

DECEMBER 1921. TWENTY CENTS

RADIO

Formerly Pacific Radio News



**REMLER
APPARATUS**

FOR A

**RADIO
CHRISTMAS**

RADIO CHRISTMAS NUMBER

Cunningham Tubes Speak for themselves

**Amplifies
as it
detects**



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C-300
Gas Content
Detector

\$5.00

248 First Street
San Francisco, Calif.

AUDIOTRON MFG. COMPANY

154 West Lake Street
Chicago, Illinois

REMLER APPARATUS RADIATES QUALITY
CUNNINGHAM TUBES MEET EVERY AMATEUR REQUIREMENT

Mr. E. T. Cunningham,
248 First St.,
San Francisco, Cal.

Dear Sir:

Alexis, Ill.

Below are recorded some of the results I have obtained with the C-300.

I had been using the --- Tubes and thought there were none better. When I placed the C-300 in my panel, the first thing I noticed was the lack of "hissing" which one company claims as an advertising point; personally, I never enjoyed it. The first station to "come in" was a spark--it was clear and strong. The tube made no noise whatever to spoil the tone, but the best of it was that I had never heard this station before, although I had tried to a number of times. When I threw in the two stage, it came in clear and before that wonderful "hiss" was one of the loudest noises.

Noting its strength and clearness, I placed it in one of the amplifier sockets and was surprised to note that it did better than the --- Tubes I was using despite the difference in cost.

Its result on C. W. reception was above anything I could have expected. Under very critical adjustment, I found that the signals were audible about six feet from the phone, while with the above mentioned make it was barely readable. There is a radio-phonograph station about fifty miles from here to which I used to listen with the receivers on light and all the doors shut. With the C-300 as a detector, I lay the head-phones on the table and forget all about the set.

I have experimented with a small C. W. outfit and it does fine on 22-1/2 volts.

I am very sorry that I did not get to communicate with you sooner but my work here was rather pressing.

At any time you get out new apparatus, will you please send literature covering it, as you are connected with the dealer people, will you be kind enough to send their catalog and prices.

Wishing you success, I beg to remain,

Yours very truly,
Frank R. Churchill
Frank R. Churchill

radio 9A0V



The trade mark
GE is the guaran-
tee of these quali-
ty tubes. Each
tube is built to
most rigid specifi-
cations.

E. T. Cunningham

"JUST LISTEN" THE OMNIGRAPH WILL DO THE TEACHING
Learn the Code with the OMNIGRAPH
 AT HOME—in half usual time—Wireless or Morse

The OMNIGRAPH Automatic Transmitter will teach you either Wireless or Morse Telegraphy—at home—in the shortest possible time and at the least possible expense. Connected with Buzzer and Phone, or with Sounder, the OMNIGRAPH will send you unlimited messages, by the hour, at any speed you desire. It will bring an Expert Operator—right into your home—and will quickly qualify you to pass the examination for a first grade license.

If you should undertake to record on paper tape, all the new messages the OMNIGRAPH will send, you would need a strip long enough to reach around the globe.

Radio
 Convention,
 March 16-19,
 1921.
 Hotel
 Pennsylvania
 Roof,
 New York
 City.

Exhibit of
 Dept. of
 Commerce,
 Bureau of
 Navigation.



Examina-
 tions for
 licenses
 were given
 by the
 Dept., every
 afternoon
 and evening
 with the
 OMNI-
 GRAPH.

THE OMNIGRAPH is always used to test all applicants applying for a Radio License

The OMNIGRAPH is used by several departments of the U. S. Government and by a large number of the leading Universities, Colleges, Technical and Telegraph Schools throughout the U. S. and Canada.

Practically every leading and reliable Home-Study Radio School furnishes their students with an Omnigraph. The Radio Institute of America, 326 Broadway, New York; The United Y. M. C. A. Schools; Extension Division, 375 Lexington Ave., New York, and the New York Wireless Institute, 258 Broadway, New York, all endorse and use it.

Thousands have learned both the Morse and Wireless Codes with the OMNIGRAPH. Send for free Catalog, describing three models—\$14 to \$30—or order direct through any of the following dealers. DO IT TODAY. The OMNIGRAPH is sold under the strongest of guarantees—if not as represented, your money back for the asking.

THE OMNIGRAPH MFG. CO., 4341 Richardson Ave.,
 Cortlandt Street, New York, New York City,
 Jan. 21, 1920.

Gentlemen:—I wish briefly to commend your very excellent Automatic Transmitter. Recently I was successful in obtaining a first-class Commercial Radio license and I believe that the Omnigraph was my principal aid.

I took a four weeks' course at a Resident Radio School in Theory only. I relied on the Omnigraph to get my Code to the proper speed, and the Omnigraph did it.

I was one of two in a class of eighteen to obtain a first-class License. The stumbling block for the others was CODE. And I know that a short time, receiving Omnigraph messages daily, would have enabled them to pass the examination as easily as I did.

I believe the Omnigraph to be the easiest, quickest and cheapest method to learn the International Morse Code.

Cordially yours,
 (Signed) GEO. E. SELLERS.

OMNIGRAPH MFG. CO., 97 Thorne St.,
 26 Cortlandt St., Jersey City, N. J.,
 New York City, May 6, 1921

Gentlemen:—I am glad to inform you that I secured my First Grade Commercial License on April 25th and as far as passing the code test, I owe most all my success to the Omnigraph. I see no reason for any one to go to a resident school to learn the code, when they can have such a wonderful teacher as the Omnigraph right in their own home. Refer any one to me if you so desire.

Yours truly,
 (Signed) CHESTER RACKEY.

THE OMNIGRAPH MFG. CO., Port Aransas, Texas,
 May 1, 1921.

Gentlemen:—A few months ago I bought one of your Omnigraphs and I have nothing but praise for it, as it increased my receiving from about five to six words per minute to twenty words in two or three months' time.

Always a Booster for the Omnigraph.
 (Signed) CHAS. F. O'DELL.

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- Bamberger & Co., L. Newark, N. J.
- Continental Radio & Elec. Corp. New York City
- Cotton, Neill & Co., Ltd. Honolulu, T. H.
- California Electric Supply Co. San Francisco, Calif.
- Detroit Elec. Co. Detroit, Mich.
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- Doubleday-Hill Electric Co. Pittsburgh, Pa.
- Killech Co., David New York City
- Manhattan Electrical Supply Co. New York City
- Manhattan Electrical Supply Co. Chicago, Ills.
- Manhattan Electrical Supply Co. San Francisco, Calif.
- Manhattan Electrical Supply Co. St. Louis, Mo.
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- Rose Radio Supply Co. New Orleans, La.
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- Southern Calif. Elec. Co. Los Angeles, Calif.
- Western Radio Elec. Co. Los Angeles, Calif.
- Williamson Elec. Co., H. E. Seattle, Wash.
- Wolfe Electric Co. Omaha, Nebr.
- Zamolski Co., Jos. M. Baltimore, Md.

THE OMNIGRAPH MFG. CO.

26 E Cortlandt Ct.,

The Omnigraph Mfg. Co.,
 26 E Cortlandt Street
 New York City.

Gentlemen:—
 As per your ad in Radio please mail me your free catalog of Omnigraphs.
 Name
 Address
 City State.....

RADIO

Established 1917 as Pacific Radio News

Volume III

for DECEMBER, 1921

Number 5

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Forecast of Contributions for January Issue

C. W. enthusiasts will welcome the announcement that ENSIGN JENNINGS B. DOW, U. S. S. California, is writing a complete "C. W. Manual," the first chapter of which will appear in these columns next month. The first article will deal with the Vacuum Tube Transmitter Circuit. Succeeding installments will treat of the inherent advantages and disadvantages of C. W. circuits to date, design and construction of five-watt, ten-watt and fifty-watt radio phones for receiving and transmitting, design and construction of a ten-watt and a 250-watt power amplifier, electrolytic and thermionic rectifiers, smoothing out systems, and valuable advice to the experimenter and constructor. This series will also be printed in book form prior to its completion as a serial in RADIO.

A beautifully illustrated account of radio as a preventive of forest-fires may inspire some of our readers with the ambition to operate one of the U. S. Forest Service radio stations next summer, an opportunity for combining pleasure and profit in an ideal radio vacation. The suggestion is pertinent that you urge your Congressman to do his part in securing a continuance of the airplane forest patrol.

The praiseworthy ambition of every amateur to build his own set may be intelligently and efficiently accomplished by following the explicit directions in a series of forthcoming articles by D. B. MCGOWN, assistant radio inspector sixth district. The first article to appear in December will illustrate and describe the construction of a good single coil receiver that will tune up to 2500 or 3000 meters, so as to get everything up to the short wave arcs. Succeeding articles will give directions for home construction of various types of receiving and sending equipment.

Much favorable comment has been received regarding the articles on how and why of radio apparatus by B. F. McNAMEE. The first, published in November Radio, gave a simple account of the theory of radio tuning, and the current issue contains an account of the apparatus and manipulation necessary for good tuning, which will be concluded in December.

'Tis with pleasure that our readers are advised that G. M. BEST of the engineering department of the Pacific Telephone & Telegraph Co., will continue the Radio Question Box, which starts in this issue. Mr. Best is an experienced radio engineer whose answers to any questions that may be propounded can be depended upon for clarity and accuracy. Send your queries to him—care of RADIO.

It's Only a Step for You Now to a Fine Wireless Position

SURELY you have noticed how wireless is spreading over the world like wildfire! Every day you learn of some new field that is utilizing it—some new firm organized to push it forward. Big opportunities are open—and every day get more numerous and attractive. But do you realize that YOU can easily qualify for the wonderful opportunities that are opening? Amateurs—do you know that you can quickly build up your present knowledge of Wireless—and be ready any time you wish for a fine wireless position, either on land or on sea? You are in a fine position to cash in big on this growing field. Right at home you can easily build up your present knowledge and quickly qualify. Through our wonderful Four-Step Home-Study Method a short period of your spare time can be turned into preparation for a worth while future in the fastest growing field in America today—Wireless. You have the whole foundation already to build upon. Our new easy method of instruction makes the rest pure fun, but fun that pays big.



The coupon below will bring you an interesting free booklet—telling about the splendid opportunities open and how you can share them. Mail coupon for booklet today!

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From our years of experience in training men for Wireless we have developed the wonderful new Four-Step Method. This method not only includes the comprehensive course of instruction written exclusively for us by some of America's greatest Wireless experts, (members of our own staff), but also includes as part of the course four remarkable inventions. Right in your own home with this amazing system we take you quickly and easily through the four short steps between you and one of the splendid wireless positions waiting for you. These four wonderful inventions make learning like a fascinating game, you learn by actually doing—and you progress so rapidly that many of our students have qualified for fine positions in a few months.

FOUR WONDERFUL INVENTIONS FURNISHED WITH OUR COURSE



Step No. 1



Step No. 2



Step No. 3



Step No. 4

Step No. 1—The Learner's Transmitter—makes learning the code a delightful pastime. With this splendid instrument you get through the fundamentals of wireless almost before you realize it.

Step No. 2—The Learner's Receiver—does away completely with the old trouble of having to have a second person send messages to the student. With the Learner's Receiver the student masters what many consider the most difficult part of wireless in "almost no time."

Step No. 3—The Wonderful Natrometer—perhaps the most important invention ever made for wireless instructional purposes. This amazing machine is designed especially to build up receiving speed. Six hundred different combinations of messages can be sent at speeds varying from five to one hundred

words a minute smoothly, noiselessly and without the slightest bit of "choppiness" by this wonderful machine.

Step No. 4—The Special Westinghouse Receiving Set—completes your training into a high-paid wireless expert. This is a real receiving instrument and will enable you to "listen in" on the world. This splendid device gives you the practical experience of actually taking messages" out of the air."

Our special short-cut course is built around the use of these four wonderful inventions. No matter whether you know a thing about electricity at the present time, this wonderful Four-Step Method will qualify you quickly and easily for the splendid opportunities open for you in Wireless. No wonder our students learn so rapidly—hundreds of them are making good in all parts of the world today. You owe it to yourself not to let this really once-in-a-lifetime-chance slip by. With the experience you have already had as an amateur you should qualify in a very short time through this new easy way to learn.

Big Opportunities in Wireless

Radio provides you with a valuable training and gives you a trade that will last you a lifetime. As a radio operator you save big money right from the start. It is nothing uncommon for radio men to save \$1,000 the first year they work—and why not? All expenses are paid in addition to salary, and he has plenty of time to prepare for the higher-up positions. (Radio-Engineer, etc.) paying \$6,000 to \$10,000 a year. Think of it! Are you going to let this great opportunity slip by?

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11 Points That Make This School the Best

1. Four Wonderful Inventions Given With Course.
2. New Easy Method of Copyrighted Theory Instruction.
3. Our Diploma Given Government Credit and Recognition.
4. Our Location in Washington—Passing New Official Radio Developments on to You.
5. Personal Individual Attention of Great Experts.
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Mail coupon today for our free illustrated booklet, "Wireless—The Opportunity of Today." Without cost or obligation we want to tell you more about this field, its big opportunities both on land and sea and just how our new method quickly qualifies you. We want to let you read some of the wonderful stories of our students, told in their own words. How, through this wonderful Four-Step Method they quickly and easily qualified for wireless. How they are holding down fine positions in all parts of the world, earning big salaries, saving money, leading a wonderful life of freedom.—And we want to tell you how you can follow in their footsteps and win just as great or greater success. Don't hold back, wireless is calling you NOW! Send off the

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Age.....
Address.....
City.....
State.....
() I am interested in a sea position.
() I am interested in a land position.



Say Radio to the Advertiser, it will help you.

