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Published by AMERICAN RADIO RELAY LEAGUE

The Transatlantic Hero

BZZ

FEBRUARY 1923

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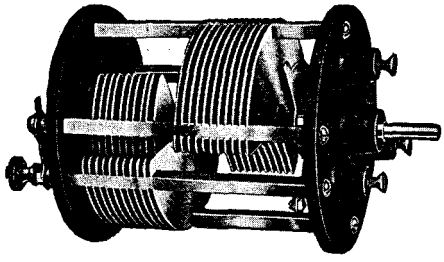

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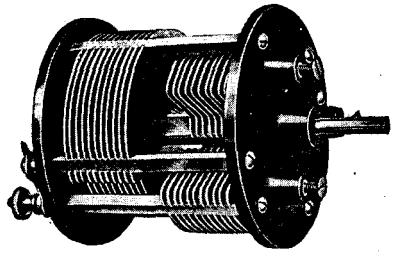

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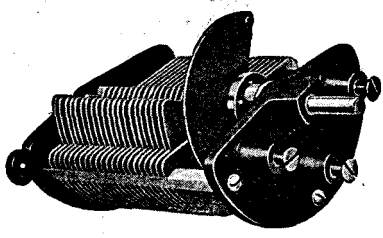

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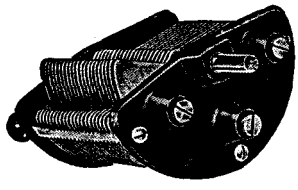

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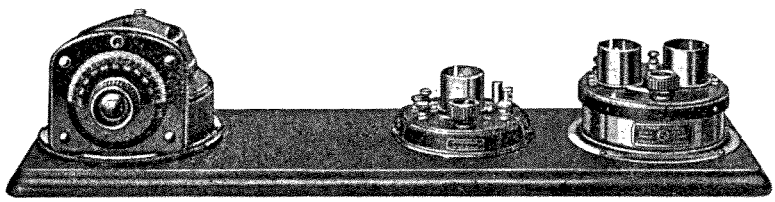

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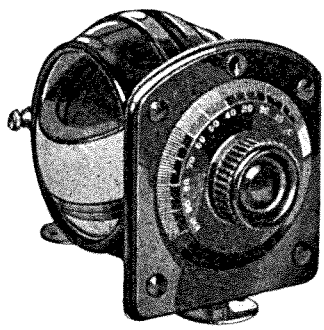

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QST

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

VOLUME VI FEBRUARY, 1923 No. 7

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THE AMERICAN RADIO RELAY LEAGUE, Inc.
HARTFORD, CONN.

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a board of 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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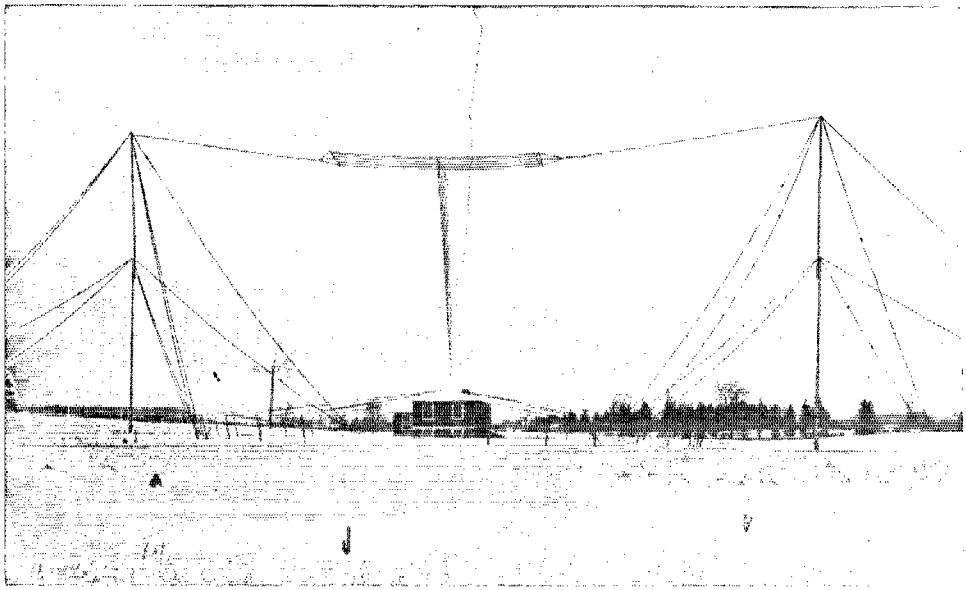
QST

A Magazine Devoted Exclusively to the Radio Amateur

The Transatlantic Triumph

By The Editor

THIS poor magazine has recorded so many dazzling accomplishments in recent issues that its supply of exclamation points and bold-faced type is in danger of exhaustion. Time after time in the weeks just passed we amateurs have achieved big victories in undertakings—accomplishments which have made us throw our cat at the stenographer, crown the office boy with a wastebasket, and dance a merry jig. Now we are faced with the duty of taking our mill in hand to chronicle in our official organ an accomplishment so staggering that we know not how to proceed. In times gone by we would start off with a spectacular sentence embracing some choice and carefully-selected adjectives and embodying numerous stars and screamers. But somehow we have a different feeling in writing the story of the Transatlantic Tests. We are possessed of a very full measure of exuberance, to be sure, but our predominating emotion is a quiet exultation, a deep-seated joy, a pride which to some extent arises from the calm consciousness of a hard job well done. In other words, we are happy, and our heart sings within us as we write this account of the inspiring bit of work done by the radio amateurs of Europe and America in the Third Transatlantic Tests of the American Radio Relay League.



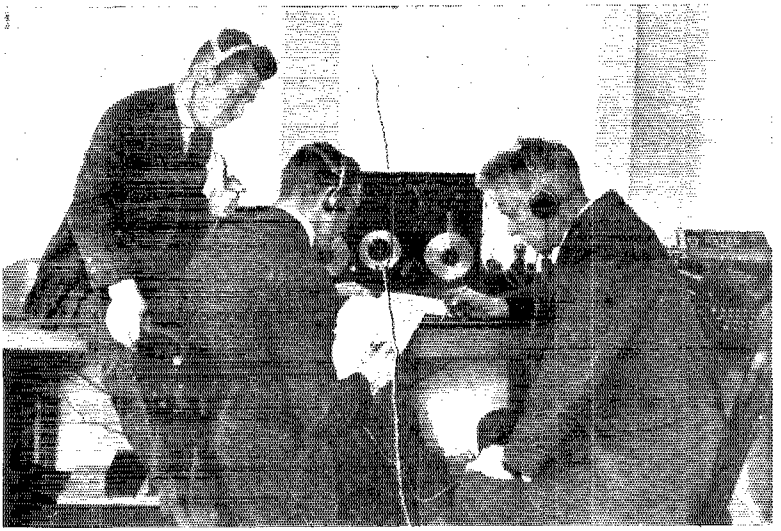
One of the prettiest amateur aerials in America, 8AQO-8BSS, Cazenovia, N. Y.

The success of these tests is not attributable to accident or to a kindly Fate but is the result of months of conscientious work on the part of the individual station-

owners and on the part of the leading amateur organizations in the various countries involved. In Great Britain the work of organizing and conducting the tests was handled by a committee of the Radio Society of Great Britain (formerly the Wireless Society of London) headed by Mr. Philip R. Coursey, while in France the several societies formed a joint Transatlantic Test Committee under the leadership of Dr. Pierre Corret. These committees paralleled in their respective countries the preliminary work done in America by the A.R.R.L. Operating Department in the qualifying of stations, assignment of code words, preparation and dissemination of schedules and bulletins, etc. How

the schedule rotating each night. In the remaining three and a half hours of each of these nights, the 324 American stations which had qualified in the Preliminary Tests and won special identifying code letters transmitted for 15-minute periods in groups of from 22 to 25 each. During the last ten days of the tests, European amateurs transmitted while America listened, the British and French amateurs dividing the 6-hour period into two equal sections and alternating each night in their order of transmission.

The reports to date, very briefly summarized, show that a total of 315 different United States and Canadian amateurs were heard across the Atlantic! The British



A familiar scene in many American stations—copying the returns from MUU and UFT to see who was heard in Britain and France. (Left to right, K. B. Warner, editor of QST and A.R.R.L. secretary; F. H. Schnell, League traffic manager; and Hiram Percy Maxim, our president.)

splendidly they did their work is attested by the results.

The general idea of the tests was explained on pages 8, 9 and 10 of *QST* for December. It will be well to review it briefly here, to keep the plan in mind in studying the results. The tests covered a 20-day period from Dec. 12th to Dec. 31st, inclusive, in Greenwich dates, which was divided into two equal sections, the transmission each night occuring from midnight to 0600 G.M.T. During the first ten nights American and Canadian amateurs transmitted while European amateurs listened. The first two and a half hours of the operating period of each of these nights was given over to "free-for-all" transmission by each Inspection District in the United States and Canada, in 15-minute sections,

heard a total of 161 different stations, the French and Swiss a total of 239, while 85 American calls were heard both in the British Isles and on the Continent. In the "west-bound" tests a total of about 20 different American amateurs heard European amateur signals, principally from French 8AB and from British 5WS and British 2FZ.

The "East-Bound" Tests

Now let us get into the matter in greater detail. Here for many months American amateurs had been grooming their transmitters and the Europeans had been getting their receptors in a fine state of preparedness. European success in our preliminary tests had prepared us for good news when the first official test-night rolled around.

Dec. 13, 1922

Codes verified: 2ZK, 2AWF, 8AQO, 8ATU.

Free period: 8AQO.

DX: 1BDJ.

Dec. 14, 1922

Codes verified: 1ZE, 2ZK, 8AQO.

Free period: 2NZ, 2ZK, 3ZY, 3HG, 3FA, 8UE, 8BU.

Working DX: 1BET, 1BDT, 2LI, 2EL, 8LA, 9OM.

Dec. 15, 1922

No codes verified.

Free period: 1BCG, 1YK, 1BDT, 1GV, 2AHO, 2BLF, 3XM, 3ZW, 8ATU, 8AQO.

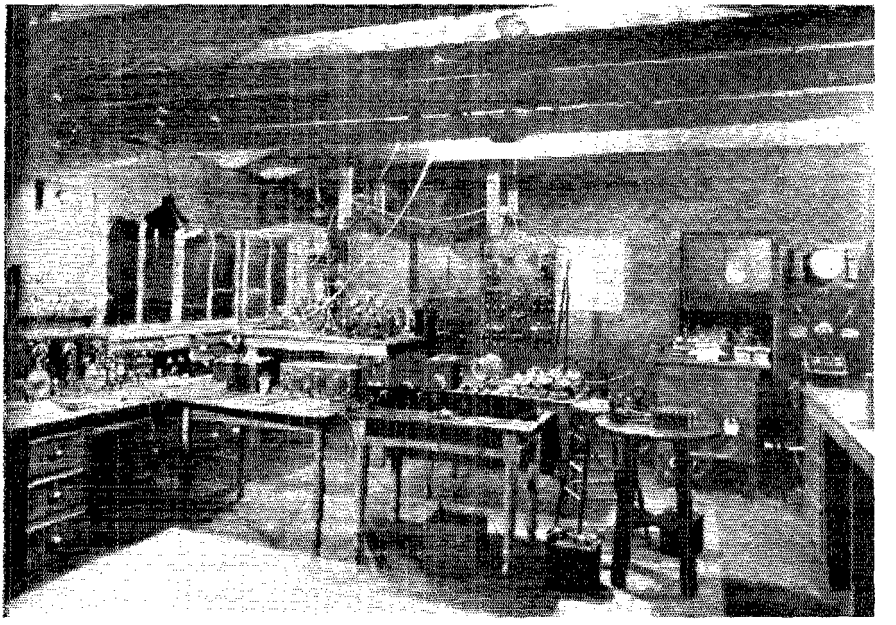
Free period: 1BDF, 1BDK, 1BDT, 1YK, 1ZE, 1ARY, 1BCG, 2GK, 2NZ, 2RP, 2ZK, 3HZ, 3HG, 3ZW, 3ZY, 8AX, 8AZ, 8AQO, 8AWP, 8AW, 8BSY.

Working DX: 1XZ, 1GH, 1MV, 1XU, 1SOK (obviously n.g.), 2AF, 2EI, 2EL, 2AAA, 3XM, 6KA, 8AQO.

Dec. 19, 1922

Codes verified: 1AKG, 1AGK, 1ASF, 1XM, 1GV, 2GK, 2AWF, 2EL, 8AQO, 8AIO, 8BXH.

Free period: 1BDT, 1AKG, 1AGK, 1DNI, 1XU, 2CJW, 2ZK, 2CBX, 2CQZ, 2EL, 2CPD, 2ER, 2RP, 2XAP, 2XC, 2ZS, 3EX, 3HG, 3SG, 3FX, 3ZY, 6KB, 8AQO,



"Radio Heaven," or a glimpse of the main operating room at C. B. Meredith's 8AQO-8BSS-8XH-WMAC. 8AQO is the set in the center background, 8BSS is the small panel set on the table in the left-hand corner, and 8XH is seen on the right below the window. Across the two tables in the foreground is a 9-tube super-heterodyne.

Dec. 16, 1922

No codes verified.

Free period: 1BED, 1BGF, 1OR, 2AWL, 2BLM, 2HJ, 2XAP, 2NZ, 2ZK, 3ZY, 8ATU, 8XE.

Working DX: 2AW (probably British).

Dec. 17, 1922

Codes verified: 1YK, 2ZK.

Free period: 1BDA, 1BDI, 1BRQ, 1CDX, 1CMK, 1BCG, 2AYV, 2BGL, 2BLK, 2LI, 3BGT, 3HG, 3ZY, 6AV, 8AWF, 8AZO, 8BSL, 8BSS, 8LA, 8AQO.

Working DX: 1BAT, 1NI, 1BCG, 3XM, 8AQO.

Dec. 18, 1922

Codes verified: 1ASF, 1XM, 1BET, 2AWL, 2GK, 2LO, 2ZK, 3BLF, 9DWK.

8AWP, 8BU, 8MZ, 9OM, 9DWC.

Working DX: 1ADL, 1AW, 1BS, 1OR, 1AGK, 1ZE, 2ZK, 3XM, 3BG, 8BTV, 8AQO, 8UE, 8BSS.

Dec. 20, 1922

Codes verified: 1BCF, 1BFP (error; no such station qualified); 1CMK, 1CNF, 1GV, 2CQZ, 2EL, 2LO, 2XAP, 3ZW, 8AQO, 8AWP, 8BK, 8BXH, 8IB, 8ML, 8UE.

Free period: 1AJP, 1BEP, 1AKG, 1BES, 1ASF, 1BET, 1AWO, 1BRQ, 1AZL, 1BWJ, 1BCC, 1CN, 1BCF, 1CNF, 1BCG, 1CKP, 1BDT, 1CMK, 1DWP, 1EJA, 1GV, 1II, 1PG, 1RD, 1UN, 1XM, 1ZE, 2AWF, 2CBW, 2AWL, 2CJD, 2AYV, 2CJN, 2BDJ, 2CKR, 2BGL, 2CQZ, 2BLK, 2EL, 2BLP, 2FP, 2BML, 2GC, 2BQD, 2GI, 2BQH, 2GK,

Free-for-all: 1ZE, 1BKQ, 1XM, 1AJP, 1OR, 1BDT, 1II, 1BEP, 1CMK, 1BES, 1BRQ, 1BET, 2GJ, 2XAP, 2CTN, 2AWF, 2CQZ, 2BML, 2EL, 2BLP, 2FP, 2BQU, 2KG, 2CKR, 2HW, 2NZ, 2UD, 2XAO, 3BYC, 3AFP, 3CC, 3AQR, 3HQ, 3AUU,

Even the Y.L.'s got in on the tests this year. Here is Miss M. Adaire Garmhausen, 3BCK, in her working clothes to get up her aerial. Photo by 3HG.

3JJ, 3BGT, 3XR, 3BLF, 3ZW, 4BX, 4EA, 4EB, 5NK.

Also "many" unnamed stations working DX.

Dec. 21, 1922

Codes verified: 1BEP, 1CWF (erroneous; no such call); 1BGF, 1GV, 1XM, 2AWL, 2GK, 2LO, 2BLP, 2EL, 2NZ, 2ZK, 3AUU, 3BGT, 3ZW, 4BY, 4KM, 8AQO, 8BK, 8IBF (error somewhere; no such station qualified); 8SP, 8UE, 8ATU, 8BXH.

Free-for-all: 1XB, 1RY, 1AJP, 1BDT, 1BEP, 1BES, 1BKA, 1BMK, 1BRQ, 1CDO, 1CKP, 1CKG, 1II, 1CMK, 1XK, 1OR, 1XM, 2CBW, 2XAO, 2XAM, 2ZK, 2AXO, 2BRB, 2BYS, 2CKR, 2CQZ, 3AQR, 3BLF, 3HG, 3YO, 3BFU, 3BGT, 3BNU, 3ZW, 3ZZ, 4EA, 5XK, 8ADG, 8SP.

British Summary

Compare this in your mind's eye, if you can, with the reports from the Second Tests last year, when a total of around 35 station were heard. It can't be done—there is no comparison.

If now an analysis be made of the above calls, and tallies made of the number of times various calls are reported, we arrive at the following summary:

District	Stations Heard	Best Station
First	41	1XM-1BET
Second	46	2EL-2ZK
Third	27	3ZW
Fourth	9	4BY
Fifth	6	5XK
Sixth	1	
Seventh	1	
Eight	25	8AQO
Ninth	4	
Canada	1	
Total	161	

A total of 161 different stations from every district in the U.S., with 3ZW the star in point of number of times reported.

Now be it known that there are amateurs in Switzerland too. We didn't know it before the tests, but Dr. Corret reported separately for the Swiss amateurs until the last few nights, when they got too thick for him. Most of this work was done, we believe, by a Mr. Luthi, and our hat is off to him. He reads the code and his lists are real ones:

HEARD IN SWITZERLAND

Dec. 13, 1922

Free period: 8BSS.

Dec. 14, 1922

Code verified: 8AQO.

Free-for-all: 2BGL, 2RP.

Dec. 18, 1922

Code verified: 1AZW, 1XM, 2AWL, 2GK, 3AFB, 4BY, 5ZA, 8AIO.

Free period: 1AZW, 1BDT, 2CKR, 2CPD, 2RP, 3HG, 8AXC, 8CJH, 8ML.

Working DX: 1ST, 1XY, 2EL, 4EA, 8AQO, 8BRC, 8UE, 8VQ, 9CM, 9DFB.

Dec. 19, 1922

Free period: 1BDT, 1II, 2AYV, 2CBX, 2CJN, 2CPD, 2XAO, 2XAQ, 3BFU, 3HG, 3OT, 3XM, 3ZW, 3ZZ, 8AQO.

Working DX: 3ZH.

HEARD IN FRANCE

Now for the French reports sent by Dr. Corret for the French inter-society committee. As noted above, the following reports include under the dates of Dec. 20th and 21st the reception in Switzerland as well as in France.

Dec. 12, 1922

Codes verified: 1YK, 1BGF, 1BCG, 2XAP, 2BML, 8AQO.

Free period: 1NX, 2ZK, 2EL, 2ZS, 3HG, 3FX, 3HM.

Working DX: 1BRQ, 1MBG, 8MZ.

Dec. 13, 1922

Codes verified: 2ZK, 2AWF, 8AQO, 8ATU.

Free period: 8AQO.

DX: 1BDJ.

Dec. 14, 1922

Codes verified: 1ZE, 2ZK, 8AQO.

Free period: 2NZ, 2ZK, 3ZY, 3HG, 3FA, 8UE, 8BU.

Working DX: 1BET, 1BDT, 2LI, 2EL, 8LA, 9OM.

Dec. 15, 1922

No codes verified.

Free period: 1BCG, 1YK, 1BDT, 1GV, 2AHO, 2BLF, 3XM, 3ZW, 8ATU, 8AQO.

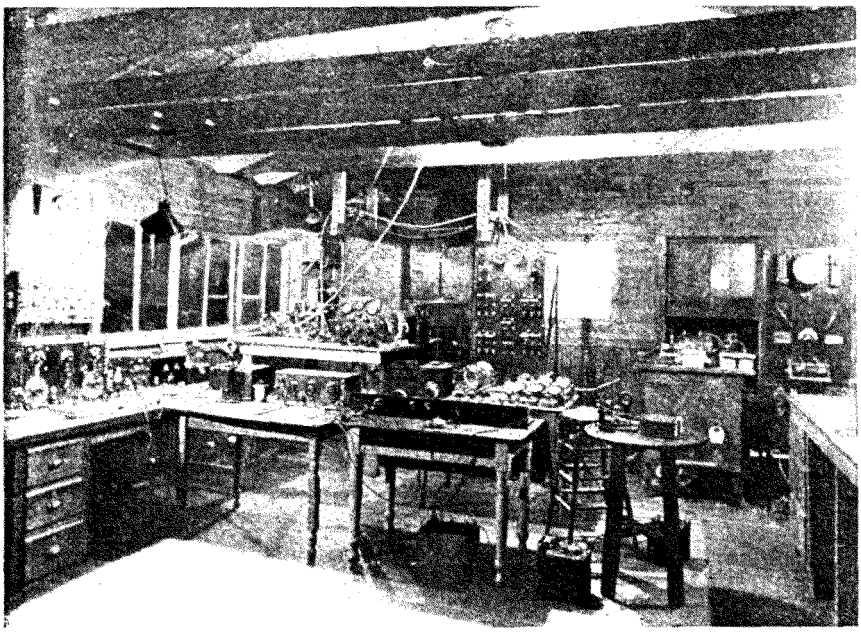
Free period: 1BDF, 1BDK, 1BDT, 1YK, 1ZE, 1ARY, 1BCG, 2GK, 2NZ, 2RP, 2ZK, 3HZ, 3HG, 3ZW, 3ZY, 8AX, 8AZ, 8AQO, 8AWP, 8AW, 8BSY.

Working DX: 1XZ, 1GH, 1MV, 1XU, 1SOK (obviously n.g.), 2AF, 2EI, 2EL, 2AAA, 3XM, 6KA, 8AQO.

Dec. 19, 1922

Codes verified: 1AKG, 1AGK, 1ASF, 1XM, 1GV, 2GK, 2AWF, 2EL, 8AQO, 8AIO, 8BXH.

Free period: 1BDT, 1AKG, 1AGK, 1DNI, 1XU, 2CJW, 2ZK, 2CBX, 2CQZ, 2EL, 2CPD, 2ER, 2RP, 2XAP, 2XC, 2ZS, 3EX, 3HG, 3SG, 3FX, 3ZY, 6KB, 8AQO,



"Radio Heaven," or a glimpse of the main operating room at C. B. Meredith's 8AQO-8BSS-8XH-WMAC. 8AQO is the set in the center background, 8BSS is the small panel set on the table in the left-hand corner, and 8XH is seen on the right below the window. Across the two tables in the foreground is a 9-tube super-heterodyne.

Dec. 16, 1922

No codes verified.

Free period: 1BED, 1BGF, 1OR, 2AWL, 2BLM, 2HJ, 2XAP, 2NZ, 2ZK, 3ZY, 8ATU, 8XE.

Working DX: 2AW (probably British).

Dec. 17, 1922

Codes verified: 1YK, 2ZK.

Free period: 1BDA, 1BDI, 1BRQ, 1CDX, 1CMK, 1BCG, 2AYV, 2BGL, 2BLK, 2LI, 3BGT, 3HG, 3ZY, 6AV, 8AWF, 8AZO, 8BSL, 8BSS, 8LA, 8AQO.

Working DX: 1BAT, 1NI, 1BCG, 3XM, 8AQO.

Dec. 18, 1922

Codes verified: 1ASF, 1XM, 1BET, 2AWL, 2GK, 2LO, 2ZK, 3BLF, 9DWK.

8AWP, 8BU, 8MZ, 9OM, 9DWC.

Working DX: 1ADL, 1AW, 1BS, 1OR, 1AGK, 1ZE, 2ZK, 3XM, 3BG, 8BTV, 8AQO, 8UE, 8BSS.

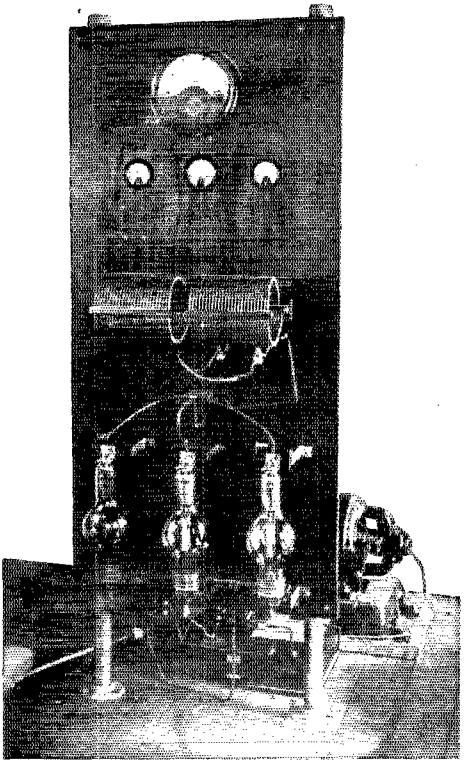
Dec. 20, 1922

Codes verified: 1BCF, 1BFP (error; no such station qualified); 1CMK, 1CNF, 1GV, 2CQZ, 2EL, 2LO, 2XAP, 3ZW, 8AQO, 8AWP, 8BK, 8BXH, 8IB, 8ML, 8UE.

Free period: 1AJP, 1BEP, 1AKG, 1BES, 1ASF, 1BET, 1AWO, 1BRQ, 1AZL, 1BWJ, 1BCC, 1CN, 1BCF, 1CNF, 1BCG, 1CKP, 1BDT, 1CMK, 1DWP, 1EJA, 1GV, 1II, 1PG, 1RD, 1UN, 1XM, 1ZE, 2AWF, 2CBW, 2AWL, 2CJD, 2AYV, 2CJN, 2BDJ, 2CKR, 2BGL, 2CQZ, 2BLK, 2EL, 2BLF, 2FP, 2BML, 2GC, 2BQD, 2GI, 2BQH, 2GK,

2BQU, 2GY, 2ZL, 2LO, 2LY, 2NZ, 2RP, 2UD, 2XAO, 2XAP, 2XAQ, 2ZE (error), 2ZK, 3AH, 3DLG, 3AQR, 3GN (Canuk?), 3AUU, 3HG, 3BCN, 3YU, 3BG, 3ZW, 3BGA, 3ZY, 3BGT, 3ZZ, 3BL, 3BLF, 3BLZ, 3BNU, 4BY, 4EA, 4GT, 5XK, 8ADD, 8BC, 8ADG, 8BSS, 8AGZ, 8BTV, 8AIO, 8BXH, 8AQO, 8CJH, 8ATF, 8CVA, 8ATU, 8IB, 8AW, 8JB, 8AWP, 8MR, 8AZQ, 8UE, 8BR, 8YD, 8ZW, 9AUL, 9DFB.

Off-schedule: 1BCF, 1BDT, 1BES, 1BET, 1CDO, 1CDR, 1CDN, 1CK, 1CKP, 1DWO, 1II, 1IT, 1IW, 1XM, 1YK, 1ZE, 2BQH, 2CQZ, 2EL, 2RB, 2RLC (?), 2XAP, 2XAQ,



The transmitter at 1ZE, one of the best stations in the tests. This set put fourteen complete messages over to England one night without repeats. The antenna current on 225 meters is 18 amperes.

3AQR, 3AZQ, 3BES, 3BL, 3BLF, 3BM, 3CC, 3HG, 3IN, 3JRB (?), 3TJ, 3XN, 3WR, 4AU, 4EB, 6ADG, 6GZ, 6MLZ (?), 8ADG, 8AM, 8AK, 8AQO, 8AQZ, 8ATB, 8ATU, 8AWF, 8AX, 8AXC, 8BSS, 8BSL, 8BSY, 8BU, 8BXF, 8CKR, 8CYH, 8IB, 8ML, 8XE, 8WR, 9DWQ.

Dec. 21, 1922

Codes verified: 1XM, 1YK, 2LO, 2XAP, 2XAP *on phone*, 2ZK, 3ZW, 8AQO.

Free period: 1AGK, 1ASF, 1BDI, 1BDJ, 1BDT, 1BES, 1BRQ, 1BKQ. 1CKP, 1CMK, 1CNF, 1EMK (?), 1GK, 1HRX (?) 1OR, 1XM, 1XO, 1XRAY (?—hi! Who spelled out his call letters?), 1YK, 2AFB, 2AFP, 2AWF, 2AWL, 2BML, 2BQT, 2CBX, 2CKN, 2CPD, 2CQZ, 2EL, 2FP, 2GK, 2GLF, 2GR, 2LO, 2UD, 2XAP, 2ZK, 3AFB, 3BFU, 3BO, 3BSY, 3FA, 3HG, 3KXM (?), 3XM, 3ZW, 3ZY, 4BY, 5XK, 6ZA, 8AIO, 8ATU, 8AQO, 8AVO, 8BSS, 8BU, 8NF, 8UE, 8XE, 9OX.

Off-schedule: 1AJP, 1AWP, 1BCG, 1CDO, 1FB, 1II, 1OR, 1RDE (?), 1ZE, 2CQF, 2FP, 2FW, 2KA, 2ZK, WUBA, 3BLF, 8ADG, 8AQO, 8ATU, 8BRK, 8SP, 9CJC, 9OX.

Franco-Swiss Summary

From the above reports we obtain the following summary in the same manner as for the British reception.

District	Stations Heard	Best Station
First	61	1BDT
Second	63	2ZK
Third	41	3HG
Fourth	5	4BY
Fifth	2	
Sixth	7	
Seventh	0	
Eighth	51	8AQO
Ninth	9	
Total	239	

A total of 239 different stations, several from California, representing every district but the Seventh, with 8AQO easily the star.

Grand Summary

A careful analysis of these reports, eliminating duplication of calls heard in both countries, gives us the following grand total of individual stations crossing the Atlantic Ocean in the tests:

First	District	78
Second	"	81
Third	"	53
Fourth	"	11
Fifth	"	7
Sixth	"	8
Seventh	"	1
Eighth	"	63
Ninth	"	12
Canada		1
Total		315

Three hundred and sixteen different stations got over this year!! Just think of it! It is surprising to find but one Canadian station reported as such but we feel sure that many of the 3's and perhaps some of the 2's and 9's listed as U.S. calls should be credited to the Dominion. Any information Canadian amateurs can give us on this will be appreciated.

The Top-Notchers

It is evident we believe that a list of those stations reported *both* from Britain

and from the Continent will show those that have the real stuff in them, and, because it involves reception at at least two points, is double certification that they "got over." In this list we find:

First District: 1YK, 1BGF, 1BCG, 1BRQ, 1ZE, 1BET, 1BDT, 1GV, 1OR, 1BDI, 1CDX, 1CMK, 1ASF, 1XM, 1AKG, 1BCF, 1CNF, 1AJP, 1II, 1BEP, 1BES, 1CKP, 1CDO, 1AZW. Total 24.

Second District: 2AWL, 2GK, 2CKR, 2EL, 2AYV, 2XAO, 2XAP, 2BML, 2ZK, 2ZS, 2AWF, 2NZ, 2AHO, 2LO, 2CJW, 2CQZ, 2CBW, 2BLP, 2FP, 2GK, 2BQU, 2ZL, 2LY, 2UD, 2AFP, 2BQT, 2CKN, 2GR. Total, 28.

Third District: 3AFB, 3HG, 3BFU, 3XM, 3ZW, 3ZY, 3BGT, 3BLF, 3ZZ, 3BG, 3AQR, 3AUU, 3BL, 3BNU, 3CC. Total 15.

Fourth District: 4BY, 4EA, 4EB. Total, 3.

Fifth District: 5XK. Only 1.

Sixth and Seventh Districts: None.

Eighth District: 8AQO, 8AWP, 8ATU, 8XE, 8BK, 8UE, 8SP, 8AXC, 8ATF, 8BXH, 8ML, 8YD, 8ADG. Total 13.

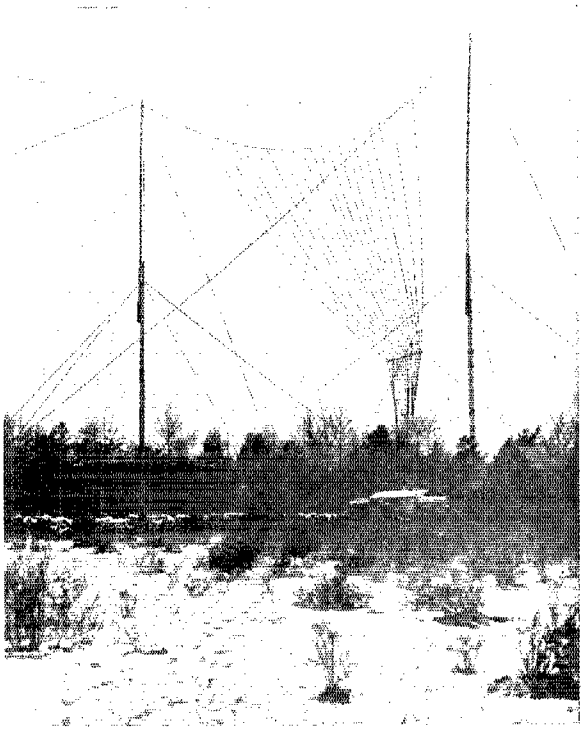
Ninth District: 9AUL. Only 1.

Total number of stations listed in the reports of both Mr. Coursey and Dr. Corret, 85.

Some Lists!

It is impossible for us to express ourselves adequately on these results. The success of the European reception was many times our fondest anticipations. We expected big lists of calls, but nothing like this. Why, do you men realize that it took big long expensive radiograms to make these reports daily via the commercial transatlantic stations, and that, for an example, one of the French messages to the Traffic Manager had a check of 635! Zowie! It certainly was a thrilling thing to listen in on a long-wave set and copy the returns each morning, the British with their "able, boy, cast," and the Frenchmen with their "Andre, Berthe, Camille." At first there was an awful kick in it but later on we grew rather blasé about it and found ourselves wondering one morning what was the matter with these Britishers: they had reported only 37 stations for the previous night! And that was more calls that the entire tests a year before had yielded! And it seemed that it was in answer to this feeling in us that the reports from both Britain and France soared to "new highs" in the concluding days of the period, reaching totals that would make any ham gasp at the sheer wonder of it.

There are naturally some calls in the foregoing lists which "look fishy," and some that are positively incorrect. In the main, however, the percentage of accuracy is surprisingly high. The British amateurs proved superior in reading, we feel, the accuracy of their reports being considerably the higher. The French amateurs have reported almost 50% more calls than the British, but against this it must be remembered that they had the excellent assistance of two Swiss amateurs and the figure must also be discounted to some extent to allow for "phony" calls, misread combinations, three-letter calls with the last one missing, etc., with a result which probably puts the reports of the two countries as such on a parity. All of this shows the value of the preliminary tests and the assigning of secret code combinations, the copying of which on the other side has provided positive identification for the majority of the more reliable stations.



The big fan at 1ZE, Marion, Mass.

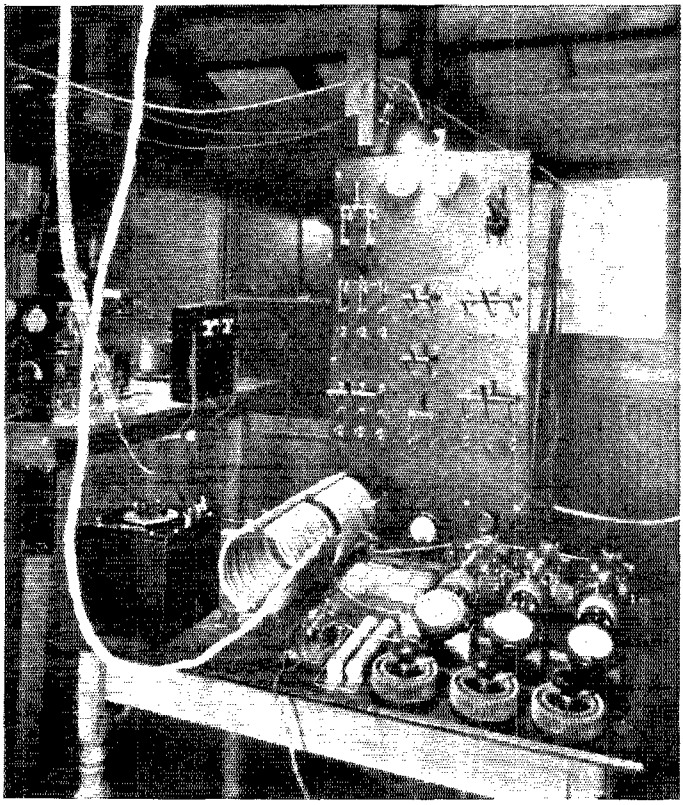
At this writing we have no information as to the number of successful British listeners nor as to their equipment. The latter, we imagine, consists largely of radio-frequency amplifiers with separately-tuned inter-stage circuits for coupling, used in connection with separate heterodynes. Dr. Corret has advised us that at the con-

clusion of the tests there were about forty successful French amateurs, and two in Switzerland, the equipment known to him at that time including Reinartz tuners, American-built three-circuit regenerators, and a super-heterodyne. Many of the signals copied in France were received on a single detector tube without amplification of any kind!

It is interesting to speculate what the effect of the weather may have been. Except around Dec. 15th and 16th the reports increased daily in size from both countries, the latter received no secret codes. The 15th was not a good night for France, and it is possible that the phenomenon, whatever it was, was a traveling effect.

The "West-Bound" Tests

We wish we could be as enthusiastic over the results of the last ten days as we are over the first period. They were successful, after a fashion, but the part played by America in her reception effort was so inconspicuous in comparison with Europe's success the first ten days that,



A close-up of 8AQO, the star of the tests. The helices forming the coupled circuits are clearly shown. From the panel behind the table "juice" of all descriptions may be had.

particularly on the last two nights, which may have been attributable to an increasing body of interested listeners and greater success as they became more proficient in hunting for American signals, or the atmospheric conditions may have improved, or it may have been a combination of both. On Dec. 16th the British dropped almost to nothing, which is surprising in view of the fair luck in France that night, altho even allowing for the lessened chances, we cannot say that we are particularly pleased. Information in our possession at this writing is too meagre to warrant speculation as to whether this may be charged to poor transmitters, poor receivers, poor weather, or poor co-operation on the part of the American amateur.

Mr. Coursey reported code combinations assigned to 17 British stations: 2AW, 2FP,

2FQ, 2JF, 2JZ, 2KF, 2KV, 2MF, 2OD, 2OM, 2ON, 2SH, 2UV, 5MS, 5WS, 5MT, and 9AN. In addition to this a half-hour free-for-all period was provided each night during which numerous other British stations of quite low power transmitted. Dr. Corret listed codes for 22 qualified French transmitters: 8AB, 8AC, 8AD, 8AG, 8AH, 8AO, 8AP, 8ARA, 8BB, 8BG, 8DP, 8DVP, 8DY, 8FZ, 8GU, 8LBC, 8RRX, 8ST, FFC-21, 8AU, 8PA, and 8BL; no information available on free-for-alls.

The following is a summary of the American reception reported up to January 4th:

Dec. 22, 1922

No signals reported.

Dec. 23, 1922

About 0400 G.M.T., French 8AB, 240 meters, no code copied, reported by 8FQ, Pittsburgh, on detector and 1-step A.F.

British 2PO, unlisted, 180 meters, no code, time not stated, reported by 8FQ.

0345, 2FZ calling test, wave stated as 250 meters, heard by 8AMD, Lewisburg, W. Va., equipment not known.

0218, 2FZ, wave estimated 200 meters, heard on super-regenerator and 2-step on loud-speaker by 9DRR, Marquette, Mich.

0333, 2FZ, calling "Test," heard on detector and 1 step by 3HS, Washington, D.C.

2FZ and other unreadable foreign stations heard, time not stated, by 2BML, Riverhead, L.I., on Beverage wire, other apparatus unknown.

Dec. 24, 1922

0156 G.M.T., "5SW" heard transmitting "AFGCX," the code-word assigned to 5WS, by 1RU, Hartford, Conn., on Tuska 3-circuit tuner and detector 1-step. This was the first time a foreign code-word was copied, and it is believed the British operator became confused at the start of his sending, there being no question of the signature 5SW versus 5WS.

0220, 5WS, code verified, wave estimated 215 meters, heard by 2BBB, Ridgewood, N.J., on Reinartz tuner and detector only. Attaboy!

About 0200, 5WS, code verified, by 3BEC, Radnor, Pa.

0220, 5WS, code and message to American amateurs OK, by 1ANA, Chatham, Mass., on Beverage Wire and Reinartz tuner, valves unknown.

0230, 5WS, code verified, by 1XP, Athol, Mass., on 3 stages R.F.A., detector and 1 audio.

5WS, time not stated, code verified, by 1BFG, Belfast, Maine.

Ditto, 1BQD, Newport, R.I.

Ditto, 1OR, Plymouth, Mass.

0230, 5WS without code, by L. D. Warner, Schenectady, N.Y., apparatus unknown.

Dec. 25, 1922

0150 French 8AB, without code word, wave stated 240 meters, 25-cycle note, reported by 8FQ, Pittsburgh, detector and 1 audio.

0435, British 2FZ, 200 meters, by 2BSK, Schenectady, N.Y.

0435, 2FZ, by 2GK, Schenectady, on Reinartz tuner and 1 step.

0440, 2FZ, heard by 8FQ, Pittsburgh.

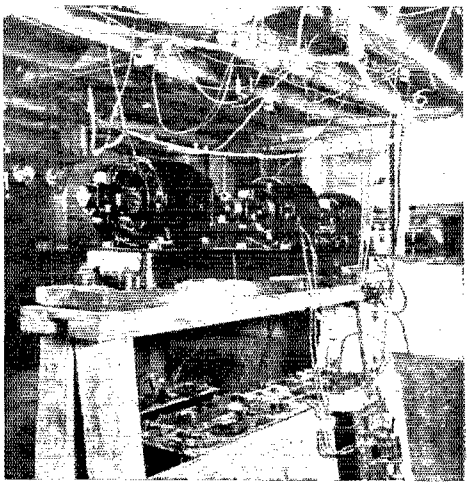
0440, British 2JZ, by 8FQ. Question if not also 2FZ.

0445, 5WS, code verified, by 1ANA, Chatham, Mass.

Dec. 26, 1922

0025 G.M.T., 2FZ, wave stated as 245, sending "k v v v v v," repeated, heard by 2CQO, Elizabeth, N.J., on Grebe CR-9 and detector-1-step.

0154, 5WS, signing "Radio Society of Great Britain," heard by 1MO-1BHW, Hartford, Conn., detector and 1-step audio.



The big Esco motor-generator at 8AQO. The motor operates on 110-volt D.C. obtained from storage batteries, which are charged daily by a gas-engine-driven generator.

Dec. 27, 1922

2FZ heard swinging in for few seconds, time not stated, by 1ANA.

Dec. 28, 1922

0432 G.M.T., unknown station, faint code unreadable, by 1ANA.

Dec. 29, 1922

No signals reported.

Dec. 30, 1922

From 0310 to 0410 G.M.T., French 8AB steadily audible, sometimes unreadable, sometimes QRK, code word "ALUDO" verified, 190 meters, 25-cycle A.C.C.W., copied by C. A. Service, jr., ex-3ZA, at So. Manchester, Conn., on 3-circuit tuner, detector, and two stages audio.

Dec. 31, 1922

0453 G.M.T., 5WS, without code, by 3ADP, Chester, Pa., detector only.

Summary

5WS, the London station of the Radio Society of Great Britain, heard by 1BFG, 1BQD, 1OR, 1XP, 1ANA, 3BEC, 2BBB, 1MO, 3ADP, and L. D. Warner of Schenectady. Total, 10.

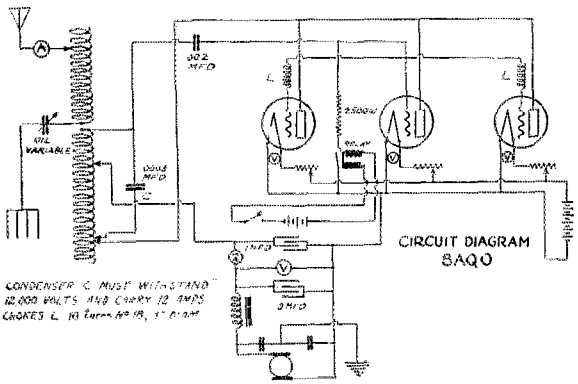
2FZ, Wireless Society of Manchester, heard by 1ANA, 2CQO, 2GK, 2BSK, 2BML, 3HS, 8FQ, 8AMD, 9DRR. Total, 9.

8AB, Leon Deloy, Nice, France, heard by 8FQ and by C. A. Service, So. Manchester, Conn. Total, 2.

5SW, undoubtedly in error for 5WS, heard by 1RU.

2PO and 2JZ, somewhat questionable, heard by 8FQ.

Total British stations positively known to have been heard, 2. Total French, 1. Total Americans hearing European signals, 20.



And that's all. While the figures are disappointingly low, they nevertheless testify to an achievement that should make us all sit up and figure. *European amateurs are transmitting, and we can hear them in America!* In middle December that had never happened and we weren't quite sure that it would. In fact it was with some trepidity that the writer made a wager with W. Witt Burnham, British 2FQ, of a morning coat with which the famous hat-trophy of last year's tests could be worn, that European amateur signals would be heard during the Finals by at least ten bona-fide American amateurs using plain antennas. We have won the bet, but not as decisively as we would like. That, to our mind, is expressive of the whole result—a startling thing has been accomplished in the reception of European sigs in this country, but we didn't do the job nearly as well as we should. Let us look into the reasons.

The strongest point in our belief that we did less than we should is made by the comparative figures. If the combined European reception of Americans had totalled 3 stations, heard by 20 operators, we would feel that we in turn had done well. It is true, we believe, that American amateurs excel in transmitting; we come close to being "past masters" in that gentle art; and we have several thousand active stations. From all of which it is perhaps no particular wonder that the 316 best stations got over. European amateurs have concentrated on reception for many years, and, not being permitted to transmit except under oppressive restrictions, they have developed their receivers to ultra-sensitivity, particularly in the matter of tuned radio-frequency amplification. There are fewer of them and it is easier to get a high degree of co-operation from a limited number than it is from a body of 15,000. These factors combined to make the European success. The number of low-powered American stations heard is testimony of their superior performance in reception.

On the other hand we believe it is quite a new problem for the European amateur to rig up a moderately high power amateur transmitter. We do not know how many of the 39 individual stations assigned code groups were of a calibre that might reasonably be expected to "get over," nor how many of them actually transmitted, but we must assume that they had the power and did transmit. Granting that this is a small field for the American amateur to work with, the results still are poor, and this we must attribute to our inferior receiving apparatus and to jamming on the part of our own men.

The QRM at times was merciless. The first night was hopeless because of hundreds of transmissions calling "Test" in the mistaken belief that it was a transmitting night, the confusion being due to the use of G.M.T. The next couple of nights were more or less consumed in quieting things down. It is an awful job in a country having 16,000 licensed transmitters, about 60% of which are thought to be in commission at any one time and representing amateurs of many diverse interests. Eventually comparative quiet prevailed and there were many nights, in the east at least, when it was possible to listen for many minutes on 200 meters and meet only the silence of the grave—surely the only time this has been the case since macaroni was invented. Not that the gang were entirely quiet—they were not. We believe that any listener could have logged 100 to 150 different American stations in any night's listening, and say but weren't some of them having a beautiful time! Able to work half-way across the country with their little sets and hugely enjoying the clear uninterrupted signals, telling each other what FB it was. Except for the absence of practically every really high-

grade station, the air at times sounded as busy as any normal relay night. But it was the punks and lids who were at it, the halting fists that could hardly be read, the poor sets which had never been heard out of their back-yards before, and blessed if they weren't getting out all over the country during this quiet spell, and enjoying it hugely. Some of 'em even complained bitterly of QRM!

It was in air of this sort that we listened. In conditions of this same sort or not even as favorable, the U.S. west coast hears the east coast and vice versa, which being over land represents a harder feat than to hear similar-power stations in Europe. It was to be expected, then, that we would hear some signals, and we did—to just about the same order of magnitude as we would expect to perform transcontinental reception. That we did not do better must be charged to our receivers and not to our QRM, for there were many periods when the air was quiet enough. We Americans have developed in conditions differing greatly from those of the European amateur. All our radio lives we have been surrounded by thousands of transmitters, and not only has the incentive been lacking to develop a super-sensitive receiver to hear something but such receivers always have been "knocked cold" by nearby stations when put into operation. The result is that most of the signals we heard in the tests were received on regular relay receivers, with audibilities about the same as American transcontinental reception. Of the 20 successful American listeners, two used Beverage Wires and the rest to our belief had normal aerials. We know of several well-made super-heterodynes which were in operation thruout the tests, but no signals definitely traceable to Europe were received on such sets and it is important to note that most of the reception was accomplished on regular amateur apparatus—regenerative tuner, detector, and one or two stages of audio amplification. We have no record so far of any reception on radio amplifiers embodying transformers of the type offered us by American manufacturers. 1XP used a 3-step R.F.A. but tuned the stages with variometers to give reactance-capacity coupling after British practice.

It was a foregone conclusion that 8AB was the best French bet. We understand Mr. Deloy was able to make use of his maximum licensed power of 1 k.w., which was put into a new antenna supported by three 75-ft. masts. During the tests several reports of 8AB were received from the New York district, describing the signals as around 240 meters wave-length, D.C. supply, compensated. 8AB's wave length was 195 meters and his supply 25-cycle A.C. self-rectifying, and not compensated. Somebody with a lopsided sense of humor and no respect for law was having a huge time of it sending out bum French on a receiving set! 2FZ seems to have been more or less of a dark horse, operating without code word, whereas nothing was heard of 5MS, operated by the same club, which it was generally thought would be well heard. Ship operators have reported 5MS very QSA 1000 miles west of Lizard. 5WS was the star European station. This was erected especially for the tests by the Radio Society of Great Britain, and we congratulate its designers and operators. Good signals, code repeatedly verified, and its kind messages of greeting to American amateurs copied QRK. We have no technical particulars at this writing.

Acknowledgment

The A.R.R.L. wishes to express to the Radio Society of Great Britain and to the *Comite Francais des Essais Transatlantiques* its cordial appreciation of and thanks for their co-operation in making these tests successful, fully realizing the enormous effort that has been expended by them; and it hopes that they will agree that the results have been well worth while. We are indebted to the Radio Corporation of America, particularly its traffic manager Mr. W. A. Winterbottom, and to the management of stations MUU and UFT, for their great kindnesses in arranging for the special transmission of our daily reception reports, which enabled amateurs on both sides to keep posted daily on the progress of the tests. To the members of our own Operating Department we extend thanks for their efforts and the same to the good United States and Canadian amateurs who co-operated thruout the 20-day period. And, finally, *QST* offers its hearty congratulations to the successful stations on both sides of the Atlantic, who by their participation have added this crowning accomplishment to the annals of Amateur Radio.

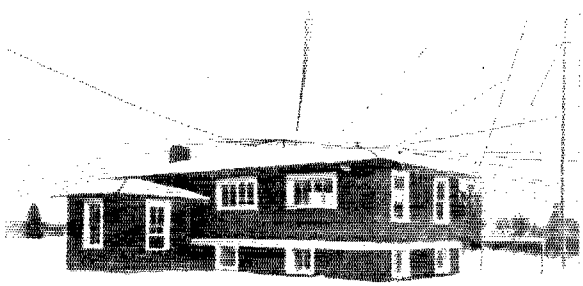
Side-Lights on the Tests

We are sorry that it is impossible to publish the adresses of the American stations successfully spanning the Atlantic, in order that our non-amateur readers may appreciate the full significance of the tests. Space does not permit this, however, and we can only say that they cover most of the United States. We were particularly glad to see the reception of California stations, in marked improvement over last year's tests. The reception of 6KA and 9DWK is credited to Messrs. Perroux and Louis, at Orleans France, concerning whose receiving circuit mention was made on page 24 of December *QST*. Fine work.

Counting the number of times the better stations were reported, we arrange them as follows in the order of their consistency: 8AQO, 2ZK, 2EL, 3ZW, 2AWL, 3HG,

2XAP, 1XM, 1BET, 8ATU, 3XM, 2AWF, 2LO. This rating is not wholly reliable, as it is based on the regularity with which the stations transmitted as well as their reception. For example, 1ZE got off the air after he had been reported from both England and France, and so does not appear in our count. Except for this there is no doubt that "VN" would have been practically on top of the list.

8AQO, as the star of the tests, deserves a further description. Photographs of it are interspersed thruout this article. It is owned by Clive B. Meredith, of "Fernwood," Cazenovia, N.Y., near Syracuse, and was built with the assistance of J. Edward Page, who is its chief operator.



The station building at 8AQO. On the main floor are the batteries, a work-shop, and a hot-air furnace. The dog-office and operating room, while downstairs are the storage house" contains the two Delco outfits which charge the batteries. Note the radial counterpoise in particular.

A young Bureau of Standards, it is surpassed in sheer magnitude by 3ZO alone, as far as we know. At this station Mr. Meredith has 8AQO, which will be described in detail; 8XH, a 500-cycle I.C.W. set using a single 1 k.w. Radiotron; 8BSS, a 15-watt D.C. set which also got over nicely, and WMAC, a low-powered broadcasting set.

In an ideal location on quite high ground, beautifully in the open, 8AQO appeals to us as the best amateur transmitter we have ever seen, if size and power and general magnitude are to count. The radiating system is a thing of beauty, reminiscent of 1BCG of last year except that it has a 6-wire flat-top T aerial. The short flat-top is hung between two 100-ft. masts, which are placed several hundred feet apart to keep the guys as much as possible out of the field. A 6-wire vertical portion drops from the center of the flat-top, the wires joining into a rat-tail just above the station, which is a specially-built bungalow midway between the masts. A radial counterpoise radiates from the station roof as a center to a circle of short poles surrounding the station at a distance of about a hundred feet, glazed porcelain insulation being used thruout. The station also has an elaborate ground system of radially-buried metal strips which come together in a well in the center of the cellar floor, but this has been abandoned in favor of the counterpoise. Constants of the system are not known to us, but the natural period is over 200 meters and the operating wave of 208 meters is secured by the use of a series condenser, so it is probable that the radiation resistance and the radiated energy are both relatively high.

The station building itself is a peach. Glass cabinets house the best laboratory apparatus obtainable, and no amateur could wish for better fortune than to be locked into this station and left for a week—he'd forget about eating. Long wave receivers, short wave regenerators, a super-heterodyne, two Beverage Wires, juice on the power board in all varieties of frequencies and voltages, wave meters and standards, half a dozen transmitters. Some station.

Commercial electricity is not available, so it is "made" on the spot. A 2½ k.w. Delco outfit running on kerosene charges a bank of the heaviest lead-plate storage batteries giving 110 volts. All of the generators and alternators at this station are thus run from 110v. D.C., and even the power-tube filaments are heated from a 1000 A.H. storage battery. The poor charger averages about 7 hours a day in operating season!

The close-up of 8AQO tells most of the story. The set is arranged on a table set in front of a switchboard from which "juice" of any desired sort is available. Three 250-watt U.V.204's in parallel, with D.C. on the plates, are connected in a tuned Hartley oscillator circuit, which in turn is inductively coupled to the antenna circuit. This will be clearer after a study of the schematic diagram.

Quite a few transocean messages were handled with Europe about the time of the tests. 5WS was copied by several amateurs sending greetings to America, 2ZK's message of greetings to the city of Rochelle, France, from his town of New Rochelle was copied in France, and 8AQO was copied in France with "Merry Christmas and Happy New Year." But the prize goes to Irving Vermilya, the w.k. New England Division Manager, whose station 1ZE put over 14 messages totalling 365 words to Manchester, England, one night. There was no schedule; it just happened. It seems that "VN" was giving a talk on radio before a gathering of

business men in New Bedford and told them of the wonderful accomplishments of amateur radio. They didn't believe him, and so he offered on the spot to take a message for England from each of them, and deliver it. There were 150 present, but only 14 messages were finally secured. Vermilya's log tells the rest of the story:

"Dec. 12, 11:35 P.M. Moved clips on tuning inductance, started up big generator for first time with full load. Increased voltage on same and when the field resistance was all out, she kicked out 2,400 volts. Opened lightning switch, held key down. Radiated 12 amperes. Took wave length—showed 200 meters. Shut down and changed clips. Started up again and pressed key. This time it showed 18 amperes, and 225 meters. Started to call "English 2KW," signing "Yankee 1ZE" and "Messages—here 14 messages." Called for four minutes and then shot the messages one at a time, words once, sending slowly and carefully. After 37 minutes finished transmission and shut down, asking for a cable QSL."

The next day the cable acknowledgment arrived, saying "Manchester, England—Vermilya Marion Mass USA —All your messages received—a great stunt—(signed) Burne."

Perfectly simple, isn't it? Congratulations anyhow, Vermilya and Burne—you made history that night.

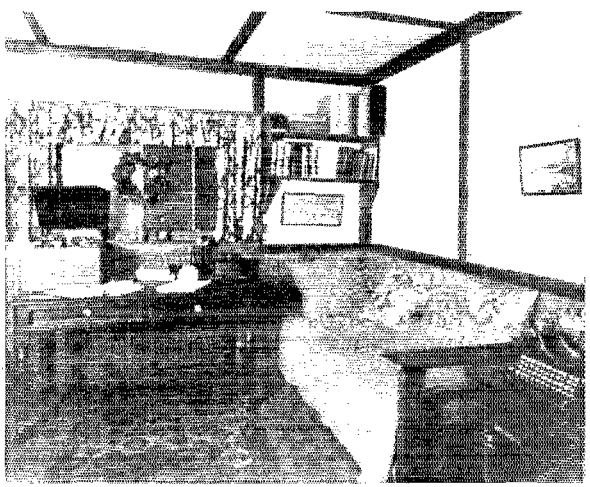
The set at 1ZE consists of three 250-watt Radiotrons having a combined normal output of 750 watts, the power supplied by a 2000-volt 1500-watt D.C. generator. We are not sure of the hook-up but believe it is inductively coupled to the antenna in somewhat the manner of 8AQO. The key is placed in the high-voltage line—a big Clapp-Eastham key with 10 mfds. of condenser across it to prevent arcing. The antenna is 100 ft. high at the top, of 54 ft. spread, containing 22 wires 110 ft. long, and supported 65 ft. high at the station end. An insulated counterpoise under the aerial contains 50 wires 100 ft. long. Total resistance at 375 meters measured as 4 ohms; resistance at 225 meters not known.

Vermilya is one of those who were bothered by miserable QRM and CQ-ing during the listening period. He says he wishes he had 1,272 freight cars full of Wouff-Hongs, Rettysnitches, ohm-saws, and dynamite, and could get a chance to get these QRM birds out in the Sahara Desert where there would be lots of room to chase 'em around and throw things at 'em. Hi!

As far as we are aware, not a single spark station got over to Europe. 315 to 0. Who said spark? "Day by day, in every way—

1BGF got tired of calling "Test" and built himself an automatic transmitter, shown in our illustration. Altho hurriedly assembled from a "Meccano" or similar toy set, it is an ingenious contrivance and served the purpose very well. An electric motor drives a paper strip thru electric contacts placed in the key circuit. In this paper strip have been cut blanks to form the continental for "Test de 1BGF 1BGF," and by the simple process of gluing the ends of the tape together the transmission of this call was made continuous at any desired speed. 1BGF made both countries on this "Wheatstone."

We were very glad to see Porto Rican 4OI get over. Rexach had luck—both bad and good. In his preparations for the tests he burned out five of his six 50-watters. He started up with the remaining single tube on the first night of the tests but it lasted only five minutes and then it too was gone. Yet in those five minutes he had been logged twice in England, and so is happy.



The station bungalow at 8AQO-Cazenovia has a cozy little combination of office, lounge and bunkroom for the convenience of the ops.

We are advised that Mr. Eschausier, the Holland amateur who heard 1BCG last year, has been successful in copying eight Americans this year, but we haven't the call letters.

In the early days of the tests Dr. Corret repeatedly reported ONX and OMX *(zero neomi xavier,* not *octave neomi xavier)* as heard in France. This puzzled us mightily.

Who among us had so rotten a fist as that? The reports continued to arrive. Then the doctor cancelled them, advising these were Holland stations. But if Holland stations, were they amateurs? Evidently they were on 200 meters, and evidently their correspondence was of amateur nature. The only idea we have is that perhaps the Dutch amateurs wanted in on the tests, and knowing that the U.S. districts are numbered from 1 to 9, chose 0 as their numeral. Hi! Too bad, too, when we were figuring on trying to get 0 for Cuba when she opens up. But now we're even more puzzled to get a letter from the secretary of the Dutch society, the N.V.V.R.T., complaining bitterly against the interference caused them in listening for America by *British* ONX working to British 2AW, Wakefield, Eng. Now we don't know at all.

The big commercial stations normally operate at a good clip, and sent our daily reports slowly especially for us amateurs. WSO had quite a tussle on the third night with UFT, who was demanding that he step on the gas and QRQ. In repeating back Corret's message WSO broke twice to say, by hand, "UFT de WSO *pse* take this TC at this speed, then faster." Hi!

How do we know that lots of stations got over? A chap in Pennsylvania wires us asking we telegraph him collect a list of the transatlantic stations. The Traffic Manager figured out that if he meant a list of those getting over, the charges would be about $56; and that if he wanted a list of those transmitting, he might get it for about $20,000. He decided to wait for this issue of *QST*.

Messrs. Burne and Cash, of Manchester, England, were among the star listeners. Writing several days before the end of their listening period, they reported having heard about 170 different American amateurs, from every district, over 100 of whom had been heard during the Finals. Of the latter, about 50 had been copied with code words. Fine work, OMs. They report 2EL readable on voice, too. That makes three amateur phones that got over: 2EL, 2ZK, and 2XAP.

Additional Reports

Since the compiling of the foregoing reports some additional lists have come in from American ship operators who listened in on the gang. 9BYP, operating aboard KDQD, mails us the following from Hamburg, copied on a Reinartz tuner.

Dec. 12th, off Land's End, England. Following, code letters verified: 1AKG, 1BCG, 1QP, 2ZK, 2CQZ, 2ZL, 2EL, 2BML, 2UD, 2AYV, 3AUU, 3BNU, 3ZZ, 3CG, 3XM, 3BIJ, 8AQO, 8BPL, 9ZN, Canadian 9AW Duncan. Working DX or testing: 1AJP, 1BAS, 1CMK, 1OR, 1CIV, 1ZE with messages for England, 2KL, 2BLF, 2LO, 2GI, 2ZK, 2ZS, 3BG, 3AQR, 3XM, 8UE, 8SP, 8FQ, 8BK, 8CJH, 8ALT.

Dec. 13th, off Southampton, End. Following with codes verified: 1ZE, 2GR, 2AWL, 3BLF, 3ZW, 8AXC, Can. 9AL Russell. Working DX or test: 1XU, 1BRQ, 1ZE with English messages, 1CMK, 2FP, 2ZS, 2AWF, 2EL, 3ZW, 3BG, 3XM, 8AWP, 8AKG, 8ALT, 9BED.

Dec. 14th, in North Sea, off Belgian coast. Codes verified: 1ZE, 2AWL, 2XAP. DX or testing: 1XU, 1GV, 1ZE, 1CMK, 1BDT, 1OR, 2FP, 2GR, 2BKT, 2CJN, 2AWL, 3AFB, 3XM, 4YA, 6YC reception doubtful, 8ATU, 8AIW, 8VQ, 8AQO.

These lists contain verification of the codes of several new stations. Among them is 1QP. Suppose it took a Reinartz tuner to hear him. Hi!

And as if that isn't enough, along comes Dave Cawman, remembered by the Ancients as "NV," and sends us a string of calls a yard long, incidentally sending copies of three of 1ZE's messages which he copied QRK while on the S.S. "Liberty" off Lizard in the English Channel, about 3000 miles east of Hoboken. Space permits us to record only the reception that is all the way across:

Dec. 13th and 14th. Codes verified: 1ZE, 1BDI, 2AWL, 2XAP, 3ZW, 8XE, 8ATU. DX or testing: 1ZE on messages to England, 1XU, 1CMK, 2ZK, 2FP, 2AWF, 3XM, 3AFB. 1ZE best station, 1BDI second best.

And now, if we're going to have anything else in this issue of *QST*, we must bring this story to an end. More next month.

Two Hundred Flat

The Radio Inspector came to town the other day,
And wavelengths took a tumble in the most amazing way.
I visited the station of a radio "op" I know,
Who begged that I should wait a bit, and hear his tale of woe.
Said he, "No doubt you wonder why I look so pale and weak.
It's due to strangulation of the wavelength, so to speak.
With just two amperes in the cage the way she worked was fine,
But that was when my wavelength was about two twenty-nine.
She still kicks out the amperes, but there's nothing much to that.
I can't work anybody now, I'm on two hundred flat.

I used to work a bunch of nines, and dalite stuff with eights.
That little old C.W. set's been heard in forty states.
I have a good location, my antenna is a peach,
It isn't that it doesn't work, I know it's got the reach,
But I'm smothered in harmonics, the broadcasts furnish that.
My sigs 'ain't what they used to be,' I'm on two hundred flat.

I used to handle traffic with a kick that knocked 'em dead.
I'd clear the hook each evening before I went to bed.
They all would tell me 'QSA,' when I was working them,
But now, I only hear that same old "Sorri, QRM.'
It's bad enough to make the Old Man spit upon his cat.
I cannot handle traffic now, I'm on two hundred flat.

I haven't seen a card in weeks, I haven't worked a soul,
I'm feeling like a nervous wreck, my traffic's in a hole.
There's only one solution which can ever save the day,
They ought to pass the Wavelength Bill, and do it right away.
For I'll bet K. B. Warner a frock coat against his hat,
That *he* couldn't handle traffic on two hundred meters flat.

—Wm. S. Creighton.

C. W. Reception with the Super-Regenerator

By Leon W. Bishop, 1XP

—Third Prize Winner in QST's Contest—

WE read Mr. Warner's article on "Radio Frequency Amplification" in the September *QST* and feel sure that he hit the nail on the head, as we have experienced with R.F. for several years. It is not a case of what R.F. can be made to do, but how reasonably can we construct a set that will stand back of our transmitter on these clear winter nights.

We have tried out many Super circuits, including several fine ones from *QST*, and finally decided upon the one we present here. This circuit is not well adapted to 360-meter broadcast reception but will produce real amplification on C.W. or spark on 200 meters.

Those who have used the Eaton Oscillator circuit will admit that it is a continuous and energetic oscillator at low frequencies, so why not use this as a base for our super circuit by inserting our short-wave coils, using the Eaton circuit for the variation frequency? It works great; just try it.

This circuit is a case wherein the positive and negative resistances are varied simultaneously and where the variation-frequency energy remains at about the same value over a large range of filament brilliancy. It is possible to perform the heterodyning, rectifying and amplifying all in the one tube, but the control of oscillation at the incoming radio frequency is very critical and we have found that a separate heterodyne aids a great deal in amplification and selectivity. Likewise, when the set oscillates at a radio frequency as well as at a variation frequency, it becomes a low-powered transmitter and radiates the radio frequency on which are superimposed all the howls and squeals and harmonics which are the accompaniment of super operation. For these reasons we shall describe later in this paper a practical heterodyne not only for this circuit but also for general use in 200-meter work.

The limit of amplification obtainable with the super-regenerator seems to be governed by the tube characteristics, as we have obtained increasing amplification with higher plate voltages up to 350 volts. We tried using one stage of R.F. amplification but accomplished nothing except a reduction of QRN.

