sky; her four crooked funnels and the two tall spars and the ancient slope toward midships gave her a drooly, haunted aspect, in the darkness. Yet it was with a sort of nameless thrill that I mounted the



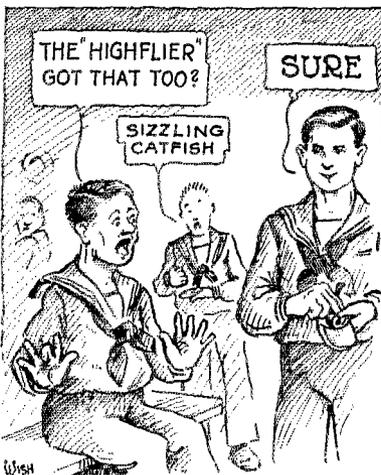
long "chicken run" and passed, thoughtlessly saluting, over the nameplate, thru the casemate door and down two decks below to the warrant flat. The lights were burning in the gun-room mess and the sound of muffled voices drifted thru the grating to my listening ears. Sure enough, here were friends, and plotting mischief too!

I entered, and here my story really begins.

Wireless Willie Westover was one of those youths of the Peck's-Bad-Boy type who is eternally plotting mischief. Together with three weary knights of the pill boxes, he had been futilely endeavoring to ward off an attack of just such a blue funk as possessed me. Draw, stud, rummy, and even crown and anchor had failed dismally. But Willie's brain never failed.

"Seen Gulsen, Marconi?" he asked, as I entered the mess. (They called me Marconi in those days, for some reason of their own). No, I hadn't seen him. "Must be up in the coop all right," he remarked. The aforesaid "coop" was a cabin about 4' x 4' x 7' containing a wild assortment of antique W/T receiving gear, and boasted the dignified name of "Silent Cabinet" in the rule book. This coop was soon to become the scene of the prank that Willie was already hatching from his fertile brain. A cabin boy was sent up-top and returned with the information that Mr. Gulsen was "in the wireless, Sir." Wireless Willie

(Continued on page 90)



The old "Niobe," her glorious duty as a warship done, lay stupidly against her temporary quay, next Pier Six. Huge twin anchor chains extended from her hawse-pipes fore and aft, and were secured to concrete blocks on shore. In vain might

Calls Heard



HEARD DURING OCTOBER Unless Otherwise Specified

Instructions to reporters:

(1) Typewrite or neatly print the calls "double spaced," on a separate sheet of paper, running them across the sheet, not down a column, and writing on but one side of an 8 1/2" x 11" sheet.

(2) Arrange alphabetically thru each district, from 1 to 9, and then Canada, with no break between the districts, using commas to separate calls and parentheses around calls of stations also worked—as in examples below.

(3) The period covered by the report shall be so stated and shall be approximately from the first of one month to the first of the following month. All lists must be received by us the 8th of the following month for publication in the next QST.

(4) In order to distinguish between spark and C.W. stations, list spark stations from 1 to 9 in the usual manner and then make a second paragraph in identical form listing the C.W. stations. Commercial calls will not be published.

Now that everybody knows how to do it, let's have a better grade of lists with some real DX and fewer nearby calls. However, be absolutely sure of the calls you log and report.

H. A. Cookson, S. S. China—(1-Step)

October 22 (449 miles W. San Francisco): 5PX, 9BED, 9ANQ, 9AWM, 9CXP, 9DHB.

October 23 (845 miles W. San Francisco): 5BN, 7ZB, 7EN, 7NY, 7AEM, 7RI, 8SP (Fairmont, W. Va.), 8XE (State College, Pa.), calls 9GK, 9BED, 9DBL, 9AJH, 9DXN, 9AXU, 9PN, 9BJL, 9BIZ, 9XE, 9ZAF, 9BDS, 9FM, 9ZN, 9XM, 9GK, AD7. (Hear 8XE and 9GK working all evening.)

October 24 (1210 miles W. San Francisco): 5ZA, 5CV, 5EO, 5ARR, 7BK, 7DP, 7SC, 7TQ, 8AIO (East Pittsburgh, Pa.), calls 6KA, 8BWA (Akron, Ohio) calls CQ, 8YU (Dayton, Ohio) calls CQ, 8NB (Rochester, N. Y.) calls 877, 9DK, 9AWM, 9BDS, 9AOG, 9CKM.

October 25 (1602 miles W. S. F.): 3BLF (?), 4HH (Tampa, Fla) heard twice, 4BV (Wilmington, N. C.) calls 9CNS, 5HA, 5ZA, 5NK, 5EO, 5SM, 5EK, 7ADF, 7RN, 7SC, 8XE (Pa.) calls CQ, 9BJ (Chicago), 9BK (Chicago), 9BJL, 9AXD? 9CMK, 9CNS calls CQ all night, 9GK copied working with an "8", msg says "want you here often sig 9DKB." 9GK very consistent & QSA, 9AWM calls 5EK, 9ZAF, 9AYI, 9BCY, 9ZAF, 9AUL QSA with 1CMK, 9BDS, 9ZN, 9RDE?

October 26 (1963 miles W. S. F.): 5KAD (?), 9XM (Madison, Wis.) very QSA and clear. Copied the following: "9XM test 9XM test use card fm any stn beyond 1200 miles fm Madison Wis test de 9XM QRX for Amateur Na 9XM." H! Several other Nines heard but unable to read acct strong induction QRM fm engine room.

The best distances logged were 5NB, Oct. 24, approx 4200 miles; 8AIO, Oct. 24, approx 4100 miles; 9BJ & 9BK, Oct. 25, 4100 miles; 9XM, Oct. 26, about 4400 miles and 8XE about 4700 on Oct. 25.

[This was mailed from Honolulu. Operator Cookson expects to hear the sixes all the rest of the way to Yokohama, Japan—Ed.]

T. W. Braidwood, S. S. City of St. Joseph

2000 miles E. of Sandy Hook: 1BDI, 1KM, 2FP, 2NZ, 3EL, 3ZO, 4BY; 1800 miles E. of Sandy Hook: 5NY; 1600 miles E. of Sandy Hook: 1XM, 2CQZ, 2EL, 3ZO; 1500 miles E. of Sandy Hook: 1AJU, 2ZK, 3BA, 4DC, 3FD, 9XAC, 9ZN; 900 miles E. of Sandy Hook: 1BKQ, 1CPN, 1XU, 2AWL, 2BLF, 3ARP, 3BGT, 3BWT, 3FS, 3RM, 3YD, 4NT, 4ZA, 8AXB, 8XE, 9APS, 9AMQ, 9BDS, 9KG, 9ZAF.

F. H. Stephins, Chicagoff, Alaska

The following telegram dated Nov. 14th is herewith printed as received: "Please print next issue Stop Yesterday copied on regenerative two step between nine ten and ten P.M. Coast time Stop Spark 9YAK CW 9AWM 7NY 9ZX 9YW 9ZN Stop 9AFD hundred feet from cans 6ZAC 9CLS and 6AD Expect install fifty watt bottle Location excellent"

Canadian 5DO, Vancouver, B. C.

C.W.: 5DX, 5EO, 5PX, 5XD, 6CC, 6GJ, 6CP, 6HC, 6IY, 6GR, 6KA, 6XJ, 6PI, 6ZF, 6ZL, 6ZW, 6ZY, 6ZZ, 6ABX, 6AJH, 6AQW, 6AWT, 6AFQ, 6AGH, 6ARK, 6ATV, 6BKO, 6BVN, 6BCR, 6XAD, 6XAZ, 6XWI, 6ZAC, 7AW, 7BK, 7BJ, 7CP, 7GI, 7IY, 7SC, 7SF, 7TH, 7TQ, 7TY, 7VI, 7WF, 7WM, 7WX, 7XC, 7ZB, 7ZG, 7ZK, 9AU, 9AY, 9DR, 9RG, 9ANI, 9AUL, 9AWM, 9CNS, 9ZAF, BT8. Canadians: 4BV, 5CT, 9AC.

Spark: 6LU, 6AWM, 6ZIW, 6BUA, 7DK, 7ON, 7VE, 7VF, 7VG, 7ZG, 7ZK, Canadian 5DX.

3JT, 63 Bellwoods Ave., Toronto, Can.

Spark: 1ARY, 1BOQ, 2NF, 2OM, 2AGA, 2AJE, 3AK, 3FL, 3FP, 3HJ, 3SE, 3QN, 3AAO, 4BL, 8TJ, 8BDA, 9AAW, 9ARM, 9AVP, 9AWP, 9DHF.

C.W.: 1AW, 1CZ, 1FF, 1FG, 1FK, 1NN, 1PR, 1RD, 1XM, 1YK, 1AHZ, 1ASZ, 1AZM, 1AZW, 1BCF, 1AOK, 1BDI, 1BDT, 1BES, 1BET, 1BGF, 1BJN, 1BKA, 1BKQ, 1BLN, 1BQA, 1BRQ, 1CCK, 1CNF, 2FQ, 2FZ, 2GR, 2HW, 2JO, 2KF, 2LO, 2NF, 2NZ, 2SQ, 2UD, 2WB, 2XQ, 1C.W., 2XZ, 2AFP, 2AGH, 2AHO, 2AJW, 2AGC, 2AIM, 2AJA, 2APA, 2APD, 2APC, 2AWF, (2AWL), 2AWS, 2ADL, 2BEA, 2BGM, 2BJO, 2BMR, 2BQH, 2BRB, 1C.W., 2BSE, 2GRW, 2CCD, 2CCX, 2CDO, 2CFB, 2CJN, 2CKL, 2CQZ, 2CPK, 2CPD, 2BK, 2BG, 2CC, 2CD, 2DB, 2FJ, 2GK, 2GN, 2HL, 2LR, 2NH, 2OT, 2PB, 2PZ, 2QV, 2RM, 2VW, (2WF), (2YH), 2SM, 2YO, (2ZO), 2ZW, 2ZZ, 2AAJ, 2AFB, 2AJE, 2AJJ, 2ANJ, 2APP, 2APR, 2ARM, 2ASP, 2ATZ, 2AVA, 2AWW, 2ASY, 2BGT, 2BHL, 2BOF, 2BRX, 2BNU, 2BVA, 2BB, 2BQ, 2BS, 2BK, 2BY, 4DQ, 4EH, 4ID, 4GL, 4JK, 4KU, 4GH, 4LL, 4XK, 5DA, 5DI, 5DO, 5EK, 5FV, 5DK, 5HR, 5MB, 5NV, 5UK, 5KK, 5AG, 5AAM, 5ADE, 5GQ, 6KA, 7AD, 7AZ, 7AB, 7CF, 7CP, 7CU, 7DR, 7DV, 7HH, 7JQ, 7IB, 7ML, 7OW, 7SP, 7ZE, 7RM, 7XE, (8YN), 8XB, 1C.W., 8ZD, 8ZX, 8ZV, 8AB, 8CF, 8ACH, 8AFD, 8AGB, 8AIW, 8ANB, 8ANI, 1C.W., 8AQO, 8ATU, 8AVD, 8AWP, 8AXC, 8BEF, 8BFM, 8BGC, 8BHO, 8BJV, 8BPL, 8BWA, 8BXT, 8BXX, 8BQJ, 8BZY, 8CBL, 8CET, 8CGJ, 8CGF, 8CGK, 8CGM, 8CJY, 8CMI, 8CNW, 8CQA, 8CRM, 8CXX, 8CYA, 8ZAF, 9AF, 9AI, 9DY, 9EL, 9GK, 9II, 9IO, 9IZ, 9JA,

90X, 9PW, 9UU, 9WC, 9YF, 9ZN I.C.W., 9AU, 9AAP, 9AFK, 9AFN, 9AMI, 9APS, 9BDS, 9BGH, 9BHL, 9BIK, 9BUD, 9CCS, 9CML, 9CUC, 9CKM, 9DAG, 9DCR, 9DKY, 9DTM, 9DOZ, 9YAJ, 9DBV. Can. 3DH. Other Canadians too numerous to mention.

3GN-9BS, Ingersoll, Ont.

Spark: 1AW, 1JT, 1RV, 1BOQ, 1CNI, 1EBG, 1ZBY, 2NF, 2OM, 2UA, 2AER, 2AHK, 2AJE, 2ARB, 2BDU, 2CCX, 2FB, 2FP, 2QN, 2ZM, 3ZO, 8ANS, 8ARM, 8AGR, 8AXN, 8XA, 8CY, 8EO, 8HY, 8LM, 8NZ, 8OI, 8TJ, 8UC, 8VH, 8VQ, 8VW, 8ZY, 8ACF, 8AFG, 8AMS, 8AWU, 8BDA, 8BGT, 8BQA, 8BVX, 8BXC, 8CEJ, 8CKV, 8CSD, 8CYD, 8CA, 8CP, 8JX, 8IV, 8MC, 8ME, 8OF, 8ON, 8PD, 8QC, 8TV, 8ZN, 8ZY, 9AAW, 9ABM, 9ACB, 9AIU, 9AMK, 9ANU, 9AQA, 9AVP, 9AZA, 9AZF, 9BOO, 9BTX, 9CIV, 9CTW, 9DAY, 9DCW, 9DGL, 9DHz, 9DXT, 9DZY. Canadians: 3BA, 3DDL, 3FO, 3MN, 3NV, 3RY, 3VW.

C.W.: 1AW, 1CK, 1CY, 1GV, 1LD, 1OE, 1PR, 1QP, 1RD, 1TS, 1XN, 1XU, 1ZE, 1AGH, 1ARY, 1AWB, 1BCG, 1BDL, 1BGF, 1BKQ, 1BOQ, 1CGO, 1CJH, 1CNF, 1ZEL, 1FZ, 1GR, 1JW, 1LO, 1NZ, 1one, 1PF, 1TS, 1XQ, 1ZK, 1ZL, 2AAB, 2AGC, 2AIF, 2AJA, 2AWF, 2AWL, 2BEA, 2BGM, 2BGN, 2BML, 2BMR, 2BRB, 2BRC, 2BVA, 2BZV, 2CBG, 2CCD, 2CCX, 2CFB, 2CKL, 2CKN, 2CKU, 2CMS, 2CQZ, 2BG, 3BR, 3CC, 3CG, 3FS, 3GR, 3HL, 3HX, 3JH, 3LR, 3NH, 3OD, 3OT, 3QV, 3RF, 3TK, 3YO, 3ZO, 3ZW, 3ZZ, 3AAO, 3AAV, 3AFB, 3AFU, 3AJJ, 3AJO, 3ANJ, 3APR, 3AQR, 3ASP, 3AUT, 3AWL, 3BGT, 3BHL, 3BHM, 3BHO, 3BL, 3BIT, 3BJY, 3BNG, 3BNU, 3BOF, 3BRW, 3BUV, 3BVC, 3CBM, 3CMB, 3CRD, 4BQ, 4BT, 4BX, 4BY, 4DL, 4EA, 4EB, 4EN, 4FE, 4FT, 4GL, 4HW, 4KD, 4KI, 4LJ, 4LP, 4TL, 4ZE, 5AA, 5DA, 5DI, 5DO, 5EG, 5EK, 5ER, 5ES, 5FV, 5HL, 5KC, 5MB, 5PX, 5SM, 5XA, 5XK, 5ZA, 5ZAS, 5ZAV, 6KA, 6XAD, 6DT, 6ABJ, 6AG, 6AM, 6BF, 6AS, 6EW, 6FT, 6GA, 6HJ, 6HN, 6HT, 6HW, 6IB, 6IC, 6LT, 6MP, 6OM, 6OW, 6PT, 6QB, 6QK, 6RR, 6SB, 6SP, 6TX, 6UK, 6UZ, 6VF, 6VH, 6WE, 6XE, 6XY, 6YD, 6YN, 6ZK, 6ABV, 6ACO, 6ABH, 6ACR, 6AEG, 6AFD, 6AGN, 6AGO, 6AGR, 6AIM, 6AKP, 6ALC, 6AMM, 6AOL, 6APR, 6APT, 6AQO, 6ARD, 6ASL, 6ATU, 6AWN, 6AWU, 6AWT, 6AWZ, 6AXN, 6BCL, 6BCY, 6BDU, 6BEF, 6BJX, 6BKE, 6BLT, 6BNH, 6BNO, 6BOZ, 6BPC, 6BPL, 6BRR, 6BSE, 6BUM, 6BVR, 6BXH, 6BXT, 6BXX, 6CAZ, 6CAZ, 6CEM, 6CGM, 6CGP, 6CGX, 6CIA, 6CJY, 6CJA, 6CKM, 6CLK, 6CMM, 6CMY, 6CBB, 6CWR, 6CPT, 6CUR, 6CY, 6ZAE, 6ZAG, 6BO, 6CP, 6DZ, 6EL, 6IL, 6IO, 6KP, 6LE, 6LQ, 6LV, 6LZ, 6OX, 6PI, 6PN, 6PQ, 6QF, 6QU, 6XI, 6ZN, 6ACD, 6AFK, 6AHH, 6AIU, 6AJH, 6AJP, 6AMH, 6AMI, 6AMQ, 6AND, 6AON, 6APS, 6AQH, 6AQM, 6ARR, 6ARZ, 6ASU, 6AUL, 6AVN, 6AWM, 6AWS, 6AXU, 6BDS, 6BED, 6BFN, 6BHQ, 6BIE, 6BIZ, 6BJY, 6BKZ, 6BLC, 6BPL, 6BQD, 6BQW, 6BRK, 6BTT, 6BUX, 6BXZ, 6BZI, 6CBA, 6CBW, 6CCS, 6CEB, 6CKM, 6CJA, 6CLN, 6CTV, 6CUL, 6DAY, 6DBL, 6DCR, 6DGE, 6DGG, 6DGT, 6DKY, 6DOF, 6DQU, 6DSM, 6DSW, 6DWW, 6DXN, 6DZB, 6XAC, 6YAJ, 6ZAA. Canadians: 3AD, 3AQ, 3BP, 3BV, 3CO, 3DH, 3DS, 3FC, 3JE, 3JJ, 3JK, 3KO, 3KP, 3MB, 3NB, 3SP, 3SX, 3TL, 3XN, 3YH, 3AGJ, 9AL, 9AW.

1XM, Cambridge, Mass. (All Districts)

(Note: list of 2's, 3's, 8's, and 9's incomplete, separate list of CWOs and sparks not kept—sori O.M.) 1(AAC), 1(ALO), 1(AJZ), 1(ASJ), 1(AXB), 1(AXR), 1(AZL), 1(BAS), 1(BKQ), 1(BKR), 1(BQD), 1(BYN), 1(CBJ), 1(CEV), 1(CKS), 1(CMK), 1(CND), 1(CNI), 1(DV), 1(FI), 1(GV), 1(H), 1(LL), 1(QA), 1(QP), 1(XU), 1(YK), 2(AAB), 2ABZ, 2AFP, 2AGC, 2(AJA), 2(AJE), 2AL, 2ANW, 2APA, 2AVE), 2AWF, 2(AWI), 2AYK, 2BB, 2BBB, 2(BGI), 2(BJC), 2(BMR), 2BQ, 2(BRB), 2(BRC), 2BSG, 2BUE, 2BUM, 2BWL, 2CBG, 2CBY, 2CGJ, 2CKN, 2CKR, 2CM, 2CMS, 2CNU, 2(COL), 2CPN, 2(CQZ), 2(CT), 2CUK, 2DI, 2DQU, 2EL, 2(FC), 2(FP), 2GK, 2GR, 2HW, 2KL, 2(KP), 2(KU), 2LE,

(2NZ), 2(OM), 2RM, 2(RY), 2SQ, 2(SZ), 2TS, 2(UA), 2UD, 2ZK, 3(AAO), 3(AAV), 3(ABC), 3(ABF), 3(AIS), 3(AJJ), 3(ANJ), 3(ANX), 3(ANZ), 3(AQR), 3(AVC), 3(AWA), 3(BB), 3(BED), 3BG, 3(BGI), 3(BHM), 3(BHN), 3(BJ), 3(BJ), 3BJY, 3BLU, 3(BML), 3(BNU), 3BOB, 3BVC, 3(BUP), 3(BX), 3CC, 3(CM), 3(CN), 3DC, 3(FS), 3(GK), 3(HJ), 3HX, 3IL, 3JH, 3(LR), 3MK, 3(OE), 3OT, 3PB, 3BNE, 3SL, 3SM), 3SZ, 3UK, 3VW, 3XC, 3XN, 3YO, 3ZB, 3(ZO), 3ZW, 4BQ, 4(BX), 4BY, 4DC, 4DQ, 4EA, 4EB, 4(EL), 4FD, 4(FT), 4GH, 4GL, 4HH, 4ID, 4KL, 4LJ, 4NC, 4(NT), 5(AAM), 5AD, 5DO, 5EK, 5ER, 5(FV), 5(HB), 5HL, 5NK, 5NV, 5OL, 5SA, 5SL, 5SM, 5XAD, 5XK, 6XAD, 6ZI, 7SC, 8AB, 8ADH, 8AES, 8AEV, 8AFD, 8AGO, 8AIM, 8AJO, 8(AIW), 8(AlC), 8AMM, 8AMZ, 8ANJ, 8AOL, 8AQO, 8ASL, 8ASV, 8(ATU), 8AVD, 8AWF, 8(AWV), 8AX, 8AXN, 8BAH, 8BCL, 8BDA, 8BDO, 8BEP, 8BEY, 8BFM, 8BGG, 8BJV, 8BKE, 8BNY, 8BO, 8BPL, 8BPN, 8(BRT), 8BTL, 8(BVR), 8BVT, 8(BWA), 8(BWK), 8BXP, 8CEI, 8CER, 8CGX, 8CJX, 8CK, 8CKM, 8CMX, 8COI, 8CP, 8CPX, 8CRX, 8(CTP), 8(CUR), 8CWX, 8FT, 8HJ, 8IB, 8KG, 8NB, 8OE, 8OW, 8QK, 8SB, 8SP, 8SV, 8TJ, 8UK, 8UP, 8UR, 8WR, 8(XE), 8YG, 8YN, 8YQ, 8ZD, 8ZO, 8ZV, 8ZY, 8(ZZ), 9(AAP), 9(AAV), 9(AAW), 9AFK, 9AFN, 9AIX, 9AJP, 9ANQ, 9AOG, 9AOT, 9(APS), 9APW, 9ARV, 9(AUL), 9AWF, 9(AWM), 9AYH, 9BCT, 9BDS, 9BED, 9BFB, 9BFX, 9(BHD), 9HIL, 9BKJ, 9BRO, 9BTM, 9BUD, 9BZL, 9CBA, 9CIV, 9CNS, 9(CP), 9DCR, 9DEN, 9DFB, 9DFP, 9DG, 9DHz, 9DR, 9(DVW), 9DXM, 9DYN, 9(ED), 9GA, 9GK, 9HJ, 9(H), 9LZ, 9OX, 9QM, 9RM, 9TR, 9UC, 9UU, 9VZ, 9XAC, 9XL, 9YAJ, 9YL, 9YM, 9YS, 9ZAF, 9ZAR, 9(ZN). Canadians: 2AZ, 2BG, 3BP, 3BV, 3CO, 3DH, 3DI, 3DS, 3GK, 3GN, 3JJ, 3JK, 3KO, 9AL, 9AW. Specials: 1(NOC), NOF, CY-1.

1CBO, Concord, N. H. (2 steps, 3 districts)

1AW, 1AEH, 1AGH, 1AGL, 1AIL, 1AKB, 1AJC, 1AJU, 1AOK, 1AYZ, 1BAS, 1BEP, 1BJN, 1BKA, 1BKQ, 1BLR, 1BNK, 1BNZ, 1BRQ, 1BSJ, 1BWJ, 1BWy, 1CEC, 1CGD, 1CGO, 1CGE, 1CMK, 1CNF, 1CPN, 1EO, 1FX, 1GV, 1IL, 1IL, 1JT, 1KM, 1QN, 1TS, 1XM 1XP 1XT 1XU, 1XX, 1YK, 1ZE, 2AAB, 2AAG, 2ABC, 2ABQ, 2ACV, 2AER, 2AFP, 2AGC, 2AJA, 2AJE, 2AJJ, 2ARY, 2ASL, 2AVC, 2AWF, 2AWL, 2AWS, 2AXK, 2AYV, 2BBB, 2BM, 2BFX, 2BGI, 2BGM, 2BJL, 2BJY, 2BOA, 2BRR, 2BRC, 2BUM, 2BZV, 2CBG, 2CBT, 2CBY, 2CCD, 2CIU, 2CJX, 2CKL, 2CKN, 2CMS, 2CNK, 2CPD, 2CQZ, 2CXX, 2EL, 2FC, 2FE, 2FZ, 2GK, 2GL, 2GR, 2HJ, 2HV, 2HW, 2KS, 2LE, 2LO, 2NZ, 2OM, 2RM, 2RY, 2RZ, 2UD, 2VH, 2XQ, 2ZK, 3AAV, 3AFB, 3AJH, 3AJK, 3AJW, 3ALA, 3ALN, 3ANO, 3AQH, 3ARM, 3ASY, 3AVC, 3BA, 3BB, 3BG, 3BZ, 3BEI, 3BER, 3BFG, 3BHL, 3BHM, 3BJL, 3BIT, 3HJ, 3BLU, 3BNG, 3BNU, 3BOF, 3BTY, 3BUP, 3BUV, 3BVA, 3BWT, 3CAQ, 3CG, 3CW, 3CER, 3DT, 3FS, 3GF, 3HG, 3HX, 3JH, 3JI, 3KH, 3NB, 3OD, 3OE, 3OT, 3PZ, 3QV, 3RF, 3SZ, 3TJ, 3YO, 3ZW, 4BH, 4BX, 4BY, 4CD, 4EB, 4FT, 4GH, 4ID, 4LJ, 5DA, 5DO, 5EK, 5FV, 5KC, 5MB, 5MY, 6SM, 6XK, 6XAD, 6AB, 6ACH, 6ACK, 6ABC, 6AEU, 6AFD, 6AFM, 6AGX, 6AHR, 6AIG, 6AIM, 6AIO, 6AJP, 6ALT, 6ALW, 6AMQ, 6ANJ, 6ASL, 6ASV, 6ATU, 6AWZ, 6AWP, 6AXB, 6AXC, 6BAF, 6BDU, 6BEO, 6BHO, 6BJX, 6BKU, 6BMK, 6BMM, 6BNO, 6BNU, 6BNU, 6BOG, 6BPH, 6BPL, 6BRC, 6BRL, 6BRR, 6BUM, 6BVR, 6BVT, 6BWA, 6BXH, 6BYT, 6CAZ, 6CBC, 6CEI, 6CFK, 6CGP, 6CGQ, 6CJY, 6CJZ, 6CKO, 6CNW, 6CQK, 6CSE, 6CTP, 6CUP, 6CUR, 6EO, 6HJ, 6HX, 6KG, 6ML, 6NB, 6OW, 6QK, 6SB, 6SP, 6SS, 6TX, 6UE, 6UO, 6XE, 6YM, 6ZD, 6ZK, 6ZL, 6ZV, 9AAP, 9AAU, 9AAV, 9AHH, 9AJH, 9AMQ, 9ANQ, 9AON, 9APS, 9ARZ, 9AWF, 9AWM, 9AXU, 9AYU, 9BAK, 9BCB, 9BCT, 9BDS, 9BEY, 9BHD, 9BLY, 9CGK, 9CLN, 9CNU, 9CR, 9CVM, 9CXP, 9DCG, 9DDW, 9DFB, 9DGE, 9DGG, 9DKY, 9DR, 9DWQ, 9DYN, 9EL, 9GL, 9IL, 9KP, 9LQ, 9OX, 9QR, 9QU, 9UZ, 9VZ, 9WC, 9XCC, 9YAJ, 9ZAF, 9ZN, Canadians: 3BP, 3CO, 3JK, 3DS, 9AL, 9AW.

1BNL, Saco, Me.

C.W.: 1(CG), 1RH, 1(BWJ), 1(CSL), 1(CDP), 1(CSD), 1(CGO), 1(BL), 2(BCK), 2HW, 2HJ, 2(NF), 2(AWN), 2(BZ), 2BP, 3BRW, 3AUT, 3BVC, 3(CG), 3(BND), 3BNU, 3BAN, 3NG, 4(BX), 4EG,

4XN (4NF), 5LA, (5ZA), 5BQ, 5BHD, (6ANY), 6BAH, (6AWR), 6ANX, 7ZY, (7ANZ), (7AE), 7EA, 7CK, (7IP), 7IT, (7UF), 7ABT, 8BTR, 8BWA, 8XE, 8UK, (8CHG), 8COY, (8APB), (8XA), 9IL, (9AN), (9ZM), 9BQ, (9AXX), (9DX), Canadian (3PT), English (X05), (LS4)?

IBYN, Worcester, Mass., Reinartz and 1 Step
1's, 2's, 3's, & 8's, all to numerous
1AW, 2FP, 3ZO, 4BX, 3BV, 4DL, 4EA, 4EB, 4EH, 4ET, 4GH, 4ID, 4JX, 4NT, 5DI, 5EK, 5ER, 5ES, 5FX, 5IF, 5NB, 5SM, 5UK, 5VA, 5XA, 5XK, 6AJA, 6XAD, 6KA, 6XAD, AD-6, 7HM, 7IU, 7ZO, AD-7, 8NO, 9GK, 9U, 9IO, 9KP, 9PI, 9PN, 9UL, 9UM, 9UZ, 9VL, 9VZ, 9XL, 9YL, 9YW, 9ZL, 9ZN, 9AAP, 9AHH, 9AHY, 9AIU, 9AIX, 9AIY, 9AJH, 9AOT, 9APS, 9APW, 9ASH, 9AUL, 9AWM, 9BCT, 9BDS, 9BED, 9BEP, 9BHD, 9BLC, 9BRK, 9CBA, 9DFB, 9DFH, 9DGE, 9XAC, 9YAJ, Canadians: 2AM, 3BP, 3CO, 3DH, 3DS, 3GN spk, 3JI, 9AW, 9AL.

1BOQ, Hotchkiss Radio Club, Lakeville, Conn.
Spark: (1ACH), 1ACO, 1ADC, 1AFP, (1AFR), 1AKC, 1AMD, 1AMP, (1AOK), 1ARY, (1AW), (1BCF), (1BJS), 1BOT, (1BPZ), (1BQL), 1BRL, 1BRQ, 1BVB, (1BYG), 1CGQ, (1CK), (1CKI), (1CNI), (1LZ), 1OE, (1OR), (1QO), 1RV, 1RX, (1SW), 2AAC, (2AAF), (2ABM), (2ADJ), 2ARY, (2AVE), (2AX), (2BM), (2BY), (2CDR), (2SJJ), 2DA, 2FP, (2OM), (2PV), (2SQ), 2WB, (3ACY), 3AIC, 3AHK, (3AQR), (3ARM), 3ARO, (3ARQ), 3AVC, (3AWE), (3AWF), (3BCQC), (3BED), 3BG, 3BJ, 3CAQ, 3CS, 3ER, (3FB), 3HJ, 3JH, (3RW), 3SF, (3UC), (3UD), 4BC, 4BI, 4GN, 4KM, 4VT, 5XA, (5ABL), (5ACF), (5AFG), (5AJT), 5APB, (5AVJ), 5AXB, (5AXN), (5AXQ), (5AXX), (5AYC), 5AZF, 5BAH, (5BDA), 5BEP, (5BFY), (5BGT), 5BLS, 5BMK, 5BROV, 5BPL, 5BQA, 5BRH, 5HRL, 5BSN, 5BVX, 5BWD, (5BXC), (5CAG), (5CER), 5CGU, 5CH, 5CKV, 5COL, 5CS, (5CSD), 5CYT, 5CYU, 5EM, 5EV, (5RW), 5HY, 5KY, 5LH, 5NY, 5PJ, (5RQ), (5TJ), 5UO, 5UC, 5VF, (5VQ), (5VV), 5WE, 5XE, 5ZY, 9AAW, 9AFK, 9AIR, 9ANP, 9ARD, 9ASJ, 9AVF, 9AVP, 9AZF, 9AZA, 9BEF, 9BJE, 9BK, 9CGX, 9CPQ, 9CP, 9DAG, 9CSU, 9DAY, 9DCE, 9DGH, 9DHz, 9DUH, 9DNT, 9DXE, 9DXT, 9LJ, 9MC, 9OF, 9UW, 9VZ, 9ZN, Canadian 3BP, (3FO), (3GE), (3GN), (9BS).

C.W.: 1ADN, 1AFP, 1AFV, (1AGH), 1AGI, 1AGS, 1AIK, 1AJP, (1AJU), 1AJW, 1AM, 1ARK, 1ARQ, 1ARY, 1ASE, 1ATJ, 1AW, 1AWQ, 1AX, (1AXI), (1AYQ), 1AYZ, 1AZV, 1BAS, 1BMM, 1BCF, 1BDC, 1BDI, 1BEA, 1BET, (1BGP), 1BGN, 1BHI, 1BJA, 1BJN, (1BKQ), 1BNT, 1BOA, 1BOM, 1BQA, 1BQD, 1BQI, 1BQK, (1BRH), 1BRI, 1BRQ, 1BSA, 1BSC, 1BSJ, (1BHV), 1BVB, 1BWJ, 1BWY, 1BZP, 1CAC, 1CAL, 1CAZ, 1CBH, (1CBP), 1CDB, (1CDO), 1CFL, 1CGO, 1CGQ, 1CCR, 1CGS, 1CJA, 1CIH, 1CJZ, 1CK, 1CKH, (1CLN), 1CM, (1CNE), 1CPN, 1CPZ, 1CTC, 1CUE, 1CUP, 1EZ, 1GV, 1HK, 1KM, 1H, 1H, 1OK, 1PR, (1QP), 1SH, 1SQ, (1TS), (1UJ), 1XH, 1XM, 1XP, 1XU, 1XX, 1YK, 1ZE, (2AAB), 2ACU, 2AFP, 2AGB, 2AGC, 2AJA, 2AJL, 2ALJ, 2AM, 2ANM, 2APA, 2AUZ, 2AVC, 2AWF, 2AWL, (2BBB), 2BBM, 2BCK, 2BDK, 2BDU, 2BGI, 2BGM, 2BII, 2BJO, 2BKQ, 2BLJ, 2BLS, 2BML, 2BQD, 2BQI, 2BQO, 2BQU, 2BRB, (2BRC), 2BRQ, 2BRS, 2BYC, 2BZV, 2CBC, 2CBW, 2CCD, 2BLS, 2BML, 2BQD, 2BQI, 2BQO, 2BQU, 2BRB, (2BRC), 2BRQ, 2BRS, 2BYC, 2BZV, 2CBW, 2CCD, 2CDC, 2CGJ, 2CIN, 2CKL 2CKN, 2CKR, 2CMS, 2CNP, 2COL, 2CQO, (2CQZ), 2DAW, 2DIR, 2DMR, 2EL, 2FC, 2FP, 2FZ, 2GK, 2KE, 2KL, 2KP, 2NZ, 2OF, 2PF, 2RR, 2RM, 2RY, (2TS), 2UD, 2VZ, 2WB, 2XG, 2ZK 2ZL, 3AA, 3AC, 3ADE, 3ADT, 3AEV, 3AFB, 3AFC, 3AGC, 3AJD, 3AJJ, 3ANJ, 3ANO, 3ANZ, 3APA, 3APC, 3APR, 3AQR, 3ASP, 3ATG, 3AUR, 3AUV, 3AWW, 3BEK, (3BG), 3BGT, 3BGX, 3BHL, 3BHM, 3BIF, 3BIT, 3BIW, 3BKQ, 3RLF, 3BLU 3BML, (3BNU), (3BOF), 3BRW, (3BTY), 3BUC, 3BUP, (3BVU), 3BVC, 3BVH, 3BVL, 3BWT, 3BZ, 3CA, 3CAQ, 3CAV, 3CRM, 3CC 3CO, 3DH, 3DZ, 3FS, 3GC, 3GE 3GK, 3GM, 3HL, 3HX, 3HZ, 3IP, (3IW), 3JH, 3JT, 3KM, 3NH, 3OA, 3OE, 3OD, 3OT 3PB, 3PT, 3QE, 3QV, 3RR, 3SZ, 3VW, (3VX), 3XM, 3YO, 3ZC, 3ZO, 3ZU, 3ZW, 3ZZ, 4AS, 4RB 4BX, 4BY, 4DK, 4DM, 4DQ, 4EA, 4EB, 4EH, 4EL, 4EN, 4FB, 4FG, 4FT, 4GH, 4GL, 4HW

4ID, 4JK, 4LJ, 4LO, 4NT, 4PR, 4OI, 5AAG, 5AAM, 5ADE, 5ATE, 5DA, 5DI, 5DO, 5EK, 5EV, 5HE, 5LK, 5NT, 5NV, 5OS, 5PB, 5PX, 5SK, 5SM, 5XAD, 5XD, 5XK, 5ZA, 6KA, 6XAD, 7AFW, 8AB, 8ABC, 8ABN, 8ABS, 8ACN, 8ACT, (8ADH), 8AED, 8AFD, 8AFT, 8AGR, 8AGX, 8AIM, 8AIZ, 8ALC, 8ALD, 8ALF, 8ALT, 8AMP, 8AMQ, 8AN, 8ANB, 8ANJ, 8ANX, 8AOL, 8APT, 8APY, 8AQO, 8ASV, 8ATU, 8AVD, 8AVL, (8AWP), 8RAE, 8RBT, 8BDR, 8BDN, 8BEF, 8BEM, (8BEO), 8BFM, 8BFH, 8BFY, 8BIP, 8BIQ, 8BJS, 8AXB, 8AXC, 8AXN, 8AZD, (8BJV), 8BJX, 8BKE, 8BKN, 8BMM, 8BNJ, 8BNN, (8BO), 8BQ, 8BOZ, 8BPH, 8BPN, 8BPV, 8BSF, 8BRM, 8BRQ, 8RTL, 8BTO, 8BTR, 8BUC, 8BVR, 8BVX, 8BWA, 8BWD, 8BXH, 8BXX, 8BYF, 8BZY, 8CAY, 8CAZ, 8CCS, 8CEL, 8CEP, 8CF, 8CFP, 8CGE, 8CGQ, 8CGX, 8CIN, 8CJY, 8CKK, 8CKM, (8CKO), 8CML, 8CMY, 8CNW, 8CNT, 8COA, 8CQA, 8CRC, 8CTN, 8CUR, 8CUS, 8CV, 8CYO, 8CVT, 8CZK, 8CZP, 8CZZ, 8DAK, 8DFB, 8DR, (8FO), 8HJ, 8HJ, 8HJ, (8IK), 8JQ, 8KQ, 8ML, 8NB, 8OE, 8OQ, 8OW, 8PD, 8PJ, 8QD, 8QK, 8RJ, 8SB, 8SF, 8TK, 8UZ, 8VF, 8WA, 8WJ, 8XAE, 8XE, 8XH, 8XJ, 8YD, 8YG, 8YN, 8ZAE, 8ZAG, 8ZD, 8ZF, 8ZK, 8ZW, (8ZZ, also 1one), 9AAP, 9AAV, 9AFK, 9AFT, 9AGT, 9AHH, 9AHQ, 9AJH, 9AJP, 9AJT, 9AL, 9ALP, 9AMI, 9AMO, 9ANQ, 9AOG, 9AON, 9APS, 9AQM, 9ARM, 9ARR, 9ATN, 9AUG, 9AUL, 9AVP, 9AW, 9AWF, 9AWM, 9AWR, 9AWZ, 9AXU, 9AZM, 9BBF, 9BBQ, 9BCB, 9BCF, 9BCT, 9BDS, 9BED, 9BEV, 9BFY, 9BGH, 9BHD, 9BIG, 9BIK, 9BIV, 9BJO, 9BJP, 9BLO, 9BRK, 9BSZ, 9BVE, 9BWS, 9BXT, 9CBA, 9CDR, 9CDY, 9CGK, 9CGN, 9CIP, 9CIV, 9CNN, 9CMK, 9CP, 9CTE, 9CTF, 9CVE, 9DCE, 9DCU, 9DVM, 9DDY, 9DEL, 9DFF, 9DHF, 9DKY, 9DOZ, 9DQA, 9DQU, 9DR, 9DSM, 9DTJ, 9DWQ, 9DYN, 9DM, 9EBI, 9EL, 9EJ, 9FM, 9GK, 9GX, 9HW, 9II, 9IO, 9KP, 9LZ, 9NS, 9NU, 9OF, 9OQ, 9OX, 9PN, 9PW, 9QF, 9SL, 9UC, 9UD, 9UU, 9UZ, 9VZ, 9WC, 9XAC, 9XL, 9XX, 9YM, 9ZAF, 9ZN, Canadians 3CO, 3DH, 3DS, 3JJ, 3JK, 3KD, 3NX, 9AL, 9AW.

2CAD, 310 Ave. E., Bayonne, N. J.
C.W.: 1AW, 1ES, 1IV, 1RD, 1SD, 1SQ, 1XM, 1XU, 1XX, 1AIQ, 1AJU, 1AKG, 1ARY, 1AWB, 1AZL, 1AZW, 1BDI, 1BEP, 1BET, 1BGF, 1BJN, 1BKA, 1BQK, 1CDO 1CJA, 1CMK 1CNE, 1CPN, 2BG, 3DH, 3FS, 3HS, 3JK 3KO, 3LP, 3NH, 3XO, 3YO, 3ZO, 3ZW, 3AFB, 3ALN, 3AIS, 3APR, 3AVC, 3BAJ, 3BHL, 3BIT, 3BLF, 3BNU, 3BIV, 3BVC, 3CCC, 4BQ, 4BX, 4DC, 4DL, 4EH, 4FN, 4FT, 4GH, 4ID, 4JY, 4KM, 4NT, 4NY, 5DA, 5DO, 5EK, 5ER, 5FV, 5SM, 5XA, 5XK, 5XM, 5ZA, 5ZAV, 6EN, 6GX, 6KA, 6UW, 6ABX, 7LU, 8BK, 8CF, 8FQ, 8HJ, 8HJ, 8IB, 8IQ, 8JQ, 8KG, 8OW, 8PD, 8PT, 8QK, 8QM, 8SB, 8SP, 8UE, 8UK, 8VE, 8VY, 8XE, 8XH, 8YD, 8ZD, 8ZV, 8ZR, 8Z, 8ZZ, 8ACF, 8ACH, 8ADH 8ADN, 8AFD, 8AFY, 8AGO, 8AIM, 8AIO, 8AME, 8AMM, 8AMQ, 8ANJ, 8ANY, 8AQO, 8ASV, 8AWP, 8AWX, 8AXB, 8AXC, 8AXN, 8BDB, 8BEF, 8BFM, 8BJS, 8BOZ, 8BPM, 8BVT, 8BZY, 8CAF, 8CAZ, 8CEL, 8CEP, 8CGK, 8CJX, 8CLK, 8CNW, 8COL, 8CQY, 8CUR, 8CTE, 8CYT, 9CP, 9FF, 9HW, 9H, 9IO, 9KP, 9LQ, 9OF, 9OX, 9PF, 9UH, 9VK, 9XL, 9ZN, 9AAP, 9AAU, 9AFN, 9AFT, 9AHH, 9ANQ, 9APS, 9AWM, 9BDS, 9BED, 9BIK, 9BIZ, 9BJY, 9BRK, 9BVP, 9BVA, 9CBA, 9CPX, 9CLN, 9DYN, 9DKS, 9DMM, 9DKY, 9DOZ, 9YAJ, 9XAC, 9ZAA, Canadians 3BP, 3JI, 3JK, 9AW.

Spark: 1BOQ, 2ACY, 8TJ, 9CP, 9UH, 9ZN, 9AW, 9DHF, Canadian 3GE.
Dastite C.W.: 1AGH, 1AJP, 1BKQ, 1BSA, 2HW, 2AWF, 2CGJ, 3CC, 3CG, 3OJ, 3OT, 3VW, 3ABN, 3AVF.

Jack Dunham, New Rochelle, N. Y.
(1 tube all over 750 miles.)

C.W.: 4BY, 4EB, 4HW, 4KK, 4OL, 5EK, 5ER, 5FV, 5HB, 5KC, 5PS, 5QY, 5XA, 5XAD, 5ZAV, 9AAP, 9AAU, 9AAV, 9AFK, 9AFN, 9AIY, 9AJH, 9AJP, 9AKB, 9AL, 9AMI, 9ANQ, 9AON, 9AOT, 9APS, 9APW, 9AUL, 9AVH, 9AW, 9AWF, 9AWM, 9BCE, 9BCH, 9BDS, 9BDE, 9BIG, 9BJY, 9BLY, 9BNV, 9CAH, 9DCE, 9DGE, 9DKY, 9DQU, 9DR, 9DVK, 9DWQ, 9DYN, 9DZ, 9EL, 9EV, 9FM, 9GK, 9GL, 9KG, 9PW, 9UU, 9VZ, 9XAC, 9XAQ, 9YAJ, 9YM, 9ZAA, 9ZAF, 9ZN.

2AWF, Albany, N. Y.
 Spark: 1AKC, 1BOT, 1BQL, 1BCK, 1CNI, 1GM, 2AJE, 2ARB, 2AX, 2BSC, 2OM, 2SQ, 2WB, 3ACY, 3CN, 3HJ, 3RW, 3YC, 3ACF, 3AXQ, 3BRL, 3EW, 3UC, 3VQ, 3XE, 3AVP, 3MC, Can., 3BP, 3FO, 3GE.