CONNECTICUT RADIO

The New Electron Tube

Detector and Self Amplifier

(Fully protected by patents in the principal countries throughout the world)



This Tube, the Sensation of the Chicago Radio Show, is new in principle and in operation. Hence it offers these notable advantages:

No B Batteries
No Tickler
No Grid Leaks
No Filament Adjustment
High Selectivity
Extreme Sensitiveness

(Equal to one stage of amplification)

Much Longer Life
Uniformity of Tubes

(All equally good)

It represents the result of over four years' exhaustive research, the study of nearly 2000 tubes, with complete records of the characteristics of each one. It has had thorough tests in our own research laboratories, and months of continuous operating use.

Only after gaining this full knowledge of its characteristics, its remarkable possibilities, and its practical usefulness, are we ready to offer it to radio workers as a forward step in a great field.

Made up in the complete CONNECTICUT Detector Set at \$35.00; Detector Unit alone, \$12.00; Tubes (for replacement), \$3.50.

We shall be glad to furnish you with further information on request. Or ask your dealer to show you the set.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Connecticut

80 Britannia Street

Say Radio to the Advertiser, it will help you.

RADIO

Copyright 1921

Vol. III, No. 5

DECEMBER, 1921

Per Copy 20 Cents

Radiatorial Comment

THE usual formula of this festive season is: "A VERY MERRY CHRISTMAS!" It looks stereotyped, and it is, we admit, strenuously overworked each year, but beneath the printed words lies all the depth of human friendship and fellowship that we possess—and that we extend to you right gladly and with fulsome cheer.

We think of you, not merely as subscribers, contributors and advertisers, but rather as co-workers, whose vast store-houses of energy are being expended along the lines of progress.

Progress! Magic term! And because of American youth and manhood, their devotion to it, this great nation of ours lights the way for the world.

It is a wonderful thing to be an American!

Have you ever given that a thought?

From the point of view of the ages of nations, we are 145 years young! But in that time we have reached—and passed—the rest.

We do not write these lines in a spirit of egotism. Rather are they set down as a spur, that we—and by "we" I have reference to the vast body of American amateur radio operators—may not forget the little tale of the tortoise and the hare!

ON THIS page is a message from President Harding to the amateur radio enthusiasts, that we are indeed honored by having been given the great privilege of publishing.

We would ask that the amateur fraternity read the conveyed words of the President—carefully:

"The splendid work done by the amateur radio operators during the World War is fully appreciated by the President, and he would be glad to help in any way to encourage the further study of this science."

Portentuous words—these!

The splendid promise of a splendid man to encourage amateur radio efforts.

The body aggregate of amateurs would be stupid indeed, were they not to take heed and forge ahead.

President Harding did not reach unto the position of the nation's Chief Executive at a sudden bound. His years of public life, and more especially his years of experience in the U. S. Senate, have given him a passingly shrewd cognizance of the affairs of the world, that are, alas, in a sadly tangled condition, and he knows, full well, the telling value of Preparedness.

God wot, we have had enough of wars—we, a world of human beings that flatter ourselves that it is "civilized!" But the fact remains that the milk of human kindness, as between nations, is not overflowing to any marked degree. The fact remains that overwhelming strength in every branch of every service in the nation's defense and offence, is—par excellence—the only road that leads to Peace. The immortal Roosevelt summed the situation neatly when he said: "Be so thunderin' strong that no one will want to start anything!"

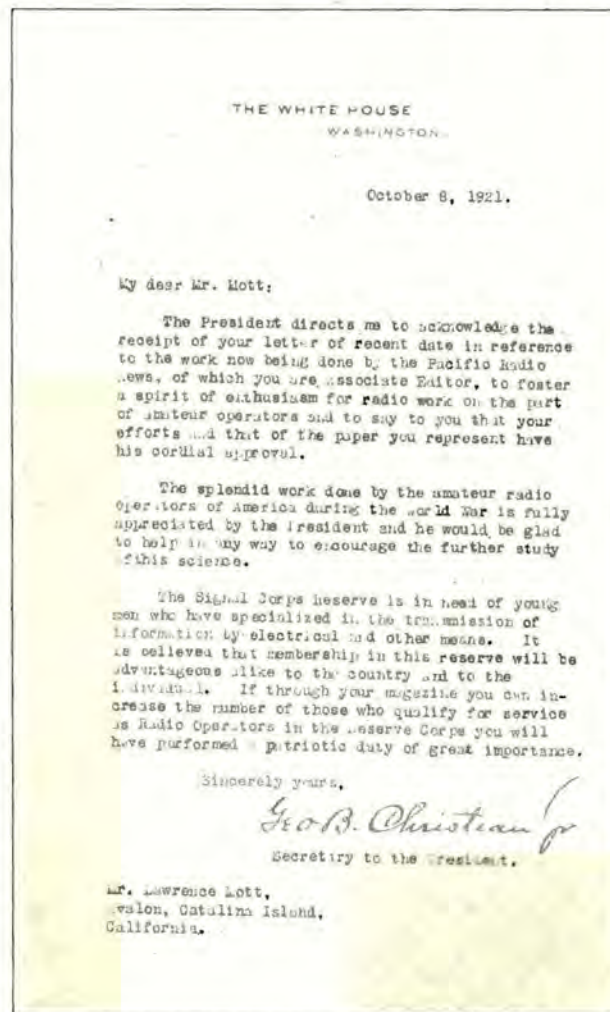
The amateur radio operators of the U. S. hold it in the palms of their hands to be of inestimable service to the President, in his capacity of Commander-in-Chief of the Army and Navy, as members of the Signal Corps Reserve.

Says the President:

"The Signal Corps Reserve is in need of young men who have specialized in the transmission of information by electrical and other means. It is believed that membership in this reserve will be advantageous alike to the country and to the individual."

This is President Harding's message. Could anything be more clear?

We think not.



And we ask that when it is possible to register at the proper places—to be later announced in these pages—for enrollment with the Signal Corps Reserve, that every amateur operator, of eligible age, and with sufficient knowledge, step forward one pace.

We further ask that those whose knowledge is a bit backward, bestir themselves and "make good."

We ask that the American amateur radio operators of the Pacific Coast work hard, seriously, continuously, during the coming year. We ask that the traffic managers of the ARRL be rendered every assistance in order that the Pacific Coast records for traffic successfully handled may prove that the operators out here are not a heedless lot of youth, but rather that they are men, of serious intent. We ask forbearance, one toward another; a little less jamming of the night airs with useless chatter. We ask that the Federal laws be obeyed.

And finally we ask that which we again extend to you—Friendship, Good Fellowship, Loyalty.

We ask these things, that his faith in amateur radio, the praise that the President has so generously bestowed upon it, and his recognition of its great potential value, may not be all in vain.

LAWRENCE MOTT.

WITH thanks do the publishers of Radio publicly acknowledge the receipt of congratulatory letters too numerous to be individually answered in person if every ounce of effort and every minute of time is to be devoted to making RADIO the best in America. We deeply appreciate these many expressions of approval and encouragement and can only say that we will do our best to justify them in the future by trying to make each issue a little better than its predecessor. To help us in this work we ask each reader to write us what he likes and what he dislikes in December RADIO what features he would like to see added and what departments dropped. And especially do we request our readers to send in radio questions so that our technical adviser, Mr. Gerald Best, may be enabled to make a success of his Question Box. Without questions no answers can qualify.

TOO much credit can not be given the generous and spontaneous action of the members of the Bay Counties Radio Club of Oakland, California, in agreeing to stay off the air while the radio concerts are being broadcasted nightly. This graceful recognition of the privilege of others to listen in to the musical treats that are now available to thousands shows that a radio fan can be a gentleman notwithstanding his eager desire to perfect his "fist" and teach his "ear." As a result many more people will put in receiving sets and the day hastened when no home will be complete without its radio.

RELATED, but none the less hearty welcome is herein given to Citizen Radio, the new name that now dignifies the amateur operator. But while such nominal recognition is due this praiseworthy effort to find for radio its place in the sun, we should not thereby forget the wonderful associations that cluster round the name "amateur." Literally and originally "a lover," amateur implies not the novice nor the inexperienced, but rather the doing well of those things which we like to do. And greatly is it to be desired as radio outgrows its swaddling clothes and assumes the responsibilities of maturity, that still may its devotees continue to play the game for the pure love of it. May the Citizen never forget to play the lover!

WE READ in the early records of the West that the Argonauts, finding a country without law and order, governed themselves by certain customs that now live and are enforced as the law of western water. So likewise have the pioneers in radio, finding the existing laws to be inadequate, mutually agreed upon certain rules of the air as traffic regulations. But the laws of the air, unlike those of water, have not yet been codified. The art is too young. Experience is showing that these tacitly accepted early customs are still inadequate to cope with the radio outlaw and to protect the majority.

So RADIO hereby extends an invitation to all of the radio clubs west of the Rockies to send representatives to a great meeting to be held at San Francisco on January 1, 1922, in order to devise some more effective means of regulating the traffic. Then and there will be given the opportunity to draft a "Pacific Plan,"—Pacific not alone territorially, but also because of its peaceful significance.

The suggestion is ours, but the action is yours, Oh Citizen Radiory of the West! Lay aside petty differences, forget past quarrels and get together in solemn council so as to bring out of the present chaos of the ether an order that may be respected and obeyed.

Your hosts will be the radio clubs of the San Francisco Bay district. Already have they anticipated this notice and prepared great pipes of peace and foaming beakers of balm. The San Francisco Radio Club has reserved a convention hall, plans a radio ball, and is arranging a radio show. New Year's Eve in San Francisco! Oh boy! Oh joy!

Let Vancouver, Seattle, Tacoma, Portland, Spokane, Butte, Salt Lake City, Reno, San Diego, Los Angeles, and all intervening centers of radio activity select of their best to represent them at this great peace conference. Let each club, through its accredited delegate, present its carefully formulated ideas. Let these various ideas be tested in the fiery furnace of discussion. And then let the best of them be welded into a complete ideal to govern the radio operator during the year to come.

The deliberations might well be guided by the general rules of the American Radio Relay League, which can be adapted to meet the special conditions peculiar to the West. They can be amended annually so as to keep pace with the rapid growth of radio. Thus, and thus only can be established that harmony so essential to the future advancement of radio.

The value of these words rests in their personal application.

\$25.00 Prize Contest

Have you a receiving set that tunes from 175 to 25,000 meters and regenerates, oscillates and detects over its entire range? If you have such a set, tell us all about it. Send in a good sketch of the circuit, the entire constructional details and enter the race for a prize of \$25.00 in gold for the best manuscript submitted. The contest closes on December fifteenth.

The Catalina-Long Beach Radio Telephone Link



An engineer's account of how radio telephone conversation from ordinary Bell telephones is maintained to and from Avalon.

Radio Station at Pebble Beach, Catalina Island.

BY MEANS of a 30-mile radio link between the coast of Southern California and Catalina Island, it is possible for a telephone subscriber anywhere on the lines of the Bell telephone system to call any subscriber on the island by telephone. Now that a year's operation has demonstrated the success of this combined wire and wireless service, it seems desirable to give some of the details whereby this remarkable event has been achieved. For a full account the reader is referred to a paper by L. M. Clement, F. M. Ryan and D. K. Martin, which will appear in the Proceedings of the Institute of Radio Engineers. The following material has been rewritten from an advance copy of this paper:

Communication is accomplished by means of a 23-mile wire circuit from the Los Angeles exchange to Long Beach, a 31.5-mile radio link from Long Beach to Pebble Beach on Catalina Island, and 1.2-mile wire circuit from Pebble Beach to Avalon, the principal settlement on the island. This circuit is pictorially shown in Fig. 1. The radio circuit is operated in duplex, it being possible to send and receive at the same time from each station. Furthermore radio telegraph

messages are sent while telephone conversations are being carried on without mutual interference.

There were two methods available for establishing telephone service to the island, either by submarine cable or by radio; and, inasmuch as the time element and first cost were determining factors, the radio telephone was selected by the engineers of the American Telephone & Telegraph Co. as the best solution of the problem. Although the decision to employ radio was reached late in May, 1920, the system was in regular operation by the following July, this rapid installation being made possible through the co-operation of the manufacturing department of the Western Electric Company and the engineering and construction department of the Pacific Telephone & Telegraph Company.

The two principle requirements of the radio equipment were duplex operation and efficient connection to the ordinary two-wire telephone circuits. The first requirement was met by making use of the principle of selectivity, i.e., different wave lengths are used for transmission in opposite directions. After a careful survey and study of the interference from nearby radio stations a wave length of 470 meters was selected for the Long Beach radio transmitter and 400 meters for the Pebble Beach radio transmitter.