Figure 1 shows a diagram of the super-regenerator. We made the resistance R of carbon grid leaks connected in series and tapped to the contacts of a switch so that the variation frequency could be changed on short notice. Fine adjustments of the resistance were made by rubbing a soft lead pencil on the grid leaks. The condensers C_1 and C_2 should have a capacity of about .001 mfd. and if possible should be of mica, 'tho very good results were obtained with paper condensers. The grid condenser should be of mica and have a capacity of about .00025 mfd. The grid leak shunting it may consist of a pencil line with a resistance of about 7 megohms. It is best to start with too much resistance and lower it until the tube stops howling. B_1 is a 6-volt storage battery. The battery B_2 may have a voltage from 30 to 300 but

with ordinary tubes a maximum signal strength will be obtained with from 40 to 60 volts. The condenser C_3 may vary from .001 to .005 mfd. Increasing its capacity cuts down both the received signal and the strength of the variation frequency, as heard in the phones. The choke, I, keeps the radio and variation frequencies out of the phones to some extent. It is a spark-coil secondary used without a core. The variometer L_2 should be capable of tuning the plate circuit to waves below 200 meters.

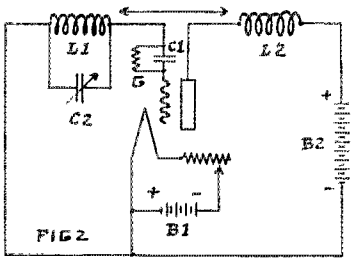


FIG 2

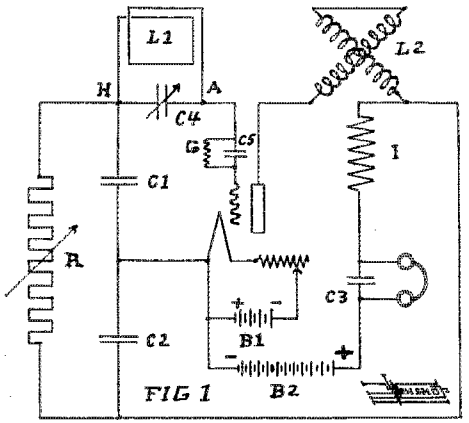


FIG 1

Many makes of variometers are not suitable because they are built for 360-meter work. L_1 is the loop, which should be variable by turns. For marked directional effects a tapped coil should be connected across the condenser C_3, which is a .0005 variable, and a loop containing 12 or 15 turns on a 3-ft.-square frame used as a collector. The variometer L_2 may then be replaced by a 50-turn honeycomb coil coupled to the tapped coil as a tickler.

We have found a great variation in amplifier tubes and a variety may have to be tested before good results are obtained. If a soft detector tube is used, excessive plate voltage must be avoided.

Several permanent adjustments must be made before the set is ready for use. These are: the proper value for the resistance R; the B battery voltage; the value of the grid-leak G; and the number of turns in the loop L_1. For spark and phone reception the value of R should be low and the filament brilliancy high. For autodyne C.W. reception the value of R should be high and the filament brilliancy somewhat lower. As the filament brilliancy is lowered or the plate and grid circuits thrown slightly out of resonance, the tube tends to break into oscillation at radio frequency, since the variation-frequency energy is no longer sufficient to prevent this.

As previously mentioned, however, autodyne reception of C.W. signals is not to be recommended on the super-regenerator and it is decidedly preferable to use a separate heterodyne as shown in Fig. 2. Here's a chance to use that soft detector tube and about 30 volts of old B battery. The grid leak G should have a resistance of about ½ megohm and the grid condenser C_1 a capacity of about .00025 mfd. The condenser C_2 is a .0005 variable. L_2 is a 40-turn honeycomb coil and L_1 a 30-turn honeycomb; the coupling between these coils should be fixed. The adjustment of the condenser C_2 determines the wavelength at which the heterodyne oscillates, while the filament brilliancy and plate voltage control the energy of the oscillations. The heterodyne should be operated on a separate A-battery in order to avoid putting too much heterodyne energy into the super circuit. No direct coupling is required; the heterodyne need only be set on the table near the super.

The heterodyne can be calibrated by bringing a wave meter equipped with a detector and head-set near the coil L_1 and adjusting the wave-meter condenser until a click is heard in the phones. This click indicates that the wave-meter has come into resonance with the heterodyne and has stopped the oscillations of the latter by energy absorption. If two clicks are heard, the coupling between the heterodyne and wave-meter should be loosened.

A line for the music fan who must have the best part of the evening. In Figure 1, increase the number of turns in the loop, use a standard variometer, and reduce the value of the fixed condenser C_1, and presto! you hear those nice talks on house furnishing and ancient history.

We have got our best results on a 32-inch-square loop, spirally wound with 24 turns spaced ½ inch. Only the first 8 or 9 turns, on the outside of the loop, are used in the tuned circuit. The unused turns of the loop beyond the point A are allowed to act as an antenna; and better results were obtained when the point H was grounded.

In a preliminary test the following stations were heard at 1XP: 2TS, 2AJA, 2BJL, 2BXP, 3AFB, 3AQR, 3ALN, 3BIJ, 3BOB, 4BX, 4BQ, 5EK, 5AAM, 5EG, 5BY,

5KG, 6ZG, 8BUX, 8AHR, 8BJV, 8CTN, 8BO, 8AWZ, 8AXN, 8XE, 8BFT, 8QK, 8SB, 8BCY, 8IB, 8CNW, 8BTR, 8ZZ, 8BRR, 8AIM, 8AGK, 8BLT, 8VY, 8BCY, 8CMI, 8CDL, 9BCB, 9APS, 9BED, 9UU, 9PN, 9AW, 9II, 9AL, 9ANY, 9XL, 9DCG, 9KM. Most of these stations came in as loud as 1BKQ, 1ABY and 1GV, who are received with terrific intensity on our regular detector and two-stage. QRN was noticeably cut down and QRM was about the same. We feel that the super has it all over our regular set and are making room for its permanent installation. The circuit does not come up to our expectations on spark—it is sensitive to spark signals but not selective. On C.W. it is very selective yet easy to tune. Another thing of interest to us is the fine daylight results we have obtained. Such stations as 1ADN, 1CMK, 1CHJ, 1BKQ, 1CPN, 1BNT, 1AZL, and 1CSO are not increased at all, but 2AWF and 2ANM are much louder than on our regular set, and we hear many 2's, 3's and 8's that cannot be got at all with our standard set.

The Hearings on the White Bill

By Hiram Percy Maxim

President, American Radio Relay League

FOR the benefit of those of us amateurs who cannot keep in close touch with legislative matters, it might be well to run over the high spots in the present radio bill now pending in Congress.

It is known as "The White Bill," because it was introduced by Congressman White of Maine. This bill was drawn up as a result of the "Radio Conference" that was held in Washington last spring. The writer, representing the amateurs, was invited by Secretary of Commerce Hoover to be a member of this conference. The big objects of the contemplated legislation, when everything is boiled down to the last analysis, are to give more wave lengths for broadcasting, so that broadcasting can grow and expand and perform the service that it should, and also to give to the Secretary of Commerce sufficient authority to properly regulate radio in the United States. The bill was drawn up by a legal committee appointed from the members of the conference.

When the bill was finally completed, our A.R.R.L. Board of Direction sat down and took up the question of what their attitude should be regarding the proposed law. It was a long session, that first one, because the Board felt that this new legislation might be a very serious thing. It was finally decided to employ expert legal counsel and to ask our Mr. Chas. H. Stewart to go to work with this counsel, study the bill from the amateur standpoint, and bring in a report.

This was done and there was another all-night session of the Board. The recommendations of Mr. Stewart and his counsel were taken up and viewed from every angle. A lot of new points were developed and the whole matter was referred back to Mr. Stewart and his counsel for further study and report. After another six weeks of work, the revised report was brought in by Mr. Stewart, and the Board of Direction went into another long session. A few additional improvements were made and we finally had the A.R.R.L. attitude toward the "White Bill." As I look back over the months of study, and the number of people who gave their best thought and hours of their time to this perplexing subject, I cannot help marvelling at the enthusiasm and splendid spirit which this effort indicates.

The conclusions of the Board were my orders, and I worked them up with the help of Mr. Stewart, and when the Hearing came, on Jan. 2d I presented the amendments which are set forth elsewhere in this issue of *QST*. (See page 24.—Ed.)

It is instructive to consider the effect upon outsiders of the way we do things. It gives us a very good line upon our standing in the eyes of the general public, which is a matter of the very greatest importance. My test was a very good one, for I had to present our amateur case to Congressmen, Naval officers, Army officers; our staunch old friends the Bureau of Navigation, Department of Commerce; and some twenty others who represented a wide variety of public interests. Before this varied audience our case appeared to win distinct favor. One could not escape the conclusion that we organized amateurs have commanded the respect of the general public. It seems to be the idea that we have business like methods, good American virility, a clear and also a broad vision, and that we know what we want and how to ask for it.

Since the Hearing, I have thought quite a bit about this public opinion matter and I must say that we are certainly very fortunate in that our Board of Direction and our individual personnel have so conducted A.R.R.L. affairs as to have acquired this enviable position in the public mind. Now, if we can "carry on" and keep the same broad-minded and unselfish viewpoint, we shall continue to grow and enjoy even greater measures of public re-

spect and confidence. Our loyalty to our country and our loyalty to our A.R.R.L. have built us a foundation of solid rock. I thought several times as I stood there in the Halls of Congress, answering questions and pleading the cause of the American Amateur, that any man could well be proud to serve as a representative of such an organization as the American Radio Relay League. There is only one way to express this spirit here in the pages of good old *QST*, and that is— FB VY OM!

73 de 1AW.

STATEMENT OF HIRAM PERCY MAXIM AT THE HEARING ON H.R.11964, JAN. 2, 1923.

My name is Hiram Percy Maxim. My residence is Hartford, Conn. My occupation is president of the Maxim Silencer Co. of Hartford, Conn. I represent the American Radio Relay League, a national, non-commercial organization of amateur radio telegraphers.

Before sugesting certain amendments to this bill, I desire to state the position which the American radio amateur occupies in our country.

As to the Value of the Radio Amateur in Time of War or Public Peril

The American amateur believes he represents a valuable national asset, which should be protected and encouraged. The value to the country of hundreds of loyal young Americans who were skilled in radio communication and who were masters of the International Morse Code was fully demonstrated in the recent World War. In future wars, or public perils, he believes he can be of even greater value to his country in view of the fact that many hundreds of him are now war veterans who have had the advantage of military radio training in the Navy, Army, Marine Corps, and Air Service. Furthermore, he wishes to point out that in order to increase his value he is at work at the present time in his national organization, upon the development of a system by means of which it is hoped that the military services of the Government may be able to keep in intimate touch with amateur radio traffic, to influence the character of this traffic, and become possessed of the actual names and addresses of expert oprators, and of those youths who give promise of becoming expert operators and who will reach the age of twenty-one as the years pass.

In view of all this, the American amateur believes that the amendments to this bill which he has to offer should be given serious consideration.

As to the Influence of the Radio Amateur in the Development of the Radio Art

The American amateur, under the law of 1912, was given limitations as to power, wave length and decrement, which were considered by the framers of the law as placing the amateur under such a handicap that he would never be able to reach out far enough to make any trouble with commercial and military communication. The handicaps were considered sufficient to prevent his signals from reaching beyond a matter of a mile or two.

By ten years of intensive study, patient research and epoch-making invention, he has today produced short wave radio transmitting and receiving apparatus which enables him to reach out into the thousands of miles and cover a continent where it was thought he would only cover a city square. Before the World War the American amateur had actually developed a radio relay system which extended aeross the American continent from coast to coast. At the time the war called him from his work he had organized his fellows and covered the entire country with a network of amateur lines. Messages were handled at the rate of several hundreds a night, and they reached into every State of the Union.

Since the World War, this development has increased tenfold and citizen radio traffic is now being dispatched at the rate of over 50,000 messages a month, and the Dominion of Canada, the Island of Porto Rico, and the Hawaiian Islands have been taken in. They are no farther away to the amateur in Portland, Maine, or in Little Rock, Arkansas, than is Baltimore from Washington. Within the past few weeks I myself, seated in my library in Hartford, Conn., have communicated for half an hour at a time with a friend on the Island of Maui, Hawaiian Islands, with one relay at Sleepy Eye, Minn. On one occasion I told my friend Dow in Wailuku that it was 5:18 A.M. Wednesday morning in Hartford and that the eastern sky was getting gray. He told me it was 11:35 P.M. Tuesday night with him. I was talking with a man by dot and dash who was in yesterday. To bring the record up to the minute, ten-day two-way transatlantic amateur communication demonstrations have just been complated within the past two days, in which it has been shown that American, British, French, Dutch and Swiss amateurs only need our American organization to establish regular two-way international private communication. In other words, the close of the year 1922 has seen the American amateur so develop the art of short wave communication that the limitations set in the year 1912 to hold him to a mile or two have not been able to hold him in the Western Hemisphere.

These wonderful achievements have been accomplished under the protection of the law of 1912, which although it limited our power and our wave length, gave us protection and insured our existence. It would indeed be a pity were we to pass a new

law which would remove this protection and this insurance.

The contributions to the art made by radio amateurs has not been fully told without a reference to their far-reaching effect in other countries. European amateurs have not enjoyed liberal laws in the past. The exhibition made by American amateurs in the War, and the achievements made since the War, have awakened other countries to the value of the radio amateur. The result has been that the laws of Canada, England and France have been modified and regular international amateur communication is a thing of the immediate future.

Therefore we say, that if the American amateur may continue to have protection and encouragement, he can be counted upon eventually to bring the private citizens of all civilized nations of the earth into free and unrestricted communication with each other. The political value to humanity of such an achievement cannot be over-estimated.

As to the Financial Advantages which the Amateur offers

There are at the present time very close to 16,000 licensed amateur transmitting stations in the United States. If it is a fact that each of these 16,000 licensed amateur transmitting stations spends $50 in a year on his station, it is plain that these amateurs have purchased $800,000 worth of supplies. There are reasons to believe that $50 is too low an average, because we know of many amateurs whose expenditures run into the thousands of dollars. If, however, we make the average $100 per station, we see that the American radio amateurs spend $1,600,000 per annum. It would seem as though he were worth having around for this reason alone.

As to the Attitude of the Amateur Towards this Bill

The American amateur has had reason in the past to view radio bills with concern. Whether intentionally or not, bills have been introduced into Congress which would have made it possible for an unfriendly official to abolish amateur radio by a stroke of the pen. In order to protect himself, and in spite of his demonstrated value to his country, he has been compelled to organize nationally. This amateur radio organization, of which the speaker has the honor to be President, is as efficient as amateur radio apparatus. It is known as the American Radio Relay League, Inc. This League has had this proposed bill carefully analyzed from the amateur standpoint. This analysis has developed six places where, if the amateur is to have his existence assured, the bill should be amended.

In submitting these six amendments, and two corrections of what are probably inadvertensies in the preparation of the bill, the amateur asks that it be distinctly understood that he realizes that he is but one of many interests which should have adequate protection and encouragement. He feels that the existing law of 1912 is entirely satisfactory to him, as an amateur, as the accomplishments of the last ten years so eloquently demonstrate; and that in spite of this fact he recognizes that improved legislation is desirable for the good of us all, and that for this reason he is glad to lend his aid in developing something modern.

In presenting his eight amendments, the amateur feels that he should emphasize this fact of his willingness and his desire to be broad-minded and unselfish, because he has suffered severely and unjustly of late from criticism born of ignorance. The amateur has been blamed by the new broadcast listener, who is looking almost solely for transient entertainment, for every form of interference from static to faulty street lamps, and from 450-meter commercial shipping to navy arc sets. He has been patient under this ignorant criticism in the belief that it was a duty he owed the common cause, and that it would eventually correct itself. The amateur furthermore believes he is justified upon this occasion in pointing out to this committee and those present that he has gone so far in his efforts to be unselfish, and fair and square, as to temporarily relinquish the best hours out of the 24 so that the broadcast listener may have quiet air so far as the amateur could control the air; and this, notwithstanding the fact that his Government license gives the amateur every right to use his transmitter. The American Radio Relay League has for several month past urged all amateurs thruout the United States who own transmitters to refrain from using them between the hours of 7 P.M. and 10:30 P.M., local time, every night in the week thruout the year. This rule is very generally followed. It is mentioned here as a concrete example, typical of amateur methods. All the amateur asks in return for this is equally fair and reasonable treatment.

The Proposed Amendments and the Reasons for Them

Section 1, page 1, line 10. The word "commercial" to be inserted after the word "of," so that the line will read, "telegraphy or telephony as a means of commercial intercourse."

Our reasons are as follows: this entire bill, as well as the Act of August 13, 1912, is built upon the power of Congress to regulate interstate commerce. The word "commercial" is a part of the Act which this bill seeks to amend. The power of Congress is derived from Section 8 of Article 1 of the Constitution of the United States,

which refers to regulating commerce with foreign nations, among the several States, and with the Indian Tribes. There exists no other power in the Congress to regulate radio communication, except, of course, the war power of Congress. Therefore our reasons for inserting the word "commercial." So far as amateur interests are concerned, whether this word is included or omitted is not vital. The point is offered because it has been brought out by our study and we consider it our duty to indicate it.

Section 1B, page 2, line 11. After the words "required therein" there be inserted the following clause: "including amateur or private stations."

Our reason for this amendment is as follows: as the section stands, it is not incumbent upon the Secretary of Commerce to make any provision for an amateur class. An unfriendly Secretary of Commerce could take advantage of this to eliminate amateur radio whenever the spirit so moved him. It is believed that this broad power is unnecessary and un-American, and that no hardships would be worked to anybody by giving the amateur this protection.

Section 2C, page 5, line 15. That the words "amateur or private stations" be inserted on line 15, and the word "except" changed to "excepting," so that this section shall read: "C. That the Secretary of Commerce, subject to the limitations of this Act, in his discretion, may grant to any applicant therefor a station license provided for in Sections 1 and 2, hereof, and, excepting amateur or private stations, that he may grant such license only to a station which is in the interest of the general public service."

Our reason for this is as follows: it would be a simple matter to interpret "general public service" as excluding the amateur, for the reason that it might be argued that his operation serves no direct and immediate public service. Such an interpretation makes it possible to withhold a station license from a worthy amateur applicant or to cancel all amateur station licenses. This is not fair or just to the amateurs of the country, and we hope nothing ulterior is intended in this peculiar wording. We believe we are justified in asking for the protection which our amendment gives.

Section 4B, page 11, line 17. The words "or amateur" be inserted after the word "private" and before the word "stations," and also the words "and sixteenth" inserted after the word "fifteenth." The word "regulation" should then be changed to "regulations."

Our reasons for this amendment are as follows: this amendment is obviously necessary if reference is had to the original Act of 1912. Leaving out the sixteenth regulation was probably an oversight in the drafting of this new bill.

Section 5, page 12, line 13. This section provides for an advisory committee. We

December in Review

West Coast amateur signals heard in Chinese and Japanese waters.

British and French amateur signals heard in the United States for the first time in history.

Three hundred and sixteen different United States and Canadian amateurs heard in Europe, the signals being reported from Britain, France, Holland, and Belgium.

66,885 free citizen messages handled by our Operating Department, a new record.

An American amateur station puts 14 messages across the Atlantic to England without a repeat.

California amateur signals heard on the Atlantic Coast in daylight.

What More---!

suggest that after the words "government service" there should be added the sentence "or affiliated directly or indirectly in the manufacture, sale, transmission or operation of radio telegraphy or telephony for financial profit."

Our reason for this amendment is as follows: if the membership of this advisory committee is made up of lawyers and consulting engineers of companies financially interested in radio, it is unavoidable that the recommendations of these members should be colored in the interest of their clients. In our own amateur organization we have laid it down as a basic principle that our policies shall not be decided nor influenced by any commercial affiliations of any kind, and we have found that this principle has been a very wise one indeed. We believe that it will be equally wise in this case. That has nothing to do with amateurs but is a suggestion that our study developed.

Section 7, page 13, line 18. That the word "not" be stricken out. Our reason for this amendment is as follows: when this section is read in conjunction with the fifteenth regulation in the Act of 1912, it will be apparent that a double negative would exist unless the word "not" is eliminated. We believe no explanation beyond this is necessary, as it was of course an oversight to make use of a double negative.

Section 7, page 13, line 20. There should be added after the words "two hundred seventy-five meters" the clause "provided, that Secretary of Commerce shall classify the transmitting apparatus used by amateur, private or non-commercial stations, and shall assign within the limits provided in this section such bands of wave lengths to these several types of transmitting apparatus as he may deem proper."

Our reasons for this amendment are as follows: we believe the Secretary of Commerce should have the power to classify the types of apparatus to be used by amateurs in the bands between 150 and 275 meters. We believe it to be to the general interest of all concerned to keep spark transmitters to low wave lengths, indeed if not to discourage their use altogether. The above amendment would give to the Secretary of Commerce desirable authority. Without this amendment it is doubtful if he has the power.

Section 10 of this bill we consider a most dangerous section. We strongly urge its elimination as a whole.

Our reasons are as follows: the section as it stands gives any commercial station, such as a telephone broadcast station, which might in any way send out a government report authorized by some department of the government, the standing of a government station. We believe that it is unavoidable that this use of words would lead to great injustice. If it is not the intent that this wording shall confer special privilege then there would seem to be no objection to making the language explicit. The words "government station" should be defined specifically in this case as meaning a radio station owned by a department of the Government and used exclusively for official government business. That is all any government department needs, and it precludes the possibility of making unfair use of veiled or doubtful language.

In Conclusion,

we believe the above suggested amendments are desirable, reasonable and just, and we earnestly urge that they be made to this bill.

Pacific Completely Bridged by Amateur Sigs.

ELSEWHERE in this issue we tell the story of the Transatlantic Tests wherein over three hundred American amateurs were heard in Europe. Altho some of these stations were in the central and western portions of the continent, it is perhaps only natural that the great bulk of them were in the eastern districts. But while all this was going on the 6's and 7's were having an informal party all their own, over their own particular ocean, and we have the pleasure of recording yet another amateur achievement, this time across the vastly broader bosom of the old Pacific. In our last issue we published logs reporting 5's, 6's and 9's within a hundred miles of Australia, and the reception of a single unknown 3d district station off Yokohama, Japan Now we can chronicle the definite reception of our ham signals in another continent, *Asia!* 6ARB, 6CC, and 7SC have been logged just off Japan, and 6CC, 6KA, 6NX and 6ZZ are reported off the coast of China, 5830 miles west of San Francisco and around 900 miles further than Yokohama! Vy FB, OMs—we offer our hearty congratulations.

A well-known San Francisco amateur operating on shipboard, whose name we have been requested to withhold, has reported the Asian records, in a log he has been kind enough to send us from China reporting signals copied on a voyage which commenced at S.F. on Oct. 24th. Reception in Hawaii is now such a commonplace that for want of space we pass up his reports east of Honolulu and will start at

Nov. 3d, 2295 miles west of San Francisco. Using home-made single-circuit regenerative receiver, 190 to 25,000 meters, from description in *Radio*, and one step audio. QRN strong. Heard 4EH, 5ACF, 5ZA, 5NN, 5NV, 5ANB, 5QY, 5UB, 6AJH, 6AWT, 6AQW, 6BQZ, 7SY, 9XAC, 9ASF, 9AMI, 9BJI, 5SM, 6BCR, 6TI, 6AJF, 6BQC, 6KA, 7BJ, 8QK, 8AXC, 8CUR, 9ARZ, 9BSZ, 9DFB.

Nov. 4th, 2520 miles west. 5TJ, 5QY, 5DO, 6CC, 6KA louder than home at S.F., 7BJ, 7ZO, 8ZY, 9BIK, 9AEQ, 9BLY, 9AWM, 9AON, 9AOU, 9CBA, 9DKY, 9BDS, 9APS, 9YAJ, 9AVZ, 9DFB, 9ZAF QSA and steady (copied his nr's 3 to 6 to 7ZO OK), 9GK? not positive.

Nov. 5th, 2770 west. QRN vy bad. 6AMN, 6BVG, 7NY, 8ZY, 9ZAF, 9AOG, 9XAC, 9AWM, 9CNS "using 10 watts 1.1 amps."

Nov. 6th, 2965 west. 6KU, 6XAD, 6KA sounds like 10 k.w., 7JW, 7BJ, 9BDS, 9BIK, 9ANQ QSA.

Nov. 7th, 3200 west. 5EK, 6CC, 6FT, 6BNW, 6ZX, 6KU, 6KA, 7AFW, 7MF, 7BJ, 9AWM, 9BDS, 9DKY.

Nov. 8th, 3425 west. 5XAD, 5SM, 5AAT, Can. 4BV wkg 7NY, 5EK, 6BRG, 6BCR, 9BJI, 6KU, 6BJW, 6ZX, 6EX spark, 6AQW, 7SC CW and ICW, 7BK, 7TO, 7NY, 7RN, 6AVR, 9APS, 9BJI, 9AYS, 6AWT, 6AGW, 6TI, 6AGP, 6JD, 6AKT spark, 8BKE, 9BJI, 9AWM, 9CNS.

Nov. 9th, 3675 west. 4EH, 5EK, 5ACF, 5SM, 6KU, 7MF, 7BJ?

Nov. 10th, 3917 west. QRN constant roar. 6BVG, 6TI.

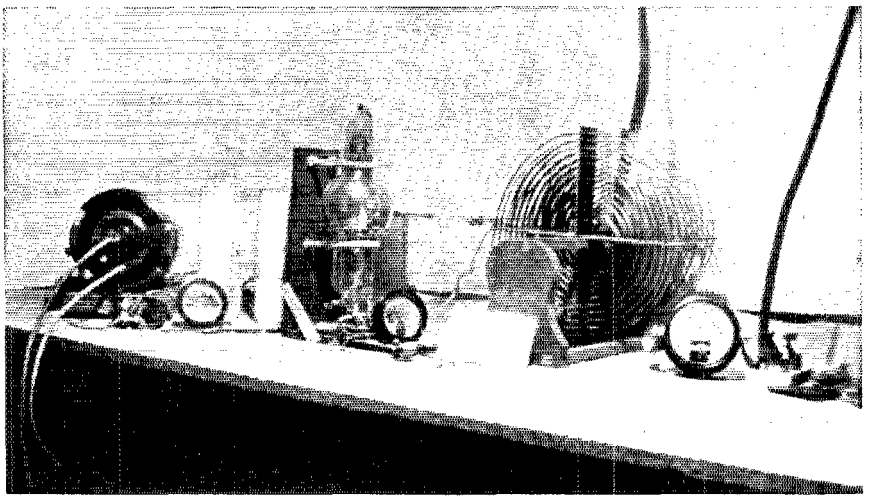
Nov. 11th, 4164 west. 6BUM, 6XAD, 6BCR, 6TI, 7OT.

Nov. 13th, 4625 west. ND last nite, Jap QRM. 6KA, 6BCR.

Nov. 14th, 4865 miles. QRN and Jap QRM. 6BCR only station copied.

Nov. 15, 5100 miles, or 120 miles further west than Yokohama. QRN occasional crashes. 6KA QSA working 8XE; sed "QRK OK but QRM at times ur....pse."

Nov. 18th, 5830 west of San Francisco, running parallel with China Coast. 6NX at 11:50 p.m., said "QTA msg." 6ZZ at 11:55 p.m. 6CC, calling 6ZAC and saying "QRK nw k" at 12:20. 6KA, calling 5TJ 11:55 p.m. 6ZZ working 6IV 12:20 a.m. 19th said "Tts same tng with me too"; short while after, called 9II. 6CC again 12:45 a.m. 19th. 6NX, calling 9ZN 12:46 a.m. 19th, said "QSA hr." 6KA, calling 8ASV 12:55 a.m. 6KA seems best QRK of all; fades very slowly and believe he could be held in all the time with about 3 steps R.F.A. I thot at 3000 he was good for 3000 more, but now think he could be heard another thousand on a good night.



6KA, Los Angeles, a 1-tube set which has been heard from France to China and most places in between. Antenna current 12 to 13 amperes.

Want some more? All right: Another ex-amateur ship operator, the same one who heard an unknown "3" in Yokohama recently, sends us the following log of his return voyage starting at that port.

Dec. 7th, 3166 west Honolulu, off coast of Japan. 6ARB, 6CC, 6ZAC, 7SC. (Whereby Cookson nails his reception in Jap waters.)

Dec. 8th, 2796 west Honolulu. 7SC QSA calling 7OE.

Dec. 10th, 2076 west. 6KA, 6AVD, 6AWT, 6AJR Reno, 7SC, 9BM calling 9BP, sigs QSA (We believe these nines are Canadian specials.—Ed.)

Dec. 11th, 1742 miles. 5AC, 6AJR, 6ZH, 9GK Fargo, N.D. 9GK heard constantly across Pacific.

Both Dec. 12th's, crossing 180th meridian, nil.

Dec. 13th, 568 miles. 6EA, 6EN, 5ZA.

Mr. T. E. Nikirk, 6KA, pre-war 3VU.

On Dec. 18th, while 1167 miles west of San Francisco, logged every district and Canada: 1MY, 2AFP, Canadian 3CO, 3DH*, 3XN, 4KT, 4EB*, 4BV*, 5NS, 5KC*, 5XD*, 5XK, 6ZH, 7MF, 8AXC, 8BK*, 8IB*, 8BXH*, 8AZD, 8CMI*, 8ZAF, 8UE*, 8QK*, 9YAO, 9AYU, 9CBA, 9ANQ, 9AAU*, 9BJI, 9DLY, 9OX. (* indicates trans-atlantic code letters verified.—Ed.)

Bully work, fellows. Now we've been heard at least in the waters off every continent. Of course actually to hear signals inland in these continents is another matter, as this over-water reception is much easier.

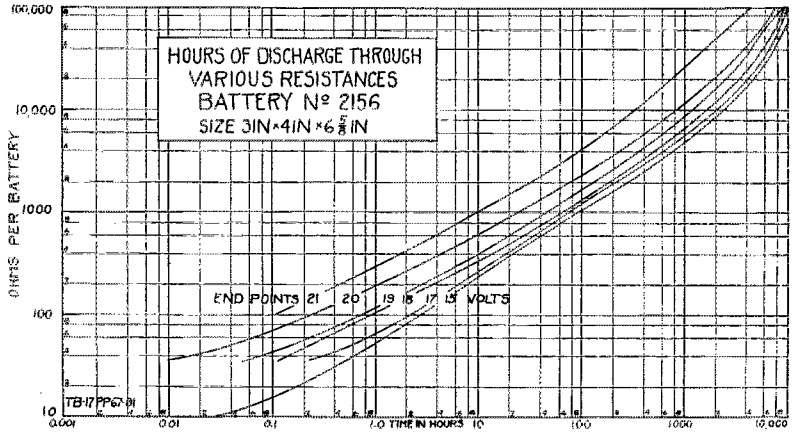
With all due credit to the entire list of successful stations, we think 6ZZ and 6KA are the stars, for they are in the China list and they also got over to Europe, including all the long 2500-mile drag over the Rockies and across the United States. That is real performance and represents so much more of an accomplishment than the Atlantic crossing by eastern stations that we are tempted to hang on these stations the champion all around DX laurels of the U.S.A. And we're glad to be able to say that to a 6, too!

We're sorry we haven't any data on 6ZZ at Douglas, Ariz., but we are fortunate in having some late photographs and information on 6KA, the ether-buster of T. E. Nikirk at Los Angeles. The aerial is a T, the flat-top having 5 wires on 14-ft. spreaders, 57 ft. long and suspended 73 ft. high, with a cage lead-in 8-in. diameter. A counterpoise is used consisting of 9 wires, embracing an area 45 ft. wide by 70 ft. long. A single tube is used, a special experimental model rated, we believe, at 250 watts output. The plate supply consists of A.C. obtained from a power transformer and rectified by a synchronous rotary rectifier, as described in detail elsewhere in this issue. The inductances consist of two double pancakes of ribbon, making four pancakes in all. The first one is the grid inductance, 5 turns of ¼" ribbon; the next the antenna winding, 6 turns of ½" ribbon; and the next two the plate coils, each 15 turns of ¼" material. Coupling between plate and antenna-grid units is variable. Filament transformer and rectifier motor are run off the lighting circuit, while a special supply feeds the plate transformer, so that the filament voltage remains constant. Telegraphing is accomplished by breaking the 110-volt circuit to the plate transformer.

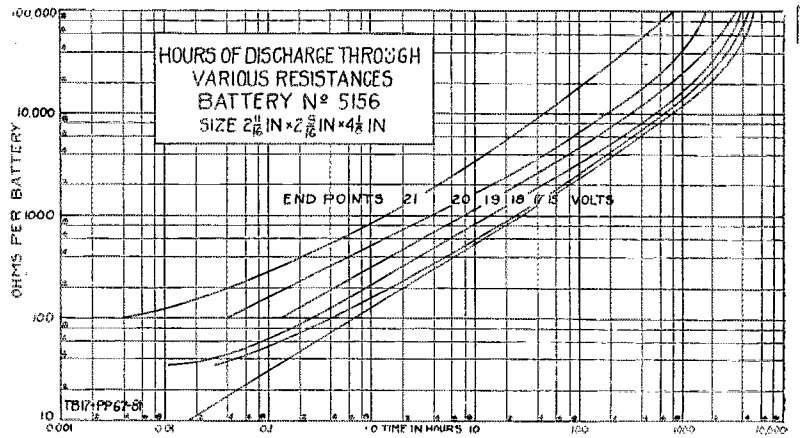
Normal antenna current at 6KA is 12 to 13 amperes, as shown on a thermo-couple ammeter. In special tests to see how great a current could be obtained, the plate voltage was run up to 8000 volts rectified and 18.8 amps obtained, but legal input was considerably exceeded to do this. Nikirk believes in getting the most out of his tubes, and has got 8.9 amps from a single 50-watter by putting over 3000 volts on it and 11 volts on the filament, but there are several holes in the plate of this particular 50 now and the practice is not at all to be recommended to those who cherish the well-being of their thermionic-triode-generators.

—*K.B.W.*

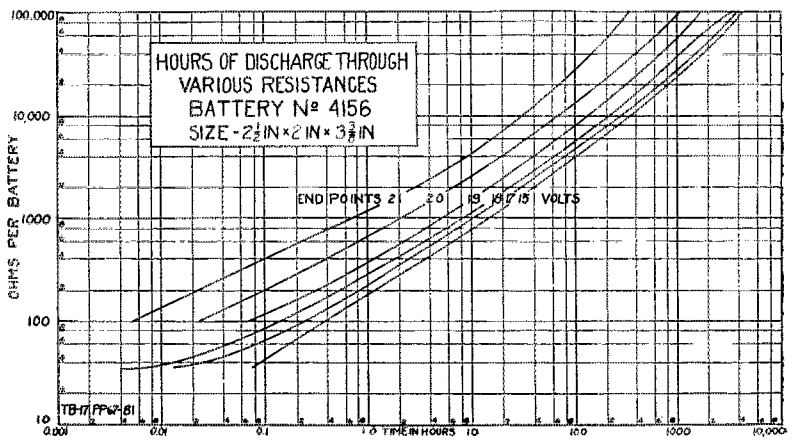
2DC SUGGESTS WE SHOW WHAT THE OCCUPATIONS OF US RADIO MEN ARE WHILE WE'RE NOT "POUNDING THE BRASS." HE HIMSELF IS A BUTCHER AND 2RO IN HIS TOWN IS A BARTENDER. ALRIGHT FELLOWS -- LET'S GO! SEND ME YOUR CALL LETTERS AND "OCCUPATION" FOR QST CARTOONLETS. ADDRESS 8UX, D. A. HOFFMAN, 12 KIRKWOOD ST. AKRON, OHIO. PHOTOS FOR DATA SOLICITED.



Curve I



Curve II



Curve III

CURVES ACCOMPANYING ARTICLE ON OPPOSITE PAGE

Hours of Service of "B" Batteries

*By W. B. Shulte**

AS "B" batteries are one of the few parts of a receiving set which become exhausted and need replacement from time to time, it is believed that data showing the hours of service of these batteries at various loads will be of interest to the amateur operator. Such information may also be of value to engineers interested in the design and characteristics of electron tubes.

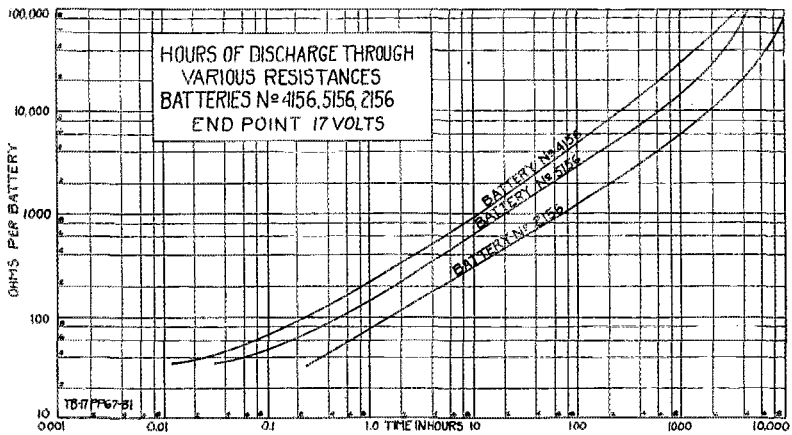
At present about ninety percent of all "B" batteries in use are one of three sizes, the general dimensions of which are shown in Table II. These batteries are 15-cell units cast in one block and having a terminal voltage of 22.5 volts. The tests of the capacity of the batteries discussed in this paper are limited to these three sizes.

The batteries were discharged continuously through calibrated resistances of the following values:

35 ohms
100 ohms
350 ohms
1000 ohms
3500 ohms
10000 ohms
40000 ohms

Two or more batteries were discharged through equal resistances and the closed circuit voltage values were recorded at periodic intervals during the course of the test. In recording the data all of the readings for the same resistance were averaged. The temperatures were maintained fairly constant and were held between 62° F and 70° F. The batteries were regular product and selected at random from market stock.

For convenience the data are presented in graphic form and Curves I, II, and III show the hours of discharge of the batteries through various resistances to various end voltages. It should be noted that the curves are plotted on a double logarithmic scale.



Curve IV

Referring to the curves, it is seen that the most useful service can be obtained if the batteries can be discharged to at least 18 volts. Fortunately the usual electron tubes can be used to a plate voltage under this value. 17 volts is the end value called for by government specifications.

Curve IV shows the data for the three sizes of batteries to an end point of 17 volts and from this curve interesting comparisons can be made between the various

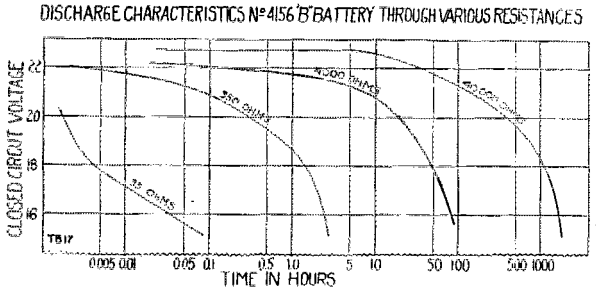
Table I

Battery No.	Hours to 17 volts 40,000 ohms	Weight Lbs.	List Price	Hours Per Lb.	Hours Per $
2156	6600	5	$3.00	1320	2200
5156	2600	1.6	2.25	1625	1155
4156	1400	1	1.75	1400	800

*Engineer-Secretary, Burgess Battery Company

batteries on the basis of the hours of service per pound of weight and hours of service per dollar of price. See also Table I.

From this it is clearly seen that on a basis of price the largest battery is the most economical.



Curve V

A comparison can be made to show the effect of heavier current drain on the hours of service. For example, with battery No. 2156, if the electron tube resistance is about 20,000 ohms, which is probably the minimum resistance, the battery will furnish about 4,000 hours of service. If two tubes are used in parallel and the resistance is 10,000 ohms, the hours of service is cut to about 1800 hours. This decrease in hours of service is important when a single battery of high voltage such as a 45-volt battery is connected to a detector-amplifier set. In using these higher voltage batteries, the negative end frequently is connected to supply current to both the detector tube and amplifier tubes and this end of the battery becomes exhausted earlier than the positive end, which only furnishes the amplifier plate current. If it is exhausted, it is seen that its service is not economical. To overcome this the battery is discarded when only part of most economical connections of "B" Batteries is to use them split into units of about 22.5 volts so that they can be interchanged from time to time from the detector-amplifier sections so that the current drain can be equally distributed between them.

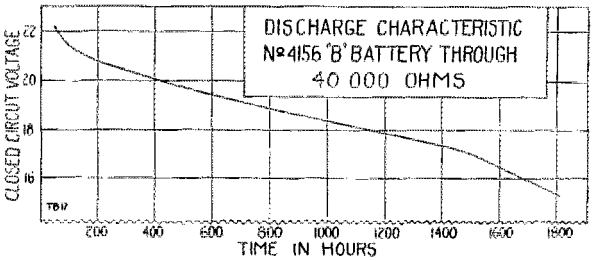
Curve V is presented to show the general shape of the discharge curve of the smallest battery on various resistances. The larger sized batteries have the same general shape as shown by this curve, and it should be noted that the horizontal scale is logarithmic.

Curve VI shows the 40,000 ohm discharge of the small battery plotted on lineal scale. It is seen that after the first part of the discharge, the discharge, the curve practically becomes a straight line, which, if extended, would cut the vertical axis at about 21.5 volts. This characteristic, of practically uniform dropping off of voltage, can be made use of in estimating the capacity of a battery at a constant current drain: for example, to find the probable hours of service of a No. 4156 "B" battery at 0.003 amperes to an end voltage of 17.5, the average voltage can be assumed as being

$$\frac{21.5 + 17.5}{2} = 19.5 \text{ volts}$$

The resistance equivalent to 0.003 amperes is

$$\frac{19.5}{0.003} = 6500 \text{ ohms}$$



Curve VI

From Curve III then, the length of service is found to be about 140 hours.

The effect of the self-depreciation, or so-called "shelf" of the batteries, is indicated by the upward bend of the curves in Curves I, II, III and IV after the 4000 hour or about 167 day discharge point. This factor is not a constant one, and the study of it and its characteristics is

Table II

Number	Dimensions Width	Length	Depth	Weight	Cell Diam	Size Length	No. Cells	Volts
5156	2 3/4"	2 5/16"	4 1/8"	5 lb.	1 1/4"	2 1/4"	15	22 5
4156	2 3/32"	3 7/16"	2 13/32"	1 1/2 lb.	3/4"	2 1/8"	15	22.5
2156	3"	4"	6 1/2"	1 lb.	5/8"	1 7/8"	15	22 5

not within the scope of this paper, but it must be recognized as being a variable which affects the hours of service of a "B" Battery, especially at the low discharge rates.

On intermittent service with high resistances or low discharge rates the total hours of service will be increased and it is estimated not more than twenty-five percent, provided, however, that the self-deterioration does not become a weighty factor. This means that for low discharge rates with large batteries, where the withdrawal of continuous current does not affect the battery before 4000 hours, the shelf characteristic of the battery is more important and has more effect on the battery life than does the hour capacity.

Synchronous Rectifiers for Plate Supply

A Symposium edited by S. Kruse, Technical Editor

Edited by S. Kruse, Technical Editor

THE synchronous rectifier or commutator, as applied to the plate supply of tubes is a California idea. At this writing it is almost exclusively a West Coast device. It is therefore fitting that the first section of this paper be from two Westerners, Howard F. Mason, of 7BK, and George Sturley, of 7BJ. To them and to R. C. Bohannan, 8ZAF, we owe most of the material here presented.

THEORY OF OPERATION

From the Letters of H. F. Mason, 7BK, and George Sturley, 7BJ.

The synchronous rectifier is nothing but a commutator which, instead of being mounted on the generator shaft, is run by a separate (synchronous) motor which usually has four poles. If it is a 60-cycle motor this gives a speed of 1800 r.p.m.

In its usual form the commutator is a bakelite disc 6 to 9 inches in diameter on the face of which is mounted a segmented brass ring running in contact with two A.C. input brushes and two D.C. output brushes. These four brushes are carried by a rocker-arm so that, while the rig is running, they can all be shifted around the disc together until the best position is found.

In the simplest disc half inch gaps are cut in the brass ring at two points opposite each other. To allow the brushes to get over them smoothly these gaps are generally filled with a segment of insulating material, preferably hard rubber which stands up much better than bakelite.

The synchronous motor may be purchased* or an induction motor may be converted as described by F. F. Hamilton on page 12 of *QST* for April, 1921. The converted motor is much less powerful than before. Hamilton was right when he insisted on starting with an induction motor of at least one-quarter horsepower rating.

The design of the rectifier disc offers some difficulties which can be explained by diagrams. If very narrow brushes are used and the gaps between the segments are very narrow the rectified voltage will have the form shown in Curve B, Figure 2. The

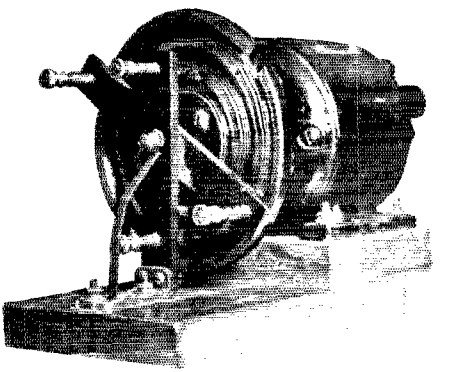


Figure 1. The Rectifier at 6BRG

brush is supposed to *break and make* while there is zero voltage. This thing cannot be built; it is a theoretical wheel. Practically, there must be a gap between the segments. But as soon as there is a gap, the break and make no longer happen at the zero point, but in the way shown in Curve C, Figure 2. Then the disc sparks. We can now shift the brushes so that the break comes at zero voltage as shown in Curve E, Figure 2, but at the same time the make goes still further off the neutral point.

Now let us connect a smoothing condenser across the output (D.C.) brushes. To do any real smoothing this condenser must be so large that its voltage never drops below that required to keep the tubes oscillating. We now have two pulsating voltages; first, the rectified A.C. from the

*Synchronous motors may be purchased from the following firms:
The France Manufacturing Co., Cleveland, Ohio. (Ball-Bearing)
The Valley Electric Co., St. Louis, Mo.
The American Radio & Research Corporation, Medford Hillside, Mass.
The Benwood Co., Inc., 1114 Olive St., St. Louis, Mo.
Crocker-Wheeler, Ampere (Newark), N. J.
The General Electric Co., thru their various branches.
Chicago Radio Laboratory, 332 S. Michigan Ave., Chicago.

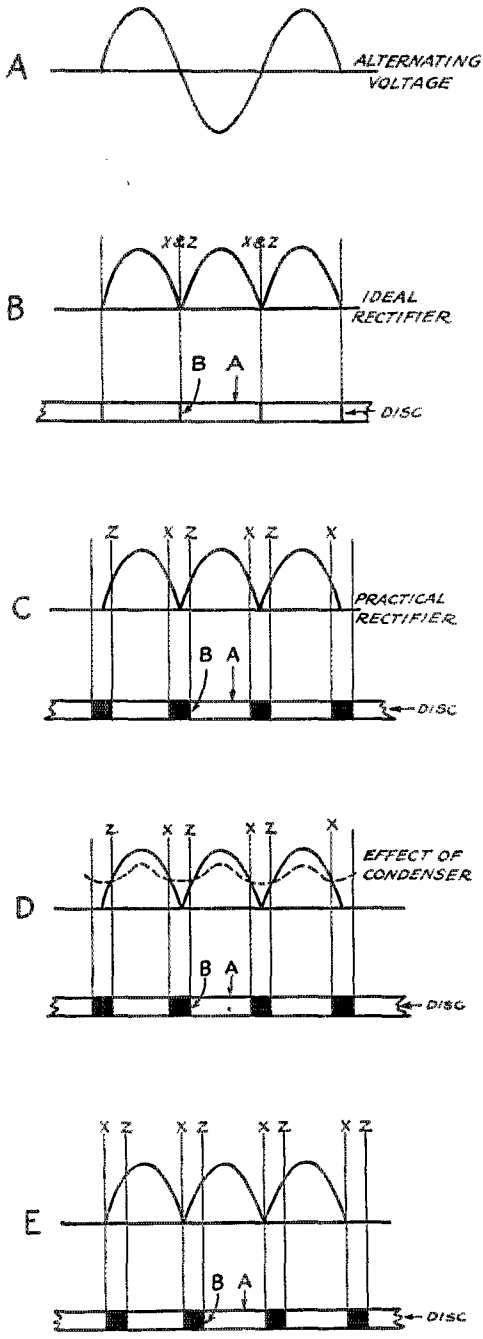


Figure 2. The Rectification Curves
A—Segment
B—Spacer
X—Break
Z—Make

disc and, second, the condenser voltage shown in the dotted curve of D, Figure 2. Now if we shift the brushes so that the make and break happen just where the curves cross there will be no sparking. Putting it differently, we can open or close the circuit without any fuss if we do it when the transformer voltage is just equal to the condenser voltage. This too is theory as the adjustment changes with the load. In practice we let the thing spark, build the wheel to stand it as well as possible, and design so that burned spacers and brushes can be renewed easily.

The disc now in use at 7BK was designed with these ideas in mind. It is of bakelite with brass segments. The insulating spacers have parallel sides so that they can be made easily and they are held in place by two machine screws each, making it possible to replace a set in five minutes.

The adjustment of the brushes is made by hunting for the point where there is least sparking and the most antenna current. When the rocker-arm is off neutral in one direction one of the D.C. brushes and one of the A.C. brushes will spark, while if the rocker-arm is off in the reverse direction the other two brushes will spark. To eliminate sparking more completely it seems as if there ought to be auxiliary brushes on either side of the main brushes and connected to them thru resistances. [Such brushes are described under the heading "Spark-Preventing Brushes."—Ed.]

There is no way of telling "which side up" a synchronous motor will start and if the line voltage is unsteady it may even "slip a pole" after things are supposed to be running properly. There must be a reversing switch in the primary leads of the plate transformer and it must be within easy reach from the operating position.

Carbon brushes, altho quiet and slow-wearing, have been useless as they coat the spacers with graphite which leaks and finally arcs over, burning out the insulation. Copper gauze or leaf brushes must be used.

The synchronous rectifier has been worth while at 7BK. Formerly the tubes were operated with A.C. supply. The antenna current was 2.8 amperes. With the rectifier the same tubes now produce an antenna current of 3.5 amperes, nearly twice as much antenna energy.

CONSTRUCTION AND OPERATION

By R. C. Bohannan, 8ZAF

Having received a great many requests for information regarding the rectifier now in use at 8ZAF, I feel glad to be able to give my fellow amateurs a description of it.

The first step in the construction is to convert an induction motor into a synchronous motor or else to buy one of the latter,

preferably of about a quarter horsepower and designed to run at 1800 r.p.m.

The rectifier disc shown in Figure 3 is made of ⅜ inch formica. It is 9 inches in diameter and carries four brass segments ¾ inch wide by ¼ inch thick. The formica spacers are of the same width and thickness.

In constructing the disc, the first step is to turn up a brass hub bored to fit on the motor shaft and provided with a flange. Fasten to this flange by means of four 10-24 machine screws, the formica disc, which has been sawed to as nearly circular form as is possible with a band or compass saw. Next fasten on the brass segments and the formica spacers, using 10-24 machine screws with the heads at the back of the disc. The whole assembly should

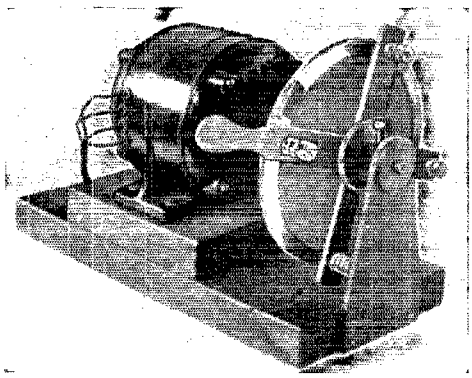


Figure 3. The Rectifier at 8ZAF

then be put on a mandrel, swung between centers in a lathe, and the faces and edges of both the brass segments and the disc itself turned off true. Then with the disc still suspended loosely between the lathe centers, or better, with the mandrel lying on two horizontal steel straight-edges, bring the disc to a perfect balance by drilling small holes in the heavy side until it will stay in any position. This is very important in securing quiet operation of the outfit.

The rocker arm, shown in Figure 3, is made of formica strips and carries four ⅜-inch round carbon brushes in spring brush holders. This assembly is capable of rotation by means of the handle so that the point of synchronism may be found. Considerable tension must be carried on the brushes to insure good contact and least sparking. Connections to the brushes should be made as in B, Figure 4, with the addition of a reversing switch in the primary circuit of the plate transformer. Since the wheel described here is not exactly like that of Figure 4-B, but has four segments, these must be connected in pairs by wire jumpers on the back of the disc. This of course could have been avoided and the construction simplified by making only two cuts directly opposite each other as in Figure 4-B, but this puts the work of breaking the current on two brushes at a time (instead of all 4 at each break) and causes more severe sparking.

When first testing, connect the 110 A.C. mains to the input brushes and a 110 volt lamp to the output brushes; then, with the machine running, adjust the brushes for the steadiest and brightest light from the lamp. Now connect the rectifier to the set and make the final adjustments for the smoothest tone in your own receiving set.

The synchronous rectifier takes less room, and needs less attention and in the end costs less than the electrolytic, the outfit will work on any voltage up to 3500. The output from the tubes is about 75% greater than when using A.C. and the neighbors are grateful for the relief from the broad A.C. racket. [Provided the rectifier sparking is not worse than the A.C.—Ed.]

The transmitter at 8ZAF consists of a tyne "P" General Electric pliotron, supplied with 2000 volt D.C. by the rectifier. The antenna current is 9.8 amperes on 200 meters. The introduction of a filter will improve the tone but necessitate a readjustment of the rocker-arm. When the load is 250 miliamperes at 2000 volts each brush will show a small blue flame but even after several months of operation this does not burn the spacers badly.

A 3600 R.P.M. RECTIFIER
By T. E. Nikirk of 6KA

The rectifier at 6KA was designed by 6JD and myself and built by me.

The rectifier disc [see the picture of 6KA in the article "Pacific Completely Bridged by Amateur Signals"] is of bakelite and 8 inches in diameter. It carries a central contact (well insulated from the shaft), a small contact ring, and a large split contact ring. Both of the rings are ½ inch wide. The outer one is cut at two opposite points, the cuts being left as open air-gaps. One half of the ring is connected to the central contact and the other half to the small contact ring as in the case of the disc shown in A, Figure 4.

The high voltage A.C. from the plate transformer is fed to two brushes that touch the central contact and the small ring respectively. The high voltage D.C. is taken off the split outer ring by another pair of brushes set opposite each other on a rocker arm so that they may be shifted for least sparking. The D.C. brushes are made of copper gauze bent over a trifle at the end so they do not catch in the air-gap.

The driving motor is a 2-pole 60-cycle synchronous, hence runs at 3600 r.p.m. The disc is not suited to 1800 r.p.m. operation unless the brushes are all four moved to the outer ring as in B, Figure 4.

The 3600 R.P.M. Rectifier at 6BRG

H. F. Mason suggests a wheel with air insulation between the segments. The same idea has been worked out by H. M. Fink of 6BRG, whose rectifier is shown in Figure 1. Note that the disc is grooved between the segments for better insulation. This is another 3600 r.p.m. disc of the 6KA type.

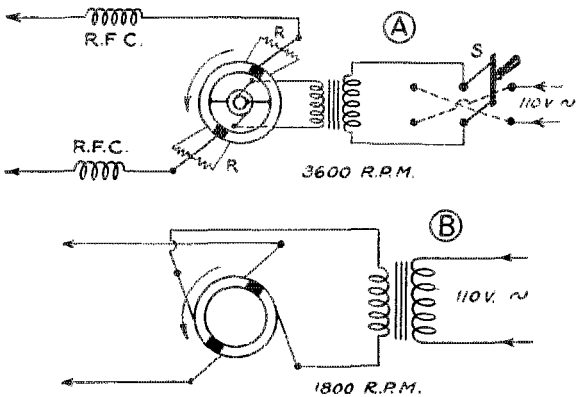


Figure 4. Rectifier Circuits
A—3600 r.p.m. type with protective devices.
B—1800 r.p.m. type.

The Rectifier at 6ZZ

The rectifier at 6ZZ, Dougias, Ariz., consists of a 9-inch bakelite disc ½ inch thick carrying four copper segments and driven at 1800 r.p.m. by a synchronous motor. The four brushes are medium hard carbon motor brushes, ⅜ inch thick by ½ inch wide, carried by a brush rig capable of rotation to adjust to synchronism. Mr. Gooding says it runs without a hitch, but the primary requirement is that it be a first-class machine job and run perfectly true. (See page 18, June 1922 *QST*.)

The Rectifier at 6CU

The rectifier at 6CU has a 6½-inch bakelite disc around the edge of which is a brass ring with two ½ inch gaps exactly opposite each other. The disc is driven by a 4-pole 60-cycle synchronous motor at 1800 r.p.m. There are four brushes of stranded copper set 90 degrees apart and lubricated with oil.

The insulation between the segments is provided by an air gap and the arcing is reduced by using radio chokes in the D.C. output leads.

An Arc-Preventing Brush

The discs that have been described take care of the matter of insulation very well but the commutation conditions are not at all good. It would be nice to get rid of this thing of having a narrow brush jump across a wide air-gap or spacer.

If we try to cover the air-gap by using a very wide brush, there will be a heavy current from the toe to the heel of the brush just before the break, as in A, Figure 5, and a moment later there will be a heavy arc, as at B. If the brush is made a trifle narrower than the spacer or air-gap, there will be arcs both to and from the brush, as at C, and in either case there will be noise, heating, and rapid wear. The only cure is to use secondary brushes connected to the main ones thru resistances, as Mr. Mason suggests. We turn to our ever-helpful advisor and quote from page 186 of Stuart Ballantine's "Radio Telephony for Amateurs" as follows: "The function of the resistance R (Figure 4-A) is to control the change of current and prevent sparking.....Since the current exists but a short time.....ordinary grid leaks, of the type used with 250 watt tubes, will be convenient. These are usually of 10,000 ohms resistance with a center-tap." The idea is to add a small brush to either side of the main brush and connect to these small brushes the ends of the grid-leak, while the center-tap goes to the main brush.

Laminated copper brushes work well on roughtened surfaces, despite severe sparking. The longest lamination (Figure 5-D) makes the contact while the others support it and prevent chattering.

Brush Gear

It must be safe and easy to shift the brushes while the rig is running. The spur-gear device built into the synchronous spark gaps formerly supplied by Chicago Radio Laboratory should be very good, as its construction permits ready extension of the control to any reasonable distance. Other devices of this sort were used on the synchronous gaps of the Jay-Ray Mfg. Co., and of the Benwood Co., but it is believed that none of them are now

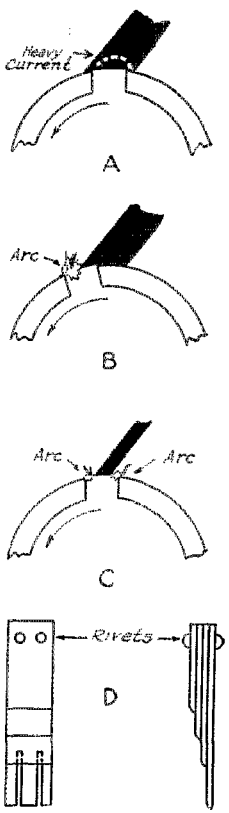


Fig. 5. Brush Action

available. Their construction may be observed in advertisements in past issues of *QST*.

In the case of 3600 r.p.m. discs only the D.C. brushes need to be adjustable, but for the 1800 r.p.m. types all four must move together.

Design of Rectifier Discs

For the sake of keeping down noise, wear, and motor load, it would seem desirable to make the disc quite small. But this should not be done. Again we quote from Ballantine, page 186: "The commutator is preferably of large diameter so that the brushes may be sufficiently large for mechanical rigidity [i.e., not too flimsy to make decent contact.—Ed.] without covering too great an electrical angle. The full secondary plate voltage will exist between the consecutive segments and this should be kept in mind in designing the insulation. Considering the design of a disc for use with a synchronous 60-cycle single-phase motor with a synchronous speed of 1800 r.p.m., allowing a maximum voltage at interruption of 15 percent of the peak value, a disc diameter of 8 inches will be indicated with an insulation segment not greater than ⅝ inches in width."

Fuses

Because short-circuits are destructive, there should be fuses in the *A.C. leads* to the rectifier. Buy a spool of the smallest fuse wire that will carry the current and use it between binding posts in lengths of 3 inches for 1000 volts and 5 inches for 3000 volts.

Radio Chokes

The high frequency voltages generated by the tubes must be kept from the disc to prevent fireworks. For low power, use a 500 turn Giblin-Remler coil, and for higher powers use a pair of coils made by winding No. 28 A.W.G. silk or cotton covered wire for 4 inches on a 3 inch tube. Do *not* dope the wire with anything but very thin collodion or varnish and keep the coils well clear of the helix.

Synchronizing the Rectifier

Before a high voltage load is put on the disc try the lamp test given by Mr. Bohannan. If adjustment of the brushes and the rocker-arm will not give a steady light listen carefully to see if the motor is running in and out of synchronism. If it is doing this the line voltage is unsteady or the motor defective and the set can not be loaded. By all means use a voltmeter on the output of the rectifier. There is no other way to make sure that the rectifier has started "right side up." Reverse voltage will damage the tubes because it will build up until a flashover occurs.

Filters

The synchronous rectifier does not take kindly to the type of filter we are accustomed to use It cannot be made to operate sparklessly unless the current and the voltage are in phase; that is, they must both be zero at the same time. This is what happens when we have only the tubes as a load. The compound brush arrangement will allow some leeway but not a great deal. Now if we attempt to smooth the output by putting a choke coil in the output leads, the current will lag and violent arcing will follow. If on the other hand we attempt to use a large condenser across the output the current will lead and again there will be fireworks. One immediately thinks of using both the choke and the condenser in an attempt to make their effects cancel. However if we use

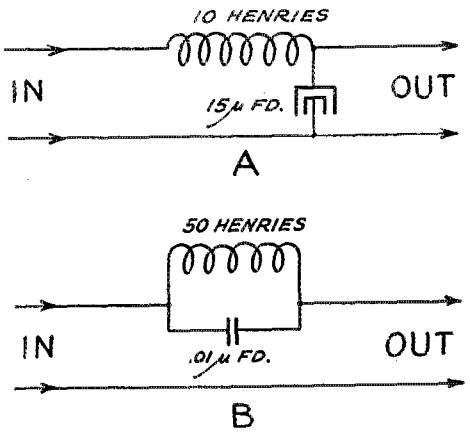


Figure 6. Filter circuits

our ordinary filter circuit of A, Figure 6, and do actually adjust things so that the inductive and condenser reactances cancel, the circuit is in resonance and does not filter at all but *reinforces* the A.C. The thing we must do is to build the filter circuit with a condenser and a choke so large that the resonance frequency falls well below 120 cycles, which is what we are trying to filter out. Ballantine states that the filter will make things worse unless "the product of L in henries and C in microfarads is greater than 3.5." (About 90% of the filters we have seen ignore this rule and *do* make things worse.) The rule calls for something like a 2-microfarad condenser and a 1.75 henry choke but that is the *very least* that will amount to anything. A 10-henry choke and a 15-microfarad condenser are nearer the requirements.

Now that sort of a filter costs a lot of money when it is built for a 2000- or 3000-volt circuit and above that the cost rises very fast indeed. For that reason and also because it is less inclined to make commutation trouble there is suggested the use of the filters we have seen ignore this rule

The correct values are .01 microfarads and 50 henries. A .01 condenser to stand anything up to 10,000 volts is not hard to make and the big choke is not an impossibility. Fifty-henry chokes for different services are described in Table 3, page 179, of Ballantine's "Radio Telephony for Amateurs."

Important Litigation

THE Radio Corporation of America has brought suit in equity in the U. S. District Court for the Southern District of New York against A. H. Grebe & Co. and J. H. Bunnell & Co. asking for an injunction to prevent them from manufacturing and selling certain apparatus and asking damages for such apparatus previously made and sold. Apparently Grebe has been selected as a typical licensed manufacturer and Bunnell as a typical Grebe dealer, with the policy in mind that if judgment can be secured it will establish a precedent that will have weight in the settlement of similar cases out of court.

The basis on which judgment is being sought against Grebe is that the Radio Corporation has secured from the American Telephone & Telegraph Co. all its rights arising from damages done it by Grebe in violation of alleged rights belonging to the A.T.&T. by virtue of the acquisition by the last-named company of the famous deForest third-element patent. It is interesting to note in this connection that the deForest company has issued a statement to the effect that while rights under their patent were granted the Western Electric Co., (and by the latter issued to G.E., Westinghouse and R.C.A.), the title to the patents still resides in the deForest interests; in effect the statement that any rights under the patents are now owned by A.T.&T. is denied. But at any rate the R.C.A. is proceeding on the basis that the A.T.&T. has rights and has suffered injuries and that they have secured the privilege of collecting the damages. The main idea on which damages are sought is that the Grebe company has violated the deForest patents in making apparatus capable of being used in connection with a vacuum tube! It is claimed that the plaintiff has been injured and deprived of profits because Grebe made "receiving sets adapted, designed and intended for use in combination with, and useful only in combination with, and.... to be used in combination with vacuum detector and amplifier tubes" which embody the deForest invention. In another complaint of very similar tenor another suit is brought against both Grebe and Bunnell, as joint defendants, in which the charge is that they violated certain other patents relating to grid biases, a matter which principally concerns audio amplifiers.

The first-mentioned suit is by far the most important. If the R.C.A. can secure judgment, it will mean that nobody except the association of bigger companies will be permitted to make any apparatus that is designed for use in 3-element tube circuits —no sockets, no rheostats of the familiar pattern, no variometers, no grid leaks, no amplifying transformers, no regenerative tuners, nothing that we can think of but loose-couplers and telephones for crystal reception. The fact that manufacturers may have Armstrong licenses and the fact that they are not making infringing tubes themselves do not count with the R.C.A.—they claim the right to collect all the benefits that may exist thru the bare existence of the deForest patent.

Radio litigation unfortunately is no novelty in this country, but we do not recall any as ambitious as this. It does not seem to us to be at all just or equitable, and certainly for the good of the game we trust that no such thing will come to pass. It seeks to crowd out every independent producer, leaving in the field only the association of big companies now familiarly known as "the Big Five," except probably those who would agree to pay a royalty so big that their competition would be entirely negligible. We have been told that the R.C.A. has offered independent licensed manufacturers a blanket license under all of their patents on a 20% royalty scheme, including the turning in of the present Armstrong licenses on which only 5% royalty is paid; but no such propositions have been accepted as far as we know, manufacturers feeling that it is useless to attempt competition under an initial 20% handicap. It is commonly felt among the independents that the purpose of the legal action is to make the 20% proposition a little more interesting.

Rumor has it that some of the leading licensed manufacturers sometime ago affiliated themselves in an informal body for common protection, pledging mutual aid; and if this be true it is probable that Grebe will have lots of help in combatting the suit. The independent manufacturers do not seem particularly worried. As one of them put it to us, this suit is much the same as if the holders of patents on electric lights were attempting to prevent everyone besides themselves from making lamp sockets, wire, switches, conduit, fuses, etc., which of course is not done; and indeed it

seems an apt comparison. There is also to be said on behalf of the independents that for many years the plaintiffs have permitted the condition of which they complain to continue, during which time the defendants built up their businesses without protest; a situation which provides them with a legal defense by an action which is akin to "outlawing" the complaint.

At any rate it probably will take a couple of years to settle the thing and by that time the principal patents concerned will be expiring. We only regret that such discord should enter the radio industry at a time when co-operation is so sorely needed. The radio amateur will have no difficulty in placing his sympathies in the matter.