C.W.: 1AGH, 1AJL, 1AOK, 1AW, (1AWB), (1AWW), 1BDI, 1BJN, 1BJY, 1BKA, (1BKQ), 1BLN, 1BQL, 1BRQ, 1BSC, 1CGR, (1CMK), 1CPN, 1GV, 1HK, 1IL, 1PR, (1RD), 1TS, 1UU, 1XM, 1XU, (1YK), 1ZE, 2AAB, 2ABC, 2AEH, 2AER, 2AGC, 2AJW, 2APA, (2APD), 2AQT, 2AWL, 2AWM, 2AWS, 2AXK, 2BBL, (2BMS), 2BNZ, (2BTW), 2BYC, 2CBW, 2CBY, 2CFB, 2CVM, 2CMS, 2EL, 2FC, 2FP, 2FZ, 2JW, 2NZ, (2RM), 2TS, 2XZ, 2ZL, 3AAY, (3AIS), 3ALN, (3AMX), 3ANJ, 3ATZ, 3AUW, 3AVA, 3AVC, 3AWA, 3BBR, 3BG, 3BGT, 3BGU, 3BHL, 3BHM, (3BIJ), 3BJF, 3BNU, 3BSB, 3BUV, 3BUA, 3BVC, 3BK, 3CAQ, 3CC, (3CG), 3CXX, 3DC, 3FS, (3GK), 3IL, 3IW, 3JG, 3JH, 3JJ, 3LR, 3MR, 3NH, 3OD, 3OE, 3SM, 3SO, 3VW, 3VX, 3ZO, 4BQ, 4BX, 4BY, 4CY, (4DC), (4DL), 4DO, 4DQ, 4EA, 4EB, 4EH, 4FG, 4FT, 4GH, 4ID, 4JK, 4KC, 4KI, 4LJ, (4NT), 4XD, 4AA, 4AAG, 4AAR, 4BQ, 4DA, 4DO, 4EK, 4ER, 4ES, 4FV, 4GL, 4HL, 4IR, 4KC, 4MY, 4PX, 4QY, 4SM, 4TJ, 4UJ, 4VO, 4XAD, 4XA, 4XK, 4ZA, 4ZAV, 4XAD, 7ZO, 5AB, 5ACH, 5ADH, (5AGR), 5AGO, 5AIM, 5AIW, (5ALU), (5AMM), 5ASV, (5ATU), 5AVL, (5AWP), 5AWT, 5AXC, 5BDO, 5BFX, 5BGJ, 5BJO, 5BKE, 5BLC, 5BMM, 5BNJ, 5BOA, (5BPI), (5BPN), 5BRM, 5BRQ, 5BUX, 5BVT, 5BWA, 5CAY, 5CAZ, 5CGP, 5CVZ, 5CKM, (5CKO), 5CMI, 5CNW, 5COI, 5CON, (5CSE), 5CUR, 5CYT, 5CZC, 5DAK, (5EO), 5FT, 5HJ, 5KG, 5ML, 5OM, 5OW, 5PJ, 5QC, 5QK, 5RJ, 5SB, 5SP, 5SS, 5VY, 5XE, 5YD, 5YM, 5YN, 5ZAE, 5ZV, 5ZL, 5ZZ, 5AA, 5AFD, 5AFN, 5AHH, 5AIX, 5AIZ, 5AJP, 5AKD, 5AMH, (5AMI), 5AMO, 5ANI, 5ANN, 5ANQ, 5ANZ, 5AOG, 5AON, 5APS, 5APW, (5AQM), 5ARK, 5ARZ, 5ATX, 5AUL, 5AWF, 5AWM, 5AXU, 5RCF, 5BCH, (5BDS), 5BED, 5BHD, 5BHQ, 5BIZ, 5BLC, 5BLT, 5BRV, 5BZI, 5CAH, 5CBA, 5CDA, 5CGK, 5CLN, 5CMK, 5CNU, 5CPY, 5CTE, 5DBL, 5DBV, 5DDY, 5DFB, 5DGO, 5DKY, 5DLK, 5DOZ, 5DQU, 5DYN, 5EI, 5EJ, 5HW, 5II, (5IO), 5IY, 5KM, 5KP, 5OK, 5PJ, 5PN, 5PQ, (5PU), 5VK, 5WA, 5XAC, 5XL, 5YAJ, 5YM, 5ZAA, 5ZN, Can., 5BS, 5BV, 5CO, 5DH, 5GE, 5GN, 5NB, 5AL.

2AGH, Caldwell, N. J.

C.W.: 1AGH, 1AJU, 1ATJ, 1AYZ, 1AWW, 1BAS, 1BDI, 1BES, 1BKQ, 1BLN, 1BLW, 1BNJ, 1BOQ, 1BWJ, 1BYN, 1CAJ, 1CPB, 1CFN, 1CGQ, 1CGR, 1CMJ, 1CNE, 1CNL, 1CPN, 1DX, 1HK, 1KM, 1MI, 1SD, 1UJ, 1XM, 1XP, 1XU, 1XX, 3AFB, 3AJO, 3ANJ, 3AOK, 3ASI, 3BHM, 3BIJ, 3BLE, 3BLU, 3BNU, 3BRW, 3BUT, 3BVA, 3CAQ, 3BX, 3BZ, 3CA, 3CC, 3CG, 3FS, 3HL, 3IW, 3KD, 3JD, 3OD, 3NH, 3OE, 3OT, 3PZ, 3QV, 3RF, 3SM, 3SZ, 3VN, 3VX, 3YO, 3ZO, 3ZW, 4BX, 4DQ, 4DL, 4EB, 4FG, 4FK, 4GH, 4HW, 4ID, 4KI, 4LP, 4DI, 4EG, 4FV, 4HB, 4JJ, 4PF, 4KC, 4SM, 4XA, 4XAD, 4XK, 4YD, 4EA, 4KA, 4XAD, 7ZO, 5ACF, 5ADH, 5AGO, 5AGR, 5AIM, 5AIO, 5AKP, 5ALF, 5AMQ, 5AMV, 5ANT, 5ANB, 5APT, 5ASV, 5AWP, 5AWZ, 5AXN, 5BCL, 5BDV, 5BED, 5BEO, 5BFM, 5BFS, 5BHO, 5BIP, 5BJV, 5BJX, 5BKE, 5BMK, 5BMM, 5BNU, 5BUM, 5BUX, 5BWA, 5BWK, 5BXX, 5BYT, 5BO, 5CAY, 5CAZ, 5CBX, 5CBC, 5CCS, 5CEI, 5CFP, 5CGM, 5CGU, 5CGE, 5CJH, 5CKL, 5CMI, 5CNT, 5CPO, 5CPX, 5CRB, 5CTP, 5CWW, 5CXT, 5CYT, 5CZZ, 5CF, 5CG, 5DAA, 5FQ, 5HJ, 5IJ, 5JU, 5JP, 5TK, 5KG, 5LT, 5LM, 5NB, 5PD, 5QK, 5SP, 5TT, 5VF, 5VY, 5XE, 5YU, 5YN, 5ZAE, 5ZAG, 5ZZ, 9AAV, 9AFN, 9AHH, 9AHN, 9AIZ, 9AJH, 9AJP, 9ANQ, 9AOG, 9AON, 9APS, 9AA, 9BED, 9BHD, 9BIE, 9BIV, 9BPT, 9BKH, 9BKK, 9BLG, 9BLC, 9BRS, 9BVP, 9CBA, 9CDA, 9CEE, 9CGT, 9CFY, 9CTR, 9CXP, 9DAH, 9DBL, 9DCF, 9DCR, 9DFB, 9DGE, 9DQU, 9DSM, 9DWW, 9DYN, 9DYI, 9EI, 9DR, 9EX, 9MC, 9ON, 9OX, 9VZ, 9YU, 9ZN, 9ZV, Canadians 2AM, 3JK, 3FO, 4BV.

2AFP, Paterson, N. J.

C.W.: 1AGH, 1AJP, 1AJU, 1AKG, 1AOK, 1AP, 1ARK, 1ASP, 1AW, 1AYZ, 1AZW, 1BEP, 1BET, 1BGF, 1BJN, 1BKQ, 1BPN, 1BQA, 1BWJ,

1BZP, 1CDO, 1CGO, 1CGR, 1CJA, 1CK, 1CKE, 1CMK, 1CNF, 1CPN, 1CSL, 1DV, 1GV, 1HZ, 1IL, 1KM, 1LL, 1RD, 1RU, (1XM), 1XP, 1ZE, 3AAO, 3ADT, 3AFB, 3AJA, 3AJJ, 3ANJ, 3ANZ, 3APR, 3AQH, 3AS, 3ASL, 3AUS, 3AVA, 3AVC, 3AWA, 3BAS, 3BEI, 3BVU, 3BG, 3BHI, 3BIJ, 3BIT, 3BY, 3BJY, 3BLU, 3BLZ, 3BNU, 3BTY, 3BVA, 3BX, 3BZ, 3CA, 3CG, 3FB, 3FS, 3GC, 3GF, 3GH, 3GK, 3HW, 3JH, 3LP, 3LR, 3MK, 3NH, 3OE, 3OT, 3PB, 3PZ, 3QV, 3SM, 3SZ, 3XM, 3ZO, 3ZW, 3ZZ, 4BF, 4BK, 4BX, 4BY, 4CG, 4CY, 4DC, 4DL, 4DQ, 4EA, 4EB, 4EH, 4EL, 4EN, 4EU, (4FT), 4HW, 4ID, 4JE, 4JK, 4JZ, 4KM, 4LJ, 4LP, 4NT, 4NV, 4UA, 4XK, 4ZK, 5AAM, 5ADE, (5DA), 5DO, 5EG, 5EK, 5ER, (5ES), 5FV, 5IE, 5KC, 5MA, 5NV, 5PF, 5PV, 5PX, 5QI, 5RK, 5SA, 5SM, 5UJ, 5XAD, 5XAE, 5XK, 5ZA, 5ZAA, 5ZAT, 5ZAV, 6ABX, 6ALE, 6JL, 6KA, 6XAD, 6ZZ, 8ACH, 8ADP, 8AGO, 8AGR, 8AHR, 8AIM, 8AIO, 8AIW, 8AJP, 8AJT, 8ALU, 8AME, 8AMQ, 8ANB, 8ANJ, 8APT, 8AQO, 8ARD, 8ASV, 8ATU, 8AWP, 8AWZ, 8AXB, 8AXC, 8AXN, 8BCL, 8BDU, 8BEF, 8BFM, 8BFX, 8BHO, 8BJV, 8BK, 8BMM, 8BNJ, 8BO, 8BPH, 8BPL, 8BPM, 8BPU, 8BRL, 8BRT, 8BVR, 8BWA, 8BXX, (8BXT), 8BYT, 8CAZ, (8CBC), 8CEP, 8CF, 8CGE, 8CGP, 8CGQ, 8CGU, 8CJX, (8CJY), 8CMI, 8CNA, 8CNW, 8CFX, (8CTN), 8CTP, 8CUR, 8CUV, 8CYT, 8DR, 8FS, 8HN, 8IB, 8IQ, 8KG, 8LF, 8LT, 8ML, 8OE, 8OW, 8QK, 8SCU, 8SE, 8SP, 8UK, 8UQ, 8UC, 8XAE, (8XB), 8XH, 8XJ, 8XV, 8YE, 8YG, 8YN, 8ZAE, 8ZD, 8ZV, 8ZK, 8ZY, 8ZZ, 9AAP, 9AAU, 9ACB, 9AEP, 9AFP, 9AFN, 9AGZ, 9AHH, 9AHP, 9AIF, 9AIZ, 9AJH, 9AJP, 9AM, 9AMT, 9ANF, 9AON, 9APS, (9AQM), 9ARW, 9ASE, 9ATX, 9AUL, 9AWF, 9AXU, 9BAK, 9BCF, (9BDS), 9BED, 9BHD, 9BIE, 9BJY, 9BLO, 9BRK, 9BVP, 9CVA, 9CCV, 9CME, 9CEB, 9CJA, 9CR, 9CXP, 9DCR, 9DCU, 9DFB, 9DGG, 9DKY, 9DOZ, 9DQU, 9DSW, 9DYN, 9DYN, 9DZW, 9DZY, 9EBL, 9EL, 9GA, 9GL, 9H, 9IO, 9KH, 9LQ, 9LZ, 9NU, 9OX, 9PI, 9PQ, 9PW, 9UU, 9UZ, 9VK, 9VWC, 9XAC, 9XAQ, 9XL, 9YAJ, 9YB, 9YM, 9ZAF, 9ZN, Can., 2AM, 2BG, 3BV, 3CO, 3DH, 3DS, 3GK, 3JI, 3JK, 3JT, 3NB, 3SK, 3SX, 4BV, 9AL, 9AW, 9SO

Spark: 1BFZ, 1CK, 5ARM, 5AWF, 5CN, 3FB, 3HJ, 3UD, 5ABL, 5ACF, 5AFG, 5BDA, 5CKX, 5COA, 5AM, 5VQ, 5AZE, 5DDZ, 5DZH, 5WD, Can., 3FO, 3GE, 3GN.

3BMN, Petersburg, Va. (1 Tube)

C.W.: 1KM, 1XM, 1AGH, 1AJU, 1AYQ, 1AZL, 1BOQ, 1BOZ, 1BRQ, 1CDO, 1CGO, 1CGR, 1CMK, 2CC, 2ER, 2GK, 2GR, 2HJ, 2KE, 2NZ, 2RB, 2XQ, 2WB, 2ZK, 2AAB, 2AFB, 2AJA, 2AUE, 2AVE, 2AVK, 2AWS, 2BAY, 2BBB, 2BDM, 2BFX, 2BGI, 2BNZ, 2BQD, 2BQU, 2BRB, 2BUE, 2CBW, 2CCD, 2CMS, 2COL, 2CQZ, 2CZZ, 3BA, 3BG, 3BZ, 3CA, 3CC, 3CG, 3CQ, 3FS, 3HL, 3HW, 3HX, 3IW, 3JJ, 3LP, 3MB, 3MT, 3OE, 3OT, 3QV, 3RF, 3RV, 3SM, 3TJ, 3VW, 3YO, 3ZW, 3AAY, 3AEV, 3AFP, 3AGC, 3AHP, 3AJJ, 3AMH, 3ANJ, 3AQH, 3AQR, 3ASY, 3AUS, 3AVC, 3BHL, 3BHM, 3BIJ, 3BNU, 3BLE, 3BVA, 3BLU, 3BUX, 3BTY, 3BUV, 3BVC, 3BVM, 3BVL, 3BWT, 3CAN, 3CAQ, 3CBM, 4BX, 4DC, 4DL, 4DQ, 4EB, 4EH, 4EL, 4FT, 4GH, 4HW, 4ID, 4JK, 4JY, 4KC, 4KI, 4LJ, 4MN, 4NT, 4NV, 4EG, 4EK, 4FV, 4KC, 4SM, 4XA, 4XK, 5AAM, 5XAD, 5AX, 5CP, 5FT, 5HH, 5HJ, 5IJ, 5JK, 5KG, 5LQ, 5ML, 5OE, 5OW, 5QK, 5RQ, 5SB, 5SP, 5TX, 5UE, 5UD, 5XE, 5YN, 5ZY, 5ZZ, 6ABN, 6ACF, 6AER, 6AGO, 6AHR, 6AIM, 6AJT, 6ALT, 6ANB, 6ASL, 6ASV, 6AVL, 6AWP, 6AXC, 6AXN, 6BAF, 6BDU, 6BDP, 6BHO, 6BJV, 6BJY, 6BQX, 6BOZ, 6BPL, 6BRM, 6BTR, 6BXX, 6CAZ, 6CEL, 6CGP, 6CMM, 6CNC, 6CQX, 6CTP, 6CUM, 6CUR, 6DAK, 6IQ, 6OX, 6VZ, 6WC, 6ZN, 9AAH, 9AOT, 9APS, 9AWF, 9AWH, 9BBY, 9BHD, 9CAH, 9DCR, 9DFB, 9DPL, 9DWQ, (Can. 3BV).

3GC, Ardmore, Pa. (1 Tube)

C.W.: 1AGH, 1AIP, 1ANQ, 1AOK, 1AYQ, 1AXB, 1AYZ, 1AZH, 1BAS, 1BBW, 1BKA, 1BLN, 1BOQ, 1BQK, 1BRQ, 1BSJ, 1CEC, 1CGO, 1CJN, 1CMK, 1CN, 1CPN, 1GV, 1LL, 1QP, 1SD, 1UJ, 1XU, 1XX, 2AAB, 2ABZ, 2AF, 2AJA, 2ANM, 2APA, 2AVU, 2AVY, 2BB, 2BDM, 2BJP, 2BMS, 2BNZ, 2BQW, 2BRB, 2BUM, 2BUR, 2CBC, 2CBW, 2CCD, 2CIM, 2CM, 2CMB, 2CMS, 2CPA, 2CQZ, 2FC, 2GR,

2HJ, 2KU, 2NZ, 2PX, 2UE, 2WB, 2XB, 2XC fone.
 2ZK, 2ZL, 3AHX, 3AUW, 3BPQ, 3MK, 3TJ, 3YO,
 3ZO, 4BQ, 4DL, 4FT, 4FX, 4IU, 4LJ, 4EG, 5EK,
 5ER, 5FV, 5MB, 5XA, 5ZAV, 6XAD, 6XEL, 6AFD,
 8AGO, 8AIM, 8AQA, 8ASV, 8AWP I.C.W., 8AXN,
 8BDO, 8BHF, 8BPM, 8BJH, 8BJX, 8BKA, 8BKU,
 8BNO, 8BPL, 8BRM, 8CEL, 8CKG, 8CGN, 8CGX,
 8CMI, 8CNP, 8CNW, 8CUR, 8CYT, 8DAK, 8ELI,
 8LJ, 8KG, 8OW, 8QK, 8UV, 8VY, 8WL, 8YD, 8ZAE,
 8ZW, 9AAU, 9AAP, 9AFK, 9AIU, 9AJH, 9AL,
 9ANW, 9AOT, 9AON, 9APS, 9ARZ, 8BF, 8BDF,
 9BDS, 9BED, 9BIK, 9BLC, 9BNO, 9BRL, 9CBA,
 9DAK, 9DQG, 9DKY, 9DW, 9DYN, 9DYW, 9EL,
 9EJ, 9KP, 9OX, 9QR, 9SS, 9UD, 9XL, 9ZN I.C.W.,
 9ZW, Can. 9AW.

Spark: 20M, 8ZY.

3DH-3KM, Princeton Radio Club, N. J.

C.W.: 1AHZ, 1AIP, 1AR, 1AXB, 1ARY, 1AYQ,
 1AZU, 1BCG, 1BDC, 1BEP, 1BKQ, 1BOQ, 1BUA,
 1BUI, 1BUA, 1BWJ, 1CDZ, 1CGO, 1CJA, 1CMK,
 1CNF, 1FB, 1FX, 1GV, 1JE, 1JT, 1LL, 1PR, 1QN,
 1XM, 1XU, 1ZE, 2's and 3's too numerous, 4BX,
 4CY, 4DL, 4DQ, 4FT, 4GH, 4GL, 4ID, 4NT, 4NV,
 4PZ, 4ZAV, 5AAG, 5BN, 5DA, 5EK, 5ER, 5ES,
 5FV, 5TJ, 5XK, 6XAD, 6HD, 6AB, 6ADN, 6AER,
 6AEU, 6AFD, 6AGO, 6AGX, 6AGZ, 6AIG, 6AIH,
 6AIM, 6AJT, 6ALE, 6AMM, 6ANB, 6ANJ, 6APT,
 6ARD, 6ASV, 6ASZ, 6AWT, 6AXC, 6AZO, 6BB,
 6BCY, 6BDV, 6BEF, 6BFH, 6BGJ, 6BIM, 6BJX,
 6BK, 6BLW, 6BLX, 6BMM, 6BNV, 6BOG, 6BPL,
 6BUN, 6BUO, 6BUR, 6BVT, 6BWA, 6BXA, 6BJY,
 6CAP, 6CBC, 6CBX, 6CEL, 6CER, 6CF, 6CFE,
 6CFX, 6CGB, 6CGJ, 6CGM, 6CGX, 6CJX, 6CJY,
 6CKO, 6CNP, 6CNU, 6COL, 6COO, 6CTN, 6CPT,
 6CTR, 6CUB, 6CWP, 6CXF, 6CZC, 6DAK, 6DR,
 6EO, 6FM, 6FQ, 6RV, 6HJ, 6JK, 6JU, 6JX,
 6KA, 6LM, 6LF, 6LT, 6ML, 6OW, 6OV, 6PJ,
 6QK, 6QO, 6SB, 6SP, 6SS, 6UE, 6UO, 6VY,
 6XE, 6YD, 6ZAE, 6ZE, 6ZR, 6ZY, 6ZX,
 9AAP, 9AAU, 9AAV, 9ACS, 9AEF, 9AFB, 9AFK,
 9AFN, 9AHH, 9AIP, 9AIV, 9AJF, 9ALC, 9ALP,
 9ANQ, 9AON, 9AOT, 9APS, 9APW, 9ARG, 9ARZ,
 9AUA, 9AVN, 9AWF, 9AWM, 9AXU, 9AYS, 9BCB,
 9BCH, 9BCX, 9BDS, 9BED, 9BIB, 9BIE, 9BIF,
 9BKV, 9BLY, 9BNO, 9BNU, 9BPD, 9BRS, 9BUE,
 9BVP, 9BYA, 9BZL, 9CAH, 9CBA, 9CG, 9CH,
 9CNS, 9CNU, 9CP, 9CTR, 9CTK, 9DEV, 9DBZ,
 9DCG, 9DFG, 9DHZ, 9DQG, 9DKH, 9DKY, 9DRR,
 9DVL, 9DVK, 9DYN, 9EI, 9GA, 9GK, 9II, 9IU,
 9IY, 9KP, 9LZ, 9ME, 9OX, 9PI, 9SJ, 9UC, 9UU,
 9WC, 9XAC, 9XL, 9YAJ, 9YAK, 9YF, 9YM,
 9YU, 9YW, 9ZAA, 9ZN, Can. 3DH, 3NB.

3BLU, Haverford, Pa. (1 Tube) Every District

C.W.: (1ABY), (1ANQ), (1AZD), (1BES),
 (1BYN), (1CJA), (2BGD), (2BSH), (2CFA),
 (2CNK), (3AJJ), (3TR), 4BQ, 4BX, 4DL, (4FE),
 (4FT), 4GL, 4NT, 5EK, 5EG, 5XA, 5XK, 5EN,
 6KA, 6PL, 6XAD, 7AD, (8AQH), 8AWP, (8BPM),
 (8BUX), (8CBC), (8CPX), (8CUR), 9AAP, 9AIV,
 9AOG, 9AOT, 9APW, 9ARZ, 9BED, (9CBA), 9DCG,
 (9DQG), 9EI, 9II, 9IO, 9UU, 9YAJ, 9ZN, Can.
 3BV, 3DS.

Spark: 1BQ, 1CNI, 2AJE, 2OM, 3FP, 8BDA, 8TJ, 9ZN.

3ZH, 2300 S St., Washington, D. C.

("Antenna" Plug)

C.W.: 1GV, 1H, 1RU, 1XP, 1XV, 1ZE, 1AGH,
 1AGP, 1ASF, 1AYQ, 1BAS, 1BDI, 1BDQ, 1BKA,
 1BKQ, 2GR, 2IG, 2ZK, 2AZC, 2BFX, 2BJO, 2BRD,
 2CCD, 2CKL, 2COS, 3's too numerous, 4BB, 4EA,
 4EK, 4JZ, 4NT, 5DA, 5DO, 5EG, 5EK, 5EO, 5ER,
 5ES, 5FG, 5GA, 5HB, 5JB, 5KC, 5NK, 5PK,
 5QY, 5SM, 5XA, 5XR, 5AAG, 5ACR, 5ADE,
 6KA, 3's too numerous, 6CR, 6GN, 6HK, 6II, 6MU,
 6PE, 6PN, 6PS, 6PW, 6UU, 6VZ, 6WC, 6YB, 6ZN,
 9AAP, 9AFN, 9AHH, 9AHZ, 9AIP, 9AIV, 9AMI,
 9AMT, 9APS, 9AOU, 9ARG, 9AWM, 9AXU, 9BDS,
 9BHD, 9BIK, 9BKP, 9BYF, 9BZY, 9CBA, 9CCV,
 9CGK, 9CLN, 9CNV, 9CPY, 9DJO, 9DOJ, 9DWM,
 9XAC, 9ZAF, Can. 3GO, 3JI, 3SX, 9AL. All calls
 above logged on one night.

4OI, Mr. Luis Rexach, Box 319, San Juan, Porto Rico (Detector and One Step)

Spark: 4BC, 8BDA.

C.W.: 1H, 1BCG, 1CQO, 2EL, 2HJ, 2TS, 2ZK,
 2AGC, 2AWJ, 2BRB, 2CPD, 2CQZ, 3FS, 3AQR.

3HJ, (4BX), (4BY), 4DL, (4EA), 4EB, 4EH,
 4EL, (4FT), 4GH, 4GL, 4ID, 4NT, 5DA, 5ER,
 5GB, 5KB, 5KC, 5NK, 5PJ, 5TJ, 5ACF, 5XAD,
 6XAD, 7AD, 8OW, 8SB, 8SP, 8XE, 8AMM, 8BDU,
 9CC, 9KM, 9KP, 9LZ, 9PN, 9AAP, 9AJS, 9BJU,
 9CCS, 9DSM.

4BL, Lakeland, Fla.

C.W.: 2FP, 2RY, 2WB, 2AER, 2AFB, 2AGC,
 2CKL, 2CMS, 2CQZ, 3BL, 3CA, 3HW, 3IW, 3OT,
 3QV, 3AFB, 3AJJ, 3BHM, 3BJI, 3BNI, 3BVA,
 3BVC, 3BWT, 3CER, 3CMS, 4AS, 4BB, 4BS,
 4BX, 4BY, 4DL, 4EA, 4EB, 4EH, 4EL, 4FG,
 4FT, 4GE, 4GL, 4GH, 4HW, 4ID, 4JY, 4JZ, 4KC,
 4KI, 4LJ, 4NT, 4NV, 4OI, 4ON, 4OT, 5BQ, 5DA,
 5DO, 5EB, 5EG, 5EK, 5EO, 5ER, 5FV, 5HL, 5JM, 5JW,
 5KC, 5LB, 5MB, 5NV, 5QI, 5QS, 5SK, 5SM, 5VY,
 5XA, 5XU, 5XX, 5XAD, 5XK, 5ZS, 5AAM, 5AAT,
 5ABH, 5ACF, 6ZZ (1 tube), 8KG, 8KZ, 8OW,
 8KB, 8SB, 8SP, 8ACH, 8AER, 8AET, 8APD, 8AIM,
 8ANB, 8ASV, 8AWZ, 8AXB, 8AXC, 8BDO, 8BKE,
 8BJF, 8BNO, 8BPL, 8BXH, 8CGM, 8CGR, 8CGX,
 8CZC, 8XE, 9BS, 9EI, 9II, 9OK, 9AEP, 9AKB,
 9AMB, 9AMH, 9APS, 9ARZ, 9AWF, 9BJY, 9BLC,
 9CGK, 9CLN, 9DVK, 9DYN, 9XAC, 9ZAA.

Spark: 2FP, 2AR, 4BC, 4BW, 4BY, 5OI, 5XA, 8BDA, 9AZA.

4MY, Atlanta, Georgia (All Spark)

2FP, 2AJ, 2OM, 3BG, 3AWF, 3AOV, 5BW, 5DA,
 5EK, 5EA, 5JX, (5PP), 5PX, (5QS), 5RZ, 5TM,
 (5TU), 5UE, 5UK, (5XA), (5XAC), 5ZQ, 6KA,
 6XAD, 7BB, 8AEG, 8AIL, 8ALZ, 8AJH, 8ARD,
 8AYM, (8BDA), 8BDV, 8BEF, 8BO, 8BVX, 8CO,
 8CSD, 8EO, 8IRS, 8KJ, (8TJ), 8UC, 8VC, 8VY,
 8XHL, 8ZE, 8ZY, 9AAW, 9AMB, 9ABV, 9ACB,
 9AFK, 9AHV, 9AMK, 9AOT, (9AQE), 9ASA,
 9AZE, 9AZF, 9BAL, 9BDD, 9BEF, 9BG, (9HO),
 8BKK, 9BMM, (9BRT), 9BSM, 9BTX, 9BWS,
 9CP, 9DCW, (9DGV), (9DHz), 9DKQ, (9DSB),
 9DWM, 9DWX, 9DXK, 9DZY, 9HO, 9LF, (9OX),
 9PD, 9PE, 9RR, 9UZ, 9ZN.

5KC, Plaquemine, La.

C.W.: (1BF), 1SW, (1AJP), (1CCZ), 2FP,
 (3BZ), (3CA), (3CC), 3HL, 3ALN, (3BLF), 3VA,
 (3CXZ), (4AS), (4BF), (4BQ), 4BX, (4BY), (4DC),
 (4DL), 4EB, (4EH), (4EL), (4GH), 4HW, (4JY),
 (4KC), (4KF), 4LP, (4NT), (5AE), (5BA),
 (5BE), 5BM, (5BQ), (5CY), 5DL, (5DO), (5DY),
 5DW, (5EK), 5ER, (5ES), 5EX, (5FV), (5HB),
 (5HL), (5IM), 5IR, (5IX), (5JB), 5JL, (5JM),
 5JO, 5KP, 5KU, 5LA, (5LB), (5LJ), 5MA, (5MB),
 5NK, 5NM, (5NV), (5PB), (5PX), 5QL, 5RH,
 (5RJ), (5SF), (5SK), (5SM), 5SZ, 5TU, 5UN,
 5UO, 5VA, 5VI, (5VY), (5XV), (5XY), (5ZA),
 5ZG, (5ZH), 5ZL, 5ZT, 5AAM, 5AAR, (5AAT),
 (5ABA), 5ACF, 5EOB, (5XAD), (5ZAG), 6EN,
 (6KA), 6XAD, (AD7), 7LU, 7ZU, (8AB), 8AM,
 8BX, (8FT), 8IB, 8TE, (8SB), 8SE, (8SP), 8UC,
 8UR, 8UZ, 8WR, 8XE, 8XJ, 8ZZ, 8ABV, (8ABZ),
 (8AFY), 8AIM, (8AIO), (8ALT), (8ANB),
 (8AQO), (8AQV), 8ASZ, 8AXB, 8BDE, 8BDU,
 (8BFM), (8BFX), (8BKE), 8BNU, 8BOX, 8BRQ,
 (8BVR), (8RWA), (8BXH), 8BXS, 8CDZ, (8CEI),
 (8CGX), 8CKO, 8CLD, (8CUR), (9CP), (9DR),
 (9EI), 9EJ, (9FK), (9FM), (9GK), (9II), 9IO,
 9JA, (9KM), (9LQ), 9LR, (9NU), 9PA, 9PI,
 9SO, (9UC), (9UU), (9XL), 9ZE, (9ZN), (9AAP),
 9ABV, (9AJH), 9AJN, 9AMT, (9AOG), (9AON),
 (9AOU), (9APA), 9APF, (9APS), (9APW),
 (9ARG), 9ARR, (9ARZ), 9AUL, 9AUS, (9AWF),
 9AXF, (9AYS), (9BCB), 9BCF, (9BDS), 9BED,
 (9BHD), (9BHI), (9BHM), (9BKP), (9BLG),
 (9BLO), 9BRL, (9BSG), (9BXT), 9BXW, (9BZI),
 (9CCS), (9CCV), (9CFI), 9CFT, (9CGK), (9CIE),
 (9CJA), (9CMK), 9CUI, (9CXK), (9DGF), (9DGE),
 (9DJQ), (9DKY), (9DPL), (9DSM), 9DTJ, 9DTU,
 (9DUG), (9DVK), 9DXN, (9DYN), 9DZK,
 (9DZQ), 9DZY.

Spark: 4BL, 5BW, (5EA), 5HZ, 5MO, (5OI), 5QA, 5TU, 5UD, 5WU, (5XA), 5XAC, (5ZL), 5ADQ, 5YU, 8CDA, 9LE, (9OX), 9YB, (9AMK), (9AXU), 9AYW, (9DKY), 9DMJ, 9DMO, 9DQ, 9DZY, 9YAD.

5XA, Auburn, Ala.

Spark: (2AJ), (2FP), (2CCX), 3GN, (3AHK),
 (4BC), (4BI), (4EA), 4FD, 4FS, (4GN), (4HS),
 (4HX), (4MY), 5AO, 5AQ, (5BW), 5DA, (5DO),

9FV, 9GK, 9H, 9KP, 9LQ, 9OX, 9PI, 9PN, 9PW, 9TU, 9WD, 9XL, 9YF, 9YH, 9YL, 9AAP, 9AAU, 9ABG, 9AFK, 9AJS, 9AMB, 9AMI, 9AMM, 9AMN, 9ANI, 9ANQ, 9AOC, 9AON, 9APS, 9ARZ, 9AUU, 9AVZ, 9AWN, 9AWL, 9AWM, 9AXU, 9AYS, 9AZZ, 9BCC, 9BCL, 9BCQ, 9BED, 9BEF, 9BHD, 9BHK, 9BK, 9BIZ, 9BJI, 9BJV, 9BQF, 9BRI, 9BUN, 9BVO, 9BXA, 9BXN, 9BXQ, 9BZD, 9BZI, 9CCS, 9CCV, 9CFL, 9CNS, 9COW, 9DBL, 9DCG, 9DGE, 9DKY, 9DQR, 9DSM, 9DTM, 9DYN, 9ZG, 9ZL, 9ZAA, 9ZAF, 9ZAS, 9XAG, 9YAJ, 9YAK.

Spark: 7OT, 7VF, 7VO, 7ZG, 7ZU, 7WG, 7AEA, 7ABH, 9ZN, 9YAH.

6ZY, Honolulu, Hawaii

C.W.: 4BQ, 4RX, 4EB, 5DI, 5JW, 5KC, 5KS, 5PX, 5ZH, 5ZA, 5AAT, 6ABX, 6ABU, 6AK, 6AHH, 6AOL, 6AWT, 6APW, 6AHQ, 6AJH, 6ASJ, 6AR, 6ARB, 6ALU, 6ATG, 6BUN, 6BRX, 6BR, 6BAH, 6BQC, 6BPZ, 6BQL, 6BYN, 6BZC, 6BSA, 6BFE, 6CII, 6CP, 6CC, 6EN, 6EC, 6EA, 6EB, 6EX, 6GX, 6JD, 6KA, 6MC, 6MDM, 6PI, 6XAD, 6XWI, 6ZH, 6ZX, 6ZM, 6ZE, 6ZS, 6ZQ, 6ZG, 7KJ, 7LU, 7MF, 7XC, 7ZO, 8AB, 8AH, 8ALT, 8ABR, 8BG, 8BPM, 8BPL, 8BSS, 8HDA, 8IB, 8KG, 8OH, 8OK, 8OW, 8AAP, 8AC, 8AJA, 8AWM, 8APH, 8ARZ, 8APS, 8AOC, 8ALT, 8AO, 8AMB, 8AGL, 8BBF, 8BNO, 8BBL, 8BEC, 8BED, 8BJV, 8BZI, 8CNS, 8CPB, 8DHB, 8DSM, 8DQ, 8DPL, 8DG, 8DTM, 8DPH, 8PS, 9UU, 9ZAF, WUBA.

Spark: 6AHP, 6EN, 6UP, 6BJU, 6BFE, 7NN.

6ZAC, Wailuku, Maui, T. H.

C.W.: 4FP, 4BV (Canadian), 4BQ, 5ACF, 5NK, 5TJ, 5SF, 5PX, 5XAD, 5ZAW, 5ZH, 5ZA, 6AJH, 6AK, (6ASJ), 6AEH, 6AHQ, 6ASR, 6AVD, (6AQU), (6ABX), 6RPF, 6BPZ, 6BJU, 6BRC, (6BSA), 6BQC, 6RRF, 6BQD, (6CC), 6CU, 6EC, (6EN), (6EX), 6JD, (6KA), 6KU, 6PI, 6RD, 6RM, (6TQ), (6XJ), 6XAD, 6ZX, 6ZAF, 6ZM, 6ZB, 6ZE, (6ZG), (7SC), 7SY, (7OT), (7XD), 7ZB, 8BUM, 8WR, 8AMB, 8ANQ, 8APH, (8AWM), 9AOC, 9BEY, 9BII, 9DSM, 9GK, 9MF, 9XAG, 9YAJ, 9ZAF, 9ZX.

Spark: 5ZA, (6EX), (6AQU), 9YAK. (Above calls heard Oct. 4th to 14th).

6BSQ, Box 1298, Nogales, Ariz. (All Districts—Detector Only)

C.W.: 1ARY, 1BCE, 2AEC, 2BEM, 2CQE, 2ER, 2NZ, 2XAP, 2AAY, 3AFP, 3AUU, 3BII, 3BUU, 3BYA, 3BUV, 3JK, 3FS, 3OD, 3OT, 3QV, 3ZW, 4BX, 4BY, 4DC, 4DL, 4EB, 4FT, 4ID, 4NT, 5AEC, 5CY, 5DI, 5AAR, 5EL, 5FA, 5BA, 5FV, 5HK, 5IB, 5JI, 5JB, 5LB, 5LK, 5MJ, 5MY, 5NK, 5NB, 5NN, 5OL, 5PX, 5PU, 5PE spk, 5QS, 5QI, 5PB, 5RR, 5SK, 5SF, 5SM, 5SN, 5TM, 5TK, 5TP, 5TC, 5UN, 5UO, 5UJ, 5UY, 5VO, 5VU, 5VO, 5XY, 5XAD, 5XD, 5XE, 5ZA, 5ZH, 5ZAE, 5ZAV, 5ZS, 5ZM, 5ZU, 5ZAI, 5ZO, 5ZY, 5ZAD, Sixes too numerous, 7AFW, 7BJ, 7BK, 7LU, 7SC, 7TY, 7ZE, 7ZU, 7ZV, 7ZO, 8AEN, 8ASV, 8AQO, 8ATO, 8AIM, 8AMM, 8APY, 8ALT, 8AEO, 8ADN, 8BXF, 8BKE, 8BPL, 8BXH, 8BDO, 8BLA, 8CEP, 8CF, 8CBX, 8DR, 8IB, 8QI, 8QK, 8WR, 8XL, 8XH, 8XE, 8XAE, 8ZAF, 8ZT, 9ABV, 9AMB, 9AWN, 9AYS, 9AVZ, 9AQE, 9ARM, 9ABV, 9AAP, 9AJP, 9AOY, 9WM, 9AUL, 9APW, 9AXU, 9AEQ, 9AVZ, 9BXA, 9BFE, 9BXT, 9BII, 9BUN, 9BXQ, 9BZE, 9BJV, 9BCF, 9BVO, 9BZZ, 9BRI, 9REY, 9BLO, 9CCS, 9CJJ, 9CCL, 9CFY, 9CMK, 9DJJ, 9DTM, 9DTE, 9DXY, 9DTU, 9DPL, 9DWK, 9DKY, 9DSM, 9DET, 9FV, 9EK, 9PI, 9PS, 9XAB, 9XAG, 9XAY, 9XAC, 9XM, 9YAK, 9YW, 9YAH spk, 9YM, 9ZAF, 9ZAS, 9ZAA, 9ZAC, 9ZV, Canadian 3CO, 9AL, 9AW, 9OF, AD7, DN4.

7AZ, Vancouver, Wash. (In 3 hours—Every Dist.)
C.W.: 1AW, 2CYS, 3CO, 4AMN, 4HH, 5HM, 5SC, 6ABX, 6ALU, 6ARK, 6CC, 6CU, 6RD, 6XAD, 6ZX, 7AFW, 7AIC, 7LU, 7ET, 7ZB, 7ZK, 8ASV, 8BCM, 8RZY, 8OW, 9AUL, 9AVZ, 9AVM, 9BII, 9DWK, 9DP, 9GK, 9II, 9YAJ.

71Y, Vashon, Wash. (Beverage Wire)

C.W.: 1BEP, 1BKA, 1CY, 1KV, 1XU, 2AWL, 2CCP, 2EL, 2LO, 2NZ, 2UK, 3GGP, 3CO, 3DH, 3DS, 3JU, 3OI, 4BV, 4RH, 4FG, 4GH, 4KF, 5AAT, 5DI, 5DO, 5EK, 5FY, 5JM, 5KC, 5NK,

5NN, 5PB, 5PX, 5QL, 5SF, 5SG, 5SK, 5SM, 5TJ, 5TM, 5UK, 5UO, 5VM, 5XAD, 5XK, 5ZA, 5ZH, 5ZO, 8AGO, 8AMM, 8APT, 8AQO, 8APY, 8ASV, 8ATU, 8AXB, 8BCY, 8BEF, 8BPM, 8BNJ, 8BK, 8BXH, 8BYT, 8CAY, 8CF, 8CFZ, 8CGX, 8CHC, 8CML, 8CP, 8CYT, 8FD, 8HZY, 8IB, 8JU, 8OW, 8PD, 8QK, 8SP, 8XAE, 8ZAG, 8ZF, 8ZZ, 8ZV, 9AAK, 9AAP, 9JP, 9AMB, 9AMI, 9AMK, 9ANQ, 9AON, 9AOP, 9APW, 9AQE, 9ARZ, 9AUL, 9AVM, 9AVS, 9AVZ, 9AWR, 9AWM, 9AZA, 9AYZ, 9BAY, 9BB, 9BCF, 9BED, 9BFG, 9BGH, 9BHD, 9BHQ, 9BIE, 9BII, 9BRI, 9BSN, 9BUN, 9CCV, 9CFL, 9CFV, 9CFY, 9CNS, 9COW, 9CTW, 9CUC, 9DAG, 9DCU, 9DKV, 9DNK, 9DSM, 9DSU, 9DTM, 9DYN, 9GK, 9II, 9LZ, 9PI, 9QF, 9UU, 9XAC, 9YAJ, 9ZAF, 9ZH, 9ZK, 9ZY.

8NB, Rochester, N. Y. (All Districts)

Spark: 1AW, 1CK, 1AKC, 1BDT, 1BOQ, 1CJA, 1CNI, 2BY, (2OM), 2SQ, 2WB, 2AJE, 2CCX, 3HJ, 5SF, 8ACY, 8AIC, 8XA, (8FE), (8KJ), 8TJ, 8CU, 8VQ, 8VW, 8YU, 8ZY, 8ABL, 8AFG, 8AVI, 8AWU, (8AXQ), 8AZF, 8AZW, 8BAH, 8BDA, 8BRL, 8BVV, 8BXC, (8BZH), 8CAH, 8CER, 8CKX, 9CP, 9JX, 9KF, 9ZN, 9AMK, 9AVP, 9AZE, 9BEF, (9BMN), 9BWS, 9DHZ, 9DXT, Can. 3FO.

C.W.: (1AW), 1CN, (1ES), 1GV, 1HK, (1II), (1IL), (1IV), 1IX, 1KK, 1LL, (1ON), 1QP, (1RD), 1SD, 1TS, 1UJ, (1VC), 1XM, 1XU, (1YK), 1ZE, 1AGH, (1AJU), 1AKG, 1ANQ, 1AOK, 1AQL, 1ARY, 1AWB, (1AYZ), 1AZD, (1AZL), 1BAS, 1BCF, 1BCG, 1BDC, 1BDI, (1BES), 1BGF, (1RIN), 1BKA, 1BKQ, (1BOQ), 1BQD, 1BQI, 1BQK, 1BRQ, 1BSC, 1BSJ, 1BYV, (1BWD), (1BYN), 1CAC, (1CMK), 1CMS, 1CNE, 1CPN, 2DR, 2EL, (2FC), 2FD, 2GF, 2GR, 2HJ, 2HL, (2HW), 2KE, (2KU), 2LO, (2NZ), (2RY), 2RZ, 2UD, 2XQ, 2ZL, (2ZS), 2AAB, (2ABZ), 2AEH, 2AFP, 2AGB, 2AGC, 2AGS, 2AHO, 2AJA, (2ANM), (2AHS), 2AUY, (2AUZ), 2AVE, 2AVU, 2AWL, 2AW, 2AYV, (2BBB), 2BBG, (2BGI), (2BJO), 2BLS, 2BNC, 2BML, 2BQD, 2BRB, 2BRC, 2BUE, (2BUM), (2BWA), 2BYC, 2CBP, 2CCD, (2CBW), (2CFB), 2CGJ, 2CGV, 2CKL, (2CKN), 2CLT, (2CMS), 2COL, 2CQZ, 3AC, 3BA, 3BG, 3BZ, 3CA, (3CG), 3HG, (3IW), 3JH, 3MB, (3OE), (3OT), (3QV), (3SZ), 3VU, 3VW, (3YO), (3ZO), 3ZZ, 8ADE, 8AFB, 8AJB, 8AJD, (8AJO), (8ANJ), 8APR, 8AQR, 8ATG, 8AUU, 8AUV, 8AVA, 8AVC, (8AWA), 3BHL, 3BHM, 3BJJ, 3BIT, 3BLF, 3BLU, 3BJY, 3BML, (3BNU), 3BOF, 3BRC, 3BRW, 3RTY, (3BUV), 3RVA, (3BVC), 3BVL, 4BX, 4EA, 4EL, 4EN, 4GN, 4HW, 4IJ, 4JM, 4JY, 4LJ, 4NT, (4YK), 5BR, 5DI, 5DO, 5EK, (5ER), 5FV, 5HB, 5HL, 5KC, 5PV, 5PX, 5EK, 5SK, 5TJ, 5ADE, 6KA, (6XAD), 7ADJ, 8's and 9's to numerous, (AD-7), WAR, WUBA, Canuck: (2AM), (3AT), (AD-7), WAR, WUBA, Canuck: (2AM), (3AT), (3BP), (3CO), (3DE), 3DH, (3JE), (3JI), (3JK), 3MY, 9AL, 9AW, 9BS.

8BFM, Akron, O. (Worked)

1AGH, 1BAS, 1BKQ, 1FB, 1XP, 1YK, 2AUZ, 2AWO, 2BBB, 2BQD, 2BRB, 2BUE, 2NZ, 2VA, 2ZK, 3AIS, 3BLU, 3BNU, 3CUR, 3FS, 3PZ, 3QV, 4BX, 4FO, 4GH, 4KC, 4NT, 4NV, 5DI, 5EK, 5EO, 5KC, 5NV, 5PX, 5TJ, 5ZAV, 6AWT, 6KA, 6XAD, (6BOE, 6CP, 6JD, heard only), 7ZO, (7XC, heard only), 9ALW, 9AMB, 9AOC, 9APS, 9AQM, 9AYS, 9RFM, 9CJA, 9DEK, 9DKY, 9DR, 9DWW, 9DZB, 9DZZ, 9II, 9IO, 9OF, 9OX, 9UU, 8VZ. All C.W. of course.