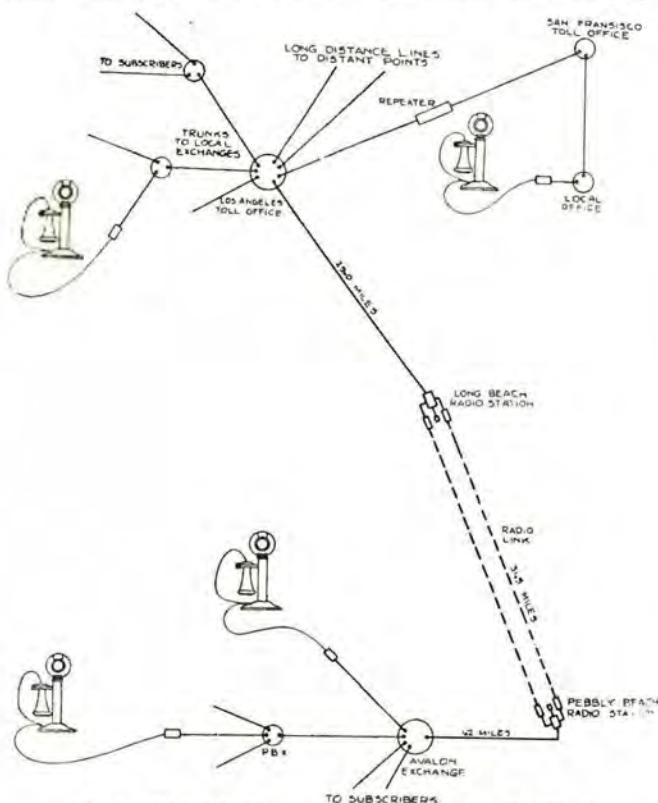
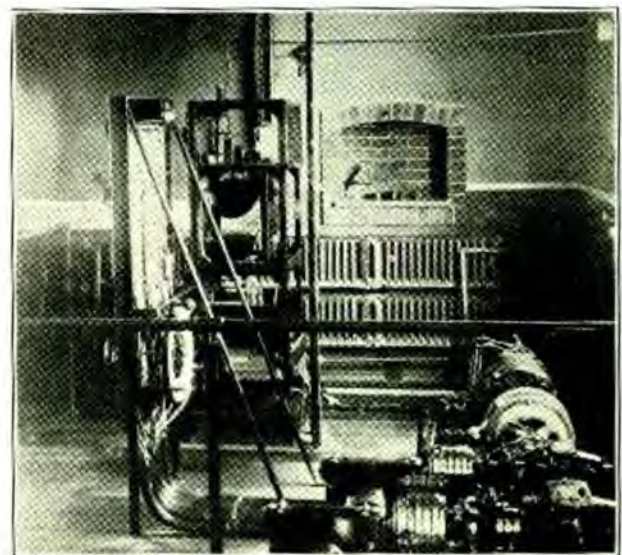


Fig. 1. Pictorial Diagram of Avalon-Los Angeles Circuit.



Rear View of Transmitter Power Panel, and Motor Generator at Long Beach.

The problem of combining a sending and receiving channel had already presented itself in ordinary telephone repeater practice; and the same method of combining the two channels into a single channel was adopted

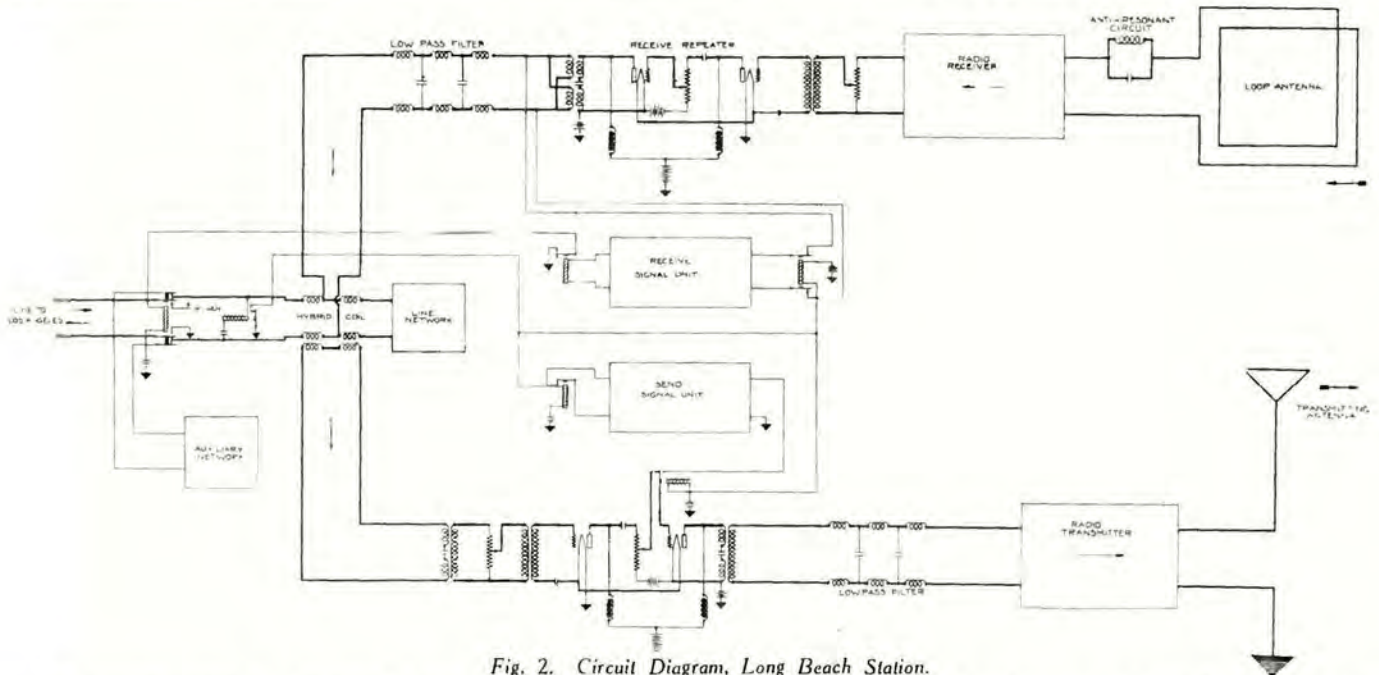


Fig. 2. Circuit Diagram, Long Beach Station.

in this case by using a three-winding transformer or hybrid coil, as it is called. This met the second requirement of efficient connection between the radio link and the wire lines.

Fig. 2 shows how the radio circuit is linked with the wire circuit. The heavy lines in this figure show the speech circuit, and the light lines the signaling system. For simplicity only the principal connections are shown.

Speech currents received from the Los Angeles line pass through the cordless switchboard to the hybrid coil and to the network inducing similar currents in the input winding connected to the send repeater. This repeater amplifies these speech currents and delivers them to a low-pass filter which freely passes the principal speech frequencies of from 200 to 2000 cycles, but greatly attenuates currents of frequencies higher than 2200 cycles. Experiments have shown that only the band of frequencies from 200 to 2000 cycles need be transmitted to deliver commercial quality and readily understandable speech, and therefore the use of this filter does not impair to any appreciable extent the quality of transmission. The filter serves two purposes: it prevents interfering currents of frequencies above the necessary speech range from entering the radio transmitter, and it makes the balancing of the line with a suitable network somewhat easier in that the balance

must be effective only for frequencies below 2200 cycles. The output currents from the filter are delivered to the radio transmitter where they are further amplified and employed to modulate the radio frequency carrier current there generated.

The cordless switchboard provides convenient means for testing and monitoring on the circuit and for connecting quickly with another wire line in case of trouble in the wire portion of the circuit.

Referring to Fig. 3, the speech current is applied to the speech amplifier tube, E, through the input transformer T₁. The output of this amplifier is impressed on the grid circuits of the two parallel modulator tubes through the transformer T₂. The action of these modulator tubes is that of an amplifier and their output voltage is impressed on the plate circuits of the two oscillator tubes by means of the reactance L₂, which is common to the modulator and oscillator plate circuits. This modulation of the oscillator plate potential results in speech frequency variation of the amplitude of the antenna current.

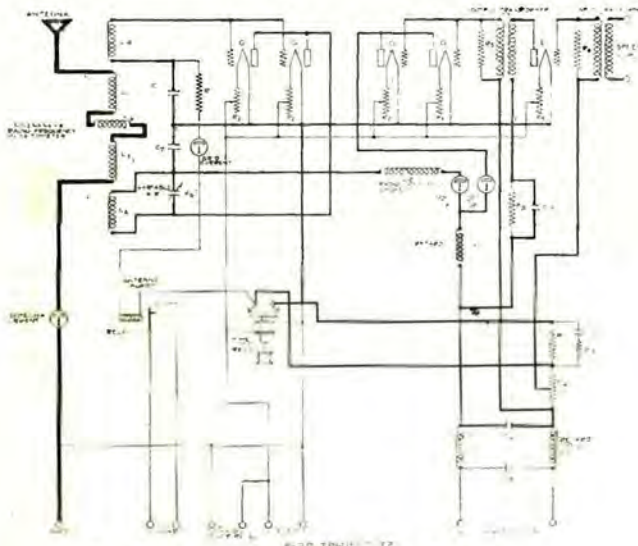


Fig. 3. Circuit Diagram of Radio Transmitter.



Antenna and Transmitter House.



Rear View of Radio Transmitter.

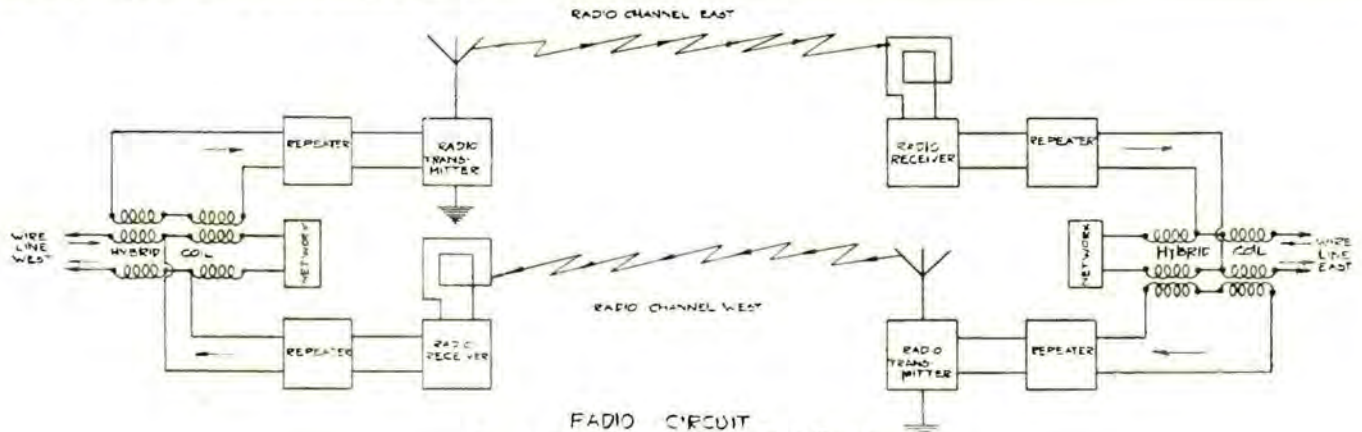


Fig. 4. Receiving and Transmitting Circuits.

Direct current supply from a.c. mains is obtained from a motor generator set consisting of an induction motor which drives two ECK generators, one 12-volt and the other 1000-volt. The low voltage supply heats the tube filaments and the high voltage furnishes the currents.

As may be noted from Fig. 3 the 1000-volt circuit includes



Rear View of Receiving Set.

a filter made up of the series retard coils L_1 and the shunt condensers C_1 , which smooth out any commutator ripple or other machine noises and protect the generator from the radio frequency potentials.

Negative grid potential for the speech amplifier E is maintained from the drop in potential in the upper part of the resistance R_1 and for the modulator tube from the entire drop in this resistance, which carries the space current of all tubes in the transmitter set.

The 12-volt filament circuit controls the time limit relay which controls the auxiliary negative grid potential resulting from the drop of potential in R_{10} . This negative potential is large enough to stop oscillations and to minimize space currents. The filaments thus reduce to normal temperature before the auxiliary grid potential is removed, which prevents excessive space currents while the filament is heating. The oscillator grid circuit stops flowing whenever the oscillations cease in the antenna circuit, releasing a relay which actuates an alarm at the switchboard.

A loop antenna is used for receiving, it being of the solenoidal type 6 feet square with five turns.

In order to prevent, as far as possible, currents of the transmitting frequencies entering the receiver, an anti-resonant circuit adjusted to have a maximum impedance at the transmitting carrier frequency is included in the loop circuit and forms an effective filter.

Fig. 4 clearly shows the entire receiving circuit as associated with the radio transmitter, and also shows the signalling circuit, the diagram in itself being self explanatory. The heavy lines in the drawing show the speech circuit and the light lines the signalling system. Current for the operation of the receiving apparatus is supplied by storage batteries and by dry batteries as in the usual amateur set.

One of the most novel features of the installation is the fact that the subscriber is called in the usual manner by the switchboard operator after the operator has been "rung" by

means of a signal which not only passes over the radio link but is automatically relayed at the junction with the wire circuit. The operator at the sending station merely throws the usual ringing key and a light appears or a buzzer sounds at the receiving toll board.

As shown in Fig. 4 this is accomplished through a series of relays actuated by the usual 16-cycle ringing current from the line wire, these relays being connected to the sending or receiving tubes.

The transmitting aerial at Pebbly Beach and Long Beach are each supported by 90 foot poles 107 feet apart, firmly set on concrete and I-beam footing so as to get the full effective height of the masts. The antennae are of the T type and consist of eight wires spaced 2 feet apart and supported by double cross arms bolted to the pole and reinforced by a channel iron truss, making for great rigidity and minimizing any change of frequency due to the swinging of the wires. This construction is clearly shown in the accompanying illustration. The antenna wire is 7-strand No. 18 silicon bronze. All joints are made with copper sleeves. A lead-in of 1/4 inch copper sash-cord is connected to the antenna wires at their center. Each wire is fastened to a long eye-bolt passing through both cross arms and secured with lock nuts, thus allowing the tension of each individual wire to be regulated without affecting the tension of the other wires. Four porcelain strain insulators in series insulate each wire from the cross arms.

Grounding at Pebbly Beach is accomplished by wires run radially from the transmitter for a distance of 250 feet and buried in the ground to a depth of 8 inches. All surrounding conduits and water pipes are thoroughly connected with each



Front View of Receiving Set.

other, copper strips are buried in moist earth and thus is secured an effective low resistance net work.