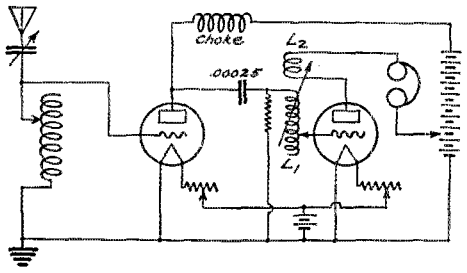
K.B.W.

R. F. Amplifier with Regenerative Detector

By Phillip N. Emmich

IT has been repeatedly stated that a regenerative detector cannot satisfactorily be used with a radio amplifier. I do not agree with this and have owned a three stage RF amplifier with two steps of AF amplification behind the detector that performs very nicely. I now have an even simpler set which employs only two tubes and secure with them verv good results.

The circuit is shown in the figure.



While a single circuit tuner is shown, the circuit is not confined to the use of such. The usual increase in selectivity will be secured by using a loosely coupled tuner. Most radio amplifier circuits either sacrifice a great deal of amplification by using a broadly tuned coupling transformer or else they complicate tuning greatly by introducing still more tuned circuits between the radio amplifier tubes and the detector tubes. By using reactance-capacity coupling, this circuit eliminates these difficulties. The novelty lies in the connections between the radio amplifier tube and the detector which permits regeneration while sticking to the simple reactance-capacity method of coupling. The feedback device (L_1 and L_2) is an ordinary vario-coupler, or one may be specially constructed for the purpose, using the following dimensions:—Stationary tubes 4" in diameter wound with 30 turns of No. 20 double cotton covered tapped every three turns. Rotor 3½" in diameter 110 turns of No. 28 wire. The choke coil is, in my case, a Coto-coil radio frequency high resistance auto-transformer. Satisfactory results should be secured with almost any small single layer coil wound with very fine double cotton covered wire. The wire should not be over No. 30, should not be doped with anything except collodion and should have enough turns so that it is entirely certain that the natural frequency of the coil is not within the wave length range over which the set is to work. The rest of the diagram is self-explanatory.

Using this arrangement I have on November 9th heard the voice from amateur radio phone 1DKA at Glenbrook, Conn., across the room. My station is located at Indian Creek, Pa. With the same arrangement radiophone broadcasts have been received on loudspeaker from stations that were 1000 miles away. With the headset they have been heard at 1600 miles.

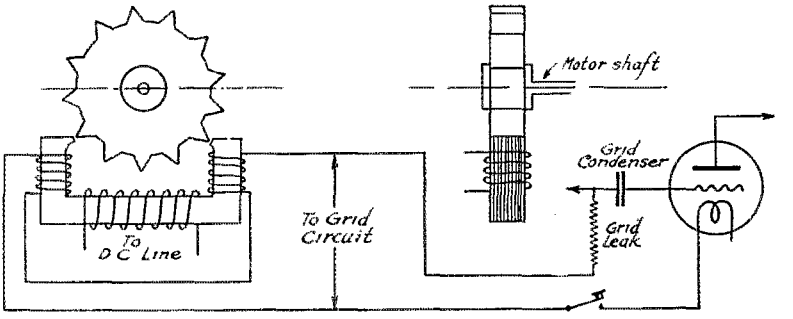
A Tone Wheel for I. C. W.

By W. A. Tolson, 5XB

SOME time ago we tried out in the laboratories here an idea for obtaining 500-cycle grid modulation on a C.W. transmitter. The results secured were so very satisfactory that I am enclosing a rough sketch of the arrangement in the hope that it may help to solve the I.C.W. problem of some other stations. There is nothing new in the construction of the 500-cycle inductor alternator, and its very simplicity should appeal to any one making his own apparatus. The idea may possibly have been published before, but if so I have failed to note it.

The inductor, which is mounted directly on the motor shaft, is made by simply filing away every other tooth from a gear having rather coarse teeth, so as to leave a relatively large space between teeth.

The core on which the coils are wound is built up from laminations from an old transformer core. The general shape of this core is shown in the sketch. It is important that the two poles, "A" and "B," be spaced so that the teeth of the inductor clear them with the least possible air-gap, and also that they be so spaced that when a tooth of the inductor is passing one of them, a corresponding tooth is passing the other.



The field coil is wound on the bottom of the core. The number of turns and size of wire in this winding will be governed by the voltage to be used in exciting it. Of course, the larger the number of ampere-turns in this winding the greater the flux produced, and the larger the induced voltage in the armature winding.

The armature winding consists of a coil of a large number of turns of small wire wound on each vertical leg of the core. These two coils are connected in series, care being taken to see that they are so connected that their voltages will add.

It is seen that when the inductor revolves between the poles of the core the reluctance of the magnetic path thru the core and inductor will be a minimum when a tooth is opposite each pole-piece of the core, and a maximum when there is a large air-gap between the inductor and the core. The flux threading the armature coils will therefore be varied from a maximum to a minimum every time a tooth passes the pole faces of the core. If the inductor has twenty teeth and is mounted on the shaft of a small induction motor running at 1750 r.p.m., the frequency of the induced voltage in the armature windings will be approximately 580 cycles.

The gear used for the inductor in our experiments was five inches in diameter, by one inch thick.

In operation the armature coils are connected in series with the grid leak of the oscillator tube, as shown in the sketch. When the key is closed the grid is made alternately positive and negative 580 times per second.

The note received at the receiving station is absolutely pure and even, and has a clear bell-like quality due to the absolute evenness of the impulses.

Signal Corps Loop Set

Judging by the inquiries we receive the members of this outfit are intensely interested in short wave loop transmission. The picture shows a low-power short wave loop set that is proving practical in signal corp use. It employs three "J" or VT-1 tubes for both sending and receiving. The range is about four miles.

There is no switching to be done. The phones are placed in the plate circuit of the tubes and the method of communication is similar to that which is employed when two ordinary receiving sets are used with the tubes oscillating and a key in the ground lead. The two loop sets are first set up with the loops pointing toward each other. As soon as the A and B battery circuits are completed the tubes begin to oscillate. One or both operators then vary the adjustment of the tuning condenser

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EDITORIALS de AMERICAN RADIO RELAY LEAGUE

Does This Shoe Fit You?

MANY hundreds of indignant letters have been received at A.R.R.L. Headquarters since the beginning of the last half of the Transatlantic Tests, protesting the gawdawful QRM that the other American amateurs made while we were trying to hear Europe. Every mother's son of us knows that it was absolutely fierce, a dirty, rotten shame, and that to just a great big extent it was pure unadulterated luck that we heard anything from across the pond at all. The best of receiving sets are helpless in the endeavor to pick up faint signals 3000 miles away on the same wave length while half a thousand transmitters in this country blaze away for all they're worth. We've received a carload of wrathy logs from good amateurs who loudly proclaim to the cockeyed world that it was a burning crime the way the gang acted and that we ought to publish a blacklist in this issue.

Now as an individual amateur the writer of these lines feels almost exactly that way about it but there are several other things to be said. In the first place an issue of *QST* isn't big enough to contain a list of all the stations that caused QRM during the tests. And again we must remember that United States amateur radio is a big institution and contains in its number amateurs of every concivable radio interest, some of whom are not yet members of our A.R.R.L., and that we have no legal right to demand that they stand by for ten nights while we of the A.R.R.L. listen. Of course it's perfectly true that the bulk of the racket was made by our own gang and for such of these as profess to be loyal enthusiastic members we have a grave sympathy. We have a sweet little list of them up at headquarters.

Looking back at the Tests now from this date well advanced into January, it seems that it was only thru the grace of a merciful Providence that anything at all was heard from our European cousins. We are ashamed that many of our members were such rotten sports as to transmit when they knew that the honor of American Radio was at stake; we are filled with compassion for those whose justification it is that they heard plenty of others transmitting and didn't see why they shoudn't too; and we are sorry that there was an element in amateur radio which professed to care nothing about the tests. To our hard-working and eminently successful British and French confreres our hat is off in deep respect. *You* did a great job, and we admire you and thank you for the splendid part you played in the Tests. We are only sorry that *we ourselves* were prevented from making a better showing by the heedless in our midst. Perhaps next time we can do better.

"QST's Family"

MOST of us are accustomed to think of the American Radio Relay League as having one publication, *QST*. Well, it started out that way but at the present time just take a look around. No matter where you go there is a district amateur publication. The list of them is perfectly surprising: *The Delta News*, *The Hamville Star*, *The Hot Wire*, *Kickbacks*, *Michigan Radioist*, *The Modulator*, *The Oscillator*, *QTC*, *The Radio Amplifier*, *South Dakota Oscillator*—why, the list is so large that we have a notion we forgot some of them. But that is not the real beauty of the thing. The real joy comes in noticing the attitude that all these papers have towards the A.R.R.L. and towards *QST*. You can't pick up an issue of any of them in which they don't tell us what a fine thing the A.R.R.L. spirit is and in which they don't advise their readers to read *QST*. Can you anywhere else in the journalistic world find a group of papers that devote part of their space advising their readers to read another paper? If you can, it is news to us.

All this is just another demonstration of the old A.R.R.L. spirit of comradeship. And thus it is spreading. It is getting so now that you can't really tell whether some of the broadcast listener publications are not more than half in favor of this American Radio Relay League. They refer to *QST* on the slightest provocation, and here of late we have begun to wonder if the

Literary Digest is not beginning to like us quite a little bit.

But what we started out to say was the boosting of *QST* is the thing that the *QST* Factory and its editor appreciates. We have been trying for a long time to figure out how to say this and may be have not done it well now, but we know that among a gang of brass-pounders the idea will get over just the same. *QST* thanks you and to show its appreciation, is going to print a list as nearly complete as possible of all the district and club papers and their publishers and schedule. We are going to do our level best to make it complete but if you are at all uncertain about our knowing everything there is to know about your particular district publication, came right ahead and give us what we need to make this list 100% complete

The Conversion of a B.C.L.

OUT in Hutchinson, Kansas, there was recently held a radio convention. One of the salesmen at the convention was demonstrating a very fine receiving set which was being marketed largely to broadcast listeners, that is, to the radio novices who are interested in the reception of radiophone concerts and speeches only. Along toward the latter part of the second evening of this convention he was persuaded, which by the way was not very hard, to take this set over to a radio store and put it on an antenna for the benefit of an interested group who wanted to see what it could do. After the crowd had thinned down somewhat and a group of amateurs remained, some one asked permission to tune to the ship wave lengths and copy some commercial stuff in continental code. The salesman said "Sure, go right ahead," and the gang began to copy ship stuff. Kansas is a wonderful receiving location and commercial shore and ship stations were heard from both coasts and from 'way down the Gulf of Mexico during the next half hour. The calls and messages were explained to the salesman. He was much entranced, he had never suspected before what interest there was in the code end of this game. And when we switched down to 200 meters and began to copy the fellows all over the country, he was even more interested. At last there came a terrific I.C.W. signal that fairly lifted the phones off the table. He asked at once "Who in the world is that?" We had the great satisfaction of saying, "That is the station of your own firm." You should have seen him. He was just as tickled as the traditional boy with the new red wagon. And when we sent a message to the station of his firm telling of the reception of their signals at 600 miles on their own receiving set, he was even more pleased. The last we saw of him, he was trying to find out the quickest way of learning the code. Another B.C.L. had been converted.

That is not the only example we could give; we could give hundreds of them. The whole thing just confirms what we have said again and yet again, namely, that the interest in this old radio game lies in the code stuff. What possible thrill can there be in sitting in a California room and listening to a radiophone station in Denver or (if it happens to be a good night) in Kansas City, compared to the thrill that the same man will get out of sitting in the same room after he has installed an amateur station of his own and is not listening to a broadcast station sending to no one in particular but is hearing the little old dots and dashes come in and tell him that *he himself* is being *personally addressed* by another amateur up in the Second District at New York City? Oh there may be a thrill in copying WHB or KYW, but there is about seventeen times as much of a thrill when you are camped somewhere in the 6th or 7th district and are copying 2RI and 2RI is talking to YOU.

SIGNAL CORPS LOOP SET

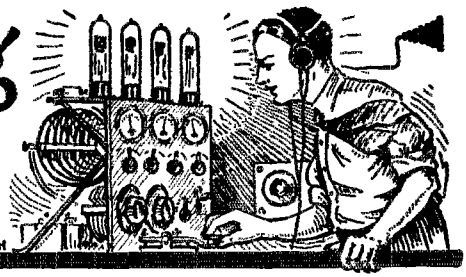
(Concluded from page 40)

until the beat note is at a convenient pitch. This note now continues steadily in both head sets until either operator depresses his key when the beat note in both sets changes. The key shunts a small mica condenser around the tuning condenser and thereby changes the frequency generated by the set. The operator can not only hear what he is sending but at the same time is always able to tell whether he is being copied OK. If the other operator has QRM he simply holds his key down. This results in still another change in the beat note which both operators hear. The sending operator then pauses until the receiving operator can tell him what the trouble is. What this amounts to is a very simple and positive break-in system. The method of keying is better than interrupting the grid or plate circuit or the loop circuit because it does not change the load on the tube, and hence permits very stable operation. In addition to that it allows the break-in system to proceed perfectly which would not be the case if the set stopped oscillating every time the key was up.

Because loop radiation is much better at extremely short waves, the waves employed by this set lie between 70 and 200 meters. About the only defect that using such a short wave results in is that any one coming within 10 feet of the loop changes the beat note. The loop itself is made of ¾" brass tubing and has so low a resistance that the very small power used puts a current between ½ an ampere and 1 ampere thru the loop.

The Operating Department

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



Now Mr. Printer, we want the best type and the fanciest letters you have for 3XM, and the prettiest box. 3XM has made a dream come true! Often did we long to see what a message report in four figures would look like, and we want to look at it many times perhaps, hence we want pretty figures. That box is going to stand out all by itself because it is as near the top as we can put it. We would like to do it in colors if we could. By George, 3XM, you are the king of them all right now. You were the first to go over the 1000 mark and you went over big. The first time in the history of amateur radio that any station hit that high mark.

PRINCETON U RADIO CLUB
(3XM)
PRINCETON, N. J.
1226 MESSAGES
ATLANTIC DIVISION

That isn't the end of our story. Our Total 66,885 for the month, again smashed all previous known records by over 10,000 messages. Whew! What next? Things are happening in this old radio game of ours. Our Operating Department is living up to its predictions made last April when we started to scrub off the barnacles and get down to business. Our reorganization

Message Traffic Report By Divisions
DECEMBER

Division	C.W. Stns.	C.W. Msgs.	C.W. M.P.S.	SPARK Stns.	SPARK Msgs.	SPARK M.P.S.	TOTAL Stns.	TOTAL Msgs.	TOTAL M.P.S.
Atlantic	166	14026	84	41	2439	59	207	16465	80
Central	120	10210	85	45	3349	74	165	13559	82
Dakota	28	2988	107	10	434	43	38	3422	88
Delta	14	1332	96	3	151	50	17	1483	87
East Gulf	8	441	55	5	210	42	13	651	50
Hawaiian	2	171	86	—	—	—	2	171	86
Midwest	67	6390	95	16	867	54	83	7257	87
New England	68	6142	90	18	1250	69	86	7392	86
Northwestern	37	1861	50	9	135	15	46	1996	43
Ontario	29	804	27	4	67	17	33	871	27
Pacific	56	2769	49	18	767	43	74	3536	46
Roanoke	42	2830	67	4	270	67	46	3100	67
Rocky Mountain	17	2135	126	2	40	20	19	2175	114
Vancouver	7	253	36	2	16	8	9	269	30
West Gulf	43	3948	92	12	590	49	55	4538	83
Total,	704	56300	82	189	10585	59	893	66885	77

Total C.W. Messages, 56,300—84%
Total Spark Messages, 10,585—16%

Total, 66,885

We know that some of these fellows who handled four, five, six, seven and eight hundred messages will be somewhat disappointed in not taking highest honors, and we know too, that they will be the first to congratulate you on your excellent work. Headquarters congratulates you!

is a fine thing—something we all are proud of. We have increased the number of men in every branch and every man is keeping the wheels turning in high. That is the spirit, men, and that is what will establish amateur radio more permanently. Our messages are being delivered promptly and a greater percentage of them is getting thru. That, for a long time, was our hardest job, but we believe we have mastered it quite successfully during the last few months. We might strive for a little more accuracy in addresses and signatures, tho. Too, we think that if there were less "CQ"-ing" there would be more traffic handled.

We have a pretty long list of "brass pounders" for this month, some of whom were announced last month.

300 Hitters or Better in the Brass Pounders' League.

Call	Msgs.	Call	Msgs.
3XM	1226	1CDO	420
3ZO	884	5IX	416
3YO	854	1BKQ	369
*9VZ	807	3BIT	346
9AWM	714	*8AWU	334
3BLF	665	3APR	332
8FT	639	6ZZ	331
8ALC	631	9UU	327
5KC	519	9DTA	326
8IJ	515	2AJF	325
9OX	504	7OT	323
5TC	486	8CGX	319
9AMB	482	3SU	318
6CC	462	2DI	316
1XM	459	9BGH	316
9XAQ	437	8AIM	312
*2OM	436	6ZH	307
9DQU	423	3SM	307
*1CNI	422	1QP	300

(*) indicates spark stations.

Look 'em over and see if that isn't the nicest piece of work you ever heard of in this modern day.

We regretfully announce that our old Pacific hopper, 6ZAC is discontinuing operation and leaving the island. Perhaps he will return some day, and in the mean time we will pin all our hopes on 6ZY, the new station being erected by Gunner Marshall. Welcome, OM!

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

ATLANTIC DIVISION—C.W.: 8BSF, 40; 8KU, 12; 8PJ, 14; 8QB, 8; 8MZ, 32; 8UE, 42; 8AVD, 146; 8AXN, 108; 8CTN, 58; 8BMM, 45; 8ASL, 17; 8ADG, 30; 8BIP, 14; 8ATU, 45; 8AMQ, 11; 8CSE, 18; 8CUU, 77; 8AIW, 50; 8AMR, 30; 8NB, 226; 3BLU, 110; 3AWH, 27; 3CC, 112; 3ADQ, 51; 3BNU, 248; 3YO, 854; 3BUV, 12; 3JG, 8; 3ATG, 125; 8ALU, 31; 8BIQ, 14; 8ZO, 884; 3MB, 118; 3LP, 2; 3AQR, 59; 3CCU, 182; 3BIT, 346; 3CX, 8; 3CGX, 4; 3AAY, 107; 3KD, 25; 3HX, 20; 3VW, 82; 8FM, 15; 3GK, 89; 3TA, 11; 3UD, 7; 3ANJ, 160; 3BJY, 50; 3OE, 71; 3AGN, 4; 3SM, 307; 3RB, 156; 3FS, 51; 3QV, 107; 3HD, 23; 3AWA, 27; 8QC, 69; 8VH, 7; 8AGR, 25; 8RC, 1; 8OC, 28; 8ABW, 12; 8ZE, 44; 8BRL, 26; 8AIO, 78; 8CFP, 36; 8AGO, 238; 8CFB, 7; 8BJV, 206; 8AAF, 67; 8AZQ, 77; 8CEJ, 188; 8ZD, 176; 8OW, 10; 8CKM, 32; 3AJD, 61; 3APT, 42; 3AC, 41; 3WF, 34; 3SQ, 10; 3FK, 6; 3PH, 4; 3HG, 233; 3AFB, 22; 3AIS, 8; 3SU, 318; 3BHM, 172; 3JJ, 135; 3PZ, 42; 3AJH, 39; 3AB, 26; 3IL, 21; 3BSB, 16; 3LR, 12; 3OD, 6, 8AOL, 56; 8CKO, 179; 2FC, 89; 2CQZ, 124; 2WR, 84; 2AOS, 69; 2AFP, 97; 2CKL, 65; 2BFE, 40; 2BLL, 21; 2CGS, 20; 2RG, 11; 2BMR, 26; 2CHG, 9; 2BOI, 5; 2BON, 4; 2CTC, 10; 2ALY, 115; 2BBL, 61; 2BKB, 263; 2AJF, 325; 2AJA, 35; 2ACY, 1; 2CRM, 9; 2AFC, 68; 3XM, 1226; 3BLZ, 12; 2ARS, 36; 2AWL, 114; 2OF, 170; 2AER, 30; 2CMS, 204; 2BJP, 75; 3ACC, 43; 3BDT, 16; 3CG, 86; 2BIR, 34; 2AVE, 20; 2BNL, 61; 2KP, 26; 2AQL, 15; 2CPO, 9; 2AEO, 37; 2AUY, 22; 2ADY, 8; 2TT, 2; 2AWF, 31; 2AWS, 200; 2BRC, 40; 2BSC, 164; 2AJW, 50; 2BYC, 184; 2BQU, 160; 2CEV, 136; 2NZ, 141; 2TS, 66; 2AGC, 27; 2IG, 6; 2BQD, 23; 2CKN, 20; 3HW, 56; 2ANM, 52; 2BRB, 102; 8AVJ, 87; 2GK, 205; 2VH, 35; 2CIM, 8; 2CEI, 60; 2BUE, 80; 2FZ, 11. Spark: 8AXN, 134; 8VW, 29; 8KU, 18; 8AXQ, 19; 8MZ, 16; 8AAW, 5; 8AEO, 72; 3QN, 64; 3ADP, 24; 8ACY, 94; 3AGT, 28; 3API, 8; 8TA, 149; 3UD, 20; 8EV, 22; 8BRL, 31; 8EW, 25; 3SF, 4; 2AAF, 97; 3CS, 5; 2AFA, 85; 2CJA, 49; 2CAD, 20; 3FP, 44; 2AWZ, 12; 2QC, 5; 2AAF, 94; 2AXB, 20; 2BQZ, 91; 2CJX, 51; 2SQ, 88; 2FX, 8; 2OM, 436; 2CHY, 40; 2DI, 316; 2ND, 71; 2PV, 11; 2BY, 45; 8AOT, 7; 2CT, 50; 2IF, 22.

CENTRAL DIVISION—C.W.: 8FT, 639; 8ALC, 631; 8IJ, 515; 9OX, 504; 9DQU, 423; 9UU, 327; 8CGX, 319; 8AIM, 312; 9ASE, 298, 8CTT, 250; 9EI, 212; 9APS, 204; 8CM, 197; 8BYN, 194; 9WX, 190; 8QK, 182; 8AER, 176; 8BNH, 161; 8BVR, 151; 9DDY, 148; 8BHO, 136; 8BWA, 131; 9DCR, 129; 9BQW, 126; 8AND, 121; 9BVR, 120; 8BXH, 118; 9LQ, 114; 8BAH, 112; 9ASD, 106; 8TT, 86; 9RTA, 85; 9RJT, 81; 9ACE, 76; 8IB, 75; 9DBV, 73; 8BDO, 72; 9BIZ, 69; 9AKU, 66; 9LH, 64; 9AOT, 62; 8UR, 57; 9AWF, 57; 9BIL, 53; 9ZY, 52; 8CBX, 52; 9BWQ, 49; 9OS, 47; 8CXP, 45; 9DYN, 44; 9VK, 44; 9TO, 42; 9DVW, 40; 9YB, 39; 9ARR, 39; 9AMH, 38; 9DJO, 38; 9CTE, 35; 9AKD, 22; 9CXZ, 4; 9CP, 9; 9BGW, 19; 9ZN, 202; 8CWP, 37; 9AQA, 37; 9BHX, 86; 9ALW, 36; 9CDZ, 34; 9ALR, 33; 9BOO, 32; 8BFX, 32; 9BFB, 32; 9DWM, 31; 9BVZ, 30; 9AP, 30; 9MC, 30; 9AMR, 30; 9CM, 28; 9DCT 28; 9DYG, 27; 8CAB, 26; 9AFN, 25; 9AFK, 25; 8RR, 25; 9CFK, 24; 9RC, 23; 9AMO, 22; 9BUO, 21; 9EP, 21; 9DYU, 20 8BCT, 20; 9BAC, 20; 9AAV, 20; 8LT, 20; 9DHD, 19; 8CWC, 18 9BYX, 18; 9CLZ, 16; 8CXW, 16 9BCH, 16; 9DVL, 13; 9AKY, 12; 9BHQ, 12; 9DXE, 11; 9BVP, 10; 9QS, 10; 9CJI, 8; 9AZN, 8; 9BXD, 7; 9BAA, 7; 9BPP, 7; 9BRA, 6; 8BCE, 6; 8HN, 6; 9ATX, 5; 9PN, 4; 9AIH, 3; 8CKV, 2; 9DWS, 1; 8BWK, 36; Spark: 9VZ, 807; 8AWU, 334; 8AIB, 228; 8TJ, 222; 9AAW, 217; 9CA, 116; 8BAH, 112; 9ZN, 102; 8EB, 102; 8AIZ, 102; 9WX, 69; 9ASA, 62; 9DHG,48; 8CKV, 47; 9BEF, 45; 9BJT, 43; 8CVD, 40; 9DDZ, 37; 9MC, 36; 9DWA, 32; 9AZA, 32; 9PD, 28; 9DFF, 24; 8CWR, 23; 8CMI, 21, 9AZF, 19; 9AOY, 17; 9APH, 17; 9NQ, 15; 9AMQ, 14; 9DAY, 12; 9AES, 11; 8CGX, 10; 8BEJ, 8 9YJ, 7; 9DXT, 5; 9CIC, 4; 9YB, 3; 9DXE, 3; 8SG, 2 9BQG, 2; 9VK, 1; 8CNR, 17; 9AIU, 137; 9CP, 116.

DAKOTA DIVISION—C.W.: 9GK, 147; 9AOR, 34; 9GW, 26; 9BAF, 40; 9ABB, 64; 9BAV, 48; 9BKP, 164; 9BVY, 68; 9BBF, 148; 9AUL, 37; 9AWS, 120; 9AJP, 9; 9DGE, 23; 9ZT, (9DR), 58; 9BKW, 14; 9AWM, 714; 9YAJ, 45; 9ASN, 120; 9AUA, 51; 9BKJ, 53; 9APW, 96; 9MO, 5; 9BRI, 140; 9ASF, 123; 9AVZ, 106; 9DKQ, 100; 9PI, 79; 9CXV, 56; Spark: 9DLF, 21; 9FX, 11; 9ZC, 22; 9EAU, 2; 9FH, 3; 9DGW, 57; 9DAG, 51; 9BOF, 119; 9CGA, 81; 9DKQ, 67.

DELTA DIVISION—C.W.: 5JB, 107; 5KC, 519; 5ZS, 13; 5UK, 108; 5PV, 35; 5NV, 68; 5MO, 25; 5ZB, 25; 5EK, 80; 5DA, 39; 5XK, 86; 5AAG, 66; 5MB, 18; 5QM, 29; Spark: 5ZR, 80; 5JD, 49; 5XAC, 22.

EAST GULF DIVISION—C.W.: 4HZ, 105; 4MT, 10; 4DL, 20;4FS, 13; 4JK, 34; 4BB, 2; 4EL, 235; 5XAE, 22. Spark: 4BC, 18; 4EG, 30; 4FD, 126; 4GN, 22; 4SK; 14.

HAWAIIAN DIVISION—C.W.: 6TQ, 43; 6ZAC, 128.

MIDWEST DIVISION—C.W.: 9CCV, 200; 9DTA, 326; 9DEF, 27; 9AEY, 130; 9CYV, 5; 9BHN, 118; 9ANQ, 113; 9BZZ, 18; 9CAC, 32; 9CNY, 1; 9ABV, 164; 9DSD, 95; 9CCS, 127; 9DXH, 14; 9DPD, 18; 9BGH, 310; 9DKY, 264; 9FK, 211; 9ARZ, 182; 9BSZ, 200; 9ECZ, 5; 9RIK, 191; 9AOU, 170; 9AHH, 152; 9AMI, 84; 9CXP, 70; 9CLQ, 45; 9BFG 28; 9BZE, 21; 9CHN, 18; 9DJM, 15; 9BCF, 15; 9DOF, 15; 9BDR, 14; 9UL, 7; 9BLT, 4; 9APE, 7; 9YU, 335; 9DSL, 115; 9DAH, 23; 9BXJ, 23; 9DRA, 110; 9YA, 82; 9BDS, 132; 9FM, 203; 9YM, 33; 9AQR, 205; 9AYL, 12; 9DJB, 12; 9BJC, 4; 9BKO, 35; 9RR, 6; 9EX, 81; 9ANO, 31; 9HT, 102; 9DXN, 72; 9DWK, 14; 9AON, 83; 9DNC, 250; 9RLG, 42; 9PW, 20; 9BHI, 10; 9BXT, 210; 9RIE, 59; 9DZY, 22; 9DMJ, 30; 9BED, 110. Spark: 9BME, 15; 9AFW, 70; 9ARZ, 26; 9BMN, 167; 9AOJ, 71; 9YM, 7; 9HO, 112; 9RR, 102; 9AHZ, 66; 9AYL, 87; 9DAE, 65; 9DWK, 12; 9DCW, 18; 9AWT, 4; 9CUF, 10; 9DZY, 35.

NEW ENGLAND DIVISION—1IL, 82; 1AWW, 88; 1BSJ, 7; 1BWY, 19; 1CMK, 240; 1BLN, 35; 1AOJ, 46; 1BVR, 15; 1CJD, 119; 1CJR, 37; 1ARY, 27; 1BHO, 5; 1CJH, 55; 1XM, 459; 1PM, 289; 1CPN, 151; 1YK, 43; 1IL, 53; 1AXB, 10; 1BDU, 20; 1SD, 112; 1CBJ, 121; 1BYN, 235; 1AWE, 56; 1BQD, 63; 1AMD, 84; 1GV, 129; 1ABC, 4; 1CSW, 15; 1II, 257; 1CBP, 2; 1BVB, 132; 1BKQ, 369; 1BVH, 46; 1CQJ, 9; 1LL, 150; 1AAC, 13; 1KC, 14; 1CRU, 12; 1BET, 110; 1CNF, 66; 1ZE, 198; 1CKP, 24; 1BRQ, 159; 1KX, 49; 1BAS, 115; 1BES, 105; 1BNP, 32; 1CDO, 420; 1BNT, 56; 1CIT, 19; 1ASF, 158; 1IX, 10; 1CM, 4; 1AGH, 46; 1BM, 4; 1IV, 21; 1AYO, 94; 1JT, 21; 1CR, 58; 1AYU, 137; 1BIY, 71; 1BGF, 14; 1AW, 78; 1MY, 107; 1QP, 300; Spark: 1ARY, 15; 1AHT, 1; 1GM, 22; 1BQL, 194; 1BRQ, 79; 1FM, 154; 1CIB, 63; 1BJS, 41; 1ACO, 4; 1LZ, 17; 1CNI, 422; 1BZN, 184; 1BNT, 16; 1CM, 21; 1CKI, 15; 1QO, 2.

NORTHWESTERN DIVISION—C.W.: 7OT, 323; 7BK, 219; 7BJ, 197; 7LR, 167; 7MF, 127; 7WM, 107; 7TQ, 32; 7AFM, 60; 7HM, 59; 7LY, 42; 7ACA, 40; 7OO, 37; 7AGF, 35; 7ABB, 33; 7ADP, 32; 7OE, 32; 7MH, 29; 7UD, 28; 7AFH, 27; 7GP, 27; 7ACV, 24; 7ZU, 22; 7AHI, 15; 7AII, 15; 7QE, 14; 7DC, 13; 7TT, 11; 7JG, 10; 7NA, 10; 7NG, 8; 7AEL, 7; 7AIC, 7; 7DU, 6; 7FD, 6; 7HD, 5; 7IY, 3; 7AIF, 2. Spark: 7OJ, 55; 7AFO, 30; 7NC, 14; 7AIO, 14; 7BC, 11; 7FH, 5; 7AGI, 2; 7WG, 2; 7WD, 2.

ONTARIO DIVISION—C.W.: 9BS, 19; 3BV, 38; 3XN, 93; 3TB, 2; 3FA, 11; 3TA, 6; 3VW, 2; 3KP, 73; 3DS, 22; 3BQ, 7; 3AD, 29; 3HE, 28; 3IL, 19; 9AV, 2; 3NF, 2; 3FC, 22; 3CO, 20; 3JI, 31; 3JT, 30; 3DE, 52; 3SX, 18; 9AL, 92; 9BV, 9; 9BJ, 7; 8AJ, 37; 9CD, 52; 3GK, 27; 3JH, 42; CFCA, 2. Spark: 3GN, 5; 3MN, 2; 3OH, 10; 3EI, 50.

PACIFIC DIVISION—C.W.: 6HP, 3; 6ZH, 307; 6AVR, 56; 6AHQ, 76; 6BJY, 20; 6AUB, 19; 6AVX, 12; 6ZB, 16; 6TW, 4; 6EC, 10; 6IV, 45; 6ZN, 60; 6EB, 22; 6BQC, 26; 6BRG, 10; 6BUN, 22; 6BQR, 26; 6ME, 6; 5BJC, 17; 6BQY, 6; 6BVG, 14; 6BRF, 4; 6BQG, 28; 6BQZ, 18; 6BEQ, 8; 6OM, 8; 6PI, 109; 6KA, 43; 6ALA, 54; 6RR, 7; 6BDW, 10; 6BRD, 12; 6CU, 17; 6ZR, 2; 6BKO, 8; 6FT, 4; 6JD,-6ZG, 9; 6EN, 128; 6ATC, 13; 6LV, 30; 6ZE, 23; 6AOR, 54; 6ABX, 150; 6GF, 12; 6AK, 45; 6GR, 14; 6FH, 30; 6GX, 5; 6ARF, 20; 6ZX, 79; 6AVM, 2; 6CC, 462; 6TC, 70; 6BBH, 10; 6BNW, 2; 6ZZ, 331; Spark: 6AOA, 122; 6ANM, 60; 6ZH, 24; 6AVR, 57; 6BJU, 37; 6AGK, 8; 6OD, 132; 6ALD, 28; 6BAE, 26; 6OL, 32; 6APY, 41; 6PL, 28; 6KE, 10; 6BRD, 5; 6BQD, 3; 6TU, 122; 6GR, 10; 6GS, 22.

ROANOKE DIVISION—C.W.: 8BPU, 65; 8AUE, 47; 8SP, 65; 8CAY, 22; 8BKE, 48; 8RDB, 34; 8AIP, 39; 8CZR, 68; 8CWV, 1; 3BLF, 665; 3APR, 332; 3BZ, 101; 3BOF, 89; 3BHL, 70; 3CA, 61; 3BIJ, 52; 3IW, 49; 3BVC, 44; 3TJ, 42; 3MO, 41; 3BVL, 34; 3BNE, 27; 3ASP, 21; 3RF, 17; 3AEV, 16; 3AJG, 12; 3CEL, 10; 3ATB, 10; 3ZZ, 9; 3AFW, 8; 3HL, 6; 3AHE, 5; 3BMN, 2; 4BX, 125; 4FT, 207; 4NT, 111; 4NV, 14; 4DQ, 20; 4LJ, 68; 4DC, 112; 4EN, 27; 4OI, 34. Spark: 8BDA, 260; 8TH, 1; 3APR, 6; 3AOV, 3.

ROCKY MOUNTAIN DIVISION—C.W.: 6BOE, 60; 9AMB, 482; 9XAQ, 437; 9BJI, 214; 9DTM, 192; 9BXA, 110; 9RUN, 83; 9BXQ, 63; 9CFY, 19; 9DHI, 15; 9CCJ, 14; 9BVO, 27; 7AFW, 113; 7ZV, 16; 7LU, 139; 7ZO, 85; 6ATQ, 56. Spark: 6APL, 25; 6BKE, 15.

VANCOUVER DIVISION—C.W.: 5CW, 95; 5CT, 78; 4DQ, 19; 5GO, 23; 5EJ, 22; 4AB, 3; 5BQ, 13. Spark: 5AK, 12; 9AX, 4.

WEST GULF DIVISION—C.W.: 5ZA, 223; 5IS, 44; 5IX, 416; 5VA, 32; 5TC, 486; 5SF, 259; 5DI, 206; 5PX, 125; 5XAJ, 75; 5QT, 2; 5NS, 76; 5QS, 128; 5XAJ, 150 (fone); 5ZH, 30; 5ZAD, 1; 5DE, 3; 5ZAE, 20; 5VO, 10; 5SS, 5; 5MT, 2; 5ZAI, 9; 5UJ,37; 5TM, 38; 5KP-5ZU, 383; 5YK, 2; 5XB, 50; 5XAD, 14; 5XV, 204; 5AE, 22; 5NK, 185; 5NN, 105; 5ZX, 2; 5TJ, 139; 5VM, 17; 5ZM, 60; 5XT, 109; 5ZAV, 75; 5LB, 19; 5TA, 32; 5EL, 26; 5UN, 6; 5AAR, 17; 5UO, 24. Spark: 5ACQ, 76; 5TU, 84; 5TP, 230; 5UG, 10; 5QT, 10; 5ZH, 62; 5ZAE, 27; 5HC, 2; 5YK, 8; 5HU, 44; 5AQ, 35; 5UO, 2.

ATLANTIC DIVISION
C. H. Stewart, Mgr.

Delaware: 3AFB and 3AIS are the only stations taking active part in relay work at this writing. However, prospects look good for some new stations in the immediate future.

MARYLAND: Practically all relay work centers around Baltimore with the leading traffic stations 3AJD, 3APT, 3AC, 3WF, and 3HG. New DX stations are 3PH and 3FX while 3OU will be back with C.W. 3BUC and 3WF are increasing power on C.W. 3SQ is commencing to reach out in better shape. 3SF and 3UC are the only remaining spark stations.

DISTRICT OF COLUMBIA: Traffic has taken a big jump. 3SU, the sleepless wonder, is the outstanding star. For some unexplainable reason south bound traffic is experiencing some delay. 3LR is lining up with more power. 3ZW and 3KM will give a good account of themselves. "LC" of NOF is back again in the amateur fold, and we welcome him.

EASTERN PENNSYLVANIA: Dist. No. 1—3QN blossoms forth with a new sink gap and oil condenser. (Better peddle it, while you have a chance and hook up a couple of small tubes.—F. H. S.) 3CC and 3BLU continue to bump out in all directions. 3ADQ and 3ADP are doing good relay work. Dist. No. 2—3BNU has opened up this coal country and traffic is moving thru without delay. Dist. No. 3—8ZQ is QRV for all traffic. 8BYK, 8BVH, 8BKA, 8KX, and 8ATA are coming right along in good fashion. Scranton threatens to put some good stations on the air. Dist. No. 4—3ZO could not be dethroned in message traffic. Perhaps the Traffic Manager can tell Mr. Beale why 3ZO was not in the final T/A Tests. (Oh sure! That is easy. By referring to October *QST* 3ZO will see that one of the requirements, and the most important, was that a station make formal application for final entry. Such entry was not made by 3ZO—F. H. S.) 3MB maintains daylight schedules with 3BIT, 3FS, 3XM, and 3ZO. Dist. No. 5—3AQR has increased power to 100 watts.

3BIT has four transmitters, the 100 watt outfit being used for DX work. 3BIT has been appointed City Manager of Lancaster. 3CCU and 3ACY are still holding their own. 3AAY has a daylight schedule with 4BY. Philadelphia is better represented than ever before with such stations as 3KD, 3SM, 3RB, 3FS, 3QV, 3HD, 3AGN, and 3AWA on the job. 3UD and 3TA are now C.W. stations—for which we are thankful.

WESTERN PENNSYLVANIA: A decided improvement is noticed in activities which is further born out by the traffic summary of the stations. 8OC and 8ABW are new stations handling traffic. 8BMW and 8OB will be heard from very soon. 8AHE, 8CNB, and 8RC are promising stations. 8AGR with his 5 watter is doing wonderful DX work. 8EV is fortunate in not being QRM'd from KDKA commercial work after the programs. The 10th Penn. dist. suffers badly on this account and the only work done is during the early hours of the morning. 8XE is the star station for the month in Dist. No. 7. 8QC, 8VH, 8BRC, and 8CH are all operating full time and moving much traffic. In Dist. No. 11, 8BLT is the only station doing anything at all. Dist. No. 9—8AGO is the traffic leader with 238 messages. 8AGO has been reported by west coast stations and has worked 6ZZ. 8CFP, ex 8XM, is regarded as the least QRM'er in the state yet messages are handled for the A.R.R.L. without bothering other interests. The old spark at 8EW has been heard fairly consistently when Bud Cramp was home from school to operate. 8AIO is consistently reported on the Pacific Coast and handles a good share of the traffic. 8BRL, on spark and C.W., is about even in each case. The 900 cycle I.C.W. set you hear is 8ZE who is doing some mighty good work. Poor 8CFB—the same old story—burned out all of his tubes. (Wouldn't it be wonderful if vacuum tubes were made of reinforced concrete and couldn't burn out?—T.M.) 8BJV is one of the most consistent stations in the state and Scott has done much to get all other stations lined up properly. Connelsville is well represented on the air by 8WR, 8BRW, 8ALT, 8BSJ, 8BGG, and 8ABS. 8BJV has regular schedules with 9BFG, 9BLG, 8AIW, 3BNU, 4EB, and 8SP. But hey! what's the matter with reports from 8BJX, 8SE, 8CKM, 8AKW, 8BTR, 8ALF, 8ACF, 8DV, 8DR, and 8BPL? 6AZQ with 100 watts is reaching the Pacific Coast and handling traffic nightly. It has been in operation but a short time, however. 8AAF will give a good account of himself in relay work with his 100 watter. 8OW only reported a few messages and the way he reaches out he ought to handle at least 1000 a month. 8CEJ tried C.W. for a short time and because he blew a couple of tubes had to go back to spark until the old pocketbook spills over again. 8ZD, operated by J. Leighner, P. E. Wiggin, and F. B. Westervelt operate from 10:00 P.M. to 4:00 P.M. on Tuesday, Thursday and Saturday; and 10:00 P.M. to 1:00 A.M. on Monday, Wednesday, Friday, and Sunday. 8CKM will be on in a new location with 100 watts.

NORTHERN NEW JERSEY: To 2AWL is due much credit for his persistent work in lining up stations who have lead the district for the third time in handling traffic. By contrast, 3CG asks for better co-operation in his section, and he should have it. 2CKL has schedules west and south. 2BBB has a schedule of 4 A.M. to 7 A.M. Monday, Wednesday, and Thursday. 2AJF clears on schedule with 3AWA at 6:30 A.M. Paterson turned in 300 messages. That used to be a good report for a whole year. Don't quite understand why 2CJA stuck in a spark set. "Sink Spark" Ostman, 2OM, is making an effort to dump the spark for two 50 watters. "SW" is away at the hospital, so the gang will not be hearing him on the air for a couple of weeks.

EASTERN NEW YORK: 2HW is having a heck of a time getting the gang lined up, and wants more and better reports. (Hey, gang! Is Brooklyn dead? Where are those traffic reports?—T.M.) let's get a little more action around this neck of the woods. Why man alive, these stations are doing scads of business. Tell us about it!

WESTERN NEW YORK: Traffic has taken a big jump and reports came in splendidly. 8AVD has been appointed superintendent of Dist. No. 11. 8AXN was the leading traffic station and but for antenna trouble he and 8ASL would have done much better. Rome transmitters are being overhauled and activity is increasing.

CENTRAL DIVISION

R. H. G. Mathews, Mgr.

A drive is being made for messages in this division. Note the increase in the totals each month for the past four months. Our November report totalled 10,000. All stations are urged to get their message reports in through the proper channels before the 25th of the month, and help put their division in the lead permanently. We have always lead the League in traffic handled and there is no reason why we should not continue to do so.

Special attention is called to the wonderful totals of 8FT, with 639; 9VZ with 807; and 8ALC with 631.

KENTUCKY: 9OX is being heard by many sixes and sevens. 9VZ, operated by Kleman and Brown of old 9UH, hands in a splendid total. They are using a *spark set.* (Well! well!! well!!!—T.M.)

OHIO: Considerable progress is shown in message handling. All over the state

reports show that a number of stations are working with the Pacific coast with fair regularity. Most of the cities have adopted quiet hours from 7:00 P.M. until 10:30 P.M. in favor of the broadcast listeners, and as a consequence, have very little trouble with interference complaints.

Dist. 2 and 6: These two districts are jogging along without superintendents which accounts for the small reports. 8CMI operates only during week-ends due to attending college. 8IJ hands out a nice little bunch of messages this month. Dist. 4: This is the star district. Springfield is showing signs of life, while Dayton and Cincinnati continue to do first-class work. Dist. 3: Has more than trebled the number of messages. Akron has come to the front with a nice report of messages handled. Dist. 5: Has nearly doubled the number of messages reported last month. M. F. McDowell succeeded in lining up a new station 8AER, who is with us this month. Dist. 6: 8CXW has his station finished, and was in operation only a few days before the end of the month. This station makes another link in an east and west route.

WISCONSIN: At a recent meeting in Milwaukee at which there were present the Assistant Division Manager, two District Superintendents, several prominent Wisconsin relay men, and the members of the Milwaukee Amateur Radio Club, the following trunk lines were adopted for the state of Wisconsin: Trunk No. 1—Runs along the Lake Shore. Trunk No. 2—Milwaukee, Oshkosh, Neenah and Superior.

WISCONSIN ROUTES

No. 1 Lake Shore
" 2 Milwaukee, Oshkosh, Neenah, Superior
" 3 Whitewater, Oshkosh.
" 4 Milwaukee, Waukesha or Whitewater, Madison, LaCrosse
" 5 Oshkosh, LaCrosse
" 6 LaCrosse, Superior

Trunk No. 3—Whitewater to Oshkosh. Trunk No. 4—Milwaukee, Waukesha or Whitewater, Madison and Lacrosse or Trempleau. Trunk No. 5—Oshkosh to LaCrosse or Trempeleau. Trunk No. 6—La Crosse to Superior. These routes are all in operation and handling traffic.

New officials for Wisconsin since last report are: M. J. Bishop, Supt. of Dist. 3; Rob. White, City Mgr. of Superior; Irving Strassman, City Mgr. of Milwaukee; and Mark Doll, City Mgr. of West Allis.

Dist. 2: Several new stations are springing up in this district. The old ones are not heard from any more. Two stations doing some work are 9CCF and 9XL. Stations in this district who are known to be handling traffic are: 9XL, 9CHE, 9CPT, 9EAR and 9AIP, but they have failed to report.

Dist. 3: 9ACM, 9DVY, and 9DLN, on the Lake Shore Route No. 1, have been heard recently, and judging from the noise they make they have been on regularly. 9DLX, owing to illness, has not been on the job regularly. 9BCH is doing excellent work on 10 watts.

Dist. 4: Only four stations in this district have been handling traffic. Three of these are located at La Crosse, i. e.; 9ZY, 9AZN and 9AKY, all C.W. The fourth is 9CM of Trempeleau.

Dist. 5: 9YAC will be on the air with C.W. The old operators have been invited to again handle the set and to rebuild it if necessary. Three stations in Superior, 9PN, 9DYG, and 9QS are doing good work.

ILLINOIS: Dist. 1: This district is improving with renewed activity. Dist. 2; Headed by 9CA, hands in the astounding total of 1465 messages from twelve stations. For one district to do nearly as much as the whole state did the preceding month is a testimonial to Dist. Supt. Bergman's ability in picking his official relay stations. (F.B. OM, keep it up. How does the *suit* fit?—T.M.)

Dist. 3: Under 9MC, is beginning to show what concentrated effort on the part of a conscientious worker will do. Dist. 4: This district has the star station. 9DQU leads with 423 messages on a 50 watt bottle. Dist. 5: Seems to be the land of the unburied dead. This is the territory closest to the windjammers at St. Louis, which may explain the reason for no report. Dist. 6; is to have a district convention to evolve relay routes across the north part of the state, also for a social get-together. Chicago, under City Manager N. C. Bos, reports a tremendous amount of message work is being handled with 9UU, 9AAW, 9AOT and 9ZN.

SOUTHERN INDIANA: 9ARR is a sure QSR west. 9BRK has handled the most traffic 9AMO is on every morning from 3:30 to 5:00. 9ARK has just returned from his

honeymoon and promises to be on with 100 watts. 9LQ is handling the bulk of the traffic through Indianapolis, but 9BVP and 9BVZ are doing good work. 9YJ, a new station, will be a big help. 9PD is doing good work on spark. 9ACE is on very steadily and is doing a lot of short jump relay work. 9DWA is doing good work.

DAKOTA DIVISION
N. H. Jensen, Mgr.

MINNESOTA: Dist. 1: Northern Minnesota is opening up in fine shape with more relay stations. Places that were impossible to reach a year ago now have fine traffic service. All of the Duluth traffic was handled by 9GW. 9CO is temporarily out of commission. 9BAV and 9BAF increased traffic this month. 9BAF has a schedule with 9CMJ each noon, and 9CMJ has an outlet for westbound traffic through Fargo, North Dakota. 9EAU is now running a test schedule with Duluth stations, and this marks the opening of new territory in the Iron Range country. 9AOR is moving traffic with his usual efficiency. 9ABB is doing work and heads the list for traffic handled in the district.

Dist. 2: Traffic is increasing rapidly. 9AWM continues to do good work. He has been in communication with Pacific coast stations nearly every night during the past month and was QSO with 6ZAC for ten nights running. City Manager, Don Wallance, of Minneapolis, formerly 9DR, is now operating under the call 9ZT. 9APW has put up a 65 foot mast in place of the old 50 footer.

SOUTH DAKOTA: Traffic has moved much better. Daylight work is being carried on with success. 9BRI heads the list for traffic handled. Traffic westbound is being handled 9BRI to 9AVZ and direct to pacific coast stations. 9ASF is on the air regularly and is having wonderful success with 15 watts. Sioux Falls stations were slow in getting started, but 9DKQ and 9AIG are both on regularly.

NORTH DAKOTA: Very few stations are reporting traffic. 9GK is doing good work. The Division Manager respectfully requests that all relay station operators get in touch with supt. T. W. Jackson, 9FX, at Jamestown, and to send monthly reports to him, of traffic handled.

DELTA DIVISION
J. M. Clayton, Mgr.

Despite the necessary slackness of message handling, due to the transatlantics, the message report for the division is holding its own. 5KC with 519 messages on C.W. outclasses the rest of the gang. (F.B. KC. OM.)

ARKANSAS: 5JD after an absence of several months is back on the air with the rock wagon. JD was one of the prize traffic handlers for the state in pre-broadcasting days, and is opening up as though he intends to make up for lost time. 5ZR, ex 5JF, is on fairly regularly and handling traffic. ZR is to be complimented on the way he handles the traffic. 5CB, 5DQ and 5CR are heard on the air occasionally. 5EN a new C.W. is on now and then and makes an "awrful" racket here in LR. 5WE and 5WK are on the air with C.W. and are reaching out in fine style now. 5ZL's 20 watter is pending dope for a C.W. rectifier.

LOUISIANA: New Orleans continues to be well represented on the air by 5UK, 5HB, 5AA, 5ZAP, 5LA and others. 5UK, however is handling the bulk of the traffic andcovering remarkable distances 5KC is being heard regularly on both coasts and handles gobs of messages. Official relay stations in Louisiana are requested to send in their monthly reports regularly, and not later than the 20th, to Hubert E. DeBen, 1044 City Park Ave., New Orleans, La. DeBen is now Assistant Division Manager for Louisiana in addition to being executive assistant. Our old friend Willie Antony, 5ZS, of Shreveport, is back with us again on 100 watts C.W., I.C.W., and fone. He has gotten 4000 miles out of the C.W. and is handling more traffic on C.W. than he ever did on spark. (F.B. OB.) 5ABA is off the air waiting to finish his 50 watt CW.

TENNESSEE: In Memphis 5PF is doing good work on the bottles, but ND for a report from him. 5EK maintains his ancient lead over the gang. 5IK works the west coasters on one lone 50 watt tube but no traffic. 5DO has been changed to 5ZB. 5RZ has the sink going now and has reached out very good on ½ K.W. 5AAG is out on account of burned-out tubes. 5HL is out due to same trouble. 5MB has been reported from Pacific coast and 5HL has been reported on the 10 watter from Porto Rico. 5QM (ex 5EG) is on and handling traffic OK.

HAWAIIAN DIVISION
C. J. Dow, Mgr.

6TQ is our only station in Honolulu and by working on schedule reliable communication was maintained day after day. 6ZAC has been reaching out quite steadily and working any number of stations on the mainland and it is regretted that 6ZAC will be no more when this appears in print.

EAST GULF DIVISION
B. W. Benning, Mgr.

FLORIDA: Dist. No. 1: 4HZ is doing very good DX work with 10 watts. He works 8's, 9's, and Canadians regularly and has worked 4GE in daylight. 4HZ has

schedules with 4FB, 4MT, and 4EB. Messages over this route are handled speedily. 4MT works up the coast consistently. 4FS is back with C.W. Dist. No. 2: 4NU has suffered at the hands of some sort of radio fans who maliciously destroyed his complete outfit. It is reported that a box of tacks were dumped into the storage battery, his Reinartz tuner and transmitter were smashed to bits, and his antenna chopped down. Until the C.W. set can be installed again 4NU will use spark. 4XK is making some improvements. Dist. No. 3: M. B. Ohlhaver, 4BC, has been appointed D.S. 4DL now has 100 watts and with 4BC keeps South Florida open for traffic.

SOUTH CAROLINA: 4JK and 4EG have been the only active stations this month. 4FQ and 4LA were busy with the season rush buying Xmas presents.

GEORGIA: Dist. No. 2: 4HS has added C.W. and uses it along with his spark for traffic work. 4BG is the same old reliable. 4EH has been having some trouble, hence a small number of messages. 4EB is the leading station for the month. 4FB has schedules with 4HZ and 4FD. Dist. No. 3: 4GN, as usual has been pounding out good DX altho the number of messages is small. 4FD lost considerable time because of the T/A Tests but managed to ring up a pretty good number of messages. Dist. No. 4: 4EL handled a nice bunch of messages. 4SK seems to be the connecting link between Florida and Georgia as his location is an ideal one.

MIDWEST DIVISION
G. S. Turner, Mgr.

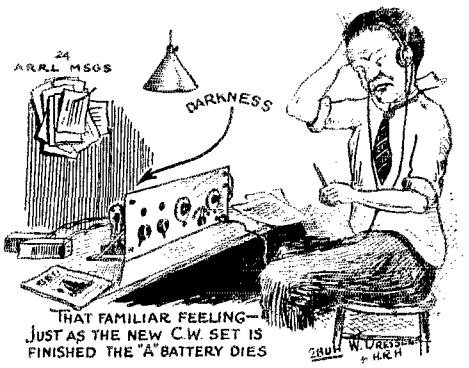
Considering the holidays and the tests which have to some extent detracted the attention of the fellows from their radio work, the reports received this month are good. The results they have accomplished in these few short months show they have been on the job. During the new year we will accomplish great things in the "Heart of the League" division.

MISSOURI: Conditions are progressing quite satisfactorily. The St. Louis Radio Association is busy increasing its membership and satisfying the listener. The Assistant Division Manager is now working with the broadcast situation in St. Louis and has succeeded in arranging a plan that satisfies the amateur, broadcaster, and listener. It also arranges a satisfactory schedule for the C.W. and spark. As a whole it is a very fine piece of work and is quite an accomplishment. (F.B. Doc.—T.M.)

9DXN has been appointed an official relay station. O. E. McDaniel, the official route man, has left the Midwest Division. The new appointee will be announced next month. 9BED blew his 50 watter and is now using two 5 watters. 9AON is still on the job but due to holidays his message total is very small. 9BIE, 9ALX, 9CUM, 9CGK, 9PW, 9CJC are swinging in line for good work. 9BDS and 9DWK are always on the job.

The month has been marked by an upheaval of radio affairs in Kansas City. At the regular meeting of the radio club, December 7th, by a vote of the membership, resolutions were adopted condemning broadcasting in Kansas City which has been started from 11:45 P.M. to about 1:00 A.M. The resolution also stated our intentions to observe silent hours from 7:30 to 10:30 P.M. provided local broadcasting ceased at 10:30 P.M. Broadcasting stations are paying little attention to the wishes of the local club and the unorganized listeners' pleas. The plan for a division of time has failed to produce results. WHB has secured call 9XV and if it is used properly, it may be of considerable value to Kansas City as an aid to some of the over-worked amateurs.

Kansas City's customary increase in message traffic is again shown. The following stations have recently installed C.W.: 9DJB, 9AYL and 9RR. 9DAE and 9BMN, on route "C," will make the jump direct with 9AYL in Kansas City. 9DAE also has a 6:45 A.M. schedule with 9AQR of Kansas City, so the line is open on two different schedules. 9EX has lost a 50 watter. 9ANO has junked his spark set and completely overhauled his station for C.W. 9CTG has also junked his spark. 9DSL is now on C.W.



The District Superintendent of Western Missouri reports that an attempt was made with 9CHJ and other southern stations to get a south daylight route working, but so far, they have had no luck. Don't give up men! New Sedalia stations now on the air are: 9COU, 9BWR, 9CDH, and 9EFB. Sedalia is a good outlet for Kansas City traffic. Columbia has been well represented during the last month by 9YM, 9CWB, 9AOJ and 9HO.

9AQR takes traffic honors with 205 messages.

KANSAS: The Kansas gang have been playing in hard luck, burning out tubes. The Assistant Division Manager burned out one 50 and two of the small ones. (Tubes are not particular who burns them out, eh! —T.M.) What is the matter with the traffic report this time fellows? When your station handles any messages be sure that you, and this state, get credit for 'em. No reports were received from the Wichita or Kansas City Managers. Snap out of it, fellows, or we will be looking for new C.Ms.

Stations doing good work this month are: 9DTA, 9CCV, 9AEY, 9ABV, and 9AOG. A new 5 watter has opened up at 9AOD. 9DUN is now 9EFA. 9BS has resigned as Route Manager of Kansas on account of school work. In his place Clifford Peters, 9DTA, of Tonganoxie, Kansas, has been appointed.

9AOG *again wins* traffic honors for the division with 372 messages.

IOWA: Considerable transcontinental traffic is passing through the state. Stations making this large message total possible, are: 9BGH, 9DKY, 9FK, 9BSZ, 9BIK, 9ARZ, 9AOU and 9AHH. Each of these fellows handled over 150 messages. Come on, Iowa, let us show them that even if this is "where the corn grows high and the west begins" that we can push the traffic through.

9CLQ has had some tough luck, burning out tubes, but keeps going. 9DOF is putting in 50 watts. 9BLT has just opened up on C.W. It is rumored that old 9FP will be back with 50 watts signing 9EDB. (Ur welcome OM). 9UL is back with the gang again. Besides the stations listed above the following are doing their bit: 9CXP, 9AFW, 9AMI, 9BFG, 9DJM, 9APE, 9CHN, 9BDR, 9BCF, 9BZE, and 9DSL.

9BGH with 310 messages wins Iowa honors.

NEBRASKA: No reports were received outside of Omaha and unless some immediate action is taken there will be some new appointments.

Traffic to Omaha goes thru like the north wind thru a silk shirt. Traffic to the southwest goes to Wichita, Oklahoma City, Houston; northwest to Fargo, Falls City, and Yankton; northeas to Chicago, Minneapolis, and St. Paul; southeast to Kansas City, Louisville, and Hammond. But few messages hang on the hook longer than 24 hours. We have commenced to realize the immense importance of delivering messages by mail, usually all neatly written on a regular message blank and numerous QSL's have come back. 9ATC, 9CIM, 9DSM, 9YU, 9DNC, 9BXT, and 9HT are getting out wonderfully and handling traffic. 9ASO is out temporarily. 9EW and 9DXY have sold out. 9HT is being reconstructed at 9SC. The "Quiet Hours" are working like a charm and no complaints are being registered by the B.C.L.'s.

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

The following have been appointed Official Relay Stations: 1CQZ, 1CM, 1BVR, 1IL, 1IX, 1LL, 1BAN, 1AIR, 1AWW, 1AWE, 1BQD, 1AMD, and 1KP. In connection with the announcements of these appointments let it be said that any O.R.S. which fails to send in reports every month without a good reason will have the certificate cancelled. O.R.S. certificates are given only to stations that can hold such appointment, and to hold it a station must report every month.

Taking into consideration the time lost in the T/A Tests, 7392 messages is not what could be called a slack month.

MAINE: Considerable traffic is being handled during daylight in the Pine State. 1BDI and 1BAS have been heard by 4OI. 1BRQ handled traffic with 4OI direct. C.W. stations doing good work are 1KX, and 1IT. The spark stations leading in traffic are: 1BRQ, 1FM, 1BQL, 1CIB, 1BJS, 1ACO, and 1CDO.

NEW HAMPSHIRE: The old state is making good under 1CM with the assistance of such good stations as 1CQJ and 1IX. Stations are few, but traffic moves regularly.

VERMONT: 1ARY, 1BHC, and 1CJH keep things lively and messages do not linger long on the hooks.

RHODE ISLAND: 1BVB is now C.W. being on the job regularly between 3 and 8 A.M. 1GV is reaching out fine in all directions. Other traffic handling stations are 1BES, 1AWE, 1BQD, 1AMD, 1ABC, 1CSW, 1II, 1CBP on C.W. and 1AHT on spark.

CONNECTICUT: 1QP, the A.D.M. proposes that every Sunday be "ham day" and that every available station turn out and handle traffic in daylight. Then on Monday each station will report to 1QP and in that way new stations may be appointed as a result of their showing on Sunday. Here is a bunch that may be heard with the crowd: 1AGH, 1BM, 1IV, 1AYQ, 1JT, 1CR, 1AYU, 1BIY, 1BGF, 1AW, 1MY, 1QP, 1CKP, 1CKI, and 1QO.

MASSACHUSETTS: Springfield has returned to the lime-light once again with an outburst of renewed enthusiasm. Twelve radio clubs are being instructed in code and theory by the old timers. 1CMK and 1BWY pushed a goodly number of messages thru. Leading stations are 1CNI, 1ASF, 1BZN, 1XM, 1CPN, 1BYN, 1BKQ, and 1BET. 1ZE is arranging a Transatlantic schedule with British 2KW for two nights a week.

NORTHWESTERN DIVISION
H. F. Mason, Mgr.

IDAHO: 7OT reports everything hunky-dory in his state. Dist. 1—7JF is breaking in two new operators, those of 7AGU and 7FT. 7FT, it will be remembered, is an old timer and was Idaho's A.R.M. some years ago. (Welcome back to the brass OM.) Little QSS is experienced in working out of Moscow. Schedules are maintained with 9AWM, 5KC, and 6XAD. Two 5 watters died this month. Dist. 2—7WG is not able to pound brass much, but is doing his share of DX when on. He also works 7LY in daylight. (F.B.) He is installing a new antenna and a C.W transmitter. Dist. 3—Traffic in the Boise district is slipping right through. 7AEM on 10 watts, has been heard 825 miles west of San Francisco. 7HJ is doing very well on 50 watts and is improving his set. 7YA is in operation on 375 meters again with his 150 watt C.W. and the old spark. 7OT is doing very good work on 100 watts and will be on pure C.W. shortly. He has worked 6ZAC and land stations up to 2,000 miles distant, besides being the star station for the division. An early morning schedule is being maintained at 7OT and 7AEM. 7LU is the most consistent station east of Boise and handles the bulk of the traffis east. 7PJ is open for traffic in Boise. Spark now, but C.W. soon.

MONTANA: No detailed report on activities received The matter is being taken up with the fellows over there and some changs will be necessary in the personnel to perk up Montana's organization.

OREGON: On December 28th, 29th and 30th, the Division Manager was in Portland and found that although there are lots of stations on the air, and traffic is going through, there is a complete lack of co-operation in the matter of getting reports in. The question was squarely put before the local radio club and it is sincerely hoped that the gang can get together down there. All Portland stations are requested to get their reports to 7DP, as the official League representative and District Superintendent in Portland, by the 15th of each month. He will then see that the reports are properly made up and put in *QST*, but it's up to each and every one of you to get behind Dippy and show some real co-operation.

Dist. 2—7HD reports conditions as very good in his district during the past month. 7HD is handling traffic in all directions. Dist. 5—7MF, 7LR and 7NA are handling the bulk of the traffic going south. 7NA has opened up on his 10 watt set and worked into Wisconsin the first night. 7TQ is doing very consistent work. Dist. 3—No report received from District Superintendent, 7MU, but Mr. Bowser of Silverton sent in the news from his part of the country. (F.B. OM.) He states that most of the old gang have quit radio, but that several new stations are on the air. 7AGE is a newcomer in Salem. He started out by copying 8's and 9's on a fence. (????— D.M.) At Silverton 7IN and 7CW are NM, and we regret to hear of the passing of these two premier stations. 7AGP is a new station.

WASHINGTON: Traffic has been moving better than ever before. New stations are into the relay game, and the old timers who dropped out when broadcasting was all the rage are coming to the front. Dist. 1—7OJ reports that traffic is moving with regularity. 7NJ will be on soon with C.W. Come on 7UQ, get on the job, OM. Dist. 2—No report has been received from the Grays Harbor district. It may be necessary to make a change in this district, as there is considerable traffic being handled that should be reported. Dist. 4—7GP reports that amateur activities are on the increase. The BCLs are anxious to learn to read the "buzz buzz" 7GP on C.W. is handling traffic and is working ninth district stations. Traffic from the Sound going in any direction is QSR'd easily. Dist. 5—7BJ reports traffic almost doubled. 7ZK, 7AIC and 7BJ have been hard at it. 7ZK says there is lots of QRM—BQ3 says it's QR Rum and BJ says its static. Anyhow its awful, and interferes with DX work. The weather has been quite favorable for DX and traffic in every direction is moved with ease. No more stale messages on the hook. It sure is fine to hear all the classy C.W. on the air and getting through. Dist. 6—Traffic has been moving with the usual regularity, but the stations are not coming across with reports. 7AII is proving a good relay station and works east and south with fair regularity. 7WM has been holding his own with a 50 watter (and an awful hum). 7AGV and 7QE are still doing fair work on C.W. The Radio Club of Tacoma has a live publicity committee and is putting the amateur side of the game before the Radio Public. KFEJ is a new broadcasting station that is giving some valuable aid to the A.D.M. and the club along the publicity line.

Dist. 7—Waskey reports that conditions are improving steadily in his district. 7AFH in Monroe is working 7MF in daylight and is reaching out well in all directions. 7ABB is reaching into the 5th and 9th districts with his 100 watts. 7EQ and 7PF are also doing well. The bulk of traffic goes through 7BK, 7OO, 7ADP, and 7MH. 7FR finally threw away the synk spark and is breaking through on 15 watts of the "old reliable." (You don't mean it!—F.H.S.) 7FD has handled traffic direct with 8CMI. 7UU is still out with a broken mast. Dist. 8—This district has come to the front with

a bang. Mr. Leonard Tate, 7JS, has been appointed District Superintendent. He will be on soon with C.W. 7AIO is working north OK and traffic in this direction should be routed through him. 7UD is on the job with 5 watts. He is working in all directions when possible to get some one to take up his traffic. 7WD is having trouble getting out on spark. (Maybe better luck with C.W. OM.) Dist. 9—7NE has made himself known, but has not yet turned in his traffic report. Dist. 10, 11, and 12. No reports, due to the fact that Mr. Maybe is changing his QRA, and building a C.W. set. Dist. 13—While this district is the infant of the state, the results under Mathes have been more than gratifying. All amateurs in the district are keen for traffic work. Heretofore, Seattle has been the clearing house for traffic originating in district 13, but in the past month the Grays Harbor and Portland districts have been worked direct Bremerton amateurs have obtained quarters for a central station in the High School and will maintain a continuous watch. The Amateur Radio Operator's Club of Bremerton is giving code instruction and other instruction necessary to obtain an amateur operator's license. By judicious propaganda in the local newspaper, the amateurs have won the esteem of the public and this has been reflected in the volume of traffic handled. 7ACZ is QSO Bremerton. 7AAO, 7ABV, 7ABW will all be on the job in the near future. 7ACA and 7OE are doing the bulk of the relay work with the able assistance of 7DC, 7NG and 7AIF. 7OE has said something about a couple of 50 watters. (More power to you OM.) The Central station has been assigned the call 7HE. There will be some YL's sined on as ops. there too, we understand.