8BMM, Olean, N. Y. (1 tube)

C.W.: 1AYQ, (1BAS), 1BRQ, (1CMK), (1CNF), (1CPN), 1SI, 1XM, 2AAE, (2AUZ), (2AVE), (2AWS), (2BGI), (2BNC), 2HRB, (2BUB), (2BWA), (2BYC), (2CBW), 2FZ, 2GK, 2HJ, 2JW, 2RZ, 2WR, 2ZK, (3AAO), (3AFB), (3AJD), 3ANJ, (3APR), (3BPC), 3BHL, (3BHM), (3BNU), 3BOF, (3CFB), (3BB), 3BG, (3CG), 3FS, 3LR, (3OF), (3RE), (3V), (3VW), (3YO), 3ZO, 3ZL, 4BQ, 4BX, 4DC, 4EB, 4FC, 4GH, 4GS, 4ID, 4LJ, 4LP, 5AAM, 5RA, 5DA, 5DO, 5EK, 5FV, 5KC, 5NT, 5NV, 5PV, 5PX, 5QL, 5SK, 5SU, 5UJ, 5ZA, 5ZAG, 6BUN, 6XAD, 6EN, 6GX, 6KA, 7AN, 7LA, (8AGR), (8AME), (8AMM), (8ASL), (8AXN), (8BCL), (8BKO), (8BLT), (8BJC), (8BJV), (8BLX), (8BNH), (8BQH), (8BTR), (8BWA), (8CAK), (8CBC), (8CCS), (8CLX), (8CKO), (8CON), (8BO), (8HJ), (8KG), (8NB), (8QB), 8QUE, (8YN).

8ZZ, (9APS), (9ARG), (9AYS), (9BEH), (9BLC), (9BLY), (9BRO), (9DFB), (9DVV), (9OX), 9ZN, Canadian (3BV), (3JE), 3JI, 3JK, 9BS, 9AL.

(9AQM), (9AQU), (9AYS), (9BCF), (9BED), (9BHQ), (9BJD), (9BMN), (9BQW), (9BVG), (9BXT), (9CCB), (9CCS), (9CFI), (9CFW), (9CGG), (9CKM), (9DHA), (9DFP), (9DHz), (9DKY), (9DSM), (9DVV), (9ZAF), Can. 3CO, 5JI 4BV, 9AW.

Spark: (5XAC), (9ABV).

RECORD SMASHED!!!

On Nov. 22, 1922, 1AW relayed a message to 6ZAC in Hawaii via 9AWM and the answer returned in four minutes and eighteen seconds! 9AWM, at Sleepy Eye, Minn., was the only intermediate station. Details will appear in January QST.

8UR, Columbus, Ohio. (All Districts)

Spark: 1BDT, 1CNI, 2AJE, 2BAK, 2CBG, 2OM, 2WB, 3ACY, 3AOV, 3HJ, 4HX, 4GN, 5JF, (5XAC), 8ACF, 8AFG, 8AGY, 8AIZ, 8AWT, 8BOA, 8BEW, (8BHO), 8BRL, 8BXX, 8CDV, 8CH, 8CMI, 8CYU, 8EO, 8MZ, 8RQ, 8XE, 8YM, 8YU, 9AFK, 9AVF, 9AZA, 9AZF, 9BAH, 9CA, 9DQQ, 9DTN, 9DXT, 9DZY, 9MC 9YAK, 9ZN, Can. 3GN.

C.W.: 1ADP, 1AGH, 1AJP, 1AOK, 1AQL, 1ATJ, 1AUN, 1AYZ, 1AZD, 1BAS, 1BGG, 1BDI, 1BEP, 1BGF, 1BKA, 1BKQ, 1BQ, 1BNT, 1CAC, 1CEC, 1CGJ, 1CGO, 1CHJ, 1CJA, 1CSE, 1CMK, 1CN, 1CNE, 1CNF, 1CNU, 1CUS, 1CZO, 1DV, 1FB, 1FW, 1GV, 1KM, 1PR, 1QP, 1RD, 1RV, 1XM, 1XP, 1XU, 1YK, 1ZE, 2AAB, 2AA, 2AFB, 2AFP, 2AGC, 2AIS, 2AJA, 2AJJ, 2ALW, 2ANJ, 2APA, 2AWF, 2AWL, 2AVC, 2BBB, 2BG, 2BGL, 2BGM, 2BHM, 2BLT, 2BJO, 2BLS, 2BNZ, 2BOL, 2BOU, 2BQ, 2BRB, 2BRG, 2RSC, 2BUE, 2BVC, 2BYC, 2BZ, 2BZV, 2CAC, 2CBT, 2CBW, 2CCD, 2CDG, 2CFI, 2CGJ, 2CJE, 2CKL, 2CKN, 2CMV, 2COL, 2CQZ, 2DAW, 2EB, 2EL, 2FC, 2FD, 2FL, 2FP, 2FS, 2GF, 2GK, 2HJ, 2IG, 2KE, 2LV, 2NZ, 2OE, 2OF, 2QV, 2RE, 2RR, 2SQ, 2TS, 2UD, 2VW, 2WB, 2XI (fone), 2XQ, 2XZ, 2ZK, 3AAO, 3AC, 3AEU, 3AEV, 3AFP, 3AHP, 3AJJ, 3AJO, 3ALA, 3ALN, 3AMH, 3ANJ, 3ANO, 3AQM, 3AQR, 3ASP, 3AUU, 3AWF, 3BFE, 3BHL, 3BHM, 3BHO, 3BL, 3BIT, 3BU, 3BLF, 3BLU, 3BMN, 3BNU, 3BOF, 3BQT, 3BRW, 3BSB, 3BUP, 3BUV, 3BV, 3BVA, 3BVC, 3BVL, 3BVV, 3BZ, 3CA, 3CBM, 3CC, 3CG, 3FA, 3FG, 3FS, 3HG, 3HL, 3HX, 3IW, 3JJ, 3MB, 3NH, 3OD, 3OE, 3OT, 3PZ, 3SM, 3TJ, 3WF, 3WV, 3VX, 3XM (fone), 3XN, 3YO, 3ZO, 3ZW, 3ZZ, 4BB, 4BQ, 4BX, 4BY, 4BZ, 4CG, 4DC, 4DL, 4DQ, 4EA, 4EB, 4ED, 4RH, 4ER, 4FD, 4FE, 4FG, 4FT, 4GH, 4HW, 4ID, 4J, 4JK, 4KC, 4KL, 4KM, 4KU, 4LC, 4NT, 4NV, 4OI, 4TV, 4XK, 5AAT, 5ABA, 5ABY, 5BE, 5CY, 5OA, (5OD), 5UD, 5EG, 5EK, 5ER, 5ES, 5FV, 5HB, 5HL, 5IR, (5JB), 5JM, 5KB, (5KC), 5LB, 5MA, 5MB, 5NB, 5NV, 5PF, 5PX, (5QS), 5RE, 5RH, 5SA, 5SK, 5SM, 5SZ, 5TJ, 5UJ, 5UK, 5VK, 5VM, 5XA, 5XAE, 5XK, 5XV, 5XY, 5ZG (fone), 5ZAG, 5ZAV, 5CC, 5XAD, 7ZO, (8's and 9's too numerous to mention, Can. 2BG, 2GB, 3BV, 3CO, 3DH (dalite), 3DS, 3JK, 3NB, 9AL, 9AW.

9DR, 1830 Stevens Ave., Minneapolis, Minn.

C.W.: 1XU, 1YK, 1BKQ, 1CMK, 2FP, 2GR, 2KL, 2NZ, 2QZ, 2ZK, 2BRB, 3BZ, 3FS, 3GK, 3LP, 3LR, 3PB, 3PC, 3ZO, 3ZW, 3AFB, 3AJD, 3AUU, 3AUY, 3BHM, 3BNU, 3BVC, 4BO, 4DQ, 4EB, 4FT, 4JK, 5BA, 5DE, 5DI, 5DO, 5EK, (5EL), 5FB, 5FE, 5JE, (5KC), 5LB, 5MA, 5NC, (5NV), 5NK, 5PX, 5QS, (5SF), 5SM, 5TJ, 5UO, 5VM, 5XD, 5ZA, 5ZH, 5ACF, 5ANU, 5CAP, 5DAK, 5ZAG, 5ZAW, 5ZAZ, 6CP, 6CU, 6EA, 6EN, (6KA), 6PV, 6ABX, (6ARB), 6ASJ, 6AWT, 6BMN, (6BSA), 6CBR, (6XAD), 7LU, (7SC), 7ZB, 7ZO, 7AFW, 7BWA, 8AB, 8AN, 8AR, (8BO), 8CF, 8FT, 8IB, 8KC, 8OW, 8QL, 8QK, 8SP, 8VY, 8WA, 8XE, 8XH, 8YD, (8ZL), 8ZY, 8XZ, 8ZZ, 8AER, 8AFN, 8AGC, 8AIM, 8AIO, 8AIV, 8AJP, 8AJV, 8AKP, 8AME, 8ANB, 8AOE, 8AQO, 8ASV, 8ATI, 8ATU, 8AWP, 8AWZ, 8AXP, 8AZB, 8BDO, 8BDU, (8BDV), 8BED, (8BFM), 8BKE, 8BNJ, 8BPL, 8BTL, (8BUX), 8BVR, 8BWA, 8BXX, 8BXX, 8CAK, 8CAY, 8CBO, 8CGM, (8CGP), 8CGX, 8CHJ, (8CMI), 8CPC, (8CPT), 8CUR, 8CUU, 8CYT, (8ZAB), (8CP), (8EX), (8GK), (8IU), (8PS), (8UU), (8ZC), (8ZN, (9ABV), (9ANQ), (9AOG),

9AHC, Ellendale, N. Dak.

C.W.: 1AOK, 1BCG, 1BDI, 1BKA, 1BKQ, 1BRQ, 1BWJ, 1CRF, 1XM, 1XU, 1YK, 2AGC, 2AHO, 2APD, 2AWF, 2AWL, 2BEA, 2BFX, 2BGM, 2BJO, 2BML, 2BQU, 2BRB, 2CKL, 2CKN, 2CPD, 2EL, 2FP, 2LO, 2NZ, 2OE, 2UD, 2XAF, 2ZK, 3AA, 3AFB, 3ANJ, 3AQR, 3AUU, 3BHL, 3BJ, 3BNU, 3BVA, 3BZ, 3CC, 3CG, 3FS, 3MK, 3OT, 3QV, 3SM, 3XN, 3ZO, 3ZW, 4BQ, 4BY, 4CG, 4DQ, 4ID, 4K, 4EN, 4FG, 4FT, 4GH, 4GL, 4HW, 4ID, 4KE, 4KL, 4KL, 4XD, 5AAG, 5AAM, 5ABA, 5ABH, 5AE, 5AEC, 5CY, 5DA, 5DI, 5DO, 5EG, 5EK, 5EL, 5ER, 5FA, 5FJ, 5FV, 5GA, 5HD, 5IX, 5JR, 5JL, 5JW, 5KC, 5LB, 5ME, 5MO, 5MY, 5NK, 5NV, 5PB, 5PX, 5QL, 5RH, 5SF, 5SK, 5SM, 5SZ, 5TC, 5TJ, 5TP, 5UK, 5UM, 5UN, 5UO, 5VM, 5WX, 5XA, 5XAC, 5XAD, 5XB, 5XD, 5XV, 5XY, 5ZA, 5ZAC, 5ZAG, 5ZAW, 5ZAZ, 5ZG, 5ZH, 5ZP, 5ZT, 5ZU, 5ZY, 6ABX, 6AHQ, 6AJH, 6AK, 6ALU, 6APW, 6AQW, 6ATQ, 6AUU, 6AVD, 6AVR, 6AWT, 6BDW, 6BES, 6BJC, 6BJY, 6BPZ, 6BQC, 6BQD, 6BRF, 6BRG, 6BSA, 6BUM, 6BUN, 6CC, 6CP, 6CU, 6EN, 6EO, 6GR, 6JD, 6KA, 6KU, 6PI, 6RD, 6RM, 6SG, 6UW, 6VM, 6XAD, 6XAS, 6XJ, 6ZG, 6ZK, 6ZZ, 7AFW, 7BK, 7EX, 7HM, 7LU, 7OT, 7SC, 7XI, 7YA, 7ZO, 8AB, 8ACH, 8AFD, 8AGO, 8AIM, 8AIO, 8AIV, 8AMM, 8AN, 8ANB, 8APT, 8AQT, 8ARD, 8ASV, 8ATU, 8AWP, 8AWT, 8AX, 8AXB, 8AXC, 8AXN, 8AZD, 8AXH, 8AZS, 8BCL, 8BCY, 8BDM, 8BDV, 8BFF, 8BFH, 8BFM, 8BFX, 8BJC, 8BK, 8BKE, 8BKN, 8BMK, 8BNJ, 8BOZ, 8BPL, 8BRM, 8BRQ, 8BUC, 8BUM, 8BWA, 8BXH, 8BYF, 8CAY, 8CBX, 8CEL, 8CEP, 8CF, 8CGM, 8CGP, 8CGX, 8CIA, 8CJH, 8CJX, 8CJZ, 8CKM, 8CJZ, 8CKM, 8CMH, 8CMI, 8CP, 8CQX, 8CPT, 8CUR, 8CVE, 8CFE, 8CZC, 8DAK, 8DR, 8FS, 8FT, 8GT, 8HJ, 8IB, 8IJ, 8JK, 8KG, 8ML, 8MP, 8O, 8PD, 8QK, 8SR, 8SP, 8SS, 8UK, 8UZ, 8XE, 8XJ, 8YD, 8YN, 8YU, 8ZAF, 8ZE, 8ZZ, Canadians 2BV, 3BV, 3CO, 3DE, 3DH, 3GK, 3GN, 5JK, 3KO, 4BY, 9AC, 9AL, 9AW, (fone: 8XS, 9ASF, 9CUC, 9GK, 9YAJ, and lots of broadcasters.

Spark: 5ADQ, 6AL, 6AQ, 5LB, 4MO, 5OI, 6QQ, 5QS, 5TU, 6UG, 5ZAW, 5ZC, 5XAC, 7YA, 7ZU, 8BDA, 8BGT, 8BEP, 8CER, 8TJ, 8ZY, Can. 3GN.

9ZN's "FJ" 5723 Winthrop Ave., Chicago, Ill

Spark: 1AW, 1CNI, 2FP, 2OM, 2SZ, 3HJ, 3RW, 4GN, 5XA, 5XAC, 5ZL, 8KG, 8NZ, 8RD, 8RQ, 8TJ, 8UC, 8VQ, 8YU, 8ZY, 8ACP, 8AIB, 8AWU, 8AFG, 8BDA, 8BVK, 8BXC, 8BGT, 8CYU, 8CVD, 8CYA, 8GC, 9LF, 9MC, 9OF, 9ON, 9YB, 9YM, 9YAK, 9ZX, 9AVP, 9AMK, 9AZF, 9AQE, 9AJE, 9ABV, 9ATV, 9AOJ, 9AIP, 9ASO, 9ACB, 9AHK, 9AIR, 9BMN, 9BXT, 9BXC, 9BFF, 9RGX, 9DAX, 9DMJ, 9DGV, 9DAY, 9DQ, 9DQ, 9DNC, 9DIF, 9DDZ, 9DNZ, 9DLX, 9DY, 9DZY, 9DHC, 9DRA, 9DHZ, 9DBK, 9DRL, Canadian spark: 3GE, 3GN, C.W.: 1RD, 1RV, 1XM, 1XP, 1XU, 1YK, 1AYZ, 1AJU, 1AGL, 1AZW, 1AVQ, 1RGF, 1BDI, 1BKQ, 1BES, 1BQG, 1BRQ, 1CMK, 1CJA, 1CGJ, 1CNF, 1CCZ, 2EL, 2FC, 2FD, 2FP, 2GR, 2KE, 2HJ, 2HW, 2KE, 2LO, 2NZ, 2UD, 2WR, 2XQ, 2XAF, 2AVE, 2AUZ, 2AWF, 2AQL, 2APA, 2AWL, 2BRB, 2BMR, 2BNZ, 2BQ, 2BRG, 2BQD, 2BQU, 2BFX, 2BMR, 2CCD, 2CJE, 2CQZ, 3BK, 3BV, 3CA, 3CG, 3CO, 3PS, 3BZ, 3FV, 3HL, 3HZ, 3JJ, 3LP, 3LR, 3MK, 3NH, 3PB, 3QV, 3RV, 3RF, 3VW, 3YO, 3ZO, 3ZW, 3ZAF, 3ZJ, 3AQR, 3ASP, 3AIP, 3ANJ, 3AA, 3AVA, 3AFB, 3AJJ, 3AEV, 3AUU, 3ATZ, 3AWL, 3BNU, 3BHM, 3BHL, 3BVA, 3BSJ, 3BXJ, 3BLU, 3BJ, 3RQX, 3BUC, 3BUV, 3BNG, 3BMJ, 3BGG, 3CXX, 4BB, 4BK, 4BY, 4DC, 4DL, 4DQ, 4KA, 4EB, 4EH, 4EN, 4FG, 4FT, 4GH, 4HW, 4ID, 4JK, 4KL, 4KM, 4NN, 4NT, 4NV, 4XK, 5AA, 5CY, 5DA, 5DI, 5DO, 5EK, 5ER, 5ES, 5EG, 5FV, 5HB, 5HL, 5JR, 5KC, 5IS, 5LA, 5LB, 5NK, 5NN, 5NV, 5PB, 5PF, 5PU, 5FS, 5QS, 5SF, 5SK, 5SM, 5TJ, 5TK, 5UK, 5UO, 5VM, 5WX, 5XA, 5ZA, 5XAD, 5ZAA, 5ZAV, 5ZAZ, 5AAB, 5AAM, 5AAR,

(Concluded on page 90)

A Few Minutes at 6ZAC

How would you like to be located on a far away island in the Pacific Ocean and hear amateurs from all parts of the U.S.? Oh boy! Take a look at the list below, extracted from 6ZAC's log during some lively minutes, and then look on a map and figure the distance! Over the ocean, Rockies, prairies, 'n everything! Think of the things we considered great just a short while ago! But now look over the list, received just as the last few pages of this issue were going on the press. Many of the owners of the calls are unknown to

6ZAC so this will be good news to many and we therefore have made special effort to squeeze this in. The time given is 2½ hours later than Pacific Standard and all reception was done with one step of audio amplification.

Now what do you think of that? Dow, O.M., we don't believe there is a single honest-to-goodness amateur in this country but what would give his best detector tube to sit in with you five minutes! FB OM, FB!

October 26th, 1922

Time	Test de	Call	I.C.W.	200 meters	QSA	
7:15 P.M.	Test de	9ZN	I.C.W.	200 meters	QSA	
7:19 "	"	9BJI	C.W.	"	"	
7:19 "	"	9BBF	"	"	"	
7:20 "	"	9CNS	"	"	"	
7:20 "	"	9AMI	"	"	"	
7:21 "	"	9AWM	"	"	"	
7:22 "	"	9BEY	"	"	"	
7:23 "	"	9DYN	"	"	"	Just signing off.
7:24 "	"	9CCV	"	"	"	
7:26 "	"	9BEY	"	"	"	Calling CQ also.
7:26 "	"	9DSP	"	"	"	
7:30 "	"	9AWT	"	"	"	"QRA Duncan, 196 Ellsworth Ave., Toronto, Canada"

October 28th

Time	Test de	Call	I.C.W.	200 meters	QSA	
6:37 P.M.	Test de	8AMM	C.W.	200 meters	QSA	
6:38 "	"	8XH	I.C.W.	"	"	
6:39 "	"	9DTM	A.C.C.W.	"	"	
6:40 "	"	9APY	C.W.	"	"	
6:40 "	"	8BEF	"	"	"	
6:41 "	"	9AMB	"	"	"	
6:41 "	"	9AXM	A.C.C.W.	"	"	
6:41 "	"	9ZAF	C.W.	"	"	
6:42 "	"	9BJI	"	"	"	
6:43 "	"	5KC	A.C.C.W.	"	"	
6:43 "	"	9ZX	C.W.	"	"	
6:43 "	"	9GK	"	"	"	
6:44 "	"	9BCH	A.C.C.W.	"	"	QRZ
6:45 "	"	9BRI	"	"	"	
6:46 "	"	9CCV	C.W.	"	"	QSA
6:47 "	"	9AVZ	A.C.C.W.	250	"	
6:52 "	"	9YAJ	C.W.	200	"	
6:53 "	"	9XL	A.C.C.W.	"	"	
6:54 "	"	9PI	C.W.	"	"	"6½ amps"
7:03 "	"	9AW	"	"	"	

October 29th

Time	Test de	Call	I.C.W.	200 meters	QSA	
6:23 P.M.	Test de	8AWP	I.C.W.	200 meters	QSA	
6:23 "	"	8XH	"	"	"	
6:25 "	"	9ZAF	C.W.	"	"	
6:27 "	"	9BJI	"	"	"	
6:27 "	"	9BDS	"	"	"	
6:27 "	"	9CNS	"	"	"	"QRA Cape Girardeau, Mo."
6:28 "	"	9PI	"	"	"	
6:29 "	"	9ARZ	"	"	"	
6:30 "	"	9YAJ	"	"	"	
6:33 "	"	9CFY	"	"	"	
7:09 "	"	1BCG	"	"	"	
7:11 "	"	2NZ	"	"	"	"QSL cards Greenwich, Ct."
7:12 "	"	2NZ	I.C.W.	"	"	
7:13 "	"	2GR	A.C.C.W.	"	"	
7:14 "	"	2AGC	C.W.	"	"	
7:15 "	"	2XAP	"	"	"	
7:16 "	"	2BFX	"	"	"	

(Concluded from page 88)

5AAT, 5ABN, 5XK, 5AD 5CP, 5CU, 5CC, 5EN, 5GR, 5JD, 5KA, 5RM, 5ABX, 5ATG, 5AVD, 5AWT, 5BHM, 5BUN, 5XAD, 5ZI 5ZZ, 7BB, 7LU, 7MS, 7SC, 7TH, 7AFW, 7ZO, 7ZU, loads of 8's and 9's Canadian C.W.: 2BG, 3CO, 3GN, 3DH, 3JI, 3KO, 3JK, 3DS, 3BV, 3XN-(?) 3AL, 3AW, Specials: CY1, AD7, NOF. Copied every district for five consecutive night during Prelims.

9WM, Sleepy Eye, Minn.

Spark: 5PE, (5U), 5KA, (5XAC), 7ZU, 8ZY, C.W.: (1FB), 1GV, (1XM), 1XU, 1YK, 1AGH, 1ARY, 1BCG, 1BEP, 1BKQ, 1BJN, 1BRQ, 1CMK, 1COL, 2EL, 2FD, 2FP, 2GR, 2HJ, (2HW), 2LO, 2NZ, (2RM), 2WB, 2XQ, 2ZK, 2ZL, 2AEO, 2AHO, 2AGC, 2AWF, (2AWL), 2AZC, 2BEA, 2BFY, 2BML, 2BME, 2BQU, (2BRB), 2BRG, 2CAF, 2CCD, 2CKL, 2CQZ, 3BC, 3BZ, 3CC, 3FS, 3HL, 3JJ, 3LP, 3PQ, 3SK, 3TC, 3TJ, 3ZO, 3ZW, 3ZZ, 3AAY, 3AFB 3ALN, 3ANJ, (3APR), 3AQH, 3ASP, 3BFB, 3BIJ, 3BIY, 3BLF, (3BNU), 4AS, 4BB, 4BQ, (4BX), 4BY, 4CR, 4CY, 4DC, 4DQ, 4EH, 4FG, 4FT, 4GH, 4HW, 4ID, (4KF), 4KI, 4LJ, 4MH, 4XD, 5BE, 5CY, (5DI), 5DO, 5EG, (5EK), 5EL, 5ER, 5FV, (5HB), 5HL, 5IR, 5IX, 5JB, (5JL), 5KB, 5KC, (5LB), 5MB, 5MY, 5NN, 5NK, (5NV), 5QL, 5PB, 5PF, (5PX), 5OL, (5SF), (5SM), 5SK, 5XK, (5XV), 5ZA, (5ZH), 5ZM, 5AAM, 5AAG, 5ABY, (5ACF), 5XAD, (5ZAW), 5ZAV, 5ZAZ, (6CP), 6CCQ 6CU, (6GX), 6JD, (6KA), 6LK, 6PL, 6TI, (6VM), 6XT, 6ZF, 6ZG, 6AJH, (6ALU), (6ASJ), 6AWT, (6BES), 6BNW, (6BOE), (6XAD), (6ZAC), (7EX), 7JF, (7LU), 7SC, 7ZB, 7ZO, (7ZU), 7AFW, 8AB, 8AN, 8AX, 8CF, 8DR, 8FH, 8FT, 8HH, 8HJ, 8GT, 8IB, 8IJ, 8JU, (8KG), 8KN, 8ML, (8PT), (8QK), 8SB, 8SP, (8SS), (8TT), 8UE, 8UK, 8UZ, (8VY), 8XE, (8YD), 8YG, 8YN, 8ZE, 8ZW, 8XZ, 8ZY, 8ZZ, 8ACH, 8ACO, 8AFD, (8AGR), 8AIM, 8AIO, 8ALF, 8ALU, 8AME, 8ANB, 8APY, 8AQO, 8ARD, (8ATU), (8AWP), 8AWZ, 8AXB, 8BBR, 8BCY, 8BDV, 8BFF, 8BEK, 8BPH, (8BFX), (8BGO), 8BGL, 8BHO, 8BJC, 8BJV, (8BJX), 8BKE, 8BKH, 8BLW, (8BLV), 8BOZ, 8BPL, 8BRM, (8BTL), (8BUC), 8BUX, 8BWX, 8BXA, (8BXH), 8RXT, 8BXX, 8BYF, 8BYS, 8BZY, (8CAU), (8CAZ), 8CBX, 8CCM, 8CDG, (8CEI), 8CEZ, 8CGP, 8CGX, (8CIX), 8CMI, 8CMH, (8CPD), (8CPT), 8CPX, 8CTP, (8CUR), 8CUE, (8CYT), 8CZC, 8CZO, 8DAK, 8ZAE, 8ZAF, 8ZAG, Canadians: 3BP, 3BV, 3CO, 3DS, 3GK, 3GN, 3KO, 3NB, (4BR), (3BV), 4GB, (4RH), (9AC), 9AL, 9AW. 9's too numerous to mention.

SOS A LA WIRELESS WILLIE

(Concluded from page 80)

glowed. We gravitated toward him and he unfolded the plot that was to raise a laugh and drive away the blues. "I want one of you to help me," he said. We tossed a coin, and the lot fell to Tommy Lay.

Now the victim of this conspiracy was a pink cheeked rural youth, who had left his country school appointment at England's call and was now a "learner" in the W/T classes on "Niobe." A credulous sort of chap he was, who was forever being sent up forward to see if the bos'n had pressed Willie's pants yet, or down below to see if the gadget was ready for Mr. Emerson, or up to the officer-of-the-day to ask if he might go ashore at four bells!—a lad who never once failed to fall for some fool's errand, ever a ready target for a sailor's joke.

On this particular night Gulsen was "sitting in" for practice and laboriously spelling out the press from POZ. Lay opened the door of the coop and stood be-

hind his victim, while Wireless Willie carefully disconnected a wire from the test buzzer outside in the transmitter cage.

"How's everything?," asked Lay suddenly.

Gulsen jumped—"Oh just a lot of rot from POZ. That Fritz guy makes me sick."

"Switch her down on Q and listen for some real stuff, why don't ye?"

"Guess I will."

As the set was tuned over to 600 meter adjustments, WCY's wailing note came in. Gulsen immediately began to murder A3Y's code message. This was Willie's chance. Carefully bracing his elbow on a nearby jigger-box he slowly ticked off his message on the buzzer. Gulsen, with true learner's instinct, deserted A3Y for the louder signal. "EEE TTT EEE," he wrote, straining and grunting with the supreme mental effort necessary at his stage of advancement. "EEE TTT EEE S S Stanleysink." Lay removed his right hand from the button to stifle his rising mirth. The sigs stopped, and he hastily placed the hand back on the button and used the other. "52436834 NW immediate assistance" wrote the victim. The sigs stopped again, and there was a deadly calm. "Wat's 'EEE TTT EEE' stand for?," asked Gulsen.

"Dunno," said Lay in a strained voice, "must have got it down wrong. Wat's that 'assistance' stuff at the end—looks like it might be a distress call!

"That's it!," cried Gulsen, his face suddenly white and his body a quiver, "'EEE TTT EEE' should be SOS!"

"Sure enough," said Lay calmly, "that's what it is—should 'ave noticed that."

"What'll we do about it?," whispered the ashen goat, in an awed voice. "Better take it to the O.W.," advised his tempter.

Gulsen rushed down to the officer of the watch and showed him the message.

Now if Wireless Willie had stopped the proceedings here nothing more would have happened, but Willie lost his nerve after this unlooked-for development and beat it off for the mess room along with his fellow conspirator, where together they sat staring at one another in fearsome apprehension. Meanwhile things happened.

The O. W., not being "in" on the conspiracy, promptly turned the thing in to the N.I.D. office. Now the Naval Intelligence Department had no fools. The officer on duty looked at the msg. and then at Gulsen's white face; he knew men, and though appearances were against it, he "smelled a rat." True, "Stanley" was out near Sable Island somewhere, but—well, it looked queer—this SOS on a clear night of calm seas. He opened the wire and called Camperdown, but he hadn't heard it. The grim man smiled under his brass hat, and turned to answer the bridge phone. "Rush visual from 'Highflyer,' sir," said the signalman on the bridge, "intercepted W/T,

prefix p, begins, SS Stanley sink (break) 52436834 N.W. mined immediate assistance ends signals weak and broken—Hall."

The three-ringer lost no time. He dismissed his audience with curt nod and set about the execution of his duties. Two ships were near the position given, but both were bound in to Louisburg for fuel; they could not be diverted. There was nothing to do but send out ships from the base. PV's 4, 5, and 6, and drifters CD 37, 42, 56 and 67 were ordered to follow "Grilse" to the scene of the sinking and report every hour via W/T. The little destroyer was off and out of sight before the first PV had steam up, but one by one they followed out past St. Georges Island, and on thru the defenses, into the night.

Gulsen walked on air from the N.I.D to the gunroom mess; with head erect and bulging chest he related the receipt of the confirming message from "Highflyer," who lay in Berth about a hundred yards from "Niobe" but out in the stream. Wireless Willie jumped to his feet. "Wha-a-a-t!!," he cried, "you say 'Highflyer' got that too?" His outspread hands, open mouth and staring eyes were reflected upon the person of his fellow in crime.

Gulsen began to see the light. "W-what's all about it" he said, "you seem to think something's wrong by the look of you."

"Everything's wrong," said Lay, who felt not the same sense of responsibility that had now frightened Wireless Willie into silence. We were only jokin' about that SOS wireless here. Sent it to you on the 'bee' to fool you."

Gulsen's jaw dropped. After a long silence the three tiptoed together, aft along the passage toward the torpedo chamber (which was now used as a dressing room) in search of sympathetic ears among their mates.

I was in Cabin 12 chatting with a friend whom I had not seen for some time. The door opened and in walked the three crepe-hung actors. The case was explained in many words, advice and council were solicited. My friend was inclined to treat it as a good joke on old Brass Hat and pass it over. But my own sense of humor is subject to limitations and I saw nothing funny in the affair. The buzzer signals had evidently radiated sufficiently to be picked up a scant 400 feet away by "Highflyer's" sensitive audions. By reason of time and tide, she lay but a short way from us with her aerials paralleling ours. I advised the criminals to confess and have the search vessels turned back before they should have needlessly burned up more of His Majesty's coal and oil.

There was really nothing else they could do. So they confessed. And I went back to the comfort of our own wardroom.

Wireless Willie was put in irons and left to dream of sunrise and a firing squad for

two whole days; for the same two long weary days Tommy Lay picked oakum in the fore, and Gulsen stayed aboard, guest of the O.M. The courtmartial had to wait until four captains should be at hand. At length "Devonshire" and "Achilles" steamed in, and the four brass hats got together. I imagine the court martial must have been funny, for though the offense was really very grave, it had its humorous side.

Anyway, the final outcome was that Wireless Willie got a lecture on "an officer's wartime duty to H.M. the King," and lost all his seniority; Lay got a similar, if somewhat lesser punishment; and Gulsen was advised to change his name—in hopes it would make him the less gu-ible in the future!

LETTERS FROM FRANCE

(Concluded from page 74)

tion would then pay in addition to 100 francs, 24,000 francs a year—if its antenna is not more than 50 meters high. If it is higher than 50 meters, it will pay 48,000 francs a year, and if it is higher than 100 meters, 72,000 francs a year, but!!!!

Broadcasting stations will have a maximum power of 500 watts input and the wave length from 200 to 280 meters with telegraphy and with 220 to 230 with phone. They will only pay two-thirds of the preceding taxes; that is to say, with an antenna higher than 100 meters, a 500 watt station will pay 100,000 francs a year (2/3 of 100 francs per watt!!)

Licenses may be cancelled any moment by the postal telegraph administration, and this without the necessity of giving any reason whatsoever (absolutely arbitrary!).

Finally, the administration may at any moment and at the first request take possession of your station and use it thru its agents and this "at the expense of the licensee." Employees of the postal telegraph service will be loaded onto you, they will operate your station and it will be you who will pay for the tubes which they burn out!

You see that the French amateur situation has made some progress in ten years, but it is still very far from being compared to that of the lucky American amateurs!

Fortunately, all this is only a project, and even if it is carried into effect without great modifications (which is most probable) it would only be a decree and not a law, which alone could not be legal concerning the matter. And even if it were a law, the force of inertia works for us. How is it that they never discover an amateur who receives on a loop and who has never declared himself? How would you prevent an amateur transmitting "I

have 3.56 amperes in my antenna" and that the number 3.56 might mean "come and have dinner with me tomorrow"?

But it would take the bureaucratic administration which we enjoy ten more years to understand this!

LONG-WAVE HELP

(Concluded from page 79)

tion was in process of development, and nearly everything known was tried. For a while as many as ten stages of resistance-coupled radio-frequency amplification were in use, and POZ, the station then sending press, could be copied on a 6-ft. loop. The final circuit when I left New York had been boiled down to the use of an antenna, noe stage of resistance-coupled radio, detector and one stage of audio, and a separate heterodyne. Also an extra two stages were employed to operate a loud speaker connected by a rubber tube with the dictophone recording set for the high speed traffic. This worked very well, I know, and the station is still in use receiving press, I believe from OUL.

Of great importance in the attempts to properly tune long distance stations is the use of very loose coupling. It has been my experience that while I could tune to POZ here, and read his signals with the primary at practically right angles, or adjusted so as not quite to be at zero coupling, when the coupling was increased to an angle of about 30 degrees between coils

POZ could not even be found, due to the interference from other stations near his wave. POZ is hard to tune too, but will be recognized when heard starting up by a characteristic increase in pitch or tone.

With sincere regards,

Yours very truly,

W. W. Lindsay, Jr., 6ZF.

You Need This "MAC - RADIO" TEMPOMETER

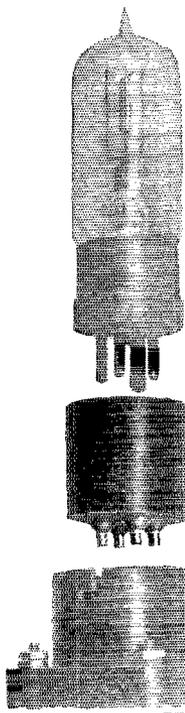


An accurate, easily operated device by which you can instantly compare the Standard Time used in all points of the World. An absolute necessity for all radio operators who are receiving either telegraph or phone station schedules throughout the World. IT TELLS YOU WHEN TO LISTEN FOR THAT CONCERT OR MESSAGE. FOR A LIMITED TIME ONLY with each tempometer we will include FREE OF CHARGE our folder giving: Standard Time Meridians of the World, also U.S. time zones and time sending stations, Broadcasting stations of U.S. and Canada with time used by each. Radio Tempometer Price \$1.00. Delivery return mail. Dealers write for discounts.

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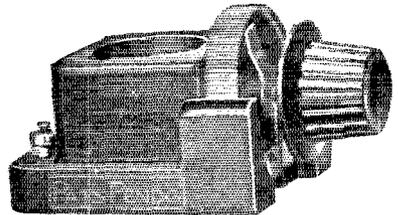
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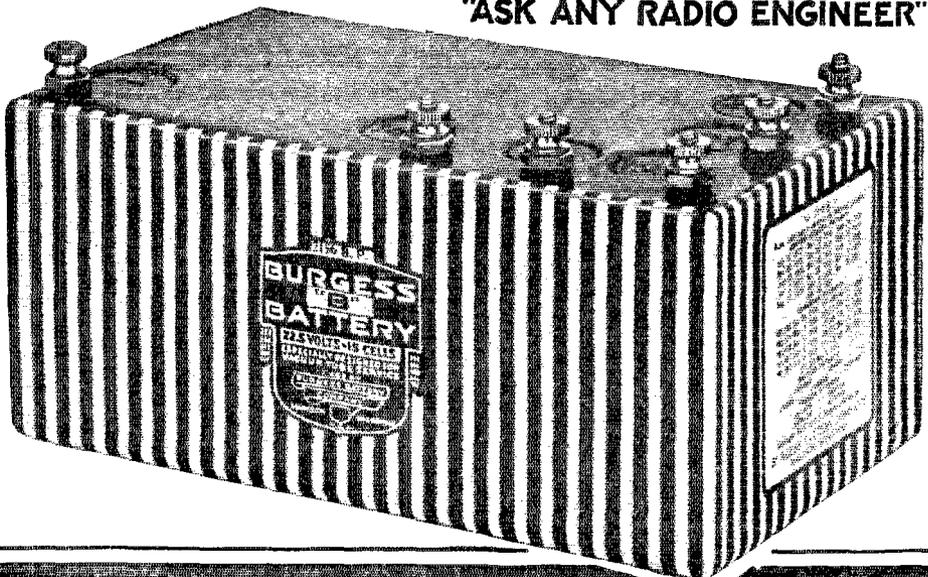
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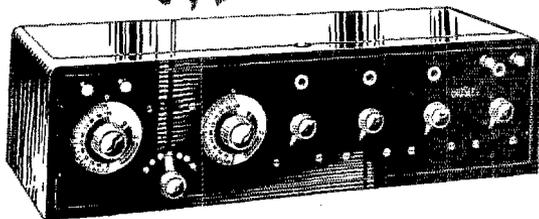
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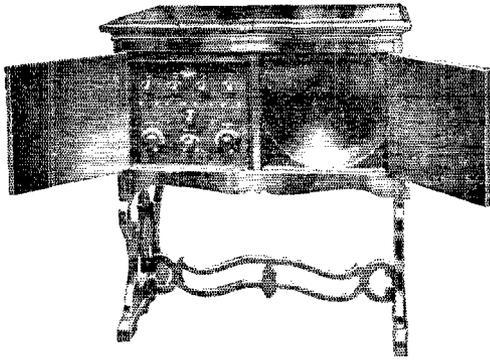
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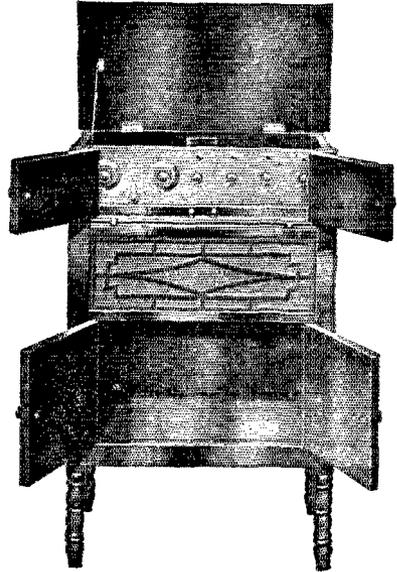
CROSLEY RECEIVER MODEL X. A four tube outfit the same as shown in the above scene. It consists of Tuner, One Stage of Tuned Radio Frequency Amplification (the feature that has made this instrument so popular) Detector, and two stages of Audio Frequency Amplification, in a beautiful mahogany finished cabinet. It will bring in distant stations loud and clear. Price without tubes, batteries, phones.....\$55.00



CROSLY MODEL XXV

This beautiful mahogany cabinet is equipped with four tube panel incorporating the same units as the Model X, but the panel is of a different shape, as will be noticed from the illustration. This cabinet is arranged to take the Model R-3 Magnavox that can be quickly installed and hooked up to the set, but the Magnavox is not furnished at the price. Cabinet also contains space for "A" Battery, "B" Battery and battery charger if desired. A throw-over switch is provided to change from head phones to loud speaker. It is guaranteed to bring in broadcasting stations up to one thousand miles or more, loud enough to be heard all over the room. This beautiful instrument, without tubes, batteries or phones, sells for \$150.00.

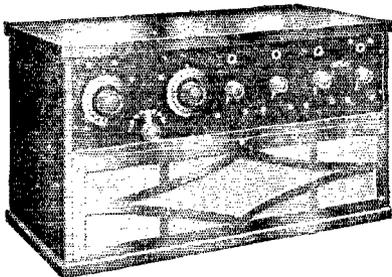
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CROSLY MODEL XX

The same as CROSLY RECEIVER MODEL X in an upright cabinet with special sound resonating chamber. A hinged lid, when raised allows the operator access to every part of the receiving apparatus. Directly under the receiving apparatus is a highly finished board that slips in and out, forming a desk for the person operating the instrument. Has the same volume and range as the MODEL X. Mahogany finished. Price without tubes, batteries or phones \$100.00.

Three Beautiful Cabinet Models



CROSLY MODEL XV

Incorporates the same receiving apparatus as the other instruments on this page. Has special sound resonating chamber but without compartment for batteries. Can be set upon a table or stand. Will fill your room with music or other broadcasting. Mahogany finished. Price without tubes, batteries or phones \$70.00.

Your Dealer or Jobber should be able to furnish you with Crosley Apparatus. If not, send us his name and order direct.

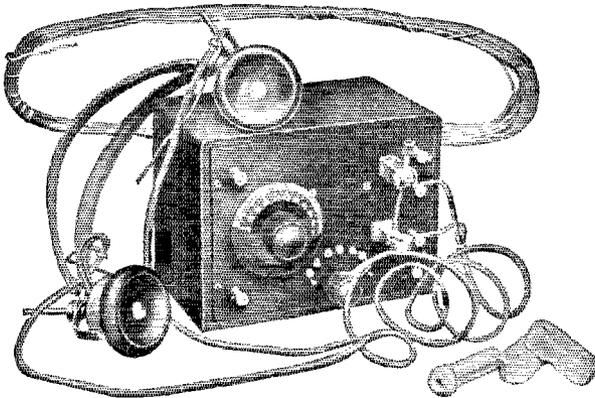
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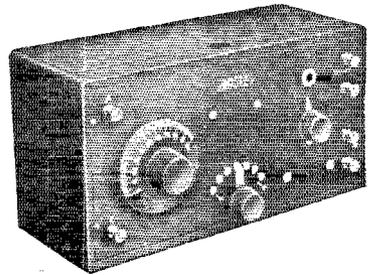


CROSLEY CRYSTAL RECEIVER MODEL I

This outfit complete as shown, is not only very efficient of its type, but is beautiful in finish and appearance, and complete. Later, if desired, additional units can be added, including audion detector, radio frequency amplifier and two stage audio frequency amplifier. Manufactured under the Pickard patents. Price of the set illustrated above complete with instructions is \$25.00.

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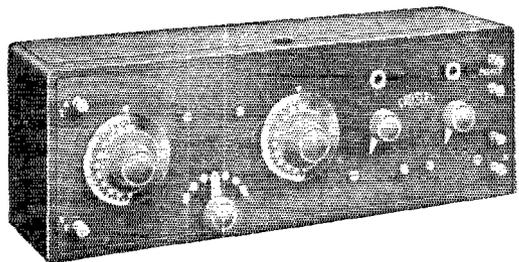
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HARKO SENIOR MODEL V

Greatly refined and improved gives better results than ever before. We guarantee it to bring in even distant broadcasting stations and believe it to be the most efficient one-tube receiving set on the market. With this unit, Denver has heard Schenectady, N. Y., and many other wonderful distance records have been made. Price without tubes is only \$20.00.

Three Smaller Models Of the Usual Crosley Quality



CROSLEY MODEL VI

A two-tube set similar to the MODEL X shown on the first page. This unit has approximately six times the range and volume of the Harko Senior. It consists of one stage of Radio Frequency Amplification and Audion Detector. It eliminates static to a large extent and distant stations are brought in clear and sharply. Price without tubes, batteries or phones \$30.00.

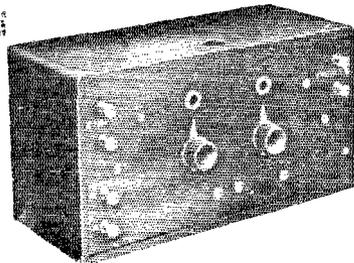
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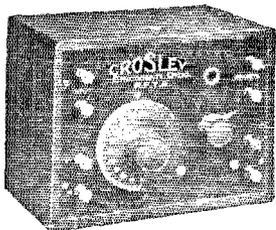
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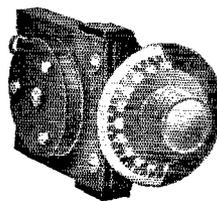


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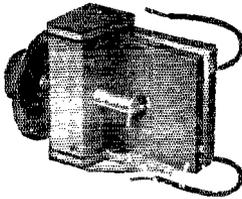
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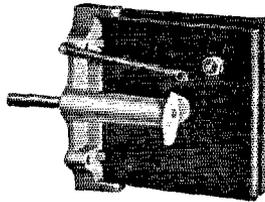
Better---Cost Less

RADIO

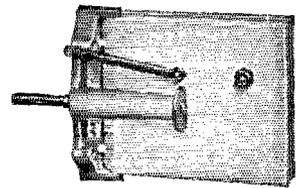
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MODEL B

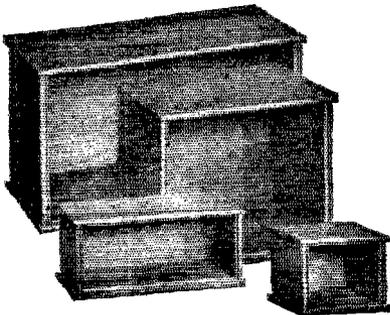


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CROSLEY VARIABLE CONDENSERS

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The Crosley Radio Cabinets are made of hardwood Adam brown mahogany finish. Live dealers handle them—prices and sizes in our catalogue.