At Long Beach, besides the office ground, copper strips are buried at the bottom of a 34-foot well which was filled up with junk copper, coke and earth; in addition all surrounding pipe and metal were thoroughly grounded.

It is of interest to note that not a single conversation has been interrupted by static, although the line has been "noisy" during electrical storms. The station radiates a pure sharp wave and any interference with nearby stations is easily eliminated by anti-resonant circuits.

The Handling of Tuning Apparatus

By B. F. McNamee.

AN OLD style tuning coil consists of a single layer of copper wire wound on a tube made of some insulating material. The turns do not touch each other, being separated by insulation or by being wound in a groove. A slider makes contact with the wire, so that one can use any desired number of turns. By using the connections shown in Figs. 2 or 3, such a coil may be used for tuning to transmitting stations on various wave lengths by simply adjusting the position of the slider.

In studying the action of tuning apparatus we are repeatedly confronted with the terms "inductance" and "capacity." A short explanation is therefore in order.

Whenever an electric current flows there is magnetism set up in the space surrounding the conductor. To demonstrate this one has but to observe the deflection of the needle of a

able with respect to the other, we have the ordinary form of variable condenser, as shown in Fig. 6. The capacity of such a condenser can be changed by simply turning the knob, which controls the movable plates.

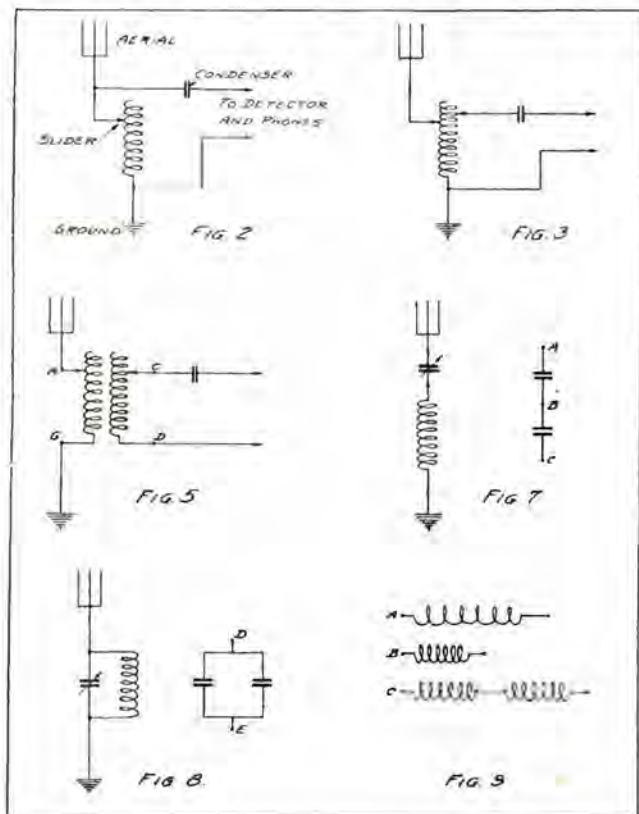
Just as the frequency of a pendulum may be changed by changing its length, the frequency (or wave length) of an electric circuit is changed by varying its inductance or its capacity. In the circuit shown in Fig. 2 the main inductance is the coil, and the main capacity is the aerial. It is easily seen that the aerial and ground form the two plates of a condenser with the air between them as the insulator. As it is



Fig. 4. Loose Coupler.



Fig 6. Variable Condenser.



difficult to vary the capacity in this circuit, the tuning is done by running the slider along the coil, thus varying the inductance.

Fig. 3 shows the two-slide tuning coil which permits the detector circuit to be tuned as well as the aerial circuit. This circuit will give louder signals than that of Fig. 2, because the tuned detector circuit will supply more energy to the detector.

Fig. 4 shows the ordinary type of loose coupler, the circuit of which is shown in Fig. 5. The two coils are generally arranged telescope fashion, with one of them free to move with respect to the other. One of the coils form the main inductance in the antenna circuit, and is known as the primary, while the other, known as the secondary, is the main inductance in the detector circuit. The action is the same as in an ordinary transformer. The magnetic effect of the current in one coil sets up a corresponding current in the other if the latter is tuned to the wave length in question. We therefore have two distinct circuits which must be both tuned to the incoming signal before it will be picked up, except in cases where we are very close to an extremely powerful station. While the loose coupler involves more adjustment than the tuning coil, it provides for much greater freedom from interference. A variable condenser is usually connected between points C and D to assist in tuning the secondary circuit.

It is a common and serious mistake to think of the two circuits of a loose coupler as entirely independent of each other when it comes to tuning. The presence of each circuit changes the amount of inductance in the coil of the other circuit, and the closer the two coils are placed, the greater is this effect. Consequently if we tune in a signal with the coils

compass when brought under a trolley wire. The property which an electric circuit has of storing energy in the form of magnetism is called the inductance of the circuit. While a straight wire of given length has a certain amount of inductance, the same length of wire wound into a coil has many times that amount of inductance.

Before a lightning discharge takes place there must be a storing of energy in the cloud in the form of static electricity.

The property which the cloud has of storing electrostatic energy is called its capacity. This capacity of the cloud is greater because of its nearness to the earth than it would be if far removed from all conducting bodies. The cloud and the earth taken together with the non-conducting air between them form what is termed a condenser. A condenser consists of two conductors separated by an insulator, and usually takes the form of two metal plates separated by some insulating substance, such as glass or air. When a condenser is constructed of two sets of metal plates, in which one set is mov-

For Consideration by the Secretary of the Navy

By Lawrence Mott, Associate Editor.

LET it not be thought that in this article I venture to criticize the Navy Department—as such, indeed, is far removed from my intent—which is to call the attention of the Honorable Secretary of the Navy to certain—facts. And this for the reason that it is seldom that the Man at the Top knows o'erly much anent "doings" many rungs lower down on the Official Ladder!

I reproduce part of a communication received by me from one of the foremost amateur operators in Southern California, a man of mature age and dignified profession, whose hobby is research and experimental work in radio effort. Only in the fact that he does not transmit messages for financial considerations is he different from Class A-1 Commercial Operators—and I make so bold as to state that he has forgot more about radio than the average commercial operator knows—today!

Hence his letter is very much worth while considering!

" Something should be done about these arcs. It seems unjust that the Naval Stations should be permitted to use a transmitter that upsets all traffic within 100 miles. Their own engineers have counted over 60 harmonics. The foolish part of it is that it not only upsets all commercial and amateur stations within the above distance, but the Navy spark station, itself, has the greatest difficulty in reading, sometimes faring much worse than the amateur stations.

"There must be some politics, somewhere, or else much gross negligence and inefficiency! It is too bad that some of the real engineers, interested in the location of some of the government radio stations, have not been listened to—at Washington. This arc station, here at San Diego, has no natural ground! It was placed where it is because of a fancied protection, yet its visibility is relatively just as great where it is, as had it been put in False Bay—where a really efficient ground system could easily have been obtained. The arc is the most discouraging single element here, completely wiping out as it does, decent reception most of the time. . . ."

"loosely coupled" and then separate the coils somewhat, the signal will become weak or disappear, because it is now de-

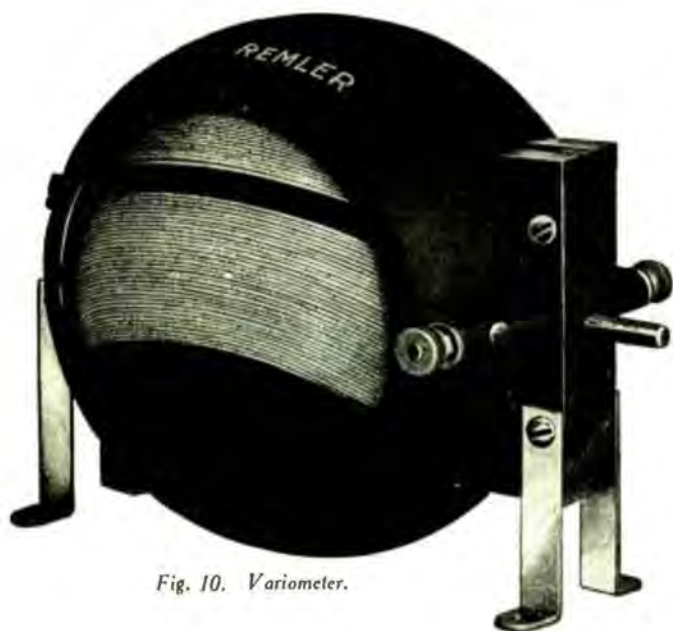


Fig. 10. Variometer.

tuned, due to the changed inductances. This does not mean that the coils must be returned to their former close position, but rather that the signal should be tuned in again, with the coils somewhat separated, by means of the sliders or variable condensers. It will generally be found that the signals can be

All this is a sheer waste of men's time, of the Government's apparatus, etc. And it could all be efficiently remedied, were investigations—and their resultant changes—made.

I am informed that these conditions exist, to a large extent, wherever a Naval Station is situate.

WHY? Ah! there's the rub o' it!

Radio communication is rapidly becoming one of the chiefest arteries of the nation's means of communication. Should a state of war exist, it would be the artery. Why not—while the Dove of Peace—poor, harassed bird!—seeks a hit-or-miss roosting place on American soil, and timidly utters a plaintive coo-coo—why not look into the matter of faultily-built Naval Stations, and correct mistakes? Mistakes that—although doubtless made in good faith—might prove to be very expensive—especially on the Pacific Coast.

No one censures an honest mistake. But they are fools, indeed, that seek to "hush up" mistakes—and trust to "getting by" with them.

RADIO holds no "special license" to censure, to criticize or to publish articles that are derogatory to the dignity and prestige of the Government of the United States. Or that reflect adversely on any Department in the Government. The Editors take a very great deal of pride in trying to further certain plans of the War Department—for more efficient radio among civilians.

BUT the Editors also feel that it were a mistake—in the wrong direction—not to call the attention of the Honorable Secretary of the Navy to certain, inexcusable weaknesses in the nation's most sensitive and critical arm of defense: its means of radio communication on the Pacific Coast.

made as loud with loose as with close coupling, and at the same time the possibility of interference is greatly reduced.

When condensers are connected in series as in Fig. 7, the total capacity is reduced. Thus the capacity between points A and C is less than that between either A and B, or B and C. Fig. 7 also shows a variable condenser connected in series in the antenna circuit, thus cutting down the total capacity. This circuit will therefore tune to a shorter wave length than otherwise.

When capacities are connected in parallel as in Fig. 8, the total capacity is equal to their sum. Thus the wave length to which the antenna circuit in Fig. 8 will tune is increased because the capacity of the variable condenser is added to the capacity of the aerial.

Fig. 9 illustrates the principle of the variometer. A represents a coil with widely separated turns. B represents the same coil with the turns brought nearer to each other. In the case of B the magnetic action of the current in each turn has much more effect on the other turns than in case A, and the inductance of B is therefore greater than A. C represents two coils wound in the same direction. If they are brought nearer each other, the total inductance is increased. If one coil is turned completely around so that its magnetic field opposes the other, the total inductance will be decreased by bringing them close together. In the variometer shown in Fig. 10 one coil is mounted on a shaft and may be revolved. The inductance is greatest when the current goes through both coils in the same direction, and least when it goes around the two coils in opposite directions. By means of a variometer we can have any amount of inductance between these two values.

(To be continued in January RADIO.)

Promoting the Sale of Radio Equipment

By Ellery W. Stone.

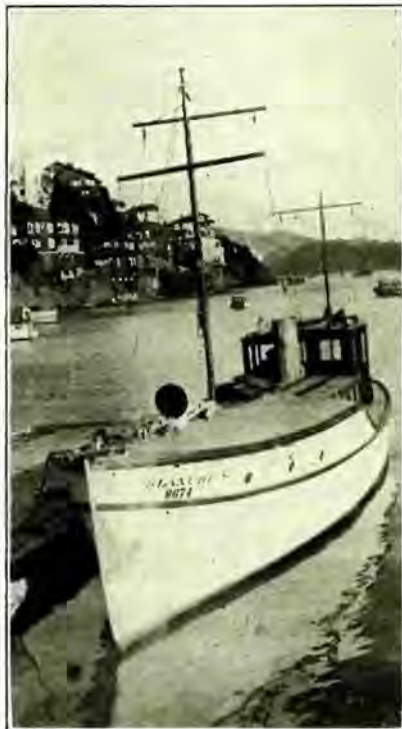
In the early days of radio, the bulk of the so-called amateur radio business was handled by the mail order method. But as the volume of business increased and as new inventions and developments were made, the number of manufacturers increased steadily and the form of distribution naturally changed. Radio equipment is not a staple article, the purchaser wants to see and handle his prospective purchase rather than to buy them from printed descriptions in catalogs, so that the logical contact with the purchaser is through the retailer.

According to "Electrical Merchandising," the market in this country consists of some 700,000 boys, men, and some women, ranging in age from 16 to 60, the average age being 21. Until the last year or two, the radio market consisted largely of the boy who bought radio parts and in many cases, only raw materials, with which he built his own equipment. That was before the advent of the radio telephone, when to be able to transmit and receive radio messages, it was necessary to learn the telegraphic code. As a rule, it was only the boy who had the time, the ambition, and—I must admit—the ability to become proficient in the code. And because he was only a boy with a youngster's naturally limited purchasing power, although as I have intimated before, this was sometimes unnaturally augmented, he was restricted to the purchase of parts only and he was able to build a set which he could not afford to buy ready made because he had an abundance of time which cost him nothing. Besides, he was not limited to eight hours daily production.