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

1922 was a banner year for us! We had practically no inter-communication at the beginning—but just look at us now. 1923 will see us even further along in the game since the Radiotelegraph Department by its clarification of the amateur radio laws, has pointed out that they consider the amateur, especially the C.W. amateur, worth while. The Department intends to encourage the amateurs. The Transcanadian Relay, without doubt, will come to pass very shortly and every Canadian "ham" is eager for the chance to try it.

Western Ontario with 3DH, 3EV, 3GN, 9BS, 3XN, 3FA, and 3TA, is leading Central Ontario a merry race. Traffic moves thru these stations like water runs off a duck's back. London and Toronto are in daylight communication on schedule and traffic simply flies thru. Central Ontario sends out a bold defi to Western Ontario and asks to be shown up again—if it can be done. 3KO has been appointed City Manager of Chatham. 3AD has been appointed City Manager of Sarnia. 3KP continues to handle the bulk of the business around the Niagara section and new stations are coming along. 3EI moved from Toronto to get away from QRM, and on spark moved some messages. 3JI and 3JK have hooked up together and have one real good station. 9AJ, formerly interested in broadcasting, gives our best stations a run for the highest traffic honors. 9CD, ex 3GE, is doing twice the work on C.W. that was done on spark. 3CO has been appointed City Manager of Toronto, and he bumps along even tho he has only one tube left. Eastern Ontario has succeeded in picking up 2BG, 2EI, and 2AN. This opens the way for traffic and is especially of value in the Transcanadian Relay for working farther east.

PACIFIC DIVISION
J. V. Wise, Mgr.

CALIFORNIA: Dist. No. 1: 6BJY, 6AHF, and 6BJU have changed over to C.W. 6ZB and 6ZH continue to handle their share of the traffic. Dist. No. 2: The new Pacific Plan has met with great favor and is working out nicely and much traffic is handled even before 10:00 P.M. 6EB has increased power to 50 watts. Dist. No. 4: 6TU is back with his sink spark after repairing his antenna which came down in a storm and which put 6ATC out. 6ATC has not recovered as yet. 6LV is as reliable as ever in moving traffic. Dist. No. 7: The slump in traffic is not due to inactivity but to the business of remodeling and which is producing some splendid stations among which we find 6GF, 6GR, 6ABX, 6GX, 6FH, 6AK, and 6ZX. 6AVM has the C.W. now in place of the spark. Dist. No. 8: 6TC and 6CC without question did some mighty good work with 6ZAC and since 6ZAC is leaving the island we believe these two stations will continue to work efficiently with 6ZY as soon as that station gets on the air. Reports from the other districts are missing.

ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

Every month the Division Manager is going to check the list of official relay stations against the stations reporting and he who fails to report will have his appointment cancelled. If you are in doubt as to whom you report, look in the front of this issue and find your division and then look for your state and the A.D.M. listed. He will be glad to tell you to whom you report. Our operating months run from the 18th to the 18th of each

month. This is the last warning from the D.M. about reporting, and is final. Let's have no certificates cancelled.

Did you see what we did for November? Increased our traffic 230% over October. Did you see our special box seat for traffic honors? Did you see what state sat on top of the gang? Who will be there next time? Gosh men, you gotta work now or the first thing you know, cow punchers or salt miners will boost the Colorado ether pounders off the coveted perch. The D.M. favors no state; he is just a judge in the race, and hopes to see each state rest on that high perch at some time or other. We want this division just like a "Hinie" picnic, something doing all the time. Headquarters has kept us pretty busy this fall with special tests and the like, and between fighting for our place in the wind and moving traffic this will be a banner year for us hams.

Because of many bad storms out here there has been originated an amateur distress call "ASA." Now this is not another "CQ," men, but a call that in case of dire necessity is to be used and this office will do all in its power to protect an amateur who uses that call for humanity sake in case of storm or disaster, if there be lodged against him serious complaints by BCL's. On the other hand if this call be used for any other purpose than that for which it has been originated, there will be a hot time in some town that night. The letters "ASA" were chosen in that it is a good keying combination and will at once be recognized. Remember, you men in Colorado and Wyoming, especially, that this call exists, and in case of another tie up like we have had each year, use the call, and during those times all men who possibly can, stand by their sets until they know wire communication has again been established. You will remember the Pueblo flood, and other like disasters, so never do we hams want to be caught without some means of help these broadcasting days.

Bang, Bang, look what happened! Colorado blew up, went sky high and is now settled down again with a whole new line of League officials. The following is the new line-up in Colorado. A.D.M., J. L. Turre, 706-18th St., Denver, Colo.; Dist Supt., Philip Laskowitz, 611 Marion St., Denver, Colo.; City Mgr. for Denver, J. Lewis Hathaway, 1575 Pennsylvania St. Denver, Colo. Colorado is just humming now. All you men in Colorado who have any matter what-so-ever, take it up with your new officials and you will receive prompt attention. The annual election was held in Denver Friday, December 15th. You Colorado gold miners get behind the men you selected and boost your state to a farethee-well.

Do you remember the daylight transcons? Do you remember the midnight oil that many of us burned trying to get a route over the mountains through this division to the Pacific coast? Well gang, you did it! A transcon went through this division over the Rocky Mountains and landed on the west coast. 9AMB, 6BOE, and 6BKO get the credit in this division as far as can be ascertained. 6BOE got the west transcons from 9AMB. He gave it to 6BKO, but was unable to get a QSL for it. 6BOE broadcasted it and it was received in Belleview, Washington. Again 9AMB is in the lime light, and our "six" friends deserve a lot of praise for their good work in getting that message across. To 9AMP and 6BOE goes the credit of having done the job.

COLORADO: See who sits in the box seat this time. All done on C.W. and in the early hours of the evening.

C.W.—482 Msgs.
J. L. Hathaway,
9AMB
Denver, Colo.

9BJI is the first station of Denver to handle traffic direct with 6ZAC, and it was done on one fifty watt tube. 9CFY is a new station. A regular schedule between 9CFY and Denver will be in effect as soon as possible that all southbound traffic for Colorado can be shot right to that part of the state. Nearly all the traffic handled by 9AMB was put through between the hours of 5:30 and 7:30 P.M. Get on the air along about this time and see the scads of stations looking for traffic. 9DTM has changed from his old reliable 20 watts of D.C. C.W. to 100 watts of A.C. C.W., and from the way he sounds around Denver, it seems his 20 watts worked about twice as good as his 100 watts. We know that the A.C. C.W. causes a lot more QRM than the generator. 9ZAF blew a quarter K.W. tube and was out of commission on traffic work for the past month. 9CNS was in Denver visiting a bunch of his many radio friends. 9XAQ is open again with a C.W. set.

WYOMING: 7LU takes traffic honors for Wyoming this month. Connections west from this part of the division is hard, and traffic, a good many times, is delayed on account of trouble connecting west. 7AFW runs 7LU a close second. 7AFW uses 10 watts of C.W. 7ZV has his 100 watter going with two operators. His second trick man is Slauson of 7ZG. 7ZO continues in the same old way. Traffic is moving over the Sage Brush state better than it ever has. Why? C.W., 'eh?

UTAH: 6BOE takes traffic honors for Utah and for noteworthy achievements

during the month. 6BOE QST'd the transcons to the coast after it had been "heaved over the mountains" to him. 6ZM has been out of commission for a while waiting for suitable protectors for his motor-generator set. 6ZM is also KZN, another of our traffic handling broadcast stations. 6BKE got in a bad mood and knocked his works to pieces and in the rebuilding much improvement and efficiency has been gained. Let her buck, 6BKE, 6ATH has the bottles oscillating. 6ATQ has established a schedule with 9BXA and 7TQ, and traffic moves very nicely over the route. 6APL is on again and his traffic report this time was done in one week.

ROANOKE DIVISION
W. T. Gravely, Mgr.

Honors this month go to a Virginia station and to one which has been performing admirably. Behold the "box."

C.W.—665 Msgs.
C. Russ Hoffman,
3BLF
Richmond, Virginia

Spark—260 Msgs.
Morris & Stealey,
8BDA
Parkersburg, W. Va.

Interest has centered the past month around the transatlantic tests, and due to this fact, traffic has not been quite as active as it might have been . The manager wishes to congratulate those stations which made the "big jump," and his hat is off to each one of you. Also, the manager wishes to thank every station in the entire division for its sportsmanship during the European reception periods, and to congratulate each one for that fine spirit of co-operation, as the Roanoke Division had, probably, the most quiet one throughout the reception periods.

It is with regret that we have to report traffic suspended for the time being between Porto Rico and the States, 4OI is temporarily, out of the game. Traffic will be resumed at the earliest possible moment.

WEST VIRGINIA: The BL's are falling over themselves in an effort to get receiving sets installed and the business never was so great. Dist. 1—D.S. Jones has been trying for T/As. He has also been doing the "Boiled Owl" along with the Christmas rush in his store, and says it has about gotten him down. No report from Clarksburg. Dist. 2—D. S. Liller has been so busy he has scarcely had time to write, but his interest is keen. Dist 5—8BDE is going to put in 100 watts and 8BKE 150 watts. 8BKE reports having been heard on the west coast by 32 stations. There is a new station in Charleston, 8AIP, on 10 watts of C.W. Dist. 5—8BDA only ran for one week when it was visited by the Radio Inspector and license suspended. (Rotten luck.) They are arranging to install 100 watts C.W.

VIRGINIA: Let's get that Form No. 1 and Form No. 2 straight for once. Form No. 1 should be sent to all of your relay stations who make the usual report thereon in the prescribed form. This is forwarded to your District Superintendent not later than the 15th of each month, along with any comments which you may think will prove of interest. (This last is very desirable—D.M.) This data is written into the usual letter report of your District Superintendent to the Assistant Division Manager and the message report is entered on Form No. 2, which is sent to the Assistant Division Manager each month, along with the report. It is not necessary to send Form No. 1 to the Assistant Division Manager if all the dope has been taken from same. All those not having the relay station certificates should make application to their respective District Superintendents for same. These requests then go to the Assistant Division Manager for approval, thence to the manager.

Dist. 1—There seems to be a dropping off of traffic in this district. (What's the trouble?—D.M.) 3ACK on 10 watts was logged by 7PN on two different occasions while testing the set out at 3ZZ, but when installed at its permanent location it would not work. (Howcum?) 3BVC reported 1300 miles on 10 watts and is handling lots of traffic. 3BNE is getting out in fine shape since changing his antenna and is handling traffic. 3ZZ got in very little traffic due to sickness. His signals have been reported at great distances. He was unfortunate enough to get a bad burn from the set and lost his one typewriting finger, and is now using the "hunt and peck system." (Sa Bo! We have our troubles, don't we?—D.M.) 3AAG is heard on the air, but failed to make any report. Here is more dope on the antenna. 3BVC and 3BNE changed from flat tops to cages and increased the ranges. Now, that starts more argument. (Will Kruse come to the rescue?) Dist. 2 is another district with little traffic on account of the transatlantic tests. Petersburg has a bunch of stations and the number is increasing right along. Latest addition is 3AOT. 3CEL is going strong, and turns in a good report. (Atta boy.)

Dist. 3—3BVE increased power and got over. 3BIJ, on 100 watts, seems to have better luck with the fives than with the others and is afraid the 5 will run out. He has been reported by 6AMT and 6BUD. 3MO still uses the clothes-line for an an-

tenna, and gets out, working Canadian stations best. Considerable work is done from Richmond in daylight, and several regular schedules are maintained. The BLs have it from 7:00 until 10:30 P.M. in this city. Dist. 4—3BLF (another one of them to get across),when reported by 6ZAC, took all the doctors to bring him "to." This station is the star station for this month, and is in operation on several daylight schedules. As many as 100 messages have been handled on one night, and 250 stations worked during the month. Dist. 5—3BOF with 50 watts and new cage antenna is doing fine. 3AFW, while not handling much traffic, is a real bug. 3SK, 3CI, 3CER, and 3CDY report no traffic, but they are new ones just getting under way. 3IW is not handling his usual bunch of traffic. A new mast 60' high, and a new antenna just installed may help the situation. Dist. 6—Some traffic is being handled, but on account of the small number of stations, they cannot do much. However, a fine spirit is shown. 3BHL has pep. Dist. 7—3YK, V.M.I. station, promises to get in now since the "pig-skin" season is over. 3CCB is a new station at Washington & Lee, operating spark. (How about it OM?) 3ZAA finally got the set to work and will be getting out in good shape now. Dist. 8—There is only one stationso far in this district, 3APR, who does excellent work, having several daylight schedules, and ready ot take on all new comers. We understand our old friend 3ZY is now located at Lynchburg and is hot after a broadcasting station. (Go after him 3APR—D.M.) Dist. 9—3RF is back in the game and clearing traffic. 3BIY is having his troubles. (Keep trying OM.) 3XN assigned to V.P.I.Blacksburg, has been heard on the air lately. 3BHS and 3BKX are having trouble with C.W. transmitters. 3BNM may come back soon. 3CU and 3AIR are now getting out on C.W. (Traffic report next time, please.) 3HL is getting in the game again and handling traffic. Dist. 10—3AOV, the only station in the district, operates spark, but seems to have been converted over to the bottles, and likely will have a real "he" set shortly. (Atta boy, you are about to talk "turkey.") 3BWY is coming up. (We need you OM., won't you let us hear from you often?) Mr. Van Nestrand, the Radio Inspector, paid a visit to several of the Virginia cities recently: Richmond, Danville and Roanoke. He made a little talk to the amateurs and BLs regarding the QRM that is claimed to be so great on 360-400 meters, and it is hoped that the matter was fully understood as it was ably explained by the Inspector.

(Say, 3CA, don't let them tell about that "Irish trick" they pulled on 3BX, Xmas. Ye Gods! wooden cans! 'Nuf ced. —D.M.)

NORTH CAROLINA: No detailed report from Assistant Division Manager Simpson this time. He explained this by saying that he received no detailed reports from any of the fellows. (Scouts, this won't do. It isn't like you, so come on up with details that you may receive due recognition for your splendid activities—D.M.)

PORTO RICO: Traffic for this month has not been as it should be. The reason for this is due to a breakdown at 4OI, and a short vacation taken by 4KT at Carolina, P.O. 4JE is still using his old 20 watt C.W. set and is quite nervous at the new record set by 4OI in tube "busting"—Five 50 watters in one week and six condensers "shot." 4JE's 200 watt set is still hidden away in the old trunk, but we expect to hear it knocking our tin cans off in a short time. (Come on 4JE, with the 200 watter YOU ARE NEEDED—D.M.)

From now on amateur traffic in P.O. will not begin until 10:00 P.M. A new broadcasting station recently inaugurated in San Juan will make it impossible to do any work before that hour. We could not keep away from it boys, so what's the use in worrying? Cheer up! Our fellow brothers in the States have had this trouble for nearly two years. (We are still sitting on the "cat's bristles," though. Brother Rexach, sit tight, we are all OK. —D.M.)

VANCOUVER DIVISION
J. T. North, Mgr.

A marked improvement is shown throughout the division and particularly in the Vancouver vicinity.

VANCOUVER: Things are picking up rapidly, although the immediate vicinity is still quiet. 5CN has handled most of the traffic. 5EJ, a new 5 watt station, has handled quite a little traffic and works 4DQ and 6AWT. 5AC and 5GO, two new 10 watt stations are going good work, and 5AC is making antenna improvements which will doubtless increase his working range. Both of these stations work sixes and distant sevens with ease. 9AX has been using his 500 cycle spark some and is putting in 20 watts of C.W. 5BQ is still on the job and 5AK is putting in 5 watts of C.W. to help along his spark.

VANCOUVER ISLAND: A very big increase in traffic at 5CT is shown, no doubt chiefly due to increased power and the addition of a counter-poise. Traffic east has been handled with 4DQ and 7AGF. Several stations in and around Frisco have been worked but no traffic handled direct. The most reliable route is via Portland.

Victoria has "dug in" for another quiet spell, and both 5DX and 9BG are off the air these days. 5AL is working hard on a C.W. transmitter.

ALBERTA: 4DQ is still going strong both on the air and on the mill. You Alberta fellows can help by writing him before he has to write you. He has another 50 watter in Calgary lined up now, and has located 4AB in Vulcan.

PRINCE RUPERT: 9BP is not yet on the air, but is doing everything possible to get there. He was unfortunate enough to have the top-mast blown off of his 90' mast, but he is still hitting the ether trail with both feet.

WEST GULF DIVISION
F. M. Corlett, Mgr.

Well, now who was it that said the amateurs was doomed!!!? If a few busybodys will just allow the amateur to attend to his own business of relaying friendly messages over this ever growing smaller world, the amateur will save himself.

Fort Worth (Cow town) with five stations handled 1,076 and had time to ask a few questions about the weather, "how's my spark," and "how you get me now," too. Some one living in Fort Worth advised the Radio Inspector that all he had ever noticed the amateurs doing was asking the qestions named above, and remarked that he didn't see where there was any advantage to the art of radio communication in that. There is a file of 1,076 messages on file in five Fort Worth stations, if that party would care to look them over. 5TC is the star station of the division with 486 messages.

OKLAHOMA: To 5TJ and 5TA goes the honors of being the first Oklahoma stations to "get across," both having been heard in Manchester, England, on the same night. 5WX has moved and is busy getting his new station in order. 5SR has been appointed official relay station. Ballinger is back on the job and with the assistance of Cummingham, is operating 5AQ. 5BM is going strong again with 50 watts. 5LB is obtaining the best of results with the C.W. 5ZAV, 5ZAT, 5XT, and 5TA have things pretty well in hand. 5ZM and 5HU are the only active stations in the northwestern part of the state. 5TJ and 5VM are doing some splendid relay work. The state honors for the month go to 5TJ.

NORTHERN TEXAS: Traffic increases, still a great many are not reporting. The following messages were handled by five Forth Worth stations: 5TC, 486; 5SF, 259; 5DI, 206; and 5PX, 125. 5DI is going strong on 25 watts with which every district has been worked and traffic handled with 6ZAC. 5SF is on regularly from 3:00 to 7:00 A.M. City Manager reportes radio in Fort Worth has been agreeable, except that broadcast stations are breaking the schedule agreed to last June.

Dist. 3: 5UO is working out some relay routes. 5ZH has had hard luck with his bottles, "leaking air" and "no oscillate," and was compelled to QSR with his old spark demon. Old 5TU and 5TP pounded in and moved traffic fine as well as did 5QS. 5ADP is installing a 5 watter. 5TP has been doing some excellent work with ½ K.W. spark, having worked 6ZZ, 4FD, 4GN and 4MV. Hi!

SOUTHERN TEXAS: Every district superintendent reports crippled traffic, due both to lack of co-operation in making reports and bad QRN. Although the winter is half gone already very few nites have been even cool this season, and few ideal nites, if any have been available. Traffic is moving by a very few stations in each district, but it is noticeable that some of the best stations are not working. 5AAU begs of you fellows in Eastern Texas to give him some work to do, as he cannot possibly discharge the duties of his office if you won't make your station reports to him, and furnish him with information regarding your activities. Certainly all of the other three Dist. Supts. in this section will second this plea. 5NK has suffered the loss of his high voltage transformer and is temporarily shut down. 5XV has a splendid record this month and is closely followed by 5XAD. 5XB states that traffic has suffered from incomplete transmitter.

Dist. 2: Greater activity has been noticed and the traffic would be a delightful thing to publish if the fellows would only turn in all reports. 5KP and 5RA are both splendid examples of relay stations, but data from 5RA is not obtainable. 5YK has abandoned the spark and will be heard only on C.W. Some difficulties have been encountered in handling traffic in San Antonio and vicinity, because of lack of cooperation between listeners and amateurs. 5MT has his big 100 watter going and which has been found to bridge the gap to the valley in fine style. The big news of the San Antonio district this month is the return to the air of 5ZAK at Camp Travis. 5ACU has abandoned his spark. 5ZAE has reported more work on spark this month than C.W., but he is fast becoming a lover of C.W. From El Paso comes the all too brief report with a very short traffic list. Dist. Supt. E. R. Mc Cracken of 5ADB tells of a wonderfully fine prospect at Marathon who is equipped with 900 cycle spark and I.C.W. and answers to the call 5BO.

Holland Letter

Referring to my previous letter, in addition I take pleasure in telling you herewith something about the radio exhibition on November 17-19th, which was organized by our Rotterdam section.

The Exhibition was divided in two main parts; the amateur and the industrial parts, with 37 exhibitors in the former and 12 in the latter. In the amateur part there was a very interesting historical section where everything from the beginning of wireless up until today was shown. During the exhibition radio concerts were received from PCUU, Glowlampworks Heussen & Co., The Hague & Arnhem; the Aerodrome, Waalhaven, Rotterdam; Middelraad, Ymuiden; PCGG, Nederlandsche Radio Industrie, den Haag; FL, Paris, Eiffel Tower; and LP, Koenigs-Wusterhausen near Berlin. A guide containing articles about radio history, audion characteristics, notes and all manner of formulae for calculation was sold in great quantities. To the 1000th, 2000th, 2500th, 3000th, 3500th, and 3750th paying visitors, presents were given such as audions, etc. In all the exhibition was visited by about 5,000 persons, which in three days is a great success. Several official persons from the Dutch government, Electric Works, etc., showed interest in our work, and even the Polish Ambassador.

Another thing that has taken up our interest has been the Transatlantic Tests. No doubt they will be a good example to help convince our Minister and other authorities that wireless for amateurs is possible without jamming public service. If we ask for a sending license, the reply is always the same—jamming of public service. The government here always sticks to an opinion and that is the reason all telegraphical and telephonical work is handled by the government with the exception of some great towns where the telephone is operated by the town itself. There are even no cable companies having direct cables to America and other parts of the world, but only branch companies, and not many of these connect to London where the messages can be retransmitted on the various cables. Let us hope that in the near future the government will break with the autocracy.

Within a few weeks the new transatlantic station near Kootwyk will start its trial signals. It is built by Telefunken and is about the same type as Nauen and built to work with our East Indies, especially the Malabar station where our famous Dr. deGroot is operating. The new receiving station is near Sambeek, in the eastern part of our country, and has already operated about a year. The transmitting aerial is of the hexagon type, supported by six triangular masts, the highest being about 210 meters. The distance between the towers is 450 meters and the aerial is made in four segments, each of which can be taken down independently.

I will finish for this month with best wishes and success for the coming year,

K. F. M. Kunen.

Rotterdam, Dec. 15, 1922.

Letter From France

Dear *QST* Readers—

The Transatlantic Tests are in full swing and are proving to be a great success! Although I was probably more optimistic concerning their result than anyone else in France (and I was repeatedly accused of being too optimistic) the results have surpassed my greatest anticipations! I knew you would do great work; you have done even better! Most hearty congratulations, O.M.'s.

I will not give you detailed information concerning the results so far obtained; Dr. Pierre Corret, President of our Comite Francais Des Essais Transatlantiques, will surely do that much better than I could. I will just tell you a few words about my own experiences in these Tests to give you an idea of how they are viewed from this side.

Two days prior to the Tests, on Dec. 10th, I was listening in for American amateur stations when I picked up 1ARY on C.W. His signals were very QSA, I should say readable fifteen feet from phones at times although I did not try it. This reception gave me very great pleasure indeed, as it was the first time I could identify one of your stations. That was at 4:54 A.M. and

I knew then I had been hearing him many times before without being able to copy his complete call.

On the next day, Dec. 11th, at 5:03 A.M. I heard 2KL calling 9DNS on A.C.C.W. and at 5:22 A.M. 1BDI calling 1BHR, also on A.C.C.W. I followed him until 6 A.M. and he was still there although QRZ when it began to be daylight. This gave me great hopes for the actual Tests. As a matter of fact I received on the first day five of your stations: 1BGF at 2:56 A.M.; 8AQO at 3:55 A.M. with code word; 1BCG at 4:35; 8MZ at 5:17 A.M. (not participating in the Tests), and 1YK at 5:50 A.M. with code word.

On the 13th I copied only 8AQO at 1:32. But since then (four more days) although I heard a few more signals I could not copy the calls on account of QRN. Atmospherics have been very heavy of late which is usually the case in this southerly part of France; every night they can be heard sixty feet from phones on two valves. All the above receptions were made on a Tuska receiver and one step of audio frequency amplification.

And now for the transmission Tests, and let us hope we shall soon need the adoption of some plan to distinguish between the calls letters of our different countries! I was very glad to see that my suggestions concerning this question had aroused interest in America and I think the modifications proposed by the Editor of this magazine would be a great improvement if agreed to by the different governments.

Wishing you as good luck in receiving as you had in sending, I am

Your old friend,
Leon Deloy,
French 8AB.

Nice, Dec. 17th.

With deep regret we learn of the death on Nov. 12th of M. Charles Constant Corret, Professor Emeritus of the *Faculte libre de Droit*, of Paris, formerly counsel to Court of Appeals, the father of Dr. Pierre Corret who in so able a manner has acted as head of the joint French committee of radio societies in handling the arrangements in that country for the Transatlantic Tests. M. Corret was in his 89th year. Our sincere sympathies are extended Dr. Corret and his relatives in their bereavement.

In the October number of the French *La T.S.F. Moderne*, just received, we have noted the following points of particular interest:

A club of telegraphing amateurs has been formed known as *Le Club des "8,"* the main requirement seeming to be the possession of a transmitting call. It should be remembered that the French calls start with the numeral 8.

In the same issue the publication of *Indicatifs Entendus* is commenced—"Calls Heard," by heck! And in one Paris list we spot a 1XM which we'll bet is our M.I.T.

And in the advertising section an illustration of a neat little tuner after the American idea. Something about it looked distinctly familiar. Get the label: "Poste Reinartz. Reception de 140 a 600 m. Tous nos Appareils ont obtenu lesplus hautes recompenses." Rah for 1QP—you started something, son.

What to Hear Tonight

By 1ZE

W GUY—Beantown, Mass. (360.5 Meters)
- 8 P.M.—Boston Homicidal Statistics.
- 9 P.M.—"Who Struck Billy Patterson?" —by the claim agt. New York, Near Heaven & Heartiess R.R.
- 10 P.M.—Taps—played by the Black Gents Minstrels from New York's darkest Streets, weapons furnished by the Boston Symphony Orchestra.

KAY WHY TRUBBLE YOU—Windburg-on-the-Lake (360 Meters)
- 6 P.M.—Dramatic Reading of Sears, Roebuck catalogue by John Smith.
- 7 P.M.—How to Roll Your Own—recital by Prince Albert.
- 8 P.M.—Electrical Cat Chorus by the Loose Connections in the Set.

WOP—PHILADELPHIA (360-567 Meters)
- 8 P.M.—Boiler Recital by the Baldwin Locomotive Wks. Quartet. 1st Sledge, 2nd Hammer, bass-Bellows, baritone-Riveting Machine. Very selective.
- 9 P.M.—The Dangers of Smoking—by Bluenose Mary of the U.S. Weather Bureau.
- 10 —Popular Entertainment by Uncle Tom's Cabin Outfit.

CAL—"LOS ANCHELES" (361 Meters)
- 10 P.M.—Impassioned Oration entitled "Why California Climate is BEST" —by any native of the State that is handy at the moment.
- 11 P.M.—Samples of Indoor Lightning by Steinmetz.
- 12 P.M.—Hawaiian Song "Put Cocoanut Shells on Your Feet and Clatter Home."

KOW—DALLAS (412 Meters)
- 10 P.M.—Chinese Ballad—"No Tickie, No Shirtie."
- 11 P.M.—Bedtime story for Father. Short Talk on Methods of avoiding Influenza by Luke McGlook.
- 12 P.M.—"Bull I have Thrown" by a Prominent Cattle Man.

OWL—ATLANTA (400 Meters)
- 3.52 A.M.—Chimes announcing breakfast and the regular sunrise program.

Who's Who in AMATEUR WIRELESS

W. W. LINDSAY, Jr.

Mr. W. W. Lindsay, Jr., better known as 6ZF, was really born down east. To be exact, this first great incident in his life happened in Overbrook, Pa., November 16th, 1899, 10 P.M. Not long after, he went abroad to travel and study and later went to school in New York, where he spent considerable time. During the earliest years of the war he was again in Europe, this time connected with the U.S. Diplomatic and Consular Service in Hanover, Germany, where he had been studying electrical engineering.

His radio interest dates back to his younger days of 1908. The first real transmitter started in New York with two five-watt tubes. Later a Navy "P" tube was hooked up with a 1500 volt generator and the sigs reached 4GL and 9AFK. This was when he signed 2ARD. Lindsay went down to 2RK's one night and got an earful of real DX and decided that New York was

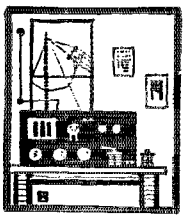
(Concluded on page 66)

J. A. GJELHAUG

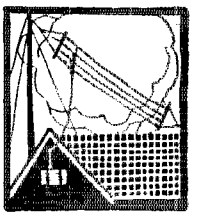
Mr. John A. Gjelhaug, 9ZC, located in Baudette, a small town on the northern boundary of Minnesota wilderness, perhaps never did anything to startle the radio world. He never tries to send messages at break-neck speed. He is, in short, one of the boys. During his long service as District Superintendent he was a good worker, his reports were always on time, and because of his reliability in all things he has won a name that is truly enviable—"Old Reliable."

Although a photographer by trade, getting ZC to come thru with a photograph of himself was no easy job. His wife finally did the "taking" and as it has her O.K., it must be at least a good likeness. But to get started—he was born July 29, 1880, in Bigwoods, Minnesota, a town noted only for turning out a real amateur. He first got going in wireless in 1914, but "got the bug right" in 1916 and installed a one

(Concluded on page 66)

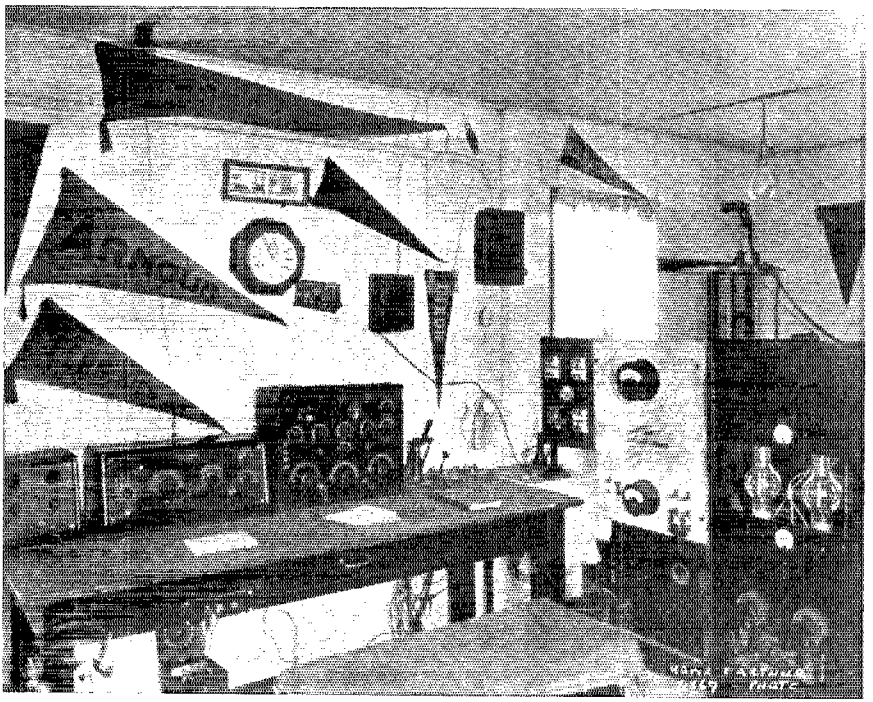


Amateur Radio Stations



9ZN, Chicago, Ill.

Although featured in this department in the old spark days (January, 1920), 9ZN, the station of our Central Division Manager, R. H. G. Mathews, 5525 Sheridan Road, Chicago, Ill., has a new tube set that has been tearing up the air quite generally in the western hemisphere. Although a gold plated antenna has recently been put up. The towers are 90 feet high, 150 feet apart, located 50 feet from the edge of the lake, and support the broad ten-wire vertical fan antenna. The old electrose insulators have been replaced by glazed porcelain insulators.



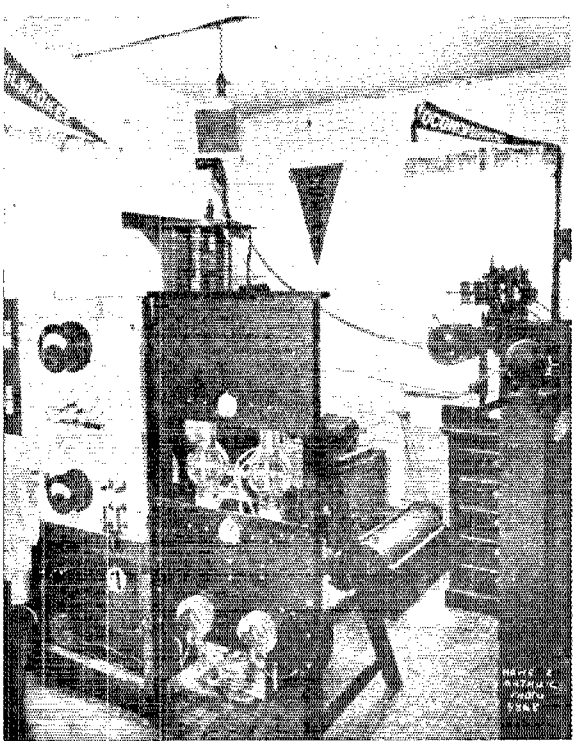
owned and operated by Mr. Mathews, who signs "WO", he is assisted in operating the station by J. E. Brennan—"MA"; L. E. Dutton—"DN", G. A. Fitzsimons—"GJ", F. J. Marco—"FJ", K. E. Hassel—"SF", Wayne Stack—"WS", and J. Callanan—"JA."

The same antenna and ground system is used as in the past, except that the corrosion of the wire due to smoke and the elements caused high skin resistance so

The photo of the operating room shows on the table the old Chicago Radio Laboratory Paragon with the new model Zenith 1-R to the left. The two step amplifier, we understand, is chiefly used by "FJ", who likes loud signals. The antenna switch and keys for the three transmitters are on the extreme right of the table.

By referring to the close-up of the transmitter more information can be gained. 9ZN has two spark sets, but the well known

60-cycle synchronous set is the most brutal. The open-core transformer seen on the floor will throw a fearful four inch spark and the spark in the four-toothed gap



leads two inches to each tooth and with a racket at least equal to NAA. We have never witnessed a sworn statement as to the power input of this set. The condenser is of ⅜" plate glass and these plates puncture too often. On full power the whole antenna lights up blue and six inch sparks can be drawn from the lead-in. To the right and rear may be seen the Telefunken 500-cycle quenched spark set, which is a very neat little set with a whale of a kick. The spark sets are used on 200 meters only. The 60-cycle set puts 7 amperes into the antenna and the 500-cycle shoves in 12 amperes. Most of this has been in review. The whistle of 9ZN's 500-cycle spark and the heavy bass of the "synk" set have long been familiar in every state.

But 9ZN has an I.C.W. tube set that will make good Mathews' promise—"When a tube set goes in at 9ZN it will be a HE set." The tubes are a couple of U.V.204 Radiotrons, the filaments of which are operated on 60-cycle A.C. Because there has been found no direct current generator with high enough voltage the plate energy is obtained from a Telefunken 500-cycle generator driven by repulsion motors and excited by a separate exciter. The generator voltage is stepped up by a transformer to "several thousand" volts which is supplied directly to the plates of the tubes. The marble panel contains the A.C. voltmeter and radio frequency ammeter. Below is the field rheostat and directly behind is the "radiation amplifier" which can best be described by the owner. The tube panel holds the tubes, filament rheostats, plate milliammeter, and filament voltmeter. Except when the exciter "goes democratic," this set puts into the antenna 7 amperes on 100 meters, 11 amperes on 200 meters, and a measly **28 amperes** on 375 meters.

4EH, Atlanta, Georgia

4EH, the station of H. A. Cole, is located at 335 Hill St., Atlanta, Ga. It is an example of a very good working and neat little set of fifteen watts power.

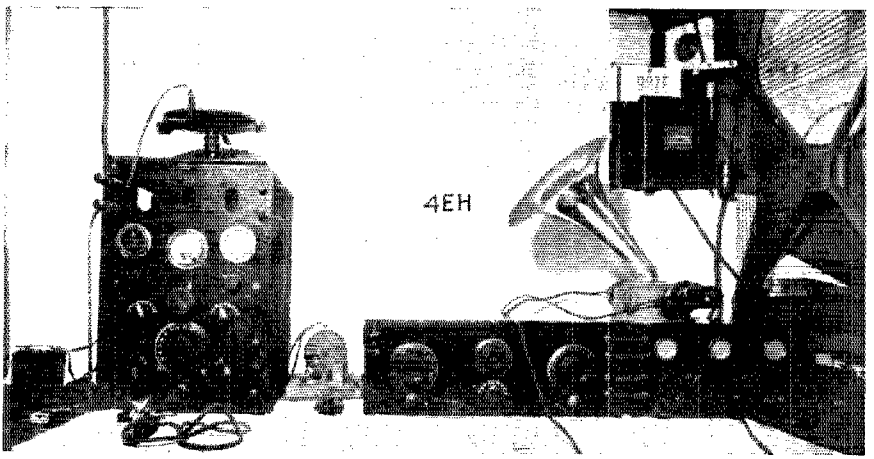
The antenna is a five-wire cage 70 feet long and 55 feet high at the open end and 30 feet high at the lead-in. The counterpoise is composed of seven wires eight feet off the ground and arranged in the shape of a fan.

The transmitter, shown at the left, uses three U.V.202 tubes in the "1DH-sure fire" circuit. Plate current is supplied by a 600 watt Acme transformer, and, tapped off at 750 volts, the antenna current is four amperes. To the right of the transmitter may be seen the chopper which is connected in the grid circuit and is used for local work and calling. Most of the work is carried on with straight C.W. with the key connected in series with the grid leak. Loop modulation for phone is accomplished by connecting a microphone to the ends of a loop of wire wound around the main inductance. The flat pancake inductance on top of the cabinet is not the main inductance, however, as this coil is in the counterpoise lead to bring the antenna and counterpoise wave length up to the antenna and ground wave, which must be done before the same clip can be used for ground and counterpoise. (The usual procedure, however, is to use separate clips and include more turns between the antenna and counter poise clips than between the antenna and ground clips, thus eliminating

the extra coil.) The variable condenser across the grid coil, the grid coupling, the filament rheostats, and wave length adjustments are all varied from the front of the panel.

The rectifier is under the table and is composed of 22 1-pt. fruit jars with 2-inch lead and aluminum strips immersed in a solution of borax. The current is filtered by two large choke coils and two 1 mfd. condensers in parallel on each side of the chokes. By-pass condensers are used across the halves of the filament winding.

On the right is the receiver which is a home-made three-circuit regenerative, with Amrad variometers and a Tuska coupler. Hooked to this is a detector and two-step audio amplifier with W.E. phones. The owner excuses himself on owning the Moon loud-talker, saying it is to produce music for the family. Above the amplifier cabinet hangs the Tungar for charging the battery.



The signals of 4EH are quite well known over most of this country, having been heard in every district, 37 states, and confirmed reports from 4OI and 6ZAC, Hawaii. The record on phone is 400 miles. Mr. Cole shares credit in the work of his set with C. W. Duzzit.

9DR-9ZT, Minneapolis, Minn.

The station 9DR, and more recently 9ZT, is owned and operated by Donald C. Wallace, 1830 Stevens Ave., Minneapolis, Minn. 9DR has been heard in all corners of the country, even with a location un-

(Continued on page 70)

The South Dakota Oscillator published by the Y. M. C. A. Radio Club slips into our office every month. Each month it is brimming over with snappy bits of news on amateur radio. It is not a paper devoted to technical articles yet it fills a much felt need in that it maintains close contact with amateurs in the Dakota Division.

We are in receipt of a splendid paper "Why does the radio amateur need an association?" by I. Creaser, 1BSJ. Because of limited space and the length of the paper we quote interesting parts which will be of immense help to all clubs. Mr. Creaser says, "one of the essential purposes of a radio organization is to serve the amateur by supplying him with those things which he needs in the way of advice that he may derive the greatest pleasure and benefits along with his own efforts. A radio organization must be based upon co-operation and must show results of its purpose, not in an enormous membership but by progressive membership. There are eight essential principles for proper organization. 1, unity of purpose; 2, common aim; 3, co-operation; 4, specialization; 5, instruction; 6, learning; 7, leadership; and 8, action." Mr. Creaser goes on to define each of these eight essentials and a careful study of them will bring forth the interpretation desired. We suggest that interested organizations write to Mr. Creaser and obtain an exact copy of his paper, which will be an asset to any club desiring to make progress.

Michigan State A.R.R.L. Convention

ATTENTION!!!! On February 9th and 10th the Hotel Durant will be the scene of the Michigan State A.R.R.L. Convention at Flint. The program is loaded with interesting meetings among which will be technical, general, and traffic sessions. The arrangements committee guarantees the "gang" it will be so full of "pep" that no radio amateur can afford to miss it, and we believe it because Flint knows how to do conventions up brown. There will be plenty of entertainment during the "free periods" and a hobo band will meet all trains. All Michigan A.R.R.L. district superintendents and city managers will be on hand along with Division Manager Mathews, "WO" of 9ZN; Assistant Division Manager C. Darr, 8ZZ, and Traffic Manager Schnell, 1MO. (And if possible the T.M. will try to bring Secretary Warner along with his new hat which he won in the T/A Tests last year—F.H.S.)

Prizes will be awarded for various contests, souvenirs will be passed out, and Oh Boy! the banquet with plenty of eats on the last night. Let's see a big turnout, fellows, and don't forget the time and place—Flint, Michigan, February 9th and 10th.

Corwin Udell Eckel was secretary of the Lane Radio Association, (Chicago) up to the time he made the supreme sacrifice when he tried to rescue his brother Everett from the undertow in Lake Michigan. Corwin was born March 18, 1905. "Eck," as he was known to his many friends, was a real radio bug and as a literary student held highest honors in his classes of '19, '20, '21, and '22. He graduated from Lane Technical High School in June, 1922.

South Dakota Radio Convention

102 delegates attending the second annual convention held in Sioux Falls, December 28 and 29, boosted amateur radio skyhigh in that part of the country. At no time before has there been such an enthusiastic convention of amateurs who came from all parts of South Dakota, Minnesota, and Iowa. The program included two technical sessions with the reading of papers

by well known amateurs. H. R. Skifter, 9YAJ, held the attention of the gang for two hours with an interesting paper on the "construction and operation of C.W. transmitters." Entertainment at the Orpheum Theatre and a sight seeing trip around the city were enjoyed. The convention closed with a banquet at the Cataract Hotel and as usual this was the climax of the meeting and nothing was left undone. N. H. Jensen, manager of the Dakota Division, was presented with a Grebe CR-9 by the gang. Dealers exhibiting at the convention gave six prizes which were awarded in the code contest and to the delegate coming from the greatest distance. 9AWM told of the record breaking relay 1AW to 6ZAC and return. The old A.R.R.L. spirit was the order of the day. Joe Dean of 9ZU, Homer Fitch of 9YAK, and Orville Wheelon of 9AVZ did much to make the convention a grand success.

Bloomfield Radio Club

The annual election of officers was held December 20th and the following men will hold office for the ensuing year; F. J. McKinney, president; A. J. Ball, Jr., vice president; R. R. Blunt, secretary; A. J. Wykes, treasurer. 2EY was re-elected chief operator and traffic manager.

Third District Convention

Baltimore, Md.!!!! April 13th-14th, 1923!!!! Hotel Emerson!!!! Watch this column for the latest dope. Its going to be a real one, boys.

Seventh District Executive Council

The Seventh District Executive Radio Council took definite form at the annual meeting held in Portland December 28 and 29. At this writing no details are available, but an understanding of what the council consists and how it will function, briefly, is as follows. For several years it had been the custom in the Northwestern Division of the A.R.R.L. to hold annual banquets, each year at a different city. These banquets always were well attended and the A.R.R.L. spirit reigned supreme. Early last summer during the radio show and convention plans were announced for the formation of the council. The council is made up of the officers of the radio associations and clubs in the Seventh District. From this membership the chairman for the coming year is elected annually. Each year there is a new chairman with a new place for the next annual meeting. The chairman has his various assistants either by selection or election who serve with him for the term. The chairman and his assistants are charged with the duty of administering radio affairs as set down by the council. He is responsible for the arrangements of an annual meeting. The purpose of the council is the widest possible co-operation with every interest. (A detailed account of what is being done will apear next month.—F.H.S.)

Milwaukee Amateurs' Radio Club

The Milwaukee Amateurs' Radio Club, which was founded in 1917 and became affiliated with the American Radio Relay League, Inc., in 1919, is enjoying an active and successful season. The society meets weekly at 7:45 P.M. on Thursdays in the Trustees' Room of the Milwaukee Public Museum. Meetings have been well attended, and the membership is increasing.

The Board of Direction has recently appointed two additional officers: L. S. Baird, Business Manager, and L. J. Topolinski, General Counsel.

E. D. Nunn, a Milwaukee radio engineer, demonstrated a receptor of his own design and gave a short address on radio frequency amplification. At a special informal meeting, a "ham-fest" was held with F. H. Schnell, Traffic Manager of the A.R.R.L. as guest and principal speaker. "The Construction of a High Voltage "B" Storage Battery" was the subject of a talk by Marian Szukalski, Jr., 9AAP. Ben A. Ott, 9ZY, and K. C. Maas, 9AZA, state officers of the League, recently visited the society and gave talks on state organization.

The Technical Committee, headed by E. T. Howell, Sc.M., and R. E. (radio engineer) Lathrop, 9ATZ, Vice-President of the Waukesha Radio Amateur Club, has submitted several reports on topics of timely interest. The "S" tube has been discussed; super-regeneration explained; and analogy given for oscillating tubes; and the Hartley and reverse feed-back C.W. circuits contrasted.

A spirited spark-C.W. debate was put over with great success. The argument waxed hot, and the sound of the gavel was frequent. A contest in defining technical radio terms caused many lines to be spelled down, but resulted in adding a large store of words to the member's vocabularies. Several meetings have been devoted in part to discussions of the proper design and construction of aerials in way of collecting data for this society's contribution to the antenna symposium number of *QST*.

The Junior Operator

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

Broadcast Comments Needed

Nothing discourages an artist appearing before a theatre audience as much as a cold and unresponsive reception. We must all admit that there is nothing colder than a radio audience. It is no easy task to provide a daily program, hours in length, seven days in the week, each of which will be pleasing and satisfactory. The gratuitous service given by those who appear in the programs is prompted by a sense of duty to the world but the time is here when more than this is needed as a stimulant.

But the listeners for the most part remain passive and take whatever is dished out without comment—at least it does not get back to the transmitting station if there is comment. Many of the leading broadcasting stations have asked their audiences to respond with some encouragement to the artists, or to submit their suggestions and criticisms. Thousands have done this, but the number is only a small fraction of the vast unknown and unseen audience. Several companies have pledged themselves to follow the will of the majority, so it is plainly up to the listeners to make known their wants. Therefore the best way to get good concerts is to let your broadcasting stations know what is lacking. Possibly the reason more comments have not been received is because the beginner listens to the local concerts and because of the newness of the thing, is not in a capable position to suggest improvements, and after that he is trying to see how far he can receive or the greatest number of stations he can hear in one evening and does not sit on one wavelength long enough or regularly enough to consider himself a critic of the productions of any particular station. But if you have something to say, say it to the right ones so it will do some good.

Can We Help?

Broadcast receiving stations are now installed by the hundreds of thousands and the number of transmitting stations has increased at a rapid rate until there are at the present time somewhere around 600 in operation. The growth has been far too fast for the slow-moving wheels of legislation and the situation has gotten beyond the point where broadcasting can be limited to a few stations. With most of these stations on 360 meters, it means terrific interference. Everyone is looking for a good plan to correct this chaotic condition.

In the first place, some broadcasting concerns seem to want to crowd down on amateur wave lengths so they will *force* their concerts to be heard. Now the amateur does *not* want to interfere with concerts, and wishes the concerts were up on a million meters, but when such stunts are pulled and he gets the blame, he is naturally peeved. Then, too, there are many cheap receiving sets sold to new listeners—sets of the single circuit type, or with tightly fixed coupling—that are anything but selective, and even with a good three-circuit regenerative receiver, the average beginner never learns to listen with the loosest coupling, thereby gaining enormously in selectivity, but instead listens with the coupling tightest all the time. The amateur operator, 'tho perhaps not interested in broadcast reception is forced to be interested in the conditions it has brought about, especially when it threatens his very existance. Can we not, therefore, because of our experience in this art, furnish a satisfactory solution to the problems involved in broadcasting?

Such companies as the Westinghouse Electric and Manufacturing Co. have sold countless receivers of all prices to the public for reception of their broadcasting stations. They are under obligations to furnish entertainment, not on high wave lengths beyond adjustment of past-sold apparatus, but on waves in the neighborhood of 400 meters. It is estimated that on the waves now available for broadcasting, not more than 30 or 40 stations throughout the country could operate without interference, and this number only with a very careful staggering of waves in each part of the country and no repetition of wave assignments except where two stations are considerably more than out of range of each other. One night per week free from local broadcasting has been tried in some localities and although the concensus of opinion seems to be in favor with it, yet the predetermination of nights favorable to distant reception is not yet possible, and the uncontrollable interference going on in the rest of the world is almost hopeless. There have been all kinds

of suggestions. One suggestion is to put all the broadcast stations on various waves above 1600 meters and limit the number to comparatively few, and in each locality a small station is to rebroadcast the concerts on 360 meters. The technical difficulties in carrying this out with good resultant modulation and not too much static are no small problems, however. Eventually most of the listeners would probably buy equipment for the long wave reception and the transition would be more gradual and less liable to produce a bad holler. No matter whether you are a broadcast listener or a dyed-in-the-wool ham, we ask that you put some thought on this vital radio question of the day, for it concerns all of us in one way or another.

The WD-11 Tube

The WD-11 receiving tube has attracted considerable attention of late, chiefly because it operates from a single dry cell for a filament source of potential.

This tube is a high vacuum tube and is used as a detector or amplifier, either audio or radio frequency. It is particularly adapted for the "Radiola" receivers which have special sockets that do not allow the insertion of any other type of tube. A special socket is therefore necessary or an adapter fitting between the tube base and the ordinary socket. As a detector, a voltage of 22½ is normally used on the plate, and as an amplifier, 45 to 60 volts is recommended. The filament consumption is about 0.25 amperes at 1.1 volts and will operate on one dry cell or two Edison-Leland primary cells (as in the Radiola Grand). A straight line relation exists between filament voltage and current and at no point does it seem to be especially critical. Emission varies directly with filament current in the neighborhood of the normal operating current. The plate impedance is 20,000 ohms with a plate voltage of 40 or over, but at lower voltages the impedance increases rapidly. The grid requires no bias. Tubes of this type tested by the writer and several others brought back the verdict that almost nothing is critical in its adjustment—grid, filament, and plate voltage variations produce much less variation in signal strength than anything ever tried before; and although the amplification seems not to be quite up to some other tubes, they are as a whole very quiet in operation, which, together with their economical operation, make them very desirable.

—*B.P.*

It is generally agreed in amateur radio that there is only *one* flux satisfactory in soldering—*rosin*. The use of any type of acid or salt fluxes, thru corroding, causes the majority of inefficient receivers.

W. W. LINDSAY, Jr.

(Concluded from page 59)

the bunk. Upon his arrival in Los Angeles he started again, this time with a 50-watter and A.C. C.W. Later moving up to his present location at Reedley, California, some better sticks were put up and things began to happen. Operating with the call 6ALE and later 6ZF, he became well known as one of the first Pacific coast amateurs to be regularly heard in the eastern states and in turn he copied 2FP often about a year ago when such DX was very unusual, and numerous mentions of this station have graced the pages of *QST*. He says he has always used a wattmeter on his input and it has never read over 200 watts on any real DX test. His aim has always been to get the most out of the set for the least put in.

J. A. GJELHAUG

(Concluded from page 59)

K.W. Thor with a home made rotary gap and O.T. After pumping A. Hoyt Taylor, then of 9XN, with lots of correspondence, he managed to finally hook up with him over the 135 miles in the fall of 1916, having at that time the call 9QK. Old timers up his way will remember him as being a pusher in the North Dakota Radio Assn., one of the pioneer organizations that tried to work relay routes between adjacent towns. He was also an associate member of the I.R.E. and considered himself duly initiated into the game when the war came along and put the straps on things for a while. After the war he was one of the first on the air, using "JAG" while waiting for the call 9ZC. With many improvements in the spark set, it has been getting out well, being reported on both coasts, the Gulf, a ship in the Pacific near Colon, and on all kinds of receiving aerials, loops, and freak sets in the U.S. When C.W. got fashionable, ZC built a 10 watt C.W. and phone set and has been reported QSA on phone with good modulation in Kansas, and on C.W. in Pennsylvania. Convinced that C.W. has the punch, a 100 watt set is being tried out for traffic handling. Two years ago he fixed up a set in his auto which affords him plenty of fun on his vacation and from which he has worked five miles when traveling thirty miles per hour and with an input to the spark coil of only a dozen watts.

Because Mr. Gjelhaug has been working away quietly and persistently for our A.R.R.L. in northern Minnesota and fostering the Winnipeg Division from infancy to the point where it is this month turned over to its own organized men, all without seeking personal publicity, we think "Old Faithful" deserves a few words of praise.

—*B.P.*

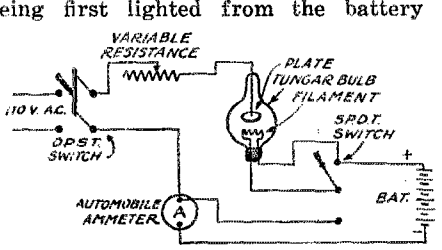
Strays

2AUU suggests that for an automatic battery charger that the battery be connected to a plug and a double contact jack arranged so that the battery is connected to the terminals to which the plug connects. Pulling the plug out connects the battery to the charger.

Will someone kindly step forward and tell us why some cells in an aluminum-lead rectifier rectify and some do not when the aluminum and lead plates are all cut from the same sheet, and the solution all made in one jar? Also, in a series of cells, some have a high and some have a low voltage drop across the individual cells and we would like to know what this means.

"Of all inventions, the alphabet and printing press alone excepted, those inventions which abridge distance have done the most for civilization"—Macaulay. If "Mac" had lived today and had a couple of 250 watters hooked up, what would he have said? When the transatlantics returns are all in we propose digging him up to see if he has turned over.

9AOQ uses this diagram in charging his storage battery. A variable resistance composed of lamps, iron wire, chokes, or anything handy is used to cut down the charging current. There is no transformer required in this arrangement, the filament being first lighted from the battery by



throwing the switch down and then throwing it up. This connects both terminals of the filament together and makes the filament burn evenly while the charging current keeps the filament incandescent. Should the supply current be cut off the charging will not resume on its coming on again, however.

Just a word about audio amplifiers. In lots of sets the grid circuit is completed around to the negative of the storage battery and the filament rheostat is between this terminal of the battery and the filament. The result is that when the "A" battery goes down in voltage, even tho the rheostat is turned up to bring the filament back to the same brilliancy, the signal strength is not what it formerly was. This is because the grid bias has changed. Completing the grid circuit to the negative terminal of the *filament* will get away from this variation, or if a potentiometer is used, it should be connected directly across the filament. Confidentially, gang, we believe the W.E. amplifier works so well because the designers knew how to juggle the bias on the grids. This is a subject for experimentation, especially if a hundred volts or so are used on the plates and it is desired to rattle the windows with strong signals. Just a few dry cells in series with the negative lead to the grid will do the trick in most cases.

Will someone explain why stations on low wave lengths are sometimes heard along with high wave stations only while continuous waves are being emitted by the high power station?

"J" of 3XM heard the following, evidently one of the pitiable results of broadcasting: "Hellow 2ZZZ, hellow 2ZZZ, 2CTR calling, 2CTR calling, 2CTR calling 2ZZ. 2CTR signing off. Come in." Mind you, this was on SPARK, every word spelled out. Probably some ham will spell out the musical notes next.

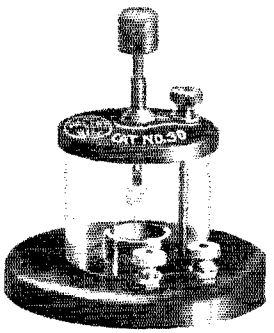
The telephone is still useful for calling up a friend to say you are sending him a message by radio.—*Boston Traveler.*

Doc Blum in Kansas City took a msg from 8QK for a local grain company asking for a quotation. The msg was delivered with precision, which does not surprise us half so much as the Doc was surprised when one of the officials called him on the phone and said he sold a car of kaffir as a direct result and was sending a box of cigars. *Moral: Deliver your messages!*

In this, our transatlantic number, we should use our September cover with the "QRN" on the devil changed to "QRM," it has been suggested.

Scene: Inside office of a mushroom radio store. Manager seated at desk dictating orders for supplies from catalogues he is scanning with perplexity. He pushes a botton. Enter a newly knighted "radio engineer-clerk."
Manager: "Mr. Jones, just what is the difference between radio and wireless?"
Clerk: (hesitatingly): "Um-m, ah-h,—well—radio is where they talk into the wireless and wireless is using the code."

It is hard to convince some people that xtal detectors actually use cat whiskers so it is necessary to produce the proof that one manufacturer even goes so far as to number the cats. The illustration shows that this particular cat whisker came from "Cat No. 30."



Joe Flemming, 4KL, refused to move with his family to Tennessee because he can't make a five.

Who makes a good porcelain antenna insulator?

It is suggested that the conventional radiogram "Greetings via radio" be shortened to QGVR.

8ML wonders what codes are used in radio. First it was Morse, then Continental, and now he understands it's Underwriters'.

Friend of Ours

WDAF, of Kansas City, runs a midnight club of BCL's on the air, initiations conducted with the aid of a cow-bell, and all that sort of thing, calling the members Nighthawks. In their newspaper they publish news from the fledgling Nighthawks, from which we quote this choice morsel:

"Logan, O.—Have you yet filled the job of official gunman of the Nighthawks? If not, I will greatly appreciate the appointment. I can guarantee to take care of interfering amateurs in the proper manner. Tell brothers to send addresses of such brass pounders to me.—W. B. Showalter."

Pleased to meetcher, Mr. Showalter. Ever hear of a Wouff-Hong?

A. L. Munzig, 6ZJ, 1017 Tribune Bldg., Redlands, Cal., is laid up in the hospital and would like to hear from some of the gang.

A thousand Signal Corps tubes, VT-11, of G.E. make, have been declared surplus and are offered for sale to the public at $5.50 each, not more than three to a person, for amateur and experimental use. Certified checks or postal money orders should be payable to Finance Officer, U.S. Army at Signal Section, 1819 West Pershing Road, Chicago, Ill. Capt. Bowman assures us the tubes have never been used and make good detectors and amplifiers.

Wanted: Some dope on synchronous motor driven rectifiers. Need not be literary masterpiece or include finished drawings but should tell the story of someone's woes in making one of these things.

Standard transmitting grid leaks are sometimes used by the gang for resistances in radio frequency amplifiers, multipliers in voltmeters, and field rheostats in motor-generators. The halves are paralleled for some of these uses.

Daylight Work

During the Transatlantics 1BCG of Greenwich, Conn., was heard at 3:54 P.M. Hawaiian Time on Dec. 13th by T. A. Marshall, 6ZY, in Honolulu, transmitting its code word ZHCCN. The distance is about 4700 miles, the first 2500 miles of which was covered in darkness while the balance was in daylight, the reception being made in broad sunlight in midafternoon.

6ZY has also reported hearing 6KA at 2 o'clock in the afternoon so loud that he could not keep on the phones. He says 6KA is three times as loud at Honolulu as either NPL or NPG.

In full daylight on Thanksgiving afternoon last, 3LR in Washington, D.C., three times heard the signals of 6XAD, Avalon, Calif., the first transcontinental daylight reception of which we have ever heard. FB!

If you want all terminals in your set shunted by grid leaks, start by laying out your panel with a pencil instead of a scratch-awl or other sharp-pointed tool.

9CGD says "The Old Man may be funny, but 1DH is Whittier."

Doc (at 9ZAF asking Carp about a soldering iron): "Hey, Carp, is it Heising yet?"
Carp: "No, Hartley. It's almost Colpitts."

About 99% of the reports on 7AD really belong to AD7 at Fort Omaha, Nebraska. 7AD has a small tube set and gets out but at the same time wants no honors that do not belong to him.

BOOK REVIEW

Conducted by S. Kruse

"Radio Telephony for Amateurs," by Stuart A. Ballantine, David McKay Co., Philadelphia, 1922, 296 pp. 8¼x5½, 153 illustrations, $1.50.

Already once reviewed in our columns, we mention this book again not only because of its general excellence but primarily because our previous remarks unfortunately were strewn thru many *QST* pages in a manner which no doubt caused many to forego reading it.

For the first time in many years we have read a radio text book complete from cover to cover. Perhaps the main reason why we have read Mr. Ballantine's new book is that it is not at all about radio telephony, and we have no idea why that title was chosen for it unless it was done by the publisher because of the popular interest in telephony.

This is a practical book for the practical amateur and it takes us back to the days of Morgan and Edelman. It is by long odds the most interesting book from the standpoint of the amateur that has appeared in years. After a noble preface in which the author considerably twists the tail of the English language in spite of his apology in that connection, he reviews the principles of radio telephony and of the audion in his first two chapters. These chapters are the most compact review of fundamentals which we recall seeing, and knowing Mr. Ballantine as we do we are certain that it must have been a terribly hard job for him to be so brief and to the point! Likewise there is hardly any math in the book, which again must have been a trial to Mr. Ballantine, so our wonder is the greater at his book.

As the author himself says, in the third and succeeding chapters all mistaken attempts at a popular treatment have been frankly abandoned, which was necessary in order to get something said. Antennas, transmitters, sources of power, and receiving apparatus, are the general classifications—into the subdivisions of which we cannot go. The author likes cages, knocks the Alexanderson multiple tuned antenna, advises amateur C.W. transmission on the aerial fundamental wave length, raps aerial insulators having high capacity to ground, boosts the master oscillator and gives some good dope on it, also upholds the Meissner circuit as the best for C.W. transmission raps A.C. on the plate, tells how to build 50-henry chokes, boosts the Reinartz tuner skyhigh for C.W., recomends soft tubes for amplifiers for maximum results, and prays for the return of the day when we shall have decent detector tubes on the amateur market. Complete wiring diagrams with constants are given for any number of C.W. transmitting arrangements, designed in every case for two 5-watt tubes, two 50-watters, or two 250-watters. The author concludes with his Appendix B in which he advises his readers to become affiliated with their local radio club where they will come in contact with kindred spirits, and to make it their business to become a member of the American Radio Relay League, to which he graciously devotes several pages.

A few minor errors and a few statements of opinion on which we would beg leave to differ with the author do not detract from the value of this book, which we unhesitatingly recommend to every amateur. *QST*'s Book Department handles it, by the way.

"Radio Reception," by Harry J. Marx, Technical Editor, *"The Radio Digest,"* and Adrian Van Muffling, Consulting Engineer, New York. The Knickerbocker Press, 1922, 8 vo, 92 illustrations, 38 diagrams and one full-page plate of symbols.

A book for the man who wishes to become familiar but not intimately aquainted with the principles of radio circuits and then to proceed to the assembling of purchased parts into receiving sets. It is not for the man who wishes to make everything himself, nor is it for the almost-scientist.

The explanatory diagrams are given in several forms for each circuit and so carefully labeled that they can be followed with ease by the assembler. Minor errors, such as the return of the grid circuit to the wrong side of the filament rheostat, occur in some of them. The only especially bad thing in the book is the chapter on "Antenna and Ground" which leaves the reader with the mistaken impression that the ideal receiving antenna is an umbrella and next after that a multi-wire T or L with the downlead wires patched together with a clamp connector.

"Radio for All," by H. Gernsback, Editor *"Radio News,"* New York; J. B. Lippincott Company, 1922, 8vo.; 292 pages; 145 illustrations.

Although primarily of interest to the former, this book will be useful to both the novice broadcast listener and the receiving amateur. Despite an imaginative frontispiece and preface, this book is pleasantly free from the radio bunkum that mars most recent radio books. The beginner is led by easy and understandable stages up to the construction of receiving equipment embodying a tube detector with two stages of amplification. On the road the author meets, exposes and denounces a number of persistent radio fallacies.

The text is explained by the liberal use of mechanical and hydraulical analogies. In the main these are happily chosen. The construction of antennas is taken up with reference to the conditions one actually will encounter in an unfavorable rather than an ideal location. The underwriters' requirements in this direction are also made clear. The illustrations are of the perspective-diagram type until the latter part of the book, in which the reading of flat diagrams is explained.

Although little mention is made of code transmission and reception, the appendix contains a variety of material of interest to the code man. There are provided also wire and winding tables, a list and map of the broadcasting stations of the United States.

On the whole it is a well balanced book. It must be given a good rating, especially after it has undergone revision and in the process has lost certain sentences of cumbersome construction, a few direct technical errors, and a surplus of references to instruments now obsolete.

"Ideas for the Radio Experimenter," by Milton Sleeper, New York. The Norman W. Henley Publishing Co., 1922. Duodec.; 134 pages; 2 plates of radio symbols and 60 illustrations.

Bearing the stamp of Mr. Sleeper's personality in its characteristic clear-cut drawings, detailed instructions and precise statements, this booklet is best described by quoting from its own cover the statement that it is "an accurate, reliable and authoritative guide for the laboratory worker."

The chapters concerning the construction and use of laboratory oscillators, wave meters and variometers, described thoroly practical instruments. The chapters concerning such subjects as radio compass operation, the measurement of tube characteristics, high frequency resistance and the like, are clearly and concisely put.

Special attention is paid to the calculation of inductances and the oscillation frequency of circuits. There is a wealth of information regarding coils with a single layer, various numbers of banks, spaced layers, also coils of toroidal form and pancake coils of various shape including the "spiderweb."

The book terminates with a liberal supply of tables

and a chapter on the requirements of the National Fire Protection Association with regard to radio installations.

"Modern Radio Operation," by J. O. Smith of 2ZL, New York, Wireless Press, Inc., 1922, 8vo, 34 halftone illustrations and 32 diagrams.

The value of Mr. Smith's book is greater than one's first impression indicates. Thru an unfortunate arrangement of the chapters vacuum tube fundamentals are not touched upon until page 48 and Chapter VI are reached, tho there have gone before three chapters on radio telephony. The A.R.R.L. man will do well to begin reading at page 52.

Tho heavily shaded by the pencil of the Radio Corporation the remainder of the book is of use in the amateur tube station and will at times provide information as to the mysterious ailment that is troubling the transmitter. The price of the book is set too high.

"Letters of a Radio Engineer to His Son," by John Mills, Engineering Dept., Western Electric Co., Inc. Harcourt, Brace & Co., New York, 1922, 8vo, 265 pages, 12 full-page plates and 136 illustrations.

The position of Mr. Wills in the radio world is such that comment on the correctness of the statements in his book is not required. While written as a boy's book of radio the "Letters" are intended for reading with serious thotfullness as they deal more with the fundamentals of radio than with the mere putting on of phones and twiddling of knobs. Mr. Mills gets over this ground and leads up to the *intelligent* construction of operative sets without calling on any mathematics beyond the simplest arithmetic, without dodging questions, and without the use of crude and inaccurate explanations.