CROSLEY KNOB AND DIAL



Attractive and inexpensive CROSLEY KNOBS and DIALS are extremely well made for all required purposes. The dials are made of solid hard rubber 2 1/8 in. diameter, with the letters and figures moulded into them and white enameled.

Furnished Standard for 1/4" shaft or 3/16" shaft, optional—\$0.40.

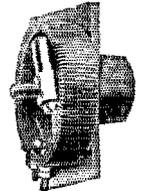
CROSLEY RHEOSTAT

Note the new Crosley Rheostat with ball bearing contact, patent pending.

This rheostat permits exceptionally accurate and delicate variations of the filament current. With it, the best possible results are received from expensive vacuum tubes.

Unique construction allows the CROSLEY RHEOSTAT to be mounted on a panel of any thickness up to and including 3/8 inch. A special grade of non-corrosive wire forms the resistance and results in highly efficient service.

This rheostat is much more attractive, works better and is easier to assemble than the old Crosley Rheostat. It is better in every way and yet the price is the same.....60¢



CROSLEY TAP SWITCH



The unique construction of CROSLEY TAP SWITCHES assures a constant tension and eliminates all possibility of the switch loosening and developing a faulty contact on the taps. A stationary washer of our own design has a soldering lug which makes possible a bus wire connection. ALL CROSLEY TAP SWITCHES are furnished with a newly designed tapered knob and nickel-plated switch arm and bushing.

Price each complete.....30 cents

Switch Taps for the above made of brass, nickel-plated and complete with brass nut, 2 1/2 cents each.

Your Dealer or Jobber should be able to furnish you with Crosley Apparatus. If not, send us his name and order direct.

Send for Catalog

CROSLEY MANUFACTURING CO.

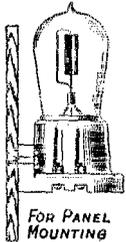
DEPT. QST 4 CINCINNATI, OHIO

CROSLY RADIO PARTS shown on these pages are the personification of economy and efficiency. The fact that they are endorsed and used by the best Radio Men in the country should be sufficient testimonial.

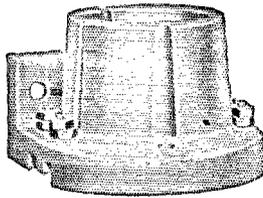
CROSLY

Better---Cost Less

RADIO

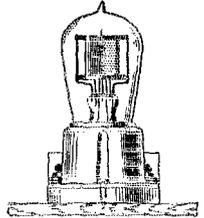


FOR PANEL MOUNTING



CROSLY V-T SOCKET

This socket has been pronounced by many radio engineers as the best socket on the market. Ever since its announcement, its success has been phenomenal. Although the success has been largely due to the price, its real popularity is based on its high quality, efficiency, service and practical unbreakability. Patents pending. Beware of imitators. Made of porcelain for base, or panel mounting.....\$0.50

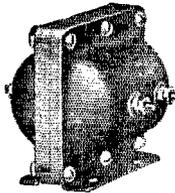


FOR BASE MOUNTING

CROSLY SHELTRAN

Incorporated in the design of the CROSLY SHELTRAN, are all the characteristics, so essential and necessary to obtain the maximum amplification from the modern vacuum tubes used in radio work. These tubes, with their high amplification constant, operate most effectively at large fluctuations of the grid potential. The CROSLY SHELTRAN is designed to accomplish these results and tests have shown that the design is correct to insure maximum efficiency. Completely shielded—9 to 1 ratio.

Better—Costs Less—\$4.00



CROSLY VARIO-COUPLER PARTS

The CROSLY VARIO-COUPLER is made with the same accuracy as the CROSLY VARIO-METER, and is designed to function perfectly with it. Each Vario-Coupler set consists of a formica tube, rotor and the necessary hardware for complete assembly.



Complete as shown in illustration, ready for assembly—\$1.50. Also furnished completely wound and assembled. "Better—Costs Less"—\$3.00



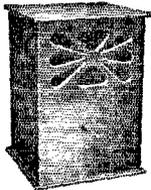
CROSLY BINDING POSTS

These are made in three sizes — $\frac{5}{8}$ " diameter, $\frac{7}{8}$ " diameter and $\frac{1}{2}$ " diameter. They are all of the same design, however, as shown in the illustration.

- No. 1..... 5¢ each
- No. 2..... 7½¢ each
- No. 3..... 10¢ each

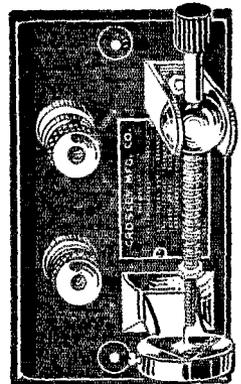
CROSLY MAGFON

No Radio station is complete without this MAGFON. A built-in horn amplifies signals, voice or music. With it head phones are unnecessary except on weak signals. Any make of watch case receiver can be used with the CROSLY MAGFON by simply inserting it in the back of the cabinet. Mahogany finished \$10.00.



CROSLY CRYSTAL DETECTOR STAND

This unit is especially well constructed, neatly mounted on black base covered on bottom with green felt. All parts are bright nickel finish, complete with mounted crystals, binding posts, etc., manufactured under the following patents: "Patented January 21, 1908; November 17, 1908; June 15, 1909; September 7, 1909; July 21, 1914; September 8, 1914; November 24, 1914; April 27, 1915; January 23, 1917. Licensed for amateur, experimental or entertainment purposes only. Any other use will constitute an infringement. —\$1.60.

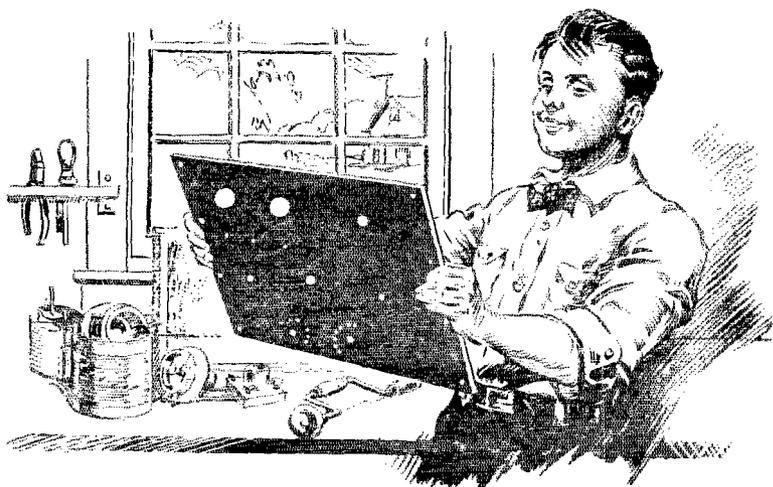


Your Dealer or Jobber should be able to furnish you with Crosley Apparatus. If not, send us his name and order direct.

Send for Catalog.

CROSLY MANUFACTURING CO.

DEPT. QST 4 CINCINNATI, OHIO



This Panel Will Improve Your Set

CONDENSITE CELORON

The best panel made is none too good for your set. Dependable insulation is vital because it has a direct bearing upon the clearness and sensitivity of both transmission and reception.

Every thinking radio enthusiast certainly wants the highest type panel he can obtain and the surest way to get it is to insist upon Condensite Celoron.

This strong, handsome, jet-black material is not merely an insulating material—it is a radio insulation made to meet high voltages at radio frequencies. That is why it will give you greater resistivity and a higher dielectric strength than you will ever need.

Make your next panel of Condensite Celoron. It machines readily, engraves with clean cut characters and takes a beautiful polish or a rich dull mat surface.

An Opportunity for Radio Dealers

Condensite Celoron Radio Panels and Parts offer a clean cut opportunity to the dealer who is keen on building business on a quality basis. Write us today. Let us send you the facts. You'll be interested.

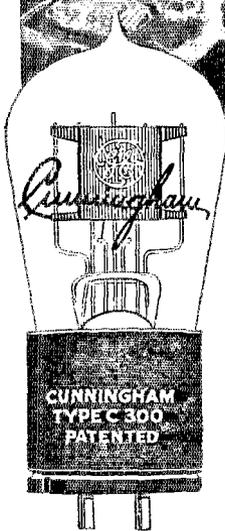
Diamond State Fibre Company
Bridgeport (near Philadelphia), Penna.

Branch Factory and Warehouse, Chicago.

Offices in Principal Cities

In Canada: Diamond State Fibre Co., Ltd., Toronto.

Cunningham TUBES



The trade mark GE is the guarantee of these quality tubes. Each tube is built to most rigid specifications.

Assure Clearest Broadcast Reception

Nationally known for Super-sensitive Detector Action and Distortionless Amplification, Cunningham tubes are ideal for use in your home receiving set.

The results obtained from the best radio sets depend largely upon the vacuum tubes used. Cunningham Detector Tubes insure clear reception—maximum signal strength and an absolutely quiet receiver in the absence of incoming signals.

Cunningham Distortionless Amplifier Tubes perform a great service. In making possible the reception of distant stations and the use of loud speaking telephones, these tubes bring into your home the music of great concerts and the singing of famous artists, aiding in the cultivation of the musical side of home life.

TYPE C-300

Super-Sensitive
DETECTOR

\$5.00

Amplifies
as it
Detects

TYPE C-301

Distortionless
AMPLIFIER

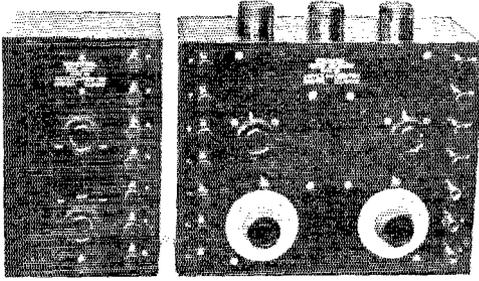
\$6.50

Patent Notice Cunningham tubes are covered by patents dated 11-7-05, 1-15-07, 2-18-08 and others issued and pending. Licensed only for amateur or experimental uses in radio communication. Any other use will be an infringement.

E. J. Cunningham

Home Office:
248 First Street
San Francisco, Cal.

Eastern Representative:
154 West Lake St.
Chicago, Ill.



The Biggest Advance Yet Made Toward Elimination of Distorted Signals is Found in the Universal Radio Receiver and Coil Unit

This set has been designed to cover all the fine points of radio technique.

The wave length range possible with Coil Unit is 180 to 6200 meters. Wave lengths ranging from 200 to 2500 meters may be covered when using the standard coupled circuit.

The proposed changes in broadcasting wave lengths by the government require a larger wave length range than in use today which means that the average radio receiver must be altered to receive all broadcasting waves. The proposals cover ranges from 200 to 2500 meters.

The terminals of various circuits are brought out to binding posts which allows the operator to use any of the following standard hook-ups; single circuit, two circuit, regenerative, or oscillating.

FINE TUNING OF THE SET is accomplished by means of the **VARIABLE CONDENSERS**.

Weak and strong signals may be received alike **WITHOUT DISTORTION**.

This set is very compact, flexible in adaptation of various circuits to any desired hook-up. It is easy to operate because of the convenient location of the various adjustments and, at the same time, the set has a very high efficiency. This set has been thoroughly tested at the Bureau of Standards and the results are highly satisfactory.

Cabinets are finished mahogany and the panels are of bakelite.

Size of Universal Coil Unit, 5 3/4" x 9 1/4" x 4 1/4"

Size of Universal Radio Receiver, 11 1/2" x 9 1/4" x 4 1/4"

We guarantee the workmanship and quality of this set to be of the highest type.

Give a Universal Receiver and Coil Unit for a Christmas present.

Dealers write for our proposition. The demand for this set will be tremendous everywhere. A simple demonstration will bring all the orders you can handle.

\$110.00 F. O. B. Factory

HAYES & NEWTON

115 N. Market

Urbana, Ill.

O-B Radio Co.

Distributors for

Colin B. Kennedy Co.
Horne Receiving Sets
Remler Accessories
Horne Accessories
Cunningham Tubes

If your dealer can't supply you, write to us direct for any standard Radio material.

O-B Radio Company

Flatiron Hotel Bldg., 1730 St. Mary's Ave.

Omaha,

Nebr.



SOUTHERN RADIO CORPORATION

Radio Engineers and Jobbers

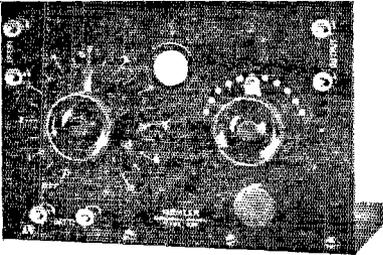
905 Realty Building,

Charlotte, N. C.

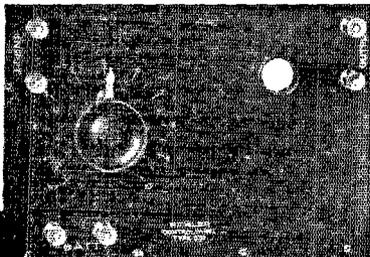
REMLER

Cumingham

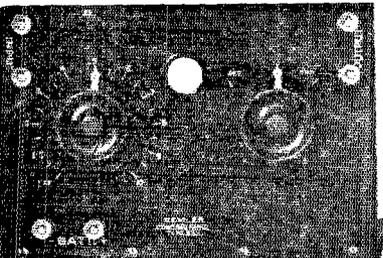
APPARATUS THAT RADIATES QUALITY



Remler Type 330 Detector Panel. Price \$8.50



Remler Type 331 Amplifier Panel less transformer Price \$6.00



Remler Type 333 Amplifier Panel less transformer Price \$9.00

THE MOST POPULAR

Panels

ON THE MARKET

IN designing these Remler Control Panels, Remler Engineers combined every point necessary for efficient detector and amplifier tube control with special features of construction for the convenience of the user. No process of manufacture that would make these panels efficient in operation and beautiful in appearance has been neglected.

Each panel is a complete unit, mounted on a hardwood base for table use, but so designed that it may be easily mounted in a cabinet. The input and output binding posts are located on opposite sides of the panel at a standard height to facilitate the neat and easy connection of other Remler units.

The 330 Detector Panel contains the Remler Grid Condenser and Variable Grid Leak unit. Also the patented Remler "A" Battery Potentiometer for plate voltage control—an item very necessary for obtaining maximum efficiency from the sensitive gas filled detector tubes.

The 333 Amplifier Panel contains the Remler Rotary Cam Switch which does the work of two jacks and plug in cutting in or out steps of amplification.

All panels are of highly polished black Bakelite and only Remler standard Quality parts are used in the assembling of the unit. All lettering is recessed and filled with a special white enamel that will not discolor or chip out.

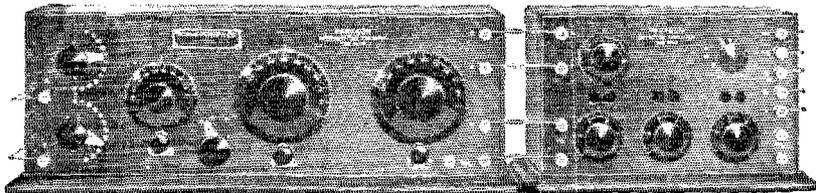
NEW REMLER CATALOGUE

Send 10¢ for new 40 page Remler Catalog just off the press containing circuit diagrams for Remler Apparatus and other useful information, including a table of inductance, capacity and wave length.

REMLER RADIO MFG. CO.

FACTORY AND HOME OFFICE
248 FIRST ST. SAN FRANCISCO, CAL.

EASTERN REPRESENTATIVE
154 W. LAKE ST. CHICAGO, ILL.



PARAGON RA-10

DA-2

Only New England Distributor of
ADAMS-MORGAN CO.

PARAGON
T. M. Reg. U. S. P. O.
RADIO PRODUCTS

ONLY NEW ENGLAND DISTRIBUTOR OF

Radio Improvement Co. Improved Anti-Capacity Jacks,
Telephone Plugs & Switches

ONLY DISTRIBUTOR OF
WALTHAM CONDENSERS

3 PLATE VERNIER.....	\$1.75		
11 PLATE .00025.....	3.25	With Vernier....	5.00
13 PLATE .00027.....	3.50	" "	5.00
17 PLATE .0004.....	3.75	" "	5.50
21 PLATE .0005.....	4.00	" "	6.00
41 PLATE .001.....	4.75	" "	7.00

BUILT LIKE A WATCH

Also Distributor of the

BETTER GRADES OF RADIO SETS AND PARTS
ACME APPARATUS CO. **NATHANIEL BALDWIN, INC.**
AMRAD BURGESS BATTERY CO. **GENERAL RADIO CO.**
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BOSTON 17, MASS

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TRADE MARK

A Neat Back Mounting Binding Post Panel
For UR **DRAWER SHELF**
NP, non-removable heads, with special provision for jumpers. Mounted on $\frac{1}{4}$ " grained HR, 2" x 5". Complete with soldering lugs and NP mounting screws.
Type R7 Receiving Cabinet 1.10; T4 Tuning Cabinet .30; A5 Amplifier 1.05; DA9 Detector-Amplifier 1.35; AG2 Aerial-Ground .60.

TERMNAPANELS are sold direct to user only, Postpaid in U.S. and possessions.

A. L. WOODY (TERMNAPANELS)
HOMWOOD, ILLINOIS

AMATEURS!

Are you ready for the Transatlantic Tests?

We carry a complete line of parts for both receiving and transmitting.

Radio Sales & Service Co.
Ypsilanti, Mich.

Adds 1000 Miles with Bradleystat!

Allen-Bradley Co.:

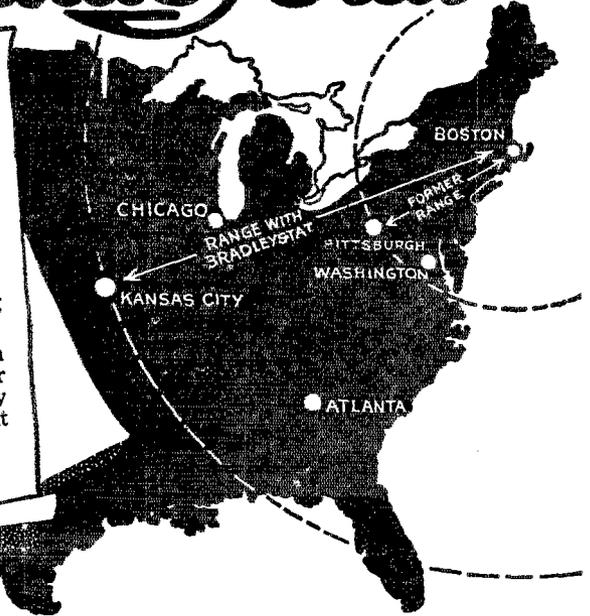
I am situated in Boston harbor and heard Anacostia, D. C., Pittsburgh and Schenectady with wire rheostats of various makes.

Attached a Bradleystat and now pick up Kansas City, Atlanta, and heard music from Havana, Cuba. My set no longer has tube noises that worried me with wire rheostats, and do five times the tuning with the Bradleystat.

I would not advise any person or manufacturer to use any other tube controller, as they will surely go to the Bradleystat, even at three times the price.

Robert C. Daly.

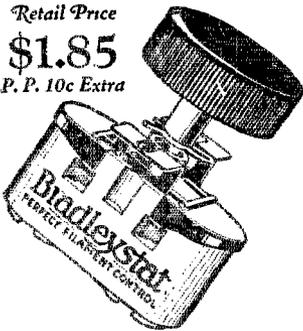
Winthrop, Mass.



Retail Price

\$1.85

P. P. 10c Extra



Fully Guaranteed
Against Defects

Extend your receiving range, too!

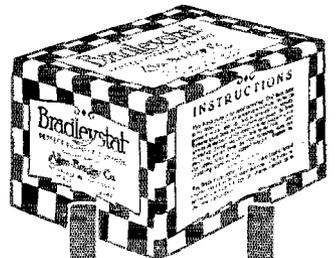
Mr. Daly's letter is one of hundreds received from enthusiastic Bradleystat users. The improvement in range, clearness and speed of tuning surprises everyone. Try a Bradleystat, tonight.

Another Allen-Bradley product is the Bradleyometer, the perfect potentiometer. If you use a potentiometer in your set, write for latest Bradleyometer bulletin.

Allen-Bradley Co.
Electric Controlling Apparatus

277 Greenfield Ave., Milwaukee, Wis.

MEMBER OF
National Radio Chamber of Commerce



Bradleystat

REGISTERED U. S. PAT. OFF.

PERFECT FILAMENT CONTROL

The Telmacophone in Every Home



The Telmacophone in your home provides entertainment and instruction for every member of the family. No one has to take turns or miss any part of the program. No need to change headphones from one person to the other. You are always assured a loud,

clear tone. Everybody can hear everything, clearly and distinctly.

The tone is produced by original Baldwin Type C. Unit and reflected into the outer horn. There is no metallic effect. Finished in black and gold to harmonize with any surroundings.

Correctly designed—fairly priced—unreservedly guaranteed. The ORIGINAL \$20.00 loud speaker and still the BEST. With original Baldwin Type C. Unit. Price complete \$20

If your dealer hasn't the Telmacophone in stock, send us his name and order direct from this ad enclosing \$20.00. Prompt shipment. Write for new free catalog.

RADIO DIVISION

TELEPHONE MAINTENANCE CO.

20 S. Wells St. Dept. D Chicago, Illinois

TELMACO

Quality Radio Exclusively

JOBBER! DEALER! The demand for the Telmacophone is great. Write for new catalog and discounts on our complete line. We are also distributors for the better standard lines.

WIRE YOUR OWN RECEIVER AND SAVE 50%

B&K UNWIRED RECEIVER

Consists of

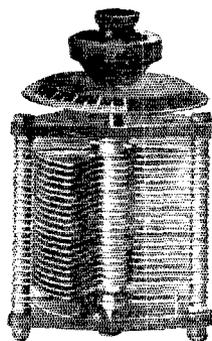
Two B&K variometers, 1 B&K variocoupler, 1 switch, 10 contact points, 2 switch stops, 1 FADA socket, 1 FADA rheostat 1 .002 and 1 .00025 Dubilier Micadon, 10 rubber binding posts, 3 Radion dials, 5 lengths bus wire. Mounted on shielded engraved rubber panel and solid mahogany cabinet.

Complete, Postpaid \$32.50

BONDUAUX & KNIGHTS

1115 Kelly Street,

Bronx, N. Y.



NOTICE SPECIAL

FOR THIS MONTH
VERNIER
CONDENSERS

11 PLATE . . . \$2.25

23 PLATE . . . 3.00

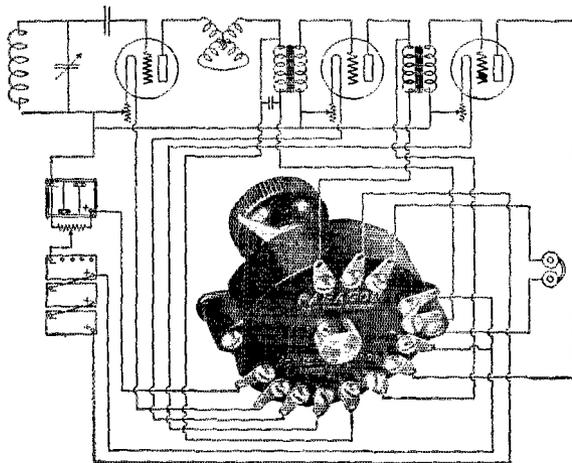
43 PLATE . . . 3.50

PRICE INCLUDES
KNOB & DIAL
ALUMINUM PLATES
FORMICA END PLATES
GUARANTEED

M. C. E. Co.

Manufacturers
Indianapolis, Ind.

Instant—Positive—Noiseless



Paragon Stage Control Switch

Plugs and jacks are now obsolete. The PARAGON Stage Control Switch combines the functions of three multi-circuit jacks and the telephone plug. It controls, automatically and progressively, all the filament circuits, plate battery circuits and input and output circuits of the detector-two-stage amplifier.

Switching from stage to stage is instantaneous, positive, noiseless. All battery circuits are protected. The

wiring of amplifier is simplified.

The wiring diagram, illustrated above, shows the method of connection when this new PARAGON switch is employed for control of detector and two-stage

amplifier. The switch may also be used for an unlimited combination of vacuum tube circuits. $2\frac{3}{8}$ " in diameter, $\frac{3}{4}$ " in thickness. Price, \$3.00.

Send for new illustrated catalog of Paragon radio parts.

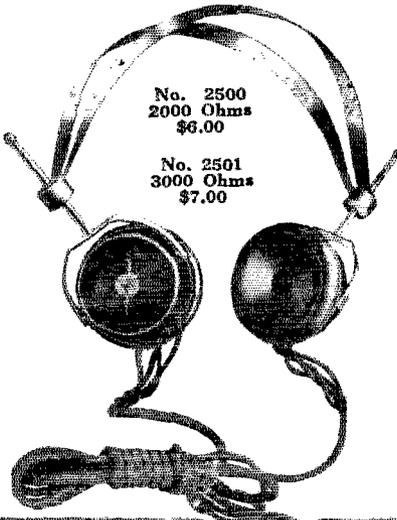
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ADAMS-MORGAN CO., 4 Alvin Ave., Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS



Concealed Cord Tips

THIS is an important feature of the Manhattan Headset. Concealed Cord Tips have two real advantages:

The first is the elimination of all possibility of unbalancing the receiving set and decreasing the strength of the headset signals by having the hand come in contact with exposed cord tips or terminals. The loss of strength due to this contact is often as great as 50%.

Manhattan Headsets have concealed cord tips.

By enclosing the cord tips, all obstructions on the outside of the receiver are removed and the smooth molded case will not scratch the handsomest furniture.

The Manhattan Headset case is free from obstructions.

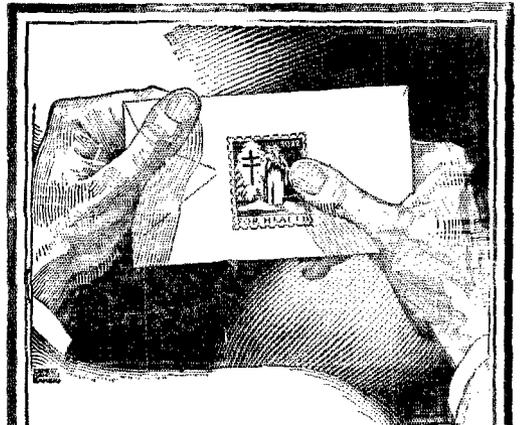
In addition, the cords of the Manhattan Headset are designed with two other important features.

1. Strain on the terminals is relieved by a tie-cord attached to a small eyelet in the case.
2. The polarity of the cords is indicated and the terminals within the receiver case marked. This permits the headset to be correctly connected in the circuit to give the best results.

Manhattan Headsets are prized alike by professional and amateur operators. Identify them by the "M-Flash-Seal" on the back of each receiver case. Look for it when buying your Headset. It is your guarantee of Manhattan quality.

MANHATTAN
ELECTRICAL SUPPLY CO., INC.
Makers of the Famous Red Seal Dry Batteries.

New York Chicago St. Louis
17 Park Place 114 So. Wells 1106 Pine St.
San Francisco 604 Mission St.



Honor these Seals

A NATION-WIDE movement is carrying on a warfare against the scourge of Consumption. In saving over 100,000 lives last year, it actually *cut the death rate from tuberculosis in half.*

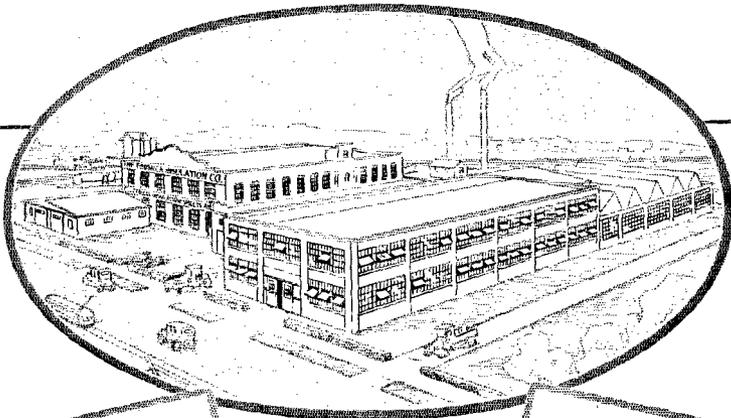
Each year these organizations sell Tuberculosis Christmas Seals. The proceeds from these sales are devoted to the work of caring for and curing tuberculosis patients and to educational and other work to prevent the dread disease.

Buy these Seals and urge your friends to buy and use them. To do this is both Charity and Patriotism.

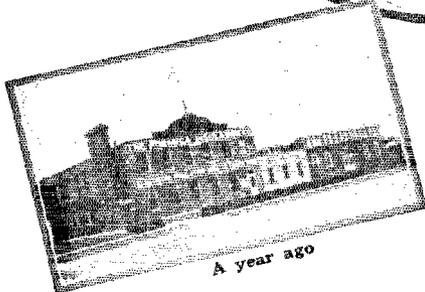
Stamp Out
Tuberculosis
with
Christmas
Seals



THE NATIONAL, STATE, AND LOCAL
TUBERCULOSIS ASSOCIATIONS OF
THE UNITED STATES



The Formica plant today



A year ago



Nine years ago

Appreciation and Progress

NINE years ago the Formica Insulation Company began business in the small building shown at the right.

Two years ago the demand for the product from every branch of the electrical industry, forced a move to the building shown at the left where capacity was greatly increased.

Now, recently constructed additions to that plant have brought into existence the plant shown at the top—a plant with more than twice the capacity of the company—a year ago—and the largest in the industry.

Appreciation of a better insulating product—one that at very slightly increased costs removes thousands of troublesome and costly possibilities for insulation failure—has built the business.

*If you do not know or use Formica
write us now for literature and prices*

THE FORMICA INSULATION COMPANY

4620 Spring Grove Ave., Cincinnati, Ohio

SALES OFFICES

50 Church St., New York, N. Y.
9 South Clinton St., Chicago, Ill.
415 Ohio Building, Toledo, Ohio

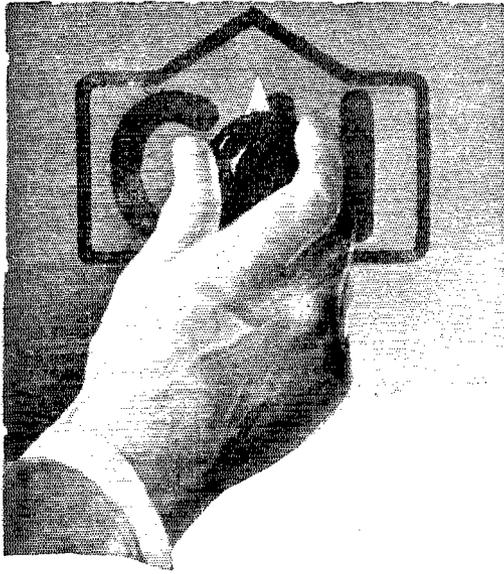
414 Finance Bldg., Cleveland, O.
1042 Granite Bldg., Rochester, N.Y.
318 Title Building, Baltimore, Md.

422 First Avenue, Pittsburg, Pa.
1210 Arch St., Philadelphia, Pa.
Sheldon Bldg., San Francisco, Cal.

FORMICA

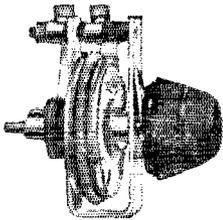
A Laminated Phenolic Condensation Product

SHEETS TUBES RODS



Radio Rheostats of Reputation

Protecting every C-H Radio Rheostat stands a guarantee stronger than human hands can write. The decades of persistent and successful development of rheostatic control by the engineers of CUTLER-



C-H Radio Rheostats are built in two styles, Type 11601-H1 with vernier adjustment for detector tube control and Type 11601-H2 is furnished without vernier for amplifier tube control. Both rheostats have a range of four ohms with one ampere current capacity.

Type 11601-H1
with vernier
Type 11601-H2
without vernier

\$1.50
\$1.00

THE CUTLER-HAMMER MFG. CO.
Milwaukee, Wisconsin

CH RADIO RHEOSTATS
"BUILT BY RHEOSTAT BUILDERS"

RT-5 and RT-6

Have Taken the "Freak" out of RADIO FREQUENCY

The RT-1 Frequency Transformer covering a range of 175 to 500 meters, built by the Radio Service Laboratories, has long been recognized as the best transformer of its kind on the market. It is with pardonable pride that we announce two new types of radio-frequency transformers that are far ahead of anything on the market today. Realizing that it is impossible to obtain maximum efficiency for both the amateur, who builds his own set and is only interested in C.W. work; and for the man who purchases his set and is only interested in the broadcast reports and entertainments; we have perfected a transformer for each class. We have more than doubled the amplification by cutting the range in half.

AS A RESULT WE NOW OFFER

TYPE RT-5 a transformer of high radio frequency amplification specially selected for the first stage for the amateur range only, 150 to 300 meters. **RT-5A** is a transformer that is interchangeable for the second and third stages.

TYPE RT-6 a special transformer of equally high radio frequency amplification for the first stage, for the broadcast range only, 300 to 600 meters. **RT-6A** is a transformer that is interchangeable for the second and third stages.

These new types are put through the famous triple test and are still the only completely shielded iron core radio frequency transformers on the market. These new types have literally taken the "Freak" out of Radio Frequency and give

"Louder Signals with less noise
Greater Range with same equipment."

RADIO SERVICE LABORATORIES Transformers by actual test are superior to any domestic or foreign make in the market. For sale at reliable electrical shops or stores where Radio supplies are sold.

All types retail at \$6 each.
Send for your complimentary copy of booklet on Radio Frequency with schematic diagrams.

Rasla Sales Corporation

National Distributors

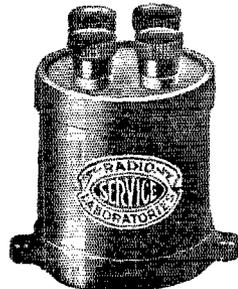
Dept. B, 10 East 43d St., New York City
Western Sales Agents

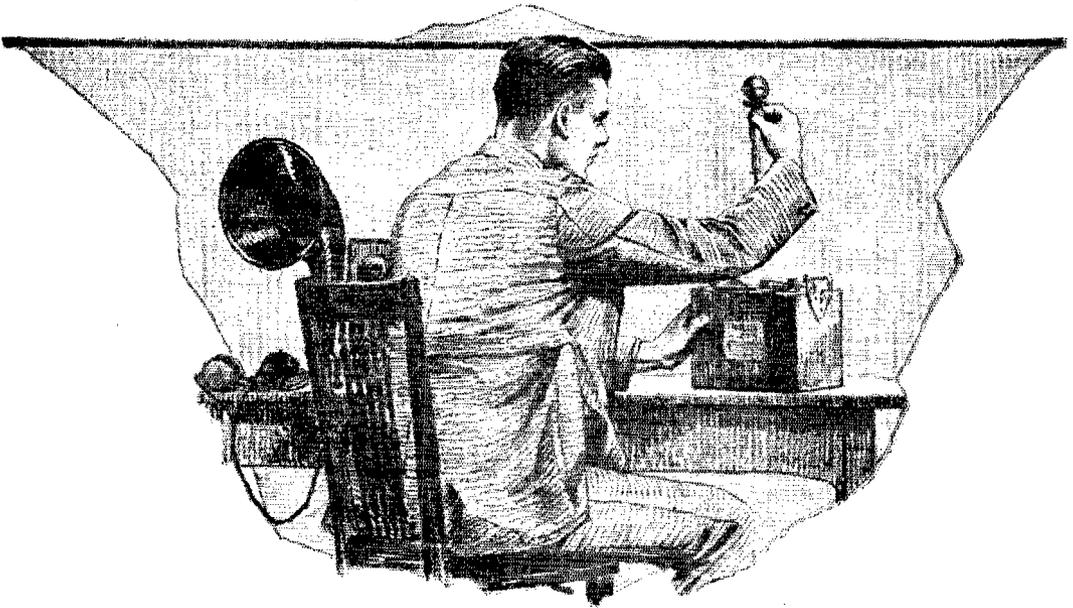
Detach & Company

555 Turk Street, San Francisco, Calif.

Western Radio Distributing Co.

1114 L. C. Smith Building, Seattle, Washington

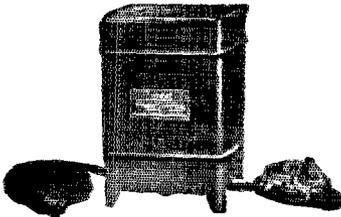




Tungar
GENERAL ELECTRIC COMPANY

Your Battery

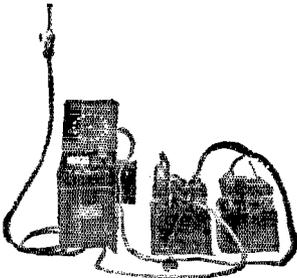
Should be Kept Fit



This enables you to keep batteries fit, right at home. With simple attachment, it will also charge "B" storage batteries.

The Tungar Battery Charger makes it a simple matter to keep your storage battery tuned-up and fit. With it you can recharge your battery at home—and at little cost.

Tungar is a small, compact rectifier, which can be connected with any a-c. lighting circuit. It is easy and safe to operate—in fact, requires no attention after starting. And when properly connected, the current can go only the one way, eliminating any danger of ruining the battery.



This is the way "B" Storage Batteries are charged with Tungar and attachment.

There is no excuse for allowing your battery to run down and spoil the evening's fun. A Tungar doesn't cost much—and it charges the starting and lighting battery in your automobile also.

Send for our new booklet on Tungars for radio, if your dealer cannot supply you.

Address Merchandise Dept., General Electric Company, Bridgeport, Conn.

General  Electric Company
 General Office Schenectady, N.Y. Sales Offices in all large cities 75A-79C

No Wireless Receiving set complete without it



Make it the **GREATER Radio Christmas**

THE success of Magnavox today comes from the patient research and experiment our engineers carried on in Radio's "pioneer" days.

R-2 Magnavox Radio with 18-inch horn: this instrument is intended for those who wish the utmost in amplifying power; for large audiences, dance halls, etc. **\$85.00**

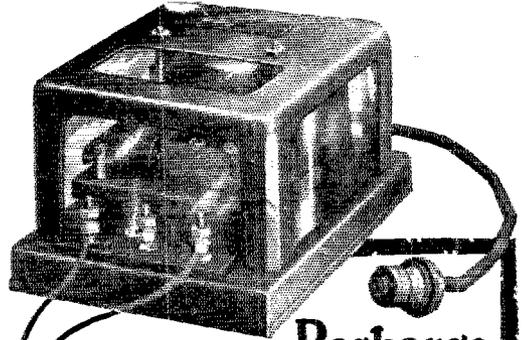
R-3 Magnavox Radio with 14-inch horn: the ideal instrument for use in homes, offices, amateur stations, etc. **\$45.00**

Model C Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Radio.
 2 Stage AC-2-C **\$80.00**
 3 Stage AC-3-C **110.00**

Magnavox products can be had of good dealers everywhere. Write us for copy of new illustrated booklet.

The Magnavox Co.
 Oakland, California
 N. Y. Office: 370 Seventh Ave.

MAGNAVOX
 Radio
The Reproducer Supreme



Recharge Your Battery at Home

Charges both A and B Radio Batteries

Don't be without the use of your Radio Receiving Set while your battery is being charged. Get a **Valley Charger** and charge your battery right at home.

Attach the Charger to your home lamp socket—attach the clips to the battery terminals and you will get a quick, tapering charge which just exactly charges your battery, but cannot overcharge it or harm it in any way.

Will charge the A 6 volt battery at a 5 ampere rate, and the B 22½ volt battery at the required ¼ ampere rate. 45 volt B batteries may be connected in parallel so that they can also be charged.

SATISFACTION GUARANTEED.

If your local distributor cannot supply you, write direct to

VALLEY ELECTRIC COMPANY
 Department Q, ST. LOUIS

- - - - - Mail the Coupon - - - - -

Valley Electric Co., Dept. Q, St. Louis, Mo.

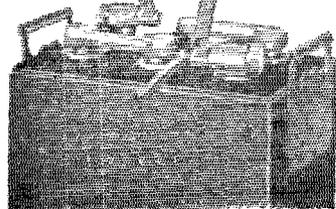
Gentlemen: I am enclosing money order (or check) for \$18.00, for which send me a Valley Battery Charger with five-panel glass display case and indicator. If not satisfactory I will return it and get my money

Name _____

Address _____

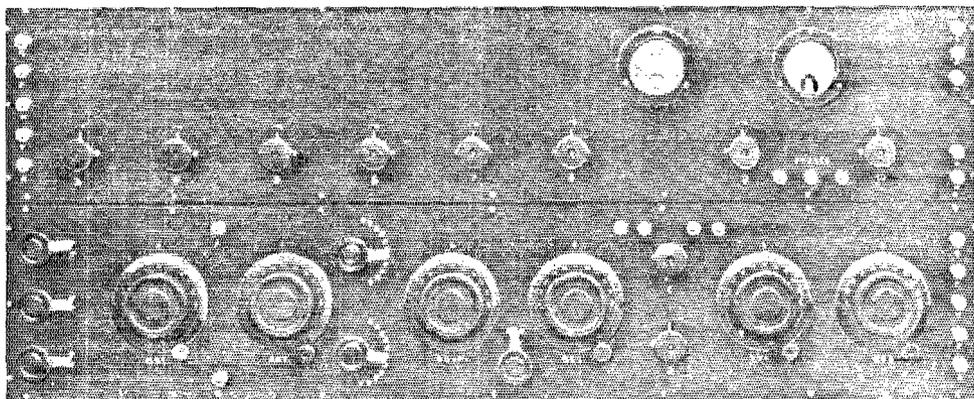
\$18.00

F.O.B. St. Louis



“Super-Heterodyne, the Rolls Royce Method of Reproduction”

E. H. ARMSTRONG



**Armstrong Super-Heterodyne Receiver 160 to 850 meters, 850 to
to 25,000 meters—Average Range 3000 miles**

THIS METHOD OF RECEPTION USED BY

Paul F. Godley at Ardrossan, Scotland and received 27 American
Amateurs 3000 miles.

Commercial Ship and Shore Traffic 3000 miles and over.

Advanced Amateurs for Extremely Long Distance Reception.

Obtainable Exclusively thru

Experimenters Information Service

Designers of the Highest Class Radio Apparatus in the World

23d Floor 220 West 42nd Street, New York City

Request Catalog K covering full line.

CAT. No. 50
Now
Price \$1.



Exterior view of the sturdy PACENT Universal Plug.

The Radio Amateur Knows

Every control perfectly adjusted—bulbs bright as you dare risk them—all connections tight—every detail perfect, you suppose. You're straining your ears—pressing the headphones closer—but can't quite get the signal.

There may be something wrong with your Plug contact. Pacent Universal Plugs are the first choice of most amateurs, because they realize the importance of perfect contact.

The Special spring connectors of the Pacent Plug form a perfect biting contact with the cord tips or conductors and become tighter the more the cords are stressed. The Pacent Plug is used and endorsed by leading radio experts.

Send for descriptive Bulletins QD102.

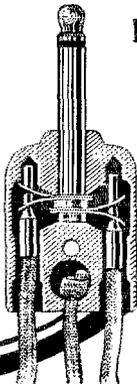
PACENT ELECTRIC COMPANY
INCORPORATED

Executive Offices: 22 Park Place, New York, N. Y.

BRANCH OFFICES

PHILADELPHIA, Bourse Building		WASHINGTON, D. C. Munsey Building
CHICAGO 33 So. Clinton St.		SAN FRANCISCO Sheldon Bldg.

Interior of PACENT Universal Plug showing special spring connectors.



Dont Improvise
"Pacentize"

"This is
A Radio
Christmas"

Assembled

But
Not
Wired

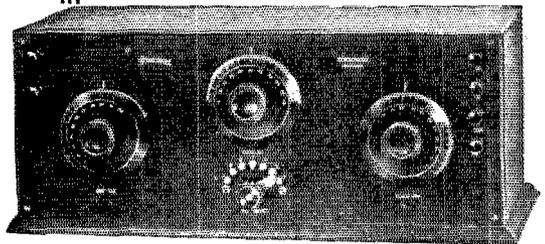
A new
Method of
Buying
Radio
Equipment

The
STANDARD
Idea

Buy your radio instruments according to the Standard Idea—a new way and a cheaper way. Our full line of instruments, including the popular Detector and Two-Stage Amplifier and the Multiple Wave Tuner, embodies the latest developments in radio practice. These instruments are delivered to you—completely equipped—but not wired. You do the wiring yourself, using our simple diagrams and instructions, and save fully 20% over what you would usually pay for an instrument of this kind.

The STANDARD IDEA is the latest thing in Radio. It saves your money and improves your knowledge of the science of radio. It saves money because it enables our factory to eliminate the costly operation of hand wiring; an interesting job that you can do in your spare time.

Write today for a description of the various instruments we make and their prices. Ask about our offer to ship any instrument on receipt of 1/3rd the purchase price, subject to refund if the instrument does not come up to your expectations.



STANDARD ASSEMBLING CO.
6 Stone St., New York

ARE YOU A GOOD GUESSER?

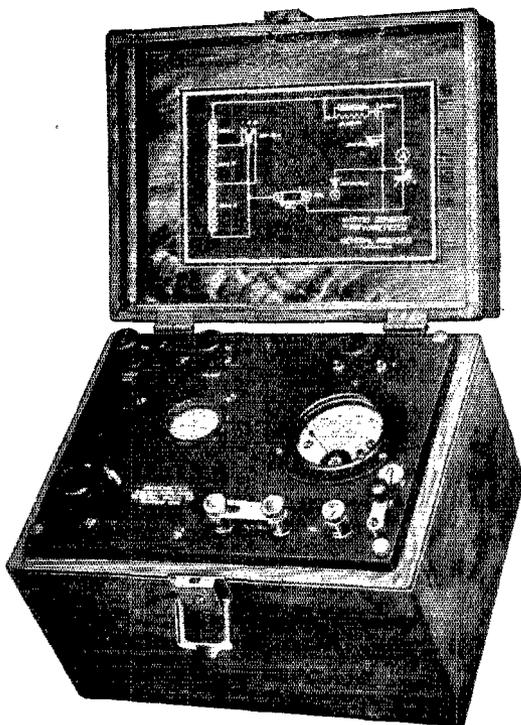
Direct reading.