But with the advent of the radio telephone, the adult has become interested in the radio art, because it is no longer necessary to learn the telegraph code in order to gain employment from this pastime. Anyone now can enjoy concerts by radio in his home, no government license is required for receiving sets, and so far as technical knowledge is concerned, it is no more difficult—and probably easier—to operate a radio telephone than to drive an automobile. The equipment necessary to receive music and news items by radio is neither cumbersome nor elaborate and the cost is no more than that of a phonograph. It may be installed anywhere in one's home and there is no unsightly mast to be erected, as in the old days. A single bare copper wire strung from the roof to a house, tree or other support, say two hundred feet away, is all that is required.

The electrical dealer gets so many

This is an article which every amateur can read with profit. It is taken from an address given before the San Francisco Electrical Development League, many of whose members are prospective radio dealers. It illustrates the work that is being done to make it possible for every amateur to examine his equipment before purchase in his own home town. It also opens up the way for commercial advancement in the radio field on the part of ambitious young men.—The Editor.



Motor Boat Cruiser "Blanche S" equipped with Radio Receiving Set. Dr. Martin E. Simon, Flood Building, San Francisco, is the Owner.

calls for radio equipment that he has to put in a radio department. He hires a bright radio amateur for work after three p. m. and all day on Saturdays. Such an amateur knows what you need to carry in stock, he belongs to one or more radio clubs, his friends will buy from your store, and you will learn the radio business from him. But don't think you will be able to supplant him. Because when the time comes when you know as much about the radio business as he does, your radio department will

have developed to the stage when you will need all of your radio salesman's time and you will be looking for additional help from him.

What is the cost of the apparatus purchased by the amateur? The average boy starts off with a supply of parts and small equipment which will total from \$5 to \$15, and as his interest and his requirements increase, he buys more and better apparatus to add to or replace what he started with. The older amateur or the adult prefers to buy a set complete and his initial outlay will average at least \$50. By the time both types of amateurs get through with this thing, only fortunately for us they never do get through with it, they will have stations worth hundreds and even thousands of dollars.

"Electrical Merchandising" very conservatively estimates the purchasing power of the radio amateurs who "tinkers" and experiments at about \$25 per year. The radio customer who has the means and inclination to purchase complete sets ready made of course does not buy new apparatus often. But he does buy supplies for renewal, and as he increases the range of his set, and this invariably happens, he spends more for new equipment than the "tinkering" amateur spends in a number of years.

There are some 6,500,000 farms in the United States with at least one boy per farm who can learn to operate a radio receiving set. The Department of Agriculture has commenced the erection of eight radio telephone stations at the various agricultural centers of the country to broadcast by telephone crop reports, crop and produce prices, weather and stock reports. There are several receiving sets on the market designed especially for farm installation. The radio manufacturers are advertising in the farm journals and these journals are running editorials and articles on the subject. You jobbers have your salesmen out in farming territory. A radio line will be a profitable one for them to handle.

In addition to the boy amateur, the power company and industrial concern, and the farmer, there is the man who installs a radio receiver in his home for the reception of concerts, stock reports, baseball scores and other news items. I know of a man of means across the bay who has a radio receiver in his living room and his daughter, who doesn't know an ampere from a volt, operates the set and receives radio music in their home every evening. There are many such installations in private homes locally, pur-

(Continued on Page 246)

The Armstrong Super-Heterodyne

By A. K. Aster.

The rapidly increasing number of amateur stations makes it necessary to have an extremely selective receiving set in order to do any long distance work or to listen to any radio-phone undisturbed. To meet this demand the Armstrong super-heterodyne is the only system which permits almost unlimited radio-frequency amplification and allows you to get that faint fellow several districts away. Remember, that two or three steps audio-frequency amplification is about the limit, that a detector works much better on strong signals than on weak ones, and that the way to get strong signals into the detector is to use radio-frequency amplification.

Fig. 1 shows the wiring diagram of such a system adapted for use on short-wave-lengths. Its operation consists in heterodyning the 200 meter incoming sig-

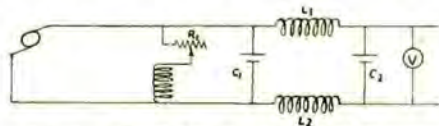


Fig. 1. Wiring Diagram for Radio Frequency Amplifier.

nals to some long wave-length, say 3500 meters, then amplifying them at radio-frequency, then detecting them, and finally amplifying them at audio-frequency to any desired audibility. The reason for heterodyning the incoming signals to some long wave-length is because this gives added strength and because radio-frequency amplifiers work better at long wave-lengths than at short ones. All this sounds far worse than it really is.

At this point let me dispel any fear which may lurk in the mind of the reader regarding the difficulty of handling this system. It is very easy to adjust, having no more settings than the ordinary feedback receiving set. In place of having to set the size and coupling of the tickler coil you have the coil and condenser of the local oscillator to set.

First tune the primary and secondary to the wave-length of the sending station and then adjust the local oscillator till the signals come in loud and clear. It will be noted that only the first step of the radio frequency amplifier is tuned, the other steps being resistance coupled. This is far simpler than the ordinary radio frequency amplifier because, once set, it does not need any further adjusting. It may be found necessary to keep the first step slightly detuned to prevent howling, otherwise this system is absolutely howlproof, a decided advantage over the feedback system. Those who have never used a properly designed set of this kind have no idea of its possibili-

ties. It is the only system for real relay and loop work. Contrary to current opinion this entire system can be successfully operated from a single "B" battery without difficulty.

The oscillator, tuner, radio-frequency amplifier and detector, and audio-frequency amplifier must be mounted in separately shielded boxes or in separately shielded compartments of a single box. I cannot overemphasize the fact that the system must be properly shielded to get satisfactory results.

If separate boxes are used, they may be lined with tin foil, including the inside of the front. Such boxes should be pro-

mounted inside of the boxes and shielded by mounting copper tubes around them. These copper tubes should continue through to the front of the box and there be capped by screening so as to permit ventilation and observation of the filament color.

The "B" battery for a system like this should be at least 100 volts and since at least four or six tubes would be used the upkeep cost, if flashlight cells were used, would be high. The solution is either a set of small storage batteries or a motor-generator set. A set of small glass jar storage batteries can be purchased for about the cost of three sets of

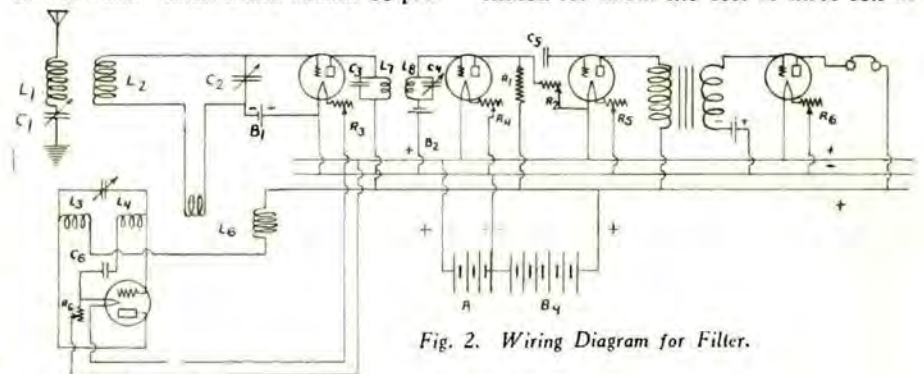


Fig. 2. Wiring Diagram for Filter.

- L₁ 25 or 30 turn HCC.
- L₂ 35 or 50 turn HCC.
- L₃ 30 turns No. 24 DCCC on 3-inch tube, tap at 8, 12, 16, 24 and 30th turn.
- L₄ Same as L₃.
- L₅ 10 turns No. 24 DDC on 3-inch tube.
- L₆ 200 turns No. 24 DCCC on 3-inch tube, winding space 1 1/2 in.
- L₇ 150 turns No. 34 DSCC-pancake 1. D. 2 1/2 in. 1/8th in. thick.
- L₈ Same as L₇ Coupling between L₇ and L₈ 1/4th in.
- C₁ 0.0015 variable (See Note 1).
- C₂ 0.001 mfd. variable.
- C₃ 0.00025 mfd. mica condenser.
- C₄ 0.0003 mfd. variable.
- C₅ 0.00025 mfd. mica condenser.
- C₆ 1 mfd. paper condenser.

- C₇ 0.0005 mfd. variable.
 - R₁ 1/2 megohm.
 - R₂ 2 megohm.
 - R₃ Standard filament rheostat.
 - R₄ Ditto.
 - R₅ Ditto.
 - R₆ Ditto.
 - B₁ 1 to 6 cells flashlight battery.
 - B₂ Same as B₁.
 - B₃ Same as B₁.
 - B₄ 110-volt battery or motor-generator set.
 - A 6-volt storage battery.
 - T Audio-frequency amplifying transformer.
- Note 1 Condenser C₁ should be provided with a switch so that it may be put either in series or in parallel with L₁.
- Note 2 The circuits C₃L₇ and C₄L₈ at M must be adjusted for resonance.

vided with a false front three or four inches back of the actual front. All tap-switches, etc., should be mounted on this panel and all controls, including condensers and rheostats, must be connected to the actual front by means of rubber or bakelite rods.

If a single box is used it likewise should be provided with a false front for controls, but it should be lined with thin sheet copper as, due to the proximity of the various parts, the resistance of the tinfoil would be too high for sufficient shielding. All joints of the box, except the top, should be soldered and the connecting wires from one compartment to another should be led through as small a hole as practical. No matter what sort of boxes are used, the tubes must be

standard 108 volt "B" batteries. Probably the most economical scheme in the long run is a motor-generator set. The writer built such a set from good second-hand machines for about the cost of a standard 108 volt "B" battery. The generator can be made of any good 110 volt d. c. shunt wound motor having at least 36 bars on the commutator and having a well, electrically balanced armature. All armature coils must have the same number of turns, otherwise it is practically impossible to smooth out the commutator ripples. The motor to be used as a generator should be rated at 1100 r. p. m. because such a motor when driven at 1750 r. p. m. will develop about 110 volts, which makes it possible to directly connect it to a standard 1750 r. p. m.

motor. The driving motor, if a. c., should be of the enclosed type so as to have as little external field as possible in order to keep the a. c. hum out of the plate circuit of the tubes. Mounting the motor-generator set on a non-magnetic base will also help matters. If the plate voltage generator is some distance from the set the leads should be made of lead covered wire or run in conduit. The sheathing should be well grounded in either case in order to cut out power line induction.

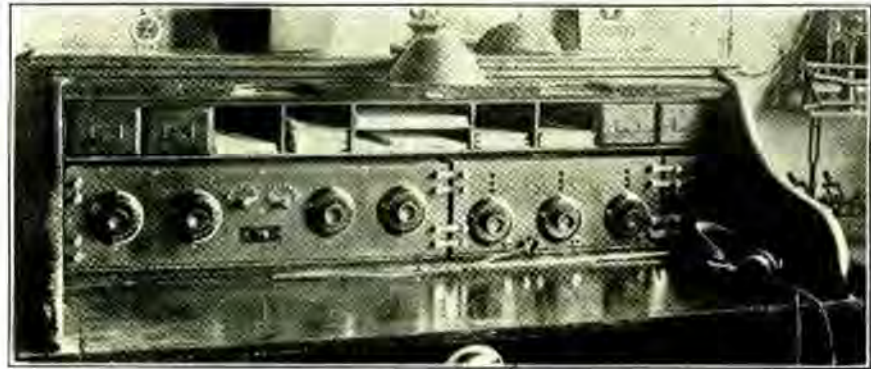
The design of a filter is a case of cut and try for each individual generator. (See Fig. 2 for approximate dimensions and wiring diagram.) The motor-generator set has the advantage over the storage batteries because it needs little attention other than an occasional cleaning and oiling. The commutator of the generator must always be kept thoroughly clean so as to insure sparkless commutation, which is absolutely necessary. The brushes should be of hard carbon and properly fitted.

Another point which must not be lost sight of is that operating five or six tubes puts a heavy drain on the "A" battery and if this is not large enough it will not hold its voltage steady for any length of time, which means continual adjustment of the filament rheostat and unsatisfactory operation. The battery should be large enough to deliver at least six amps. for 10 or 12 hours.

To those who are not accustomed to operating a number of tubes in parallel let me give a word of caution which may save the filaments of a few tubes. When shutting off one or more tubes of a bank of tubes operating in parallel always shut off the entire bank first, then cut out the desired tubes, set all filament rheostats for minimum current and you are ready to turn on your tubes again. If you cut out a tube while the others are burning the rise in current is liable to burn out the entire remaining bank of tubes. Another thing to remember is that the filament circuit must be connected up with heavy wire, as a very small resistance produces a very large voltage drop on low voltage circuits. This is especially important if the batteries are some distance from the set.

For those who are interested in loop work this is the ideal system, for thereby radio-frequency amplification can be used under advantageous circumstances, that is, at long wave-lengths. With a fair sized loop and five or six stages of radio-frequency amplification one should be able to pick up amateur stations at surprising distances. It should be remembered that a loop is very free from static and interference can be eliminated by adjusting for direction as well as for wave-length.

To doubters all I can say is "the proof of the pudding is in the eating."



New Radio Shop Receiving Set in Use.

THE SOUTHERN CALIFORNIA RADIO ASSOCIATION DINNER-DANCE BY "6XAD"

Decidedly it was a success! Thanks to the "wim and wigor" of President Lex Benjamin (6MK) the "party" given at Panlals' in Los Angeles, on the evening of November 7, was very much in the nature of a thumping—success!