The book also touches upon telephone transmission over wire lines and the association of these lines with radio stations. Because that material is not found in most of our references and because of the thoro way in which the fundamentals are illuminated, many of us may well sit at Mr. Mill's knee and with him review the principles of the apparatus we use daily.

"The Radio Amateur's Handbook," by A. Frederick Collins, New York. Thomas Y. Crowell. Revised edition 1922, 8vo, 403 pages, 16 full page illustrations and 100 diagrams.

The text of "The Radio Amateur's Handbook" is written down to the small boy, the absolute beginner in things electrical. Much of it is well presented, the internal arrangement and the connections of radio apparatus are explained by well-conceived diagrams and figures. That their impression is unfavorable is due to weak draughtsmanship entirely.

The ordering of the material within the chapters and of the chapters themselves is incoherent and illogical. Neither will the Telegraphing Amateur that reads these pages recognize the radio world presented by Mr. Collins. In these pages are preserved antennas of construction well-nigh forgotten and spark sending sets of types that have wholly disappeared—even back to the ones that include an electrolytic interrupter. Again the tube sets shown do not employ the circuits with which we are most successful and some of them have no means of signalling save a grid-leak chopper. The adjustment of tube sets is passed over entirely, and regenerative tuners are treated most casually. It seems unfortunate that in the revision there was not taken into council an amateur conversant with current practice.

The amateur license system is explained in the appendix but the doings of the amateur world are left to the imagination. Despite its title this is not "The Radio Amateur's Handbook."

"The Book of Radio," by Chas. Wm. Taussig; D. Appleton & Co., New York, 1922, 8vo., 445 pages, 186 illustrations.

The unusually clear printing and good binding of this book are a pleasure to the reader. The various chapters are apparently written by or copied verbatim from authorities on the subject under consideration. The book is accordingly useful as a readable reference on specific phases of radio. Nevertheless the book is an array of detached chapters which the author has lacked the courage to impress with his personality and consolidate into a unit. As a text the book would not be useful.

Because of the manner of its construction the book also suffers from reiteration. Chapter 1, "Listening In," is almost an exact duplicate of Chapter 16, "What Can I Hear On The Radio." Wherever the text comes from the pen of the author himself the material is neither clearly presented nor entirely correct in detail.

At a guess the author dropped out of radio about 1914 and has since been in very loose contact with it. An unnecessary amount of space is given to spark sets and to obsolete or obsolescent receiving apparatus, while tube transmitters are treated as a mystery capable of solution by none but scientists.

We were happy to see a good chapter on "What the Amateur Has Done in Radio," with considerable information on the A.R.R.L. and its aims and accomplishments.

Viewed all around, in spite of the fact that we do not like it as a book, we must admit that there is much in it which will help the Novice who tires of idle knob-twirling and seeks to find out a little about the very interesting activity of the Amateur.

9DR-9ZT, MINNEAPOLIS, MINN.

(Continued from page 62)

favorable to transmission.

Typical of the truly amateur station, the apparatus is strewn all over the table where all kinds of experiments and changes can be made without a great amount of trouble. 9DR has just this reputation; but each change is generally for the better, we are happy to add. Someday he will put everything in a box or behind a panel and then a picture will show nothing but some knobs, meters, and a switch, and perhaps the signals will not get out half so well.

The present transmitter has two 50-watt tubes in parallel as oscillators. The other two tubes are kenotron rectifiers which rectify the stepped-up A.C. to a high voltage D.C. which is supplied to the plates of the oscillators with a current flow of 200 milliamperes. A.C. is used to heat the filaments of the four tubes. The set is designed as a relay transmitter and the change-over from transmitting to receiving is remarkably quick and accomplished with a single switch. The maximum antenna current was 6½ amperes but with increased height of the antenna the current dropped to 5 amperes. The present antenna is a two-wire flat top between two apartment houses and is 20 feet from the roof and about 70 feet from the ground. A nine-wire fan counterpoise covers a great portion of the area between the two apartments.

The bulk of the receiving is done with a single circuit receiver combined with a G.E. detector-amplifier unit, using W.E. phones. If at any time the signals become unreadable, the radio frequency set to the left of the photo is used, although it

(Concluded on page 79)

Calls Heard

HEARD DURING DECEMBER
Unless Otherwise Specified

B. Overstreet, U. S. S. Canopus, Colon, Panama.
C.W.: 1DQ, 1FB, 1XM, 1ADL, 1ADP, 1AJA, 1AJP, 1ALZ, 1AWF, 1BDT, 1BES, 1BET, 1BKA, 1BKQ, 1CCZ, 2EL, 2FP, 2FQ, 2FU, 2GI, 2GK, 2KL, 2LO, 2OM, 2NZ, 2ZK, 2ZL, 2ZS, 2AHO, 2AWF, 2AWL, 2AYV, 2AZC, 2BRB, 2BRC, 2CBW, 2CBX, 2CCD, 2CGJ, 2CIM, 2CKR, 2CQL, 2CQZ, 2XAO, 2XAP, 3BG, 3CO, 3DH, 3HG, 3JH, 3JJ, 3TJ, 3XM, 3ZH, 3ZW, 3ZZ, 3ABY, 3AFB, 3AQR, 3AUU, 3BFU, 3BGT, 3BMN, 3BOB, 3BTK, 3BVL, 4AQ, 4BX, 4DL, 4EB, 4EH, 4FT, 4HK, 4IZ, 4KM, 4NK, 4OP, 5DA, 5EK, 5FU, 5MT, 5PX, 5SK, 5SM, 5TT, 5XB 5XK, 5ZA, 5ZAV, 6DA, 6ZI, 6ANY, 7BH, 7QV, 8AB, 8BP, 8CV, 8CY, 8FQ, 8FU, 8HJ, 8IG, 8KG 8ML 8MZ, 8PD, 8QK, 8UE, 8VQ, 8XE, 8YD, 8ZY, 8ZZ, 8AAF, 8ADG, 8AGZ, 8AYC, 8AZQ, 8BDA, 8BDE, 8BDU, 8BEO, 8BNY, 8BOZ, 8BRC, 8BRK, 8BSY, 8BVR, 8BXW, 8CFB, 8CKO, 8CQL, 8CVA, 8CZC, 9AL, 9EI, 9EJ, 9EP, 9II, 9KM, 9UC, 9UU, 9XL, 9ZN, 9AGG, 9AIX, 9AMI, 9AOU, 9APS, 9ASE, 9BBF, 9BED, 9BIE, 9CYW, 9DJB, 9DKY, 9DSM, 9DWK, 9XAC, 9YAJ, 9ZAC. Canadians: 3BV, 3DH. 3JH, 3OT. 4AQ, 9AL.. I.C.W.: 2FP, 9ZN. Spark: 4BY. Fone: 2EL, 5ZA.

H. T. Mapes, Guanajuato, Gto., Mexico.
(All over 800 miles)
C.W.: 1AZW, 1CKP, 2UD, 2FP, 3YO, 3VO, 3DH, 4EH, 4FG, 4KM, 5AE, 5AEC, 5ADE, 5ANO, 5ACF, 5AAS, 5BE, 5CK, 5CI, 5DI, 5EN, 5EK, 5FT, 5FV, 5GJ, 5GAM, 5GR, 5GEN, 5IX, 5IR, 5IA, 5JB, 5JAI, 5JL, 5JT, 5KC, 5KP, 5LA, 5MT, 5ME, 5MY, 5MX, 5NN, 5NK, 5NS, 5OX, 5PO, 5PV, 5PX, 5QI, 5QY, 5QA, 5RA, 5RH, 5RN, 5RE, 5SF, 5SS, 5SM, 5TK, 5TJ, 5TC, 5UJ, 5UMT, 5UK, 5UO, 5VA, 5VO, 5XVH, 5XA, 5XAJ, 5XD, 5XX, 5XY, 5XAD, 5XV, 5ZAV, 5ZAA, 5ZAK, 5ZAT, 5ZB, 5ZU, 5ZA, 5ZO, 5ZAG, 5ZAS, 5ZAE, 6AK, 6ANH, 6AGP, 6ABX, 6AVD, 6AMZ, 6AJF, 6ARB, 6APW, 6AEQ, 6AW, 6BOE, 6BKO, 6BUN, 6BRF, 6BJQ, 6BVW, 6BRS, 6BUM, 6BVQ, 6BOD, 6BPZ, 6BIQ, 6BQC, 6CU, 6CC, 6CBI, 6EK, 6EN, 6FH, 6FF, 6FT, 6GX, 6IF, 6KA, 6LV, 6NN, 6OH, 6RM, 6RR, 6SF, 6SU, 6TI, 6TW, 6WH, 6XAD, 6XK, 6XA, 6ZH, 6ZZ, 6ZX, 7AD, 7AW, 7BJ, 7LR, 7SC, 7TQ, 8AEA, 8AZF, 8AB, 8ABC, 8AZQ 8AZD, 8AQ, 8AQO, 8ARD, 8BK, 8BSY, 8BLC, 8BXH, 8CID, 8CUR, 8PD, 8SP, 8UE, 8XE, 8YD, 8ZN, 8ZY, 8ZW, 8ZZ, 9AAV, 9AOD, 9AOU, 9ABU, 9AUL, 9AYU, 9APW, 9AON, 9ARV, 9APS, 9AVZ, 9AIX, 9AJH, 9AIG, 9AFK, 9ANQ, 9ANF, 9ASF, 9AMI, 9AWM, 9AAP, 9AUA, 9AEY, 9AOG, 9AEX, 9BM, 9BDS, 9BED, 9BBF, 9BJI, 9BJ, 9BZI, 9BXQ, 9IK, 9BKP, 9BK, 9BXT, 9BSG, 9BP, 9BZZ, 9RLY, 9BRK, 9BGS, 9CNA, 9CNY, 9CPU, 9CR, 9CDE, 9CMK, 9CGK, 9CNS, 9CUC, 9CFY, 9CCV, 9CBA, 9DQU, 9DKQ, 9DGE, 9DWK, 9DSM, 9DQM, 9DKY, 9DFB, 9DGV, 9DBL, 9DZ, 9EBT, 9FM, 9GK, 9GN, 9HK, 9IY, 9IR, 9LN, 9PN, 9RW, 9RK, 9UU, 9XAQ, 9XAC, 9YAJ, 9YM, 9ZT, 9ZN.
Spark: 5ACQ, 5RB, 5RA, 5TG, 5TP, 5UD, 5YG, 5ZAI, 9AQE.

Heard at Sea by "FK"
Dec. 13; (140 miles North of Jupiter, Fla.). (All Dist.)
C.W.: 1AGH, 1ALZ, 1AKB, 1ARY, 1AXE, 1BCF, 1BDI, 1BDT, 1BES, 1BET, 1BKA, 1BKQ, 1CJA, 1CMK, 1CRR, 1CY, 1SN, 2AHO, 2AJF, 2ATS, 2BG, 2BSC, 2CCD, 2CEI, 2CGT, 2EE, 2GI, 2UO, 3AFB, 3AIP, 3AIQ, 3AUU, 3BEC, 3BFG, 3BFQ, 3BG, 3GT 3BHM, 3BHO, 3BIY, 3BNU, 8BSM, 3CC, 3DH, 3HD,3HH, 3IW, 4BY, 4CO, 5EB, 4EH, 4EL, 4FT,4GL 4GX, 4KK, 4YA, 5AAS, 5ABH, 5ACF, 5DA, 5DI, 5EK, 5GD, 5IK, 5JB, 5KP, 5MY, 5NV, 5PB, 5PX, 5SF, 5TC, 5TU, 5UJ, 5UN, 5VY, 5WE, 5WH, 5XV, 5ZA, 6ANH, 6KA, 7XXV, 8AA, 8AAF, 8AB, 8ABM, 8AD, 8AIW, 8ALT, 8AQD, 8AXB, 8AZF, 8AZQ, 8BCY, 8BDB, 8BDU, 8BDV, 8BEF, 8BGJ, 8BK, 8BNY, 8BP, 8BRM, 8BSF, 8BU, 8BUM, 8BVR, 8BVT, 8DAT, 8CEP, 8CGY, 8CGX, 8CKO, 8CMI, 8KS, 8ML, 8MZ, 8PD, 8RL, 8SP, 8UE, 8XE, 8ZD, 8ZR, 9AAP, 9ABV, 9AHH, 9AMH, 9APS, 9AQR, 9ASJ, 9AWF, 9BAK, 9BED, 9BEY, 9CBA, 9CJC, 9CKM, 9CP 9CPY, 9CXN, 9DFB, 9DJB, 9DNH, 9DPL, 9DQM, 9DQU, 9DSD, 9DVN, 9DXU, 9DYN, 9EI, 9FM, 9II, 9KB, 9LQ, 9PS, 9US, 9UU, 9WC, 9XAC, Canadian 2BG.
Dec. 14: (110 miles South of Jupiter, Fla.) C.W. 1AZW, 1BAS, 1BEP, 1BET, 1BKA, 1BKQ, 1CJA, 1CMK, 1CY, 1XU, 1XZ, 2AFA, 2AHO, 2AJW, 2ASJ, 2ATS, 2AVU, 2AWL, 2BKT, 2BRY, 2CBG, 2CBX, 2CBW, 2CC, 2CD, 2CKR, 2EL, 2FW, 2GI, 2GR, 2HW, 2KL, 2LO, 2NZ, 2UD, 2XAO, 3AFB, 3AIP, 3AIS, 3ANS, 3AQR, 3AUU, 3BFU, 3BG, 3BGT, 3BHM, 3BIJ, 3BOB, 3BVL, 3BZ, 3CAN, 3CM, 3HG, 3HJ, 3JJ, 3MO, 3NH, 3UBW, 3XM, 4BQ, 4BX, 4BY, 4CG, 4EB, 4EH, 4EL, 4FG, 4FT, 4OA, 4YA, 5ACF, 5ADE, 5CI, 5DA, 5EK 5IR 5MY, 5NK, 5RH, 5SF, 5SN, 5UF, 5UK, 5XAD, 5XB, 5XV, 5XY, 5ZA, 5ZAS, 5ZO, 5ZS, 7ZO, 8AAF, 8AB, 8AIM, 8AIO, 8AIP, 8AQO, 8AXC, 8AZD, 8AZF, 8AZQ, 8BDB, 8BDG, 8BEF, 8BFT, 8BKE, 8BSS, 8BVR, 8CF, 8CJH, 8CVR, 8CZR, 8FQ, 8FT, 8ML, 8SP, 8SUE, 8UE, 8VY, 8XE, 8ZY, 9ABU, 9ALR, 9AP, 9APS, 9BED, 9BIK, 9BHI, 9BYN, 9BZI. 9BZZ, 9CBA, 9CJ, 9CMK, 9CP, 9DFB, 9DGB, 9DGQ, 9DQU, 9DUB, 9EBI, 9EBT, 9EI, 9FM, 9GK, 9OX, 9PX.
Dec. 15th; (175 miles West of Key West, Fla: Through heavy QRN) C.W.: 1ALS, 1BEP, 1BES, 2AVU, 2AWL, 2CBX, 2CJN, 2EL, 2FP, 2GI, 2GS, 2LO, 3AB, 3AQR, 3AUU, 3BFU, 3BZ, 4BY, 4EA, 4EL, 4FG, 4HS, 4IZ, 4YA, 5AAT, 5EK, 5ES, 5IK. 5JB, 5JL, 5MY, 5NK, 5SM, 5SS. 5UK, 5XV, 5ZA, 5ZAS, 5ZAV, 6ZZ, 8AZQ, 8BDU, 8BKE, 8BQM, 8BRC, 8CHU, 8CMI, 8FQ, 9ADS, 9AQS, 9BDS, 9CJC, 9DQU, 9EJ, 9KM, 9PS, 9XL.
Dec. 16th; (430 miles West of Key West—All Dists.) C.W.: 1AJP, 1ASF, 1QP, 1UN, 1XM, 2AJW, 2AWL, 2UD 2XAO, 3BEI, 3BGI, 3CO, 3DH, 3FS, 3FO, 3HD, 4CY, 4EA, 4EB, 4EH, 4EU, 4GH, 4IZ, 4YA, 5AAT, 5ABY, 5CI, 5EK, 5ES, 5FV, 5HB, 5IR, 5IX, 5JB, 5JL, 5MC, 5MT, 5RH, 5SF, 5SS. 5TC, 5VM, 5XV, 5ZA, 5ZAS, 5ZAV, 5ZB, 6BRS. 6KA, 6ZZ, 7AFW, 8AB, 8AGO, 8AXC, 8AXM, 8BEF, 8BFM, 8BKE, 8BRC, 8BSS, 8BUE, 8BVT, 8CIA, 8LT, 8ZD, 8ZY, 9AL, 9AEV, 9AIY, 9ALR, 9APS, 9AQA, 9ASF, 9ARZ, 9BAA, 9BET, 9BIE, 9BIP, 9BXT, 9BYX, 9BZ, 9BZZ, 9CBA, 9CCM, 9CCS, 9CJC, 9CKM, 9CNY, 9DCK, 9DGE, 9DKB, 9DQU, 9DQW, 9DSD, 9DYR, 9DYU, 9ECZ, 9FM, 9GK, 9KM, 9PS, 9UH, 9US, 9YAJ, 9ZAF.
Dec. 18th: (At Tampico, Mex.) (All Dists.) C.W.: 1AJP, 1BET, 1CJA, 1FB, 1UN, 1XM, 2AHU, 2BMR, 2BRB, 2CBX, 2CCD, 2CFI, 2CJN, 2CPD, 2EL, 2FP, 2GI, 2GK, 2LO, 2XAO, 2XAQ, 3ANS, 3AUU, 3BMM, 3BNU, 3HG, 3OT, 3XN, 3YO, 3ZW, 4BY, 4CG, 4EB, 4EH, 4FG, 4GI, 4KM, 4YA, 5AAM, 5AAT, 5ABY, 5AEC, 5BE, 5CC, 5EK, 5EN, 5GH, 5IA, 5IR, 5IS, 5IX, 5JB, 5JL, 5KB, 5KC, 5NK, 5NV, 5NS, 5PF, 5PO, 5QI, 5QS, 5QY, 5RH, 5SF, 5SK, 5SM, 5SS, 5TK, 5UK, 5VA, 5VM, 5VY, 5XAJ, 5XD, 5XK, 5XV, 5ZA, 5ZAP, 5ZAS, 5ZB, 5ZS, 6ABX, 6BQE, 6CU, 6IF, 6KA, 6ZZ, 7BJ, 7ZU, 8AQO, 8AWP, 8AXC, 8BDE, 8BDU, 8BFQ, 8BKE, 8BRY, 8BSS, 8BXH, 8CAA, 8CAC, 8CUR, 8CV, 8JU, 8SP, 8YD, 8ZY, 9AEV, 9AEY, 9AJG, 9AJH, 9ANF, 9AOG, 9AON, 9APS, 9AQR, 9ASF, 9AUL, 9AVZ, 9AYO, 9AXU, 9BAK, 9BDI, 9BDS,

9RIE, 9RJI, 9RJV, 9RKM, 9RLG, 9RXI, 9RZI, 9RZZ, 9CCS, 9CCV, 9CFK, 9CHF, 9CJN, 9CMK, 9CNY, 9CTR, 9CWC, 9CXP, 9CZF, 9DZH, 9DEG, 9DGE, 9DKY, 9DPL, 9DQM, 9DTA, 9DWK, 9DXD, 9DXN, 9DYN, 9EBI, 9ECZ, 9EI, 9FM, 9KM, 9OX, 9PT, 9PW, 9RR, 9UH, 9XAC, 9XM, 9YC, 9YM.

Canadian 9AC, Calgary, Alberta.

C.W.: 1AJP, 1BER, 1BES, 1CAK, 1CKP, 1GV, 1XM, 2AF, (2AYV), 2BT, 2CCD, 2CGT, 2FP, 2HW, 3ABW, 3HD, 3JJ, 3YO, 4BR, 4FS, 4KA, 5AAR, 5EK, 5KC, 5JL, 5NK spk, 5PX, 5QI, 5QY, 5ZAG, 5ZAK, 5ZB, 6AAK, 6ALV, 6AWT, 6BIQ, 6CC, 6GX, 6FH, 6XD, 6ZO, 7AAB, 7ADF, 7AEM, 7AFH, 7AIC, 7EA, (7HJ), 7NG, 7NN, 7VX, 8AAF, 8ABS, 8AQO, 8AXC, 8AZQ, 8BGT, 8BSS 8CEI, 8CGX, 8CO, 8CPD 8CRB, 8NN, 8QK, 8XU, 8ZY, 8ZZ, 9AIX, 9AMI, 9AMU, 9ANQ, 9ARZ, 9AXU, 9AYU, 9AZA, 9BCF, 9BIK, 9BJI, (9BLY), 9BSZ, 9BTT, 9BQW, 9BX, 9BZI, 9CMV, 9DPF, 9DQU, (9EBT), 9GK, 9IY, 9KP, 9MF, 9XAC, 9YAJ, 9ZC spk., 9ZN, (9ZT),. Canadians: 3XN, 4BV, 4EA, 4HH, 5AC, 5CT, 5CN, 9AL.

Canadian 5CT, W. F. Reeves, Duncan, B. C. (Vancouver I.)

Spark-U.S.: 6AWH, 6BGY, 7ABS, (7AIO), 7BG, 7CD, (7HD), 7IX, 7KJ, 7LY, 7NW, (7OJ), 7RO, 7VF. Canadian: (5AK), 9AX.

C.W.-U.S.: 1FB, 1IT, 2EL, 2FP, 3OT, 4BY, 5BE, 5FQ, 5GF, 5MY, 5NK, 5PX, 6RH, 5SF, 5SM, 5TC, 5UK, 5UN, 5VA, 5XV, 5ZA, 6ABX, 6AHR, 6AJF, 6AJR, 6AK, 6ALX, 6AOR, 6ASX, 6ATC, 6ATU, 6AUY, (6AWT), 6BCJ, 6BIQ, 6BMD, 6BNT, 6BOW, 6BUM, 6CC, 6FH, 6KA, 6LV, 6NX, 6OH. 6RM, (6UW), 6VM, 6ZH, 6ZT, 6ZX, 6ZZ, (7ABB), (7ACG), (7ACX), (7AD), (7ADF), (7ADG), 7ADM, 7ADO, 7ADP, 7AEM, (7AFH), (7AFS), 7AFW, (7AGF), 7AGV, 7AHA, 7AHI, (7AIC), (7AII), 7AIM, (7AJC), (7BJ), 7BK, 7DC, (7DP), (7EQ), 7FD, 7GE, (7HJ), 7HM, 7IY, 7JG, 7JW, (7KE), 7KG, 7LR, (7MF), 7NA, 7NF, 7NJ, (7NM), 7NY, (7PF), 7QF, 7QT, 7RI, 7SC, 7SJ, 7TH, (7TO), (7TQ), (7TT), (7UD), (7WK), (7WM), 7ZK, 8AB, 8AEA, 8AJX, 8APY, 8AXB, 8AZD, 8AZF, 8BFM, 8BK, 8CYT, 8IB, 8UK, 8YD, 8ZK, 8ZW. 8ZY, 8ZZ, 9AAP, 9AAU, 9AEQ, 9AEY, 9AFK, 9AHH, 9ASF, 9AUL, 9AU, 9BBF, 9BIK, 9BJI, 9BJV, 9BLY, 9BM, 9BP, 9BRI, 9BSG, 9BXQ, 9CCV, 9CMK, 9CNS, 9CZZ, 9DCG, 9DPL, 9DQM, 9DSD, 9DSM, 9DTM, 9EBT, 9GK, 9IG, 9KP, 9PW, 9UC, 9XAC, 9YAJ, 9YM, 9ZN, AD7, Canadian: 3CO, 4AB, 4BR, (4DQ), 4HH, 5AC, (5BQ), 5CN, (5EJ), (5GO). Will QSL any inquiries.

1BOQ, Lakeville, Ct.

Spark: (1CNI), (2FP), (3UD), (4FD), 4GN, 4XD, 5QS, 5TU, 5XA, (8BDA), (9CP), 9HO, 9JX, 9LF, 9MC, (9OF), 9FV, 9OR, 9TL, (9VZ), 9WX, 9YJ, 9ZN, 9AAW. (9AIR), (9AZA), (9ARM), 9ACN, (9ACW), 9AID, 9AGH, 9AMK, 9AMQ, 9AOJ, 9APK, (9AVP), 9AHP, 9AZE, (9AZF), (9BOO), 9BRI, 9CAN, 9CBS, 9CEL, 9CEN, 9DAG, 9DAY, 9DHG, 9DHZ, 9DJC, 9DKG, (9DLX), 9DNC, (9DTN), 9DTY, 9DWA, 9DWP, 9DWX, (9DXE), (9DXK), 9DXT.

C.W.: 4BX, 4EA, 4FT, 4JK, 4LJ, 4XB (fone), 5FJ, 5IC, 5IR, 5PX, 5XA, 5ZA, 5ZAS, 6XAD, 7ZU, (9AAP), 9AEY, 9AIP, 9AIY, 9AMH, 9AMI, 9AMF, 9AMU, 9AON, 9AOT, 9APH, 9APS, 9ARZ. 9ASN, 9ATJ, 9AYL, 9BCF, 9BDB, 9BDS, 9BDY, 9BED, 9BVP, 9CAN, 9CCM, 9CDA, 9CGK, 9CHN, 9CJL, (9CTE), 9CZL, 9DDY, 9DKY, 9DPJ 9DQU, (9DTA), 9DWK, 9DWQ, 9DZU, 9EBI, 9BP, 9DJ, 9CP. (9EI), 9EP, 9GX, 9LH, 9LQ, 9OX, 9PU, 9WC, 9WX, 9ZN.

1AAC, Framingham, Mass.

C.W.: 1AS, (1DM), (1DQ), (1GV), 1IL, 1II, 1JT, (1KC), 1LL, 1LJ, 1MA, 1MY, 1OR, 1ON, 1QP, (1SD), (1ABY), (1ADN), 1AGH, (1AIH), (1AiL), 1AJU, 1AJR, (1ANY), 1ANQ, 1AOT, 1AVK, 1AWW, (1AXI), (1AYD), (1AZL), (1AZW) 1BAS, (1BBP), 1BDT. 1BES. 1BGF, 1BGW. 1BKQ, (1BKR), (1BJN), (1BLA), (1BNF), 1BNT, (1BQD), (1BQK), 1BRQ, 1BSZ, (1BWJ), 1BXXH, (1BYN), 1CAJ, (1CAK), (1CCT), 1CDO 1CEO, 1CGR, (1CJD), 1CJH, 1CMK, (1CNF), (1CPD), (1CPI), (1CPN), 1CRW, 1CVE, (1CSW), 1CXX, 1CZR. 2EL, 2KV, 2NZ, 2RY, 2TB, 2VH, 2ZK, 3AAB, 2ABD, 2AAF, 2AVA. 2AVG, 2AYV, 2BFS, 2BGI, 2BJP, 2BQD, 2BQU, 2BRB, 2BRC, 2CBG, 2CBW, 2CCD, 2CGS, 2CGT, 2CMM, 2COR, 2CQP. 2CQZ, 2XAP, 3BJ, 3CC, 3CG, 3CX, 3FA, 3HJ, 3HX, 3IW, 3KD, 3PZ, 3QN, 3QV, 3SM, 3TJ, 3XM, 3YO, 3ZZ 3ARJ, 3ACR, 3ADT, 3AFB, 3ALJ, 3AQR, 3APT, 3AWH, 3BFQ, 3BFU, 3BIF, 3BIJ, 3BIT, 3BOB, 3BOF, 3BJY, 4BX, 4EL, 4EP, 4FT, 4HW, 4JK, 4KA, 4KK, 4KL, 4LP, 4NK, 4NT, 4YA, BY4, 5EK, 5KC, 5NZ, 5TJ, 5UK, 5UO, 5XD, 5XK, 5ZA, 5ZB, 5ABY, 5ZAG, 5ZAS, 5ZAV, 6CC, 6ZZ, 6BNT, 7SC, AD7, 8DV, 8HH, 8HJ, 8LV. 8NN, 8OE, 8ON 8PD, 8QK, 8RJ, 8SB, 8TB, 8UF, 8UR, 8VQ, 8VY, 8WX, 8XE, 8XR phone, 8YM phone, 8ZQ, 8ZY, 3ZZ, 8AAF, 8AAK, 8ABE, 8AEB, 8AFE, 8AIR, 8ALT, 8ANB, 8API, 8AQL, 8ATE, 8AVR, 8AVT, 8AVU, 8AWP phone, 8AWT, 8AWV, 8AWZ 8AXC, 8AXD, 8BDE. 8BGE, 8BGL, 8BEK, 8BGH, 8BKN, 8BNY, 8BNT, 8CUR, 8CEH, 8CEI, 8CGJ, 8CIA, 8CGU, 8CJH, 8CKN, 8CKO, 8CLK, 8COJ, 8COO, 8CPD, 8CUV, 8VE, 8BP, 8CM, 8FP, 9GX, 9KP, 9LQ, 9OX, 9PF, 9RC, 9VZ, 9WA, 9WC, 9AAP, 9AIX, 9AIY, 9AJH, 9AMI, 9AMM, 9AMT, 9ANM, 9APW, 9ASE, 9AZA, 9BAK, 9BDB, 9BED, 9BES, 9BFM, 9BQW, 9BSG, 9BSZ, 9BTT, 9BUH, 9CCM, 9CFI, 9CHI, 9CHK, 9CJM, 9CUI, 9CYW, 9DCB, 9DDY, 9DFB, 9DKQ, 9DKY, 9DSG, 9DXM, 9ECE, 9YAD, 9YAJ, 9ZAA.

Spark: (1AA), (1ACH), (1AIL), (1BFL), (1BFQ), (1BJN,) (1BRI), (1BWL), (1CSX). 2NS, 2CMM, 3CS, 3EI, 3GX, 3ARM. 4BC, 8AUG, 8BDA, 8CEH, 8CUV, 9LF, 9VZ, 9ZN, 9AHQ, 9AVA.

1BEC, R. F. Shea, 19 Laurel St., Arlington, Mass.

Spark: 2AAF, 2AD, 2BJF, 2BM, 2CT, 2DN, 2FP, 2GX, 2NS, 2OM, 2OX, 2QR, 3AHK, 3AQZ, 3ARM, 3CS, 3UD, 8BRL, 8BY, 8COA, 8KU, 8MZ.

C.W.: 1ACL, 1AGC, 1AJP, 1AJU, 1ANS, 1AOL, 1ATJ, 1AWB, 1AWW, 1AZW, 1BES, 1BFE, 1BGI, 1BGW, 1BKA, 1BMS, 1BOE, 1BOP, 1BQD, 1BZD, 1CAB, 1CA. 1CAK, 1CDO. 1CN, 1CPO, 1CQF, 1DQ, 1EE, 1GV, 1II, 1JT, 1OK, 1ON, 1SQ, 1UJ, 1ZE, 2AAB. 2AB, 2ACR. 2ACT, 2ACZ, 2ADR, 2AFA, 2AFC, 2AFP, 2AGC 2AHI, 2AHO, 2AIF, 2AJF, 2AJW, 3ALY 2AMF, 2ANM, 2APD, 2ATS, 2AVG, 2AVU, 2AWH, 2AWL. 2AWS, 2AYV, 2AZ, 2AZC, 2BBB, 2BCF, 2BCK, 2BDI, 2BDU, 2BEA. 2BEM, 2BFZ, 2BG, 2BGI, 2IR, 2BJO, 2BJP, 2BKJ, 2BKQ, 2BLM, 2BLP, 2BMK, 2BML. 2BMR, 2BMS, 2BNC, 2BNZ, 2BOA, 2BPF, 2BQD, 2BQU, 2BRB, 2BRC, 2BRX, 2BSC, 2BSH, 2BSP, 2BTW. 2BUE, 2BUM, 2BUR, 2BVH, 2BWA, 2BWH, 2BWR, 2BWU, 2BWW, 2BYS, 2BZQ, 2CBG. 2CCD, 2CDB, 2CDK, 2CEI, 2CEV, 2CF, 2CFI, 2CFS, 2CGT, 2CHG. 2CHH, 2CIM, 2CIN, 2CJE, 2CJN, 2CJP, 2CKK. 2CKL. 2CKR, 2CLX, 2CMR, 2CNK, 2COA. 2COR, 2CPO, 2CQI, 2CQZ. 2CRO, 2SL, 2CTC, 2CUS, 2CWS, 2DX, 2EL, 2FP, 2GI, 2GK, 2HJ, 2JW, 2KF, 2KL, 2ML, 2MX, 2NZ, 2OM, 2OR, 2RC, 2TB, 2UD, 2VH, 2WR 2ZL, 3AAY 3ABW, 3ACQ, 3ACR, 3ACY, 3ADE, 3ADT, 3AFB, 3AGA, 3AHV, 3AIH, 3AIQ, 3AIS, 3AJB, 3AJJ, 3ALU, 3AMW, 3ANJ, 3APB, 3APR, 3AQH, 3AQR, 3ARI, 3ARM, 3AS, 3ASI, 3ASP, 3ATG, 3AUB, 3AUU, 3AVA, 3AVC, 3AVY, 3BA, 3BAN, 3BB, 3BDM, 3BEC, 3BEI, 3BFQ, 3BFU, 3BG, 3BGT, 3BGU, 3BHL, 3BHM, 3BHO, 3BIF, 3BIJ, 3BIT, 3BIY, 3BJ, 3BJY, 3BLF, 3BLP 3BNJ, 3BNL, 3BNU, 3BOB, 3BOF, 3BSJ, 3BSS, 3BUL, 3BUR, 3BVA, 3BVC, 3BX, 3BZ, 3BZQ, 3CAN, 3CAQ, 3CBM, 3CC, 3CCU, 3CDG, 3CG, 3CGM, 3CM, 3CO, 3CU, 3DC, 3FB, 3FC, 3FS, 3GE, 3GK, 3GP, 3HD, 3HG, 3HJ, 3HK, 3IW, 3JJ, 3JL, 3KD, 3KL, 3KQ, 3LK, 3MB, 3MK, 3MO, 3NH, 3OE, 3OT, 3PZ, 3QR, 3QV, 3RF, 3RY, 3SM, 3SU, 3SZ, 3TA, 3TB, 3TJ, 3UE, 3VW, 3XM, 3XO, 3YO, 3ZH, 3ZN, 3ZO, 3ZW, 3ZZ, 4AT, 4BJ, 4BQ, 4BX, 4BY, 4DC, 4EA, 4EB, 4EL, 4FT, 4HK, 4IZ, 4JK, 4JY, 4KL, 4KM, 4LJ, 4LP, 4NT. 4YA, 5DA, 5EK, 5EL, 5FV, 5IK, 5IR, 5JC, 5KC, 5MA, 5MT, 5ND, 5PX, 5SA, 5TC, 5UJ, 5XA, 5XB, 5XK, 5ZA, 5ZAG, 5ZAK, 9AAP, 9AAS, 9AAU, 9AAV, 9ADF, 9AEN, 9AIX, 9AIY, 9AJH, 9ALP, 9AMH, 9AMI, 9AMT, 9AOT, 9AOU, 9APM, 9APS, 9AQV, 9ARR, 9ARZ, 9ASE, 9AUL, 9AWF, 9AWM, 9AYH, 9AZA, 9BAK, 9BCH, 9BDB, 9BED, 9BHL, 9BIE, 9BIK, 9BNV, 9BP, 9BSG, 9BSZ, 9BTT, 9BVP, 9BZI, 9CBA, 9CD, 9CF, 9CHK, 9CJA, 9CJX, 9CLN, 9CMK 9CNV, 9CR, 9CTE, 9CUI, 9CV, 9CXT, 9CYM, 9CYQ, 9DBV, 9DCB, 9DDW, 9DDY, 9DGE, 9DGV, 9DIO, 9DKY, 9DQU, 9DSG, 9DVL, 9DWK, 9DXE,

9DY, 9DYN, 9EBI, 9ECE, 9ECR, 9EDB, 9EI, 9EP, 9FP, 9HK, 9IO, 9KM, 9KP, 9KW, 9LQ, 9OF, 9OI, 9OX, 9PI, 9PS, 9QB, 9QK, 9RC, 9UC, 9UU, 9US, 9VK, 9VZ, 9WA, 9XAC, 9XAQ, 9YAJ, 9YM, 9ZAA, 9ZN, 9ZT, AD7. Canadian: 2AM 2BG, 2EI, 2HG, 3BV, 3BX 3CO, 3DE, 3DH, 3FC, 3GK, 3JH, 3JL, 3NB, 3PG, 3SX, 3UK, 3XN, 3ZL, 9AJ, 9AL, 9AW, 9BJ, 9BS, 9CD. Eight's too numerous.

1IV, Bridgeport, Conn.

C.W.: 3BZ, 3CU, 3IW, 3MO, 3RF, 3TJ, (3XM), 3ZZ, 3AEV, 3APR, (3BFU), 3BHL, 3BLF, 3BOF, 3BVC, (3BVL), 4BX, 4BY, 4CO, 4DC, 4DL, 4EA, 4EB, 4EL, 4FT, 4GL, 4HK, 4HW, 4HZ, 4JK, 4JZ, 4KK, 4KL, 4LJ, 4LP, 4NT, 4SW, 5EG, 5EK, 5ES, 5FV, 5KC, 5SU, 5XA, 5XK, 5ZB, 5ZS, 5ZAS, 6XAD, 6ZZ, 7ZV, 9CP 9EI, 9EJ, 9EP, 9FQ, 9FW, 9II, 9IO, 9KP, 9LQ, 9LZ, 9MC, 9OX, 9PI, 9PW, 9RC, 9UC, 9UU, 9VK, 9WC, 9XL, 9ZN, 9AAF, 9AAS, 9AAV, 9AIV, 9AIF, 9AIX 9AIY, 9AJH, 9AMH, 9AMI, 9AMT, 9ANQ, (9APS), 9APW, 9ASE, 9AWF, 9AWM, 9AYH, 9AZH, 9AZA, 9RED, 9BRK, 9BVP, 9BZI, 9CED, 9CHF, (9CTE), 9CUI, 9CZS, 9DCB, 9DFB, 9DGE, 9DKY, 9DNH, 9DQU, 9DSG, 9DWK, 9DYN, 9XAC, 9YAJ, Canadian: 2AN, (2BG), 3BV, 3CO, 3DE, 3GK, 9CD. (One's two's and eight's too numerous.)
3IL, 3JH, 3SX, 9AL, 9AW, 9BA, 9BJ, (9BS), Spark: (2ALE), (2AZD), 9AAW, 9AHQ.

2KV, Bronxville, N. Y. (All C.W.)

(1ADL), 1AGC, 1AGH, 1AJL, 1AJP, 1ALZ, 1AMS, 1ANR, 1AOJ, 1AOK, 1AOL, 1ASJ, 1AW, 1AWB, 1AWK, 1AWL, 1AXB, 1AXI, 1AYZ, 1AZW, (1BAS), 1BES, (1BGF), 1BGW, 1BKP, (1BKQ), 1BMS, 1BOE, (1BQD), (1BRQ), 1BSA, 1BSZ, 1BWJ, 1BYG, 1BZP, 1CAC, 1CDO, (1CDR), 1CFI, (1BQD), (1BRQ), 1BSA, 1BSZ, 1BWJ, 1BYG, 1BZP, 1CAC, 1CDO, (1CDR), 1CFI, 1CIV, 1CPO, 1CIV, 1CPO, 1DQ, 1EE, 1GL, 7GV, 1II, 1JT, 1KC, (1LL, 1MA, 1QR, 1PM, (1RD), 1RN, (1XU), (1XZ) 2XQ, (2ANM), 3AAY, 3ABW, 3AFB, 3AGA, 3AIR, 3AJJ, 3ALU, 3ANS, 3APR, 3APT, 3AQR, 3ARM, 3AS, 3ATB, 3AVY, 3BDM, 3BEC, 3BFU, 3BIJ, 3BIT, 3BJY, 3BKC, 3BLF, 3BNU, 3BOB, 3BOF, 3BSS. 3BZ, 3CC, 3CF, 3CG, 3FS, 3HO, 3HS, 3HL, 3IW, 3JH, 3JJ, (3LK), 3MK, 3OT, 3TZ, 3QZ, 3RF, 3SM, 3SU, 3TJ, 3VW, 3WF, 3XM, 3ZO, 3ZZ, (4BX), 4CG, (4EA), 4EL, 4FT, 4GH, 4GL, 4JK, 4KL, (4NT), 4YA, 5ABY, 5DA, 5EK, 5FV, 5HK, 5IR, 5KC, 5NK, 5SM, 5SU, 5XA, 5XD, 5XT, 5ZAS, 5ZAV, 5ZB, 6EN, 6XAD, 6ZZ, 7LU, 7ZK, 7ZO, 7ZU, 8AA, 8AAF, 8AB, 8ABE, 8ACH, 8ADG, 8ADR, 8ADS, 8ADU, 8AEA, 8AEB, 8AGO, 8AHR, 8AIG, 8AIO, 8AIW, 8AJE, 8AJX, (8AJT), 8ALF, 8ALU, 8ALT, 8AMR, 8AMF, 8ANB, 8APN, (8APU), 8AQF, 8AQO, 8ATC, 8AVT, 8AWP, 8AWU, 8AXC, 8AZD, 8BDB, 8BDC, 8BEI, 8BFB, (8BFV), 8BGL, 8BJS, 8BJU, (8BKZ), 8BKH, 8BLC, 8BNJ, 8BNY, 8BRC, 8BRM, 8BSF, 8BUN, 8BUT, 8BWK. 8BZY, 8CCS, 8CEF, 8CEI, 8CFP, 8CGB, 8CGQ, 8CGX, 8CGZ, 8CJZ, (8CKM), 8CKO, 8CMI, 8COK, (8COO), 8CQL (8CTN), 8CTT, 8CUR, 8CVE, 8CXP, 8CYT, 8DAA, 8FM, 8GS, 8HH, (8HN), 8HV, 8IB, 8II, 8IJ, 8KH, 8ML, 8OI, 8PJ, 8QK, 8SB, 8SP, 8SZ, 8TT, 8UE, 8UF, 8UK, 8VQ, 8VY, 8WR, 8XE, 8ZK, 8ZW, 8ZY, 8ZZ, 9AAP, 9AAV, 9AAX, 9AFK, 9AIX, 9AJN, 9AMI, 9AMQ, 9AMT, 9AMU, (9ANL), 9ANQ, 9APS, 9APW, (9ARN), 9ASF, 9AZA, 9BAK, (9BBK), (9BDB), 9BDS, 9BRK, 9BRY, 9BSC, 9BZJ, 9CBA, 9CHE, 9CJM, 9CNV, (9CCM), 9CP, 9CPC, 9CPY, 9CUI, 9CR, 9DCB, 9DCR, 9DFB, 9DGE, 9DIC, 9DLR, 9DPL, 9DRR, 9EI, 9EP, 9II, 9IY, 9KM, 9LC, 9QR, 9RC, 9UC, 9US, 9UU, 9VZ, 9YI, 9ZN. Canadian: 2AF, 3DH, 3GK, 3JH, 3JK, 3JL, 9BH.

2CBW & 2CQZ, Elizabeth, N. J.

1AR, 1AW, 1DQ, 1EO, 1GV, 1HX, 1II, 1IL, 1IV, 1JI, 1JT, 1KC, 1KX, 1MY, 1ON, 1OR, 1OW, 1PM, 1QP, 1SD, ISN, 1UJ, 1VC, 1XM, 1XU, 1ABY, 1ADL, 1AGH, 1AJP, 1AJU, 1AKB, 1ANR, 1AOJ, 1AOK, 1AJX, 1ARK, 1AWB, 1AXE, 1AXI, 1AYQ, 1AYZ, 1AZL, 1DAS, 1DES, 1BET, 1BGF, 1BGW, 1BIE, 1BKA, 1BKQ, 1BQD, 1BQE, 1BSA, 1BVB, 1BVR, 1BWJ, 1BYN, 1BZP, 1CBJ, 1CDO, 1CDR, 1CHJ, 1CIK, 1CIT, 1CIV, 1CJA, 1CJH, 1CMK, 1CPI, 1PN, 1CVE, 1CXX, 3AS, 3BA, 3BG, 3BZ, 3CC, 3CG, 3CI, 3FC, 3FS, 3GE, 3HD, 3HG, 3HW, 3HX, 3IL, 3IW, 3JG, 3JH, 3JJ, 3MB, 3OE, 3OT, 3PZ, 3SG, 3SM, 3SU, 3SZ, 3TJ, 3VW, 3WF, 3XM, 3YO, 3ZH, 3ZO, 3ZV, 3AAG, 3AAO, 3ABW, 3ACC, 3ADT, 3AFW, 3AJH, 3AJJ, 3ALE, 3ANJ, 3APR, 3APT, 3AMW, 3AQR, 3ARV, 3ATB, 3AVA, 3AWA, 3AWH, 3BFC, 3BFU, 3BFQ, 3BHM, 3BIF, 3BIU, 3BJY, 3BLF, 3BNU, 3BOB, 3BOF, 3BRE, 3BSB, 3BVC, 3CAL, 3CAN, 3CCU, 3CDG, 3CEL, 4BK, 4BQ, 4BX, 4CG, 4CO, 4CY, 4EA, 4EB, 4EL, 4FT, 4GL, 4HS, 4HW, 4HX, 4HZ, 4JK, 4KL, 4KM, 4KO, 4LJ, 4LP, 4MB, 4NT, 4OI, 4YA, 5DA, 5DI, 5EK, 5FV, 5JB, 5JS, 5KB, 6KC, 6NS, 5NV, 5PX, 5QM, 5QS, 5QY, 5SF, 5SM, 5TC, 5TK, 5UK, 5UV, 5VO, 5XA, 5XB, 5XK, 5ZA, 5ZB, 5AAG, 5AEC, 5XAD, 5ZAK, 5ZAS ,5ZAV, 6SC, 6BOE, 6XAD, 6ZAC, 7ZU, 7ZV, 7ABB, 8AA, 8BA, 8CI, 8CP, 8EP, 8EW, 8BO, 8HH, 8HJ, 8HN, 8IJ, 8KS, 8LS, 8MZ, 8NB, 8OC, 8OE, 8OI, 8ON, 8OW, 8PJ, 8QB, 8QF, 8QK, 8RR, 8RV, 8SB, 8SP, 8UF, 8UC, 8UT, 8UY, 8VQ, 8WR, 8XE, 8XR, 8YM, 8ABX, 8ACH, 8AEB, 8AER, 8AGO, 8AIC, 8AIM, 8AIO, 8AIW, 8AJE, 8AJT, 8AJX, 8ALC, 8ALT, 8ALE, 8AME, 8AMM, 8AMX, 8ANB, 8AOX, 8AQF, 8AQO, 8ASI, 8ASV, 8ATC, 8ATU, 8AVA, 8AVD, 8AVJ, 8AVT, 8AWP, 8AWR, 8AWZ, 8AXB, 8AXC, 8AXD, 8AXR, 8AXN, 8AXU, 8AZD, 8AZF, 8AZQ, 8BAH, 8BCK, 8BDM, 8BEF, 8BHO, 8BIN, 8BJV, 8BKE, 8BKZ, 8BMM, 8BNH, 8BNR, 8BNY, 8BOA, 8BOW, 8BOZ, 8BRM, 8BTL, 8BVR, 8BVT, 8BWA, 8BWB, 8BWK, 8BWY, 8BWZ, 8BXA, 8BXT, 8BXX, 8BYN, 8CBC, 8CCB, 8CCR, 8CDZ, 8CEI, 8CGU, 8CGX, 8CHO, 8CHU, 8CIA, 8CJY, 8CKM, 8CKN, 8CKO, 8CJH, 8CMI, 8CNA, 8CPX, 8CQX, 8CUE, 8CUR, 8CVT, 8CWP, 8CXF, 8CYB, 8CYT, 8CYV, 8CZR, 8DAA, 8DAE, 8XAE, 8BP, 9BS, 9BV, 9CR, 9EI, 9EP, 9ET, 9II, 9IG, 9IP, 9KM, 9LH, 9LQ, 9LZ, 9OF, 9OX, 9PF, 9PW, 9QF, 9QR, 9QU, 9RC, 9UU, 9VK, 9WC, 9XY, 9ZL, 9ZM, 9AAP, 9AAS, 9AFN, 9AHH, 9AIP, 9AIY, 9AJH, 9AKU, 9AMB, 9AMH, 9AMI, 9AMU, 9ANQ, 9AOG, 9AOU, 9AOT, 9APS, 9APW, 9AQR, 9AQZ, 9ARC, 9ARZ, 9ASE, 9ASW, 9AUA, 9AUS, 9AVC, 9AWF, 9AWM, 9AWS, 9AYH, 9AYS, 9AZA, 9BBE, 9BCH, 9BCT, 9BDB, 9BDX, 9BED, 9BEP, 9BFG, 9BHD, 9BIE, 9BIK, 9BJR, 9BJV, 9BKJ, 9BKW, 9BOG, 9BRE, 9BSG, 9BTA, 9BVL, 9BVP, 9BVZ, 9BYN, 9BZI, 9CBS, 9CBA, 9CBT, 9CCN, 9CGK, 9CJC, 9CLN, 9CMJ, 9CGN, 9CNS, 9CTB, 9CTE, 9CVO, 9CVS, 9CXP, 9CZF, 9CZS, 9CZY, 9DBU, 9DCB, 9DDY, 9DFB, 9DGN, 9DGE, 9DGO, 9DGQ, 9DKQ, 9DKY, 9DLR, 9DMJ, 9DPL, 9DQU, 9DTA, 9DWK, 9DWM, 9DYN, 9ECE, 9XAC, 9XAQ, 9ZAA.
Canadian: 2DA, 2EI, 2HG, 3AD, 3CO, 3DH, 3FA, 3GE, 3GK, 3JH, 3JI, 3JT, 3NB, 9AL, 9AW, 9BS, 9BV, 9CD, 9LT.

A. L. Groves, Brooke, Va. (Dec. 10th from 8:45 A.M. to 2:50 P.M. on "Souper.")

1CNF, 8CWP, 9CCV, 8HN, 8BWY, 8AZD, 8BVR, 1CNF, 9BVZ, 8BFB, 9BUH, 9DX, 9DBV, 8BMM, 9APS, 8AZD, 8ZZ, 8CRB, 8CWU, 8TG, 9DBV, 8CWF, 8CJH, 8CXW, 9APS, 8OI, 8CRB, 8CMI, 3DE, 8RV, 8ER, 1PM, 8CDZ, 8CCS, 8BPO, 8BS, 8AUH, 8HJ, 8AIM, 8MZ, 3NB, 8BGJ.

3BVA York, Pa.

C.W.: 1AP, 1AW, 1EE, 1II, 1IL, 1IT, 1GK, 1GL, 1GV, 1LL, 1MY, (1OL), 1OR, 1QP, 1SN, 1XM, 1XU, 1XZ, 1YK, 1ADL, 1ADP, 1AGH, 1AHZ, 1AJX, 1AKG, 1ANY, (1AOJ), 1AOL, 1ARY, 1ASF, 1ATJ, 1AWE, 1AYQ, (1BAS), 1BEP, 1BES, 1BDI, 1BDT, 1BJJ, 1BKA, 1BKQ, 1BLN, 1BNT, 1BOM, 1BOP, 1BRQ, 1BSD, 1BSZ, 1BWJ, 1CBJ, 1CDO, 1CHJ, 1CIK, 1CIV, 1CKP, 1CMK, 1CNF, 4AR, 4BB, 4BK, 4BW, 4BX, 4BY, 4CY, 4EA, 4EB, 4EH, 4EL, 4FT, 4GH, 4GL, 4HK, 4HW, 4ID, (4JK), 4JL, 4KC, 4KL, 4LJ, 4LP, 4ME, 4NT, 4OI, 4XK, (4YA), 5DI, 5EG, 5EK, 5ER, 5ES, 5FV, 5GP, 5IK, 5IS, 5JB, 5KC, (5MB), 5MO, 5PV, 5PX, 5SM,5UK, 5AAG, 5AAM, 5ABK, 5ABY, 5ADE, (5XA), 5XK, 5XT, 5XV, 5ZA, 5ZB, 5ZAK, 5ZAS, 5ZAT, (5ZAV), 6CC, 6KA, 6ZZ, 6PI, 6ABX, 6XAD, 7ZU, 8AA, 8AB, 8AX, 8BK, 8BO, 8CI, 8CP, 8EO, 8EX, 8FT, 8FU, 8HJ, 8HN, 8KG, 8KH, 8NN, 8PD, 8QK, 8RV, 8SL, (8SB), 8SP, 8TK, 8TT, 8UE, 8UK, 8UP, (8UR), 8VQ, 8VY, 8YN, 8ZD, 8ZW, 8ZZ, 8ZY, 8ABE, 8ABX, 8ADG, (8AEG), 8AGF, (8AGO), 8AIO, 8AJH, 8AJT, 8ALA, 8ANB, 8APV, 8APW, 8AQF, 8AQO, 8ASC, 8ASV, 8ATU, 8AWP, 8AWR, 8AXB, 8AXC, 8AXN, 8AZF, 8AZG,

8BBE, 8BDB, 8BDE, 8BCH, 8BKE, 8BLC, 8BNJ, 8BNY, (8BOG), 8BOZ, 8BPL, (8BPN), 8BRC, 8BWK, 8BWZ, 8BXF, 8BXH, 8BYO, 8BZD, 8CAB, 8CAZ, 8CBO, 8CEF, 8CEI, 8CGJ, 8CIA, 8CIH, 8CJA, (8CJJ), 8CJZ, 8CKO, 8CKV, 8CLK, 8CMI, 8CMY, 8COJ, 8COO, (8CUU), 8CUZ, (8CVE), 8CXW, 8CYB, 8CYT, 8DAK, 8DAT, 8XAE, (9AP), 9BA, (9BP), 9CD, 9CM, 9CR, (9EI), 9EP, 9GK, 9II, 9IO, 9IY, 9KP, 9LZ, 9MC, 9OF, (9OX), 9PF, 9PS, 9PQ, 9RC, 9UC, (9UU), 9VK, 9WA, 9XL, 9YM, 9ZL, 9ZN, 9ZY, 9AAS, 9AAV, 9AEQ, 9AFK, 9AFN, 9AIP, 9AIX, 9AIY, 9AJH, (9AMH), 9AMI, (9ANQ), 9AOG, 9AON, 9AOU, 9APS, 9APW, (9AQA), 9ARR, (9ARZ), 9ASE, 9ASW, 9AWM, 9AWS, 9AXU, 9AYH, 9AYU, 9AZA, 9BAK, 9BBF, 9BCF, 9BCT, (9BDS), 2BED, 9BHI, 9BHQ, 9BIE, (9BIK), 9BLG, 9BMM, 9BPJ, 9BRL, 9BSZ, 9BSG, 9BTA, 9BVA, 9BXL, 9BZI, 9BZZ, 9CBA, 9CCM, 9CDA, 9CDL, (9CED), 9CIN, (9CJA), 9CJC, 9CJM, 9CJX, 9CNS, 9CPY, 9CQM, 9CTB, 9CTC, 9CTR, 9CTW, 9CUI, 9CVG, 9CXP, 9CYM, 9DBL, 9DCB, 9DFB, 9DGE, 9DGQ, 9DJO, 9DKH, (9DKY), 9DLR, 9DPL, 9DSG, 9DXM, 9DXN, 9DWK, 9DWM, 9DYN, 9DZG, 9XAQ, 9ZAA, AD7, Canadian: 2HG, 3BV, 3CO, (3DE), 3DH, 3DS, 3EI, 3GE, 3GK, 3JL, 3JH, 3XN, 9AL, 9BJ, 9BZ, 9CD.

I.C.W.: 1UN, 1AOK, 1CKP, 2FP, 2NZ, 2XQ, 3OT, (3AQR), 4HW, 8VQ, 8AER, 8AWP, 8BLG, (9BP), 9XM, 9ZN, 9AAP, 9CXP.

Spark: 1AA, 1RV, 1RX, 1CNI, 2AD, 2NX, 2OM, 2AAF, 2CJX, 3EI, 3GM, (3ACY), 3AHK, 3API, (8BRL), 4DF, 4FD, 4GN, 5XA, 8FU, 8JL, 8KY, 8RD, 8AFG, 8AIY, 8AWQ, 8BDA, 8BRI, 8BYO, 8CKV, 8COA, 9CP, 9LF, 9TV, 9ZN, 9AAW, 9AHQ, 9AMK, 9AOY, 9AVF, 9AVP, 9BCP, 9BMN, 9CUF, 9COX, 9CZL, 9DAY, 9DHZ, 9DQQ, 9DXE.

3AWH, Langhorne, Pa.

Spark: 1AA, 1FM, 1ON, 1RV, 1ADC, 1AKC, 1AMD, 1ARY, 1CGU, 1BOQ, 1CNI, 4RI, 4EG, 4FD, 4GN, 4HS, 5XA, 9CP, 9LF, 9ME, 9OL, 9QR, 9VZ, 9YJ, 9AAW, 9ACN, 9AFG, 9AVP, 9AUC, 9AZE, 9AZF, 9BOO, 9DAY, 9DTN, 9DWP, 9DXT, Can. 3BP, 3EI, 3GN.

C.W.: 1BM, 1CM, 1EE, (1EO), 1GV, 1HK, 1IL, 1IV, 1IY, 1JT, 1OK, 1ON, (1OR), 1QP, (1RD), 1SN, 1UN, 1XU, 1ZE, 1ACC, 1AGH, 1AHT, 1AJP, 1AKF, 1ANU, 1AOK, 1AOL, 1ASJ, 1ATJ, 1AUW, (1AWB), 1AXI, (1BAS), 1BDI, 1BES, 1BET, (1BFT), (1BHK), 1BHQ, 1BHR, 1BKA, 1BKQ, 1BMS, 1BNG, 1BNL, 1BOA, 1BOB, 1BOE, 1BOK, 1BQD, 1BRQ, 1BSD, 1BUR, 1BVB, 1BVH, 1BWJ, 1CAJ, (1CDR), 1CFI, (1CGQ), 1CLZ, 1CMK, 1CMP, 1CNF, 1CPY, 1CSW, 1CVE, 4AS, 4AT, 4BG, 4BK, 4BQ, 4BX, 4CG, 4CY, 4DC, 4DO, 4EA, 4EB, 4EL, 4GL, 4HS, 4HW, 4HX, 4HZ, 4IY, 4JM, 4KL, 4LJ, 4LP, 4NA, (4NT), 5BE, 5DI, 5DO, 5EK, 5GA, 5GP, 5HK, 5IK, 5JB, 5JL, 5KC, 5MA, 5ND, 5NS, 5NT, 5NZ, 5PX, 5QI, 5TJ, 5UD, 5XA, 5XK, 5XT, 5XY, 5XAD, 5ZB, 5ZG, 5ZM, 5ZAG, 5ZAK, 5ZAS, 5ZAV 5ZAZ, 6CC, 6KA, 6ZZ, 7ZO, 7ZU, 7ZV, 9RA, 9CM, 9CR, 9FM, 9FP, 9EP, 9II, 9IO, 9IY, 9AJB, 9AJH, 9AKH, (9AKU), 9AMI, (9AMQ), 9AMT, 9AMU, 9AOU, 9APM, 9AQA, 9ARC, 9ASP, 9ASW, 9ATX, 9AUA, 9AVP, (9AWF), 9AXM, 9AZA, 9AZH, 9BAH, 9BAK, 9BAV, 9BAZ, (9BCH), 9BDB, 9BDS, 2BED, (9BES), 9BFM, 9BHL, 9BIJ, 9BIK, 9BJI, 9BKO, 9BLK, 9BRK, 9BRX, (9BSG), 9BSZ, 9BVZ, 9BWF, (9BZI), 9CAA, 9CAC, 9CAO, 9CBA, 9CCM, 9CCS, 9CCV, 9CGF, (9CGK), (9CHK), 9CIU, 9CKW, 9CMV, 9CNY, 9CPU, 9CTE, 9CTV, 9CYM, 9DAH, 9DAY, 9DCB, 9DCH, 9DFB, 9DGN, 9DGQ, 9DGV, 9DIO, 9DKH, 9DKY, 9DQE, 9DQR, 9DQU, 9DRA, 9DSG, 9DUG, 9DVL, 9DVW, 9DXE, 9DXK, 9DXM, 9DZB, (9DYN), 9EBP, 9EBI, 9EBT, 9EDO, 9XAP, 9YAJ, Can. 2CQ, 3BQ, 3CO, 3GK, 3JH, 3JI, (3XN), 3ZL, 9AL, 9AW, 9BA, 9BV. (About half these stations heard while American amateurs were supposed to keep still).

4KI, 401 Lloyd St., Greenville, S. C.

C.W.: 1AW, 1DQ, 1PR, 1II, 1AOL, 1CJA, 2KL, 2KP, 2WR, 2XQ, 2APD, 2CKR, 2XAO, 3BY, 3CA, 3CG, 3CW, 3IW, 3JR, 3LK, 3NB, 3SM, 3SU, 3PJ, 3AVY, 3RHO, 3ASI, 3BLF, (4AR), 4BG, 4BK, 4BY, 4EA, 4EB, (4EL), (4FE), 4FQ, 4FT, 4GX, (4HR), 4HW, (4JK), 4JY, 4KC, 4KK, 4KL, 4KM, 4LJ 4LP, 4YA, 5DA, 5DI, 5DQ' 5EG, 5GP, 5HL, 5JS, 5KC, 5OW, 5TJ, 5XK 5ZA, 5AFO, (5ABY), 5ZAT, 5ZAV, 6KA, 7ZU, 8AA, 8AG, 8DR, 8FP, 8FQ, 8IV, 8JU, 8LT, 8ML, 8OC, 8OW, 8SB, 8UK, 8UZ, 8WV, 8XE, 8ZD, 8ZH, 8ZZ, 8AAF, 8AIH, 8AJX, 8ANB, (8BCH), 8BDE, 8BDU, 8BEO, 8BGL, 8BGR, 8BHO, 8BNJ, 8BOG, 8BOQ, 8BOZ, 8BRL, 8BXH, 8BXX, 8BYT, 8CDZ, 8CEP, 8CHU, 8CIA, 8CGO, 8CKO, 8CQT, 8CTN, 8CZX, 9EI, 9FP, 9IP, 9KP, 8KQ, 9LC, 9LQ, 9LZ, 9OX, 9UL, 9VX, 9ZN, 9AMU, 9AON, 9AOU, 9APM, 9APS, 9ASD, 9ASE, 9BGW, 9BRY, 8BSG, 9BSI, 9BSQ, 8BSZ, 9BVH, 9BVZ, 9BXL, 9BVT, 9CCS, 9CCV, (9CFI), 9CFV, 9CJC, 9CTB, 9CVG, 9CYW, 9CZS, 9DAH, 9DAN, 9DJB, 9DTS, 9DXN, 9DWT, 9DYY, 9YAJ.

Spark: 4EG, 5ZA.

4KA, Atlanta, Ga.

C.W.: 1DF, 1NR, 1YK, 2XA (fone), 2XQ, 3BA, 3BM, 3GJ, 3DM, 3IW, 3MO, 3OT, 3ZZ, 3AFB, 3AQS, 3BIM, 3BLO, 3BLU, 3BOF, 3DMH, 4AD, 4AS, 4BA, 4BK, 4BQ, 4BY, 4CA, 5CK, 4CX, 4CL, 4EA, 4EB, 4GL, 4IV, 5LJ, 4YZ, 5AA, 5AZ, 5CS, 5DU, 5EK, 5ES, 5GI, 5GN, 5HS, 5JZ, 5LJ, 5NN, 6NZ, 5PR, 5QI, 5XA, 5XU, 5YA, 5YE, 5YS, 5ZA, 6ZB, 5ZG, 5ZL, 5ZZ, 8AB, 8CJ, 8EX, 8SD, 8XA, 8YO, 8ZD, 8ZE, 8ZI, 8ZP, 8AAY, 8ALT, ANB 8BHO, 8BHU, 8BXF, 8CIA, 8XAK, 9AC, 9AR, 9BZ, 9DX, 9EF, 9EI, 9ER, 9GX, 9KM, 9KU, 9LQ, 9LZ, 9NR, 9PI, 9SI, 9WA, 9XI, 9XJ, 9XY, 9XZ, 9YA, 9YB, 9YC, 9YJ, 9YK, 9YM, 9YQ, 9YZ, 9ZJ, 9ZW, 9ACR, 9APS, 9AGR, 9AWP, 9AYW, 9AZA, 9BDB, 9BID, 9BSG, 9BUH, 9BXG, 9CAL, 9CBA, 9CNX, 9DCX 9DLB, 9DQQ, 9DGU, 9DUB, 9DWK, 9DXM.

5DI, 2209 Azle Ave., Ft. Worth, Texas.

C.W.: 1GV, 1II, 1MV, 1XU, (1XZ), 1BES, 1BRQ, 1BWJ, 1CMK, 2BG, 2EL, 2GK, 2KF.2UD.2ZK.2ANM (2BBB), 2BOF, 2BSC, 2BZQ, 2BZV, 2CBG, 2CCD, 2CQZ, 3CC, (3CM), 3IW, 3MR, (3OT), 3RO, 3SW, 3YO, 3XM, 3ART, 3BHM, (3BLF), 3BRF, 4AT, 4CG, 4CO, 4DR, 4FG, 4FS, 4HH, 4HS, 4KM, 4NE, 4OI, (4YA), 5EK, (5EL), 5FV, 5HZ, 5GY, (5NK), (5NN), (5NV), 5RH, (5TA), (5AAH), (5ABY), 5ZAS. (5ZAZ), 6BF, 6BH, 6EA, 6CC, 6IF, 6LV, 6PI, 6XD, 6XK, 6ZH, 6ZN, 6ZO, 6ZX, 6ZZ, 6AJR, (6ANH), 6ARF, 6AVN, (6AWT), (6BBH), 6BEP, (6BJB), (6BKX), (6BMA), 6BOE, 6BRG, 6BUN, 6CBD, 6XAD, 6XAA, (6ZAC), (7BJ), 7GD, 7JW, 7OT, (7SC), 7ZU, 7BKJ, 8AB, 8CK, 8CP, 8FT, (8IQ), 8JV, (8QK), 8SB, 8XE, 8ZN, (8AER), (8AIH), 8AGO, 8AIO, (8ALC), 8ALY, (8AME), 8ANB, 8ASZ, 8AWE, (8AWZ), (8BEO), 8BJV, (8BKE), (8BSA), 8BTL, 8BUT, 8BVR, (8BWA), 8BWL, 8BWY, 8BYO, 8BYT, 8BXX, (8CAA), (8CCB), 8CFO, 8CGJ, (8CGX), 8CJZ, 8CKV, 8CMI, 8CPD, 8CPX, 8CUR, 8DAK, (9FM), 9NQ, 9OX, 9WQ, 9YU, (9ZN), 8AAP, 9ABV, 9AFA, 9AKD, 9ALW, 9AMB, 9ANF, 9ANG, (9ANS), (9AOU), 9AQZ, 9ASN, 8AUS, (9AWM), (9BDO), 9BED, 9BFC, 9BGS, 9BHS, 9BIJ, 9BIK, 9BJK, 9BKP, (9BLY), 9BRI, (9RT), (9BXT), (9BYX) 9BZI, 9CBA, 9CCS, 9CCV, (9CEH), 9CGD, 8CHG, 9CIY, 9CCP, 9CVG, 9CTE, (9CTG), 9DBB, 9DJB, (9DKG), (9DMJ), (9DQU), (9DSL), (9DSM), 9DTA, (9DWG), 9DXN, 9XAQ, 8YAJ, (9EBT), (9ECZ). Canadians: 3BV, 3FA, 3GK, 3JH, 3JT, 3OX, (4BV).