Range 150-3,000 meters.

Suitable for all types of transmitting and receiving stations.

Calibrated from the same standards and with the same accuracy as the wavemeter furnished by us to Mr. Paul Godley in last year's Trans-Atlantics. This was the wavemeter whose calibration checked so accurately with both the American and English standards.

Used in many of the broadcasting stations of national importance, as well as very extensively in the Government service.



TYPE 174B WAVEMETER

If you are, you may not need a wavemeter. But if you believe in knowing and not guessing a wavemeter becomes a necessity.

The wavemeter you desire must first of all be accurate and should also be easy to operate. These points with many others are incorporated in our Type 174-B wavemeter. A full description of this meter is not possible here, but is found in our **Bulletin 707-Q** which will be sent without charge on request.

PRICE, COMPLETE, \$68.00

Every local radio club should have one of these meters to check each member's station.

GENERAL RADIO COMPANY

MASSACHUSETTS AVENUE AND WINDSOR STREET

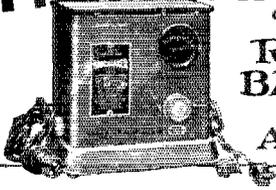
CAMBRIDGE 39

MASSACHUSETTS

Do not confuse the products of the GENERAL RADIO CO. with those of other concerns using the words "General Radio." The General Radio Co. has been manufacturing radio and scientific instruments for many years. It has no affiliation with any other company.

Standardize on General Radio Equipment Throughout

HOMCHARGE



Your
**RADIO
BATTERY**
for
A NICKEL

Enjoyable Radio Concerts and maximum receiving range are obtained only when your battery is fully charged.

Don't be bothered with the inconvenience and expense of taking your battery to a service station every few days for recharging. The

RADIO HOMCHARGER DE LUXE

has been designed especially for this purpose. It charges your "A" or "B" battery over night without removing from the living room—gives taper charge—cannot harm your battery in any way. Simplicity itself. Only two wearing parts, replaceable after several thousand hours use for One Dollar.

An Ornament for Your Living Room
Beauty has been combined with utility in the NEW RADIO HOMCHARGER DE LUXE. The body is beautifully finished in rich Antique Mahogany—the base and fittings in a handsome, dull gold. Equipped with rubber feet, it cannot mar polished surfaces. It harmonizes with the finest living room.

Over 50,000 Homchargers in Use

50,000 users have heartily endorsed the HOMCHARGER. Beware of imitations when buying and insist on obtaining the genuine which bears our registered trade name, HOMCHARGER. Furnished complete. No extras to buy. Price \$18.00 (\$25.00 in Canada) at all good dealers, or shipped prepaid upon receipt of purchase price.

Booklet illustrating the NEW RADIO HOMCHARGER DE LUXE in actual colors is FREE for the asking. Send for your copy today. DEALERS—JOBBER: Over 150,000 HOMCHARGERS will be sold this fall and winter. Send for your copy of "HOMCHARGER Business Builders" and see how you can get your share of this business.

CAUTION

When buying a Rectifier insist upon the following:

1. SELF-POLARIZING FEATURE, otherwise your battery may be ruined through reverse charging.
2. AT LEAST FIVE AMPERE CHARGING RATE, otherwise it will require several days to fully charge your battery.
3. UNDERWRITER'S APPROVAL, otherwise in case of fire your insurance may be void.

The HOMCHARGER is the only Rectifier at any price which combines the above, three NECESSARY HOMCHARGING features.

The Automatic Electrical Devices Co.
127 West Third St., Cincinnati, Ohio

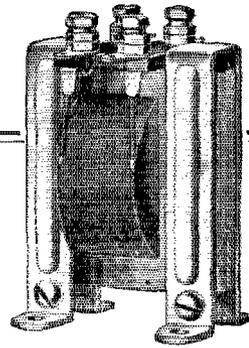
Largest Manufacturers of
Vibrating Rectifiers in the World
BRANCH OFFICES

NEW YORK CHICAGO PITTSBURGH
DETROIT DALLAS
PHILADELPHIA LOS ANGELES
BALTIMORE MINNEAPOLIS ATLANTA
ST. LOUIS NEW ORLEANS



TYPE "A" FOR WALL MOUNTING

OVER 50,000 IN USE



No. 45

Price
\$7.00

Jefferson Quality— Your Protection

The amplifying Transformer is one of the most important integral parts of the Radio Receiving Set. Probably no other part is more subject to quality. Its functions are so delicately performed that satisfactory results are most dependent on the performance of this little instrument.

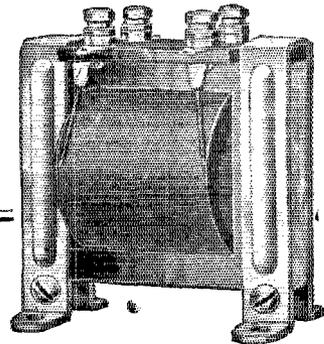
THE YEARS OF EXPERIENCE and the high quality which enters into the construction of JEFFERSON AMPLIFYING TRANSFORMERS make them the first choice of discriminating amateurs.

THE USE OF THE FINEST ROLLED core iron and the compactness of the coil windings reduce the inherent capacity effects, and ELIMINATE HOWLING AND DISTORTION AND BRING IN THE FULL CLEAR TONE IN VOLUME.

"Use Jefferson Transformers
for Best Results"

Send for Descriptive Bulletin.

Jefferson Electric Mfg. Co.
425 S. Green St., Chicago, U.S.A.



No.
41

Price
\$4.75



Owners of Amrad Receivers

Get a new Amrad 2 step R. F. Amplifier. Hooks on your present Amrad Tuner with no change in wiring. Eliminates QRM and doubles your range. **\$40** Complete with Radiformers. Immediate delivery for Christmas giving.

ANNOUNCING

“Something Old, Something New”

The old man, Mr. L. L. Lynn, one of Chicago's pioneer radio men, announces with pleasure the formation of the LYNN RADIO COMPANY and the opening of their radio studio at the above location.

To old A.R.R.L. men we offer the latest, most up-to-date line of sets and parts in Chicago. Every item brand new stock,—just what you need to put your station in shape for the coming season.

Latest types Amrad and Grebe sets, Baldy Fones, full line of Fada and Pacent parts ready for delivery over the counter or by mail. Come and inspect the latest apparatus and meet the old gang at “Radio Center.”

Personal Service - - And the Broadest Radio Guarantee Ever Written

To the new class of radio men,—the broadcast fan—we offer a service you will like. We want you started on the right track. Expert authoritative advice and explanation of present day radio without charge or obligation.

Don't buy the first set you see. Let us

recommend one suited to your requirements and pocketbook.

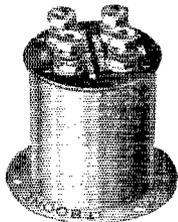
Two weeks trial on all radio sets and parts. Money refunded if you are not satisfied. The broadest guarantee ever made by a retailer. Why not come and see us today? Ask about our special installation service for Chicago customers.

LYNN RADIO COMPANY

STANDARD NATIONALLY ADVERTISED
RADIO EQUIPMENT

Sixth Floor Consumers Building
220 South State St — Chicago, Ill

A NEW STANDARD ESTABLISHED



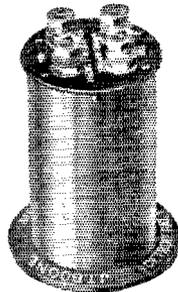
Audio Frequency
Price \$6.50

The advent of the J. T. Boone Mfg. Co.'s Radio Products has established a new Standard of Efficiency.

The "Boone" Radio Frequency Transformer is the materialization of the "DX Fiend's" dream. One or two stages added to your present set will produce almost unbelievable results in increasing your range.

The "Boone" Audio Frequency Transformer is a fit companion, producing powerful, distortionless amplification. Perfect shielding, correct impedance values of the windings, and careful manufacture account for its unusual high efficiency. If you wish to thoroly enjoy broadcast programs, be sure your Audio Transformers are "Boone."

These devices are compact and pleasing in appearance. They are carefully and rigidly tested and inspected. Instructions and proven wiring diagrams accompany each transformer.



Radio Frequency
Price \$7.50

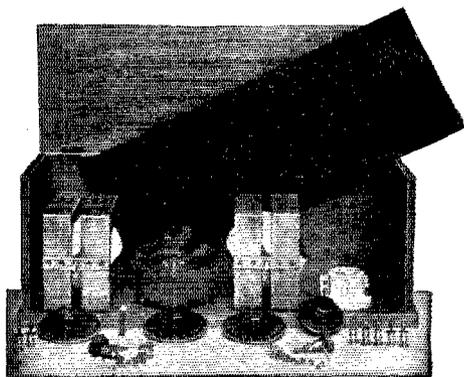
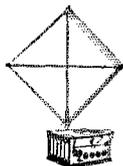
For the man who desires a high efficiency complete set, a "Boone" Receiving Set is unquestionably "The Ultimate Solution."

Write for complete descriptive literature of our products.

J. T. BOONE MFG. CO.

3469 E. Jefferson Ave.,

Detroit, Michigan



National Variometers

Beautifully finished. Especially adapted for reception of concerts, lectures, etc. on 210 to 485 meter wavelengths. Each, **\$4.00** postpaid

National Variocouplers

This coupler permits the sharp tuning necessary to get distant stations. Highest efficiency on 150 to 485 meter wavelengths. Each, **\$3.50** postpaid

SAVE MONEY!

SAVE 50 to 60% on the cost of a high grade receiver—and have the fun of making it yourself! This set, properly assembled, will pick up radio concerts in radius of 500 miles or more. We furnish the following parts, just as illustrated:—

	Actual Value
2 National Variometers.....	\$5.00
1 National Variocoupler	3.50
1 Selected Quarter-Sawed Oak Cabinet, 7x18x7, beautifully finished.....	8.00
1 Hard Rubber panel 7x18.....	2.25
3 Composition Dials, clearly and finely graduated	3.00
1 Rheostat with knob & pointer.....	1.00
1 V. T. Socket50
1 Grid Leak and condenser.....	.40
14 Contact points, 2 switch levers, 7 binding posts, 4 switch stops.....	2.05
Total actual value.....	\$28.70

OUR SPECIAL OFFER

All parts listed, complete with diagram showing how to drill panel—Postpaid to any part of the country

\$23.00

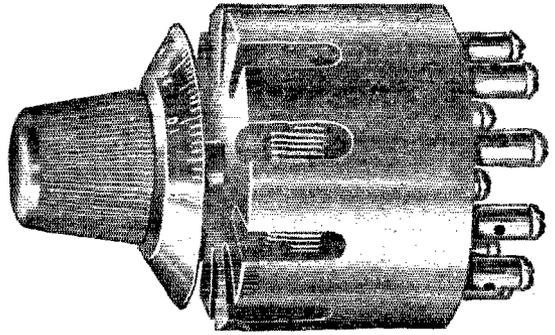
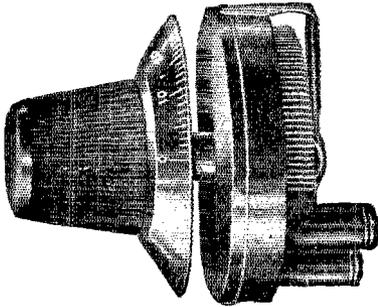
Deal rs - write or wire for proposition

NATIONAL RADIO CO., INC.

1302 So. Vandeventer,

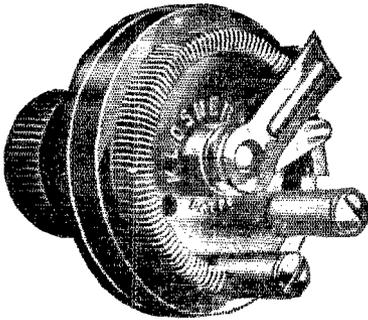
St. Louis, Missouri

**VERNIER Rheostat
MODEL 200**



The AMPLITROL

No Panel can be up-to-date without these two



**MODEL 100
The ORIGINAL
VERNIER Rheostat
\$1.50**

DEALERS

No instruments on the market surpass the Klosner in neatness of design or quality of material and workmanship. Show your customer a Klosner and any other kind—he selects the Klosner regardless of any difference in price. Order through your jobber.

ONLY A RHEOSTAT WITH A VERNIER CAN MAKE YOUR SET MORE SENSITIVE

It is impossible to tune out interference without perfect adjustment of your detector tube. No ordinary rheostat can give you the fine adjustment necessary.

The Klosner VERNIER Rheostat has a micrometer adjustment that permits getting EXACTLY on the very spot for perfect reception.

The Klosner operates both coarse and fine adjustments with ONE knob—a feature protected by broad patent claims. Wire-wound like all true electrical instruments.

And it has a graduated DIAL to show just where it is set. No guessing.

Condensite, phosphor bronze contacts, white graduations on black dial, \$1.80.

DOES AWAY WITH PLUGS AND JACKS—MAKES TUBES LAST MANY TIMES LONGER

Now, for the first time you can have complete control and adjustment of each amplifier tube merely by turning a simple knob. Do away with all jacks, plugs, rheostats and switches. The Amplitrol knob switches on the plate circuit and adjusts the filament circuit at the same time. You turn on any stage of amplification at will.

Lengthens the life of the tube from one-third to one-half, as it absolutely prevents suddenly throwing a heavy current onto the delicate filament. With the Amplitrol, the current is turned on GRADUALLY.

Genuine condensite, white graduations on a black dial, phosphor bronze contacts. Highest grade. Complete with wiring instructions, \$4.00.

If your dealer cannot supply you, don't make the mistake of accepting something "just as good." We will take care of your order direct.

KLOSNER IMPROVED APPARATUS CO.

Originators and Sole Manufacturers

2024 BOSTON ROAD,

NEW YORK CITY

KLOSNER

TRANSATLANTIC TESTS

Will Succeed!

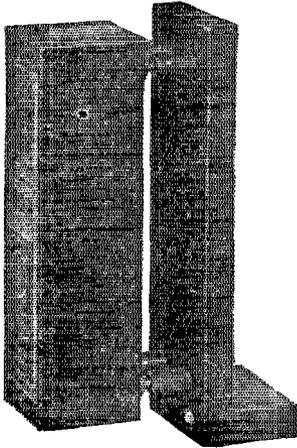
DX R F Transformers Doing Record Breaking Work.

The DX-1 Radio Frequency Transformers will be used by European and American amateurs during Transatlantic Tests.

An Illinois amateur has a proven receiving range of over 4000 miles from short wave station in Hawaii. He hears broadcasting stations in 16 different states.

A 3rd district amateur recently picked up 66 200 meter C.W. and 7 spark stations in two hours time using DX Transformers. Cuban short wave phone station picked up with small coil aerial.

It Pays to Have the Best



(Patents allowed)

**RADIO
INSTRUMENTAL COMPANY, INC.**
WASHINGTON, D. C.

(If your dealer cannot supply you, write us.)

AN HISTORICAL EPOCH IN RADIO RADIO PIONEER SLASHES PRICES

Leading Line Since 1909 - At Prices to You Less Than Dealers Costs

FREE illustrated pamphlet comprising sixty-two Duck radio instruments and sets, with reductions averaging 30%, mailed on request. Send postal today.

It was always the Duck policy to sell its own product direct,—from factory to consumer. We have decided to continue this policy and pass on to the consumer, in reductions averaging 30%, our entire complete line of radio instruments. These prices simply cannot be approached by any house. Our tremendous good will and low manufacturing overhead makes these unusual prices possible. This shall be our future policy. Get catalog out and observe the reductions and the quality of the goods.

A Few of the Many Duck Products at Startling Prices:

Duck Bakelite Dial, $\frac{3}{8}$ " or $\frac{1}{4}$ ".....	\$0.55	Duck "CQA" Three Stage Radio Frequency Amplifier in hinged mahogany cabinet..	\$49.00
Duck Positive Contact Socket.....	.70	Duck "RFQ" Two Stage Radio Frequency Amplifier in hinged mahogany cabinet..	39.00
Duck Filament Rheostat.....	.70	Duck No. A204 Parts for Short Wave Receiving Set, in mahogany cabinet.....	39.00
Duck Radio Frequency Potentiometer.....	1.15	Duck No. A211 Parts for Short Wave Receiving Set.....	24.95
Duck Moulded Plate or Grid Variometer, less dial.....	4.85	Duck No. A212 Detector Panel.....	5.25
Duck Super-selective Mahogany Form Plate or Grid Variometer.....	3.80	Duck No. A213 One Step Amplifier Panel..	10.50
Duck Variocoupler.....	3.80	Duck No. A214 Two Step Amplifier Panel	27.00
Duck Switch Parts for Variocoupler, pigtail connections.....	1.25	Duck, The Original Arlington Receiving Transformer.....	9.75
Duck Panel Type 43 plate condenser.....	3.15	Duck Navy Type Receiving Transformer..	16.10
Duck Panel Type 23 plate condenser.....	2.50	Duck No. A220 One Step Radio Frequency Amplifier Panel.....	13.60
Duck Panel Type Vernier Condenser.....	1.85	Duck No. A221 Two Step Radio Frequency Amplifier Panel.....	28.00
Note:—Positively the very best variable condenser on the market. Pigtail connections; aluminum separators.		Duck No. 223 Three Step Radio Frequency Amplifier Panel.....	38.50
Tuned radio frequency receiving set, with one step radio and detector.....	29.75		

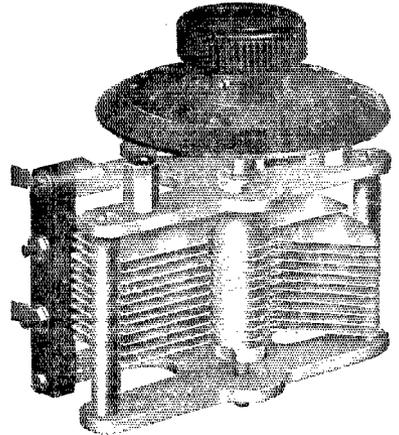
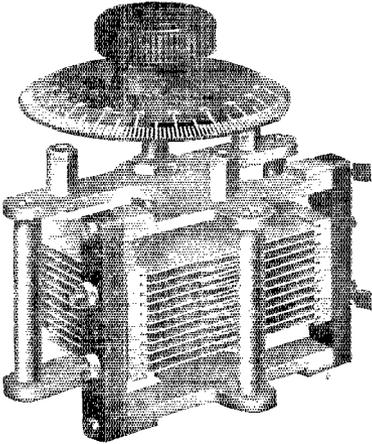
SEND 25c in coin or money order for Duck's combined radio catalog and text book No. 16, 256 pages. Continuously since 1909 the leading catalog. Replete with radio information and hookups.

The WILLIAM B. DUCK CO., 243-345 Superior St., Toledo, Ohio



An Innovation in Variable Condenser Design

Type 123-A
Variable Condenser
Patent Applied for



CARDWELL CONDENSERS are **GUARANTEED** superior to others of similar type in the following respects.

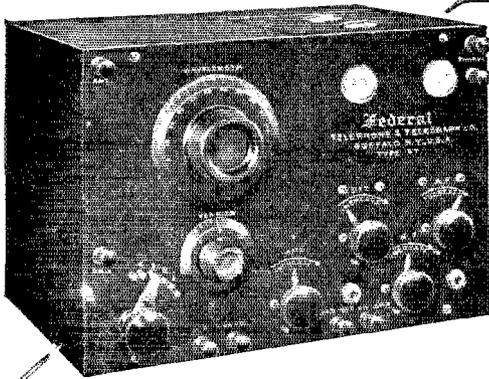
- 1.—**MECHANICAL CONSTRUCTION**—All metal frame. No insulated bushings—frame exceptionally rigid. Permanent alignment of plates.
- 2.—**ROTOR—ZERO POTENTIAL to FRAME**—“Body capacity” and leakage practically eliminated.
- 3.—**MINIMUM to MAXIMUM CAPACITY**—Greater range than any other of equal plate area.
- 4.—**DIELECTRIC**—Entirely outside the electrostatic field.
- 5.—**DIELECTRIC LOSS**—Reduced to the minimum. Less than $\frac{1}{4}$ square inch total area of contact between fixed plates and dielectric mounting strip.
- 6.—**ESPECIALLY DESIGNED** for **HIGH CLASS AMATEUR AND PROFESSIONAL** work.
- 7.—**EMINENTLY SUPERIOR** for **LOOP** sets.
- 8.—**ADAPTABILITY**—Condenser can be mounted on metal without bushings or on dielectric panel without changing capacity or increasing dielectric or leakage losses.
- 9.—**PRICE** \$4.75 less knob and dial or \$5.75 with knob and dial. A low price for a really superior instrument of .0005 mf. capacity.
- 10.—**IT'S A CARDWELL PRODUCT.**

If your dealer cannot supply you with **TYPE 123-A**
CARDWELL CONDENSERS, send your order to

THE ALLEN D. CARDWELL MFG. CORPORATION

81 PROSPECT STREET, BROOKLYN, N. Y.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS



No. 57 Radio Frequency Receiver

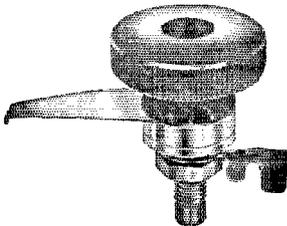
— go as far
as you like
WITH

Federal RADIO FREQUENCY AMPLIFYING APPARATUS

The FEDERAL NO. 57 RECEIVER combines simplicity and reliability of operation with a sensitiveness that is unrivaled, giving an extraordinarily high degree of amplification and making possible the reception of radio signals over marvelously great distances. It constitutes one stage of Radio Frequency, a detector and two stages of Audio Frequency.

Write for Bulletin No. 119-W

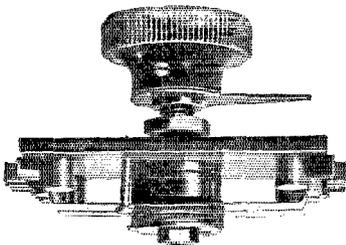
Federal Telephone and Telegraph Company
BUFFALO, N. Y.



2750
1½" Blade 55¢
752
1" Blade 55¢

DEALERS—

Send for our circulars and discount schedule of WIS-WIN Switches and other parts.



2764
Series-Parallel \$1.50 concealed type

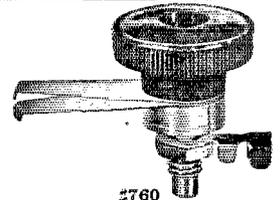
WIS-WIN Switches

For efficient operation of your set, use WIS-WIN switches, visible or concealed.

Visible types: (drilling templates furnished) Inductance switches, 6 styles. V-blade dead-end, 2 styles. Series-parallel.

Concealed types: (drill one hole to mount) Inductance, 6 contact. B-Battery, 6 contact. Series-parallel. 6 pole, double throw change over.

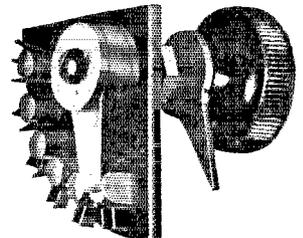
Ask your dealer for WIS-WIN switches. If he can't supply you, we will ship post-paid upon receipt of money order.



2760
1½" Blade 65¢
762
1" Blade 65¢

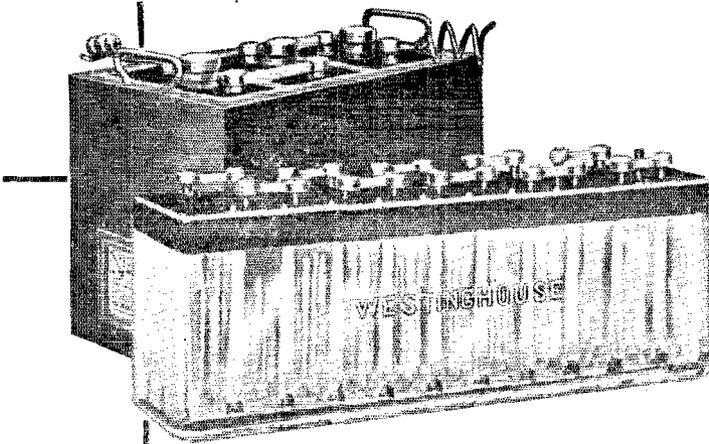
RADIO-ISTS

Send for circular giving data and prices on complete line of switches and other supplies.



2756
8 contact Inductance \$1.25
2758
8 contact B-Battery \$1.25
Additional contacts 5¢ each

Willis Switch & Instrument Co.
8 Kingsbury Street, Jamestown, N. Y.



Built by Westinghouse —you know they're *right*

Nothing about a radio set is so absolutely essential to satisfactory receiving as *right* batteries. Westinghouse Batteries are not only correct in design, but durable in construction and thoroughly dependable in performance.

WESTINGHOUSE "A" BATTERIES are full-capacity, low-voltage, slow-discharge, long-life batteries, built especially for radio work. Ten types—27 to 162 ampere hours' capacity; 4, 6 and 8 volts.

WESTINGHOUSE "B" BATTERIES. The new Westinghouse 22-MG-2 is a rechargeable 22-volt "B" battery and a marvel for steady, noiseless, full-powered service. Glass case; visible interior. Lasts indefinitely. Two other types.

*At your radio dealer's, or most any of the
2000 Westinghouse Battery Service Stations*

WESTINGHOUSE UNION BATTERY CO., Swissvale, Pa.

WESTINGHOUSE

RADIO "A" and "B"

BATTERIES

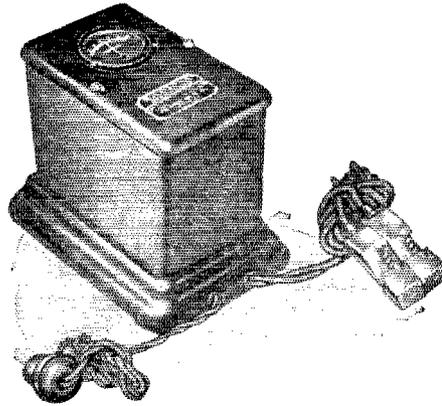


Quality Design

+ Workmanship

+ Materials

— RELIABILITY



RADIO A RECHARGER

This unit is the product of a firm of pioneers in the battery charging field. Our commercial apparatus is used in thousands of the best equipped battery service stations in the country. Materials and workmanship are the finest available. RADIO "A" is built not assembled. Simple to use—Just plug in at any 100 v. A.C. lamp socket—attach clips to battery—turn on current and

you have your own charging plant. Only one moving part, which will last for several thousand hours. The only Recharger with a one piece Removable Vibrator, can be replaced by a child. Think of the convenience of not having to carry your battery to the



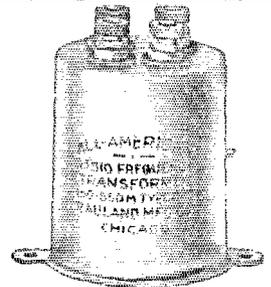
Service Station this winter. The Battery will always be full of pep. A compact portable Recharging unit that will fully charge a 100 AH battery over night for 6¢ to 10¢. A useful and lasting Xmas Gift. Lasts a lifetime.

KING ELECTRIC MANUFACTURING CO., INC.
1631 FILLMORE AVENUE, BUFFALO, N. Y.



To Strengthen Weak Signals To Bring-in Distant Stations To Get the Full Joy of Radio

You will never know the full joy of Radio until you have hooked up to your set, a set of



“All-American” AMPLIFYING TRANSFORMERS (Radio and Audio Frequency)

Our Radio-frequency Transformer (Type R-10) brings in signals of 150 to 550 meter wave-lengths, and amplifies them many-fold, clear and sharp, largely eliminating static and other disturbances.

Our Audio Frequency Transformers amplify the detected signals, so that messages that would otherwise be audible only thru head-phones come in strong enough to be enjoyed by a roomful of people, thru a loud-speaker horn.

LIST PRICES

R-10—Radio Frequency (150-550 meters).....	\$4.50
R-12—Audio Frequency (Ratio 3 to 1).....	4.50
R-13—Audio Frequency (Ratio 10 to 1).....	4.75
R-21—Audio Frequency (Ratio 5 to 1).....	4.75

Send for Bulletin No. 22.



RAULAND MFG. CO.

35 So. Dearborn St., Chicago, Ill.



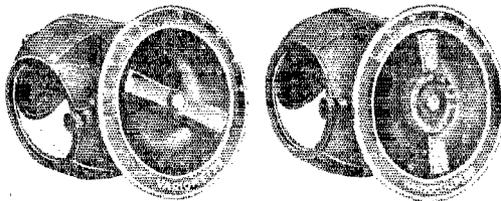
EISEMANN

THE advanced design of Eisemann radio units has met with instant favor wherever shown. The concave dial gives a mounting flush with panel. In appearance it is in marked contrast to the usual protruding knobs and dials. Another distinctive feature is the complete self-insulation of each part, making possible the use of a panel of wood, metal, or any other material.

Variometer

Both Rotor and Stator forms moulded of Bakelite. Extremely light in weight. Electrical losses reduced to a minimum.

Price each \$8.75



Variocoupler

The primary Tap Switch for tuning the antenna circuit is an integral part of the Variocoupler. No external switch, shielding, dial, or knob necessary.

Price each \$10.50

In addition to the units illustrated, other Eisemann products are Head phones, Vacuum Tube Sockets and Audio Frequency Transformers — all made to the highest electrical and mechanical standards.

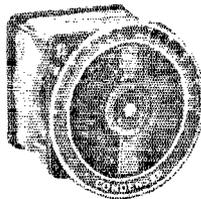
Variable Condenser

Balanced type

Rigidly constructed. Metal bearings front and rear. Rotary plates balanced, assuring constancy of setting. Vernier equipped.

Capacity .001 mfd.

Price each \$7.50



Variable Condenser

Unbalanced type

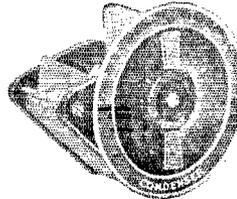
Aluminum plates accurately spaced eliminating any possibility of "shorts" between plates and assuring a more constant air gap. Vernier equipped.

Capacity .001 mfd.

Price each \$7.00

Capacity .0005 mfd.

Price each \$6.50



A combined Filament Rheostat and Potentiometer, with concave dial which conforms to the design of the parts illustrated, is now in course of preparation.

Write for Descriptive Folders.

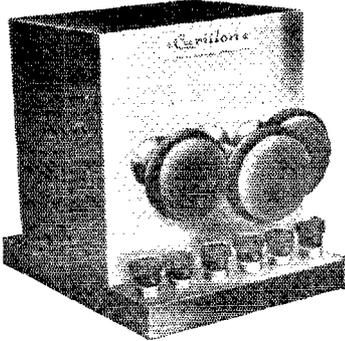
EISEMANN MAGNETO CORPORATION

William N. Shaw, President

DETROIT

BROOKLYN, N. Y.

CHICAGO



Carillon

CONDENSERS — 2 in 1; 3 in 1 “The Charge Resides In The Dielectric”

Invaluable to Experimenters

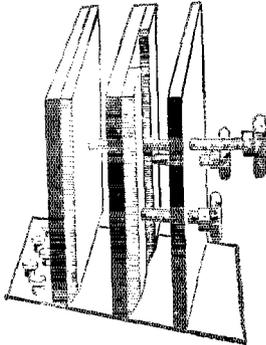
The charge if provided with the best dielectric for its movement needs but a small amount of metal, and all metal in excess means loss in signal strength by the amount of loss in eddy currents and radiation on all edges and surfaces not acting in the field of the condenser.

This condenser was designed with the object of reducing losses in electrodes, providing a concentrated field to avoid exterior radiation and the securing of a slow variation of capacity with a fair manual effort.

Write for Booklet.

CARILLON INSTRUMENTS
Marblehead, Mass.

All novel features protected under patent pending claims.



AMATEUR

RADIO CALL BOOK

Complete Radio Directory

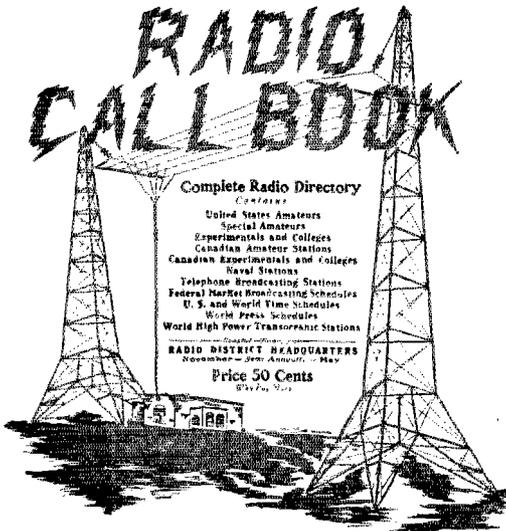
Contains

United States Amateurs
Special Amateurs
Experimentals and Colleges
Canadian Amateur Stations
Canadian Experimentals and Colleges
Naval Stations
Telephone Broadcasting Stations
Federal Market Broadcasting Schedules
U. S. and World Time Schedules
World Press Schedules
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RADIO DISTRICT HEADQUARTERS

Price 50 Cents

1924, 1925



Amateur Radio Call Book

FIFTY CENTS

Why Pay More

Contains all changes of address, Re-assigned Calls, Cancelled Calls—right up to date of issue—way ahead of any other Call Book at any price. Complete up to date Canadian list. Buy one, look it over, if it isn't the best you have ever seen, write us, money cheerfully refunded, at your dealer or direct from us. Postpaid.

Citizens Radio Service Bureau

416 S. Dearborn Street, Chicago

Dealers, write for Guaranteed Sales Plan.

SPECIAL RADIO EQUIPMENT

Prices Quoted Upon Receipt of Specifications
Machine work and panel drilling. Plans and diagrams made for special receiving and transmitting sets.

OLIVER S. EVERETT

83 Otis Street

MEDFORD, MASS.

JOY-KELSEY CORPORATION

Manufacturers

RADIO EQUIPMENT

4021 West Kinzie St. Chicago Ill.



Claudell L. Yates

The SANDMAN'S STORY



Catalog Number Four contains marvelous article on tuning Receiving Sets. 10 cents brings it to you

On a Tuska Radio Receiver, every evening you can hear "The Sandman's Story". This delights the children. Later comes entertaining Radio Broadcasting for grown-ups.

Tuska Radio will bring dependable broadcasting into your home. A Tuska Radio Receiver makes a wonderful Christmas Present.

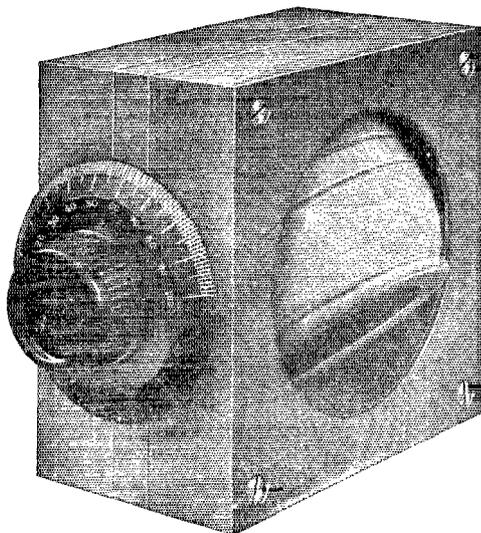
Tuska Radio is substantial, reliable, dependable and recognized. Inspect today at your dealer's.

THE C. D. TUSKA COMPANY
 33 Bartholomew Ave. Hartford, Conn.
 Pacific Coast Office, 711 Mission Street, San Francisco, Calif.

TUSKA RADIO

Established 1911

VARIOMETER-SPECIAL OFFER!



We have in stock upwards of 2,000 high-quality Variometers exactly like the illustration, which we desire to dispose of at the sacrifice price of

\$2.00

Without

Dial

These instruments have sold right along for \$6.00 and we offer this bargain to dispose of our stock for the reason that we have developed a Bakelite Variometer which will shortly appear on the market. This price is so low that we cannot afford to supply the dial which appears on the illustration.

The Variometer is made of African Mahogany and designed for wavelengths, 200-600 meters. The Rotor is boiled in paraffin and water proof. All windings are permanently fastened. A high-quality device in every way.

Sign coupon and send with cash or money order for any quantity desired while they last.

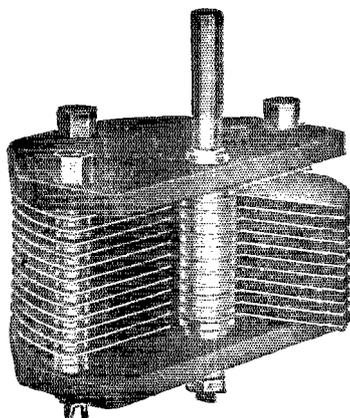
PECK & COMPANY

P. O. Box 121, Sta. A.

HARTFORD,

CONN.

Name.....
Street.....
City & State.....



MAXIMUM



EFFICIENCY

A Variable Condenser that is superior in electrical characteristics and mechanical ruggedness.

ELECTRICAL CHARACTERISTICS

Large insulating end plates cut from sheet insulating material which provides minimum dielectric losses. Perfect electrical contact.

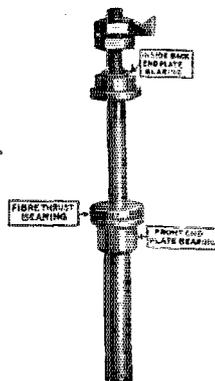
MECHANICAL FEATURES

Carefully fitted metal bearings on both ends of shaft. Adjustable Rotor Shaft Bearing.

Perfect alignment of parts. Remarkable smoothness of operation—ideal for tuning in CW reception circuits.

PRICES

3 Plate Vernier	\$2.00
11 Plate .00025 mfd.	3.15
23 Plate .0005 mfd.	3.50
43 Plate .001 mfd.	4.50



Shaft and Bearings used in MAXEPP Condensers

THE HIGGY-AVERY CO.,

1199-1205 Franklin Avenue, Columbus, Ohio

If your Radio Dealer cannot furnish you with "MAXEPP" Condensers send us your order with remittance and we will supply you postpaid.

COMMERCIAL RADIO

An interesting profession that takes you to all parts of world. Prepare through a school with a reputation for efficiency. Arc, spark and tube. Day and evening classes. Positions guaranteed.

Send 10 cents in stamps for catalog.

COMMERCIAL RADIO INSTITUTE
10 East Centre Street, Baltimore, Md.

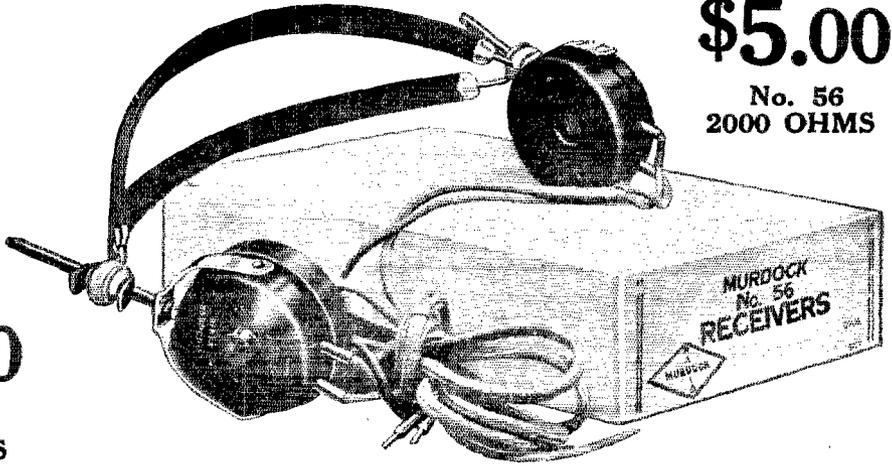
FOR SALE

- 1—Two variometer type Regenerative Tuner \$20.00
- 1—Type MP-100 DeForest Regenerative Tuner, Detector and 1-Stage Amplifier... 50.00
- 1—"International" Motor Generator 525 Volt 40.00
- 5—22½ Volt B Batteries.....each 1.35
- 1—45 Volt B..... 3.00
- 1—Magnetic Modulator 8.00

THE RICHMOND PALLADIUM
RICHMOND, INDIANA

\$5.00

No. 56
2000 OHMS



\$5.50

No. 56
3000 OHMS

CHRISTMAS!

Seventeen years ago you could have given Murdock Phones as Christmas gifts.

You can do so this year with the absolute assurance that any radio enthusiast will be mightily pleased to receive a genuine Murdock Headset for Christmas.

You well know how essential extra head phones are when friends come round to "listen in"—so fix up your friends with an extra set for a Christmas gift, and get a set for yourself.

SOLD BY DEALERS EVERYWHERE

*Sent direct on receipt of price if
your dealer does not carry them.*

WM. J. MURDOCK CO.

343 Washington Ave.,
1270 Broadway
New York

Chelsea, Mass.
509 Mission St.
San Francisco

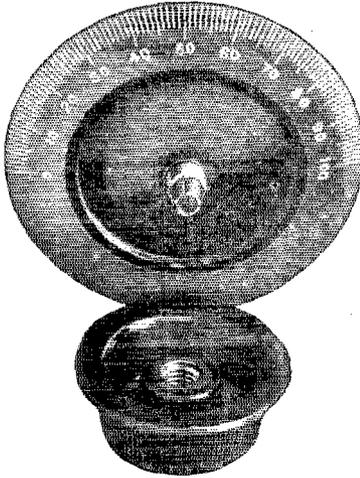
MURDOCK PHONES

STANDARD APPARATUS SINCE 1904

ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS



The Only Knob and Dial Without a Set-screw



The unsightly and troublesome SET-SCREW is at last eliminated. No more splitting the head of the set-screw or stripping of threads, perhaps ruining the dial.

To mount the TAIT-KNOB-AND-DIAL simply hold the dial with one hand and screw on the knob with the other: a few seconds does it. No tools are necessary. When fastened it is self centering and self aligning.

This beautiful patterned KNOB-AND-DIAL is made of the best grade of Bakelite.

To those building their own sets—Don't fail to use this dial. It is REVOLUTIONARY in its field and is the PEER of all KNOBS-AND-DIALS. If your dealer has none write

us, and we will refer you to one who has.

Dealers—If your Jobber is not stocked up write us and we will refer you likewise.

Price—3"\$1.00
Price—4"\$1.50

We Sell Strictly to Manufacturers and Jobbers—whom we invite to write us for samples and discounts.

TAIT KNOB & DIAL COMPANY

Incorporated

11 East 42nd Street. Dept. Q. New York

Phone Murray Hill 0341

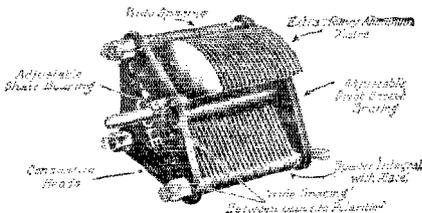
Patented June 20, 1922

Why Cole Condensers Are Better!

Spacers integral with
Stator Plates

THE spacer and the stator plate are all one in Cole Variable Condensers. Stator and rotor plates are equi-distant at every point on the dial to the half-thousandth of an inch. No chance for buckling, or loosening. Just one of many exclusive features of marked superiority. Made by well-known radio manufacturers of 17 years experience. Laboratory tested. Write today for interesting circular.

A. B. COLE, Inc.
88 E. Kinney St.
Newark, N. J.



Loud Speaker \$1

\$1

Adapter

Hear all broad-casting through phonograph. Make your own horn. Attach B-R Phonadapter to YOUR phonograph. All can hear. Entire family, neighbors, guests can hear opera, lectures, latest news, with this adapter. Stretches over receiver of Baldwin or Brandes type head-set and attaches to tone-arm of ANY phonograph. Made of soft, pure gum rubber. Quickly attached and removed. Thousands in use. Absolutely no voice distortion. For single receiver.....\$.75
For pair of receivers (more than twice the volume) \$1

Amplitone Loud Speaker

An inexpensive, loud speaking horn especially adapted for home use. Ample volume. Quality tones. Throat of horn consists of successive sound expansion chambers. Each chamber amplifies previous one. Furnished either with single or double B-R Phonadapter. Price \$8 only.....\$8

Bell Horn

A Bell Horn with ball swivel. Turns up, down, to side—any angle desired. Automatic adjustment. Very simple. No screws, thumb nuts, etc. Black finish. Complete, with phone, ready to attach to two stage amplifier.....\$15

The Beckley-Ralston Co.
1827So. Michigan Ave.
Chicago, Ill.

Go to your dealer. If he cannot supply you send money order, check or currency at our risk. Prompt delivery—postpaid. Also send us name of favorite dealer.



The Future of RADIO

The fun and entertainment that you and your friends get from Radio should never be marred by failure of your apparatus to properly do its part—and it won't fail if it is properly made.

The Radio "fans" of today will be the Radio experts of the future—*provided* the equipment used *now* gives service and satisfaction. If you are interested—much or little—in Radio, don't let inefficient equipment discourage you. Insist on SIGNAL parts and SIGNAL sets.

Every SIGNAL item is made in a factory that has grown up with "wireless." One of the earliest manufacturers of such equipment, SIGNAL offers you, now, Radio parts and Radio Sets that are *right*, and are *dependable*. To insure getting all there is—to be confident that nothing goes by you without your consent—say SIGNAL, and stick to it, when you buy equipment of any kind.

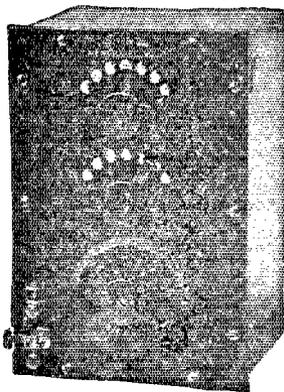
SIGNAL Electric
Mfg. Co.

Factory and General Office
1915 Broadway, Menominee, Mich.

Atlanta, Boston, Cleveland, Chicago, Minneapolis,
Montreal, New York, Pittsburgh,
St. Louis, San Francisco, Toronto.

You'll find our local address in your Telephone
Directory.