Broadcasted daily by the Western Radio Electric Co., and the southern branch of the Leo J. Myberg Co., so well heralded had the affair been that at the mustering for food there were more than 80 members present, with a modicum—too much of a modicum!—of the more Deadly Species of the Race! Radio 6XAK had intimated that all the ladies possible were to be brought, and that if one had not a wife—or a sweetheart—to bring some one else! Thus conforming precisely with the spirit of the modern day—C.W., 'neverthing! The tables were charmingly decorated with flowers, and favors of various and amusing kinds were en masse.

Interspersed with sallies from Ye Hon. President—and general gayety—the dinner progressed to a satisfying (!) end, and President Benjamin introduced a new member—U. S. Deputy Game Warden Lawrence Mott—associate editor, sometimes known by his alias of "6XAD"! Mr. Mott bored the spark men intensely—and wheered the C.W. men correspondingly—with some pertinent remarks on the reckless disregard of the radio laws by certain spark operators in the Southland, and ventured the prophecy that unless amateur operators, the nation over, behooved themselves and walked with a good deal more circumspection, the amateur fraternity stood to lose the government's interest, and the plainly-evidenced friendship of the present administration.

Mr. Mott then explained, cursorily, the new plan of the Organized Reserves, Signal Corps division, and a great deal of interest was manifested.

Some interesting words were pronounced by a member of the Naval Radio Service, in which he, too, plainly stated that spark men were getting themselves strenuously disliked along the coast by

A NEAT RECEIVING SET

The illustration shows a business-like arrangement for a radio receiving station, belonging to Rev. Clarence E. Woodman of Newman Hall, Berkeley, Calif. The desk part of it, while presenting a somewhat opulent appearance, is really constructed from an ordinary kitchen table, with under-panelling made from some matched floor boards found in the cellar. The roll-top part was bought second hand. After removing the lower row of pigeon holes, the space was just right for the "Radio Shop" set shown in the cut. The small panel, at the extreme right of the set, contains the B battery. In front, under the drawer, are six binding posts for three telephone receivers: A "Murdock," a "Liberty" and a "Baldwin." At the right of the desk are seen three throw-switches: That at the right is a 3-pole single-throw switch, to cut in any one of three aerials. The middle is a D.P.D.T. switch to connect the aerial and ground either with the desk set or with any experimental one; (the latter hooked up to a pair of binding posts shown at the front edge of the table.) The left-hand switch is for the A battery—connected either with the desk set; or with any other, by means of the pair of binding posts corresponding. The "Radio Shop" set has been found highly efficient, and gives thorough satisfaction.

the fleet's officers for causing QRM FAR above 200 meters! Not many amateurs, to be sure, but enough to create ill feeling!

I asked him point blank whether the fleet ever suffered QRM from C.W. operators, and the answer was both a prompt and a satisfying one: "Never, sir!" "Nuff sed!

Yes, it was a jolly party, and it is hoped that one such can be arranged for each month. Personally, I hope so, as there is seriously lacking in the Southland a cohesive spirit!

GET TOGETHER, SOUTHERN DIT-DAHS!



9BD (Canadian) at Vancouver, B. C.

A Northwest Mystery Explained

Due to a change of call number from 5BR to 9BD the experimental radio station of Wm. D. Wood Jr., at the Barron Hotel, Vancouver, B. C., has created much curiosity among Northwestern operators. Mr. Wood has an experimental license from the Canadian government allowing 200 meters for spark and valve set. All owners of Canadian experimental licenses must be holders of first class commercial certificates of proficiency in radiotelegraphy, Canada.

His antenna is a 7-wire "L" on the hotel roof, with cage lead-in from the south end. The aerial points due south. It is supported by two 40-foot poles with 16-foot spreaders in flat top. The total length of wires is about 100 feet and natural, period of aerial about 180 meters. An insulated counterpoise of the same dimensions is exactly under the aerial, and 5 feet above the tin roof of the building. This is used for the phone and C.W. set.

One K.W. type "T" spark transmitter with 20,000-volt secondary at all powers has been used up to the present time, but Mr. Wood has just secured a United Wireless "Coffin" type transformer with a 30,000-volt secondary, which will be used for extreme "DX" at a later date.

The gap is a Benwood super-synchronous, bakelite case. Various numbers of electrodes have been tried on the removable disc with final decision to use eight electrodes, as when the gap has but four electrodes the strain on the condenser is so great that it is likely to puncture if the "Coffin" were used. The only thing that might be improved upon the Benwood "sink" gap is the method of adjusting it to synchronism. If a device for making this adjustment easier and more accurate could be attached, it would be quite an improvement, in Mr. Wood's opinion.

Four Marconi Leyden jars of .003 mf. each are connected in parallel for a con-

denser, and give a total capacity of .012 mf, which is considerably more than most amateurs are able to get away with and still keep below 200 meters. These jars are only supposed to withstand 15,000 volts, but the fact that they stand up under twice that voltage speaks pretty well for them.

The primary inductance is one and a half turns of 1 1/2 inch brass ribbon mounted in such a manner as to be all useful inductance and not leads. The secondary of the O.T. is 8 turns of 1-inch brass ribbon, but only 5 turns are in use at present.

Six-inch coupling has been the adjustment for the past month or so, and with adjustment 4.2 H.W. amps are going into the aerial, but to prove that amps. don't mean much in some cases Mr. Wood was reported just as QSA by a "seven" station when he had reduced power and was only putting out 1.3 amps. On the night of Oct. 24, 6KA in Los Angeles said he was QSA and on this occasion the amps going into the aerial was about three and no more, and the coupling at about eight inches separation.

9BD has been in operation for a very short time and therefore has not done much "DX" to speak of, but wherever reported the sigs are usually "QSA OM" whether true or not.

The phone and C.W. transmitter is a 20-watt output set, using four 5-watt tubes and the Heising circuit. At a later date concerts will be sent out for the benefit of local amateurs. There is no other amateur phone station in British Columbia to date, so it will be new to the majority of amateurs to get the music in Vancouver via radio. Data regarding the phone set will be given in detail at a later date as no work of importance has been accomplished with it so far.

The receiver is a Radio Shop regenerative with a home-made detector and two-stage amplifier.

9BD VERSUS 5BR

Time: Oct. 15, 12 to 1 a. m.

Place: The air.

(fade in) 6QR working 9BD (they finish), 9BD coming in very QSA (then finish).

9BD 9BD 9BD 9BD

9BD 9BD de 6CP 6CP 6CP
6CP (long call dx stuff).

9BD 9BD 9BD 9BD

9BD 9BD de 7YJ 7YJ 7YJ
7YJ (also slow dx stuff).

9BD 9BD 9BD 9BD

9BD 9BD de 7BH 7BH 7BH

7BH (7BH puts extra dashes in his nines to make the impression of distance more emphatic). hi. Silence, still no answer from 9BD. 6QR de 6CP sa om who is 9BD anyway. 6CP de 6QR 9BD qra Canadian special station, old 5BR, Vancouver, B. C. (All fade out.)

Moral: If you don't think anyone hears you, just sign off a 9— call.

We'll bet 9BD in Chicago gets a couple of dozen "heard you" cards out of the deal anyway.



9BD Benwood Gap and Condensers.

LETTERS TO THE EDITOR

Sir—We have read Mr. Carl Soderstorm's letter in the September issue of your publication, and, while we agree to a great many of his statements, there are some things which we would like to discuss in all fairness to the modern radio operator. With regard to the use of audions and other modern apparatus for reception, there are, of course, many advantages and disadvantages.

It is true that the service companies are paid to furnish apparatus, and the operator is perfectly within his rights to rely on this apparatus solely for communication. However, when everyone else is covering all kinds of distances and working circles around the users of crystal detectors, it is only natural to expect the commercial operator to try and improve his range. The navy has used audions and other modern reception apparatus for a number of years and has found it not only as good as the crystal, but far better. All important stations on land have used audions even to the extent of paying royalties for the privilege of so doing.

Can Mr. Soderstorm support his claim that radio communication was conducted

(Continued on Page 248)

Christmas Off the Florida Coast

By "Sparks."

"Wishing you a Merry Christmas and a Happy New Year" was the way the cards read—the cards that our relatives, friends and sweethearts sent us. We received them as we cast off the lines that held our tiny tow boat and her tow, a long, unwieldy, sinister-looking concrete car float—to the dock at the Army Base, Norfolk, Va. As the "let go" whistle, one long and two short, sounded, the clang of the engine room bell floated harshly up to us of the decks and we were off! Out through the narrow Army Base channel we threaded our way, turning into the main ship channel at the black bell buoy and leisurely made our way to sea, out past the capes of "Ole Virginny."

The glass being low, we hugged the beach so that the west wind did not have so much effect on us, the car float sheering from side to side and almost overtaking us at times.

Coastwise men have a habit of running fairly close to each other in order to save as much time as possible but you can bet they gave us a wide berth that night—that sheering contrary mass of steel and rock caused many an old time skipper to don trousers over his pajamas, slip his deck-flattened feet into a pair of "mules" and "hit the deck" on the "cat-hop" at the urgent request of an alarmed second or third officer.

Leeway! Sink my side! We set the usual course down the beach to Cape Hatteras. At 8:10 A. M. the following day this perverse piece of war-amateur built junk that constituted our tow actually parted a $\frac{7}{8}$ steel chain and one $\frac{5}{8}$ steel chain. We stopped, brought her alongside, and repaired them.

Upon arriving off Cape Hatteras we found our sister ship, S. S. Tacony, also with a concrete carfloat in tow. By the time we rounded "Diamond Shoal" light ship the wind was howling out of the nor'nor'west. A great piling sea was breaking over us. The carfloat was pulling us back and jerking like some living thing that did not want to lead. We were in a tight place there for a while. The seas were breaking under us as they raced over those deadly shoals, the graveyard for many a good ship and gallant crew. The captain stepped down into the engine room and, calling the chief engineer to one side, said quietly, lest the men hear: "Give her all she's got until I give the word, Chief; we're on Diamond Shoals." Well, the Chief certainly shook her up and we pulled slowly into deep water and a loon laughed hysterically out there in the darkness. We pulled, strained and battled all that night—fought the seas, defied the wind and lived.

At 8:30 next morning a second bridge carried away, but the waters were too rough to go alongside so we plugged on and on praying for the one side to hold her. At Cape Lookout light ship we turned for Cape Lookout light where Cape Lookout bends a protecting arm southward.

At the entrance to this partly artificial partly natural harbor, the last link carried away and here she went hell bent for election for the beach. We caught her, brought her alongside, and made her fast for the night.

The following morning we repaired our bridges and proceeded on our way, not knowing whether the Tacony had lived or not. Finally we saw her—she sent us a radio, saying she was going into Charleston for supplies. We did not think it necessary and told her so in our reply.

We went on and on—washed and rolled, rolled and washed, until Hillsboro lighthouse, way down there on the coast of Florida was passed and then—both bridges carried away at 4:10 a. m., darker than the pits of hell, a gale blowing from the north, the Gulf Stream running north at a rate better than three knots per hour—you can imagine the seas.

We pulled in what was left of our hawser and went back over our trail to look for our lost protegee. We found her at 5:40 a. m. When dawn came we went alongside. She sprung our starboard rail, but a line was made fast to one of her bits and we put a strain on it so as to pull her up under the beach to smooth water—the line parted. Another one was made fast, it parted. In order to get away before she would ram us the captain gave the engine room a full speed astern bell. We got away all right, but when we started to come forward the engines would not move—a line was fouled in our propeller!

There we lay absolutely helpless, rolling in the trough of the sea. We sent out a radio call for help, which failed, but, thank God, we were drifting towards land. A seaman was on the carfloat and when we had drifted to ten fathoms of water we let go the anchor, put a lifeboat over the side with the second officer in charge to get the man off the carfloat and return to the ship. As they left, the wind shifted to the east, making the carfloat dead to the windward, and for every stroke of the oars the lifeboat would go back three feet. The second officer, realizing that to make the carfloat and return to the ship was impossible, gave all his attention to landing on the beach. They landed safe and sound,—the last we saw of them until we arrived at Key West.

What was that? A vibration? Are we aground? I ran to the engine room and put my head inside. The engines were turning over. We promptly heaved in the anchor and made for the carfloat before she would go aground. We made her and got the towing cable on her this time, but were aground three times in the effort.

We proceeded on our way, dead tired, dirty, hungry and with the pleasant knowledge that it was watch for watch (four hours on, four hours off) until we reached our destination. This all happened on Christmas day, December 25, 1920.

"Wishing you a Merry Christmas and a Happy New Year" was the way the cards read,—the cards that our relatives, friends and sweethearts sent us. And a loon laughed hysterically out there in the darkness.

HAM CRUDITIES AND ODDITIES

(Or: Why the Ether Is Jammed!)
Over-Hears by "6XAD"

(N. B.: When a chap is trying to do serious work—gets msgs through—or listen for l-d calls—it is ALWAYS so pleasant to hear—hour after hour—such as these):

"A cat has nine lives but a frog croaks every night." ($\frac{1}{2}$ hour's work to get an "r" on that, from San Francisco.)

"Saw Maggie with Fred tonite wheres Bill?" (Ha! SCANDAL!)

"Do u hear me any better now?" (Asked for 'steen-millionth time!)

"Pse listen while I do sum tuning." (Followed by 11 mins of "V's.")

"Harrys got a new Chandler eight." (12 mins of accurate description—paint, body, etc. Radio 6—ought to be an Agent for the Chandler!)

"Saw Jones abt moving chicken hse and he sed—" (14 mins vastly interesting info. I know all about moving chicken houses—now!)

"Am thnking buying motorbyke what u advise?" (16 mins' advice given. What I know not of motor bykes is not worth knowing!)

"Went to B—'s new soda ftn today his nut sundy fine." (How eeenormously interesting!)

"Awful grouch on father tonite cant wk long." (Hurrah!)

"Mother sez dont hav tooth pulld ul need it when you are old." (Mother is wise!)