5SF, 1616 Worth St., Ft. Worth, Texas

C.W.: 1AJP, 1AZW, 1CMK, 1GV, 1II, 1ON, 2AYV, 2BQD 2BZV, 2CQZ, 2EL, 2UD, 2XAO, 2XQ, 3AJJ, 3BLF, 3BVL, 3MB, 3OT, 3SU, 3YO, 4BG, 4CO, 4CY, 4EB, 4EH, 4EL, 4HH, 4HW, (4HX), 4HZ, 4IZ, 4KC, 4KL, (4LJ), 4YA, Fives too numerous, 6ABX, 6AD, 6AK, 6ANH, 6AWT, 6BIC, 6BOE, 6BOW, 6BQG, 6BRF, 6BYC, 6CBI, 6CC, 6FT, 6GF, 6IF, 6KA, (6ZAC), 6ZH, 6ZI, 6ZZ, 6XAD, 7NY, 7SC, (7ZO), 7ZU, 7ZV, 8's and 9's too numerous. Canadians: 3GK, 3XN, 4BV, 5CN, 9AL. All stations over 1000 miles.

Lots of equally good lists received from the 5th district.—Ed.

5NN, 2318 Jackson St., Houston, Texas

1SD, 1XM, 1XU, 1XZ, 1AJP, 2GI, 2NZ, 2XAO, 2ZK, 2ZS, 3BLF, 3BZ, 3ZH, 3ZO, 4BQ, (4CO), 4EB, (4EH), (4EL), 4FT, 4GL, (4HI), 4HW, (4HZ), 4JK, 4JY, 4KC, 4KK, 4ME, 4NE, 5's too numerous, (6ABX), 6AWP, (6AWT), (6BH), 6BOE, 6BRF, (6BSQ), 6EN, 6JD, 6KA, (6ZB), (6ZZ), 6XAD, 6RM, 7AFW, (7SC), 7ZO, 7ZU, 8AAF, (8AER), (8AJX), (8ALC), (8AME), 8ANB, 8ATU, (8AXC),

8BEF, (8BEN), (8BKE), (8BRY), 8BUM, (8BVR), (8BWZ), (8BYO), (8CP), (8CAB), (8CGJ), (8CGX), (8CVA), (8CYT), (8IJ), (8LT), 8QK, (8UR), 8VY, (8YN), (8ZF), 8ZW, 9's too numerous. Can.: (3BV).

5QF, Mobile, Ala. (1 Tube)

C.W.: 1APR, 1BCG, 1BKA, 1BRQ, 1CMK, 1DDU, 1HTT, 1QP, 2AJ, 2AYV, 2CBX, 2CGT, 2DEF, 2EL, 2FP, 2LO, 2UE, 2XAP, 2XAQ, 2ZL, 3AQR, 3AYV, 3BA, 3BAV, 3BIK, 3BIL, 3BL, 3BLF, 3BOB, 3BOY, 3BV, 3BVC, 3BVL, 3BOF, 3BN, 3BO, 3BK, 3BHN, 3BOV, 3CM, 3FG, 3IV, 3IW, 3JH, 3JJ, 3NB 3OT, 3PZ, 3RF, 3RR, 3TJ, 3TW, 3ZH, 3ZZ, 4BH, 4BK, 4BQ, 4BX, 4CO, 4CY, 4EH, 4EB, 4EA, 4EL, 4GL, 4HW, 4HZ, 4ID, 4JK, 4KM, 4KL, 4LJ, 4LP, 4ME, 4NT, 4OI, 4SW, 4XD, 4XJ, 4YA, 5AAT, 5ABY, 5ACF, 5AE, 5AGD, 5AL, 5AGJ, 5CQ, 5DW, 5EIR 5EK, 5FV, 5GI, 5GEN, 5GR, 5HZ, 5IR, 5JB 5JD, 5JL, 5KC, 5LAV, 5MD, 5MK, 5MM, 5MY, 5MN, 5ML, 5NC, 5NK, 5NL, 5NV, 5NN, 5NS, 5OT, 5PV, 5PX, 5QI, 5QR, 5QS, 5QY, 5SA, 5SK, 5SZ, 5TC 5TG, 5TJ, 5UJ, 5WE, 5XA, 5XAD, 5XAE, 5XAT, 5XB, 5XV, 5XK, 5YQ, 5ZA, 5ZAS, 5ZS, 5ZAV, 5ZB, 5ZU, 5ZAG, 5ZAK, 6AWT, 6FX, 6IF, 6KA, 6XAD 7BH, 7GH, 7VK, 7VM, 7ZO, 7ZV, 8ADU, 8ANB, 8AXC, 8AWR, 8AWY 8AZF, 8ASV, 8AIM, 8ALC, 8AWZ, 8AAF, 8ASH, 8ALF, 8AXB, 8AIO, 8AQF, 8ACF, 8AWS, 8APV, 8ATC, 8AK, 8ABE, 8ALT, 8AAN, 8BWZ, 8BOG, 8BYT, 8BDO, 8BVQ, 8BOZ, 8BTL, 8BBO, 8BGJ, 8BFV, 8BDE, 8BRM, 8BFH, 8BK, 8BXX, 8BTV, 8BO, 8BOZ, 8BXH, 8BNY, 8CKV, 8CQR, 8CIA, 8CBC, 8CKO, 8CGX, 8CJH, 8CHU, 8CJY, 8CSE, 8DRK, 8DIY, 8DKY, 8IQ, 8IB, 8JU, 8LT, 8ML, 8OK, 8OE, 8QR, 8QK, 8SB, 8TT, 8VY, 8VQ, 8VC, 8WV, 8XJ, 8XAE, 8XE, 8YN, 8YU, 8YD, 8ZW, 8ZAE, 8ZZ, 8ZAF, 9AWS, 9AIY, 9AFD, 9AVN, 9AWM, 9AMI, 9AUA, 9ASE, 9APS, 9AL, 9ANQ, 9AIX, 9AXU, 9ARZ, 9AON, 9AAP. 9AIP, 9AMT, 9AJH, 9ABV, 9BZN, 9BVZ, 9BCH, 9BWY, 9BED, 9BZL, 9BZI, 9BIK, 9BST, 9BZ, 9BI, 8BSO, 9BAV, 9BDI, 9BHD, 9BSZ, 9BXY, 9BEY, 9BRK, 9CHK, 9CP, 9CUC, 9CGK, 9COX, 9CJ, 9CVO, 9CNY, 9CM, 9CFY, 9CTE, 9CO, 9CFI, 9CUI, 9CXN, 9CXP, 9CDT, 9CY, 9CJA, 8CJC, 9CBA, 9DXN, 9DTS, 9DWU, 9DKY, 9DYW, 9DK, 9DGQ, 9DBV, 9DPL, 9DWK, 9DNH, 9DLR, 9DMJ, 9EI, 9EJ, 9FB. 9GK. 8GX, 9HK, 9IIY, 9JG, 9KM, 9KQ, 9KP, 9LC, 9LZ, 9LU, 9LH, 9OX, 9OF, 9PF, 9PI, 9PS, 9QR, 9RC, 9UC, 9UU, 9VK, 9WA, 9WY, 9WC, 9XM, 9XA, 9XAC, 8ZAC, 9ZY, AD7.

6ZY, Honolulu, Hawaii

C.W.: 1ADL, 1BCG, 1BKQ, 1BDI, 2GR, 2PW, 2ZS, 2PO, 2XAP, 3BV, 3BLF, 3CM, 3NG, 3BLF, 3AAO, 3YO, 3ZW, 4CK, 4EA, 4ID, 4KK, 4BV, 5AK, 5ACJ, 5SM, 5QI, 5XK, 5XV, 5XD, 5UJ, 5GI, 5ZB, 5XD, 5TC, 5EK, 5CN, 5MY, 5PX, 5LF, 5ZA, 6XAD, 6BRU, 6BJR, 6BPZ, 6CBI, 6BOO, 6BCR, 6CC, 6BRF, 6BVW, 6IF, 6BIQ, 6XK, 6EN, 8KU, 6KA, 6BJQ, 6BQF, 6BPI, 6ZZ, 6BQC, 6BJY, 8KU, 6ZH, 6RM, 6ARB, 6ANH, 6AJR, 6AWT, 6ZAF,7BJ, 7ADP, 7AN, 7HD, 7NM, 7SC, 7SF, 7ZU, 7NA, 8AB, 8BK, 8IB, 8KS, 8PD, 8CY, 8ML, 8OW, 8FQ, 8SB, 8EY, 8SP, 8VY, 8FU, 8AQ, 8NA, 8FT, 8QK, 8UE, 8UZ, 8XE, 8ZY. 8NA, 8YD, 8AIW, 8AXC, 8AQC, 8AEA, 8BPL, 8BFM, 8BXA, 8BDE, 8BEO, 8AIM, 8BRM, 8ASV, 8ATU, 8AXC, 8AWP, 8BKE, 8BDW, 8CAA, 8CGX, 8CGP, 8CUR, 8AZD, 8DAE, 8XAE, 8CWX, 8ZAE, 9AT, 9AL, 9AM, 9AW, 9CR, 9PS, 9KP, 9GK, 9LZ, 9ZN, 9YW, 9OX, 9VK, 9AAIL, 9AUL, 9ARZ, 9AMI, 9AOU, 9ABU, 9APH, 9AVC, 9AFK, 9ANQ, 9BEY, 9BJU, 9BRI, 9BED, 9BIW, 9BLG, 9BXQ, 9BGH, 9BBF, 9BKH, 9BQW, 9BBS, 9BKP, 9RHL, 9BCH, 9CMK, 9CCV, 9CDE, 9DSD, 9DQM, 9DSM. 9DXN, 9DQM, 9DWK, 9DYG, 9DJB, 9DQU. 9BJI. 9YAJ, 9BXQ.

6ACM, 2130 Emerson St., Palo Alto, Calif.

All C.W.: 1CLF, 1SD, 2FP, 2XAO, 3AEG, 3AUU, 3CKR, 3SM, 4CG, 4FG, 5AAR, 5AEC, 5AMS, 5BE, 5CN, 5FV, 5GO, 5GV, 5IK, 5IS, 5JL, 5MB, 5MO, 5NK, 5OJ, 5QI, 5SM, 5TA, 5TM, 5UK, 5VA, 5XD, 5ZB. (Six's and Sevens too numerous to mention) 8AB, 8AAF, 8AFD, 8AIH, 8AQO, 8ASV, 8ATC, 8ATU, 8AZD, 8AZF, 8AZQ, 8BCH, 8BEF, 3BEK, 8BK, 8BNJ, 8BOH, 8BRC, 8BRF, 8BVJ, 8BXH, 8BZY, 8CDZ, 8CF, 8CMI, 8CPV, 8CUR, 3DO, 8DR, 8ER, 8HXF, 8IB, 8IC, 8KG, 8PD, 8QK, 8SP, 8UE, 8UQ, 8UZ, 8VY, 8WA, 8XY, 8YN. 8ZAF, 8ZO, 8ZW, 9AAP, 9ABU, 9AEQ, 9AEY. 9AFN, 9AFW, 9AIF, 9AJH, 9ALP, 9ALR, 9AMU, 9ANF, 9AOU, 9AQL, 9ASF, 9ASN, 9ASV, 9APW, 9ATN, 9AXU, 9AUL, 9AYU, 9BCF, 8BCU, 9BIE, 9BIZ, 9BJI, 9BJV, 9BKA, 9BLY, 9BM, 9BP, 9BRK, 9BSG, 9BSZ, 9BVP, 9BXA, 9BXQ, 9BZI, 9BZZ, 9CCS, 9CCV, 9CDN, 9CMK, 9CFT, 9CFY, 9CJU. 9CKM, 9CP, 9CR, 9CW, 9CTN, 9CUI, 9CPU, 9DCA, 9DCR, 9DGE, 9DGV, 9DHI, 9DIO, 9DJV, 9DOM, 9DP, 9DQM, 9DQQ, 9DSM, 9DTM, 9DVI, 9DYN. 9FM, 9FV, 9GK, 9IG, 9II, 9IO, 9KP, 9LG, 9LZ, 9NQ, 9NU, 9PS, 9RC, 9UH, 9UU, 9VE, 9YAK, 9XAC, 9XKP, 9ZD, 9ZN. Canuck—3BV, 3BY, 3CO, 4AB, 4BV,4CO, 5CN, 5CT.

6ZAC, Wailuku, T. H. (Nov. 17th—Dec. 6th.)

C.W.: 1BET, 1CMK, 1XU. 2AWL, 3BLF, 4BV, 5ABY, (5DI), 5FX, 5CN, 5IK, 5IR, 5KP, 5NN, 5PX, 5QY, (5SF), 5SM, (5TC), 5TJ, 5WSY, 5XV, 5XAD, 5ZA, (6AK), (6AJR), (6ARB), (6AJF), (6ASJ), (6AVD), (6AVR), (6AWT), (6BSA, phone also), 6BBH, (6BJP), (6BGH), 6BQG, (6BQL), 6BVQ, (6BCR), (6CC), (6EA), 6EB, 6GF, (6GR), 6GX, 6CU, (6KA), 6JD, 6PI, (6TC), (6TI), (6TQ), 6XB phone, 6XAF, (6ZE), (6ZI), (6ZN), 6ZAF, 6ZG, 6ZZ, 7ABB, 7ADP, 7BB, 7BJ, 7BK, (7MF), 7RI, (7SC), 7SY, 8AA, 8AB, 8ACX, 8AIP, 8ASV, 8AXN, 8AXC, 8BK, 8BDV, 8CP, 8CUR, 8CGX, 8IB, 8JU, 8VQ, 8ZAC, 8ZAG, 8CMI 9AAP, 9AAV, 9APS, 9APW, 9AOU, 9AOG, (9AWM), 9AUL, 9BBF, (9BJI), 9BED, 9BJV, 9BP, 9BGH, 9BVY, 9CCM, 9CXP, 8CUC, 9CGK, 9DTJ, 9OU, 9QU, 9UU, 9XP, 9YAJ, 9YW, 9ZZN.

6AMZ, San Mateo, Calif. (One Tube).

C.W.: 1GV, 1XM, 2EL, 2FP, 3CC, 4BQ, 4EB. 4RG, 4YA, 5BY, 5EK, 5GO, 5HZ, 5IK, 5PX, 5UJ. 5VO, 5ACF. 5XD, 5ZA, 5ZB, 5ZAS. 5ZAV, 6AK, 6BF, 6BH, (6CC), 6CU, 6EA, 6EB, 6EF, (6EK), (6FH), 6FT, 6GD, (6GX), 6IF, 6IV, 6JD, 6KA, 6KU, 6LU, 6OH, 6OM, 6NY, (6PI), 6RR, 6TC, (6SU), 6UJ, (6ABX), 6ACB, 6AGP, (6AHP), 6AJR, 6ALU, 6AOI, (6ARC), (6ARF), 6ARK 6ATQ, (6AVN), 6AVR, 6BBH, 6BBU, 6BCD, 6BCJ, 6BDH? 6BEQ, 6BET, 6BFR, (6BGC), 6BIC, (6BIQ), 6BJJ, 6BJQ, 6BJT, 6BKD, 6BKO, 6BMD. 6BMN, 6BOB, 6BOD, 6BOE, 6BOW, 6BPZ, 6BQB, 6BQC, (6BQE), 6BQD, 6BQY, 6BNR, 6BRF, 6BSG, 6BSJ, 6BUM, 6BVG, 6XK, 6ZN, 6ZO, 6ZR. 6ZX, 6ZZ, (7BJ), 7BK, 7CD, 7DC, 7DP, (7EQ), 7EY, (7HJ), (7JW), 7HM, 7LY, (7MF), 7NC, 7NF, 7NW, (7NN), 7NY, (7PB), 7PF, 7OT, 7QT, 7QN, 7RI, (7SC), (7SF), 7SJ, 7TH, (7TO), 7TQ, (7UD), 7VX, 7WM, 7WX, 7ABB, 7ACA, 7ACG, 7ADO, 7ADP, 7ADM, 7AEM, (7AFS), 7AFW, 7AIC. 7XL. 7ZU. 7ZV, 7ZY, 8AB, 8CF, 8IB, 8ML, 8PD, 8SB, 8SG, 8UE, 8VY, 8ABS, 8AEA, 8AIB, 8AME, 8AMM, 8AQO, 8AZD, 8BCY, 8BEF, 8BLC, 8BXH, 8BXX, 8BYT, 8CUR, 8CZR, 8XE, 8XAK, 8YN, 8YD, 8YU, 8ZY. 8ZZ, 9BM, 9BP, 9CP, 9EI, 9GK. 9PW, 9RC, 9UC, 9UH, 9UU, 9VK, 9AAU, 9AAV, 9AEQ, 9AIY, 9AIX, 9AJP, 9AJW, 9AMB, 9ANQ, 9ARR, 9ARZ, 9AVZ, 9AWM, 9AUL, 9AXU, 9BDS, 9BJI, 9BSG, 9BSZ, 9BZI, 9BXQ, 9CAN, 9CCV, 9CDE, 9CFO, 9CNS, 9CUC, 9DFB, 9DKQ, 9DKY, 9DTD, 9DTM, 9DYN, 9XAC, 9XAQ, 9YW, 9YAJ? 9ZN, 9ZAF, (BT3), AD7, Can: 3BV, 4BV. 5CN, 5CT, 5GO.

Spark: 6DS, (6KC), (6KE), (6OD). (6OL), 6QK, 6QR, 6QY, 6WM, (6ABW), (6ACR), (6AHU) (6AIN), (6AGK), (6ALD), (6AMW), (6OAW), 6ARK, 6ATF, 6AVR, (6AWX), 6BAE, 6BAJ, 6BFH, 6BJU, 6BVD, 7BG, (7GE), 7FQ, (7KJ), 7LY, (7NE), (7OH), 7OJ, 7PJ, 7RU, 7RY, 7VE, 7VF, (7WG), 7AEA), 7ZK, 7ZL, (7ZU), 8BDA. (5 Watt Strait C.W. hr. nw.)

7HM, Great Falls, Mont

C.W.: 2XAT, 2XI, 3YO, 4DQ, 4YYA, 5KT, 5DI, 5ZAV, 5CT, 5TJ, 5ZM, 5ZH, 5XAJ, 5XD, (6AWT), (6AK), (6IG), 6ZX, 6ZT, 6BSA, 6XAD, 6LV, 6VM, (6ARF), (6TC), 6OK, 6UUV, 7's too numerous to give all. (7UD), (7BK), (7OE), (7BJ), (7AIC), 7ASF, (7NY), 7AF, (7TO), 7SC, 7LU, (7MF), (7GE), 7NE, 7XC, (7AGF), (7EQ), (7ABB), 7ZU, (7OT), 7LY, (7OO), (7TQ), (7QT), 7ADO, 7ABN, (7HJ), 7KE, (7AFN), (7OM), 7NA, (7ZV), (7DP), (7PF), (7TH), (7OT), (7AEM), (7DU), 8AZD, 8BDE, 8ZW, 9AXU, (9DTE), (9XAQ), (9ZAF), 9QF, 9CTN, (9BXT), (9BJI), (9CFY),

9AM, 9BZI, 9BTT, 9CNS, 9PN, 9AFD, 9GK, (9YAH), 9ZAC, 9BFG, 9CEN, 9DKY, 9BED, 9AUD 9BEY, 9ASF, 9YAK, 9AQE, 9DSM, 9ZN, 9BBF, 9CXP, (9ABB), (9BVL), 9CTR, 9CXV, 9BXC, 9AUL, 9BIK, 9DPL, 9CJJ, (9ARZ), (9AWM), (9AYU), 9DRV, 9UN, 9ZK, 9DVN, 9LZ, 9YU, 9YW, 9ANQ, 9AHH, 9EBT, 9ZT, 9DFI, 9DQM, 9CAA, (9ABU), 9AUL, (9CFY).

Spark: (6BIP), (6TU), (7KJ), 7LY, 7AFO 9JM, 9AMX, 9BOF, 9DKQ, 9AOG, Canadians: (4DQ), (4BV), (4CN), (4AB), (5GO).

7PN, Seattle, Wash. (1 tube)

All C.W.: 1BKA, 1BKQ, 1ZE, 2GK, 2NZ, 2AFP, 3FS, 3GC, 3SM, 3ZZ, 4BQ 4BY, 4GL, 4KC, 5DO, 5ET, 5IT, 5IR,, 5KC, 5NK. 5XE, 5ZAW, Sixes and Sevens too numerous, 8AB, 8VY, 8ZY, 8ZZ, 9BM, 9DR, 9GK, 9II, 9PI, 9PN, 9UU, 9XM, 9YW, 9ZN, 9AMB, 9AMI, 9APS, 9ASP, 9AUL, 9AVY, 9AVZ, 9AWM, 9AYA 9BBF, 9BBU, 9BIK, 9BJI, 9BUN, 9BZI, 9DFB, 9DQM, 9DRV, 9DSM, 9DUG, 9DZQ, 9YAJ, 9ZAF, Canadians: 3CO, 4BV, 4DQ, 5CN, 5CT, 9AC.

7IY, Vashon, Wash.

C.W.: 1BRQ, 2AFP, 2AWL, 2CKR, 2CPD, 2FP, 2ZE, 3BZ, 3JJ, 3SG, 4APR, 4BQ, 4EN, 4KK, 4YA, 5ACF, 5AEC, 5AAM, 5DI, 5FV, 5EK, 5MO, 5NX, 5NV, 5NK, 5PO, 5KC, 5IR, 5IS, 5PX, 5RH, 5SM, 8SF, 5TC, 5TJ, 5TY, 5UO, 5UN, 5XAD, 5YG, 5ZH, 5ZA, 5ZS, 8AXC, 8ANB, 8AZQ, 8AB, 8ALT, 8ASV, 8AGO, 8AQO, 8APW, 8AQR, 8ACF, 8AX, 8ABB, 8AWM, 8AAF, 8AIF, 8AXB, 8ABR, 8ATU, 8ALN 8AIT, 8BDO, 8BJU, 8BFM, 8BRM, 8BXH, 8BFX, 8BEF, 8BRK, 8BRC, 8BJV, 8BVR, 8BSV, 8BXX, 8CMI, 8CGV, 8CUR, 8CUD, 8CKO, 8CY, 8DAK, 8KG, 8JU, 8OW, 8QQ, 8IB, 8QK, 8SB, 8SP, 8UE, 8WR, 8XE, 8YU, 8ZE, 8ZAG, 9AOG, 9AMA, 9AHH, 9AMI, 9AUZ, 9AAP, 9ANQ, 9AWM, 9AYU, 9ANF, 9AVZ, 9AMB, 9AJP, 9ASF, 9ANI, 9ASF, 9ARZ, 9AOU, 9AQA, 9APW, 9ABV, 9AMM, 9AIN, 9APS, 9ARR, 9AVP, 9AIB, 9AFK, 9AAW, 9AEQ, 9AON, 9AUA, 9BQW, 9BLT 9BIK, 9BXC, 9BDV, 9BCF, 9BDR, 9BGH, 9BTT, 9BJV, 9BED, 9BM, 9BKW, 9BSZ, 9BJI, 9BRI, 9BDB, 9BXA, 9BKP, 9BJ, 9BDS, 9BVY, 9BBF, 9BRK, 9BEY, 9BCR, 9BDS, 9BXJ, 9BAK, 9CXA, 9CCV, 9CMK, 9CKM, 9CJA, 9CDE, 9CR, 9CPB, 9CVQ, 9CTN, 9CGA, 9CFY, 9CCS 9CNS, 9CCM, 9CHN, 9CXP, 9CTR, 9DVL, 9DWM, 9DQM, 9DGE, 9DYG, 9DJB, 9DBL, 9DSM, 9DCR, 9DFB, 9DQG, 9DBV, 9DHI, 9DWK, 9DXW, 9DKY, 9DDY, 9DAH, 9DCT, 9DXN, 9DQU, 9DGW, 9EBT, 9EBI, 9EI, 9FM, 9EP, 9GK, 9HT, 9II, 9HM, 9MF, 9LZ, 9PN, 9PW, 9UH, 9UU, 9XAQ, 9US, 9XAC, 9YNI, 9YM, 9ZN, 9ZT.

Spark: 5YG, 8TJ, 8CY, 8EW, 8BDA, 9ATV, 9AMX, 9AAW, 9AVP, 9AIN, 9AFW, 9ASN, 9AMK, 9BOZ, 9BTX, 9CGA, 9CP, 9CXC, 9DML, 9DZV, 9DAG, 9DGW, 9DXV, 9HT.

Two days—Daylite—3:30 P.M. to 4:30 P. M. P.S.T. C.W.: 9AWM, 9ASF, 9AUL, 9ARR, 9ASU, 9BRI, 9BZI, 9BXQ, 9BSZ, 9BRK, 9BFL, 9AJP, 9CFI, 9DHI, 9DGE, 9DKY, 9DFB, 9DGX, 9DJB, 9EI, 8AGO, 8ASF, 8AIT, 8AAF, 8BRC, 8CLK, 8BDU, 5FV, 5ZAH, 5NK, 5UK. Spark: 5AU, 9AVP, 9LF.

7MF, Eugene, Oregon.

C.W.: 1BGF, 1BWZ, 1CQM, 1AZK, 1CIK, 1BKQ, 1CMK, 1ACU, 1ANQ, 1HX, 2FH, 2ZO, 2ZL, 2AFP, 2AAW, 2FP, 2OM, 3AVY, 3BNU, 3ALN, 3ZO 4EB, 4EH, 4BO, 4GL, 4KF, 4MN, 4BX, 4MW, 5EK, 5ER, 5TJ, 5TM, 5TY, 5PO, 5PX, 5NK, 5ZA, 5QR, 5JM, 5XAD, 5ACF, 5ZAP, 5VM, 5XB, 5ZAT, 5QI, 5DI, 5DO, 5ZAC, (6AK), (6BF), (6FH), (6GR), (6GX), 6IX, 6IK, (6KU), (6LO), (6NX), 6OH, (6RD), 6ZA, (6ZF), 6ZO, 6ZS, (6ZX), 6ZZ, (6AAT), 6ABQ, 6AAK-fone, 6AQW, (6ARB), (6ASJ), 6AWT, (6BCJ), 6BQF, (6BQL), (6BUM), 6ZH ex-6AJH, 6AOR, 6BJR, 6BKX, 6BQP, 6PI, 6BUN, 6BNW, 6BIN, (6BQC), 6BMU, 6BQR, 6BEQ, (6ABX), 6ALU, 6BJJ, (6APW), 6BSH, 6AHP, 6BJQ, (6BQZ), 6BSO, (6BMY), 6ALX, 6ALV, 6AUE, 7AD, 7BH, (7BJ), (7BK), 7BS, 7CE, 7CC, (7DP), 7DU, (7EQ), 7EX, 7GH, 7GJ, 7GK, (7HM), 7HR, 7HS, 7HW, 7JD, 7KX, 7LO, 7LN, (7LU), 7LY, (7NN), 7OE, (7OO), (7OT), 7QE, (7QW), (7QT), 7RN, (7SC), 7PN, (7TH), (7TM), (7TQ), (7UD), 7UF, (7UU), (7WM), 7YJ-fone, 7ZS, 7ZK, (7AEM), (7ADF), 7ABY, 7AEL, 7AGV, 7AER, (7AHZ), 7AFW, 7ACA, 8BK, 8BX, 8BO, 8JI, 8OW, 8KG, 8QK, 8XE, 8ZY, 8ZZ, 8YD, 8AHR, 8AQO, 8BRC, 8ASV, 8ALT, 8ACN, 8AWX, 8AXB, 8BFM, 8BXX, 8BHO, 8IB, 8BDU, 8BDB, 8BDO, 8BHT, 8BNO, 8BQC, 8BQF, 8BRC, 8BWC, 8BXF, 8BXI, 8BZY, 8CAY, 8CEF, 8CKM, 8CKO, 8CYT, 8CUR, 8CVE, 8XA, 8XV, 8AMM, 8AMQ, 8ANB, 8ANX, 8APT, 8BGG, 8CCX, 8CYV, 8ZAG, 8ZAE, 8CI, 8ZE, 8ZX, 8BXA, 8DAK, 8DWK, 8RT, 9PI, 9AXA, 9II, 9AWM, 9AIY, 9BDS, 9BJI, 9DGE, 9AIX, (9AM1), 9YW, 9APS, 9YAS, 9ANQ, 9GK, 9BLG, 9BXT, 9BEY, 9AMB, 9BZI, 9BUN, 9DCA, 9CR, 9CNS, 9DYW, 9BED, 9AVZ, 9DKY, 9BIC, 9BUW, 9DSM, 9BXQ, 9PN, 9YB, 9FM, 9ZY, 9ASO, 9DFB, 9ASF, 9CBA, 9CBB, 9CCS, 9CCV, 9CDJ, 9CFI, 9CGK, 9DCG, 9DUD, 9DVW, 9DR, 9ZAC, 9CJJ, 9DEK, 9AAP, 9AJA, 9AYY, 9YAZ-fone. (C.W.) Canadian, 3CO, 3KO, 4CB, 4BV, 4DQ, (5CT), 9BD, 9AW, (9AC).

Spark: 1ARY, 5YG, 5IW, 5ZAV, 5EL, 5EW, 5FO, 5RA, 5XF, 5XD, 5XU, 5YM, 5ZR, 5ZAK, 6GR, (6OD), 6ACR, 6AQA, (6QR), (6ARK), (6EX), 6ALA, 6ARS, 6TU, 6VX, 6ZQ, 6XH, (6OL), (6KC), 6AHF, 6DD, 6AAK, 7CK 7DH, (7IM), (7VE), (7QH), (7AIO), 7ZK, (7ABS), 7KE, (7HD), (7BK), (7AW), (7AFF), 7OW, (7OH), (7AHZ), (7AJQ), 8AVJ, 8UC, 9ASO, 9DAG, 9M, (MF7), am using 5 watts. All calls above on 1-step).

8CMY, Elyria, Ohio

C.W.: 1AR, 1CK, 1CJ, 1EO, 1FX, 1GG, 1GV, 1II, 1IV, 1OR, 1PM, 1PR, 1QP, 1SN, 1UN, 1XP, 1XU, 1YD, 1YK, 1ADL, 1ADP, 1ANR, 1AJP, 1AJU, 1ARY, 1AUN, 1AYZ, 1BDC, 1BDT, 1BES, 1BFE, 1BHQ, 1BNT, 1BOM, 1BRQ, 1BWJ, 1CJA, 1CJH, 1CKP, 1CMK, 1CMP, 1XAG, 2CD, 2CE, 2EL, 2FP, 2GI, 2KE, 2KP, 2LO, 2NZ, 2TB, 2TS, 2WB, 2ZL, 2AGB, 2AGC, 2AJW, 2AHJ, 2AOS, 2AWF, 2AWS, 3BZ, 3CA, 3CM, 3CG, 3DC, 3ER, 3FS, 3HG, 3HX, 3OE, 3OT, 3PZ, 3PQ, 3QV, 3SK, 3SM, 3TB, 3VW, 3XW, 3YO, 3ZO, 8ZZ, 3ABJ, 3ADE, 3ADT, 3AJJ, 3AJO, 3ANJ, 3BBB, 3BHL, 3BHM, 3BHO, 3BIJ, 3BLF, 3BLU, 3BLZ, 3BNU, 3BOF, 3BUC, 3BVA, 3BVC, 3BVL, 4BB, 4BV, 4BX, 4CG, 4CH, 4CM, 4EA, 4EB, 4EH, 4EL, 4FE, 4FG, 4GL, 4HW, 4HZ, 4JK, 4KC, 4KF, 4KI, 4KL, 4KM, 4NT, 4NV, 4XD, 4YA, 5AB, 5DA, 5DI, 5DO, 5EK, 5ER, 5FV, 5HL, 5JW, 5KC, 5LB, 5MB, 5NN, 5PX, 5QA, 5SM, 5TJ, 5UK, 5XA, 5XB, 5XI, 5XK, 5XL, 5ZA, 5ZB, 5ZI, 5ZS, 5AAG, 5AAM, 5ADE, 5AEC, 5AER, 5AAZ, 5ANO, 5ZAG, 5ZAS, 6KA, 6ABX, 6ZF, 6ZU, 6ZZ, 7CD, 7ZU, too many 8's, 9EI, 8EP, 9FK, 9IO, 9IY, 9JL, 9MC, 9OF, 9OX, 9PF, 9PI, 9PO, 9TS, 9UH, 8UU, 9YZ, 9XJ, 9YM, 9ZJ, 9ZN, 9AAU, 9AAV, 9AFK, 9AFN, 9AJH, 9AKD, 9ALR, 9AMI, 9AMM, 9ANQ, 9AON, 9ARK, 9ARR, 9ARZ, 9ASE, 9AUA, 9AUL, 9AXA, 9AYU, 9BCF, 9BED, 9BEY, 8BFM, 9BHD, 9BIE, 9BIK, 9BIL, 8BJC, 9BJN, 9BKF, 9BLC, 9BOO, 9BRK, 9BTA, 9BUH, 9BYT, 9CCS, 9CGR, 8CGY, 9CHF, 9CJA, 9CKM, 9CLN, 9CMJ, 9CNV, 9CNY, 9CPY, 9CTR, 9CYW, 9CZF, 9DAG, 9DCR, 9DGE, 9DKY, 9DNH, 9DNL, 9DPL, 9DSD, 9DSM, 9DVL, 9DVW, 9DXN, 9DWN, 9DWQ, 9DYN, 9DYU, 9DZW, 9XAC, 9ZAF. Canadians: 3AD, 8BP, 8BV, 3DH, 3GN, 3KO, 3XN, 9AL, 9BS.

8AUU, Canton, Ohio

Spark: 1CNA, 1CNI, 1GP, 2ABB, 2AHK, 2AJE, 2AQZ, 2BMO, 2BM, 2CJX, 2FP, 2WB, 3AHK, 3BEA, 3LR, 3QS, 4FB, 4GN, 5XA, 8AAW, 8ACF, 8AFG, 8AFV, 8AIT, 8AJT, 8AQO, 8AWP, 8BAD, 8BEP, 8BPG, 8BXC, 8BD, 8CDV, 8CEH, 8CIA, 8CMI, 8CYT, 8CP, 8DY, 8EB, 8EW, 8EX, 8MZ, 8UC, 8VD, 8ZX, 9AAW, 9ACC, 9AFR, 9ANQ, 9AMK, 9AMQ, 9AQH, 9AWM, 9AWP, 9BCJ, 9BWA, 9CZL, 9DCJ, 9DHG, 9DQQ, 9DWM, 9DZY, 9EP, 9EV, 9JX, 9PD, 9UH, 9ZA, 9ZN.

C.W.: 1ADL, 1AKG, 1AOK, 1AOL, 1AZW, 1AJP, 1AWN, 1AFS, 1AMS, 1ADN, 1AJU, 1AWB, 1AXD, 1AGI, 1ASR, 1AM, 1AN, 1BGF, 1BBP, 1BKQ, 1BCF, 1BFE, 1BES, 1BSY, 1BSD, 1BRQ, 1BGJ, 1BSZ, 1BYG, 1BHL, 1BZ, 1CMK, 1CDO, 1CJH, 1CWH, 1CDR, 1CNI, 1CAK, 1CMP, 1CAS, 1CGO, 1CQW, 1EE, 1FB, 1GL, 1GP, 1GV, 1LL, 1IL, 1JT, 1JX, 1KC, 1LL, 1MY, 1ON, 1OR, 1QP, 1RD, 1RH, 1UH, 1UN, 1XJ, 1XP, 1XU, 1YK, 2ADT, 2AZY, 2AWF, 2AFP, 2AER, 2API, 2AMF, 2AQH, 2AGD, 2ANM, 2ARN, 2AYV, 2APR, 2AWL, 2AQI, 2AOH, 2AWH, 2AJF, 2AFP, 2ACR, 2BNC, 2BX, 2BYS, 2BVL, 2BOI, 2BBB, 2BEM, 2BMR, 2BUE, 2BDM, 2BFU, 2BSH, 2BBS, 2BMK, 2BUA, 2BVE, 2BBL, 2CBC,

2CBG, 2CGV, 2CZQ, 2CCD, 2CKN, 2CGN, 2CCU, 2CNK, 2CMV, 2CJN, 2FP, 2GK, 2HG, 2JW, 2KD, 2KO, 2LT, 2NZ, 2OM, 2RM, 2RU, 2SM, 2SQ, 2UD, 2VA, 2VH, 2XQ, 2ZL, 2ZK, 3AFD, 3AQR, 3ADT, 3AJJ, 3ANK, 3ALU, 3ACG, 3ALT, 3ATG, 3ABL, 3AWW, 3AWY, 3ASV, 3APT, 3ANJ, 3APB, 3ATC, 3AWH, 3API, 3APR, 3AAY, 3AS, 3BMN, 3BIJ, 3BEH, 3BHL, 3BZV, 3BJC, 3BHM, 3BAK, 3BUC, 3BFP, 3BQV, 3BOB, 3BLF, 3BVL, 3BNC, 3BOF, 3BBS, 3BKC, 3BOU, 3BNU, 3BWU, 3BJV, 3BAJ, 3BN, 3BJ, 3BG, 3BX, 3CAN, 3CBM, 3CC, 3CM, 3CF, 3CG, 3DE, 3DH, 3FH, 3FS, 3FT, 3GK, 3HB, 3HR, 3HW, 3HS, 3IL, 3IW, 3JJ, 3LP, 3MO, 3NB, 3ND, 3OD, 3PZ, 3QV, 3RV, 3TA, 3TJ, 3VW, 3VX, 3XN, 3XW, 3YO, 3ZO, 3ZV, 3ZZ, 4BB, 4BF, 4BQ, 4BX, 4BZ, 4CY, 4DS, 4EA, 4EB, 4EL, 4FB, 4FG, 4FT, 4GH, 4GK, 4GL, 4ID, 4IY, 4IZ, 4J, 4JK, 4KC, 4KF, 4KL, 4KT, 4LJ, 4NT, 4OI, 4UE, 4YA, 4ZF, 4KV, 5AGJ, 5ABY, 5AS, 5DA, 5DI, 5DK, 5EK, 5GA, 5GQ 5HD, 5HK, 5HW, 5IK, 5IX, 5IZ, 5JT, 5JW, 5KI, 5KC, 5KN, 5KL, 5LA, 5MA, 5ME, 5MO, 5NK, 5NS, 5NT, 5NZ, 5QI, 5SF, 5JM, 5SZ, 5UK, 5UJ, 5XA, 5XK, 5XT, 5ZAG, 5ZAK, 5ZAR, 5ZAS, 5ZAV, 5ZAZ, 5ZA 5ZB, 5ZL, 5ZT, 6ND, 6XAD, 6ZZ, 7EX, 7FL, 7FM, 7GA, 7HB, 7NO, 7PN, 7ZU, 7ZV. Canadians: 3BJ, 3XN, 9AL.

8CZI at Ithaca, N. Y.

Spark: 5AQ, 5QS, 9BOF, 9CTW, 9HT,

C.W.: 4GD, 4JZ, 4OI, 5AAT, 5ABY, 5AEC, 5AE, 5CI, 5DI, 5DQ, 5IR, 5JB, 5JL, 5KC, 5LO, 5MT, 5NK, 5NN, 5NS, 5NV, 5PO, 5PX, 5QS, 5RR, 5SF, 5SM, 5TC, 5TP, 5UJ, 5VO, 5WE, 5XAD, 5XD, 5XV, 5ZAE, 5ZAK, 5ZAV, 5ZAZ, 6AVD, 6AVR, 6AJH, 6ABX, 6BOE, 6BUN, 6CC, 6GF, 6RM, 6XAD, 6ZZ, 7SC, 7ZO. 7ZU, 7ZV, 9ABV, 9AFD, 9AMB, 9ANF, 9ANQ, 9AOG, 9AOR, 9AQR, 9ASF, 9ATN, 9AVM, 9AVN, 9AYL, 9AYS, 9AWM, 9BBF, 9BEY (fone), 8BFQ, 9BKK, 9BVY, 9BXI, 9CCV, 9CEH, 9CIY, 9CKM, 9CNS, 9COI, 9CPB, 9CXN, 9DKQ, 9DQE, 9DTA, 9DTM, 9DUG, 9DVP, 9EAK, 9FM, 9GK, 9PI, 9PS, 9XAQ, 9YW, 9ZAF, 9ZU, AD-7. Can. 4BV.

8CWC, Oxford, Ohio

C.W.: 1ADL, 1AGH, 1AJX, 1ARY, 1BAS, 1BES, 1BET, 1BHR, 1BKG, 1BSD, 1BWJ, 1BYN, 1CJH, 1CMK, 1CMP, 1CPF, 1CZ, 1GP, 1GV, 1II, 1IL, 1KC, 1LL, 1ON, 1OR, 1PM, 1PN, 1RD, 1RU, 1XU, 1XX, 1ZE, 2ADE, 2AFA, 2AGE, 2AKO, 2ALY, 2AM, 2ANM, 2AOS, 2AQE, 2AVU, 2AWF, 2AYV, 2BAY, 2BBB, 2BIR, 2BKT, 2BMS, 2BQU, 2BRB, 2BRX, 2BSC, 2BU, 2BXP, 2CEI, 2CFE, 2CKN, 2CMV 2CNZ, 2CQZ, 2FD, 2FS, 2GI, 2GX, 2LO, 2OM, 2RY, 2SU, 2TS, 2UW. 2WR, 2XAP, 2XN, 3ABW, 3AD, 3AFB, 3AKR, 3AMU, 3ANJ, 3AQR, 3ARO, 3AVA, 3AS, 3BA, 3BEF, 3BFG, 3BIJ, 3BJY, 3BKL, 3BLF, 3BLZ, 3BMN, 3BNU, 3BOB, 3BOF, 3BSS, 3BVC, 3CA, 3CCU, 3CDY, 3FB, 3GK, 3HG, 3HX, 3IH, 3JC, 3JI, 3JJ, 3MB, 3MO, 3NB, 3OI, 3PU, 3RF, 3SU, 3TA, 3TI, 3UD, 3XM, 3YO, 3ZH, 3ZO, 3ZZ, 3AZ, 4BQ, 4BX, 4CG, 4CO, 4CY, 4EA, 4EB, 4EH, 4EJ, 4EL, 4GZ, 4HS, 4HW, 4HZ, 4JK, 4KC, 4KK, 4KL, 4KM, 4LP, 4YA, 5AAM, 5AAF, 5ABY, 4AGI, 5DI, 5EK, 5ES, 5FV, 5IR. 5IX, 5JB, 5JL, (5KN), 5MB, 5ME, 5ND, 5NV, 5PV, 5QM, 5QY, 5SL, 5WE 5XA, 5XAD, 5XK, 5XV, 5ZA, 5ZAK, (5ZAV), 5ZB, 6BH, 6CC 6HZ(?), 6KA, 6XAD, 6ZZ, 7AW(?), 7ZU. (eights and nines too numerous). Can. (3JI).

9AHC, Ellendale, N. Dak. (One Tube, All Over 1000 Miles)

C.W.: 1ADL, 1ADP, 1AJP, 1ARY, 1AZW, 1BAS, 1BCG, 1BEP, 1BER, 1BET, 1BKA, 1BKQ. 1CJH, 1CMK, 1CNF, 1DQ, 1GV, 1II, 1QP, 1XM, 1XU, 1XZ, 1ZE, 2AFP, 2AHO, 2AWF, 2AWL, 2AYV, 2BEA, 2BGM, 2BJO, 2BKT, 2BMR, 2BMS, 2BNZ, 2BQD, 2BQH, 2BRB, 2BRX, 2CBW, 1CBX, 2CCD, 2CFB, 2CIN, 2CJN, 2CKL, 2CKR, 2CPD, 2CQZ, 2EL, 2FP, 2FW, 2GI, 2GK, 2GR, 2HW, 2JW, 2KF, 2LO, 2NZ, 2OM, 2UD, 2XAJ, 2XAQ, 2ZK, 2ZS, 3AAY, 3ABW, 3ADT, 3AFB, 3AJD, 3AJJ, 3AJP, 3ANJ, 3APR. 3AQR, 3ASP, 3ATG, 3AUU, 3BEC, 3BFF, 3BFU, 3BG, 3BGT, 3BHM, 3BIJ, 3BIT, 3BLF, 3BLU, 3BLZ, 2BNU, 3BOB. 3BSS, 3BUR, 3BUV, 3BZ, 3CA, 3CBM, 3CC, 3CG, 3CK, 3CU, 3FS, 3HD, 3HG, 3HL, 3HX, 3JJ, 3LK, 3LR, 3MB, 3NH, 3OT, 3PZ, 3RF, 3SU, 3VW, 3XM, 3YO, 3ZH, 3ZO, 3ZW. 3ZZ, 4AS, 4BF, 4BX, 4BY, 4CG, 4CO, 4EA, 4FB, 4EH, 4EL, 4FG, 4FT, 4FW, 4JG, 4JK, 4KL, 4KM, 4LJ, 4LP, 4ME, 4XD, 4XK, 4YA, 5AAT, 5ACF, 5ADE, 5AE, 5CI, 5CY, 5ES, 5GJ, 5GP, 5GR, 5HB, 5IA, 5IR, 5JM, 5KC, 5KN, 5KP, 5NK, 5NN, 5NV, 5PO, 5QS, 5QY, 5RH, 5SS, 5SZ, 5TM, 5TP, 5SZ, 5VO, 5VY, 5XA, 5XAD, 5XV (5-watts), 5ZAG, 5ZAI, 5ZAS, 5ZS, 6AAT, 6ABX, 6AHQ, 6AK, 6ALU, 6APW, 6ARB, 6ATC, 6AVR, 6AVV, 6AWT, 6BBH, 6BET, 6BFP, 6BIQ, 6BJQ, 6BJY, 6BOO, 6BOW, 6BQC, 6BQD (5-watts), 6BQF, 6BQZ (5-watts), 6BRG, 6BRS, 6BSA, 6BUM, 6BUN, 6BVG, 6BVW, 6CBI, 6CC, 6CU, 6DD, 6EB, 6EN, 6GD (5-watts), 6GF, 6GX (5-watts), 6IF, 6KA, 6LI, 6OM, 6PI, 6QA, 5XAV, 6XK, 6ZH, 6ZI, 6ZO, 6ZR, 6ZX, 6ZZ, 7AEM, 7BJ, 7BK, 7IY, 7JW, 7LR, 7PF, 7QD, 7RI, 7SC, 8AAF, 8ABX, 8AEL, 8AEU, 8AGO, 8AGP, 8AHR, 8AIH, 8AIW, 8AJX, 8ALC, 8ALF, 8ANJ, 8AOL, 8AQO, 8AVD, 8AWP, 8BDB, 8BEO, 8BJX, 8BKE, 8BKI, 8BPL, 8BQQ, 8BRC. 8BRM, 8BSS, 8BTR, 8BUT, 8CEI, 8CFU, 8CI. 8CJJ, 8CJX, 8CK, 8CKM, 8CKO, 8CPX, 8CUS, 8CVZ, 8CZR, 8JQ, 8LW, 8NB, 8OC, 8PT, 8PX, 8QB, 8SB, 8SP, 8UE, 8VQ, 8WR, 8XE, 8ZAE, 8ZD, 8ZW, NOF. Canadians: 2AF, 5CN, 5CT, 5CZ. All 5-watt stns hrd pse QSL crd. Dalite: 8AMM, 8AXN, 8CPD, 8FQ.

9HO, 404 Price St., Columbia, Mo.

C.W.: 1ADL, 1AGH, 1ALZ, 1AZW, 1BAS, 1BCG, 1BES, 1BKA, 1BOE, 1BRQ, 1BWJ, 1CIT, 1CJA, 1CKP, (1CMK), 1COF, 1CVE, 1GV, 1II, 1IL, 1KC, 1NV, 1ON, 1PM, 1QP, 1XM, 1XU, 1XZ, 2AFA, 2AFP, 2AVC, 2AYV, 2BBB, 2BBL, 2BDA, 2BFX, 2BG, 2BMR, 2BMS, 2BQU, 2BSQ, 2CCD, 2CHG, 2CKL, 2CMF, 2CM, 2CQD, 2CNZ, 2CQZ, 2FP, 2OM, 2WR, 2XQ, 2ZS, 3AFK, 3ALU, 3AQR, 3AT, 3AUW, 3BIF, 3BKC, 3BLF, 3BOB. 3BOF, 3BOU, 3BSB, 3BSS, 3CAN, 3CU, 3DS, 3EI, 3FC, 3FS, 3JH, 3JI, 3OH, (3OT), 3PZ, 3QV, 3SO, 3SU, 3TA, 3XM, 4BW, 4BX, 4CY, 4DG, 4EH, 4FS, 4GZ, 4HW, 4JK, 4KC, (4LJ), 4LP, 4ND, 4YA, 6ARB, 6AVR, 6AWT, 6BZH, 6CCO, 6LU, 6XAD, 6ZH, 6ZO, 6ZR, 6ZZ, 7AFW, 7BA, 7NA, 7NY, 7PF, 7SC, 7ZO, 7ZV. All other districts too numerous.

Spark: 2CRE, 2FP, 2OM, 3AFK, 4CC, 4FD, 4MY.

Canadian C.W.: 3AT, 3BV, 3DH, 3DS, 3EI, 3FC, 3GE, 3HX, 3JH, 4BV, 4HH, 8AL, 9BA, 9BV, 9BZ, 9CV.

9BXT, Giltner, Nebr.

C.W.: 1CN, 1FB, 1GV, 1II, 1KC, 1UN, 1XU, 1YK, 1ARY, 1BAS, 1BES, 1BKA, 1BKQ, 1BWJ, 1CKP, 1CMK, 1CMP, 1CVE, 2BG, 2FC, 2FP, 2GI, 2GK, 2KF, 2NZ, 2OT, 2SU, 2UD, 2WR, 2XQ, 2AYV, 2BBB, 2BEA, 2BML, 2BMR, 2BQD, 2BQU, 2BRB, 2BYS, 2CJN, 2CKR. 2CPD, 2XAO, 2XAP, 2XAQ, 3BZ, 3FS, 3HG, 3HX, 3IW, 3LK, 3MB, 3OE, 3OT, 3RF, 3SU, 3TJ, 3XM, 3YO, 2ZO, 3ZW, 3ZZ, 3AQR, 3ARO, 3ATG, 3AUU, 3BEC, 3BER, 3BFM, 3BFU, 3BHM, 3BKC, 3BLF, 3BLZ. 3BNU, 3BOB. 3BOF, 3BSS, 3BUV, 4BQ, 4BY, 4CO, 4EA, 4EB, 4EH, 4HI, 4HW, 4KC, 4KF, 4KL, 4KM, 4LJ, 4LP, 4OI, 4YA, (5BE), 5BW, 5CN, (5DI), 5DW, (5EL), 5EK, 5ES, 5FV, 5FT, 5GA, (5GJ), (5GR), 5IK, 5IR, (5IX), 5JB, 5KC, 5KN, 5LB, 5ML, 5MO, 5MY, 5MZ, 5NK, (5NN), 5NS, 5NV, 5PF, (5PV), (5PX), (5QI), 5QS, 5RH, 5RR, 5SF, (5SS), (5TA), (5TC), 5TJ, 5TM. 5TP, 5TX, 5UJ, 5UN, 5UQ, 5UU, 5VO, 5WE, 5XA, 5XK, 5XT, 5XW. 5ZB, 5ZS, 5AAH, 5AAR, 5AAT, 5ABY, (5AEC), 5AER, 5AQI, 5XAJ, (5ZAG), 5ZAK, 5ZAS, (5ZAV), 6CC, 6EA, 6IF, 6LU, 6LV, 6KA, 6JD, 6RM, 6VM, 6ZH, 6ZT, 6ZZ, 6ABX, 6ANH, 6ARB, 6AVD, 6AVN, 6AWT, 6BBH, 6BOE, 6BUN, 6BVY, 6XAD, 7BH, 7LU, 7LY, 7HM, 7SC, 7ZC, 7ZO, 7ZU, (7ZV), 7ABB, (7AFW), AD-7, 8AA, 8AB, 8BO, 8CY, 8FQ, 8FT, 8FU, 8HH, 8HN, 8IB, 8IJ, 8JU, 8KG, 8ML, 8OI, 8PD, 8QK, 8RJ, 8RV, 8SB, 8SL, 8SP, 8SH, 8TT, 8UE, 8UP, 8VQ, 8VY, 8XE, 8YN, 8ZF, 8ZW, 8ZZ, 8ABE, 8ADG, 8ADU, 8ADZ, 8AEA, 8AEB, 8AEG, 8AEH, 8AGO, 8AGZ, 8AIH, 8AIM, 8AJX, 8ALC, 8ALF, 8AIR, 8AME, 8ANB, 8APT, (8APV), 8APW, 8AQO, 8ARD, 8ASC, 8ASV. 8ATX, 8AVD, 8AWR, 8AWZ, 8AXB, 8AXC, 8AZD, 8AZQ, 8BCY, 8BDC, 8BDE, 8BEF, (8BEK), 8BFB, 8BFH, 8BFM, 8BFR, 8BGL, 8BHO, 8BIC, 8BJU, 8BLC, 8BLQ, 8BNH, 8BOQ, 8BOW, 8BOZ, 8BPE, 8BPJ, 8BRC, 8BRY, 8BTL, 8BUR, (8BUT), 8BVR, (8BWA), 8BWY, 8BWZ, 8ZXA, 8BXE, 8BXX, 8BYO, 8BZD, 8BZY, 8CAA, 8CAU, 8CAZ, 8CBO, 8CBX, 8CDZ, 8CEP, 8CGJ, 8CGM, (8CGX), 8CIA, 8CIH, 8CIM, 8CJH, 8CJY, 8CJZ, 8CMY, 8COJ, 8CPD, 8CRB, 8CWC, 8CWP, 8CXF, 8CXK, 8CYB, 8CYT, 8CZK, 8CZR, 8XAE, 8ZAE. Over 250 nines heard.

Radio Communications by the Amateurs

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

The Passing of 6ZAC

Wailuku, Maui.

Dear Friend F.H.S.:

Just a few lines in farewell. Am leaving for the mainland in a week or so. I am enclosing a few of the best cards that came to me in this morning's mail—they are a representative group, typifying my mail days. If I put all my DX on a map, like 6XAD, you'd never in the world find the map.

Have sold the old world-beater, and haven't a thing here except my rep. Thank goodness, it's something worth blowing about.

I'm undecided as to what I'll do next, but think I'll try for a ship that'll take me around to the east coast. If possible, I'll drop in and see you all. Nothing would give me greater pleasure.

I'm glad the gang is making such splendid progress in the T/A's, OM. Congratulate 'em for me. I sure hate to leave the game, but finances, etc., have knocked me under, for a while at least.

Best 73's to you all, and my recommendation for my successor in A.R.R.L. matters here is Gunner T. A. Marshall. He's SOME radio man, and will have my records snowed under in no time.

Sincerely,
Cliff. Dow.

[Editor's Note: We know this letter will be read with sincere sorrow and sympathy for 6ZAC. In a previous letter, written when he was starting to sell his apparatus, Dow said, "It is a heart breaker....I love my radio station more than I love my life, but there are things of greater importance, and I am called upon to make the supreme sacrifice." Dow hopes to be back in amateur radio again some day. If he never touches a key again he will be long remembered for his good spirit, and for the wonderful trans-Pacific and Hawaiian relay work.]

Rotten QRT

Ridgefield Park, N. J.

Editor, *QST:*

Well OM, I gotta big kick to make. What are you going to do to these big hams that pounded brass during the Transatlantic reception period? Gosh, OM, how can I keep my transmitter closed down while a mob of ninth, eighth, fourth, and fifth district guys are pounding away? Why I copied more nines, fours and five during the period reserved for receiving than I will in a year's time. And believe me, they aren't unknown men at all. The fellows I logged are well-known DX men and should know better. What are you going to do about it, OM? Boil 'em in oil, say I.

Cul 23, 34, 45, or any other combination,
Two cast ram oboe signing off.

[Editor's note: This is just a sample of many letters carrying the same sentiments. See our editorial on this subject this month.]

An Old-Timer Comes Back

St. Louis, Mo.

Dear Eddy:

Friend Wife has been absent for the past week, and I have been having the time of my life. I had a broadcasting station license, called WOAL, and fooled around with this darned radiofone for about a month and put lots of time and effort into getting the last word in modulation. I finally got 'er so that knocking the ashes out of my pipe would nearly bust the filter system. I got cards from New Orleans to Minneapolis and thought I had a pretty swell layout. Many's the time tho, Eddy OM, that I wished for the old spark set of 9LC.

Well, the other night I had been sitting at the old Paragon (Paul Godley pse note free ad) and listening to that train announcer they've got down at WSB, all messed up with my pet power line leak. After I got disgusted and turned off the tubes I was struck by the thought "Why not knock out a lil DX stuff?". I've heard that one could do fairly well with this C.W. they are all raving about. All I know about the stuff could be put in a gnat's eye, but I found my old bug under the cellar steps and I hooked her across the condenser of this broadcasting layout of mine. I gave the handle a couple of ditty-dits to see what would happen but the ammeter said four and one half just as it ought to and the fifty watters didn't explode or anything. Then I broke the first commandment of the old A.R.R.L. days and made a long CQ call. I turned on the receiver and, Eddy, by the Great Horned Spoon, there were at least six guys calling 9LC! Well, you cudda knocked me over with a cat whisker. I picked out a guy with the "Lake Erie swing" that old timers

use and, Eddy, who do you suppose it was? 5EK of the old spark days! "Are you Bill Woods?" he ses, with a flock of hi's, giving me the razz, I guess, for using C.W. We had a regular old hamfest, and I no more than signed off than I grabbed 9BKW up in Minneapolis, and a fellow in Davenport then gave me three msgs. I commenced to get interested about this time, went and got my pipe and set the old can of tobacco alongside the key, rolled up my sleeves and went to it right. The generator smelled like a blown-out condenser and the tubes radiated like a boiler, but I kept right on. Thrills? Say, Ed, you old slob, I'm just as nutty as I was several years ago about this radio stuff. When I went to bed the clock pointed to 3:45 A.M. just as casual as cud be.

Next morning I bought a U.S. map and a bunch of these colored pins and I've pinned up a bunch of them. Now I'm so high grade that when I call I won't even answer a fellow unless he's on one coast or the other. I suppose you're up on this C.W. junk, old boy, but put me down as a "regular" again, for I'm putting in a real set now and as soon as I catch up on the back numbers of *QST* I'm planning on working Siberia on one tube, with a Remy magneto for power supply.

This makes the third time I've come back to radio but I'm back for good now, and long after Fred Schnell's got long white whiskers I'll be boosting C.W. Hurry up that next issue of *QST*.

Yours till the Grid Leaks,
Bill Woods, 9LC.

De T.O.M.'s Squirrel

Editor, *QST*:

When the plans for the Transatlantics were printed in *QST* I read all about them and especially all about the QRT for the tests and how beautifully we were going to obey it. The European Transmission periods came along and I thot, "Well, this is where we shine". I hooked up a circuit said to be the only one and hitched on four stages and threw all my friends out of the room of mysteries so that quietness would reign. Then I spat on my paws and twisted the dials.

Well I guess A.R.R.L. must stand for American Rum Runner's League because if the regular fellows were obeying the QRT there were sure a lot of bootleg signals. It got my goat to hear nothing but 2's, 3's, 4's and 8's all evening. How the hex were we supposed to hear European stuff with that clamor going on the same wave? I can see the Old Man getting purple in the face and kitty making a wild break for fresh air. I could give you a list of these QRMers but it would look like a radio directory of the east coast—so I am going to put them in my "Dark Brown Book" and hate them till I die.

Can you understand a guy that will CQ for 5 minutes? I can't unless he is so dumb he thinks Celluloid is Harold Lloyd's brother. One fellow with a fone said he was using an absorption loop. Huh! I was wishing I had a chance to take the wire off and use it on him as a choke coil. When 2CQZ told him to QRT it was like talking to empty space—in the fone guy's head. Another fellow had a lot of trouble with his voltage dropping all the time but I never got an answer to my prayer which was that it would drop on him. Then there was the sad story of the fellow who could only get .8 amps with a "sure fire" circuit and I was hoping that it did start to fire when he was in front of the muzzle. And all this time 2CQZ was patiently calling one after another of these idiots and like a brother telling them to "Please QRT O.M." I suspect he is an angel so I will never get a chance to meet him and wring his hand but if he is human I am going to make a will leaving him all my vacuum tubes.

And then I began to consider what this sort of thing is leading us to. It is true that this gang is only a small part of A.R.R.L., but it only takes a few weeds to spoil a garden. And these ether-hogs were spoiling the work of thousands who were trying to show that Old Glory is going ahead. And just as the home is the place where citizens are made so is the radio club the place where such problems are solved and where respect for order is taught. Union is strength but hesitation in the use of that strength makes it worthless, for hesitation is weakness itself. Remember that, and as "Foresight is the Father of Wisdom" let us start now in our radio clubs to make sure that such a thing will not happen on the next A.R.R.L. test.

I am a squirrel and make a specialty of nuts so that you may be sure that even if the language above is strong, the thought behind it is pure gold.

(Signed) The Old Man's Squirrel.

9DR-9ZT, MINNEAPOLIS, MINN.

(Concluded from page 70)

is so unusually sharp that it is a disadvantage for ordinary use.

9DR is a one-man station and is located in the parlor, more or less to the detriment of the aesthetic properties of said parlor, as one might judge from the photo. The station is operating five nights per week. Don Wallace is an old timer in amateur and commercial radio and expedites "scads" of traffic with considerable snap. With the recently acquired "Z" and the prospects of a better location, we expect a good proportion of the northwest traffic will go thru this station.

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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.

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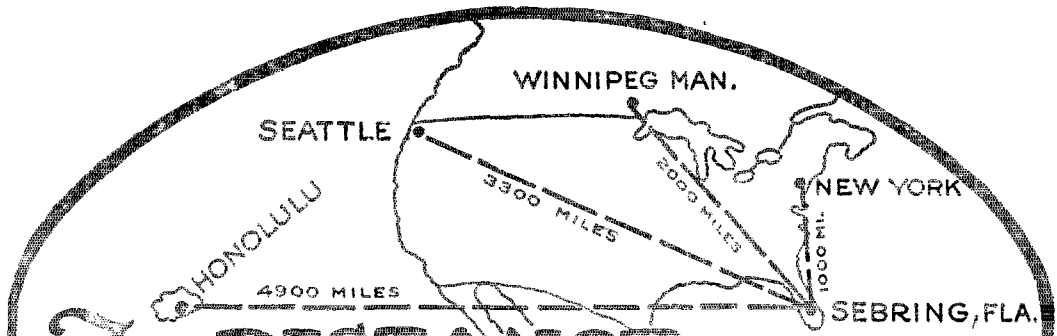


For DISTANCE HERE is a RECORD

"Crosley Manufactu ing Company,
Cincinnati, Ohio.
Gentlemen:

After a thorough trial, and observation of other radio receiving instruments, I wish to state that the Crosley Model X is giving better results than anything else I have ever tried, not only in Sebring, but in Tampa and Jacksonville as well. We are receiving from all the standard stations, North, East and West, with the exception of the New England states, New York city being the farthest we have received in that direction. But we have received from a station announcing itself as Winnipeg, Canada, letters not plain, another from Seattle, Washington, and one night we received three selections and two announcements from KDYX, at Honolulu, Hawaii.

Very truly yours,
SEBRING GARAGE,
Sebring, Florida."

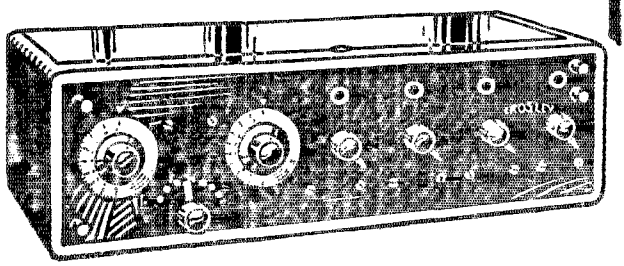
The Crosley Model X Radio Receiver, pictured below, is a four tube outfit, consisting of tuner, one stage of Crosley tuned radio frequency amplification, (the feature that has made this set so popular), detector and two stages of audio frequency amplification. This is a beautiful mahogany cabinet. It will bring in distant stations loud and clear. An Ohio woman recently heard Hawaii and a Pittsburg owner has heard Mexico City.

Price, Without Tubes, Batteries or Phones—$55.00

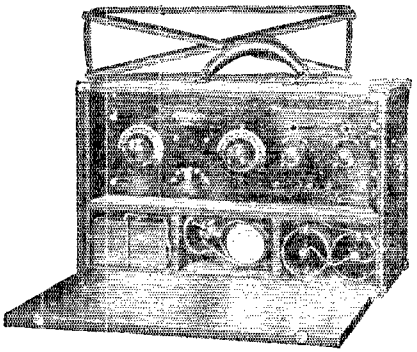
This Crosley Model X, a four tube set for $55.00, illustrates the value of Crosley receiving outfits, which range from $25 to $150.

Send for catalog

Crosley Manufacturing Company
CINCINNATI, OHIO



CROSLEY PORTABLE SETS



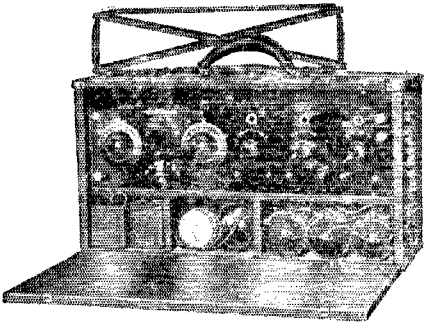
MODEL VI, PORTABLE

At the left is Crosley Receiving Set, Model VI portable. It consists of detector and one stage of tuned radio frequency amplification. This set is the same as Crosley Model VI which has given such universal satisfaction, put in a neat case with strong leather handle ready for travelling. Price **$40.00** without batteries, tubes or phones.

Carry Your Own Radio With You

It is no longer necessary to depend upon an elaborately installed receiving system in your home. The rapid development of Radio has given you the opportunity of tuning in wherever you may be. Packed in a good-looking, substantial case completely equipped with batteries, tubes, phones and an aerial. Crosley has given you in these 2 models the last word in a portable Radio Set. These sets have been tested thoroughly and have been found to give complete satisfaction.

At the right is pictured Crosley Receiving Set, Model VIII portable. This consists of one stage of tuned radio frequency amplification, detector, and one stage of audio frequency amplification. The same general construction as Model VI portable and guaranteed to give slightly better results and a wider range.
Price $60.00 without batteries, tubes, or phones.
Both of these portable sets are to be used with dry cell tubes.



MODEL VIII, PORTABLE

CROSLEY MANUFACTURING CO.

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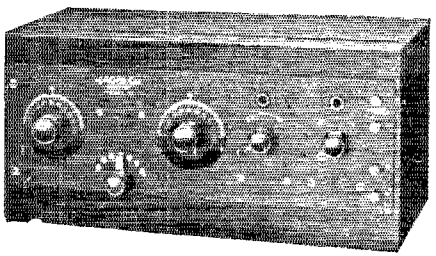
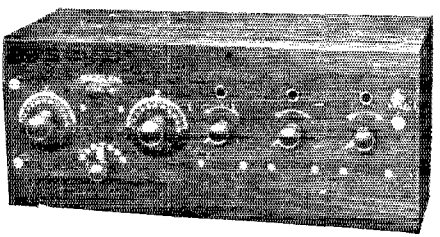
Better - Cost Less



MODEL VI-S

Increased demand for radio receiving sets which permit use of 1½ volt tubes has resulted in the Crosley Mfg. Co's. production of the 8 models on this page. These are most efficient sets bringing in distant stations not as loud of course as with storage battery tubes but very satisfactorily. The special feature of the 1½ volt tubes will appeal to those who do not wish to purchase expensive storage "A" batteries, as well as those who cannot have their own charged.