(1922)



Signal Units

For the amateur, and also the rapidly growing commercial field, we have developed an entirely new line of apparatus, in which is incorporated the very latest advancement of the science of Radio.

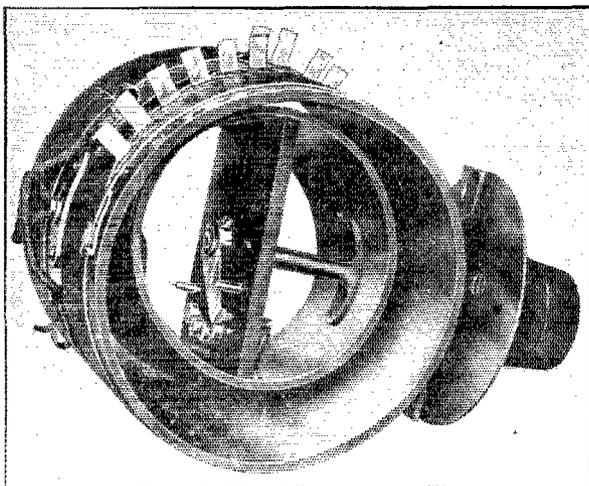
Each individual unit is primarily a separate and distinct device, complete in itself, yet by adding one to another any combination may be obtained, from the simple crystal detector through all the stages of radio-frequency and audio-frequency amplification.

Seasoned knowledge and experienced handicraft are built into these units—the product of a plant and an organization whose history in Radio dates back to the earliest days of "wireless."

Coupon for Guide to Radio Satisfaction

SIGNAL ELECTRIC MFG. CO.,
1915 Broadway, Menominee, Mich.

Please send, without obligation, your interesting book about SIGNAL parts and sets, to the name and address written in the margin of this page.



IMPROVE YOUR SET

—By—

Installing a Clarion
Variocoupler. The In-
crease in Selectivity
Will Please You.

Windings—Green Silk Wire
Shells—Non-shrinkable
Hardware—
Lacquered Brass

\$8.00

At Your Dealers or
Parcel Post Prepaid

PAT. APPLIED FOR
SECONDARY HAS FIVE ADJUST-
MENTS CONTROLLED BY DIAL
YOU CAN TUNE THE SECONDARY

CLARION RADIO SHOP

347-349 MAIN ST.

POUGHKEEPSIE, N. Y.

*The Newest Book on
The Newest Subject*

INCREASING RADIO EFFICIENCY

Through

SUPER-REGENERATION

REVISED EDITION

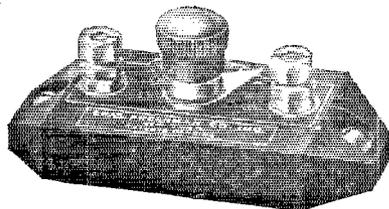
A direct, simple explanation
of the newest radio inven-
tion; its methods, circuits
and operation. Complete and
thoroughly practical. First
article of this kind pub-
lished.

\$1.00

At Bookstores, Radio stores or by mail

RADIO CONSULTATION BUREAU
Plymouth, Mass.

*The Latest and Most Essential
Part of an Efficient Tube Set*



Variable Grid Leak and Micon Condenser

(combined)

Obtainable in an unbroken range
from zero to 5 megohms—all inter-
mediate points. Fixed capacity—
.00025 M.F. Will improve your set
wonderfully by

*Clarifying Signals
Lowering Filament Current
Increasing Battery Life
Eliminating Hissing*

Price **\$1**
Only

At your dealers; otherwise
send purchase price and you
will be supplied without
further charge.

CHAS. FRESHMAN CO., Inc.
97 Beekman St., New York City
Home of Micon and Antenella

Lest you forget!

The Acme Apparatus Company

makes both RECEIVING and TRANSMITTING apparatus

SO RAPID have been the strides of radio in the past year, so popular has the demand for radio supplies become, so many and different types of apparatus have been hastily thrown upon the market that today even the experienced amateur is occasionally at sea in making a choice of his apparatus.

The Way to Choose

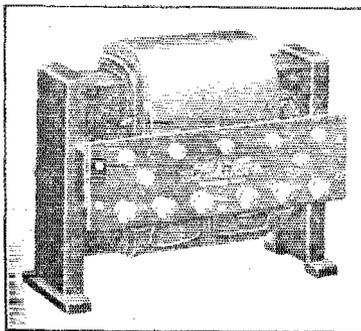
OUT of this fog of conflicting claims of untried and unknown products it is wise to be guided by the compass of past experience. Concerns like the Acme Apparatus Company who have weathered the storms of many a lean and trying year without deviating one iota from their standards of careful painstaking production are those upon whom

you should pin your faith. You can rely upon their products because of their good name. They have kept faith.

Other Acme Products

THE Acme Apparatus Company in addition to their line of RADIO and AUDIO frequency transformers are also manufacturers of amplifying units. In addition remember that they are still the FOREMOST manufacturers of C.W. transmitting apparatus of all kinds.

Reliable radio or electrical dealers stock Acme Radio Apparatus or can get it for you at twenty-four hours notice. The Acme Apparatus Company, Cambridge, Mass., U.S.A. New York Sales Office 1270 Broadway. Send for Bulletin T.

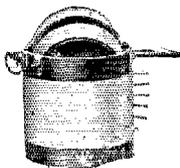


Acme C.W. Power Transformer
Price \$20.00 East of Rocky Mts.

ACME

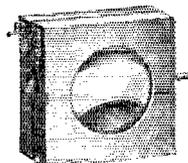
*for amplification
for transmission*

AMATEURS



BALDWIN
VARIOCOUPLER
150 TO 600
METERS \$5.50

20% DISCOUNT



BALDWIN
VARIOMETER
150 TO 600
METERS \$5.00

WILL BE GIVEN TO ONE
AMATEUR IN EACH COMMUNITY
WHO WILL SEND A COMPLETE LIST
OF ALL RADIO AND ELECTRICAL
DEALERS—THE LIST MUST BE

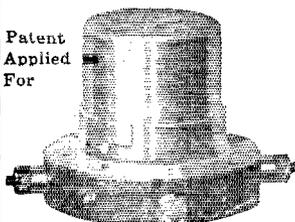
WRITTEN PLAINLY WITH THE CORRECT ADDRESSES. ON RECEIPT OF YOUR LIST WE WILL SEND YOU NOT MORE THAN 1 BALDWIN VARIOCOUPLER AND 2 BALDWIN VARIOMETERS AT A DISCOUNT OF 20% OFF THE ABOVE LIST PRICES. REMITTANCE SHOULD BE MADE BY MONEY ORDER. OUR NEW CATALOGUE CONTAINING THE LATEST DIAGRAMS, PREPARED BY OUR ENGINEERING DEPT. WILL BE SENT ON RECEIPT OF 12 CENTS IN STAMPS. THIS CATALOGUE WILL ENABLE YOU TO BUILD A COMPLETE RADIO RECEIVER WITH EXPERT ENGINEERING ADVICE.

BALDWIN RADIO ELECTRICAL MFG. CO. INC.

684-691 BERGEN STREET,

BROOKLYN, N. Y.

Patent
Applied
For



\$4.50

Postage
10c

RHAMSTINE^{*}

RADIO FREQUENCY TRANSFORMER

A handsome, efficient unit, of the high Rhamstine^{*} standard

The bayonet mounting allows changes of transformer instantly for the other wave lengths, without disturbing base or wiring.

The type 1 R.F. Transformer, with its range of 200 to 500 meters, gives best results with the present broadcasting wave lengths.

We will gladly send descriptive folder.

Manufactured by

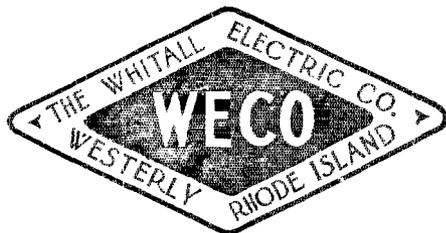
J. THOS. RHAMSTINE^{*}

2152 E. Larned St., Detroit, Mich.

^{*}Maker of Radio Products

SERVICE

SATISFACTION



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W**W**

Put YOUR Electrical Instrument Problems Up to WESTON

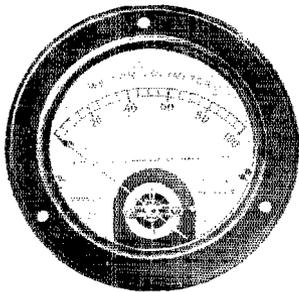
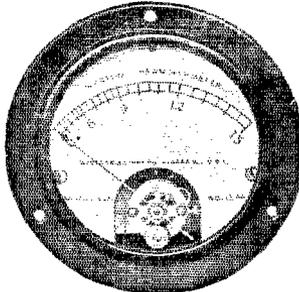
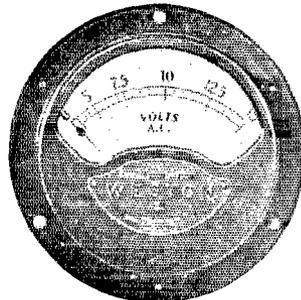


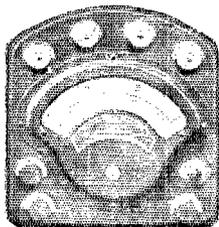
Plate Voltmeter



Thermo-Ammeter



A. C. Voltmeter



Volt-Ammeter

There is a Weston Indicating Instrument to meet every Radio need whether it be for Reception or Transmission. Voltmeters, Ammeters, Milliammeters, Thermo-Ammeters and Thermo-Galvanometers, in low or high range or in small or large size are available for the amateur, advanced experimenter or commercial station. Whatever your special requirement or problem may be, get in touch with us and let us send you full particulars and prices on the instrument or instruments exactly suitable to your needs. Weston 280 Volt-Ammeter is also specially designed for testing tube characteristics, general circuit conditions, for measuring resistance, filament voltage, plate voltage, etc.

Booklet J, and other Radio literature describes and illustrates these various Weston instruments. Everyone interested in Radio should have this important data. Write for it to-day.

Weston Electrical Instrument Co.

158 Weston Ave.,

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Electrical Indicating Instrument Authorities since 1888

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"STANDARD" The World Over
**ELECTRICAL
INSTRUMENTS**

*An Indicating
Instrument for
Every Individual
Need and Industrial
Purpose*

Warren Head Sets



Specialists in Head Sets
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The WARREN

is best for

BROADCAST RECEPTION

Our phones are scientifically designed by our Engineer who has made telephony a study for the past twenty-two years.

It is an instrument of the very highest grade in every respect, electrically and mechanically.

The Head Set with the manufacturer's guarantee back of it.

2000 Ohms

\$7.00

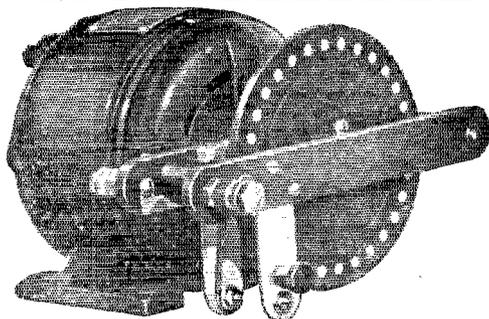
3000 Ohms

\$9.00

Attractive discounts
to Jobbers and
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WARREN RADIO PHONE MFG CO. Inc
WARREN, RHODE ISLAND U.S.A.



Patent Applied for

Don't sit up all night trying to get the other fellow.

Buy a *Robertson-Detroit Chopper* and get him quickly.

See ads. in October and November QST.

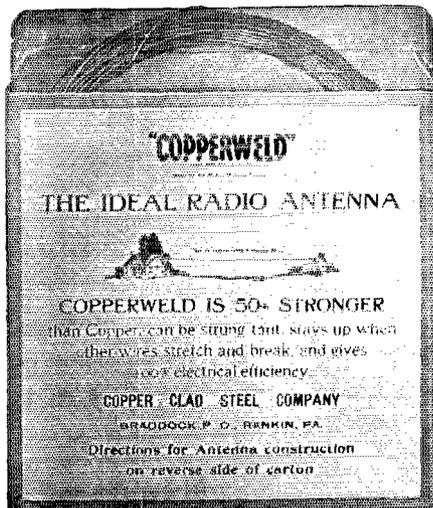
If you have a motor we will make you a Chopper Wheel with brushes and binding posts mounted on Bakelite. Send size of shaft, type and speed of motor for price and bulletin.

Ask for bulletin of our *Synchronous Rectifiers* and combination Rectifiers and Choppers.

Dealers please write for terms.

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409 East Congress St., Detroit, Mich.

Used and Recommended by
the Largest Radio Concerns



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RADIO

FOR BETTER RESULTS USE

EVEREADY

"A" and "B" BATTERIES
WITH YOUR RADIO SET

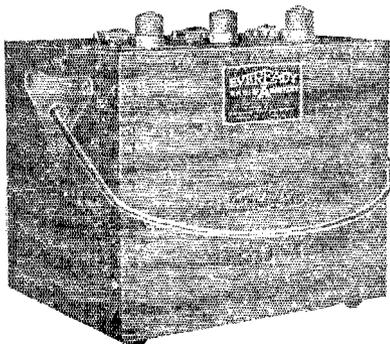
EVEREADY "A" BATTERIES

- No. 6810 50 Amp. Hrs. \$15.00
- No. 6860 90 Amp. Hrs. 18.00
- No. 6880 110 Amp. Hrs. 20.00

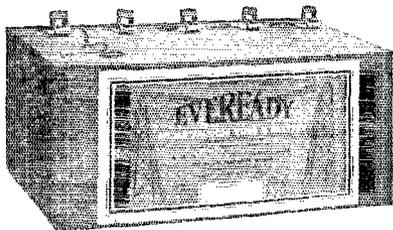
- Hardwood Box, Mahogany Finish
- Convenient Handle, Nickel Plated
- Rubber Feet, Protect the Table

No Accidental Short-Circuits

All Eveready "A" batteries are equipped with a 4 volt as well as a 6 volt terminal, making it possible to use either 6 volt or 4 volt vacuum tubes in your set



EVEREADY "B" BATTERIES



No. 766—15 Cells—16½ to 22½ Volts
(1½ Volt Steps) \$3.00

No. 763—15 Cells—16½ to 22½ Volts
(1½ Volt Steps) \$1.75

—because of limited capacity, due to small cells, No. 763 is recommended only where light weight and small space are essential

No. 767—30 Cells—16½ to 22½ Volts
(1½ Volt Steps) with a 45 Volt Tap
for the Amplifier Tubes . . . \$5.50

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(1½ Volt Steps) with a 45 Volt Tap
and a 108 Volt Tap \$15.00

Guaranteed to be Absolutely Noiseless

Columbia Ignitor Six-Inch Dry Cells Equipped with Fahnestock Connectors

Columbia Dry Cells are suitable for the filament or "A" circuit of Westinghouse WD-11 Vacuum Tubes, which require one six-inch dry cell per tube

Visit our Exhibit, RADIO SHOW Space 56, Grand Central Palace, New York

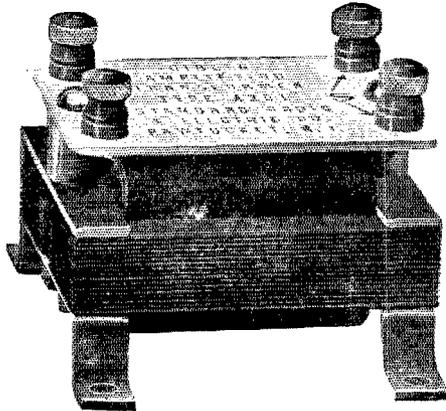
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Designed for use with standard amplifying tubes. Maximum amplification without noise or distortion.

May be placed in any position without pro-magnetic coupling or squealing.

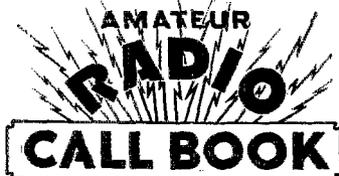
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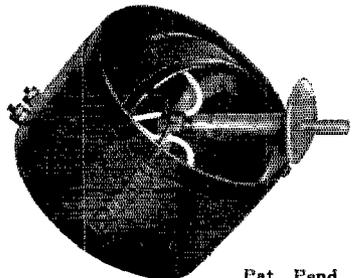
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Send for complete description. Circular C.2.

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Hear it Loud and Clear-Toned!—

THE most expensive set—the best circuit, the newest apparatus carefully tuned, will not give maximum results unless your receivers are good. "Red-Heads" in the seven years they've been on the market have met every critical test of Radio. Designed by radio engineers. They are sensitive. They are accurately made. They are durable and will hold their sensitiveness.

At the new low price of \$6.50 they are without a doubt today's biggest value in high-grade Radio Receivers. You take no risk when you buy "Red Heads". Send the coupon today—

3000 ohms Complete with military head-band and cord.

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Also producers of "NAA" Arlington Tested Detector Crystals and Teagle Line of better radio apparatus. Send for descriptive bulletins.

At your dealer's or sent direct on receipt of price.
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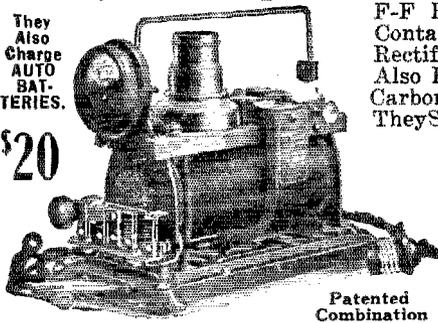
RADIO "A" & "B" STORAGE BATTERIES CHARGED AT HOME F-F RADIO RECTIFIER

FOR A FEW CENTS, FROM ANY 100 to 130 Volt 60 Cycle LAMP SOCKET, WITH AN

It Charges All 6 Volt RADIO "A" & AUTO Batteries; & RADIO "B" Storage Batteries Up to 120 Volts, In Series Inductively. Disconnecting Unnecessary. Nothing to Slop over, Burn Out, or cause trouble and It Will Charge a Dead Battery. They Charge Automatically, Operating Unattended. Leave Battery wherever it is, without even disconnecting it; Screw Plug in Lamp Socket, Snap Clips on Battery Terminals; Turn Switch & Battery will be Charged in the morning. Is it not gratifying to feel that Your Radio Batteries will never fail & You are always Ready to Receive RADIOPHONE Broadcast Music, Sermons & News; never having to be careful of or to tell Friends Your Batteries are dead?

They Also Charge AUTO BATTERIES.

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Patented Combination

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Even eventually You Will Buy An F-F Rectifier. Why Not Now? It Costs You Less To Buy a Booster Than To Be Without One. All Types But B charge Auto Batteries. The Larger Types are for heavy Batteries, or Where Time is limited. Shipping Weights Complete With AMMETER & BATTERY CLIPS 11 to 15 lbs. Purchase from Dealer, or Mail Check for Prompt Shipment. If via Parcel Post add Postage & Insurance Charges. Or have us ship C.O.D. Other F-F Battery Boosters charge Batteries from Farm Lighting Plants & D.C. Circuits & For GROUP CHARGING use our 12 Battery 5 Ampere Full Wave Automatic ROTARY Rectifier described in FREE Bulletin No. 81A. ORDER Now or WRITE Immediately for FREE BOOSTER Bulletin No. 81.

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2000 ohm Head Sets \$5.50
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"When You Listen in With ELWOOD, You Get it ALL"

Get all that's coming. Get it clear and distinct, even under interference conditions which prevent other listeners with other than Elwood Head Sets from getting it as you do.

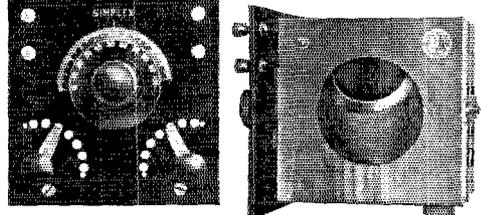
Try an "Elwood." You'll never be wirelessly happy until you're using one.

2000 ohm sets \$5.50, 3000 ohm sets \$6.50. Send your order to us if you cannot be supplied by your dealer. Above prices will include delivery.

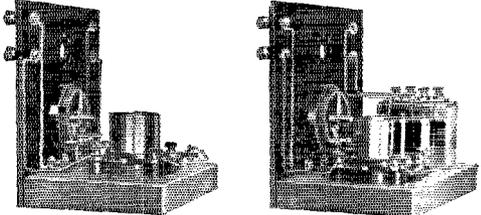
ELWOOD ELECTRIC CO. INC.

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SIMPLEX—that's your safeguard



VARIO-COUPLER PANEL VARIOMETER PANEL



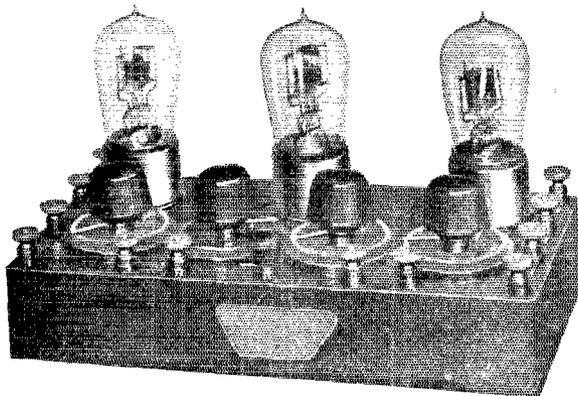
DETECTOR PANEL AMPLIFIER PANEL

Also Unmounted Variometers & Variocouplers

Simplex Panel Units make it possible to try out many different hook-ups without disassembling panels. These highly perfected units eliminate much of the uncertainty of success in receiving radio broadcasts because they have been designed by men having years of experience in radio activities. Get them from your dealer.

SIMPLEX RADIO CO.

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Just What the Readers of QST have been hoping for

—a simple, more practical, more dependable, more efficient detector-amplifier—and it's *visible*.

Compact—only 5 x 10 inches, no awkward box or cabinet.

Pure toned—all conductors are extremely short, and so arranged as to avoid the customary local capacity effects.

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Durable—a solid block of Bakelite, rugged in construction to withstand long use, and fool-proof against rough handling.

Selective—separate controls for each tube and has improved potentiometer for fine tuning.

Complete—fully wired and ready to connect into any circuit, embodies every known essential to perfect detection and two-stage audio frequency amplification. Has cut-off switch for the A battery.

Adaptable—used with any tuner or tuning circuit from the simplest coupler to the highest type of regenerative or super-regenerative hook-up; simple to connect, always giving superior signals.

Simple—being designed for straight 2-stage amplification, it eliminates the intricate wiring, troublesome switches and jacks, and many possibilities of loose contacts found in *all* amplifiers wired for intra-stage connections.

Visible—all tubes in full view, where their operation and condition may be always seen without “peeping through a knot-hole” or “lifting the lid.”

Fine looking—its Bakelite base, polished nickel fittings, improved design knobs, and all details make it look like what it is—a really FINE instrument.

The retail price of the Betts Visible Type D2A is \$38.50. Orders by mail will be handled in the order of their receipt, being referred to dealers for immediate delivery in territories where dealers are now supplied, or being shipped prepaid direct in territories where dealers are not yet supplied.

BETTS & BETTS
CORPORATION

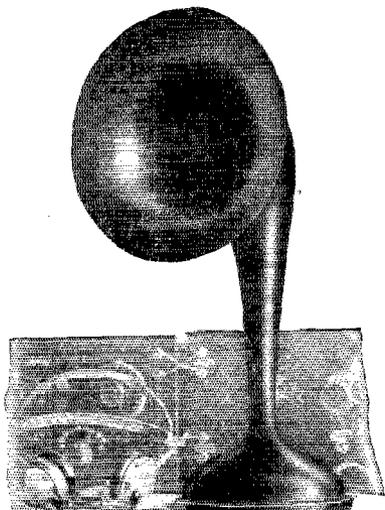
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QUALITY FIRST

The Roller-Smith loud speaker comprises two special receivers built **permanently** into a heavy cast aluminum horn. By matching the receivers as a pair and the pair to the horn we attain the quality of reproduction which characterizes a fine phone, combined with volume sufficient for any average room.

You will be surprised to hear the difference between it and the raucous shouter type or it and the fish horn squawker.

No batteries required.

Handsome black crystalline enamel finish.

Price, but eighteen dollars.

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Electrical Instruments, Meters and Circuit Breakers



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*Eventually you will
buy better apparatus—*

The AMERTRAN

**super audio frequency
amplifying transformer**

WHEN a man interests himself in any hobby, such as photography, automobiles, or what not, he usually starts in by buying cheap, crude equipment. Immediately he begins to realize that he wants better equipment, more skillfully designed apparatus.

It is the same with radio. Profit by your own experience in other matters and decide now that you will not be so handicapped.

The AMERTRAN has the greatest amplification (38.6 in one stage with Radiotrons)* and is without distortion over the whole range of audio frequencies.

*Send for leaflet #975.

Price \$7

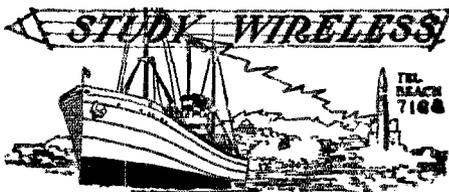
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American Transformer Company

*Designers and builders of radio
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IN making itself undisputed leader in New England, our school has become prominent *nationally*.

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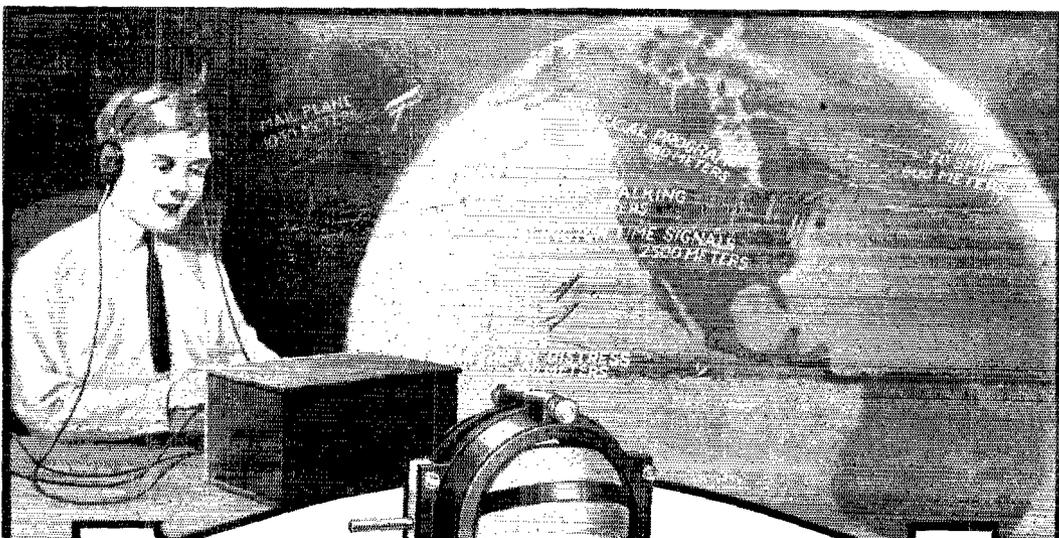
Students may enter at any time.

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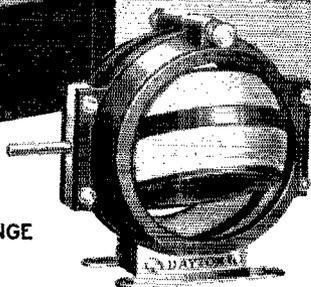
Formerly Boston School of Telegraphy, Est. 1908
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ON THE WHOLE RANGE



WITH A BACK WOUND
DAYFAN VARIOMETER

The World Is Getting Smaller Every Day

DAY-FAN Variometers and Variocouplers make the world still smaller with their exceptional *range* of wave lengths.

Assemble your own sets with DAY-FAN Radio apparatus, so you can change the arrangement as needed to meet the developments that are bound to come.

Write for Complete Catalogue, free, and mention dealer's name and address.

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Factory and General Offices

602 Day-Fan Block, Dayton, Ohio

Established 1889



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ALL DAYFAN RADIO
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POSACO RADIO

QUALITY AND EFFICIENCY

VERNIER CONDENSER WITH SINGLE KNOB CONTROL

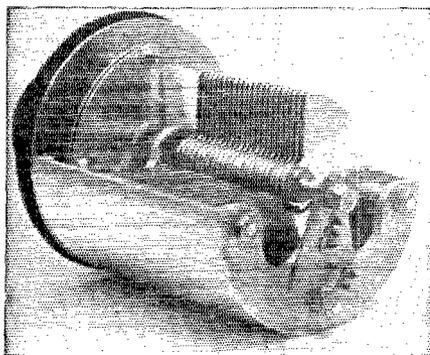
Especially Adapted to the New Armstrong Super-Regenerative Circuits in which Variable Condensers Play an Important Part and in which fine adjustments are Absolutely Essential.

B-1 .001015 MFD. \$7.50

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Constructed With the Same High Standard of Quality in Materials. Workmanship and Design As Our Regular Variable.



NEW MODEL. Improved Construction and Design. Gives Maximum Rigidity, Thus Insuring Permanence of Alignment and High Efficiency in Operation.

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A-3 .00025 MFD. \$3.50

A-4 .000045 MFD. \$3.00

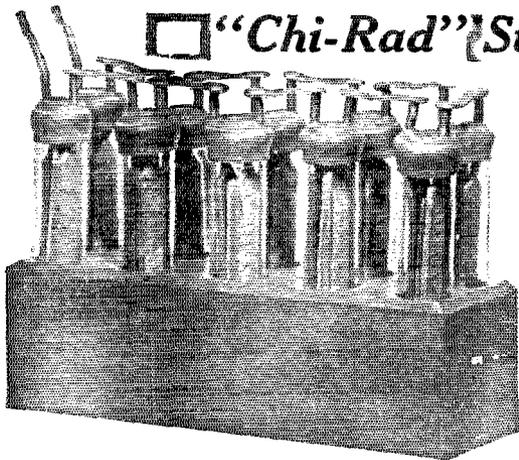
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THE C. D. POTTER CO., Stamford, Connecticut

POSACO RADIO

“Chi-Rad” Storage “B” Battery



built for service. Absolutely unequalled in quality and price—half the cost of the cheapest well-made storage “B” battery. Better and cheaper than dry cell “B” batteries because rechargeable.

Will operate a tube approximately 1,000 hours on a single charge. Recharged over night with “Chi-Rad” Storage “B” Battery Charger at a cost of about 5¢.

No noises or leakage losses with “Chi-Rad” Storage “B” Batteries. Guaranteed for service, or to be returned at our expense. Order your battery NOW.

No. 110 “Chi-Rad” Storage “B” Battery
22 volt section (mounted) \$6.00
2.2 volt section (single cell) .50
No. 110a “Chi-Rad” Storage “B” Battery
Charger 1.90
(Order by number)

Write for your free copy of our new catalog

Dealers: write for territory on “Chi-Rad” radio parts and sets,—the demand’s increasing steadily.

Chicago Radio Apparatus Co.

415 S. Dearborn Street,

Chicago

\$13⁶⁰ That's All for a Willard "A" Battery

Here's a Christmas present that will go big, you can be sure—with yourself or anyone else who has a radio set.

It's a genuine Willard "A" Radio Storage Battery at the lowest price for which a Willard Radio "A" Battery has ever been sold.

And when we say genuine Willard we mean just that, for this new battery is fit in every detail to bear the name. We are no less proud of producing such a good battery to sell at such a low price than of being the makers of the popular Willard All-Rubber Radio Batteries, the last word in radio battery construction.

Why This is a Real Willard

It is made in the same plant and by the same men who make the higher-priced Willard batteries for both radio and automobile service, and with the same care, skill and experience.

It has Willard quality plates, selected wood separators, tested rubber jars, acid-proofed container.

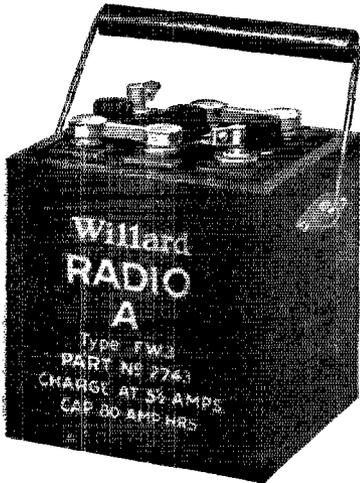
It includes such features as special terminals to insure easily-made and tight connections; special marking for positive terminal; patented rubber gaskets to prevent leakage; a convenient durable roller-type handle, and other advantages.

All Willard Radio Batteries, too, are shipped from the factory dry and fully charged, so that you always get a brand new battery ready for use just as soon as the acid solution is poured into it.

Go to the nearest Willard Service Station or your dealer's today and see this new Willard Battery.

WILLARD STORAGE BATTERY CO.
Cleveland, Ohio

Made in Canada by the
Willard Storage Battery Co. of Canada, Ltd., Toronto, Ont.



It's Made in 3 Sizes!

This new battery—the Willard FW—is of the 6-volt type and made in three sizes, 40, 80 and 110 ampere hour capacity. They are priced as follows: 40 a. h., \$13.60; 80 a. h., \$17.50; 100 a. h., \$22.00. A slight addition to these prices is made in the extreme south and west of the Mississippi.

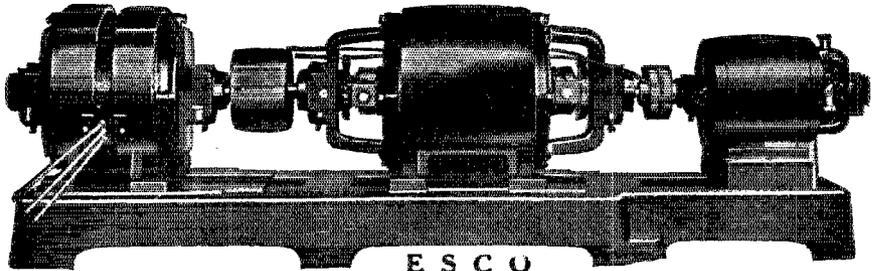
Willard STORAGE BATTERY

ESCO

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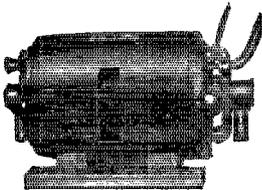
QUALITY ALWAYS HAS BEEN, AND ALWAYS WILL BE, THE WORLD'S SAFEST INVESTMENT



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BULLETIN 237 LISTS OVER 200 COMBINATIONS
Special Apparatus Developed for Special Requirements
MOTORS—DYNAMOTORS—GENERATORS—MOTOR-GENERATORS

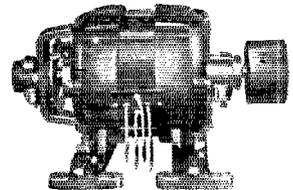
Sold by Principal Dealers Everywhere



Electric Specialty Co.

215 South Street

Stamford, Conn., U.S.A.



\$5.00



\$7.50

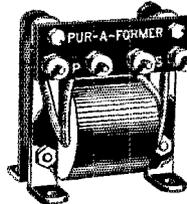
For perfect reception there is no phone like the "Royal-fone" King of All at either \$5.00 or \$7.50. Either phone will make an appreciated Christmas gift, something that anyone will cherish for a long time.

A "Royalfone" is a satisfied gift because it is guaranteed.

We will take care of you if there is no dealer in your vicinity.

ROYAL ELECTRICAL LABORATORIES
207 Market St., Newark, N. J.

Royalfone



PUR-A-FORMER
\$350

Here's an audio amplifying transformer without any frills or fancy finishes—just solid honest value. The PUR-A-FORMER is compact and strongly built—amplifies without howl or distortion. Takes minimum space in your set and will produce results equal to many selling at double the price. Winding ratio $4\frac{1}{2}$ to 1. Buy them at all good dealers.

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DEALERS ONLY—

Write for Harry Alter's RADIO "POCKET-BOOK." A net price catalog of radio supplies published each month. Our wholesale prices hit bottom. The RADIO "POCKETBOOK" sent free to dealers only. Use your letterhead.

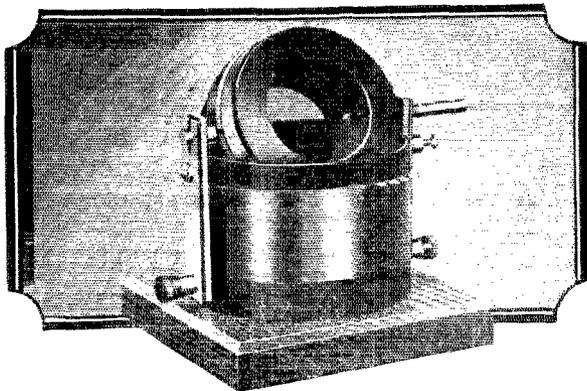
HARRY ALTER & CO.

126 No. May Street, Chicago

We Sell To Dealers Only

Thoro-bred

RADIO PRODUCTS



How to tune-in without the "birdies"

HISSING, sizzling and similar noises have been such a common experience of the radio amateur while tuning in that they have been nicknamed the "birdies." This nuisance can be eliminated. The Thoro-bred Vario-Coupler in addition to the usual services has the added feature of tuning in so closely that the "birdies" are driven away. Ordinary vario-couplers have a tap brought out for connection purposes only at every six or seven turns of the primary. The Thoro-bred Vario-Coupler has each of the first seven turns tapped one turn at a time and the balance of the primary tapped every seven turns. This close-tuning feature scares the "birdies" away. It also saves you the expense of a variable condenser.

Each tap on the primary has a 3" lead insulated with cambric tubing. This permits making connections to contacts without using soldering iron. There is a directly positive connection to the secondary which eliminates all scratchy noises when in operation.

The Thoro-bred Vario-Coupler is molded. It is not subject to moisture as are the common wooden types. Distributive capacity is eliminated through the use of special green silk wire in both the primary and secondary. *For only five dollars* you can now buy the Thoro-bred Vario-Coupler from your nearest radio or electrical store. If for some reason your dealer cannot supply you, send the money direct and a Thoro-bred Vario-Coupler will be mailed you parcel post prepaid.

THE MARSHALL-GERKEN CO.
Toledo, Ohio, U.S.A.

THE MARSHALL-GERKEN CO.
Toledo, Ohio, U.S.A.

My dealer was unable to supply me with a Thoro-bred Vario-Coupler. Please send me one parcel post prepaid. I enclose five dollars.

Name..... City.....

Street..... Dealer's Name.....

BUILD YOUR OWN RADIO

The Radio Specialty Company—RASCO for short—specializes in small orders; in fact, 50% of our orders are less than one dollar. 24-hour service guaranteed.

This Company specializes in small parts for radio, selling only the highest class of materials. This Company is aware of the fact that very high prices prevail in radio now. By buying material from us you not only save anywhere from 50 to 75% on the cost of the instruments, but you have the fun and instruction of making them yourself. Our quick, 24-hour service means satisfied customers. We have no Complaint Department. Hundreds of letters such as the following, unsolicited, are in our files:

41 Rodney St., W. St. John, N.B.
Dear Sirs:

Enclosed you will find one (1) dollar for which please send me 1 dozen binding posts No. 201 at \$1.00 per dozen and oblige.

Geo. B. Ingraham P.S.—Rasco Service is sure all it is cracked up to be. I have received three different orders from Rasco and I am still waiting for an order from another Company which was sent in before the first Rasco order.

Yours truly, 64 page catalog
G. B. I.
Our prices are low and all goods are shipped prepaid. You deal with the oldest and only Company exclusively manufacturing the small parts in their own two big factories. Our big 64-page catalog, No. 7, containing over 300 illustrations, will save you money. This catalog also contains

75 Diagrams of Vacuum Tube Hook-Ups

not to be found in any catalog, only found in expensive text books. This catalog sent only upon receipt of 15c. Once you have tried the RASCO service you are a customer for life. 85% of our customers always come back.



Detector 50c

Radio Specialty Co.

88-100 PARK PLAGE, NEW YORK CITY

What is the Finest Receiving Set Made?

To be worthy of this distinction, the set must have three characteristics—

- World-wide receiving range—
- Reception in all wave lengths—
- Reception without distortion.

RadioCraft D-6 Regenerative Radiophone* (by permission of DeForest Radio Tel. & Tel. Co.) will receive even European stations, and of course all those on this continent.

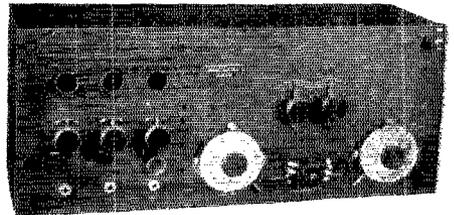
It receives on all amateur, broadcasting, and transatlantic wave lengths.

In clearness and avoidance of distortion, it must be heard to be adequately described.

D-6 uses outside aerial only, and head sets or loud speaker.

It claims to be the finest receiving set now manufactured and any authorized DeForest dealer (who also carries the RadioCraft line) will be glad to prove this to you by actual demonstration.

RadioCraft Regenerative Radiophones* (by permission of DeForest Radio Tel & Tel. Co.)



RadioCraft Regenerative Receiver Type D-6

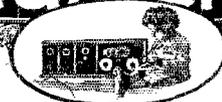
range from the simplest to the most elaborate.

It is unnecessary to add that this entire line of DeLuxe radio equipment is most exquisitely finished in every detail.

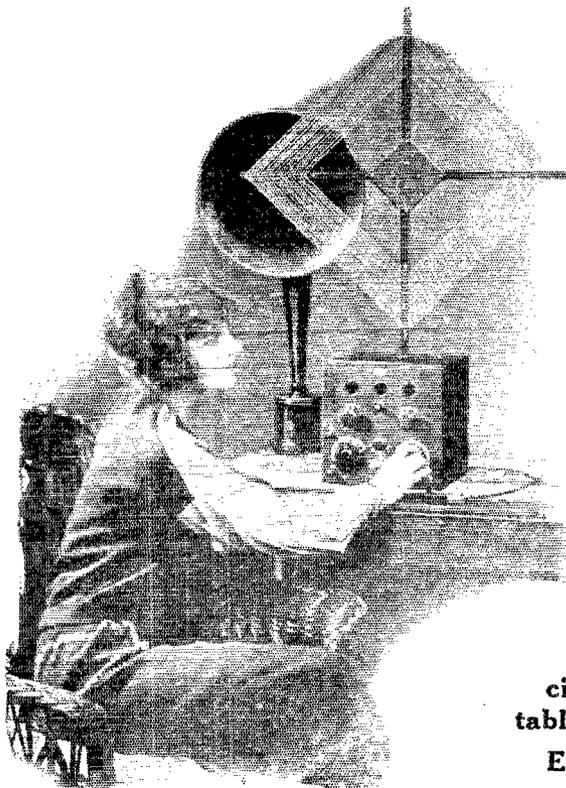
The Radiocraft Co.

139 Franklin Street, Jersey City, N. J.

RadioCraft



*Reg. U.S. Pat. Off.



De Forest
D-7
Reflex
Radiophone*

Listen to Half the Continent This Christmas!

HERE'S the latest DeForest triumph, the D-7 Reflex Radiophone* Receiver. It's the newest and most sensitive set of them all, with a thousand mile range on a two-foot indoor aerial!

That's what you've been waiting for.

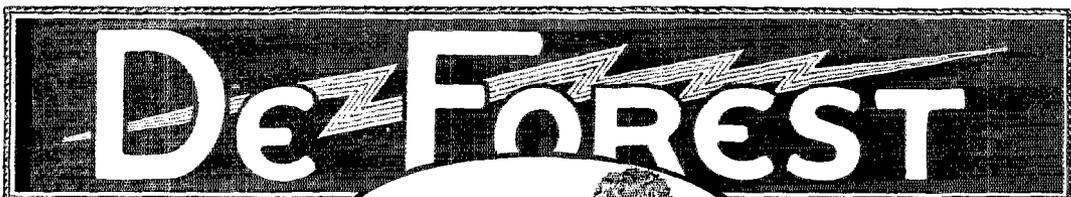
No outside aerial is needed. The whole set is as you see it here.

Easy to control with its single knob—small, compact, super-efficient—and an ornament to any library table!

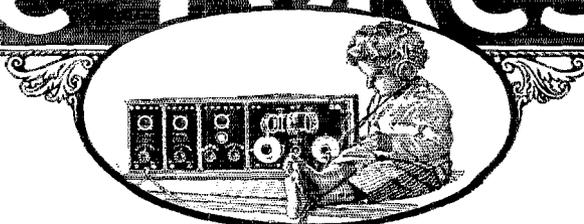
Economical to operate, too, because you get five stages of amplification on three tubes, and correspondingly longer life for your storage batteries.

If you want to bring into your home the news, the music, the lectures of half the American Continent—with no trouble—clearly without interfering noises—this is the set for you. Remember it's a Radio Christmas—and here's one set that is all you ever hoped a receiver could be. Ask your DeForest dealer about D7 and other DeForest sets—today.

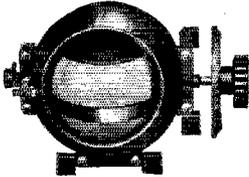
De Forest Radio Tel. & Tel. Co.
JERSEY CITY, N. J.



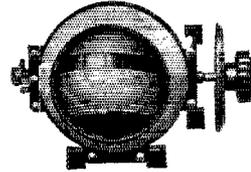
*Reg. U.S. Pat. Off.



DAYTON RADIO PRODUCTS



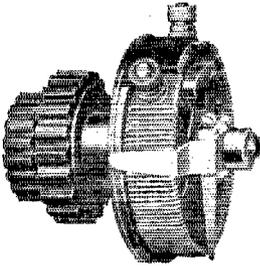
MOULDED BAKELITE VARIOMETER
 Price\$6.75
 With Bakelite Dial..... 7.35



MOULDED BAKELITE VARIO-COUPLER
 Price\$7.00
 With Bakelite Dial..... 7.80

We claim for these instruments the following distinctive features:

- 1—Use of genuine Bakelite throughout and elimination of all unnecessary metal parts.
- 2—Positive Contact to Rotor by use of pig-tails.
- 3—Convenience of mounting to either panel or table.
- 4—Stator has ledge for mounting an inductance coil to Variometer, making a complete Tuning Unit if desired.
- 5—High polish to Bakelite, beauty of design and unequalled efficiency.