"Going be sick tomorrow wont hav go school." (The OLD stuff!)

"Wish Dillon come down and listen 2 all these brd spks." (Cheer: the wish to the echo.)

And so on—AND so forth, dit-tah without end: AMEN!

A Distress Call at Triangle

(Triangle Island, a mountain peak protruding from the Pacific off the northwest end of Vancouver Island, rises abruptly to a height of 680 feet. The Canadian Government radio station which crowned its summit was closed down in June, 1921, a transfer being made to a less isolated location.)

Triangle Island trembled and the wireless office shook;
The radiotelegraphist glanced up with puzzled look.
The wind came from Queen Charlotte Sound, below there
in the gloom,

Beating on the windows with a fearful note of doom;
It blew with sudden fierceness, as only east winds blow,
And lashed the sea to fury six hundred feet below;
The spray dashed up the cliff-sides, and it made a salty rain
That drenched the rock's high plateau and flew to sea again.
This was the most tempestuous night that he had seen or heard;
He thought the island trembled (but that was quite absurd)
The wireless house might shiver, and the shock might be
profound,

But the building, like its engines, was bolted to the ground;
The roof might shed its shingles, and the windows make a din,
The ice-edged wind was all outside and comfort was within.

Signals from the stations all up and down the coast,
Varying from a drum-beat to the whisper of a ghost—
Some high-pitched and strident, and others merely drones—
Superposed and intertwined, they sounded in his 'phones.
Seattle and Victoria, Prince Rupert, Estevan,
North they came from 'Frisco and south from Ketchikan;
Shrill note from a "K"-boat, slobber from chopped arc;
Many kinds of music from as many kinds of spark.
The "Emperor of Africa" was seven days from land,
And working now with Estevan she sounded close at hand;
The Honolulu station was very faint and thin
(Outside the gale was raging but the fire burned bright
within).

A lonely life is radio, if lonely one can be
With all the north Pacific to bear one company,
With ready means of flashing thought with all the speed
of light;

For ever and where'er they be,
Ploughing each her furrow free
Ships upon the sombre sea
Are speaking through the night.

Unfaltering the signals came, and out of all he heard
The storm they had to penetrate affected not a word,
For naught can stop electric waves, divert them or delay;
The radiated impulses go heedless on their way.
But no ship called his station (and this he did not mind,
For starting up an engine is labor of a kind);
He merely sat and listened to the voices in the air,
His feet upon the table and reclining in his chair
In indolent position—one might have thought he slept.
But the vigil never ceases where a wireless watch is kept.
For ever-present service, unseen by those they serve,
Wireless men upon the coast,
At their isolated post,
Are least considered of the host
Who work with brain and nerve.

The boisterous night was passing and at last a glimpse of day
Came creeping over Triangle and drove the wind away.
The operator left his 'phones to stretch and breathe a spell,
For with the night the signals were fading out as well;
He took a turn around the room, and then a step outside,
Drinking in the freshest air that sea-girl hills provide.
The sun that pierced a filmy mist persuaded him to stroll;
He walked a dozen yards or so and climbed a little knoll.
Before him stretched a corner of the greatest sea of all;
It boiled and wrought its violence below the rocky wall.
He went a little further and he halted with a start,
He halted with a shudder and a leaping of the heart.
For he stood in a position where he knew the eye could reach
The churning of the breakers on the boulder-studded beach,
And now the beach was buried full twenty fathoms deep.

Straight from the water's level the cliffs rose clear and steep;
The island's base was hidden and the ocean had encroached
On all the hollow places where the height could be approached.
This was no time for standing there, this was no time to think
What seismic disturbance might have caused the isle to sink,
For Lanz Isle and the Haycocks were nowhere to be seen,
The sun had shifted northward from the point where dawn
had been—

And then a slight vibration, like the rocking of a boat—
He knew at once these signs must mean: Triangle was afloat!
Its narrow point to windward and its broadest end to lee,
It had slid away before the gale and drifted out to sea.
With sailless masts and rudderless, it wandered where it would;
A grotesque ungainly barge,
Roaming on the sea at large,
With a wireless man in charge
Who was spellbound where he stood.

Blunderingly he hastened back, deciding as he went
Not to wake the other fellows till the call for help was sent;
He set the flywheel spinning, and the engine gathered speed,
Then sat to send a message that all the world should heed.
He sent a call out broadcast, and an answer came at length
From Estevan, with signals of but half the normal strength;
He told in hurried phrases of Triangle Island's lapse
From insular solidity to a nautical "perhaps."
Letter followed letter as he jerked the signals free,
Letter followed letter as he pounded on the key,
Sending out to everyone the message of distress:
With a roar and with a crash,
As the disc smoothed out the flash,
By the magic dot and dash
Went forth the S. O. S.

The echo of the final flash had scarcely died away
When the chair slid from the table and the place began to sway
The tuner toppled over and hit the rising floor,
As the operator dodged the stove and scrambled through the
door;

Stumbled on the moving steps and struck the tilting ground,
Seeing in that instant that the waves were close around.
The island was submerging, for ended was its sail
(For gone was all the impetus imparted by the gale);
Higher rose the water till it touched his feet at last,
Higher yet and higher as he grasped the central mast;
Unscalable when vertical, he climbed it now with ease—
A yard or two each time it swung to forty-five degrees.
Impressions were chaotic now—he had not far to go—
The chimney lashing through the waves was all that showed
below.

Then downward plunged the wireless mast, and downward
too, went he,
Down into the clutches of the icy, stifling sea.
The frenzy of complete despair demanded effort yet;
And he fought back with all his might
Till he rose back to the light,
Where all that was in sight
Was cold and very wet.

All nature mocked the human speck that struggled there in vain,
The wave-troughs pulled him down with them, but still he
rose again.

The sun beamed bright to ridicule all lingering trace of hope;
But the "Emperor of Africa" was throwing him a rope.

The island seemed to tremble, and the windows made a din;
Outside the gale was raging, but the fire burned within.
The radiotelegraphist, reclining in his chair,
Was languidly attentive to the signals from the air;
The warmth had made him drowsy, and he noted with surprise
The clock had stolen half an hour before his very eyes!
His log required an entry, and here it seemed to be—
For the "Emperor of Africa" was calling V-A-G.

—Will Burford.



Radio Verse and Reverse

PEACE AND GOOD WILL

By J. F. DILLON

*Like the fog that drifts in from the ocean,
An impenetrable curtain of gray,
So the angry passions encompass the mind,
Obscuring the clear light of day.*

*Gone then is the poise which we boasted,
And all true sense of justice and right,
The abysmal instinct of ages long past,
Has returned like a thief in the night.*

*Shall this demon of malice and hatred have reign
In a soul consecrated to love,
When charity and tolerance of thought and of deed,
Would dispel all the darkness above?*

*If the mind close the bars of its portal to hate,
And conjure thoughts of love and of right,
In His infinite wisdom the Master of all,
Will sanction and aid in the fight.*

*The dear friends we love are precious jewels
most rare,
So let us prove to them worthy each day:
How vacant and dreary our lives here would be
Without them to brighten the way.*

INDEED IT IS!

By "6XAD"

*When at night you're DX sending,
Rhythmic dots and dashes blending—
And some spark breaks in—unending—
Ain't it . . . grand?*

*When you hear that far "2" Station
With such feelings of elation . . .
And a spark roars in . . . damnation!
Ain't it . . . grand?*

*As he opens up—full power—
Keeps on going—hour by hour—
Just discussing some girl's flower—
Ain't it . . . grand?*

*When you hear his squawk go flooey—
"Blow his works, migosh! Oh blooey!"
Doesn't that your life re-new-y—
And: AIN'T IT GRAND?*

MUSIC IN THE AIR

By P. FENNEL

*Are you very fond of music as it's sung—
Do you revel in the touching tenor tongue,
Would your inner soul delight
In a Bach or Wagner night
If you didn't tuck your torso in a suit that's far
too tight?
Maybe you profanely holler
When you don your evening collar
That the bore of formal clothing sends your
pleasure out of sight.
And perhaps you tell your consort
When the taxi driver calls
That you'd fain attend the concert
In your khaki overalls.*

*If you're really strong for comfort and for ease
You'll enjoy the lines that follow after these,
For they'll tell you—and it's true—
What your radio will do*

*When you want to hear some music without
getting black and blue
From a fight with starched linen,
Causing cussing, which is sinnin'*

*Well, the trick is very easy. It's available to
you.
Simply string denuded copper
From your chimney to a tree
And your wireless is ready,
Music, absolutely free.*

*If for Sunday church you find you're rather late,
Tune your wireless up for services and wait.
You will hear the hymn and prayer
And the choir on the stair;
And in time the morning sermon will inspire
via air.*

*Then you'll hear metallic trickles
As the deacons gather nickels,
But you really can't contribute if you really
are not there.*

*You can share a thousand wonders
Or enjoy these all alone
When your house includes the presence
Of a wireless telephone.*



Things That Never Happened!

Codfish for Christmas

By Volney G. Mathison.

OLD JUDGE DRIFFIN, sometimes disrespectfully referred to by Samuel Jones as Dopey, was badly rattled. Beads of sweat were springing out on his face and his hand shook nervously on the key as he asked N-P-R for a third repetition of a message he had been vainly trying to copy for the past half-hour.

Biting his signals off angrily, the gob at N-P-R bounced through the telegram again. The navy man's snappy sending flustered Old Judge more than ever. His fourth copy of the message looked about like this:

"Nrl ck-n—SagFranc—Nog—Jotees Cal Alaskp Codfish Cogtany, Unga, Alaska: Driffin has asced for posuion as radio oanerator w K-V-I mhr you legee gxt gmthifn yough judqent he is atslc opelate qhe afflavit tothw effertrt and radio fspetrtr pill mrpt him a anrovisulaanerzt if hrot ascanble hold job immfsteainy adtsseand we will send twou a relig on scsoneae ppgasseak sliling in thri days. ...Anspr. A. C. Co."

With a short, terrified gasp, Old Judge clutched at the key and stuttered out still another woeful Q-T-A.

"Hey, holy criminy, whassamatter!" howled the enraged gob at N-P-R. "Who in h—I ever told you you could operate, anyway! You ought'a be in a wireless kindergarten copyin' rat-cat-dog four words an hour off'n an omnigraph! For th' love of mud, get that operator an' lemme get clear before I go bugs an' jump off'n th' bluff into th' Bering Sea!"

"Shucks, that won't do, Dopey," disgustedly declared Samuel Jones, who had been listening in all the time on an extra pair of phones cut into the circuit. "In about a week you'd have that poor gob goin' out an' hangin' hisself on his wireless pole—gimme th' key."

His face red with shame and mortification, Old Judge gave up his chair.

"Sorry, O-M," flashed the clear, smoothly-sent signals from the steady hand of the veteran brasspounder; "I'm pullin' out'a here next month, an' was tryin' Dopey out to see if he could hold down th' job—guess he won't pass muster, though. Slip me that blue."

The gob came back on the air, spluttering angrily.

"Well, all I gotta say is don't you ever spring him on me again if ya don't want me to send you a box of dynamite fer Christmas!" he barked. "Ain't it bad enough to be stuck out here in th' middle of th' ocean on a sliver 'a ice-covered rock along with a gang of home-brewin' lunatics, without sendin' all day to a confounded old codfish who couldn't read three words a week if ya sent him a copy of th' message by mail first! Here's that blue—copy:

Nr 1 ck 58 nl San Francisco, Nov. 15. Jones, care Alaskan Codfish Company, Unga, Alaska: Driffin has asked for position as radio operator at K-V-I when you leave. If in your judgment he is able operate, make affidavit to that effect and radio inspector will grant him a provisional permit. If he not capable hold job, immediately advise and we will send you a relief on schooner 'Anangashak' sailing three days. Answer. A. C. Co."

Samuel Jones gave the navy operator an O. K. and told him to stand by.

"I'm goin' to tell 'em to send up a man," he said bluntly, showing the message to Old Judge.

The look on Old Judge's face was tragic.

"I—I—couldn't I have another chance, Sam," he pleaded. "Knowin' it was a test made me rattled; an' seein' th' message was somethin' about my application for this job made me more flustered than ever—"

"No, you might as well forget about tryin' to run this station," sharply interrupted Samuel Jones. "You ought to've had enough, after th' mess you've made of the schedule this afternoon—I guess I was a fool ever to encourage you in thinkin' you could handle K-V-I. Go an' play with your ham set—you seem to do better with it than you do here."

Drawing a pad of sending-blanks toward him, Samuel Jones wrote out a message.

Old Judge made as if to speak again, but then the spark crashed out with its heavy roar and a telegram was started on its circuitous road to San Francisco. Old Judge easily read the younger man's strong, steady sending. The preamble went by unnoticed, but the concise text cut him to the heart:

Driffin incompetent send man on schooner.

As Samuel Jones sat waiting for an acknowledgement from N-P-R, Old Judge stepped softly to the door and stole out of the station.

Across the tops of the white-crested seas that were sweeping into the bay came a wily-wawing southeasterly squall, which swirled fiercely along the granite cliffs where the wireless shack snuggled, and pelted Old Judge with a blinding flurry of soggy, wet snow that made him sink his head still lower in his mackinaw as he stumbled disheartenedly along the narrow trail which led up through the village.

His failure to get that wireless job was a bitter disappointment to Old Judge. It left him completely in the lurch. As federal commissioner, Old Judge drew no salary. He received a meager fee of eight dollars each time he held court, which since the advent of prohibition and an extremely easy-going marshal, he

did not have occasion to do hardly oftener than once a month. He was also the village postmaster; and the revenue he derived from this, along with a few straggling dollars gleaned from performing sundry Siwash weddings and by acting as administrator when some fishermen's row ended with Colts and tombstones, served to keep the wolf from the old fellow's door—but only by a scant margin. Indeed, his mode of living was little better than hand to mouth.