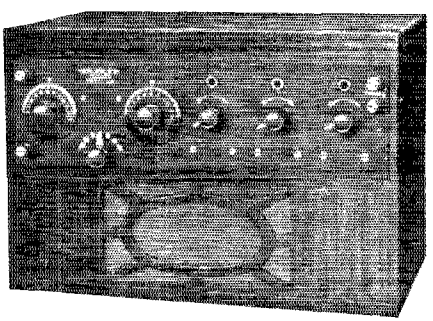
MODEL VIII-S

Model 8-S and 6-S are designed for those who desire to use 1½ volt tubes. They are the same as the popular and well known Crosley Models 8 and 6, but have a larger cabinet. They have remarkable power and bring in stations loud enough to fill an entire house.

Price of the Model 8-S.....**$50.00**
Price of the Model 6-S.....**$30.00**

These prices do not include batteries, tubes or phones.

Each set is carefully tested before it leaves the factory, thereby eliminating the chance of getting a faulty receiver. Thousands of dealers handle Crosley instruments, but as the ones pictured here are new it may be well to stock up before the demand gets too great.



MODEL XII

Model XII is a beautiful cabinet set with a special sound resonating chamber and space for batteries. It combines one stage of Crosley tuned radio frequency amplification, detector, and one stage of audio frequency amplification. For volume we recommend that 6 volt tubes be used.

Price, without tubes, batteries, or phones **$65.00**

CROSLEY MANUFACTURING CO.

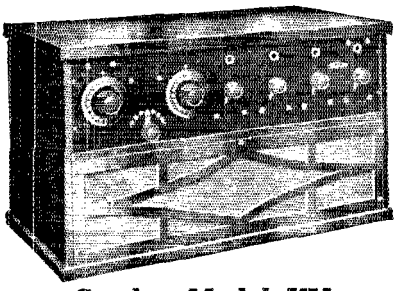
218 ALFRED STREET, **CINCINNATI, OHIO**

Crosley Model XXV

This beautiful mahogany cabinet model not only enables one to hear any broadcasting station in the U.S., but is so designed as to match perfectly the finest piece of furniture in the home. It is equipped with a 4 tube set, consisting of detector, one stage of tuned radio frequency amplification, and two stages of audio frequency amplification. The cabinet is arranged to take the Model R-3 Magnavox, but this is not prescribed at price below. This model has met the test of competition and triumphed where others failed.

Price, without batteries, tubes, Magnavox or phones **$150.00**

Three Beautiful Cabinet Models



Crosley Model XV

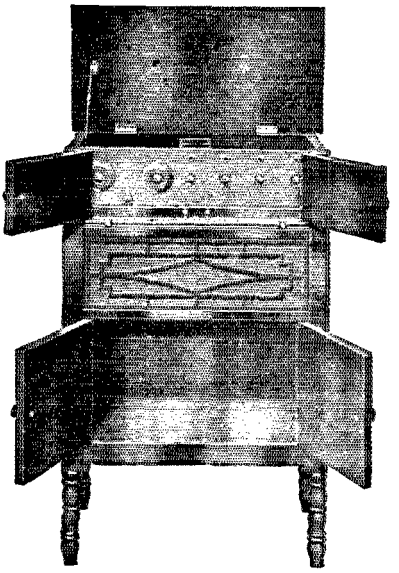
Consisting of a single circuit tuner, one stage of radio frequency amplification, a detector and two stages of audio frequency amplification, together with the special sound resonating chamber, this set is practically like the Model X. The addition of the sound chamber permits all persons in the room to hear clearly and distinctly all that is being received. This mahogany finished receiving cabinet would be an addition to any home.

Price, without tubes, phones, or batteries **$70.00**

CROSLEY

Better---Cost Less

RADIO



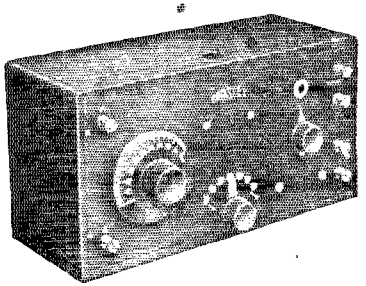
Crosley Model XX

This is the same as Model XV, only in an upright cabinet of beautiful design and staunch structure. The doors both upper and lower are hinged and directly under the receiving apparatus is a board which slips in and out and which the listener may use as a desk or rest. Music received on this set will be heard throughout a large room providing the broadcasting station is powerful enough.

Price, without batteries, tubes or phones **$100.00**

CROSLEY MANUFACTURING CO.

218 ALFRED STREET, CINCINNATI, OHIO



Crosley Harko Senior Now Regenerative

Manufactured for us under license under Armstrong U. S. Patent Number 1,113-149 Oct. 6, 1914, for use to amateurs, in amateur radio stations, to radio experimenters, and in school and college experimental stations.

The regenerative Harko Senior is one of the most efficient single tube sets on the market. The regenerative feature in this one tube set increases the range and volume. We believe that the Harko Senior Models are the best one tube instrument on the market today.

The Harko Senior Model V is now made in three types:

Model V-A, with overhanging lid, panel marked, regenerative **$16.00**

non-regenerative **14.00**

Model V-B, with regular new style Adam brown mahogany cabinet, regenerative **17.00**

non-regenerative **15.00**

Model V-C, with regular new style Adam brown mahogany cabinet, regenerative, panel engraved **20.00**

non-regenerative **16.00**

These prices without tubes, batteries, or phones.

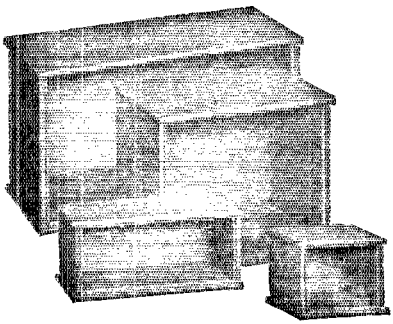
The new regenerative feature embodied in this Harko Senior Model V now makes the Crosley line as complete as any in the country and no feature is being used in connection with radio reception that Crosley has not incorporated in one or more of their sets.

CROSLEY MANUFACTURING CO.

218 ALFRED STREET, **CINCINNATI, OHIO**

CROSLEY
BETTER-COST LESS
RADIO

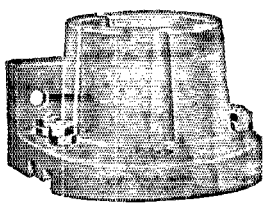
CROSLEY RADIO CABINETS



All Crosley Cabinets are made of hardwood, mahogany finish, and are staunchly constructed, with hinged lids. They are neat in design, attractive in appearance and are of the best workmanship. Used by those who build their own sets.

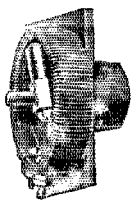
The following table includes prices on formica panels:

Model	For Panel Sizes	High	Wide	Deep	Cabinet Prices	Panel Prices
A-1	6 x 7	5½ in.	6½ in.	7 in.	$2.50	$1.05
A-2	6 x 10½	5½ in.	10 in.	7 in.	2.75	1.58
A-3	6 x 14	5½ in.	13½ in.	7 in.	3.30	2.10
A-4	6 x 21	5½ in.	20½ in.	7 in.	3.90	3.15
B-5	9 x 14	8½ in.	13½ in.	10 in.	3.70	3.15
B-6	12 x 14	11½ in.	13½ in.	10 in.	4.40	4.20
B-7	12 x 21	11½ in.	20½ in.	10 in.	5.25	6.30



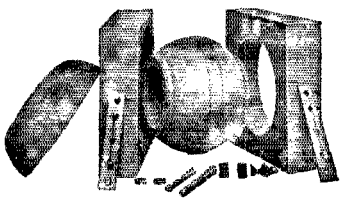
V-T SOCKET

The Crosley V-T Socket is made in one piece of porcelain, the same material used in base of vacuum tube to insulate the four prongs. The contacts are of strong, phospor bronze. The V-T Socket can also be mounted on a base or side for panel mounting. A number of manufacturers are now specifying Crosley V-T socket on all their products. Price 40¢.



RHEOSTAT

Crosley Rheostat permits exceptionally accurate variations of the current thereby giving the best possible results. Notice smooth running ball bearing contact. Unique construction enables you to mount the Rheostat on panel of any thickness up to ⅝ inch. Model A Crosley Rheostat has a resistance of 6 ohms, and will carry one ampere without heating.



VARIOMETER

Crosley Variometer parts consist of wood rotor two stator parts with complete hardware. Price—Poplar **$1.25**; Mahogany **$1.50.**

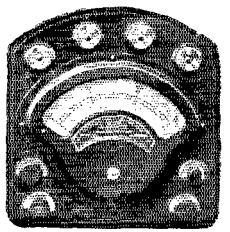
Crosley Variocoupler parts consist of wood rotor tube hardware. **Price $1.25.**
Crosley Variocoupler also furnished wound and assembled. Price **$3.00.**

CROSLEY MANUFACTURING CO.

218 ALFRED STREET, **CINCINNATI, OHIO**

Electrical Instruments for Radio

Weston
Model 280
Volt-Ammeter



One of numerous Weston Instruments designed especially for Radio use

THIRTY-FIVE years of knowing how to originate and manufacture electrical indicating instruments of every character—stands back of all Weston instruments. That is why the name "Weston" on any instrument for radio use is your positive guarantee of dependability, utmost perfection and continuous satisfactory service. Voltmeters, Ammeters, Milliammeters, Thermo-Ammeters and Thermo-Galvanometers —for amateur, advanced experimenter or commercial station. Also a specially designed Volt-Ammeter for testing tube characteristics, general current conditions, measuring resistance, filament voltage, plate voltage, etc.

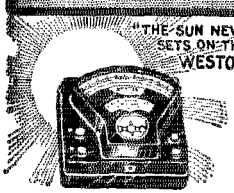
Fully described and illustrated in Booklet J. and other Radio literature. Write for it to-day.

WESTON ELECTRICAL INSTRUMENT CO.

158 WESTON AVENUE, NEWARK, N. J.

Electrical Indicating Authorities since 1888

WESTON

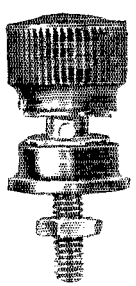


"STANDARD" *The World Over*

ELECTRICAL INSTRUMENTS

An Indicating Instrument for Every Individual Need and Industrial Purpose

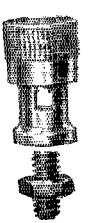
DAY-BY-DAY—IN EVERY WAY



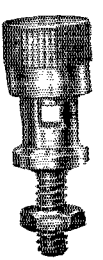
COMMANDER

ENSIGN

EBY PRODUCTS are getting BETTER AND BETTER AND BETTER



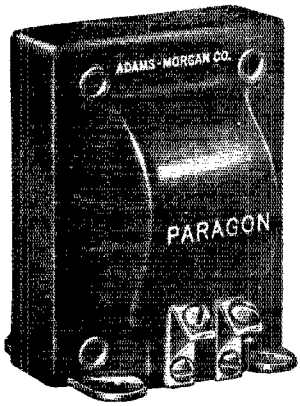
CORPORAL



SERGEANT "SS"

Repeat the above 5 times, then buy Eby posts and be cured of your Binding Post ills

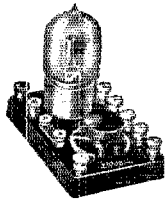
THE H. H. EBY MANUFACTURING COMPANY, PHILADELPHIA, PENNA.



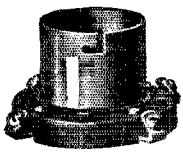
New Paragon Audio-Frequency Amplifier Transformer

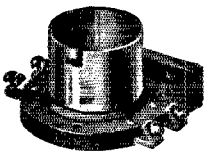
$5.00

Specially designed for reception of radio telephone signals. Reduces tone distortion. Chokes out vagrant currents that cause scratching, hissing and hollow tones. Gives the soft, full, well-rounded tones essential for good radio telephone reception. May be mounted on either panel or base. Has four terminals conveniently arranged and marked for connection. Completely housed in polished condensite shell. No. 81.

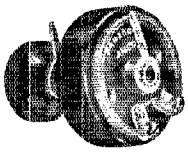


Paragon V. T. Control No. 70
Attractive — compact — efficient
$6.00





Paragon V. T. Sockets
Perfect contacts — heatproof — mirror finish — non-breakable
Standard
No. 30, $1.00
Universal Mounting
No. 32, $1.25



Paragon Rheostat No. 25
Panel or Table
Rugged — dependable — smooth action
$1.50

Paragon Stage Control Switch
No. 90
Positive—noiseless—rapid—ideal
$3.00

Paragon Potentiometer No. 35
300 ohms — economical — rugged
$1.75

An illustrated Catalog of Paragon Radio Products is yours for the asking.

DEALERS—The Adams-Morgan Company has an interesting proposition to make to reputable radio dealers who believe in quality merchandise. Details on request.

ADAMS-MORGAN CO., 4 Alvin Ave., Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

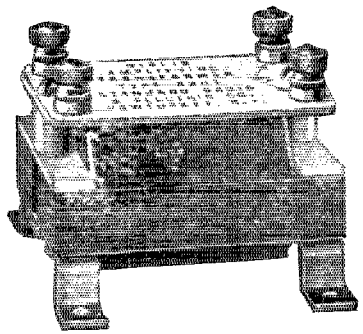
RADIO PRODUCTS

GIBLIN
RADIO APPARATUS

Every product that we manufacture is the result of the inventive genius of Thomas P. Giblin. When you buy Giblin products you know that they will perform satisfactorily.

Radio-Frequency Amplifying Transformer

Gives maximum amplification; maximum distributed capacity. Simple iron; maximum coupling between primary and secondary winding; minimum distributed capacity. Simple in operation. Price $7.00.

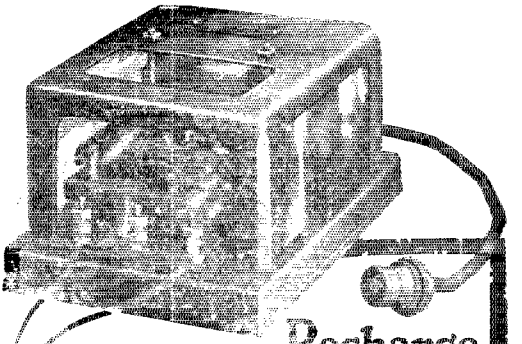


Audio-Frequency Amplifying Transformer

Designed for use with standard amplifying tubes. Gives maximum amplification without noise or distortion. May be placed in any position without pre-magnetic coupling and squealing. Price mounted, $4.50; unmounted, $3.50.

Buy Giblin Radio Products from your dealer Or address Department R

STANDARD RADIO & ELECTRIC CO.
PAWTUCKET, RHODE ISLAND



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 ½ 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.

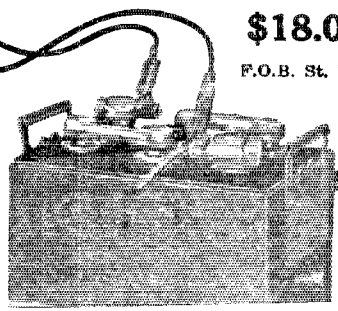
Gentlemen: I am enclosing money order (or check) for $18.00, for which send me a Valley Battery Charger with five-panel glass display case and indicator. If not satisfactory I will return it and get my money

Name

Address

$18.00

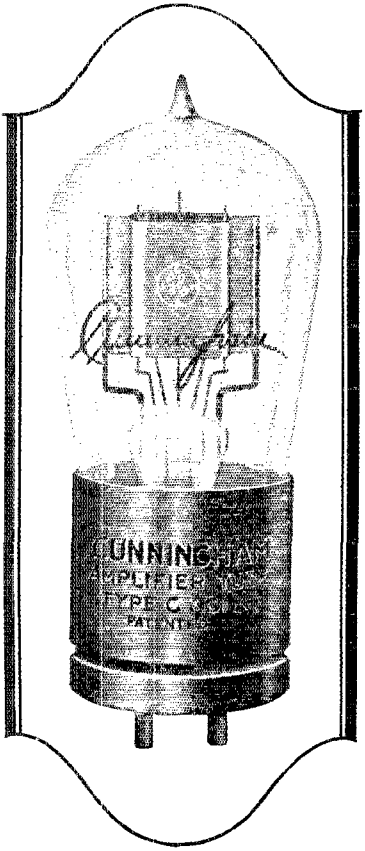
F.O.B. St. Louis



Announcing the New

Cunningham

Amplifier Tube



Type C-301-A List Price $9.00

The most efficient vacuum tube ever placed on the market for amateur and experimental use. The engineers of the General Electric research laboratories have at last succeeded in perfecting a tube that every owner of a radio set has been waiting for.

Greater Power Amplification Only ¼ Amp. Filament Current

THIS new and improved Cunningham C-301-A Amplifier is a high vacuum tube designed for use as an amplifier and detector, containing a new Tungsten Filament, the characteristics of which are long life, low power consumption, low operating temperature and greater power amplification than any previous amplifier tube. The tube has a standard four prong base, and the glass bulb has the same dimensions as the C-300 and the C-301.

Filament potential	5 volts
Filament current	.25 amp.
Plate potential	20 to 100 volts
Plate impedance	16,000 ohms
Amplification constant	6.5

The greatly reduced filament current permits the use of four of these tubes without exhausting the A battery any faster than when using one of the previous type of amplifier tubes.

Complete instruction for the care and efficient operation of this new Amplifier Tube are packed with every tube.

Insert a C-301-A in your amplifier set today. Note the improved quality and increased audibility.

The Cunningham Technical Bureau is at your Service
Address your problems to Dept. Q.

E. T. Cunningham

248 First Street
San Francisco, California

154 W. Lake Street
Chicago, Illinois

Like Postage Stamps

HERBERT H. FROST, INC. FROST RADIO CHICAGO, U.S.A.

Used Everywhere

What is FROST-RADIO

FROST-RADIO is a dependable high quality output made under manufacturing and engineering conditions that insure high grade quantity production at a price within the reach of every radio fan. There is no time limit to the guarantee on Frost Radio.

FROST-FONES

reproduce voice and music in clear natural tones. The world's sweetest-toned radio receiver. Frost Fones, built by telephone engineers, are noted for permanence of magnetism. Sold at a low price because of tremendous output and efficient factory methods.

No. 162, 2000 ohm Frost-Fones, $5.00

No. 163, 3000 ohm Frost-Fones, $6.00

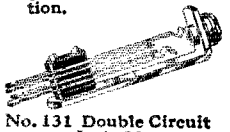
FROST-PLUGS

Accurately made by precision methods according to correct radio engineering standards. The tip grips the jack springs and insures a good electrical connection.

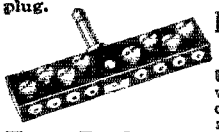
No. 139 Frost Plug 60c

FROST-JACKS

All Frost jacks are carefully inspected to make sure the springs are perfectly adjusted to make positive contact with tip and sleeve of plug.



No. 131 Double Circuit Jack, 90c



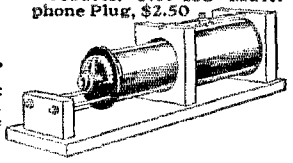
Frost Multi-Phone Plug

Use one to four sets of phones with this jack. Receivers connect in series, giving best results. No. 138 Multi-phone Plug, $2.50

Frost Radio Receiving Transformer

A long and short range coupler. A highly selective accurate tuner.

No. 400—$8.50



Ask Any Good Dealer for Frost Radio

HERBERT H. FROST, Inc.
154 WEST LAKE STREET CHICAGO, ILLINOIS.

The Heart of Radio Frequency

Is The Transformer

And Your Success in Getting Distance and Distinctness Depends on the Efficiency of Your Transformer

Do not condemn Radio Frequency because you have used poor Transformers. The RT-5 (150 to 300 meters) and the RT-6 (300 to 600 meters) have been tested severely by experts in various parts of the country and are proven without equal in tone quality and distance. They are an absolute necessity to the enthusiast who desires to get the best results from his radio set. With the RT-6 and RT-6A transformers, a loop receiver will operate a loud speaker on distant stations and you can easily receive wonderful programs from Chicago, Kansas City, Dallas, Atlanta, Winnipeg and other distant stations within a two thousand mile radius.

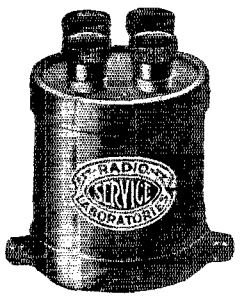
Order by type number, accept no substitute and remember that all Radio Service Laboratories Transformers are individually triple tested and unconditionally guaranteed. For sale at all reliable electrical or Radio Stores or order direct from us.

Send ten cents for new booklet on Radio Frequency with schematic diagrams — a most valuable and helpful publication for the radio amateur and expert.

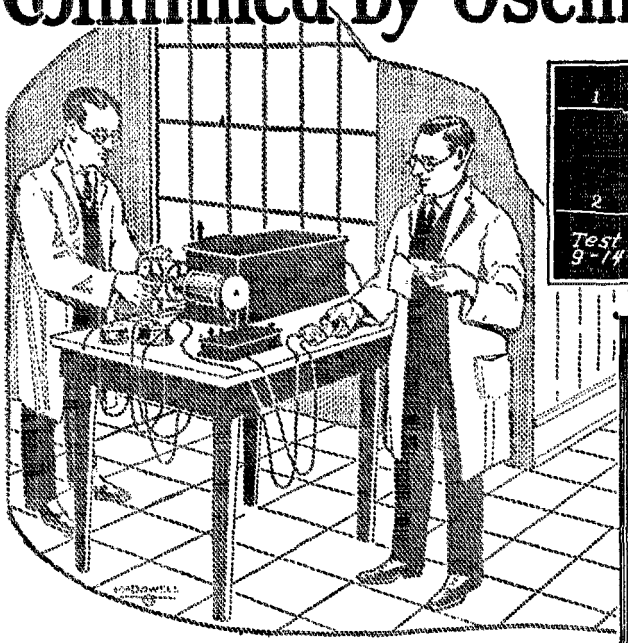
RASLA SALES CORPORATION

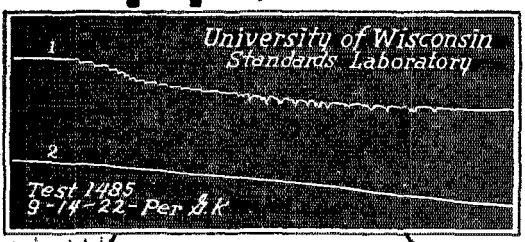
National Distributor

Dept. B, 10 East 43rd St., New York City



Bradleystat Superiority Confirmed by Oscillograph Tests





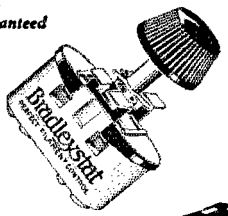
An Important Test

The Oscillograph is a delicate instrument which records on a moving photographic film any fluctuations in electric current flowing through a rheostat connected to the oscillograph.

Test No. 1—See the violent fluctuations, the jerky, noisy control of a regular wire rheostat. Imagine the hissing and whistling such rheostats create in your detector tube.

Test No. 2—Now look at the smooth, stepless control of the Bradleystat. No hissing, no frying nor loss of exact control. Such noiseless, gradual control extends your range immensely.

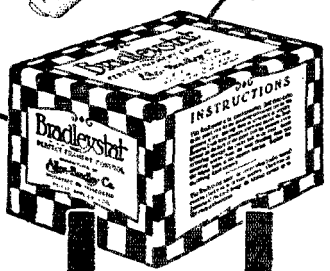
Fully Guaranteed



Replace your Rheostats with Bradleystats

Just compare the oscillograph curves above, made in the Standards Laboratory of the University of Wisconsin. The superiority of the Bradleystat is strikingly evident. Thousands are now installing Bradleystats in place of their wire rheostats, and get quicker tuning, greater range and louder detection. Try one, tonight, and note the amazing improvement.

A new Allen-Bradley product is the Bradleyometer, the Perfect Potentiometer. If you use a potentiometer in your set, send for a Bradleyometer bulletin.



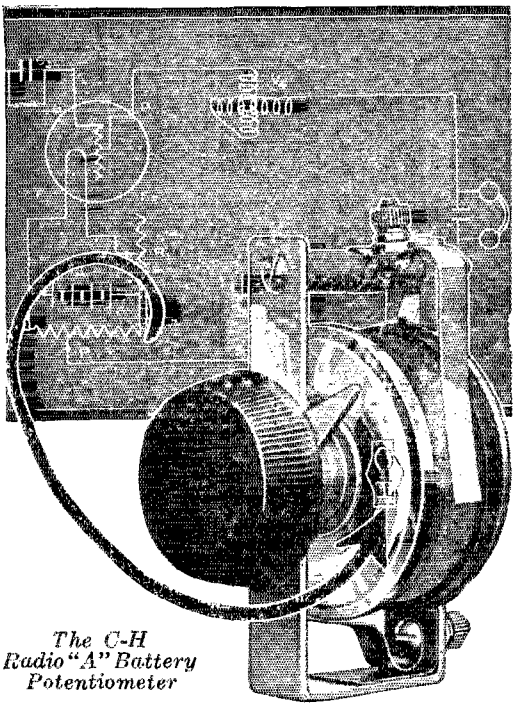
Allen-Bradley Co.
Electric Controlling Apparatus
277 Greenfield Ave. Milwaukee, Wis.
Member of the National Radio Chamber of Commerce

Retail Price
$1.85
P.P. 10c extra

Bradleystat

REGISTERED U.S. PAT. OFF.

PERFECT FILAMENT CONTROL



The C-H Radio "A" Battery Potentiometer

Another Opportunity to Demand C-H Protection

The C-H trade mark has made its place in the history of radio. More than a quarter million rheostats engraved with this mark of the master builder of rheostatic control apparatus are today giving satisfaction to an army of enthusiasts.

The new "A" Battery Potentiometer gives the same assurance of satisfaction in any equally vital part of your receiving circuit—the same assurance that has for more than thirty years made engineers the world over demand the C-H trade mark for protection.

This new potentiometer matches exactly the C-H Radio Rheostats in both appearance and performance. It is of the revolving drum type with a total resistance of 300 ohms. It is designed for panel mounting and finished in satin nickel and ebony black. A comfortable knob of genuine Thermoplax and a highly nickeled pointer provide easy and positive control.

To be certain of results demand the C-H trade mark—it is your guarantee of satisfaction.

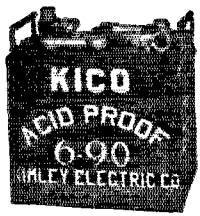
THE CUTLER-HAMMER MFG. CO.

Member Radio Section, Associated Manufacturers of Electrical Supplies

MILWAUKEE - WISCONSIN

Over a Quarter Million C-H Radio Rheostats Now in Use

C-H RADIO "A" BATTERY POTENTIOMETER

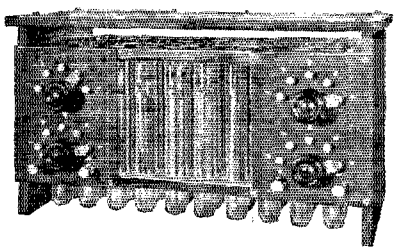


"B" Battery with Panel Control

Storage Batteries

designed for

RADIO



KICO Storage "B" batteries are used by thousands of amateurs who understand radio and consequently buy nothing but the most efficient equipment.

A FEW REASONS

1. Alkaline type. Unlimited Life.
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.

		(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
78 cell	100 volts	16.00	21.00
108 cell	145 volts	21.00	26.00

F.O.B. Buffalo, N. Y.

Literature gladly furnished

We distribute KING Chargers

KIMLEY ELECTRIC CO.

1355 Fillmore Ave., Buffalo, N. Y.

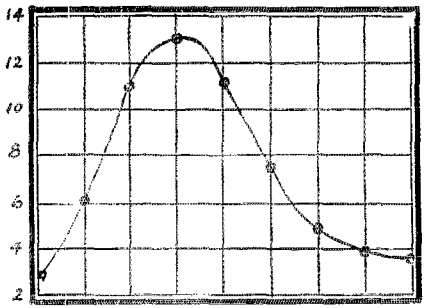


CHART I

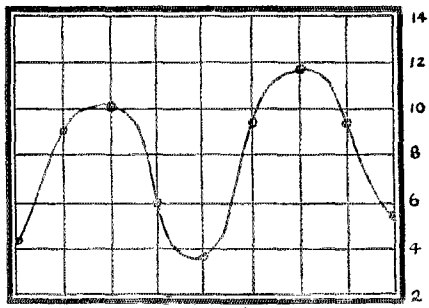


CHART II

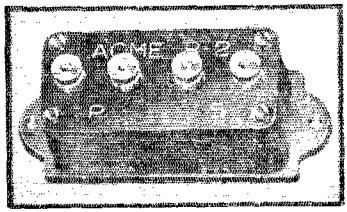
The importance of uniformity

How to avoid amplification losses when using radio frequency

BEFORE you purchase a radio frequency transformer be sure to find this out. Does it show marked depressions and peaks in the amplification range between 200 and 600 meters? No amplification is possible in such depressions. Getting distant stations becomes a gamble as to whether or not there is any amplification at a given point.

How to get uniformity

THERE is a radio frequency amplifying transformer which has been so perfected that the peaks and depressions are eliminated. This is the Acme R-2. This unique transformer, after long months of experimentation, has been perfected with a special type of iron core and windings which eliminate the peaks and depressions and provide a steadily increasing volume of amplification up to the point of maximum importance—360 meters.



ACME R-2 Radio Frequency Amplifying Transformer.
Price $5.00 (East of Rocky Mts.)

Gets greater distance

EQUALLY important is the far greater distances you get broadcasting. The Acme R-2 used in a radio frequency amplifier builds up wave energy before passing it on to the detector. You hear signals ordinarily inaudible. The simplest and most elementary type of set, either vacuum tube or crystal receiver type, will have its range tremendously increased.

The best method

TO SECURE maximum results use three stages of Acme Radio Frequency Amplification (R-2, R-3 and R-4), a crystal detector and three stages of Acme Audio Frequency Amplification. This insures maximum sensitivity and intensity, quietness in operation and freedom from distortion. A small indoor antenna or loop may be used and sufficient intensity obtained to operate the Acme Kleerspeaker, providing perfect entertainment for a roomful of people.

You can get these and other Acme Products at radio, electrical and many hardware stores.

Write for booklet R-2 showing proper hook ups and other information.

THE ACME APPARATUS COMPANY

Pioneer transformer and radio engineers and manufacturers

CAMBRIDGE, MASS., U.S.A.

New York, 1270 Broadway
Chicago, 184 W. Washington St.

ACME

~ for amplification

No Wireless Receiving set is complete without

MAGNAVOX

THE trade name "Magnavox" has become standard among radio students because of the electrodynamic principle it represents — an original invention of lasting importance.

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.

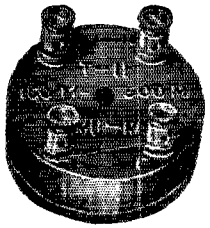
2 Stage . . **$80.00**
3 Stage . . **110.00**

Magnavox products can be had of good dealers everywhere.

THE MAGNAVOX CO.
Oakland, California
N. Y. Office: 370 Seventh Ave.

MAGNAVOX
Radio
The Reproducer Supreme

Mu-Rad RADIO Laboratories
AMPLIFICATION DISTANCE



MU-RAD
R-F Amplifier Transformers
200-600 Meters
Air Core

The great distances attained by Mu-Rad Receivers — over 1000 miles with only a small loop aerial—are in a very large measure, due to this extraordinary transformer. So accurate that they vary less than a half of one per cent.

No iron losses. No undesirable capacity effects. No eddy current loss. Other transformers may cost less but none at any price can accomplish what the Mu-Rad Transformer can. Increase the range, the efficiency and the clarity of your set with a Mu-Rad R-F Amplifying Transformer.

Sold at Most Good Radio Stores or Sent Direct

Accept no substitute. There are no transformers "as good as Mu-Rad." Stores where other quality radio merchandise is sold generally carry Mu-Rad Apparatus.

Let us send you the Mu-Rad booklet.

Three Types

Type T-11 for the first stage $5.00
Type T-11A for the second stage $6.50
Type T-11B for the third stage $7.00

A Real Proposition for the Dealer

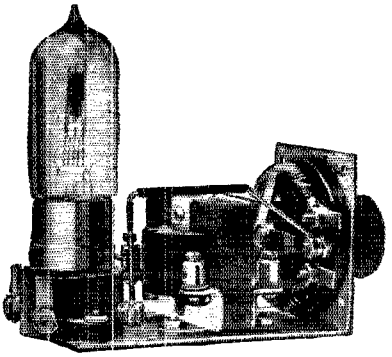
Write for Literature and Discounts

MU-RAD
LABORATORIES, Inc.
804 Fifth Avenue
ASBURY PARK, N. J.

DID YOU READ LAST MONTH'S ANNOUNCEMENT?

Last month we announced a list of five new instruments. These instruments were so new that only two of the cuts had been obtained at the time the QST forms closed. This month we have these cuts available.

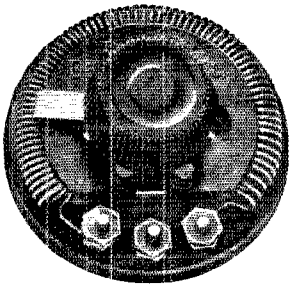
There is so much to be told about these instruments that even a brief outline is not possible here. Send for FREE RADIO BULLETIN 913-Q and learn about them. Ask your local dealer to let you examine them.



TYPE 300-A AMPLIFIER UNIT

A compact unit consisting of our Type 231-A Amplifying Transformer, Type 255 Filament Rheostat and Type 282 WD-11 Tube Socket mounted on a nickel finished brass mounting. These parts are all wired ready for the external connections. The mounting is so designed that the unit may be used on a table or mounted behind a panel with only the rheostat knob projecting.

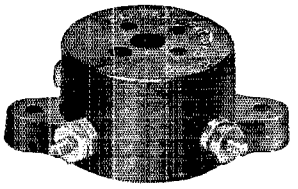
PRICE, COMPLETE $7.50



TYPE 255 RHEOSTAT

A rheostat of moulded bakelite, not a substitute, for panel or table mounting. Smooth in operation and attractive in appearance. Resistance 6 ohms; current carrying capacity 1.25 amperes. May also be supplied in a 3.5 ohm, 2.5 ampere size for one power tube.

PRICE $1.00



TYPE 282 WD-11 TUBE SOCKET

A socket of moulded bakelite arranged with positive side contact springs to take the WD-11 tubes. Socket will fit only in correct position, thus avoiding danger of burning out tube. Terminals plainly marked.

PRICE . . . . . 80 Cents

GENERAL RADIO COMPANY

MASSACHUSETTS AVENUE AND WINDSOR STREET

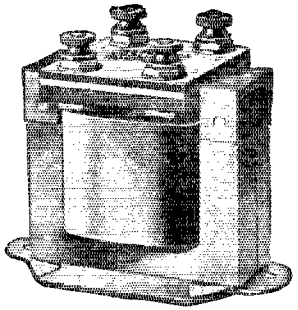
CAMBRIDGE 39 MASSACHUSETTS

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

BUY THE BEST

THORDARSON AMPLIFIERS



A New Thordarson

6 to 1 ratio audio frequency amplifying transformer. Designed for those desiring a higher transformer ratio than our standard. Unusually high and constant amplification without distortion over a broad band of audio frequencies. Core is twice the cross section of that of the ordinary amplifying transformer and is made of special 36 gauge silicon steel. The coils have low distributed capacity. The high "Thordarson" standard has been maintained throughout.

6 to 1 ratio transformer. . . . $5.00
with Red Label

3½ to 1 ratio transformer. . 4.50
with Black Label

Thordarson Electric Mfg. Co.
500 W. Huron St.
CHICAGO

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, G. B. I.

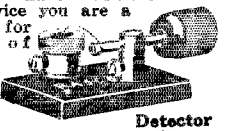
64 page catalog

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 15¢

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

98-100 PARK PLACE, NEW YORK CITY

EISEMANN

CORRECT SHIELDING

THE ideal method of shielding is to be found in the use of a metal panel.

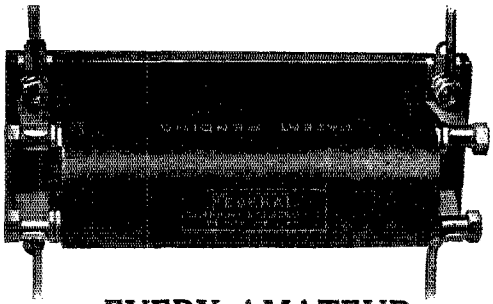
Metal panels have other advantages. Units are more easily mounted on them and they greatly simplify the assembling of your receiving set.

All units mounted on metal panels must, of necessity, be completely self-insulated.

Eisemann Variometers, Variocouplers and Condensers embody this feature together with electrical and mechanical characteristics of a high order.

Write for descriptive literature.

EISEMANN MAGNETO CORPORATION
William N. Shaw, *President*
BROOKLYN, N. Y.
DETROIT CHICAGO



EVERY AMATEUR

District in United States Copied at Detroit, Michigan During November by Keith Bernand, 8AZD, and E. H. Clark, 8AO.

MATERIAL USED: Outside Antenna—Variocoupler—Variometer to tune Plate of Detector—One #29 Federal R. F. Transformer — Detector. **NO AUDIO.**

CALLS HEARD

1AKL, 1AVC, 1AW, 1AWW, 1AXW, 1BCQ, 1BDI, 1BES, 1BET, 1BKQ, 1BRQ, 1BV, 1CLF, 1CMK, 1CPN, 1GV, 1RD, 1XM, 1XU, 1XZ, 1ZP.

2ABZ, 2AFR, 2AWL, 2AYV, 2BJO, 2BLP, 2BNZ, 2CBT, 2CCD, 2CJN, 2CKR, 2CMS, 2EL, 2KF, 2LO, 2SU, 2UK, 2WB, 2XL, 2ZK.

3AAO, 3AC, 3AFB, 3AIC, 3AJH, 3AUU, 3AVC, 3AVY, 3BFU, 3BIJ, 3BIW, 3BLF, 3BR, 3BU, 3BVA, 3BX, 3BZ, 3CC, 3CF, 3GK, 3LP, 3NB, 3OE, 3OT, 3SU, 3TJ, 3VW, 3XM, 3YO, 3ZO.

4AY, 4BK, 3BV, 4BY, 4CG, 4GG, 4EB, 4EH, 4EL, 4EQ, 4FT, 4GL, 4KK, 4KM, 4LJ, 4NT.

5AAB, 5ADE, 5AEW, 5DI, 5EK, 5FV, 5HB, 5MY, 5NB, 5NK, 5PO, 5QM, 5QY, 5SM, 5TC, 5TJ, 5WW, 5XA, 5XAJ, 5XK, 5XT, 5XV, 5ZAD, 5ZAS, 5ZAV, 5ZB.

6CU, 6EN, 6KA, 6XAD, 6ZD.

7ZO, 7ZU.

8AA, 8AIO, 8AQO, 8AWR, 8AX, 3AXZ, 8AZE, 8BCY, 8BDV, 8BEF, 8BEO, 8BFX, 8BHO, 8BK, 8BLC, 8BUV, 3BUX, 8BXX, 8CAK, 8CCP, 8CF, 8CI, 8CIJ, 8CMY, 8CUR, 8CXF, 8DAT, 8EF, 8EN, 8IQ, 8JQ, 8NB, 8OW, 8PJ, 8QK, 8SB, 8SP, 8UF, 8UP, 8VQ, 8XE, 8XXE, 8YY, 8ZE, 8ZO, 8ZY.

9AAP, 9AAV, 9ABB, 9ACS, 9AEQ, 9AFD, 9AFN, 9AHH, 9AIY, 9AJP, 9AL, 9ALP, 9AMI, 9ANF, 9ANK, 9ANM, 9ANQ, 8AOG, 9AON, 9AOV, 9APS, 9APW, 9AQA, 9AQM, 9AQR, 9ARZ, 9ASE, 9ASF, 9ASU, 9ATN, 9ATX, 9AUL, 9AVZ, 9AWM, 9AWW, 9BCH, 9BCY, 9BDS, 9BEH, 9BEY. 9BHD, 9BIE, 9BIK, 9BJI, 9BJV, 8BKU, 9BLT, 9BP, 9BQW, 9BRE, 9BRK, 9BRX, 9BSP, 9BUD, 9BVL, 9BVP, 9BXT, 9BZI, 9CA, 9CBS, 9CCM, 9CCV, 9CJA, 9CKM, 9CMK, 9CUC, 9CVC, 9CXP, 9CXZ, 9DAG, 9DEF, 9DFB, 9DGE, 9DGN, 9DGQ, 9DGW, 9DJM, 9DKY, 9DNH, 9DPE, 9DTA, 9DXN, 9DWN, 9EI, 9EP, 9EW, 9FM, 9GK, 9GW., 9HO, 9IG, 9II, 9IO, 9LE, 9LQ, 9LZ, 9NE, 9OX, 9PM, 9PT, 9PW, 9QR, 9UC, 9US, 9UU, 9YAJ, 9YB, 9YW, 9ZL, 9ZN, 9ZY. Canadian Stations: 3KO, 8XN, 4BV.

For Complete Description Write for Bulletin No. 119-W

Federal Telephone and Telegraph Co.

BUFFALO, N. Y.

MANUFACTURERS OF STANDARD RADIO EQUIPMENT

KQV—Pittsburgh, Pa.—RADIO BROADCASTING STATIONS—Washington, D.C.—WMU

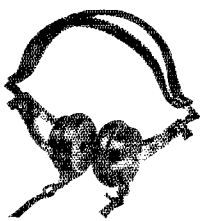
STANDARD RADIO ESSENTIALS

All orders with remittance promptly delivered, Post or Express paid.

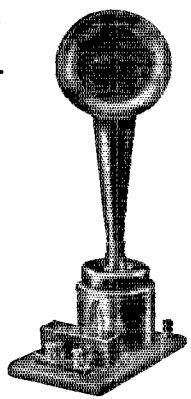
Large and varied stock of modern and reliable RADIO EQUIPMENT and PARTS

ALWAYS in STOCK

IMMEDIATE DELIVERY on ALL ITEMS LISTED



Stromberg-Carlson No. 2-A Headset, $7.50

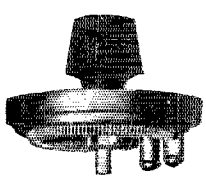


Aeriola Senior Westinghouse Receiver	$65.00
DeForest Radiohome Set DT 700, less Batteries, Bulbs and Headset	36.00
DeForest 2-stage Amplifier DT 800, less Bulbs and Batteries	35.00
Simplex Variometers	6.00
King Amplitone Horns	12.00
Holtzer-Cabot Headset	8.00
UV 200 Radiotron Detector Bulbs	5.00
UV 201 Radiotron Detector Bulbs ..... each	6.50
Standard Horns 7" Bell ..... each	7.50
Standard Horns 5" Bell ..... each	5.00
RK Horns ..... each	5.00

Enclose Certified Check or P.O. Money Order with orders.

DOUBLEDAY-HILL ELECTRIC CO.

WASHINGTON, D. C.—DEALERS WRITE FOR DISCOUNT—PITTSBURGH, PA.



GENUINE CUTLER-HAMMER THERMOPLAX RHEOSTATS, will carry 1½ amps. All metal parts nickeled. Full guarantee 60¢ 3" dials, tapered knobs, 30¢ Tapered switch knobs, 1¼ radius, 30¢.

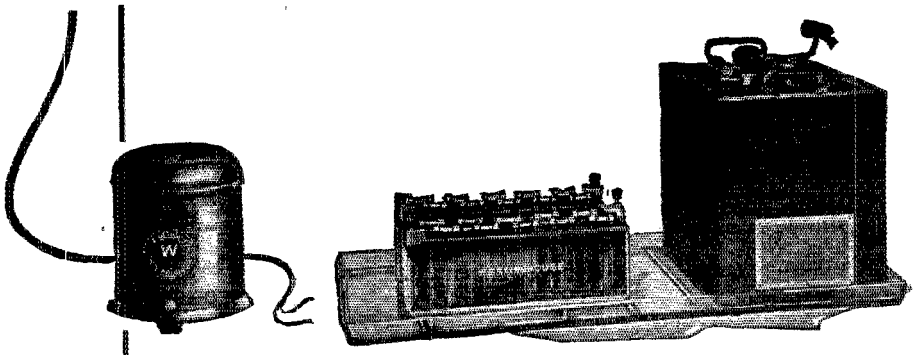
AMERICAN RADIO MFG.
3 Saratoga Ave.,
Brooklyn, New York

RADIO CLUB PINS

Des. #937

An emblem made to order for your Club will work wonders—Write today for free 52 page catalog showing radio emlems, class rings and pins. Samples loaned to officers.

METAL ARTS CO., INC.
7753 South Ave., Rochester, N. Y.



Radio is full of interest—fascinating. But you want only the clearest, fullest tones you can get. These are possible only with batteries that are absolutely RIGHT.

Get a Westinghouse Radio Power Set

and enjoy radio at its best. Set consists of a Westinghouse "A" Battery, two or more Westinghouse Radio "B" Batteries, a glass tray and a battery charger.

With this set you can always be sure of ample current and clear, strong reproduction. You can also cut in with additional storage batteries and enjoy concerts from more distant broadcasting stations.

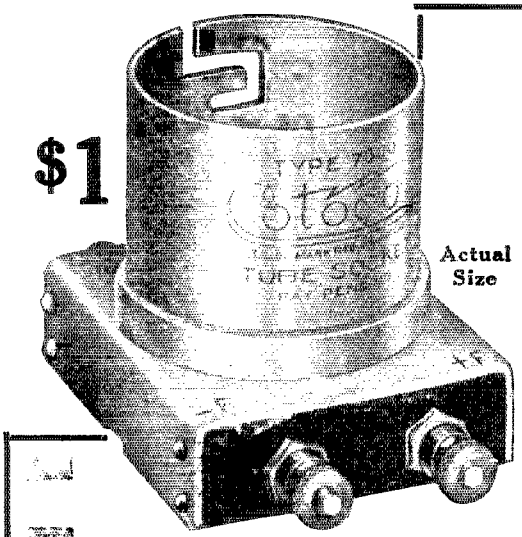
WESTINGHOUSE STORAGE BATTERIES are made in voltages and amperages suitable for all the popular size radio outfits. Radio dealers and more than 2200 Westinghouse Battery Service Stations have them for you.

Write us for illustrated folder on "Westinghouse Radio Storage Batteries"

WESTINGHOUSE UNION BATTERY CO., Swissvale, Pa.

WESTINGHOUSE

RADIO "A," "B" and "C" BATTERIES



$1

Actual Size

O. K.

You will surely approve this

Better Tube Socket because our Engineers have built into it five points of excellence. Read them. You Need them ALL.

1. Positive double side grip contacts. The Bayonet slot enables this.
2. Hard rubber insulation assures a minimum of losses.
3. Rugged construction. Practically unbreakable.
4. Compact design permits close assembly.
5. Heavily nickeled for neat appearance.

If your Dealer

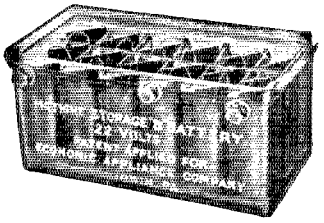
can't show the Cotoco Double Bayonet Slot Action, Make him write us today for

Dealer's Sample

COTO-COIL CO.

87 Willard Ave., Providence, R. I.

McTighe Alkaline Storage "B" Battery FOR RADIO OUTFITS



The McTighe Storage "B" Battery is now furnished in two sizes, the original 22 volt and a new 28 volt battery, having 30% more plate capacity. McTighe Batteries are absolutely noiseless, can be charged from any light socket, and are proof against damage by short circuit, overcharging or standing unused. They are furnished in oblong glass cases which nest neatly, each with its own size.

The McTighe Chemical Rectifier will charge one, two or three "B" Batteries at one time. Our Combination Magnetic Rectifier will charge 6 volt "A" Batteries or "B" Batteries up to 120 volts.

22 Volt Battery $5.00
28 Volt Battery 6.00
Chemical Rectifier 1.50
Magnetic Rectifier 20.00

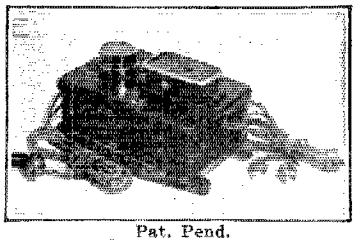
F. O. B. Irwin, Pa.

ECONOMIC APPLIANCE CO.

IRWIN, PENNA.

SILENT NILES

BATTERY CHARGER



Pat. Pend.

THE BATTERY CHARGER SUPREME

Keeps your battery in prime condition and your receiving set always in service by charging at home from electric light socket.
AN ASSET TO EVERY RADIO BATTERY OWNER—PAYS FOR ITSELF.

Price, $17.50—$19.50 West of Rockies
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Trade **"NO AERIAL" RAD-O-PLUG** Mark

TAKES THE PLACE OF AN AERIAL

Operates from any electric light socket. Complete with 8 ft. cord.
APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS

PRICE $2.00

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Manufacturers
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Distributors
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The broadest guarantee ever put on radio sets and parts. Two-weeks trial with money back if you are not entirely satisfied. You take no chances, you make no costly experiments. When you buy Lynn Radio you know you are getting the high quality you have a right to expect. The safe, satisfying way to buy radio.

Standard Reliable Sets and Parts

Nationally advertised dependable radio. Our stock includes such well known makes as Amrad, Acme, General Radio, Fada, Grebe, Pacent,—also Burgess "B" batteries and Philadelphia storage batteries.

Fada vernier rheostats for super-delicate control of detector filament current. Single contact lever. Moulded insulation. **$1.25.**

Fada vernier rheostat attachments, fitting any rheostat with 3/16" shaft, **50c.**

Fada Potentiometers, 200 ohms or 400 ohms, **$1.00.**

General Radio W.D.-11 amplifying units, **$7.50;** General Radio W.D.-11 sockets, **80c;** W.D.-11 tubes, **$6.50.**

Complete stocks. Everything new and up to date. You'll find everything worth-while in radio here at "Radio Center."

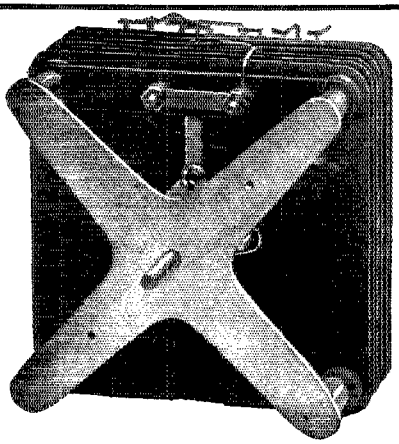
Special attention to mail orders.
Personal service to Chicago customers.

LYNN RADIO COMPANY

STANDARD NATIONALLY ADVERTISED
RADIO EQUIPMENT

Phone Harrison 7293 **L. L. Lynn, Pres.**

Sixth Floor Consumers Building
220 South State St — Chicago, Ill



Patents Pending

FREE: Illustrated Booklet on Radio frequency Amplification with circuit diagrams and operational characteristics.

BY LESTER L. JONES.
Formerly Expert Radio Aid, U.S.N.

TELOS VARIO-TRANSFORMERS
for
Tuned Radio Frequency Amplification
are

Grid circuit tuning variometers of the "Telos" interleaved double D coil type coupled to a fixed plate coil in such manner as to increase transformer coupling on the longer waves.

TELOS VARIO-TRANSFORMERS tune and amplify between 160 and 480 meters with more amplification per stage than the best audio and with no distortion of tone.

TELOS VARIO-TRANSFORMERS have closed magnetic circuits and can be symmetrically mounted next to each other with no local oscillations due to magnetic coupling. The automatic change in coupling minimizes local oscillations due to tube capacity. Grounding the metal spider frame eliminates hand capacity disturbances.

A tuned radio frequency amplifier using TELOS VARIO-TRANSFORMERS will greatly increase the range and selectivity of any receiver.

SPECIFICATIONS: All types require space 5"x5" back of panel.

TELOS TYPE	Depth back of panel	Wave length Range	List Price
TA4 Vario-transformer	3⅜"	160-480m.	$6.50
TA6 Vario-transformer	4"	200-750m.	7.50
A4 Variometer	3¼"	130-460m.	5.50
A6 Variometer	3⅞"	180-730m.	6.50

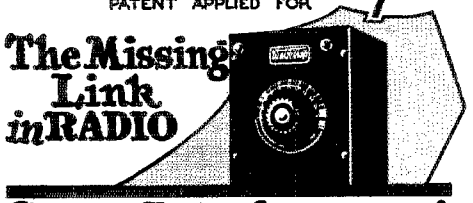
SHIPPED DIRECT ON RECEIPT OF ORDER

Kindly give your dealers name.

DANZIGER-JONES, Inc.

143A PRINCE STREET (Sole Licensees) NEW YORK, N. Y.

TRADE MARK
Wave Trap
PATENT APPLIED FOR



The Missing Link in RADIO
Stops Interference!

Get that elusive DX station thru heavy QRM. With the "WAVE TRAP" you can do it and greatly increase your range.

It is installed in a minute by changing only one connection and is indispensable on any receiving set, with any type of antenna. It is mounted on a Formica panel in a handsome mahogany finished cabinet 6x5x6, and is a high-grade instrument throughout.

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BY A. FREDERICK COLLINS

Inventor of the Wireless Telephone

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Second Printing Revised and Enlarged
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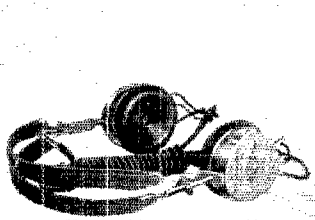


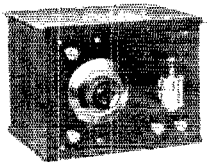
Head Phones
2000 Ohm—$6.00
3000 Ohm—$7.50

Vernier Rheostat $1.25

Plain Rheostat 85¢

Radio Frequency
Transformer $5.00

BASCO



Complete
Crystal Set
$12.00

Tube Socket 50¢

Dial 50¢

Variable Air Condenser
11 to 43 Plate $3.45 to $4.25

Better Radio Results at Lower Costs

THE results obtained from any radio outfit—home made or factory built—depend largely on the units employed. Cheaply constructed electrical apparatus *cannot* give best results.

After twelve successful years building electrical units the Briggs & Stratton Company have acquired an invaluable knowledge of electrical design which now expresses itself in the construction and workmanship of every unit in the Basco line of radio equipment.

"Better Radio Results at Lower Cost" tells briefly what these many years of experience mean to you. Insure yourself against failure—insure top-notch results by building your outfit on a foundation of real result-getting radio units—the Basco Line.

Insist on Basco parts—ask your dealer for them. If he can't supply you, write us direct and we will see that your order is promptly filled.

Besides articles shown and listed here, we also make switches, contact points, stop posts, binding posts and bezels.

Jobbers and dealers! Write for free catalog and details of our attractive selling proposition.

BASCO Radio Frequency Transformer. Efficient over wave band for 00 to 600 meters with all standard tubes. Employs non-capacity winding—double silk covered wire—no enamel. Maximum transfer of energy. Windings encased in fibre. Mountings and binding posts silver plated. List Price.....**$5.00**

BASCO Radio Receivers. Super-sensitive—natural voice pitch—no scratching. Light weight aluminum case—solid horse shoe type magnet—no laminations. Diaphragm set to thousandths-of-an-inch accuracy from magnet poles. Clean cut, rugged design. Comfortable on ears. 2000 and 3000 ohms, list **$6.00** and **$7.50** respectively.

BASCO Vernier and Plain Rheostats. Vernier adjusts to 1/150 of an ohm. None better for detector. Smooth, positive contact always. One hole only for panel installation. Coils rigidly inset in heat-resisting fibre—no shifting possible. Metal parts heavily nickeled. List price—Vernier Rheostat—**$1.25**. Plain Rheostat **85¢**

BASCO Crystal Detector Set. Complete for instant hook-up to aerial, ground and phones. No batteries. *Simple and sturdy. One dial to adjust. Sensitive* tested crystal enclosed in glass. Simple cat-whisker adjustment. Maximum crystal-set range. Metal parts solid brass. Bakelite composition panel. Mahogany finished cabinet 8"x6¾"x6". List price.....**$12.00**

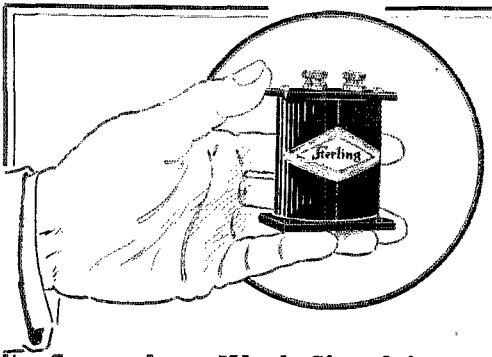
BASCO 11 to 43 Plate Air Condensers. Sturdy—compact. Heavy plates, accurately spaced—no chance of touching. Two screw holes for easy mounting. Without dial, list prices:

43 plate	$4.25	17 plate	$3.60
23 plate	3.75	11 plate	3.45

BASCO Tube Socket. Black oxidized tube holder. Bakelite base. Strong—good looking. Sure-contact springs. Nickeled binding posts. An exceptional buy at **50¢**

BASCO Moulded Composition Dial. Graduated 180° and 100 divisions. 3 inches diameter. 1½ inch knob. High lustre black—white inlaid figures. Accurately trued brass bushing for ¼-inch shaft. List price **50¢**

Briggs & Stratton Co.
BASCO PRODUCT
Milwaukee Wisconsin



Look At This Little Transformer!

—A GIANT FOR WORK—

Strengthens Weak Signals! **Brings in Distant Stations!**

An Audio or Radio Frequency Amplifying Transformer—regular Tom Thumbs in size but Giants for work. That's the Sterling.

For pure amplification, reducing distortion and increasing your range, make sure you ask your dealer for the STERLING. Size 1½" by 2" by 2⅞".

Radio Frequency Amplifying Transformers

OPERATE ON ANY WAVE LENGTH

List Price $5.00 Trade Discounts on application

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AMPLIFYING TRANSFORMERS

mean success to your radio receiving

Other STERLING Radio Products

Portable Rectifiers — Filament Rheostats — Filament Meters — Pocket Voltmeter — Filament Meters — Pocket Voltmeters

—and increasing fast.

THE STERLING MANUFACTURING CO.

2845 Prospect Ave., Cleveland, O.

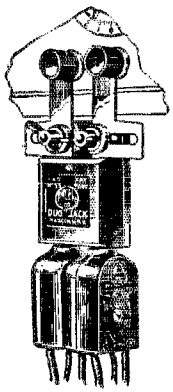
Audio Frequency Amplifying Transformers

MAGNETIC CIRCUIT OF CLOSED CORE PERMEABILITY SHELL TYPE

STRAY FIELDS REDUCED

List Price $4.00 Trade Discounts on application

Awkward Binding Posts



are immediately changed to convenient jack equipment by the Pacent Duojack. It also provides for connection of two sets of phones or a head set and loud speaker.

PRICE, $1.50

Other PACENT Plug and Jack devices, which will increase the pleasure of operating your equipment, are the PACENT Universal Plug, PACENT Multijack, PACENT Twinadapter and PACENT Jacks.

Don't Improvise "PACENTIZE"

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Used and Recommended by the Largest Radio Concerns

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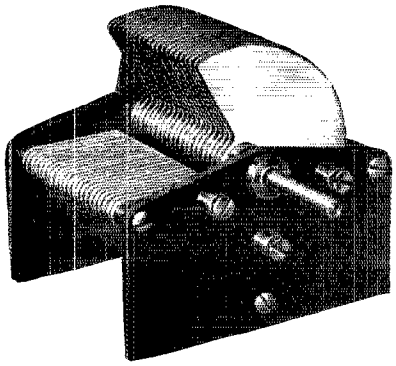


THE WIMCO CONDENSER

Made to meet a demand for quality — highest efficiency, 3 plate, 23 plate and 43 plate sizes.

Very low resistance and very low zero capacity. The phase angle does not depart from 90° sufficiently far to be detectable. Highly recommended for the fine tuning necessary in amateur apparatus.

THE CARCO COUPLER

Just the thing for the popular receiving set. Bakelite tube and rotor, silk covered wire, perfect contacts. Designed and developed by an amateur for the amateur.

Guaranteed to produce superior results. Range 150 to 700 meters. Not just "a coupler" but the real coupler—peer of all, the Carco.

We invite Dealer and Jobber inquiries.
Send for literature and prices on the
WIMCO SOCKET FOR WD-11 TUBES

THE WIRELESS MANUFACTURING CO.

CANTON, OHIO

Manufacturers—Distributors

TRADE **ESCO** MARK

THE AMATEUR TRANSATLANTIC TESTS SHOW

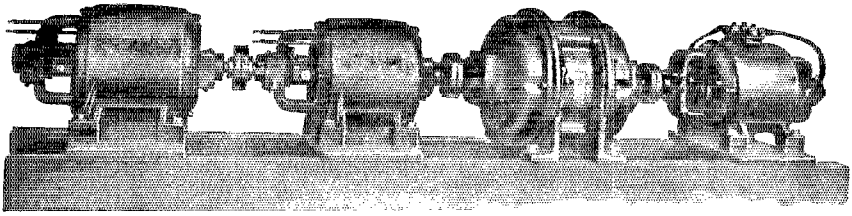
(At the Time This Adv. Was Written)

That More Operators Succeeded in Getting Across With

"ESCO" MOTOR-GENERATORS

THAN WITH ALL OTHER MAKES COMBINED

8BSS Cazenovia first to be heard in Switzerland—Same Station 8AQO heard in England—France—Switzerland first 8 Nights. 1BGF, Hartford, first to be reported back.—Very many others made, remarkable records with our apparatus.



This is a Special Four Unit Set for the largest broadcasting station in existence. A 10 H.P. 220 V. 60 cycle, 3 phase motor—Two 1000 V. 2000 W. Generators designed to operate in series, thus producing 2000 V. 4000 W. and one 12 V. 2000 W. Filament Current Generator.

Besides making standard outfits in over 200 combinations, we are constantly developing special apparatus for special purposes.

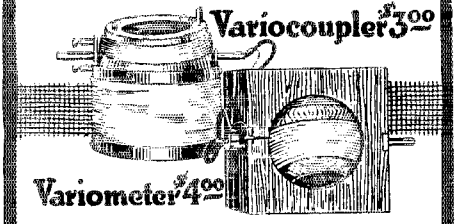
BATTERY CHARGING MOTOR-GENERATORS IN MANY SIZES
MOTORS—DYNAMOTORS—GENERATORS—MOTOR-GENERATORS

ELECTRIC SPECIALTY CO.

215 SOUTH STREET, STAMFORD, CONN., U.S.A.

SOLD BY PRINCIPAL DEALERS EVERYWHERE

Both Selling Fast Because the Price is Right!



Variocoupler $3.00

Variometer $4.00

Set of Three

2 Variometers $8.00
1 Variocoupler $3.00
$11.00

a "Chi Rad" *Special* $10.00

Send Your Order in To-day

OUR NAME PROTECTS YOU

CHICAGO RADIO APPARATUS Co.

415 So. Dearborn Chicago.

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 .02½
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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.

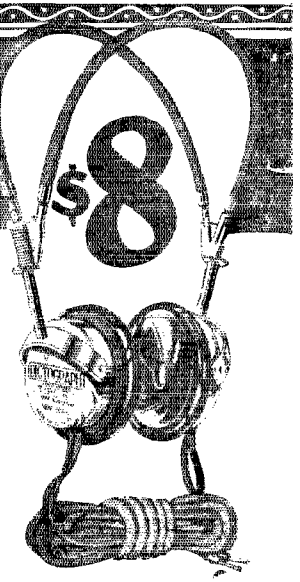
Listen!

Dictograph Announcing *A Sensational Reduction*

Big news for all radio enthusiasts. The price of the Dictograph—the supreme radio headset—has dropped $4, a clean third of the regular price. The world's best headset is now within *everybody's* reach. Intensive production to meet the enormous demand has effected a great manufacturing economy. We are allowing *you* the saving. Take advantage of this wonderful opportunity to save $4 on the best headset in the world.

DICTOGRAPH *Radio* HEADSET

Was $12.00 *NOW* $8



The Standard of the World

This is the same supreme Dictograph Headset that has always sold for $12—same in quality, same in guarantee, same in everything but the price—$8 complete. Made by the makers of the world standard Dictograph products—the marvelous "Acousticon" for the Deaf, the famous Detective Dictograph, the Dictograph System of Loud Speaking Telephones and the Dictograph Radio Loud Speaker for the Home.

Type R-1, 3,000 ohms, for *all* types of receiving sets. Complete with 5-ft. cord.

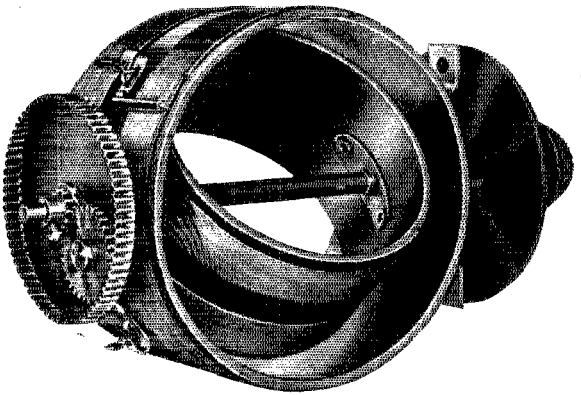
If your dealer is sold out, order direct from us. Immediate delivery.

Dealers: Order through your jobber or write direct for names of authorized distributors.

DICTOGRAPH PRODUCTS CORPORATION

220 WEST 42nd STREET, Suite 1304 NEW YORK CITY

Branches in all Principal Cities.



PAT. APPLIED FOR

PRICE COMPLETE WITH DIAL

$5.50

SEND FOR BULLETIN NO. 2

AT LAST!

A VARIOMETER WITH A REAL VERNIER. THE GEARED CONTROL — 7 TO 1 RATIO — MAKES CLOSE TUNING EASY. SIMPLE TO INSTALL — NO EXTRA HOLES TO DRILL — NO EXTRA KNOBS ON YOUR PANEL.

MFG. BY

CLARION RADIO SHOP

POUGHKEEPSIE, N. Y.

BIG PROFITS IN R. T. S. EQUIPMENT

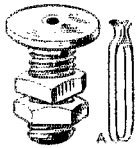
R. T. S. Equipment converts the one-time buyer into a profitable, permanent customer. By handling R. T. S. Standard and Special Equipment you can fill every demand promptly, with satisfaction to your customer and profit to yourself.

The R. T. S. Condenser, shown here, is proving unusually popular. They make the tubes perform properly, cut out "howling," and clear up phone speech. Furnished complete with mountings, ready for connection.

Made in three capacities, prices to retail trade as follows:

Grid Condenser .0005 MF.....30¢ each
Grid Condenser & Leak, Combined,.....45¢ each
Phone Condenser .0013 MF.....30¢ each

R. T. S. CORD TIP JACK



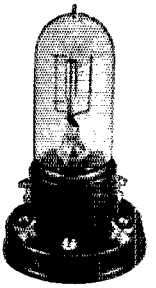
This R. T. S. Cord Tip Jack leads the way in quality, service and price. Constructed of spring phosphor bronze, highly nickeled. A wiping spring contact insures a clean, positive contact at all times. Where others sell from $1.00 to $2.50, this R. T. S. Cord Tip Jack

Retails at.....per pair, 50¢

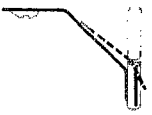
Jobbers and Dealers: Send Today for NEW Wholesale catalog, with scale of prices and discounts to recognized trade.

RADIO TESTING STATION

Dept. Q-1, 25 Sturgis Street
Binghamton, New York



Na-ald W.D.-11



It's the contact that counts

The special phosphor bronze clips of the Na-ald W. D. 11 Socket maintain perfect contact regardless of any variation in tube prongs and bases.