The Dayton Bakelite Vernier Rheostat was designed to provide for extremely fine filament adjustments on the vacuum tube, it being especially efficient when using regenerative circuits for C.W. or Phone work, owing to the perfect adjustments obtained. Licensed under Patent #870,042.

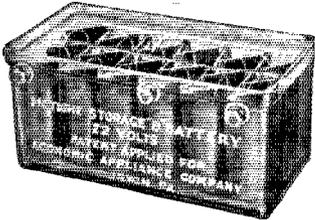
PRICE\$1.75
 PRICE Plain Rheostat..... 1.10

The A-C Electrical Mfg. Co. Dayton, Ohio, U. S. A.

Makers of Electrical Devices for over 20 Years.

McTIGHE ALKALINE STORAGE "B" BATTERY

for RADIO OUTFITS



The McTighe Storage "B" Battery is the most satisfactory for radio use. It gives 72 volts, is inexpensive--noiseless--cannot be damaged by short circuit, overcharging, standing idle or uncharged. Can be fully charged from any light socket for less than one cent. Is furnished in an oblong glass case which nests neatly. The McTighe Rectifier is cheap, simple, durable, and effective, and should be used when charging the McTighe "B" Battery.
 Battery \$5.00, Rectifier \$1.50, Rubber Filler 25¢
 F.O.B. Irwin, Pa.

Shipment to Dealers Address Dept. Q Prompt shipments

ECONOMIC APPLIANCE CO.
 IRWIN, PENNA.

A Nimble 'Dollar-Seller'

The "Chaslyn" Sink-or-Swim Ball Battery Testing Outfit

Set consists of

1. Battery Tester, with 3 balls of different colors and weights. The way they sink or swim shows condition of acid.
2. Depth Gauge for determining depth of acid.
3. Air-Controlled Bottle Stopper for adding di-tilled water.

Price of Set, \$1.00

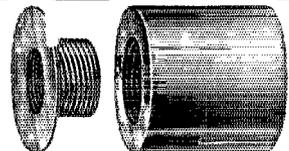
Special Offer to Dealers.

Write on your business stationery enclose one dollar for TWO of the above sets.

THE CHASLYN COMPANY
 4317 Kenmore Ave. Chicago



Green-Lean
 White-Right
 Red-Dead



ATTENTION RADIOTICS
 IF YOU USE AMPLIFYING TUBES you can make your Victor talking machine a RADIO LOUD SPEAKER, with a "BEEKO" Radio-Phone attachment.

Sample by mail, 40¢.

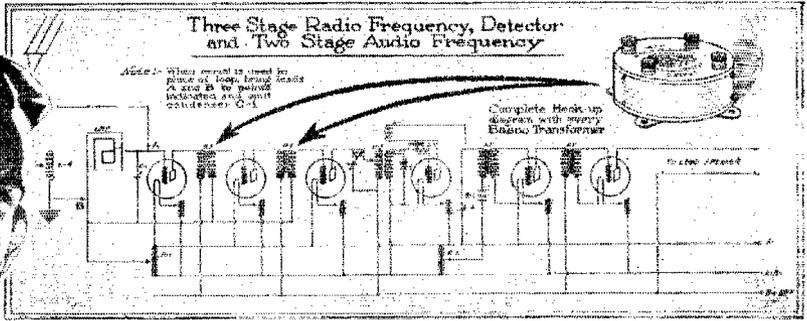
Liberal discount in quantities

J. H. BUNNELL & CO.

32 Park Place, Department Q New York



"Comin' In Great!"



Don't Let That Term--- "Radio Frequency," Scare You Out of Doubling Results

NO bugbear about it. Thousands of amateurs are accomplishing wonders with Radio Frequency. The greatest radio development of the day. A loop aerial and three stages of radio frequency hooked right to your regenerative outfit—"plate tuned" or "feed back"—doubles your signal strength, day or night—greatly increases your range and eliminates most of the static. Two stages are nearly as gratifying. Results will surprise you.

Study the diagram shown above. And here's the ideal transformer for the job—the

Basco Super-Sensitive Receivers



Radio Frequency Transformer

"The Element of Certainty"

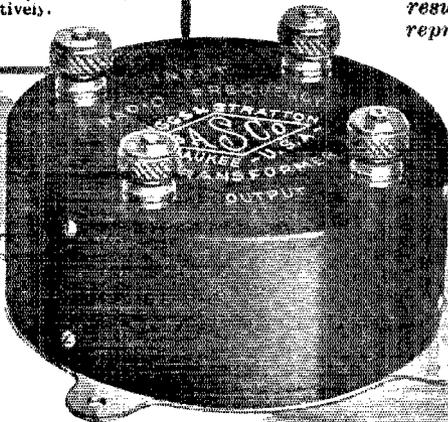
Thoroughly proved—for any well balanced circuit. Efficient. Operates over wave band of 200 to 600 meters. Affords great selectivity. Employs non-capacity winding—*double silk covered wire*—no enamel. Maximum transfer of energy. Clean cut—neat. High grade workmanship throughout. Encased in bakelite. Binding posts and base-mounting *silver plated*. No higher grade transformer can be built. Basco Radio Frequency Transformers are the first step toward a better outfit. If your dealer can't supply you, write us.

Jobbers and Dealers, write for particulars. No better, trade building transformer built. Gets results—gets business. We have local factory representatives. Write for name of nearest one.

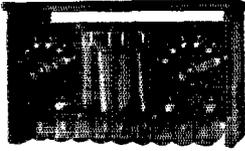


Light weight—aluminum case—extra sensitive lean cut, rugged design see them. 2000 and 3000 hms.—\$8.00 and \$7.50 respectively.

Briggs & Stratton Co.
MILWAUKEE, WISCONSIN
The Basco Product



\$ 500



Storage Batteries

designed for

RADIO



KICO "B" BATTERY

KICO "A" BATTERY

FACTS ABOUT KICO STORAGE "B" BATTERIES—

1. Alkaline type.
2. They eliminate noises caused from "Bs" that are rapidly deteriorating.
3. The switch control allows single cell variations from 12 volts up. (A critical plate adjustment is essential on your detector bulb for C.W. and Radiophone reception.)
4. Rechargeable from your 110 Volt A.C. line in connection with the rectifier supplied with each battery.
5. Will last from three to six months on a single charge while in the detector plate circuit.
6. NOT an experiment. All batteries sold with the privilege of receiving your money back if unsatisfied within a 90 day trial.
7. Neat, Efficient and Compact.
8. Unlimited life.

	Plain	With Panels
16 cell 22 volts	\$6.50	
24 cell 32 volts	8.00	\$12.00
36 cell 48 volts	10.00	14.00
50 cell 68 volts	12.00	17.00
75 cell 100 volts	16.00	21.00
108 cell 145 volts	21.00	26.00

Literature gladly furnished.

KIMLEY ELECTRIC CO., 1355 Fillmore Ave., BUFFALO, N. Y.

PANEL SERVICE

We offer to the amateur and dealer

REAL PANEL SERVICE.

Our panels are cut to your order. Only genuine Condensite and Formica used.

- 1/8" per square inch \$0.02
- 3/16" per square inch .02 1/2
- 1/4" per square inch .03

We also carry a complete line of radio essentials. Dealers will find it profitable to have our latest price list and discount sheet.

PITTSBURGH RADIO

AND

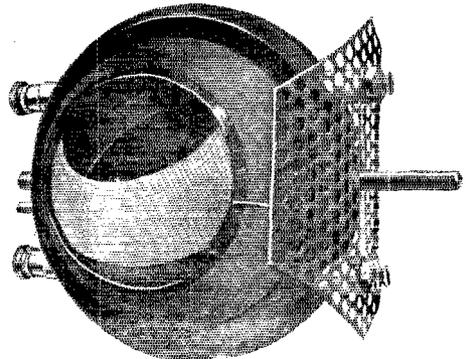
APPLIANCE CO., Inc.

"Pittsburgh's Radio Shop"

Desk B

112 Diamond St., Pittsburgh, Pa.

THE LAST WORD IN



Precision Variometers

Spaced bare lacquered wire prevents leakage and capacity effects.

Shells of newly discovered composition only .025" thick prevent dielectric hysteresis.

Perforated shield plate prevents eddy current losses.

Absolutely guaranteed. A superlative instrument.

Price ready for mounting—Variometer... \$7.50
Variocoupler... 8.00

Write for Sample Shell Coil

Dealers write for discounts.

HORTON CORP.,
Ridgefield Park, N. J.

DICTOGRAPH Radio HEAD SET

Was ~~\$12.00~~ Now

Why This Sensational
Reduction in Price?

A sweeping cut of \$4.00 in the price of the Dictograph Radio Headset! The tremendous endorsement of radio enthusiasts has made possible this sensational reduction. To meet the demand, production has been planned on a new, gigantic scale. Great manufacturing economies establish the new price—only \$8.00.

A wonderful bargain! And above all, a wonderful headset—the world's standard of supreme quality for super-sensitive and accurate sound-transmission.

The same quality, the same guarantee, the same supreme Dictograph headset in every respect but the price. Type R-1, 3,000 ohms, for all types of receiving sets.

The Standard of the World



DICTOGRAPH Radio LOUD SPEAKER

The Perfect Loud Speaker
for the Home

Public demand has made possible the Dictograph Loud Speaker at the low price of only \$20.00, complete with 5 ft. flexible cord. A handsome instrument that reproduces every sound in crystal-clear, natural tones, full volume, and free from distortion or noise. Ask for demonstration at reliable radio dealers. Get world-famous DICTOGRAPH quality and still save money.

Dealers: Order through your jobber or write direct for names of authorized distributors.

Note: Plans are now under way for the production of the new 4,000 ohms Dictograph SUPER-TONE Headset, the most perfect radio headset that can be made. For the most delicate work, the most exacting requirements. A new standard of super-sensitive-ness! List Price, \$12.00.

List Price, \$20



DICTOGRAPH PRODUCTS CORPORATION

220 West 42d Street,

Branches in all principal cities

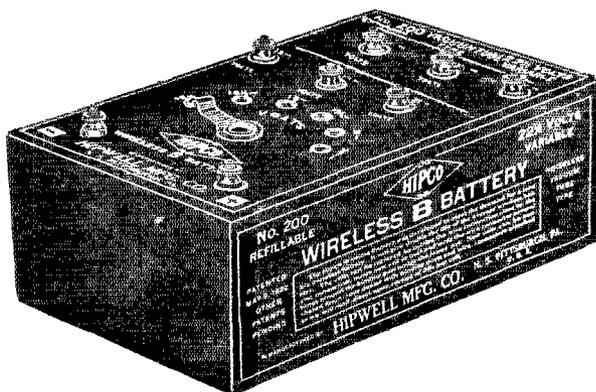
New York City



PRICE \$3.50

THE NEW IMPROVED
WIRELESS B BATTERY
REFILLABLE VARIABLE
NOISELESS IN OPERATION

The Switch Makes It 100 p.c. Perfect



Must be seen to be appreciated. It has all the features that made last year's B Battery the phenomenal success. Ask for catalogue describing our full line of B Batteries and other Radio Supplies.

For sale at all radio supply dealers.

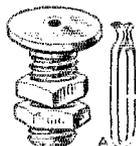
HIPWELL MFG. CO
N. S. PITTSBURGH, PA.

JOBBERs and DEALERS
Make **BIG** Money

Radio **RTS** Equipment

RTS Radio Equipment has become so popular that we have found it hard to meet the demand. But we have enlarged our plant, and now are prepared to supply standard and special equipment in any quantity.

R.T.S. CORD TIP JACKS



This new R.T.S. Cord Tip Jack leads the way in price particularly. Used in place of ordinary jack in Detector and last stage of amplification and in place of binding post and for experimenters in making any desired connection.

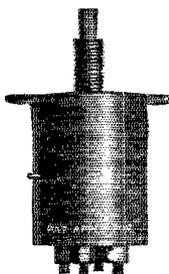
A—illustrates inside of jack. Constructed of spring phosphor bronze highly nickel plated. By method of a wiping spring contact a clean and positive connection is always assured. Where others sell from \$1.00 to \$2.50 the R.T.S. Cord Tip Jacks are 50¢ per pair.

Amateurs order direct from dealers. If they can't supply R.T.S. will supply you direct.

Now is the time to "cash in" Big Profits! All RTS Specialties are in demand among amateurs in every part of the country! Write NOW for price list and special discounts to the trade.

RADIO TESTING STATION

Dept. Q-12. 25 Sturgis Street
Binghamton, New York



DONGAN

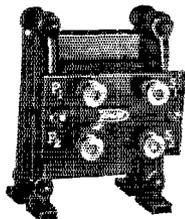
RADIO FREQUENCY TRANSFORMERS

are unexcelled for radio frequency amplification. The adjustable silicon core, (a patented feature) enables accurate tuning of the grid and plate circuit to the frequency of the incoming signals.—Without an equal from 200 to 400 meter reception."

DONGAN

AMPLIFYING TRANSFORMERS

embody the DONGAN standard of high grade workmanship throughout. Scientifically constructed.—Reasonable in price—Neat in appearance. Manufactured in ratios of 6-1 and 3½-1.



Manufactured By

DONGAN ELECTRIC MFG. COMPANY
2983-2993 Franklin St.
DETROIT, MICH.

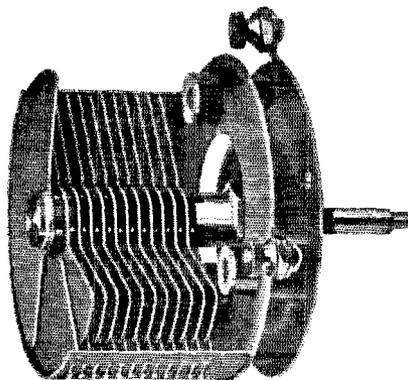
—Western Distributors—

SIERRA ELECTRIC COMPANY
301-304 Roberts Bldg., Los Angeles, Calif.
515 Market St., San Francisco, Calif.

BUY THE BEST

The Thordarson Condenser

Movable and
Stationary
Plates
Shielded



Single
Bearing
Simple
Vernier

OUR LATEST PRODUCT

The best, most flexible and most complete variable condenser on the market today at any price:

Some of its features are:

Movable and stationary plates completely shielded.

Stationary plates spaced accurately by Special Punched Shell.

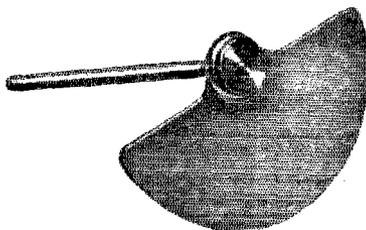
Movable plates secured by an ingeniously assembled comb separator brushing against the bearing.

Single bearing fastened directly to the shielding base plate without any dielectric.

Assembled by machine.

Lowest possible zero capacity and dielectric loss.

WITH OR WITHOUT THE VERNIER



A single plate

That can be added by anyone at any time at a very small cost.

		Condenser	With Vernier, Knob and Dial
13 Plate	.00025 M.F.	\$2.00	\$3.50
23 Plate	.0005 M.F.	2.50	4.00
43 Plate	.001 M.F.	3.00	4.50

Vernier, only, furnished separate if desired, complete with knob \$0.60

THORDARSON ELECTRIC MFG. CO.

500 W. HURON STREET,

CHICAGO



KEEP TO THE RIGHT



Quality

Apparatus

We stock all makes and types of complete Radio sets and parts

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 Corwin, A. H. & Co.
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 Dictograph Products Corporation
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 Kennedy, Colin B.
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Delivery same day order received

Pioneers in the Radio Field

Send 10c for latest catalog

ROSE RADIO AND ELECTRICAL SUPPLIES

129 Camp St.

New Orleans, La.



He Hears the Bedtime Stories
with his Big Brother's

Stromberg-Carlson Radio Headset

This Standard Headset has unexcelled tonal qualities. Reproduces accurately faint long distance signals; fits comfortably and is quickly adjustable to any size head. The forked cord permits separation of the receivers for use by two observers simultaneously.

Other Stromberg-Carlson Specialties include the "Universal Radio Plug" and various styles of "Radio Jacks"—made to fit all standard equipment.

Order Stromberg-Carlson Apparatus from your electrical merchandise dealer or send for Bulletin #1029-Q.

Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

UNIVOX 90° COUPLER

FOR SINGLE—THREE
CIRCUIT OR ARMSTRONG
SUPER HOOKUP

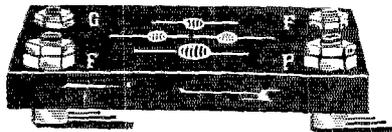
A high grade unit priced right & unconditionally guaranteed. Formica tubes—Green silk wire. Nickel plated brass fittings. Good design—Perfect workmanship. Bulletin C describes in detail.

UNIVOX FILAMENT RHEOSTAT

Honestly made—honestly priced
Bulletin R gives complete data
Splendid discount to the trade.

Walter R. Horning, Inc.
Mfrs. 'UNIVOX' Radio Units
Cleveland, O., U. S. A.

FRANKLIN SOCKET



For W-D-11—DRY CELL TUBE

Holds tube firmly.
Makes Perfect Contact

PRICE \$0.50

We also make an Adapter that fits Standard Sockets, Price \$1.00.—Dealers Write for Discounts.

FRANKLIN RADIO MFG. CO.
711 Penn Avenue, Wilksburg, Pa.



MIGNON



RADIO APPARATUS

BEST BY TEST

STRAIGHT LINE

VARIABLE AIR CONDENSERS

TYPE "A"
.0005 M.F. \$4.50

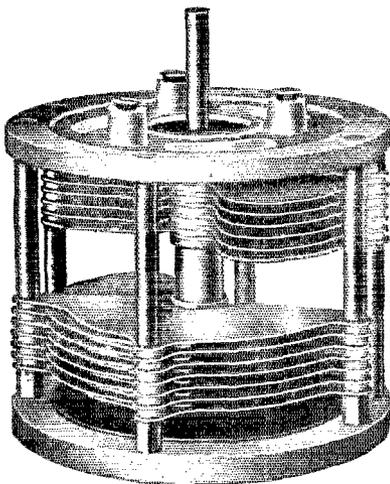
TYPE "A"
VERNIER
.0005 M.F. \$6.00

TYPE "B"
.0008 M.F. \$5.00

TYPE "B"
VERNIER
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TYPE "C"
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TYPE "C"
VERNIER
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BY ALL
LEADING
ELECTRIC
FIRMS
AND
RADIO
DEALERS

TYPE "B" .0008 M.F.

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For New York Metropolitan Territory

Radio Stores Corporation, 218 W. 34th St., New York, N. Y.

Our Products are on exhibit at the PERMANENT RADIO FAIR

Hotel Imperial, New York, N. Y.

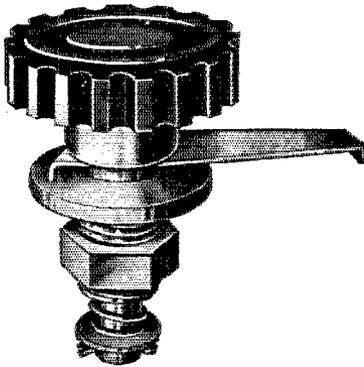
Write for Literature

MIGNON ELECTRIC MFG. CORP.

25-35 South Water Street,
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Use a REAL Switch Lever--



makeshift stuff never gives you proper results. Look at the good points in the ACE Panel Lever Switch; molded in shaft, therefore Knob cannot work loose—hexagonal shoulder absolutely guarantees blade against turning on shaft—perfect self-cleaning wipe contact at EACH end—spring and cotter pin tension—no nuts to loosen. Absolutely the finest switch lever obtainable. This and other high grade products of our factory listed in our new fall catalog; 10c brings it.

Dept. YB

THE PRECISION EQUIPMENT COMPANY

2437-39 GILBERT AVENUE,

CINCINNATI, OHIO

The Living Room Is No Place for a Storage Battery

Locate it in a permanent place away from fine furniture and rugs, then use a **LEICH NONTUNE RADIO RECTIFIER** to keep it in condition. No attention—just throw the switches. Safe—Convenient—Dependable.

Your tubes will work more consistently with the steady voltage delivered by a fully charged battery, and your evening entertainments will not be subjected to the annoyance of continual adjustment of tube filaments.

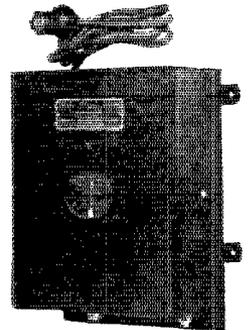
Your battery will have a longer life under these conditions.

Ask your dealer—or write for Bulletin 100.

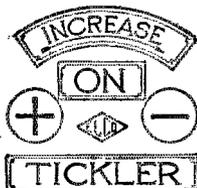
LEICH ELECTRIC CO. Manufacturers of
Telephones—Switchboards—Accessories.
GENOA, ILLINOIS

THE Non Tune Radio Rectifier needs no attention while charging. During power interruptions storage battery circuit is automatically opened.

The Non Tune Rectifier is a time-tested instrument that is used extensively for railway signal and other work which requires an efficient and dependable machine.



"ENGRAVE" YOUR PANEL



Letter your panels with **ELCO RADIO PANEL TRANSFORMERS**. Will adhere to any material. Very easily to apply. Enhance the appearance of a Radio Set 100%. Comes in card of 31 different wordings, everything necessary for the best kind of receiving set.

35c Price, per set, with directions, 35c
(in coin)

Dealers write for samples and discounts

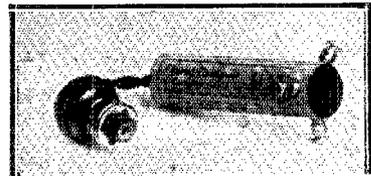
ELCO RADIO COMPANY

Dept. S.

410 Third Ave.,
158

Pittsburgh, Pa.

THE WIRELESS WONDER



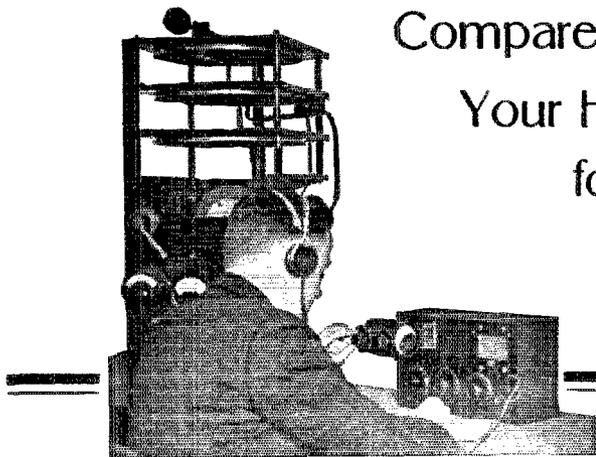
A Complete Aerial for \$1.50

Simply screw in any lamp socket and turn key on. Better than an outdoor aerial. Nothing to get out of order. Eliminates lightning danger. Money back guarantee.

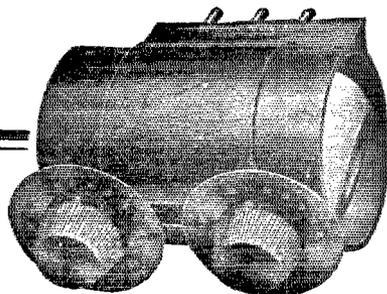
Radio Catalog free at your dealers or
STEINMETZ WIRELESS MFG. CO.
5706 Penn. Ave., Pittsburgh, Pa.
Electrical Engineers and Manufacturers

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

Compare TUNIT with Your Honey-comb Coils for Short-Wave Work



Station 2AW, Brooklyn, N. Y.



SORSINC

DURING the A.R.R.L. tests of October 27th and October 28th, 1922, the following C.W. and Spark Stations were copied at 2AW, Brooklyn, New York, through heavy static, using a Tunit with detector and two step amplifier:

3HL, 3BGT, 4GL, 4EB, 5EK, 8BDA, 8QO, 8AQO, 8AIW, 8BVR, 8BUM, 8AXC, 8DE, 8BZY, 8ADN, 8ZE, 8UK, 8AXB, 8BXH, 8AWP, 8ANJ, 8ACQ, 8XH, 8ZX, 8RNJ, 8XE, 8ON, 8QK, 8BPL, 8OW, 8BXH, 8IB, 8YM, 8CNW, 9CP, 9AWF, 9KE, 9CN, 9AAU, 9AUL, 9DYN, 9II, 9AJF, 9IO, 9XAC, 9AA, 9ZN, 9UU, Canadian, 3CO, 3FO, 9AW.

This reception has been confirmed by mail and was not surpassed by stations using high-grade regenerative receivers of standard manufacture.

There is no comparison between the Honeycomb coils and the Tunit on short wave lengths. All A.R.R.L. stations should use a Tunit in their Honeycomb coil sets. For C.W. work on 160-600 meters it cannot be excelled. Its shielded dials, perfectly balanced, make the closest kind of tuning possible, without the objectionable capacity effects, common to Honeycomb coils.

Your dealer should have Tunits in stock. If he cannot supply you, order from us direct, enclosing money order for \$15.

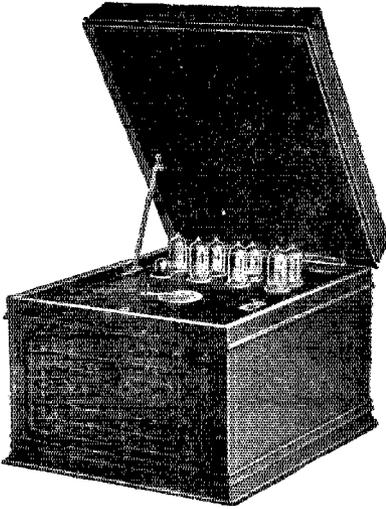
SHIP OWNERS RADIO SERVICE INC.

80 Washington Street, New York
Wholesale Distributors

BRANCHES:

Boston, 48 Cornhill
Baltimore, 11 N. Eutaw St.
New Orleans, 740 Union St.
San Francisco, 591 Mission St.
Chicago, 538 So. Dearborn St.
Seattle, 67 Columbia St.





HAVE YOU HEARD THE NEW RADIOLA GRAND?

No storage battery necessary; a complete and portable unit. Have your dealer order from us. We are also distributors of the famous Grebe products.

TRADE-MARK



REGISTERED

PHILADELPHIA WIRELESS SALES CORPORATION

Formerly Philadelphia Wireless School of Telegraphy

1533 PINE STREET,
Wholesale Dept.

PHILADELPHIA

1326 ARCH ST.
Retail Dept.

Getting Astounding Results

Amateurs in every state and many abroad as well have worked or heard 2ZL. His station is known from coast to coast. Many wonder how he does it. He has told the tale partly over the air, and partly to those who have been fortunate enough to visit him at Valley Stream, Long Island. Now for the first time the whole story has been put into print for anybody to read. J. O. Smith (2ZL) has written the book of the year:

MODERN RADIO OPERATION

By J. O. Smith

No theory, no mathematics, no formulas, just a straight account of how it is done by C.W., not only at 2ZL, but also at other famous stations such as 1ZE, 8ZG and 9ZG which were installed by Mr. Smith. Also, the story of broadcasting from WDY, WGY and WJZ.

Receiving too—by all types of sets, including the Armstrong super-regenerative circuit.

DO YOU KNOW?—The proper proportion of grid and plate current in transmitters? The relative merits of D.C. on transmitter tube plates; of A.C. with half-wave rectification; of A.C. with full wave rectification; of Kenotron-rectified A.C.? How much you can gain by adding more tubes to your transmitter? How and why C.W. beats spark in purity, damping and economy? All these and many other vital questions are answered.

"Modern Radio Operation," \$1.75
By J. O. Smith

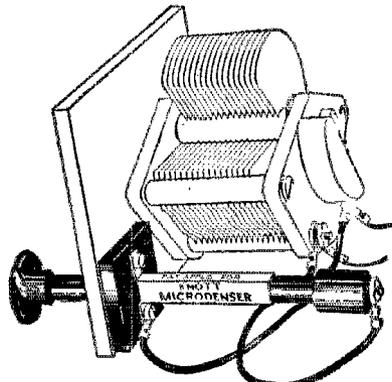
"The Wireless Age" for one year. . . 2.50

SPECIAL OFFER \$4.25

BOTH for \$3.75 (foreign postage, 50¢ extra)

WIRELESS PRESS, INC.
328 Broadway New York City

Knott Super-vernier Condenser



(Trade Mark Registered)

Showing how you connect to Condenser. Tune in that message or music you have been losing. Tune out that interference. Bring it in and clear it up.

Tune your condenser to the whistle and then bring in the messages with this Micro.

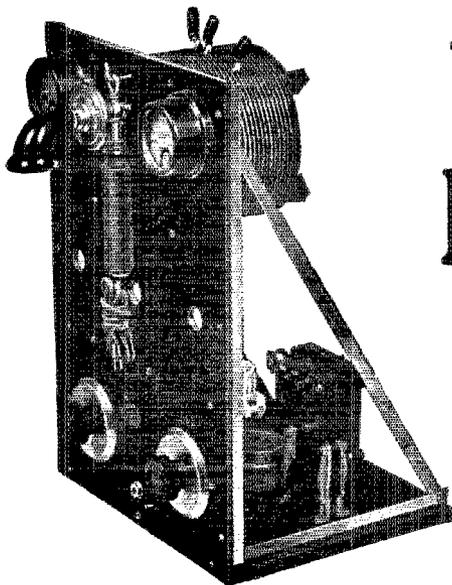
Buy it of your dealer, or send us \$2.75 and we will mail you one complete with connecting wires and wrench-screw driver.

Knott Sure Ground, Radio Name Plates, Patent Dial, Rheostat, Quodcoil, Cinqcoil, Microstat.

Send Postal Card for Circulars.

Jobbers write for our proposition. It will please you.

E. R. KNOTT MACHINE CO.
Boston 27, Mass.



1500 MILES

With CW!!

1100 Miles Voice!

*Music Heard 40 Feet From
Phones by Stations in 300
to 400 Miles Radius*

THESE are actual results obtained by our testing station WEB, using the Benwood CW Transmitter shown herewith. You can get just as good results with it. This high-class set is just the thing for your broadcasting and DX work—using CW, ICW, Modulated Buzzer or Voice Transmission. An ideal set for the local radio club or the more progressive amateur. Think of the range this set will give you! If centrally located, you will be heard in almost every state in the Union. It is manufactured exclusively by and for the Benwood Co. and combines the best in material, workmanship and design. We guarantee it to radiate $1\frac{1}{2}$ Amps. on the average amateur antenna and 2 to 3 Amps. when used with an antenna whose fundamental wavelength is 225 to 275 meters. That's why you can get such wonderful results.

Read This Testimonial

Broadcasting station WSN, the Ship Owners Radio Service, Inc., located at Norfolk, Va. wrote us on *August 10th* (fine season for static) as follows:—

Gentlemen:

I thought possibly you would be interested to know of the remarkable results we have obtained from the 15 watt Benwood Phone set we purchased from you.

We are only using two 5-watt tubes in your set and on several occasions have been reported in Long Island, N. Y.—Phila., Pa.—Cape May, N. J. and Newman, Ga. which is approximately 700 miles from here. Our record was established last week by being reported by O. R. Krannich, 215

South Street, Iola, Kansas, a distance of approximately 1000 miles.

The remarkable part of this occurrence is that this distance was covered under the most undesirable conditions as we are unable to erect a suitable antenna or obtain a good ground. Our place of business is a one story building situated between two ten story buildings and there is certainly a great deal of current absorbed.

Yours very truly,

O. S. Mock

The Benwood CW Transmitter is completely wired and set up. You can start sending as soon as you insert tubes and attach to ground and antenna. Complete, without tubes, \$350.00—if your dealer cannot supply you, write to us direct, giving us his name.

Ask Your Dealer For Benwood Radio Apparatus

The **BENWOOD** Co. INC.
RADIO
"WORLD-WIDE MAIL ORDER SERVICE"
1114 OLIVE STREET ST. LOUIS, MO.

KQV-Pittsburgh, Pa.-RADIO BROADCASTING STATIONS-Washington, D.C.-WMU

STANDARD RADIO ESSENTIALS

All orders with remittance promptly delivered, Post or Express paid.
 Large and varied stock of modern and reliable
RADIO EQUIPMENT and PARTS

ALWAYS in STOCK

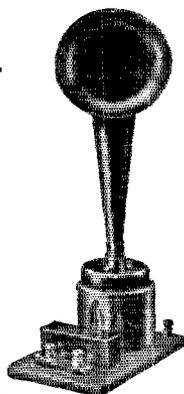
IMMEDIATE DELIVERY on ALL ITEMS LISTED



Stromberg-Carlson

No. 2-A Headset, \$7.50 Enclose Certified Check or P.O. Money Order with orders.

- Aerola Senior Westinghouse Receiver.....\$65.00
- DeForest Radiohome Set DT 700, less Batteries,
 Bulbs and Headset 36.00
- DeForest 2-stage Amplifier DT 800, less Bulbs and
 Batteries 35.00
- Simplex Variometers 6.00
- King Amplitone Horns 12.00
- Holtzer-Cabot Headset 8.00
- UV 200 Radiotron Detector Bulbs 5.00
- UV 201 Radiotron Detector Bulbs.....each 6.50
- Standard Horns 7" Belleach 7.50
- Standard Horns 5" Belleach 5.00
- EK Hornseach 5.00



DOUBLEDAY-HILL ELECTRIC CO.

WASHINGTON, D. C.—DEALERS WRITE FOR DISCOUNT—PITTSBURGH, PA.

AUTOMATIC FILAMENT CURRENT ADJUSTER



\$110 WITH MOUNTING

Eliminates Rheostats in all amplifying circuits.

Operates vacuum tubes at greatest efficiency without adjustments of any kind.

Automatically keeps filament at proper temperature thereby prolonging life of tubes from two to three times, and preventing "burning out."

Eliminates need of measuring instruments. Easily attached, simplifies wiring, permits compactness, improves appearance of panels and sets.

Must be used in every vacuum tube circuit in order to insure continuous operation at maximum efficiency.

Used as standard equipment by leading manufacturers.

AMPERITE

Manufactured by

RADIALL COMPANY

99 WARREN STREET

NEW YORK



Buy Your Radio Receiving Set at Manufacturers' Cost

Buy your Radio Supplies at a large discount below the list or retail price. If a saving of \$15.00 to \$140.00 on a Radio Receiving Set or if a saving of 25% to 40% on Radio Supplies interests you, write or telegraph us today.

KING RADIO MFG. CO.

521 Penn Ave., Wilkinsburg, Pa.

"EURACO" PRODUCTS

(Guaranteed)

Compact — Interchangeable
 Most Efficient — Accurate:

60 Cents per Unit



60 Cents per Unit

Mica Condensers — Grid Leaks Mountings:

Interesting Proposition for Dealers
EUROPEAN RADIO CO.

1342 East 22nd Street, Brooklyn, N. Y.

What's in the Name?

Cotoco

TRADE MARK REG. U. S. PAT. OFF.

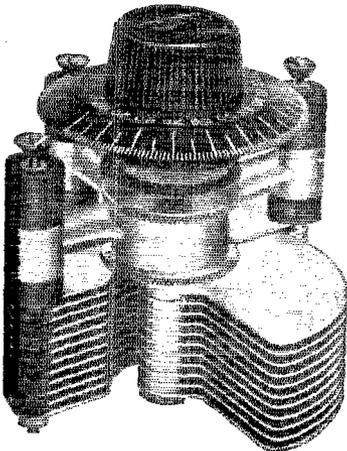
Radio Supplies Made For Better Results

DESIGNED by an organization of Electrical and Mechanical Experts. Made to supply the needs of those amateurs and professionals in radio who know and demand the best. You will find Cotoco Products displayed by those wiser dealers who are building permanent business on radio supplies that give maximum results and by keeping abreast of the latest developments in radio,—namely radio frequency and loop aerials.

COTOCO VARIABLE AIR CONDENSERS

are scientifically correct to minimize electrical losses. We have tested many condensers but have never found their equal.

Works just as smoothly as a fine watch, because it's made as well.



*Just as Superior
In Action
As in Looks*

If Your Dealer Can't Supply You

Write us his name and address. We will see that you are supplied with

FREE

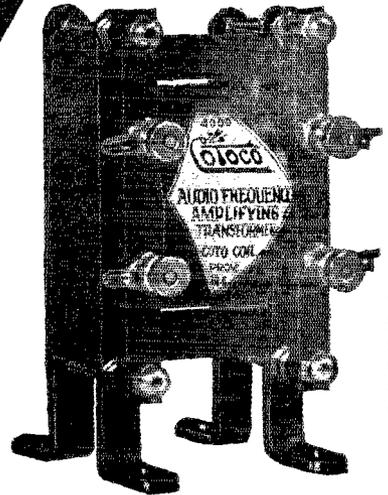
Connection Diagrams for Loop Aerial Sets using either two or three stages of Radio Frequency Amplification.

COTO-COIL CO.

87 Willard Ave.

Providence, R. I.

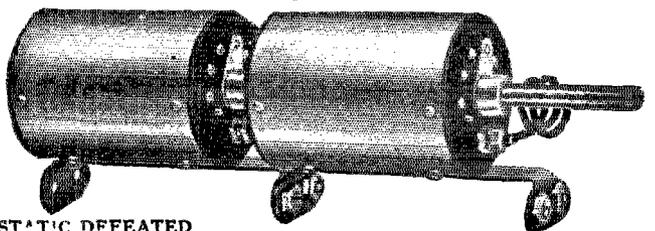
Distortion **EL**
Banished



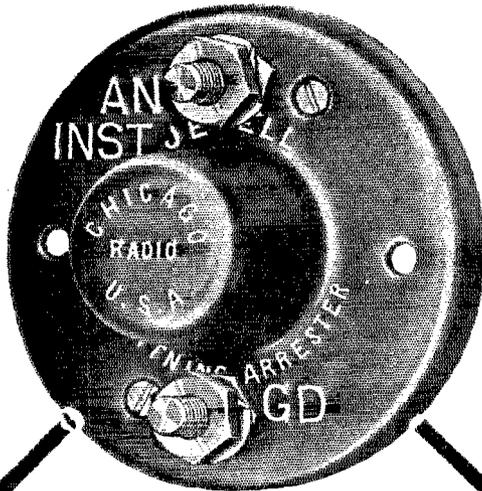
"Buy by the name Cotoco"

Loop Aerials Available to All

Beyond our most sanguine expectations we have succeeded in overcoming Static and securing great range with Loop Aerials. Distortion in headphones or loud speaker is practically unknown with a Cotoco built set, using Cotoco Amplifying Transformer for Audio Frequency (above) and Cotoco Amplifying Transformers of tapped type for Radio Frequency (below). Most selective. Almost Static-proof. Write for connection diagram.



STATIC DEFEATED



LIGHTNING ARRESTER

APPROVED by Underwriters' Laboratories, latest Code. Carbon block type (not vacuum type) using a brown glazed porcelain case which can be installed inside or outdoors. Carbon block arresters have been standard in Railway signal and telephone protection for over 20 years. Ask your dealer or write us for special circular.

PRICE \$1.10

Jewell Electrical Instrument Co.

1650 Walnut St., Chicago

NOVO

"B" BATTERIES FOR RADIO

22½ - 45 & 105 VOLTS



**NOISELESS
DEPENDABLE
GUARANTEED**

ASK YOUR DEALER

NOVO MANUFACTURING CO.
424-436 W. 33rd ST.
NEW YORK

531 SO. DEARBORN ST., CHICAGO.

3000 OHM SETS, \$3.98

PLUS 20 CTS. POSTAGE AND PACKING

Satisfaction Guaranteed or Money Back



We mail phones the day your order arrives. Every pair tested, matched and guaranteed as sensitive as \$8 to \$10 Sets. Circular Free.

TOWER MFG. COMPANY

107 STATION ST., BROOKLINE, MASS.

HYGRADE SPECIALS

Radiotron Tubes, U.V.200-4.50-U.V.201	\$5.75
#766 Eveready Variable B. Battery	1.98
#774 Eveready Variable B. Battery	3.98
45 volt Cyclone Variable B. Battery	2.50
Electrore Insulators, per dozen	2.00
7-stranded Copper Aerial Wire, 200 Ft.	1.00
Arkay Loud Speaker	3.89
.001 M.F. Signal Variable Condensers with Dial and Knob	3.98
Thordarson Amplifying Transformers	3.49
Acme Amplifying Transformer (mounted)	4.25
Federal Amplifying Transformers	5.95
Skinderviken Transmitter Buttons	.75
Firco Bull Dog Grip Phone Plug	.98
Rheostats, Fada 69¢, DeForest	.98
Klosner Vernier Rheostats	1.15
Federal 2200 Ohm Head Set	6.95
Dictograph 3000 Ohm Head Set	9.75
Western Electric Head Set	11.95
Baldwin Type "C" Head Set	14.75
Sterling Rectifier	13.95

"MARKO STORAGE BATTERIES"

6 volt 30 amp. guaranteed 2 years	10.00
6 volt 60 amp. guaranteed 2 years	12.95
6 volt 80 amp. guaranteed 2 years	17.00
6 volt 100 amp. guaranteed 2 years	21.00

Above prices are F.O.B. New York

HYGRADE ELECTRICAL NOVELTY CO.
41 West 125th Street, New York, N. Y.



CRYSTAL RECTIFIER

MULTIPOINT
(Patent Pending)

A synthetic CRYSTAL DETECTOR sensitive over its entire surface

Eliminates all detector troubles. 50% increase in clearness and volume. Endorsed by Radio experts and press. Awarded certificates of excellence. Sets a new standard of efficiency.

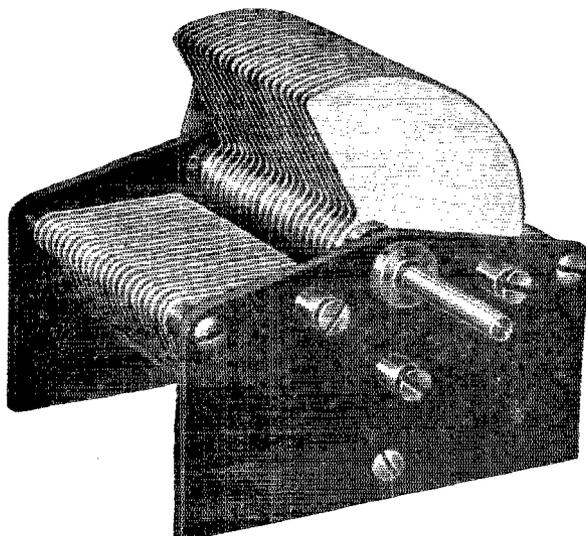
Price postpaid, mounted **50c**
Sensitivity guaranteed

Dealers and Distributors Quoted Attractive Discounts.

RUSONITE PRODUCTS CORPORATION

Dept. "O." 15 Park Row, New York

Wimco Announces



THE WIMCO VARIABLE CONDENSER

After months of experimentation to produce a really good Variable Condenser, we take pleasure in introducing to the trade The WIMCO Variable Condenser, which will be furnished in 43, 23 and 3 plate type. Tests conducted by the Washington Radio Laboratory show that The WIMCO Variable Condenser of the 43 plate type has a resistance, at maximum capacity, of but .018 ohms, and the capacity at zero on the scale is but 15 micro-microfarads. These values, we believe, are lower than in any other condenser manufactured for general amateur use.

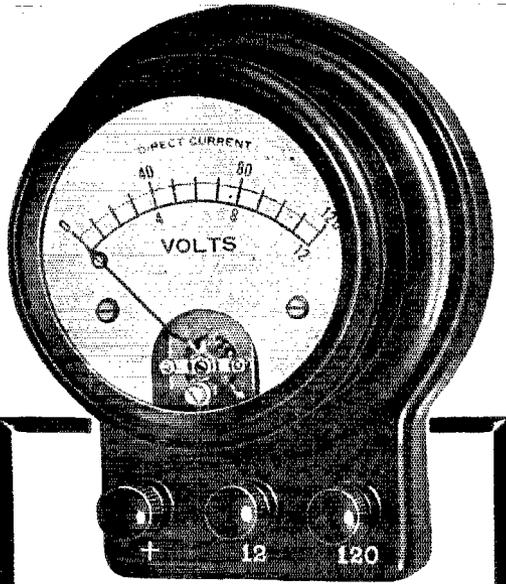
The WIMCO Variable Condenser is now in production and your orders will have our best attention.

We have a very attractive proposition for the Jobber, and solicit inquiries. Write for complete price list and discount sheet.

THE WIRELESS MANUFACTURING CO.

CANTON, OHIO

Manufacturers — Distributors



A-B BATTERY TESTER

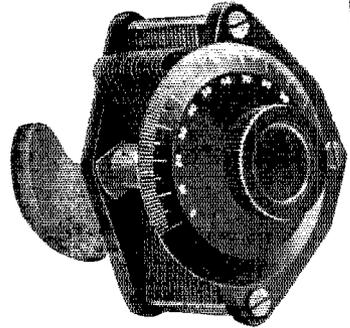
The Jewell A-B Battery tester fills a need for a low priced but accurate portable instrument for checking battery voltages. Double readings 0-12-120 volts is the range usually supplied, which takes care of the "A" battery under all conditions and the "B" battery up to the highest commonly used for receiving.

PRICE \$10.00

We were the first to supply a complete line of miniature radio instruments of uniform size. Ask your dealer or write to us for complete radio circular.

Jewell Electrical Instrument Co.
1650 Walnut Street, Chicago

CHELSEA CONDENSERS



No. 3

PRICES

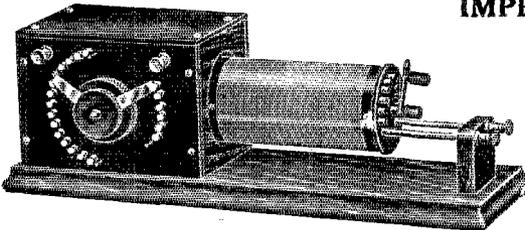
No. 1	Table .001 mf.	\$5.00
No. 2	Table .0005 mf.	4.50
No. 3	Panel .001 mf. with dial	4.75
No. 3a	Panel .001 mf. without dial	4.35
No. 4	Panel .0005 mf. with dial	4.25
No. 4a	Panel .0005 mf. without dial	3.85
No. 5	Panel .00025 mf. with dial	3.75
No. 5a	Panel .00025 mf. without dial	3.35
No. 6	Panel vernier with dial	2.90
No. 6a	Panel vernier without dial	2.50
No. 7	Table .001 mf. with vernier	6.75
No. 8	Panel .001 mf. with vernier	6.50

Genuine Bakelite Construction
The best and most complete line
of condensers in existence.
Write for our catalog No. 7.

CHELSEA RADIO CO.
156 FIFTH STREET
CHELSEA, MASS.

ARNOLD LOOSE COUPLER

IMPROVED MODEL, PRICE \$18.00



The most consistent piece of apparatus to hear the Radio Telephone (without distortion). Range of wave length from 200 to 2,500 meters.

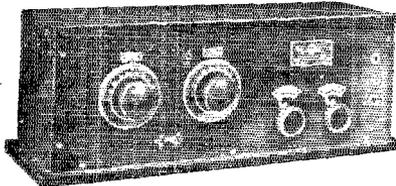
Send 3¢ stamp for literature which describes fully the Loose Coupler, Hook-ups, etc., also the New Arnold Loud Speaker, Full line of Detectors, Amplifiers, and better class of accessories.

J. F. ARNOLD, NOTE NEW ADDRESS—ONE FLIGHT UP
Established 1910 109 East 125th Street, New York City

MU-RAD

Radio Frequency Amplification

MU-RAD Receiving Sets are the original product of independent experiments and experience of leading radio engineers. Five years intensive development of Radio Frequency Amplification have given Mu-Rad Sets exclusive points of difference—points that are well worth your consideration. First, unequalled **sensitivity**. Distances in excess of 1000 miles have been covered by Mu-Rad Sets using a 3 in. diameter, inside loop aerial. Second, the **selectivity** of Mu-Rad Sets which permits differentiation of stations 1% off tune and third, the **simplicity of operation**. All tuning can be done with one hand. The high selectivity is retained by the use of patent circuits and Mu-Rad R. F. Amplifier Transformers.



THE MA-12

Three stages of radio frequency amplification and detector. With 2 telephone plugs **\$128.00**

THE MA-13

Three stages of radio frequency amplification, detector and two stages of audio frequency amplification. With two telephone plugs **\$160.00**

SPECIFICATIONS

Cabinet: Solid mahogany, varnished piano finish.
Panel: Mirror polished black Radion.

Dials: Non-warping metal—prevent body capacity effects.
Condensers: 21 plate, permanent capacity.

Modifier: A circuit unit, dial operated from panel, for controlling signal strength and stabilizing circuits.

Rheostats: Special sector wound, smooth operation, positive contact

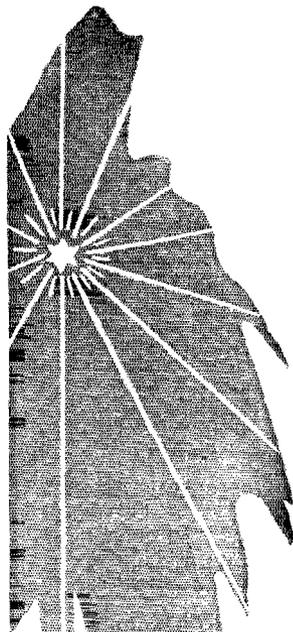
Filament Switch: Special positive toggle knife-blade construction.

Binding Posts: Polished nickel, all in rear, plainly marked.
Name Plates: Extra deep reversed etched, black with satin silver high-lights.

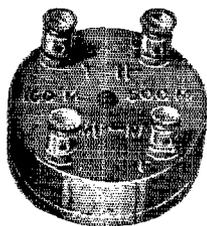
Wiring: Tinned copper bus-wire, all interior metal white nickel finish.

1000 MILE RANGE GUARANTEED

Each MU-RAD set is sold with an attached guarantee of 1000 mile reception under average conditions using a small loop aerial.



The New
Star in
the Radio
World



MU-RAD R-F Amplifying Transformers

200-600 Meters—Air Core

The same transformer that gives to MU-RAD Receivers their extreme R-F Amplification. The skill of MU-RAD Radio engineers has been concentrated on this instrument until all the objections common to most transformers were entirely eliminated.

The absence of the usual iron core increases amplification by eliminating iron losses. No metal to produce undesirable capacity effects and eddy current loss

Three Types

Type T-11 for the first stage \$6.00
Type T-11A for the second stage \$6.50
Type T11B for the third stage \$7.00

Mu-Rad apparatus sold everywhere.
write for literature!

MU-RAD LABORATORIES, INC.

804 FIFTH AVENUE, ASBURY PARK, N. J.

ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS

LET'S MAKE THIS A REAL RADIO CHRISTMAS

The Holiday season is going to mean increased Radio Sales. THE EBY SILENT SALESMAN (illustrated below) will assist you in making quicker sales, as the prospective customer can wait on himself.



Full information as to specifications and prices of posts printed on the back. Cut shows our complete line, and our large stock means immediate deliveries. Invest in two of these attractive boards. They will pay for themselves the first week. **THE H. H. EBY MANUFACTURING COMPANY, Philadelphia, Penna.**

Trade Mark **BKUMA YRLSBUG** Reg. Ap. For
Attentive Beginners Who Use

Dodge One Dollar Radio Short Cut

- Have Mastered Code in Minutes instead of Weeks.
- Have Qualified for Exam in Hours instead of Months.
- Have Succeeded After Failing with Other Methods.

Send one dime for Code Memorizing Records made by Our Beginners in Twelve Radio Districts, who now are Licensed Operators. Know what others have done. Realize what you may do.

FOR EACH DIME OF COST OUR METHOD SAVES DOLLARS

Usually pays to Investigate B4 U BI
PRICE WILL ADVANCE JANUARY 1st

C. K. DODGE Box 210 MAMARONECK, N. Y.

SPECIALS

MURDOCK PHONES No. 56

2000 OHM\$3.98
3000 OHM\$4.98

**Variometers & Variocouplers
Best Grade Guaranteed**

VARIOMETERS LESS DIAL...\$3.98
VARIOCOUPLER LESS DIAL...\$3.98

Add 60¢ for 3" Dial
Mailing Charges on Each Item 10¢. Send Your Order At Once As There is Only a Limited Supply Left.

THE RADIO SHOP

BOX #124
New Brunswick, N. J.

DENVER

9ZAF

**REYNOLDS
RADIO CO.**

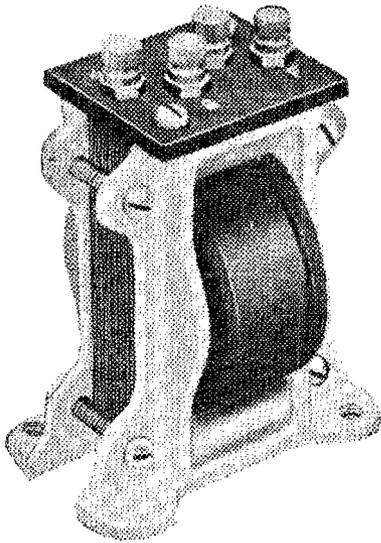
KLZ

1534 Glenarm St.
LARGE RADIO DISTRIBUTORS

EVERETT PHONES

Not the Loudest \$8 50
But the Clearest.
At your dealers, or write

EVERETT ELECTRIC CORP.
320 Broadway, New York



PRICE \$6.00

The 3YQ safely meets the exceptional demands of the new Armstrong Super-Regenerative Circuit.

Make It a Radio Christmas with 3YQ Transformers

Nothing is closer to the heart of your friends than Radio. Guide yourself with this thought in selecting gifts for them.

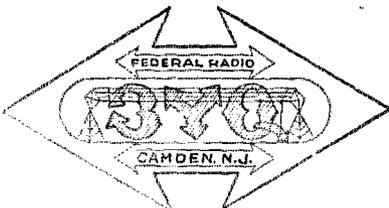
And, of course, you want to give them the best. If you are giving a complete set, select the type using 3YQ Transformers for audio frequency amplification.

If you are having a set specially assembled, specify 3YQ for maximum amplification without distortion.

And, if you or your friends are constructing laboratory or parlor receivers, you'll want the 3YQ.

The Christmas Spirit is a spirit of friendliness that says only the best is good enough. That's the spirit we put behind the manufacture of 3YQ Transformers all year 'round.

Remember the name—3YQ. Get them from your dealer.



**Federal Institute
of
Radio Telegraphy**

2nd & Federal Sts., Camden, N. J.

CLASSIFIED ADVERTISEMENTS

Six cents per word per insertion, in advance. Name and address must be counted. Each initial counts as one word. Copy must be received by the 10th of month for succeeding month's issue.

FOR SALE: Grebe CR-9 regenerative receiver, detector, and two stage. Bought new June last; perfect condition. List \$130. First money order \$100 takes it. Sidney Adams, Rock Hill, S. C.

FOR SALE: Westinghouse R.A. Tuner, Perfect Condition, \$50. R. B. Andrews, 329 N. 4th St., Olean, N.Y.

FOR SALE J-Ray Cap, \$20; 1 1/2 K.W. transformer, \$20, with condenser \$30; 1 1/2 KW Transformer, \$18; 1 1/2 K W. O.T. \$3.00; National Portable Typewriter \$35; Amrad 1 K W. Cap, \$16; Det. & 2 step \$30, Cash only. Lawton Biddle, 442 Bosart Ave., Indianapolis, Ind. 9KM.

BARGAINS: Paragon RA6 \$26.95; 43 Plate Variables \$2.95; Manhattan Phones \$1.95; VT Sockets \$0.95; Burned Audiotron \$1.50; 4 Pole DT non-capacity Switch \$2.45; 1 KW Thordarson Type R \$24.50; Grebe 12 Stud Rotary with Induction Motor \$19.75; Boston Key \$4.25; Oil Condenser \$9.75; Wide Ribbon Oscillation Transformer \$4.95; 10 Amp. Ammeter \$3.95; Aerial Switch \$1.95; Magnavox Instruments 10% off. Robt. Bishop, Locust St., Lockport, N. Y.

STANDARD REGENERATIVE radiophone receiver including detector, Bradleystat, \$39.00. Sydney Bodington, Elmhurst, Pa.

GENUINE LITZEN-DRAHT WIRE, 3x16x38 (48-Strands), enameled with two wraps of natural silk. One and a half cents per foot or \$5.55 per pound (approximately 400 feet). Shipped prepaid to any point in the United States. R. D. Borden, 630-Munsey Building, Washington, D. C.

NEW WESTERN ELECTRIC Loud Speaker \$120; Western Electric N-(Peanut) tubes and sockets \$7. Radiotron 201's \$5.00, 202's \$6.00. Remler Variometer, \$5. Radio Corp. A Batt. Potentiometer \$1.25. Variocoupler and two Variometers set \$10. All new H. E. Bussey, Box 1698, Atlanta, Ga.

FOR SALE: Clapp-Eastham Special Panel-type "High Tone" Spark Transmitter—Range 1/4 to 2 Kilowatt. Complete with Solenoid Aerial Switch—Excellent condition and very reasonable—write for information and picture. Chas. Brain, Allan Apartments, Springfield, Ohio.

NEW TYPE Western Electric VT 2's at \$6.40, 5 watt or amplifier. R. Breunig, 2252 Roscoe St., Chicago, Ill.

RADIO FREQUENCY AMPLIFIER, two step, mounted on Formica Panel—it works—\$20. Tubular Audiotron with cabinet, \$10. Write for list of other instruments. Brown, 123 1/2 Page, Dallas, Texas

TWO ATWATER-KENT Variometers, one Variocoupler @ \$7.00 Ea. Two Croft Variometers @ \$4.50 Ea. One Croft Variocoupler (180°) @ \$4.95. One Horne combination detector and two-step Amplifier @ \$49.00 Ea. One Horne Detector Unit @ \$12.50 Ea. One Kennedy type 281 Receiver @ \$70.00. One Kennedy type 521 Amplifier @ \$45.00 Ea. and many other bargains, all guaranteed perfect. If you have anything to sell or trade, write us. Buyrite Co., P. O. Box 82, (Benson Station), Omaha, Nebr.

COMPLETE Variometer Parts with Hardware \$1.10. Guaranteed Perfect. Norvell Canfield, Luverne, Minn.

RUBBER STAMP with large call letters 50c; Radiogram and Relay Radiogram blanks 25c per hundred Post Cards 60c hundred. Send us your orders. Carolina Printing & Stamp Co., Wilmington, North Carolina.

3 KW ROTARY CONVERTER. Make offer. Robert M. Chase, Plymouth, New Hampshire.

FREE: With each Moorhead detector tube \$5.00, we will give one Fada receiving rheostat. With each R-3 Magnavox, \$45.00, we will give two No. 2156BP large Burgess "B" batteries. Chesaning Electric Co., Chesaning, Mich.

WESTERN ELECTRIC PHONES, \$8.50. German Detector Amplifier tubes; flat plate, \$4.55. German H.W. ammeters list \$8.50, special \$3.95. Jewell D. C. ammeters, \$4.25. Magnavox, \$36.00. Add postage. Send stamps for descriptive matter. E. Coffin, 6810 88th Street, Woodhaven, N. Y.

A REAL BARGAIN a 5 watt C.W. and fone set including 1 Western Elec. V.T. 2, radiation, fil., plate current, plate voltage; meters; 200 watt motor generator, fil. trans., RC inductance, Federal microphone, var. cond., filter cond., choke; mounted on panel with aluminum bracing, wired reverse feedback. Shipped C.O.D., \$125.00. Bruce Cranz, 46 N. Balch St., Akron, Ohio.

9BUD's 20 WATT CW & fone heard on both coasts in one week on detector, 1XM, 2BUM, 6AJH, 7ABB, 3GG Can. Radiating 3TC Amps. on 185 M a bargain at \$250.00 for everything as advertised last month. Box 967, Ogden, Iowa.

FOR SALE: Complete radio receiver 800 meter maximum, detector, two steps, Storage battery, B batteries, phones, tubes, and Magnavox. Perfect condition. Bargain at \$150.00. All inquiries answered. G. S. Cushman, 817 Wellington St., Flint, Mich.

WANT: 500 cycle set. Cash or trade RC West. Receiver. 2UA.

NEW 15 dial omnigraph—\$20 takes it. M. Del Monte, 851 Vernon Pk. Pl., Chicago, Ill.

FOR SALE: Doran short wave regenerative & two step, \$100, cost \$130; King Am-Pli-Tone, \$90; Two General Electric R.F. amplifying transformers, \$5 each. Above slightly used, guaranteed as good as new. Sent Postpaid. Jack Dunham, 49 Overlook Circle, New Rochelle, N. Y.

500 CYCLES FOR THE PLATE—1/4 KW Motor Generator \$42.50; 1/2 KW Motor Generator \$45.00; 1/2 KW Navy Panel **QUENCHED TRANSMITTER** Complete including Motor Generator, fine for school instruction, cost \$150. Sell for \$85. 1/2 KW Marconi Synchronous Transmitter Complete including Motor Generator \$55.00. Above is all 500 cycle Apparatus. Navy instruction Set, consists of Seven Stations \$35. Army 53 ft. Sectional Pole \$25. Navy receiving Sets \$22.50 Quenched Caps \$4.00. Leyden Jars \$2.25. All Guaranteed Perfect Condition Prompt Shipment. George Eaton, 1915 South Twelfth, Philadelphia, Pa.

TUBES: Radiotron amplifiers \$5.00; Cunningham amplifiers \$5.00; Western Electric VT-1 \$7.00; VT-2 \$8.00; Westinghouse dry cell tubes WD-11 \$6.00. Kenotron \$6.00. All the tubes have been used very little. Have two or three of each kind to dispose of. A. M. Elliott, 621 No. Fifth Ave., Phoenix, Arizona.

FOR SALE: Ten (10) Dynamotors; Motor Side 6 volts; Generator Side, 600 volts; Manufactured for the United States Aviation Service. Price \$35.00 Eksaf Trading Company, 1515 Eastern Parkway, Brooklyn, N. Y.

FOR THIRTY DAYS: Radiotron tubes, detector—\$5.00, Premium Composition Socket. Amplifier—\$6.50, premium Socket. Erado Variometer \$5.00, premium Sterling Rheostat. Erado Variocoupler—\$4.50, premium Sterling Rheostat. Many others. Write for our list of premiums. Enid Radio Distributing Co., Enid, Oklahoma. Radio WNAF.

VACUUM TUBE SOCKETS 50c each. Money back guarantee. I. Fonger, 145 Pine St., Muskegon, Mich.

SELL set of Duo-lateral coils, new. Carl Frank, Rochester, Minn.

MUST SELL: Thordarson 1KVA 25,000 V Transformer \$72.50; 3/4" plate-glass oil condenser .008 mfd. holds 50,000 V on "sink" \$30.00; Benwood Rotor \$4.00; heavy Boston Key \$4.00; standard slide projection machine, made by DARLOT, Paris, fine for clubs, etc., complete with 1000 watt concentrated fil. vent lamp, cord, bargain for \$60.00. Guaranteed. Sent Express C.O.D. for 1-3 amount to show good will. W. E. Gemmill, 434 N. Beaver St., York, Pa.

BURNT OUT Tubes Repaired. All makes of detector \$3.00. All amplifiers & 5 watt tubes \$3.50. Satisfaction guaranteed. Gillmore, 48 Thomas St., Newark, N. J.

DETECTOR PANELS, Bradleystat or Klesner controls, \$6. Lloyd Grass, Absecon, New Jersey.

BARGAIN: Combination tuner, Variometer set, Detector 1 step, tuner R.F. Vernier rheostats, Honeycomb Coil set, 3 vernier condensers. All new equipment, \$40. New. Absolutely unused "Kico" 145 volt storage B, cost \$21, take \$14; terms C.O.D. H. Oge, Boonville, Ind. Box 32.

WESTINGHOUSE R C \$100, Senior 52, Junior 18. All new guaranteed. Retiring from business. H. E. Fack, 62 Governor St., Providence, R. I.

WANTED: C.W. Sell: 1/2 KW Thordarson, \$8.00. Murdoch O. T., \$2.00. Winthrop Packard, Canton, Mass.

TRANSMITTING GRIDLEAKS 5000 Ohm Radio Corporation, Five Watt size \$1.10; Fifty Watt size \$1.85; post paid. Philadelphia Wireless Sales Corp., 1533 Pine St., Philadelphia, Pa.

BARGAIN: Slightly used detector and 2 step amplifier with bakelite panel, cabinet and jacks \$35.00. M. S. Powell, Glen Ridge, N. J.

STORAGE BATTERIES: Gov't Signal Corps Edison 3 cell, type BB-4 \$4.50 and Willard 4 cell, type SYR-13 \$4.25. Willard Light weight 40 A. H. for Aeriola tubes \$5.50. Edison 6 V. \$8.00. Edison Elements 10c pair. All new, remarkable bargains, act quick, cash with order. Several bargains. Complete receiving outfits. Two stage amplifiers. Three tube Armstrong Super set. Almost new 4 tube C.W. & Phone Transmitter. Quality Radio Shop, Richmond, Indiana.

TEN PER CENT discount on all standard radio goods. Superior two step Amplifier \$75.00, Radiotron Detectors \$4.25, Amplifiers \$5.75, Trans-Atlantic Phones \$3.00, 6 volt 210 Amp. hour Batteries, \$29.75, Homechargers \$15.75. QST Rad'o Service, Williamsport, Pa.

TWO STEP AMPLIFIER panel \$26.00. Two step amplifier in cabinet \$29.00. Both the above are equipped with General Radio transformers. Chesaning Electric Co., Chesaning, Mich.

SELL: Reinartz tuner with detector, \$23; two step, \$28; detector and two step \$32; 3 tubes \$12; etc. N. Raskhodoff, 112 Everett St., Springfield, Mass.

GENUINE GERMAN TELEFUNKEN VALVES. 20 Watt (output) transmitters with bases, \$14.75; Detector-Amplifier valves, flat plate grid type, \$3.95 each; 2K.W. 240 cycle 500 volt 4 amp. output Diehl motor-generator with D.C. drive \$45.00; 0-5 Jewell filament ammeters, \$3.65. Robert E. Goll, 1342 East 22nd St., Brooklyn, N. Y.

RADIO REPAIRING—anything but tubes. Send us your apparatus that won't work. We'll make it "percolate" or charge you nothing. Prices quoted for your approval before we begin work. Only bona fide advertised radio repair shop in the U. S. Repair Dept., Radio Panel Shop, Junction City, Kansas.

FOR SALE: Omnigraph 2 Jr. with 25 dials \$12.50; Double coil mounting with 25 and 35 coils \$4.00; Spark gap \$1.00. Louis Ratisseau, 3812 Ave. P. Galveston, Texas.

HONEYCOMB Coil Regenerative, including Coils and Radiotron Detector \$30.00. Box 205, Williamsport, Pa.

CALIBRATED CHOKE Coils for "Reinartz Receiver" 200—250—300 meters. No stamps. Cost of choke 50c. J. F. R., Radio IQP, South Manchester, Conn.

RADIO FREQUENCY TRANSFORMERS 150-600 meters \$3.75, Bakelite vario couplers \$4.00, Moulded variometers \$5.00, Cunningham detector tubes \$4.70, Amplifiers \$5.20, Western Electric VT1s \$7.50, VT 2 \$8.00, R-3 Magnavox \$39.50. Reduction on all Radio supplies. Saginaw Radio Service, Saginaw, Mich.

BARGAIN: Storage Battery, Tunit, 3 Coil Mounting, Crocker-Wheeler Charging Generator. Nat Sauberman, 789 E. 163 Street, New York City.

ITS NOT VOLUME you want but DX and clarity. 4GL Radio Frequency Transformers do the trick. Made right; priced right. Savannah Radio Shop, 1223 East Duffy Street, Savannah, Ga.

USE "SIX-BY-SIX" UNITS to build any circuit you want—regenerative, super-regenerative, super-heterodyne or any other. Complete sets \$10 up. Catalog, hook-ups and information free. Radio Panel Shop, Junction City, Kansas.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

BARGAIN: Two receiving sets; one Honeycomb, two step; Other spiderweb, \$150 and \$50. Write for details to G. C. Schmid, 319 E. Wis. Ave., Neenah, Wis.

FOR SALE: Westinghouse RA Regenerative tuner, \$48. Loader, \$4. Storage Battery, \$15. Raymond Schlegel, 1118 N. Negley Ave., Pittsburgh, Pa.

ATTENTION: Closing out large stock of foremost makes of radio apparatus and parts at 10% discount. Write stating make, name, number and list price of apparatus wanted. Herman W. Seikel, 48-15th Ave., Columbus, Ohio.

FOR SALE: Klitzen det. and 2 step, with plug, \$30.00 G. Edwin Smith, 518 N. Fla Ave., De Land, Fla.

SELL FOR BEST Offer! Brand New CORONA Typewriter and Traveling Case; never used. C. L. Somers, Dresden, Tenn.

FOR SALE: Regenerative receiver detector, two step with tubes \$75.00; also detector 2 step \$30.00; two step \$25.00; detector panels, \$6.00. Russel Waite, Vineland, N. J.

IRON CLAD EXIDE storage batteries, 8 volt, 210 ampere-hour, never used, cost Government \$69, shipped free, \$25.00; VT-2's, \$9.00, Genuine 12000 ohm Lavite resistances, \$1.50, 43 plate variable condensers, unmounted, \$3.00. Western Instrument Repair, 314 N. Fairfield Ave., Chicago, Ill.

FOR SALE: 9DSD's 1K.W. synchronous spark. A real set at a real bargain. Write for description, price and DX records. 612 East A Ave., Hutchinson, Kansas.

INVENTORS: Protect your invention through A. M. Wilson, Inc., Washington, D. C. Over 20 years of efficient, expert, confidential service. Skilled in Radio-Electrical, Chemical, and Mechanical fields. Our 1922 Illustrated Booklet, giving much necessary and very useful information which every inventor should know, will be sent free upon request. Prompt and careful attention. Highest references. Moderate fees. Send sketch or model for our careful opinion and preliminary advice. Write today to A. M. Wilson, Inc., (Radio 3ARH) 310-16 Victor Building, Washington, D. C. (Successor to business established in 1891 by A. M. Wilson).

FOR SALE: I am giving up rad'o and offer the following sets: 1. One of the best radio-frequency sets made, capable of remarkable long distance reception under proper conditions. Consists of three radio, detector and two audio, etc., enclosed in beautifully finished mahogany cabinet; also loop aerial. Price including six tubes, \$150.00. 2. Also my short and long wave multiple switch tuner, with detector and two stage amplifier, together with 8 D. L. coils, plug and phones. Price, including three bulbs, \$75.00. Both of above receiving sets are decided bargains at prices quoted. H. H. Wilkins, 134 Berkeley Avenue, Bloomfield, N. J.

200-20,000 Meter Receiver including Radiotron \$35.00. Box 205, Williamsport, Pa.

RADIO DEPARTMENT for sale in a department dry goods store, a small selected stock with a receiving and broadcasting station. The only department in a city of 25,000. No charges for rent, heat or light for the first year. Address, C. S. Wise, Logansport, Ind.

WE NEVER WON a beauty prize but 4GL Radio Frequency Transformers sure do the work. \$3.15 each, postpaid, from factory to you. Range 200-600 meters. Circuit with each transformer. Savannah Radio Shop, 1223 East Duffy Street, Savannah, Georgia.

LOOK—One new R-2 Magnavox \$70.00, One Packard 16,500 v 1 KW transformer \$20.00. Arthur Waiser, Chesaning, Mich.

CLAPP-EASTHAM "ZRF" Regenerative Receiver (3 circuit) \$16. Weed, Post Office Box 1331, New Haven, Connecticut.

BUILD YOUR OWN Edison B Battery. Write for full instructions. Everything in Radio. 1KM 118 Pleasant Street, Malden, Mass.

MUST SELL: Regenerative Heard every district but 7. 1/2 KW. Spark. Make offer. Send for list. Guyatt, 31 Palisade Ave., Bogota, N. J.

FOR SALE: One France F. F. Rectifier. Ten Dollars. One Tuner, contains Remler Variocoupler two

Remler Variometers, with feed back. Thirty Dollars. Built to plug into DeForest three coil mounting. C. V. Harney, Kinsley, Kansas.

TRANSMITTER Acme transformer one kilowatt mounted, large oscillation transformer, three Thordarson oil condensers, super Benwood gap, horsepower induction motor. Postal money order fifty dollars. T. D. Haubner, River Edge, N. J.

ACT QUICK SALE: Oak Cabinets 6x8 1/2 x 18 with genuine 1/4 Celeron Panel \$3.75. Haupt Radio Supply Co., 2442 Ogden Ave., Chicago, Ill.

NEW DETECTOR one step amplifier \$13.50. Regenerator and two step amplifier, \$75.00. Other apparatus. A. Havasy, 66 Henry St., Passaic, N. J.

SBO's DX. Spark transmitter cheap. Other equipment. All like new. H. Walleze, Danville, Penna.

FOR SALE: 3 S.E. 143 Tuners made by the Wireless Specialty Co. of Boston, for the U. S. Navy known as I. P. 500. Listed in the Radio Corp. Catalogue at \$500. Will sell for \$200. They are in perfect condition. Eksaf Trading Company, 1515 Eastern Parkway, Brooklyn, N. Y.

SELL OR SWAP New Radio Corporation OT, antenna ammeter, filter reactor, magnetic modulator, microphone, filter and coupling condensers, set golf clubs, K. & E. log duplex slide rule and draftsman's outfit. Want Baldwins, good loud speaker, typewriter, or what have you. B. L. Hinnant, Wilson, N. C.

FOR SALE: Acme 200 watt CW Transformer, \$14.00. Radio Corporation Inductance, \$8.00. Tungar Battery Charger, \$12.00. King Ampitone, \$8.00. Two UV-201s, \$5.00 ea. Murad R. F. Transformer, \$4.00. Amrad Basketball Variometer, \$4.00. Murdock 43 plate variable, \$3.00. 21 plate, \$2.00. A. Hengelbrok, 922 Washington Ave., Newport, Ky.

BARGAIN: IFV's 1 KW synchronous spark set. Price \$80.00. Charles Howe, Mt. View Pk., Cape Elizabeth, Maine.

THE CALL IFD has recently been assigned to my station. Will appreciate card from anyone hearing same. James L. Hubbard, Norwich, Conn.

GOVERNMENT RADIO 1/2 KW Panel Transmitter complete \$85.00 3/4 KW Synchronous \$55.00. 1/4 KW 500 cycle Motor Generator \$42.50. Send for list. Eaton, 1915 South Twelfth, Philadelphia.

OMNIGRAPH No. 2 junior with ten dials. Good condition. \$12. David Inglis, 1025 Baldwin, Ann Arbor, Mich.

ALL PARTS AND ACCESSORIES for radio you can buy from the manufacturer cheap. Get price list. Irving, 117 E. 129th St., New York.

SELLING: Several new molded variometers with Grebe dial \$9 each. J. Jacobs, 65 West 127 St., New York.

FOR SALE: Two hundred watt, five hundred volt, motor generator, new. A. R. John, 318 Pleasant St., Dayton, Ohio.

FOR SALE: 1 General Radio variable condenser type 182-A, \$10; one ditto type 101-L, \$15; 1 Acme modulation transformer A-3, \$3.50; one 500-watt 1000-volt generator \$50; one 500-watt deForest oscillion tube, \$50. N. B. Judkins, Box 571, Warren, Mass.

SELL: New 1/2 KW Thordarson Type R, \$18; aerial switch \$1; 4 sections Murdock moulded condenser, \$7; Arlington loose coupler, \$6; omnigraph, \$11. W. Kates, 409 South Ave., Wilkesburg, Pa.

TELEFUNKEN 1/2 KW 500 cycle ship set, New \$250; Crocker-Wheeler 500 cycle motor generators for tube sets \$75. Four cylinder gasoline power units, complete Western Electric broadcasting outfit with power amplifier loud speaker and tube, 3 KW transformer \$20. Henry Kienzie, 501 East 84th St., New York.

BARGAINS: 150 Volt Edison "B" Battery, complete \$16; Adams Morgan Special 40,000 Volt, 1KW Trans. \$20; Regenerative, Det. and 2 Step, \$90. Numerous parts. Cheap! Details upon request. Homchargers, Special Price, \$16.50. All Apparatus Brand New. John Kennell, Box 102, Passaic, N. J.

Z-NITH REGENERATOR, \$30; set Atwater-Kent variometers & coupler, switches, knobs and dials complete

in original boxes, \$25; Amrad half KW gap, silver plated, \$10; Thordarson spark coil, \$2; 6 unit Murdock condenser .0017, \$10; Balanced variable, .0025 commercial make, \$10; French Army type 3Ter 3 stage A.F. amplifier with adapters for American tubes, \$30; 8 tooth aluminum rotor 15 inch diameter, 1 1/4 inch face, 12 inch 1/2 inch thick Bakelite center, fits 1/4 inch shaft, never used \$20; Siemens & Halske H.W.A. 15 amp. scale, needs repair \$5; Amrad half KW resistance, \$4; Jewell thermo-ammeter 15 amp. scale, \$10; Blitzen transformer 1KW, \$25; .01 Mfd. Dubilier, \$30; Clapp Eastham enclosed rotary, motor, attached, \$20; Thor O.T., \$5; Audiotron adapter, \$1. 9RR, 1117 Askev, Kansas City, Mo.

SELL: Benwood Inductance, \$5.00; Roller Smith H.W. 0-2.5, \$3.50; D.C. Milliammeter, \$4.00; Four one Mfd. Condensers, \$5.00; Acme 200 Watt Mounted, \$15.00; Shramco Rheostat, \$1.00; Two 5000 Leaks, \$1.50. C. J. Lawson Jr., Landscape Ave., Yonkers, N. Y.

FOR SALE: Reinartz tuner with two steps; United Wireless Transformers; Thordarson T-2 Transformer. For complete description, write Radio 9AZA, White-water, Wisc.

WIRE YOUR SET WITH COPPER BRAID instead of solid wire. Reduces radio-frequency resistance almost to zero. Contacts certain, and never work loose. Wire never breaks. No distributed capacity. Quick and easy to work. No. 16 contains 96 No. 38 bare copper wires. Six feet for 25c. Radio Panel Shop, Junction City, Kansas.

FOR SALE: 1/2 KW Acme, \$14; 1/2 KW Thordarson, \$13; 1/2 HP Robb's Meyers Induction Motor, \$25; Fidelity 3400 RPM Motor, \$18; Dubilier .007 14,000 volt, \$24; 8 stud Benwood \$15; Tuska Home Made Regenerative, \$20. James Marx, 932 No. 5th, Reading, Pa.

CLAPP-EASTHAM H.R. receiver with H.Z. amplifier, sixty dollars. Baldwin "C" headset ten dollars. Magnavox thirty-five dollars. All new. Ridgewood Orchard, Winchester, Virginia.

FOR SALE: Amrad Tuner 2596, \$45; also Arlington loose Coupler, \$8. Newton Matteson, Shinglehouse, Pa.

SELL: Set of Hawkins Guides. John Moore, Gadsden, Ala.

6 MAGNAVOX MODEL (L S2) with 18" Horns, \$45 each; 6 New 6 V 100 A Vesta Storage Batteries, \$14 each; \$350. Magnavox power amplifier, \$225; Grebe CR5, \$45. Seymour W. Mayer, 170 Overlook Circle, New Rochelle, N. Y.

SELF-THREADING PULLEY for aerial pole. Can thread rope thru pulley from ground. No need to take pole down or climb it. Only \$1.35. Address, A. R. Moreton, Marsh-Place, Waterloo, Iowa.

WANTED: 1 KW Spark transformer. High voltage preferred. Also Synchronous motor. Radio 2AWZ.

BARGAINS: Combination Variometer and Coupler \$2.50 each. Chart showing hookup free. 13 plate Variable Condensers \$1.75 each, 23 plate \$2.00, 43 plate \$2.50. All goods guaranteed. Postpaid. Cash with order. Modern Tool & Mfg. Co., 121 Opera Place, Cincinnati, Ohio.

RENEW-READY B-BATS consist of large, fresh, seamless flashlight cells in handy hardwood case. Instantly accessible. Cells have extra heavy zinc and long life. Detector size, 24 volts, \$3.00; amplifier size, 48 volts \$5.50; Magnavox size, 288 volts, \$27.50. Renewal cells, 10c each, 16 for \$1.50. Radio Panel Shop, Junction City, Kansas.

FOR SALE: 1 KW sending set. Complete. Rotary spark gap, 110 volt Thurston transformer, condensers, helix, key. Make offer to Howard McCormick, 209 Conover St., Burlington, N. J.

FOR SALE: Atwater-kent Variocoupler with panel. Beautiful job. New. \$10.00. Large number other bargains. Send for list. J. A. Murray, Kalida, Ohio.

OUR OSCILLATOR ATTACHMENT makes any regenerative receiver super-regenerative. In cabinet, \$40; mounted open, \$35; parts only, \$25. Radio Panel Shop, Junction City, Kansas.

HERE'S YOUR CHANCE: Have 4 cylinder Henderson Motorcycle, perfect condition, recently overhauled, to exchange for 1 KW 2000 volt D. C. motor generator with A. C. Drive. Must be of reputable manufacture

and in perfect condition. Will sell motorcycle for \$135.00. Good for 75 m.p.h. Write for appointment. Robert E. Goll, 1342 E. 22nd Street, Brooklyn, N. Y.

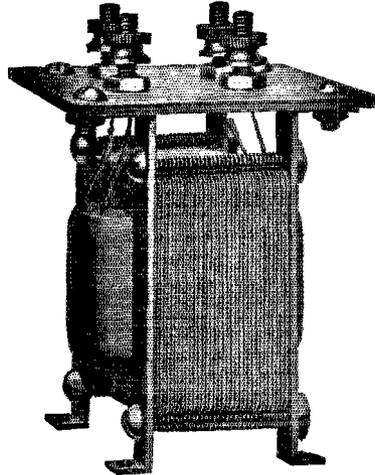
WIRELESS TELEPHONE, we hear Kansas City, Mo., 1250 miles, on a single bulb. Do you? There is radio music in the air each evening, and the living voices of the artists can be reproduced in your own home and enjoyed by you and your friends. Are you satisfied with your receiving set or would you like to build one that will receive over 6000 miles on a single bulb and quit experimenting? One that will be equal to any regardless of claims and price—with which you can read Honolulu, California, German, South American, French, and English stations, and practically all of the high-powered foreign and domestic stations, as well as amateur stations as far west as New Mexico. Anyone can assemble this outfit and wire it up and the remarkable ranges that may be obtained will surprise you. Why not make a set up to date and efficient? Don't experiment with unknown circuits. We will promptly mail you our simple diagram of a complete short and long wave receiver, 175 to 20,000 meters, together with complete instructions for wiring and assembling, price of each part and where they can be bought, leaving nothing to guess about, on receipt of 50c in coin or stamps. Here is a diagram no amateur can be without. Build your own Wireless Telephone receiver. Virginia Novelty Company, Martinsburg, W. Va.

FOR SALE OR TRADE: For good Underwood typewriter, or CW apparatus, or make offer. Trade or sell for anything worth \$75.00. ¼ KW Spark set as follows: Acme transformer, Murdock Oscillation transformer, plate glass oil condenser, Rotary gap, key, New Eldredge Hot-wire meter. Regenerative receiver as follows: Regenerative with detector combined in mahogany cabinet, with formica panel, two Duck variometers, Radisco Coupler, Remler Grid-leak-condenser, socket, dials, rubber binding posts, switch lever and points. 43 Plate Murdock condenser for secondary circuit. Plug and Jack for phones. 400 feet No. 12 aerial wire (new). Trumbull 100 ampere lightning switch. Exide storage battery (charged). Receiving range, 1000 miles; transmitting range 250 miles. \$75.00 F.O.B. Plainview. Write Wayman Davenport, Plainview, Texas.

EDISON "B" BATTERY UNITS one positive and one negative plate for 10c. 18 sets will make a 24 volt battery. Wilkinsburg Wireless Shop, 711 Penn. Ave., Wilkinsburg, Pa.

YOU GET BARGAIN PRICES by paying cash for equipment on which we must realize. Clapp-Eastham receiver \$35; Clapp-Eastham 2 step \$35; R-3 Magnavox \$38; Radiotron 200 and 201 @ \$4 and \$5.50; Kellogg headsets \$9.25. Also plate batteries, dials, sockets variometers and much other equipment at unduplicated prices. Write for list. Prompt delivery. Radio Installation Service, Eureka, Kansas.

AUDIO FREQUENCY AMPLIFIER



MOUNTED TYPE M
Silicon Steel Cores; Shell Design—Bakelite Terminal Board; Ratio—9 to 1; Insulation test 1500 Volts.
Mounted Type M—\$5.00
Semi Mounted Type SM—\$4.50
Unmounted Type UM—\$4.00
Discount 10% for cash with order

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APEX RADIO COMPANY, INC.
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QST BOUND VOLUME IV
Now Only \$3.50 postpaid from
QST, 1045 Main St., Hartford, Conn.



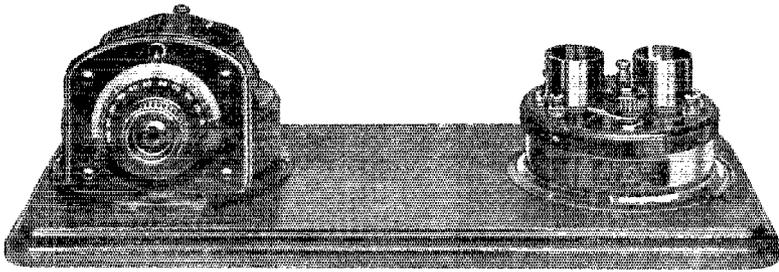
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MILLION POINT MINERAL
The World's Greatest Radio Crystal

M. P. M. is supersensitive, reproduces from every point on its surface and has record of receiving concerts over six hundred miles.
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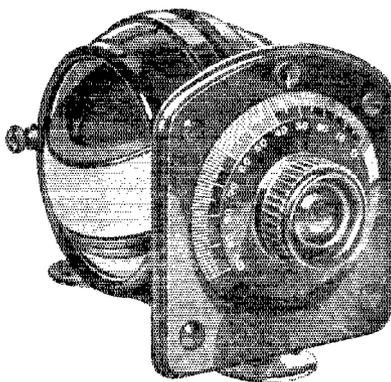
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RADIO RECEIVING SET



THE two instruments shown above comprise an excellent and complete receiving set. The Coupled Circuit Tuner and Detector Amplifier on the mahogany mounting board present a beautiful appearance. Complete outfit as above, unwired, \$32.



The Mounted Variometer carries through the standard quality of Atwater Kent products. For an open set it supplies a finished instrument unsurpassed in both appearance and performance.

Mounted Variometer, \$10.00

ATWATER KENT MANUFACTURING COMPANY

4945 STENTON AVE.

Radio Department

PHILADELPHIA, PA.

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THE SYMBOL OF SERVICE

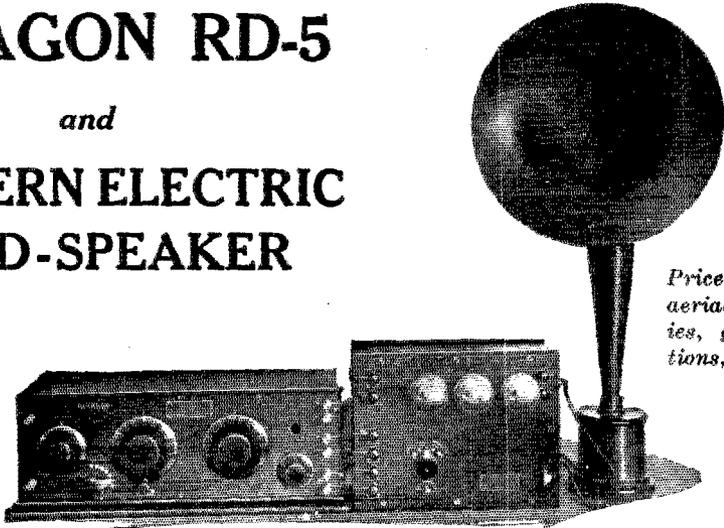
CONTINENTAL

"New York's Leading Radio House"

PARAGON RD-5

and

WESTERN ELECTRIC LOUD-SPEAKER



*Price, complete with
aerial, tubes, batter-
ies, ground connec-
tions, \$301.*

This receiver is capable of amplifying speech or music with the highest degree of clarity and tone quality. The new paragon RD-5 designed to operate on wave lengths from 160 to 510 meters has included in it a detector unit. Careful distribution and proportioning of units affords selective and sensitive tuning.

The Western Electric Loud Speaker Consists of 2 stages of amplification and a curved horn especially designed for sound reproduction. Three type 216-A vacuum tubes are used, one for the first stage of amplification and two connected on the differential principal for second stage.

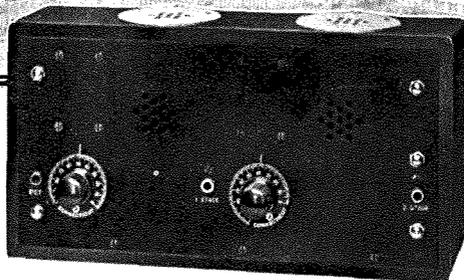
*"Modern Radio"--a two hundred and eight page catalogue of our
radio equipment, supplies and apparatus sent for 25 cents.*

2019-Q

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6 AND 15 WARREN STREET

NEW YORK, U. S. A.



*Two-Stage
Amplifier
J-120, \$20.00*

New Two-Stage Amplifier

Maximum amplification without distortion or local noises is secured in this new CONNECTICUT two stage amplifier.

Tubes are set well apart, wires are well spaced and held rigid, so there can be no interference between circuits.

The CONNECTICUT transformers used balance input and output circuits of tubes. The windings are perfectly shielded from neighboring fields.

The set is handsomely mounted in a mahogany finished box.

*If your dealer doesn't have CONNECTICUT
radio apparatus, write us direct*

CONNECTICUT TELEPHONE COMPANY
Meriden & ELECTRIC Connecticut

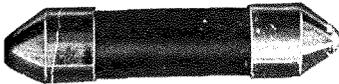
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The Recognized Symbol of Superior Performance

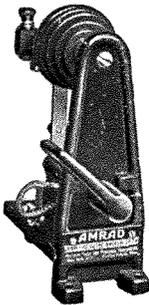
Wavemeter 2793



Price \$20.00



Fixed Condenser 2618 (7 capacities)
Price each, 45¢



Send and Receive
Switch 2834
Price \$10.00

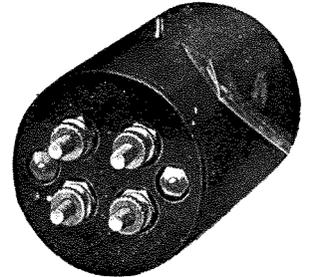
Specialties

If you would complete your Station, investigate these Specialties at your nearest dealer's. If he is not supplied, write us for free Bulletins C and E, describing the entire line of AMRAD Receiving and Transmitting Specialties.

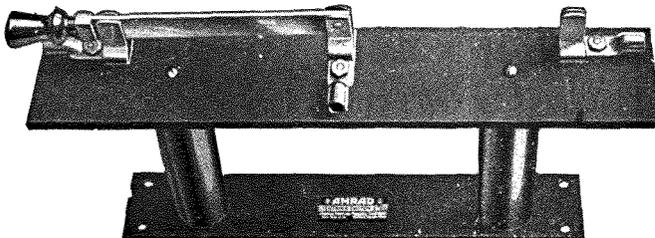
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AMRAD PARTS are KNOWN and TESTED necessities, designed and manufactured by an organization of Radio experts, including some of the first licensed amateurs of the country—an organization that has devoted itself for years to Receiving and Transmitting Specialties expressly for amateur use.

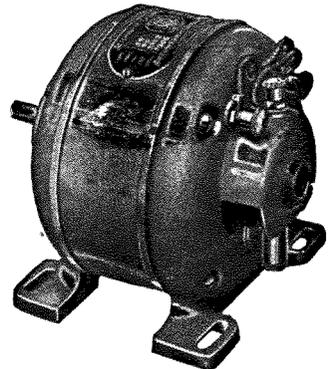
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Price each \$5.00



Lightning Switch 2796 Price \$5.00



Twin R Synchronous Motor 2551
Price \$25.00

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