Moulded from genuine Condensite, these sockets are made for use with the famous W. D. 11 tubes, operated by a single cell battery.

The Na-ald De Luxe V. T. Socket is of highest quality throughout. Its laminated phosphor bronze strips press firmly with a side wipe action on the contact pins, keeping surface clean and insuring perfect contact.

These sockets retail at 75c each

Send stamp for dial, small space socket, condenser and R. F. Transformer circulars.

Na-ald De Luxe

ALDEN-NAPIER CO.

Dept. M 52 Willow Street
Springfield, Mass.

NA-ALD

To meet the demand of radio manufacturers for a dependable coil to operate with standard types of radio receiving equipment, The Acme Wire Co. has designed the

Acme Coil for Audio Frequency Transformers

These coils are made in the plant of The Acme Wire Co. of Acme Wire, and every operation conforms to the Acme Standards of excellence.

Specifications --- Turn Ratio 3.5:1

Resistance
Direct current resistance of Primary 1090 ohms at 68°F. Direct current resistance of Secondary 5670 ohms at 68°F.
Finished O. D. 1 — $\frac{3}{32}$" ± $\frac{1}{32}$".

Core Tube
$\frac{1}{8}$" I.D. x 1" long x $\frac{1}{32}$" thick consisting of 4 thicknesses of .005" Moleskin Paper.

Primary Winding
3800 turns of No. 40 (.0031) Enamelite Wire. Length of winding $\frac{3}{4}$" allowing $\frac{1}{8}$" paper projection on each side for mechanical protection. One thickness of .00075" Glassine Paper between layers.

Secondary Winding
Secondary Winding is separated from Primary Winding by 3 thicknesses of .005" Moleskin Paper. 13,300 turns of No. 40 (.0031) Enamelite Wire. Length of winding $\frac{3}{4}$" allowing $\frac{1}{8}$" paper projection on each side for mechanical protection. One thickness of .00075" Glassine Paper between layers.

Leads
Both Primary and Secondary leads are 16 strands of No. 38 bare copper wire stranded together and covered with one wrapping of Green silk. Leads project 3" from coil. Leads brought out in such a position that coil can be assembled in laminated steel very easily. Leads brought out on opposite sides of coil.

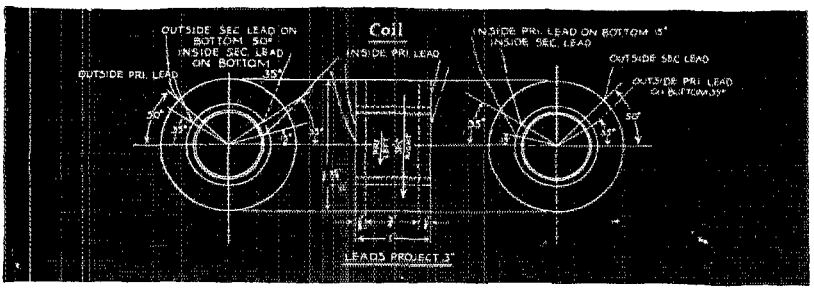
Impregnation
Coil impregnated under vacuum process in a compound consisting of beeswax and rosin.

Finish
Coil covered with Black pebbled bookbinder's cloth.

Tests
All coils tested for resistance and breakdown between layers.

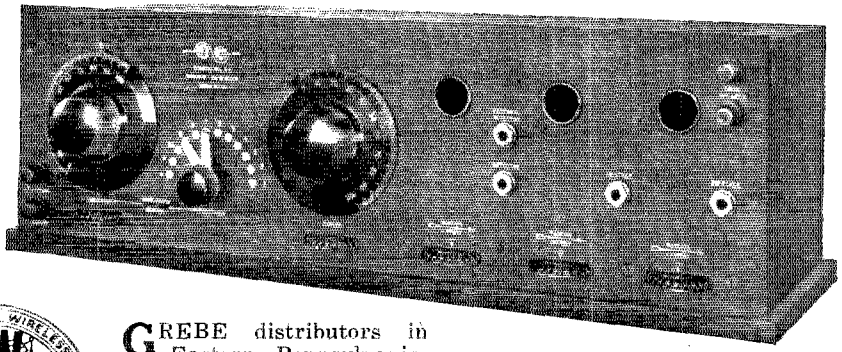
Complete information as to prices, terms, and production on request.

THE ACME WIRE CO., New Haven, Conn.
NEW YORK CLEVELAND CHICAGO



AcmeWire

"It goes in the space"



Trade Mark Registered

GREBE distributors in Eastern Pennsylvania, Southern New Jersey, Delaware and Maryland. The Famous Grebe Receivers are renowned for their sensitivity and expert workmanship.

Have your dealer order from us for immediate Shipment.

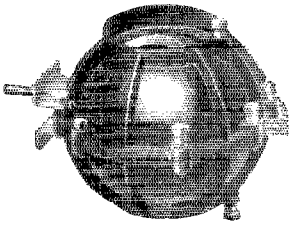
PHILADELPHIA WIRELESS SALES CORPORATION

Formerly Philadelphia School of Wireless Telegraphy

1533 PINE STREET,
WHOLESALE DEPT.

1326 ARCH ST., PHILADELPHIA
RETAIL DEPT

Kellogg Radio Equipment
For Better Results



The Kellogg Variometer

The stator and rotor are of Kellogg Bakelite, with properly proportioned windings of well insulated copper wire.

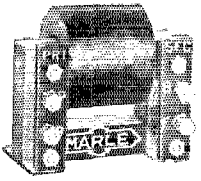
Two terminals are provided for the rotor and three for the stator, permitting the variometer to be used in all known variometer circuits.

Kellogg variometers have no sliding contacts; nothing to wear or "short." A spring takes up all play and allows the rotor to turn with a smooth even motion.

No. 501..... Each $8.00

KELLOGG SWITCHBOARD & SUPPLY COMPANY
CHICAGO

MARLE

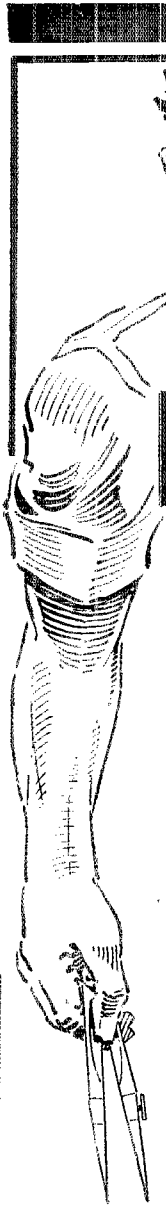


TRANSFORMERS

AUDIO FREQUENCY
RADIO FREQUENCY
MODULATION
25 Watt Filament Heating

MFD. BY

Marle Engineering Co.
ORANGE, N. J.



SIGNAL

Facts from the Factory

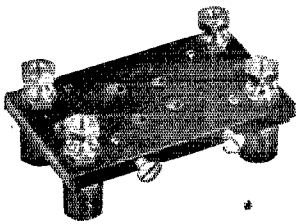
Talk No. 1.

YOU don't have to fuss and cuss every time you tune up the evening's Radio recreation—or have every other number on your program sound like a selection from *Inter Ference*.

Much of this "interference" is due to apparatus incorrectly, ignorantly, or carelessly manufactured. Do your best on assembling such parts, or manipulating such sets—you never *can* get satisfaction.

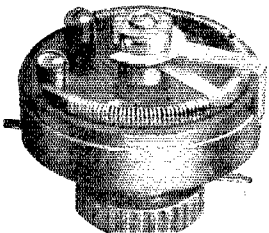
But with SIGNAL equipment—ah, that's different! Our folks have been making wireless apparatus for over thirty years. Men here have grown gray in our service. They take old-time pride in seeing that nothing but the best in materials, workmanship, and finish leaves the SIGNAL plant.

It is made right. It looks right. It works right. If you insist on SIGNAL when you're buying Radio equipment—you will buy Radio satisfaction.



SIGNAL Tube Base for WD-11 Tubes

Adapted for building receiving sets using a single dry cell for filament excitation. Does away with the troublesome 6 volt storage battery but retains the efficiency of the 6 volt tube. Legs insulated for table mounting; screw provided for panel mounting.



SIGNAL Vernier Rheostat

The first successful vernier using a single knob for control. Fine adjustment is easily obtained. Simple in design and sturdy in construction. Furnished with or without knob and pointer, so dial to match others of set may be used. (1953)

SIGNAL Electric Mfg. Co.

Factory and General Offices:

1915 Broadway, Menominee, Mich.

Atlanta	Cleveland	New York	St. Louis
Boston	Minneapolis	Pittsburgh	Toronto
Chicago	Montreal	San Francisco	

(You'll find our branch offices in the Telephone Directory)

Information Coupon

Signal Electric Mfg. Co.
1915 Broadway, Menominee, Mich.

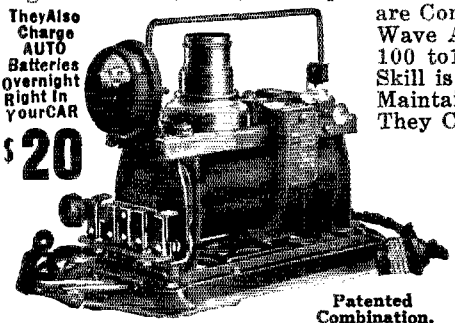
Please send catalog and bulletins giving complete information about SIGNAL Radio equipment to name and address written in margin.

RADIO "A" & "B" STORAGE BATTERIES CHARGED AT HOME FOR A FEW CENTS, FROM ANY 100 to 130 Volt 60 Cycle LAMP SOCKET, WITH AN F-F RADIO RECTIFIER

It Charges All 6 Volt RADIO "A" & AUTO Batteries; & RADIO "B" Storage Batteries Up to120 Volts,InSeries,Inductively. DisconnectingUnnecessary. NothingToSlopOver. Burn Out,orCauseTrouble. ItChargesAutomatically.OperatingUnattended.IT WILL CHARGE A DEAD BATTERY. Leave Battery Wherever it is, Without Even Disconnectingit;ScrewPlugin 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? F-F BATTERY BOOSTERS are Complete Compact Self Contained Portably Handy Full Wave Automatic Magnetic Rectifying Charging Units, for 100 to130 Volt 60 Cycle A.C. Also For Other Cycles. No Skill is Required. INFUSIBLE Carbon Rectifying Brushes Maintain Uninterrupted Service. They Save More Than They Cost & Last Lifetime.

They Also Charge AUTO Batteries Overnight Right In Your CAR

$20



Patented Combination.

POPULAR PRICES

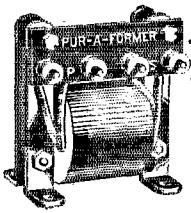
Type 6 for 6 Volt "A" Battery, Charging at 6 Amperes $15
Type B Charges Radio "B" Batteries Up to 120 Volts $15
Type "A-B" Combination Radio Rectifier for Charging 6 Volt "A" & Auto Storage Batteries & Up to 120 Volts of "B" Storage Battery in Series $20
Type 12 for 12 Volt Battery, Charging at 5 Amperes $15
Type 166 for 6 Volt Battery, Charging at 12 Amperes $20
Type 1612 Charges 12 volt Battery at 7 amperes $20
Type 1626 is a Combination Of Both Type 166 & 1612 $28

Eventually You Will Buy An F-F RECTIFIER. Why Not Now? The Sooner You Buy it; THE MORE YOU SAVE. 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 8 Ampere Full Wave Automatic ROTARY Rectifier described in FREE Bulletin No. 31A. ORDER Now or WRITE Immediately for FREE BOOSTER BULLETIN No. 31.

THE FRANCE MANUFACTURING COMPANY

OFFICES & WORKS CLEVELAND, OHIO, U.S.A.

Canadian Distributor: THE JACK V. ELLIOT COMPANY, HAMILTON, ONTARIO, CANADA.



PUR-A-FORMER $3.50

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 4½ to 1. *Buy them at all good dealers.*

HARRY ALTER & CO.

We Sell Wholesale Only

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DEALERS ONLY—

Write for Harry Alter's RADIO "POCKETBOOK." 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.

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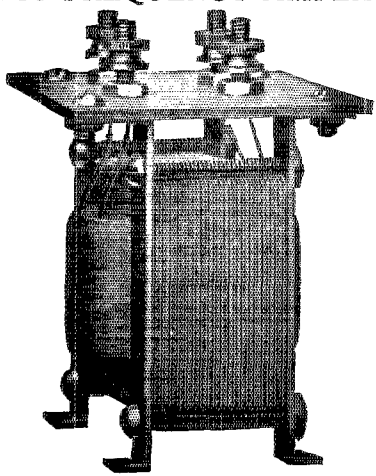
We Sell Wholesale Only

AUDIO FREQUENCY AMPLIFIER



MOUNTED TYPE M

Silicon Steel Cores; Shell Design—Bakelite Terminal Board; Ratio—9 to 1; Insulation tests 1500 Volts.

Mounted Type M—$5.00
Semi Mounted Type SM—$4.50
Unmounted Type UM—$4.00

Discount 10% for cash with order

Designed by Packard *Engineers—*

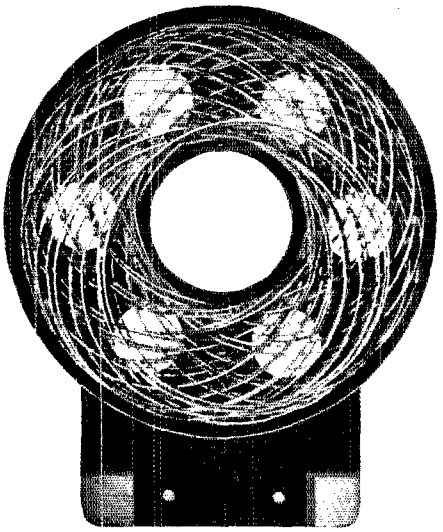
A quality Name in Radio

THE STANDARD TRANSFORMER CO.

Warren, Ohio

CURKOIDS

What They Are



Patent Pending

Curkoids are inductances wound in the form of curtate epitrochoids.

This form of winding *does* result in minimum distributed capacity and maximum concentration of the valuable inductance.

Curkoid Couplers are triple mounts so designed that the coupling movement is parallel with the common center of the coils, this movement being in low ratio to the manual operation of the dial, giving micrometer adjustment of the mutual inductive fields.

This slow parallel movement in the coupling, in combination with entirely "loose" coupling, results in the *utmost selectivity* in tuning. With "loose" coupling by Curkoid Parallel Inductance, maximum volume and distortionless tone in broadcast reception are obtained, while with "tight" coupling, spark reception of maximum intensity is accomplished.

Long distance stations are selected with signal strength at maximum. Coils 50K, 75K and 100K received on 150 to 1000 meter wave lengths and have ranged from 2500 to 3000 miles.

REMEMBER

Parallel Inductance – Distributed Capacity
+Super-Inductance=Utmost Selectivity

Special Offer to Q. S. T. Readers

TO introduce to Amateur Radio Fans *selective tuning* with parallel inductance, we offer to QST readers Curkoid Coupler and Curkoids No. 50K, 75K and 100K at a

Special Introductory Price of $6.00

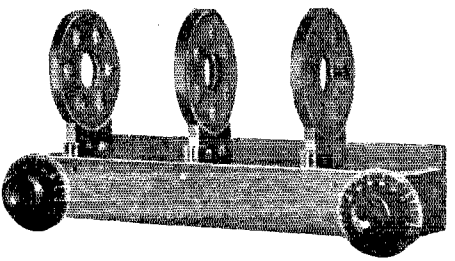
PRICE LIST

COUPLER $6.00

Curkoids

No. 20K	$1.20	No. 250K	$2.10
No. 25K	1.25	No. 300K	2.20
No. 35K	1.35	No. 400K	2.30
No. 50K	1.50	No. 500K	2.50
No. 75K	1.60	No. 600K	2.70
No. 100K	1.70	No. 750K	3.00
No. 150K	1.80	No. 1000K	3.30
No. 200K	1.90	No. 1250K	3.75
		No. 1500K	4.25

Order your Curkoid System today, the system that permits the clear reception of distant stations and the ability to hold them, audible and strong, without interference.



Curkoid Coupler Patents Pending.

RIEGER RESEARCH CORPORATION

112 West 44th Street, New York, N. Y.

POSACO RADIO

QUALITY AND EFFICIENCY

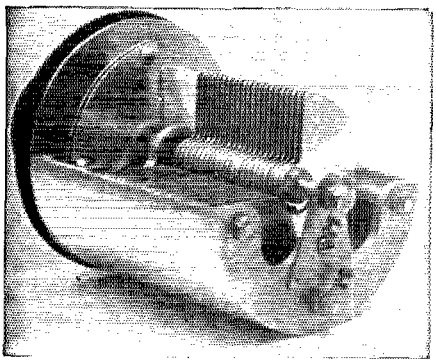
VERNIER CONDENSER WITH SINGLE KNOB CONTROL

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.

VERNIER

B-1	.001015	MFD.	$7.50
B-2	.000545	MFD.	$7.00
B-3	.000295	MFD.	$6.50

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.

REGULAR

A-1	.001	MFD.	$4.50
A-2	.0005	MFD.	$4.00
A-3	.00025	MFD.	$3.50
A-4	.000045	MFD.	$3.00

Ask your Dealer or Write for Circular.

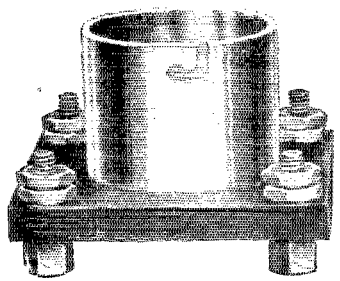
Jobbers and Dealers Write for Proposition.

Increase Your Sales.

——MANUFACTURED BY——

THE C. D. POTTER CO., Alden L. McMurtry, License **Stamford, Connecticut**

POSACO RADIO



MAXIMUM MAXEFF EFFICIENCY

Write for MAXEFF Circulars illustrating our Complete line of RADIO EQUIPMENT

MAXEFF VACUUM TUBE SOCKET

A ruggedly constructed V.T. Socket adaptable to all standard Vacuum Tubes. Base and feet are cut (not molded) from solid insulation sheet, insuring them against breakage from heat expansion or handling. Heavy polished aluminum tubing is securely pressed into base and double keyed. Maxeff sockets *give perfect contact and practically eliminate contact noises.*

Price $1.

THE HIGGY-AVERY CO.

Manufacturers

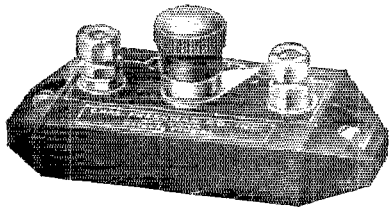
1199-1205 Franklin Ave., Columbus, Ohio

A good article is always imitated!

Be sure you receive the

FRESHMAN

Variable Grid Leak and Micon Condenser Combined



Price only $1.00

3 Points to Remember

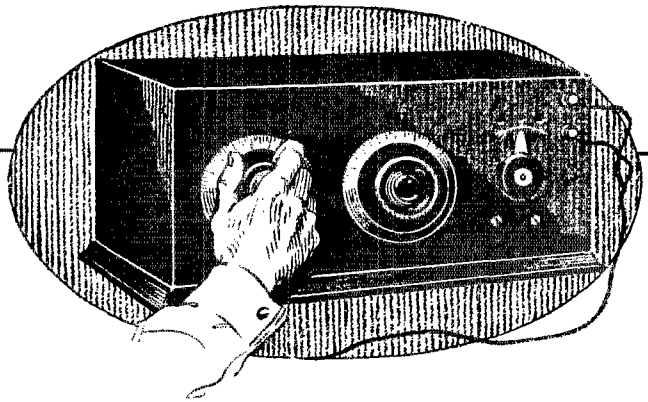
1. It is hermetically sealed in a mould to prevent moisture from affecting the grid resistance.
2. It has an unbroken range from zero to 5 megohms, allowing proper adjustment for maximum efficiency of detector.
3. It contains a tested Micon Condenser of .00025 M. F.

At your dealers—otherwise send purchase price and you will be supplied without further charge.

Manufactured by

CHAS. FRESHMAN CO., Inc.

97 Beekman Street, NEW YORK CITY



Why Formica is Preferred Insulation

SALES of Formica for radio insulation exceed those of any other material because Formica has qualities that radio engineers as well as amateurs value very highly.

Formica panels are incomparable in appearance. The splendid gloss finish is perfect. It can be converted into a satin finish equally fine.

Formica has the highest and most uniform dielectric strength—and that strength is permanent. It does not acquire water content either by internal chemical action or absorption. After a year or two of use is when the Formica panel is most appreciated.

Formica is remarkably uniform in its qualities. You can count on its performance with certainty.

Formica is approved by the Navy and the Signal Corps and has been certified by the United States Bureau of Standards.

But it holds its dominating position by virtue of the preference of active radio men everywhere—both amateur and professional.

Formica is now available everywhere for quick delivery. There is no reason to use materials in which you have less confidence.

Dealers: When you stock Formica you profit by the important advertising and sales co-operation that we have arranged for dealers.

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Cincinnati, Ohio

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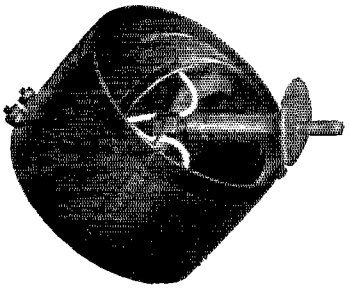
FORMICA
Made from Anhydrous Redmanol Resins
SHEETS TUBES RODS

For Complete Satisfaction you will use

THE LORAIN VARIOCOUPLER

NOW EQUIPPED WITH UNIT TAPS
7 TAPS OF 7 TURNS AND 7 TAPS OF 1 TURN

$5.00
with
30 turn plain
wound rotor



$5.25
with
70 turn bank
wound rotor

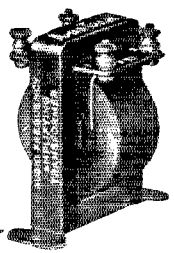
The Perfect Mounting
Pat. pend.

The Lorain will give you complete satisfaction because it combines all of these distinctive features:

The Perfect Mounting, ¼" smooth and true running shaft, Unit taps, Our special formed taps, strong and easily cleaned, Pigtail connections to Rotor, Formica tubing, #22 Green D.S.C. Copper wire, Excellent workmanship and high efficiency.

Send for descriptive bulletin.
If your dealer cannot supply you, order direct.
Dealers write for discounts.

LORAIN RADIO SUPPLY CO. LORAIN, OHIO



Price $7. **Wt. 1 lb.**

The AMERTRAN

super audio frequency amplifying transformer

gives 38.6 times audibility in your receiving, *without distortion.* Two stages (2 AMERTRANS) give 1490 times audibility.

It is doubtful if the substitution of any one thing in a radio set could make such a notable improvement as the installation of AMERTRANS.

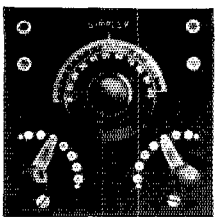
Ask your Electrical Dealer, or sent carriage charges collect.

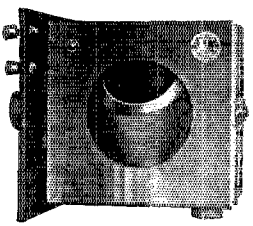
American Transformer Company

Designers and builders of radio transformers for over 20 years.

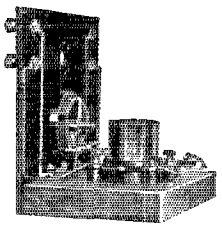
176 Emmet St., Newark, N. J

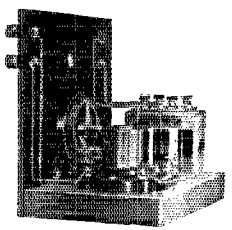
SIMPLEX—that's your safeguard





VARIO-COUPLER PANEL VARIOMETER PANEL



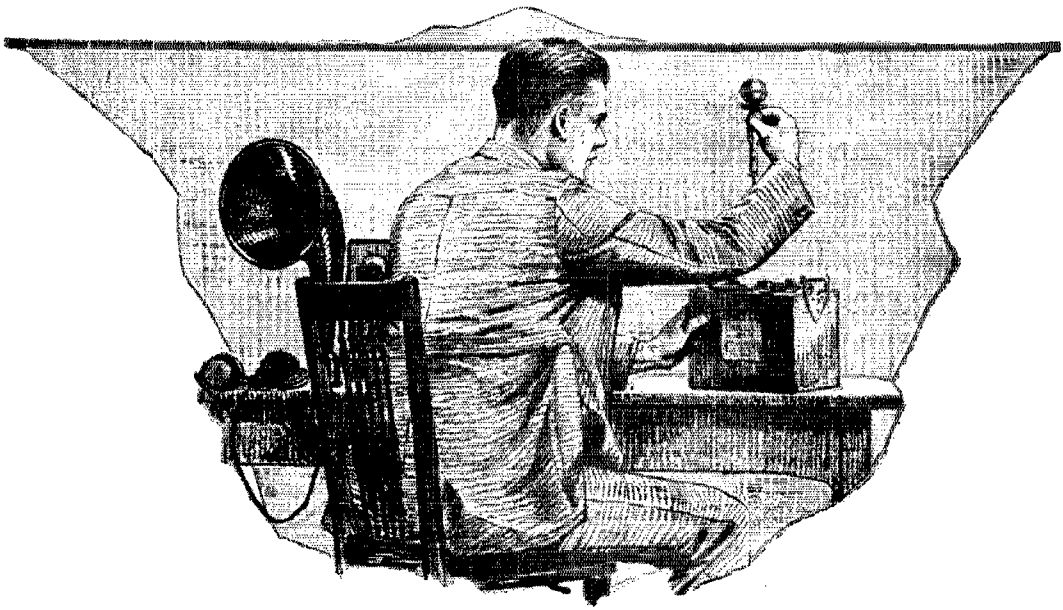


DETECTOR PANEL AMPLIFIER PANEL

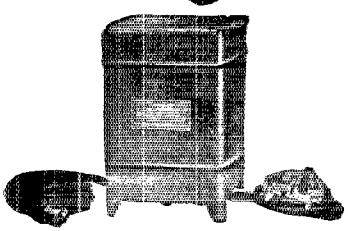
Also Unmounted Variometers & Variocouplers

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.

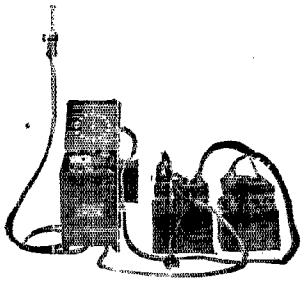
SIMPLEX RADIO CO.
1013-15 RIDGE AVE., PHILA., PA.



Tungar
BATTERY CHARGER



This enables you to keep batteries fit, right at home. With simple attachment, it will also charge "B" storage batteries.



This is the way "B" Storage Batteries are charged with Tungar and attachment.

Your Battery Should be Kept Fit

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.

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.

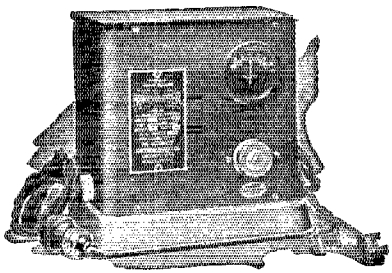
General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

35A-78C

Charge your Radio Battery at Home for a Nickel



THE HOMCHARGER

is the original and most popular charger for this purpose. After an evening's entertainment connect to any convenient lamp socket, snap the clips on your battery and "turn in."
While you sleep the HOMCHARGER is silently charging your battery—the charging rate being governed automatically. In the morning it is fully charged—ready for another evening's work, and the cost has been less than a nickel for current consumed.

Beautifully finished in mahogany and gold—may be used anywhere in the home. No muss, trouble, dirt—no moving of battery or loss of time.
The simplest, most efficient and most reliable battery charger ever made. Only one wearing part—self-polarizing—five to eight ampere charging rate—approved by underwriters—unqualifiedly guaranteed.
Over 60,000 HOMCHARGERS now in use. Sold complete with ammeter, etc., by all good radio and electrical dealers for $18.50—no extras to buy.
See the RADIO HOMCHARGER DE LUXE at your dealer's or write direct for our free circular showing why the HOMCHARGER is the best rectifier built at any price.
MOTORISTS The HOMCHARGER will also charge your AUTO Battery.

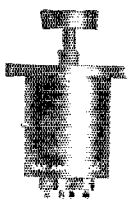
THE AUTOMATIC ELECTRICAL DEVICES COMPANY

127 WEST THIRD STREET, CINCINNATI, OHIO
LARGEST MANUFACTURERS OF VIBRATING RECTIFIERS IN THE WORLD

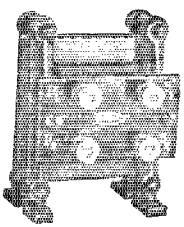
DONGAN

RADIO TRANSFORMERS

An unusual Radio Frequency Transformer with an **adjustable Silicon core**—an exclusive patented feature, enabling reception at 200 meters as well as on the higher wave lengths. Daily establishing DX records. Price only $4.50



DONGAN ELECTRIC MFG. CO.
DETROIT MICHIGAN



An amplifying transformer scientifically constructed to bring out full, clear tones. Top or side panel mounting. Price $4.00.

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 operas, 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

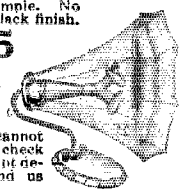
For pair of receivers (more than twice the volume) $1

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 only..... $8

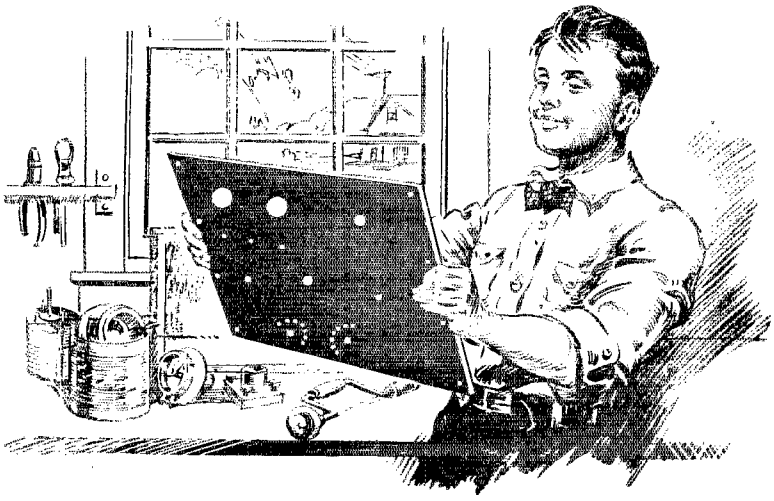
Bell Horn

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.
1827 So. 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.



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.

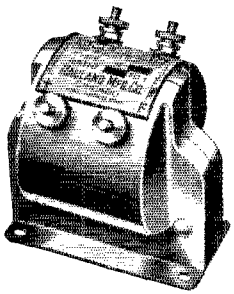
This strong, handsome, jet-black material is not merely an insulating material—it is a radio insulation made to meet high voltages at radio frequencies. That is why it will give you greater resistivity and a higher dielectric strength than you will ever need.

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.

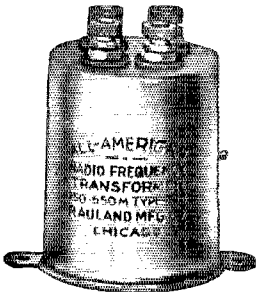
An Opportunity for Radio Dealers

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. of Canada, Toronto, 245 Carlaw Ave.



"All-American" Amplifying Transformers



Give power — range — tone-quality. Scientifically correct; fine examples of workmanship and finish.

R10, RADIO Frequency (150-550 meter wave lengths).....$4.50
R12, AUDIO Frequency (Ratio 3 to 1)..... 4.50
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Say "ALL-AMERICAN or nothing" to your dealer.

Send for Bulletin 22—Tells the truth about amplification and how to get it 100%.

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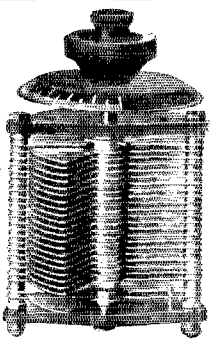
This Standard Headset has unexcelled tonal qualities. Reproduces accurately faint long distance signals; fits comfortably and is quickly adjustable to any size head. The forked cord permits separation of the receivers for use by two observers simultaneously.

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.



NOTICE SPECIAL
FOR THIS MONTH
VERNIER CONDENSERS

11 PLATE....$2.25
23 PLATE.... 3.00
43 PLATE.... 3.50

PRICE INCLUDES
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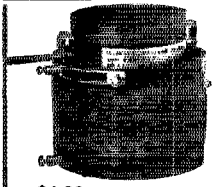
ALUMINUM PLATES
FORMICA END PLATES
GUARANTEED

M. C. E. Co.
Manufacturers
Indianapolis, Ind.



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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.

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Honestly made—Honestly priced Bulletin R gives complete data Splendid discount to the trade.

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Successors to
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THIRD ANNUAL

CONVENTION

HOTEL PENNSYLVANIA

NEW YORK CITY

MARCH 1ST, 2ND & 3RD 1923

Don't miss it this year. Better than ever. Twenty-five REAL MANUFACTURERS will be there with the Latest and Best of Apparatus. All of the Second District Clubs will have Booths in the Butterfly room.

Everybody who is Anybody in Radio will be there.

One Day Admission—25 cents

Three Day Admission—50 cents

On the last night, Saturday March 3rd, the Great Banquet will be held in the Hotel Pennsylvania, Banquet Hall. The 1923 Banquet is guaranteed to make 1922's look like a "Squeak Box" alongside a 250 Watt Bottle.

DON'T LET THIS GET BY YOU!
BE THERE!!!

Tickets are $4.00 per—and you'll surely get your money's worth. Don't wait. Order Now—from

The Secretary

Executive Radio Council, 2nd District

120 Liberty St., New York City

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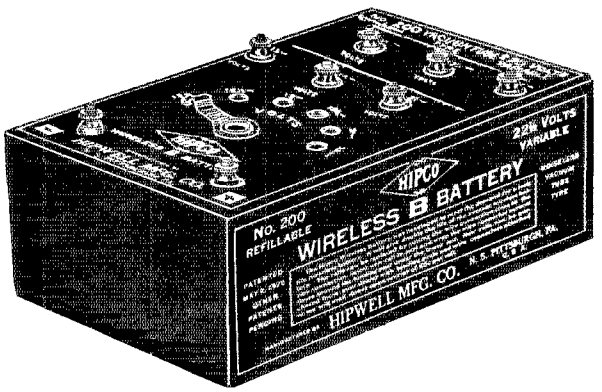
PRICE $3.50

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
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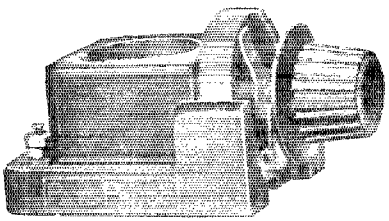
Rheo-Socket

Price $3.00 f. o. b. New York City



Compact, increased efficiency, shorter connections, less wiring—brings in stations you never heard before. Make this a part of your up-to-date set.
A high grade article in Red Bakelite with Phosphor-Bronze Contacts and Alloy Resistance Wire.
For Base or Panel Mounting.

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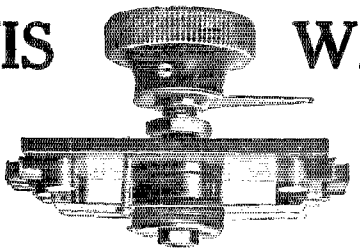

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Concealed type, mounted on formica base, $1.50. No. 754 visible type, switch alone, 65c.
Our sheet of diagrams showing the many uses of this popular switch sent free upon request.

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We have *special prices* to offer YOU on sets, radio parts and supplies.

SEND FOR OUR LISTS AND SAVE MONEY

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Manufacturer of

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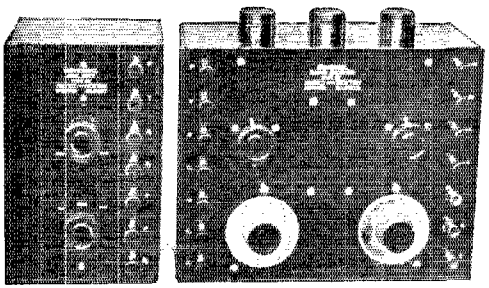

STOP INTERFERING WITH YOUR NEIGHBOR'S RIGHTS

By Making a Miniature Transmitting Station of your own Receiving Set.

Install a Universal Radio Receiver and Coil Unit which has incorporated in each all the fine points of Radio Engineering.

This set, by use of a coupled circuit in tuning, does not disturb nearby receiving sets by setting up oscillations of its own on any wave lengths from 180 to 2400 meters. This feature is highly desirable in view of the fact that such interference will eventually be eliminated voluntarily or by legislation.

The wave length range possible with Coil Unit is 180 to 6200 meters.

The Receiver is equipped with detector and two-stage audio frequency amplifier mounted in one cabinet, while the Coil Unit is in a separate cabinet.

The Universal Radio Receiver makes use of a device to PREVENT DISTORTION which, in effect, operates as a permanent "C" battery. The set will always operate at its maximum efficiency and SIGNALS WILL ALWAYS BE CLEAR AND INTELLIGIBLE.

The wave length of the secondary circuit is tuned to that of the primary circuit by means of a variable condenser, thus giving approximately 4 times the wavelength variation possible with variometer tuning.

BANK WOUND COILS, which is the best known form of winding, are used throughout.

THE SELECTIVITY IN TUNING of this Receiver is obtained by the use of the coupled circuit which allows sharper and stronger signals to be received than by means of other circuits.

We guarantee the workmanship and quality of this set to be of the highest type.

A demonstration of this set will prove conclusively that it is the biggest advance yet made toward a perfect Radio Receiver. If your dealer cannot supply you, kindly write us.

Price F.O.B. Factory

Universal Radio Receiver.....$90.00
Universal Coil Unit.....$20.00

HAYES & NEWTON

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DO YOUR OWN BATTERY CHARGING

Use a Leich Non Tune Radio Rectifier

For Long Life and Satisfactory Operation

Used by the Big Trunk Line Railroads for Block Signal and Interlocking plants.

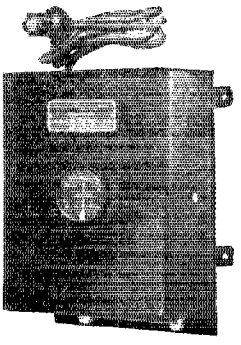
Will operate over wide range of voltage and frequency variation because **it is not tuned** to one particular frequency.

Charge radio batteries at night—Cost equivalent to burning a 40 watt lamp. Relay lock positively prevents discharge of battery due to power failures.

There are no expensive parts on a Non Tune to wear out. We limit the current output to a point where maximum efficiency and long life is obtained.

Manufactured for both 60 and 25 cycle alternating current.

Ask your dealer or write for Bulletin #100-B.



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Automatic Filament
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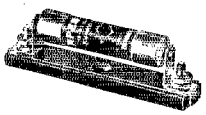
RELIEVES YOU OF ALL TUBE TROUBLES



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Direct factory to user sales methods save you 50%. Highest quality material insures you 100% service. Every battery backed by our written two-year guarantee. You take no risk. Batteries shipped express C. O. D. for your inspection. Mail your order today—at once.

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To be held in

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APRIL 13 and 14—1923

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Your days, your district, your convention

Listen in for the broadcasts giving additional information from week to week.

Elaborate plans for your entertainment are now being arranged.

Five dollar ticket entitles holder to everything, admission, exhibits, boat trip to Annapolis, Md., to visit NSS, and Banquet.

Come on fellows, meet your friends whom you all know by radio, meet them in Baltimore and know them better.

Make this a grand home coming of the Third District.

A most hearty invitation is extended to our friends of the other districts, to attend. You are welcome, we want you to feel that you are one of us.

Make your ticket reservations

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Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages only. Join the ever increasing Rusonite fans.

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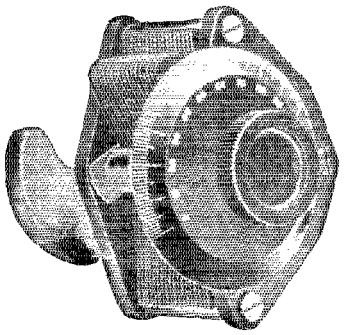

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No. 1	Table .001 mf.	$5.00
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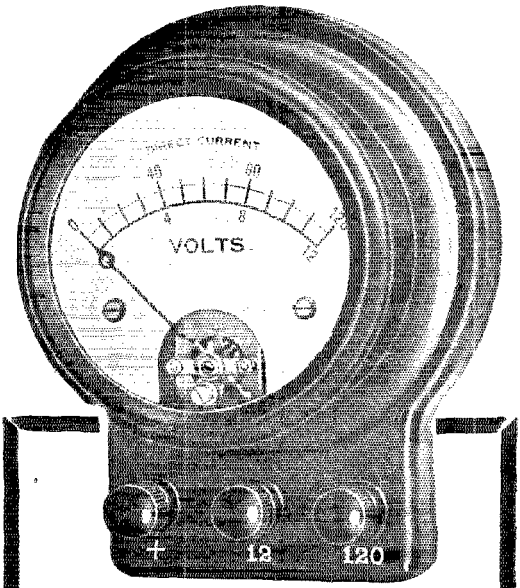
Genuine Bakelite Construction
The best and most complete line of condensers in existence.
Write for our catalog No. 7.

CHELSEA RADIO CO.
156 FIFTH STREET
CHELSEA, MASS.



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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.

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Distributors for

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If your dealer can't supply you, write to us direct for any standard Radio material.

O-B Radio Company
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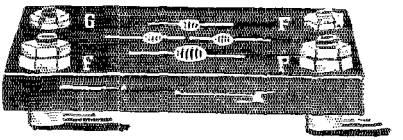

For W-D-11—DRY CELL TUBE
Holds tube firmly.
Makes Perfect Contact

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We also make an Adapter that fits Standard Sockets, Price $1.00.—Dealers Write for Discounts.

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Phone Plugs	.45	Baldwin Receivers	10.95
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Test Crystals	.09	Switch Stops	.03½
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Burgess 22½ v. B. Batts.	1.50	43 plate variable	3.00

We have the most simple set of plans for building an All Wave Regenerative Set that will receive broadcasting all over the U.S.A., Canada and Cuba. Plan 50¢ You'll be surprised how cheap you can build this set. Just ask us for prices on Material for this set.

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How Electric Current carries Speech. Tuning. How to Accomplish Practical Methods. Why a detector is necessary to translate waves. The Vacuum Tube. Amplifying Music or Speech. Distortion. Regenerative and Heterodyne Reception. Noises. What Broadcasting is. Essentials. Apparatus, and hundreds of other facts.

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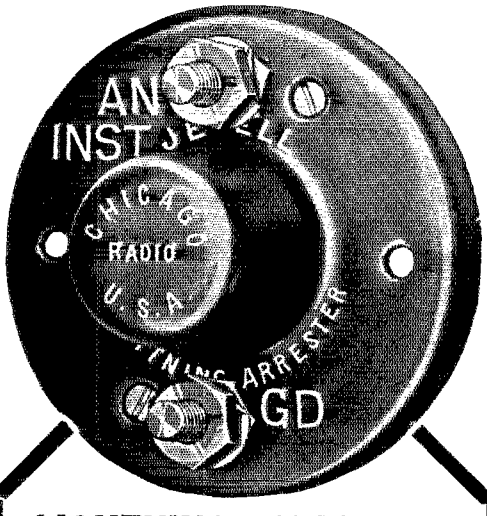

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PRICE $1.10

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Apparatus Radiates Quality

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Send 10c 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.

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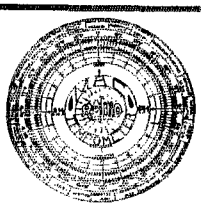

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An accurate, easily operated device by which you can instantly compare the Standard Time used in all points of the World. An absolute necessity for all radio operators who are receiving either telegraph or phone station schedules throughout the World. 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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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 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)

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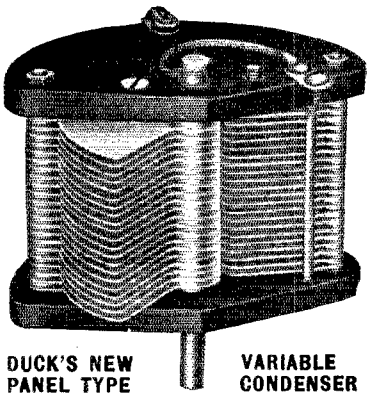
A FEW OF THE MANY DUCK PRODUCTS AT SENSATIONAL PRICES

Rheostat, 70¢; Bakelite moulded positive contact, 70¢; Bakelite moulded dial, 55¢; super-selective moulded variometer, $4.65, worth $8.00; radio frequency potentiometer, $1.15; solid mahogany form variometer, $3.60; 43-plate panel-type variable condenser, pigtail connection, $3.15; detector panel, $5.25; receiving set, mahogany cabinet, detector and two stages of audio frequency, $59.50; radio frequency receiving set with one-step radio and detector, $29.75.

SEND 25c. in coin or money order for our big 256-page combined radio catalog and text bookbook. For radio information and hook-ups it is worth many times the retainer asked.



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acclaimed by all that have seen it to be the peer of any on the market. Pigtail connections, i. e., no sliding contacts. Base and top moulded bakelite. Aluminum separators, i. e., even spacing and simple means of adjusting plates. Mounting screws furnished. Concealed by dial. Brass bearings: ¼" shaft.

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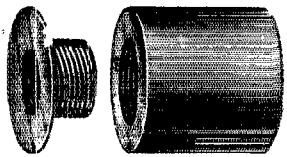

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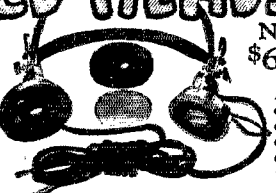

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YOU CAN'T AFFORD TO BUILD YOUR OWN when you can buy a Radex-Radio for less than the parts alone would cost you. Request Bulletin No. 4 The Radio Exchange, Hamilton, Ind.

NEW DESIGN POTENTIOMETER. Absolutely best to be had, $2.50. Combined Grid Condenser and Variable Leak, small, neat and radically new, 75c. Attractive dealers proposition. Special work solicited. Amball Equipment Co., 6545 Darlington Road, Pittsburgh, Pa.

MAPS I'll put your station on the map—Small one 20c others 50c and One dollar. No stamps. Give details. Fred W. Adams, Flanigan, Nevada.

FOR SALE—New C.W. transmitter, panel mounted, one hundred watt, complete with motor-generator, tubes, etc., ready to operate. Bargain for quick buyer, price $185. Address P. O. Box 135, Red Bank, N. J.

FOR SALE Or Trade ½ K.W. Acme transformer, ½ K.W. Amrad quenched gap. Signal saw tooth rotary spark gap, Thordarson oscillation transformer, Large Key, Clapp-Eastham loose coupler, CS Tresco tuner, Honeycomb coils and mounting, Crystal set, Control panel, Want C.W. apparatus. Glenn Anderson, Oakland, Nebraska.

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, Georgia.

20 WATT FONE and C.W. Transmitter. Panel mounted. Three meters included. Westinghouse 500 volt MG set. Four good 5 watt tubes. Price complete $150.00. Walter Baer, 350 Graham St., Pittsburgh, Pa.

FOR SALE—2-500 volt Robbins-Myers motor-generators, $50.00 each. 0-3 Jewell thermo-radiation ammeter, $9.00. 0-15 Jewell AC voltmeter, $6.00. 0-300 Jewell milliameter,$5.00. 0-500 DC voltmeter, Shunt burned out, $8.00. Acme 150 watt filament transformer, $5.00. RC modulation transformer, $5.00. Penn C 4 henry choke, $5.00. Federal 300 W choke, $5.00. 25 turn inductance complete with variable condenser and grid coil for reverse fed-back circuit, $7.00. Bypass condensers-$1.00 each. 5000 ohm RC grid leak 5 watt size 75c. RC chopper wheel ¼" shaft, $4.50. Two General Radio modulation transformers $3.00 each. 0-1 Hot-wire meter, $3.50. 25 turn edge wound inductance, $2.50. Magnavox hand microphone, $10.00. These parts have been used but are in perfect condition. A. S. Bachtel, 65 East Mill Street, Akron, Ohio.

FOR SALE—three coil set, $90.00. Two step audio frequency unwired amplifier, $25.00. One unwired C.W. (10 watt) set, $90.00. Grebe CR3A, $25.00. Barrie Barker, Gladwyne, Penna.

FOR SALE: Acme 200 Watt Trans., Grid Cond, 2-RC Sockets, 2 Fada Rheostats, 2 5-watters used 20 hours, key; $30.00 all. Installing "50 watter" hr. A Beauchemin, Bristol, Conn.

FOR SALE: 100 Watt C.W. set complete $100.00. Worked coast to coast. Radiation 5 ½ amps. 9KM.

WIRE YOUR SET WITH COPPER BRAID instead of solid wire. Has extremely low resistance at radio frequencies. Makes "cushion" contacts that never work loose. Never breaks, easy to work with, does not require soldering. Air dielectric has no distributed capacity. No. 16 contains 96 No. 36 bare copper wires. Six feet for 25c. Radio Panel Shop, Junction City Kansas.

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FOR SALE: A lot of sockets @$0.49, jacks 35c, plugs 35c audio and radio frequency transformers $2.98 each, Horne variocouplers and variometers @$3.98 each, original price $6.50, also phones (superior) @$4.98 per pair. Franklin Edward Campbell, Jr., 414 High St., W. Medford, Mass.

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.

BARGAIN: Only a few Brandes Transatlantic type headsets left. List, Twelve Dollars. While they last, Six-fifty. Mail money order and address. Citizen Wireless Service, Hornell, New York.

FOR SALE: Grebe CR-6 receiver, $75. Thordarson 1 KW transformer $20. Thordarson oil condenser, $10. Benwood Super gap, $9. 4x5 camera with plate holders and film pack adapter, $4. Seneca post card camera with plate holders, $4. Microscope, 110 diameters, with case, $8. Clarence Clark, Care Western Union, Jacksonville, Fla

FOR SALE CHEAP: 1Hall Relay and Tape, Recorder cost $160.00 never used. Is in perfect condition, $100.00. 2 Robbins-Myers Motor-Generators 110 volts, A.C. single phase to 500 volts D.C. 100 watts, $50.00 each. 1 Robbins-Myers Motor generator 110 volts, A.C. single phase to 500 volts D.C. 200 watts $55.00. 1 Esco, 1000 volt D.C. 700 watt motor generator 110/220 volts A.C. single phase supply, cost $220.00 sell $175.00. All of the above machines in perfect condition. Commonwealth Electric Co., 182 E. 6th St., St. Paul, Minn.

SPECIAL PRICES on radio supplies. Westinghouse WD-11 tubes $5.49, Radiotron UV200 $4.25, UV201 $5.55, Sockets, 60c Fada rheostats 60c, Bradleystats $1.70, Cutler-Hammer with vernier $1.35, Frost 2000 ohm phones $4.25, 3000 ohm $4.75, Murdock 3000 ohm $4.60, Western Electric Microphones $3.55. Amplifying transformers, Acme semi-mounted $4.25, Thordarson $3.85, Clapp-Eastham H.R. Regenerative receiver $34.50, H. Z. two stage amplifier $34.50, Magnavox $37.25. Prompt Shipment, satisfaction guarateed. The Cheerful Store, 46 Harvard Ave., Allston, Mass.

3BAQ has been assigned to Clarence & Blair Dreisbach, 614 N. Eighth St., Allentown, Penna. Please QSL cards if heard.

FOR SALE: Short wave regenerative with detector and two-step in beautiful cabinet—DX 2000 miles with fair antenna, $75; Audiophone loud-speaker, $22.50; R3 Magnavox, $25; Loose-coupler, 150 to 3000 meters, $5; Warren Radio Loop, $5; King Ampli-tone horn, $7; Weston DC voltmeter, 0 to 10, $6; General Electric RF transformers, $3.75 each; Baldwin C and victroia attachment, $4.50; Brach arresters, outdoor $1.50, indoor $1; Lightning switch, 75c; Send-receive switch $0.60. Apparatus guaranteed perfect condition. Postpaid on receipt of price. Jack Dunham, 49 Overlook Circle, New Rochelle, N. Y.

FOR SALE WIRELESS SPECIALTY I.P.500 tuners, Range 250-3100 meters. Made for the Bureau of Steam Engineering, United States Navy—Navy type S.E.143. Radio Corporation list price $595.00. Perfect condition. Price $200.00. Audion Control Boxes for these $65.00. GENERAL ELECTRIC 600 volt 90 watt generators. Filament winding 8 volts 2 amperes. Made for the United States Army Air Service. Equipped with Dubilier Mica filter condensers. Can be used as a dynamotor. 8 volt battery drive, 400 volts output. 12 volt—550. All new. Price $35. Navy radio telephone transmitting and receiving sets, Type C.N.936. Complete broadcasting station. Range 10-200 miles and over. NEW. Price $400.00. 2 Radio Corporation UV203 tubes 50 watts. New. List price $30. Price $20.00 each. Western Electric radio head receivers Type 145AW $3.50 per set. Elsaf Trading Company, 1515 Eastern Parkway, Brooklyn, New York.

GET MORE DISTANCE—Build your own set or rebuild existing set (usually without additional equipment) using our hook-up and bring in distant stations both code and broadcast. We get broadcasts over six hundred miles, code further, using only one tube, no aerial. Simple to operate. Practically no capacity effect. Wiring diagram and instructions mailed immediately on receipt of fifty cents, stamps or coin. Stop experimenting. Write today. E. & M. Products Co., 50 State St., Boston, Mass.

FEW GENUINE GERMAN TELEFUNKEN H. W. AMMETERS with scale reading 0-4 amps. Fitted with

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QRA 8SM Clarence Gielow, Sandusky, Ohio.

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SAVE 20% We are closing out a complete stock of Radio Sets, parts and supplies, including Grebe, Westinghouse, Clapp-Eastham and Paragon. We are offering the new R.Z. Radak Set for seventy dollars. All stock is new. We will make C. O. D. Shipments on orders accompanied by certified check or money order for one fourth of price. All stock 20% off Retail Price. Send five cents for catalog. Hight Accessory Place, Rome, Georgia.

NEW APPARATUS FOR SALE: Radio Corp. Power Transformer UP.1368, eighteen dollars. Acme Inductance and Grid Coil, seven dollars. Five amp. Weston Thermo-ammeter Model 425, twelve dollars. Ten Federal 1000 Volt Filter Condensers, $1.50 each. Also grid leaks, key, tubes, etc. R. R. Hill, 918 Academy Street, Watertown, N, Y ,

FOR SALE: Two ¼ KW Thors, $7.50 each; Five Murdock Condensers, $1.75 each. Benwood 12 Stud Super Gap, $15.00. Eldridge H.W. Ammeter 0-5, $5.00. Ellwood Hoepfner, Palmyra, N. J.

FOR SALE Westinghouse Aeriola Sr. receiver complete with phones and tube. Also 2 step Federal amplifier or will trade for C.W. Write Wm. Hulse, 1152 Hull St., Baltimore, Md.

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2,600 METER RECEIVER $15.00 includes loose coupler, $14.00. Brandes, detector, condenser. E. Langford, 1820 Oliver St., Baltimore, Md.

FOR SALE 1KW Spark Transmitter complete. Panel mounted. Cheap to quick buyer. C. Leinbach, 706 N. 12th St. Reading, Pa.

FOR SALE: 300 volt 15 watt Generator Set in good condition, will handle 5 watt tube, $30. Apply for further information. Davis Lewis, 825 Columbia Ave., Millville, N. J.

PATENTS: H. F. Lowenstein, 8th floor McLachlen Building, Washington, D. C. Registered Patent Attorney, Mechanical and Electrical expert, Physicist. If you have an invention either wholly new or an improvement on something already patented, send full description and drawing of same to me for personal advice as to how to proceed in your particular case and estimate of costs. Because many inventors have lost out on false encouragement, I will advise of the possibilities of commercial failure if I see them.

FIRST MONEY order for $90 takes 3-circuit broadcast receiver, with batteries, phones, tube, antenna. Hear broadcasts regularly 1500 miles with it. Luck, Salt Point, N. Y. Thank you.

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SPECIAL INTRODUCTORY OFFER! French Audion tubes "observation particuliers." Fits WD11 socket or ordinary adapter for VT socket. The all-round tube with which the French are breaking long distance records. $2.79 postpaid subject to prior sale. The Merit Sales Company, 642 North Fulton Ave., Baltimore, Maryland.

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2NF's Sinc spark, heard in Cuba, also forty thousand volt one Kilowatt transformer and half kilowatt packard. Write for particulars. H. McCollum, 130 Second Ave., Long Branch, N.J.

1DQ'S C.W. TRANSMITTER. 10 watts complete with transformer, rectifier, and new tubes. $110. All letters answered. 1DQ, Box 388, Stamford, Conn.

FOR SALE: 500 volt C.W. Motor Generator. Never used or will trade for Grebe CR5 or loud speaker. Make offer. George Neff, Jr., 49 N. Gore Ave., Webster Groves, Mo.

FOR SALE or trade 24 watt 350-v Motor Generator. What have you to offer? Stanley F. Northcott, 1204 N. Birney St., Bay City, Mich.

TWELVE PER CENT DISCOUNT on all apparatus. Lists free. North Star Radio Co., Caledonia, Minn.

THINK! For sale: No. 41 Jefferson amplifying transformers $3.25 each. No. 45 Jefferson amplifying transformers $5.00 each. UV 200's $4.00, UV 201's $5.00, and 5 watters $5.75. All above in absolutely A1 condition. Sent C. O. D. Lowell Orth, 1412 N. Adams, Mason City, Iowa.

SELL OR TRADE: 250 W.P. tube $70; Navy E tubes $7; Navy Moorheads $6; 1000 v. 300 w. Esco generator $70; RA-10, $50; Murdock regenerator, $15; P501 Navy tuner with detector, listed $595, $150; Parts 100 w. transmitter—everything in 500 cycle apparatus—want Navy and WE apparatus. Edw. Page, Cazenovia, N. Y. 8AQO & 8XH.

MOTOR GENERATORS: Esco five hundred volt one hundred watt $65. Benwood $89. Clapp-Eastham receivers $31. Terms C.O.D. Patterson. Radio Shop Hugo, Okla.

TRADE: Acme 50 watt transformer for 200 watt Acme transformer. State money difference. F. Phillipson, 2274 Loring Place, New York City.

SELL: 1KW Thordarson Transformer $20, or exchange for good Regenerative tuner such as Clapp-Eastham. Also Packard ½KW, boxed in paraffin $12. Dr. H. M. Quisenberry, Lexington, Va.

WHILE THEY LAST—$45.00 Receiving Sets including Radiotron Detector $32.00. Two step amplifiers, $22.00; $12.00 Trans-Atlantic Phones, $8.00; Loud-speakers, $12.00; Homchargers, $15.75; 43 plate Variable Condensers with three plate vernier and dial $5.50; Radiotron Detectors, $4.25; Amplifiers $5.75. OTHER BARGAINS. QST Radio Service, Williamsport, Pa.

YOU CAN'T BEAT THIS FOR $125.00. Variometer tuner, detector, two stage amplifier, genuine Formica panel, all in beautiful cabinet, MAGNAVOX, bulbs, batteries and aerial equipment. NO EXTRAS TO BUY. Concerts over 2000 miles distant heard throughout large room. Request Bulletin No. 4, describing and illustrating Radex-Radio models, each selling for less than it would cost you to buy the parts and assemble them yourself. The Radio Exchange, Hamilton, Ind.

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. Rates reasonable and satisfaction guaranteed. Only shop in the U. S. doing guaranteed general radio repairing and wiring. Repair Dept., Radio Panel Shop, Junction City, Kansas.

BARGAINS: 2 Amrad Basketball variometers $4.50 each. 1 Simplex variocoupler $4.50. 1 pair Murdock 2000 ohm phones $4.00. 1 Magnavox $36.50. Terms C.O.D. Elmer Scharbach, Hobart, Ind.

SACRIFICE Brandes Superiors $4.50, Arlington coupler $4.50, Tresco 5000-25000 meter arc tuner $6.00, DL-750 mounted honey comb $1.40, new big Hipco 22½ volt B. Battery $1.50, Chelsea .001 panel mounting condensers with dial $2.75, Murdock enclosed 23 plate table type $2.50, slightly used Cunningham amplifier $4.00. Whole works for $25. Everything work fine. John Richards, Carrollton, Ohio.

FELLOWS: The Clarion Headset at $5.00 is the best headset buy on the market. It is guaranteed to produce as good or better results than any other headset regardless of price. Money refunded if not entirely satisfactory. Send money order and receive a set by return mail. The test will tell. Citizens Wireless Service, Hornell, N. Y.

MUST SELL— DeForest OT3, 3 UV202, Federal Hand-microphone worth $130.00 for $40. Rhodes, Worcester Academy, Worcester, Mass.

PLEASE NOTICE: Call 5GT has been assigned to James Maury Riggan, Pearsall, Texas.

TRADE FOR OMNIGRAPH. Rectifier, gun or both. Kenneth Roloson, 609 Castillo, Santa Barbara, Calif.

FOR SALE: Slightly used Esco motor generator in perfect condition and as good as new. Generator 200 watt 1000 volt D.C. Motor 110 V 60 cycles A.C. 3500 R.P.M. connected shaft. Base slate. Bronze bushing bearings, oil cups and distributing rings. Terms cash, $100.00. Securely boxed. F.O.B. Further particulars, apply to William A. Roy, La Grangeville, N. Y.

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.

WESTINGHOUSE RC $100.00; Clapp-Eastham HR receiver or HZ amplifier $26.00 both $50.00; Grebe CR-5 $65.00; All new goods; Paragon RA6 $25.00; Any of the above sent C.O.D. upon receipt of $5.00; Ten Murdock Telephone receivers 55's and 56's $4.00 each cash. R. A. Saeger, Ankona, Fla.

FOR SALE: Four tube receiving outfit. One radio two steps audio. F Schoenwolf, 4917 Warner Ave., Chicago.

SIX HUNDRED CYCLE two hundred fifty watt alternator Sinc Rotary attached, quarter kilowatt transformer dubilier Condenser inductance Alternator fine for ICW. All $25.00. Four new VT2's $25.00. O. M. Shaw, Marathon, Texas.

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MUST SELL 20 watt C.W. fone complete with 200 watt motor-generator, tubes, key, microphone, buzzer. Rad. 3.5 amp. Cost $275. Sell $185. H. Siebens, 5772 DeGiverville, St. Louis, Mo.

FOR $275 CASH 8L.F. Telephone-Telegraph transmitter including motor generator tubes, filament transformer, four meters, antenna change over switch, key, buzzer, microphone and Westinghouse RC Receiver Detector Two Step. C.W. copied 2750 west of San Francisco Voice as far as Nebraska and Florida. Highest class workmanship tubes new and will guarantee. W. K. Thomas, 17 Emerson Avenue, Crafton, Pa., A.D.M. Atlantic Division.

RADEX-RADIO. Sensitive, selective, simple to operate, at a price you can afford. Request Bulletin No. 4, illustrating and describing various models. The Radio Exchange, Hamilton, Ind.

BARGAIN! $75 takes Amrad tuner, detector and two step and two stage radio frequency set. Been used only few months. Will sell in separate units if wish. George Traber, Jr., Perry, N. Y.

HUNDRED WATT Radio Corporation Radiophone Transmitter complete for sale, includes all necessary apparatus including Kenotrons and one extra fifty watt oscillating tube. Will sell at an extremely reasonable price. L. D. Stewart, Ironwood, Michigan.

WANTED: Several Seibt variable condensers. Advise capacity, condition, best cash price. K. B. Warner, c/o QST.

REGENERATIVE RECEIVER consisting of two shielded variometers, coupler and detector. Almost new. Cost $37.00. Take $25.00 Holtzer-Cabot and Brandes phones, practically new. $5.00 each. K. Winslow, Winter Park, Florida.

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BARGAINS—No. 2 Jr. Omnigraph with 15 dials $15. 1 vario-coupler, 2 variometer, wired, regenerative set, mounted on bakelite panel 21" * 62, in mahogany finished cabinet. Money back if unsatisfactory. Henry C. Winte, Chesaning, Mich.

CLEARANCE SALE. Unusual bargains in new and and used apparatus to make room for new stock. Bulletin S-3 for two cent stamp. The Radio Exchange, Hamilton, Ind.

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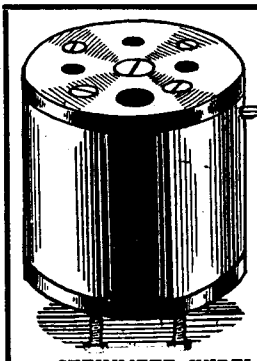

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"THE STEINMETZ ADAPTER"

Will enable you to do this by simply inserting it in your standard socket and using the Westinghouse Dry Cell Tube.

STEINMETZ 3000 ohm phones $6.50; 2000 ohm $5.00; 1000 ohm phone $1.75. Equal to any $10 or $12 phones made.

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HYGRADE SPECIALS

7-Stranded Copper Aerial Wire, 200 ft.	$1.00
‡763 Eveready Variable B. Battery	1.25
‡766 Eveready Variable B. Battery	2.25
‡767 Eveready Variable B. Battery	4.25
45 Volt Cyclone Variable B. Battery	2.50
Thordarson Amplifying Transformers	3.49
Acme Amplifying Transformers (Mounted)	4.00
Federal Amplifying Transformers	5.75
Skindervilkin Transmitter Buttons	.75
2000—Ohm Murdock ‡56 Head Set	4.49
3000—Ohm Murdock ‡56 Head Set	4.98
Federal 2200—Ohm Head Set	6.50
Western Electric Head Set	9.75
6 V. 20 A. Marko Storage Batteries	8.95
6 V. 50 A. are	11.95
6 V. 80 A. Guaranteed 2 Years	15.45
6 V. 110 A.	18.95

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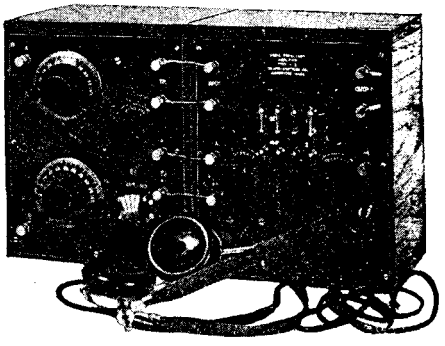
"New York's Leading Radio House"

THE SYMBOL OF SERVICE

CLAPP-EASTHAM

TYPE HR RECEIVER—TYPE HZ-2 STAGE AMPLIFIER



This Clapp-Eastham Set

Consists of a Type HR Regenerative Receiver and a Type HZ Two Stage Amplifier, uniform in size and fine finish. Strong, clear tone, simple tuning, utmost reliability. Complete with Federal Head Telephones, Magnavox Horn, Antenna Equipment, all Tubes and Batteries: $177.50.

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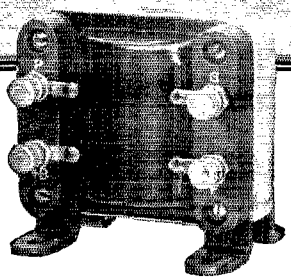

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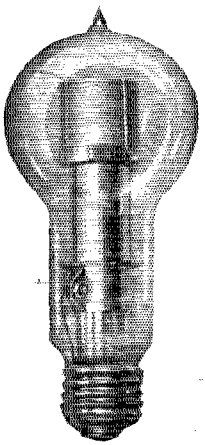

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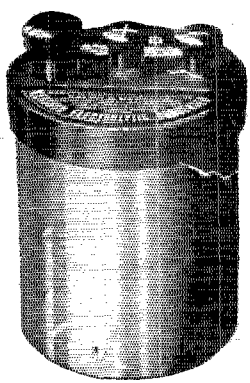

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