In justice to Samuel Jones, it is necessary to state that he knew nothing whatever about Old Judge's financial affairs, and imagined him wanting to get K-V-I merely from a childish desire to have a larger wireless set with which to amuse himself.

Reaching his dwelling, which stands on a knoll in the middle of the village of Unga, hardly a thousand feet from the wireless station, Old Judge mechanically brushed the snow off his worn mackinaw and twice-half-soled shoes, and went slowly in.

Lying on his table, waiting to be opened were four big packages, all marked in flaming red letters: "Wireless apparatus—don't crush." They had arrived that very morning in a bunch of mail dropped by a passing steamer.

STANDING there disconsolately, contemplating the four packages, Old Judge's thoughts wandered back to the happy period not long past when he had first become a wireless amateur.

His amateur set, which had come to him through his friend Hell-fire, the builder of K-V-I, consisted of a two-inch spark-coil, a small loose-coupler, audion detector, and a few essential auxiliaries. The coil and the audion were operated on a storage battery, which was charged by means of a small power-line strung along the village housetops over to the codfish company's station. Outside his dwelling, two neatly-guyed eighty-foot poles supported his aerial, a good-looking antenna in every respect, though it paled into insignificance below the towering masts of K-V-I only a few hundred feet away.

For several months Old Judge had been supremely content with his little set. He established friendly relations with the operators of the Alaskan steamers that occasionally went by the isolated Shumagin Islands, and with the lapse of time every brasspounder on that run had come to know and look for the old fellow's fuzzy spark-coil note.

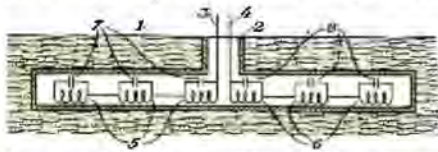
But eventually Old Judge became a
(Continued on Page 222)

Digest of Recent Radio Patents

Prepared by White, Prost & Evans, Patent Attorneys, San Francisco, who have been particularly active in the radio field for many years, and from whom may be obtained further information regarding any of the patents listed below.

Earl C. Hanson, No. 1,388,336—August 23, 1921.—Underground and Submarine Antenna.

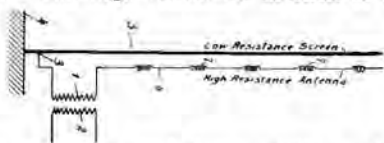
An antenna is described adapted to be placed underground, so arranged as not to be responsive to strays. This is effected by forming the antenna in spirals to



increase its self-induction. Thus strays, being highly damped, find difficulty in passing through, but sustained oscillations can get through. To enhance the effect, sections of the coils may be bridged by condensers which are properly tuned relatively to the shunted coils so as to produce the right effect.

Pupin & Armstrong, No. 1,388,441—August 23, 1921.—Multiple Antenna for Electrical Wave Transmission.

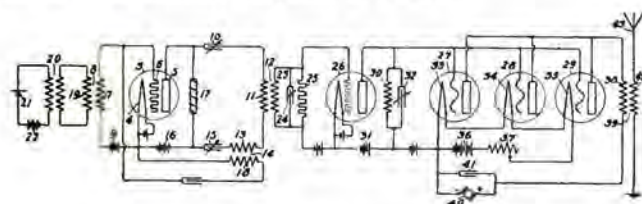
A low resistance, low inductance, antenna is inductively coupled loosely to a high resistance, high inductance antenna. The high resistance antenna is the



one actually used for receiving and is tuned to the oscillations to be received; the other being used merely to screen impulses of short duration. Such short impulses are dissipated in the low resistance antenna by oscillations which have a very high period, equal to that of the natural period of this antenna. Since the coupling is loose between the two antennas, these oscillations have little effect upon the high resistance antenna.

Colpitts & Arnold, No. 1,388,450—August 23, 1921.—Transmission of Intelligence.

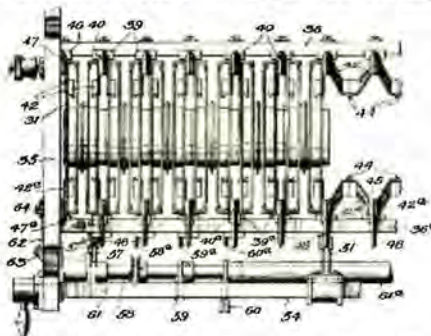
This patent described a scheme for sending high frequency modulated waves of high power. The modulations are produced by an ordinary telephone transmit-



ter 21 which modulates waves of radio frequency of amplitude comparable with that of the modulations. The modulated waves are then amplified and caused to radiate energy from the antenna 43. The low amplitude carrier waves are generated in an oscillating audion tube 3, the input circuit of which is coupled to the transmitter circuit. The output circuit of the oscillating tube is amplified by tube 26, and then by tubes 27, 28 and 29 in multiple. For powerful sending, hundreds of such tubes as 27, 28 and 29, are connected in multiple.

F. Lowenstein, No. 1,388,834—August 23, 1921.—Spark Gap Apparatus.

A quenched spark gap is described, so arranged that any number of individual spark gap units up to a limit may be independently inserted between spring contacts to form an apparatus of any



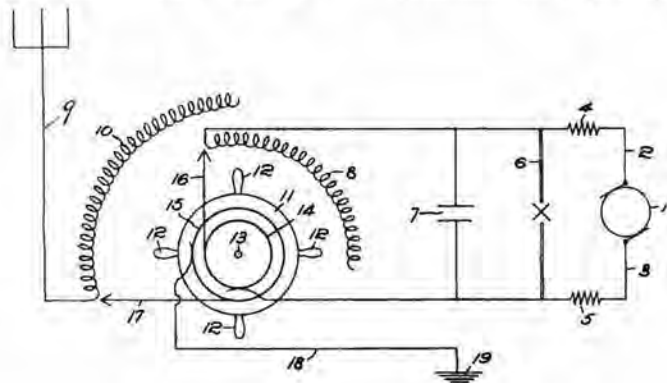
required number of gaps in series. The spring contacts 42 are so arranged that they automatically complete the circuit upon removal of any gap unit, as for repairs. The gap units have chimney-like flanges 31 of metal which serves the double purpose of providing a metallic contact to the springs 42 and of conducting the heat away from the spark gap. Switches are also provided for short circuiting any member of the gaps without necessitating their removal, and at least

one of these switches is so arranged that the number of gaps may be varied in steps of one so that accurate adjustment may be obtained.

J. H. Hammond Jr., No. 1,390,288—September 13, 1921.—System for Controlling Moving Bodies By Radio Energy.

A scheme is described by means of which a moving body, such as a torpedo, may be steered by radio. The body carries an antenna system 20, 21, 22, 23, and 24, and has a plurality of receiver circuits 25 and 26. These circuits are tuned to different wave lengths, so that by radiating energy of the proper wave length from a distant point, it is possible to select which one of the two circuits may be rendered active. The device is so arranged that if circuit 25 is active, the body is caused to turn say to the right, while if circuit 26 is active, the body is caused to turn to the left. This result is accomplished by rapidly rotating switches 27 and 28, of which 27 is arranged to connect the circuits 25 and 26 alternately to the input circuit of a detector 35, 36, 39 and switch 28 is arranged simultaneously to connect the output circuit of the detector to relays 42, 43, so that when circuit 25 is connected to the detector, the relay 42 is also connected thereto; and on the contrary, when circuit 26 is connected then relay 43 is also connected. The movement of the switches is so rapid that the scheme is practically the equivalent of two separate detectors, each associated with one of the receiver circuits 25 or 26. Upon transmission of waves which renders say circuit 25 active, the relay 42 is energized, and this causes actuation of an electric valve 52 in the fluid cylinder 49, the piston of which is acted upon by fluid under pressure in tank 55 to move the rudder actuating bar 50.

(Continued on Page 253)



Monthly Broadcast of Radio Newslets

R. R. Beal, chief engineer, Federal Telegraph Company, is in the Orient. Haraden Pratt is acting chief engineer during Mr. Beal's absence.

D. C. Marsh, until recently in charge of the Federal Telegraph Company's Washington, D. C., office and having the title of resident engineer, has been transferred to the Pacific Coast, where he will be attached to the engineering staff of the company in connection with marine and other radio duties.

W. E. Lufkin, formerly sergeant in the signal corps and past president of the San Francisco Radio Club, has been appointed assistant radio inspector for the sixth district. Because of his sympathetic understanding of the radio situation throughout the sixth district Sergeant Lufkin is well equipped for his new duties in which a host of friends join in wishing him all success.

The Federal Telegraph Company exhibited for one week in the rooms of the San Francisco Chamber of Commerce the Kolster radio compass and position finder. This equipment will shortly be installed on shipboard for the purpose of giving practical demonstrations at sea, after the conclusion of which, this development will be placed on the market for sale.

The official opening of the Radio Central station, New York, owned and operated by the Radio Corporation of America, was inaugurated November 5 by the transmission of a message from the President at the White House in Washington and its simultaneous reception at every radio station in the world.

The Olympia Radio Club has elected officers for the ensuing half-year term as follows: Edwin Wilson, 7ZP, president; E. O. Robbins, 7BZ, secretary-treasurer. J. Grant Hinkle was elected an honorary member by acclamation. Regular meetings will be held on the first and third Wednesday evening of each month.

St. John's Radio Club has been organized at Berkeley, Calif., with a charter membership of forty boys. Frank McCullough is president and chief operator. Gilbert Earle, vice president; Charles Clark, secretary-treasurer and John Pedder, sergeant-at-arms. Meetings are held each Friday evening at 2640 College avenue, Berkeley, for code practice and arrangements have been made for monthly addresses on radio matters by a number of prominent radio men.

Complete success attending wireless transmission of handwriting now marks

the most advanced step in utilization of radio activity. Messages from General Pershing and Premier Briand, sent from the Belin laboratories in Paris, have been received and recorded in the handwriting of the senders at the United States naval radio station near Bar Harbor, Me. Practical use of the new invention is assured. Credit for its perfection largely is due Professor Edouard Belin, whose scientific research for many years has distinguished him as one of the foremost thinkers of the age.

The point to point radio stations recently completed by the Federal Telegraph Company at Portland and San Francisco were placed in commercial operation September 1. Three full duplex radio channels are now operated between these points. The company's Los Angeles station now under construction will be placed in operation about the first of the year. This station is also for point to point service, and when placed in commercial operation, will communicate with San Francisco, Portland and Seattle, operating three arc transmitters simultaneously.

Complete radiophone reports of the football game wherein the Oregon Agricultural College defeated the University of Washington at Corvallis were given students at Seattle. The Seattle Post-Intelligencer had a special telegraph wire between the football field at Corvallis and its radio broadcasting room at Seattle in charge of R. W. Bell. The Northern Radio and Electric Company installed a receiving set at the university in charge of H. S. Tenny. The telegraph reports from Corvallis were typewritten and then read into the transmitting radiophone by Mr. Bell.

G. E. Robinson, formerly 6AIH and now KOZR, reports hearing the Fairmont Hotel, San Francisco, radiophone, operated by Leo J. Meyberg, 800 miles north of Seattle on board M. S. Culbarra. Two stages of amplification were used. He also clearly heard the Hotel Oakland phone, Oakland, Calif., operated by P. D. Allen, 6XW, operated by Sergeant Travers at the Presidio, and 6XAC, operated by Colin B. Kennedy Co. at Los Altos, Calif. 6XG is the best all 'round, 6XW runs a close second, 6XAC is louder than either, but the modulation is no where near as good. 6XAJ I got good one night.

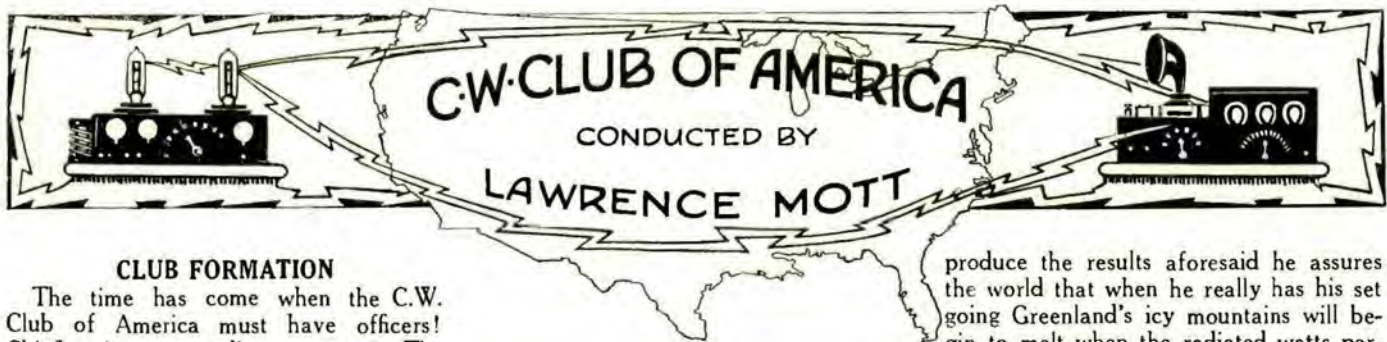
The amalgamation of all the clubs of the Pacific Northwest is well under way at present, although the name of the organization has not been decided on as yet. It has certainly been a hard job and

a slow one, too, since it was first proposed by the Radio Club of Tacoma, at their annual banquet in March, 1920. The constitution is being threshed out among the clubs now. The purpose of the amalgamation is to bring closer together the various clubs and to make better working conditions. The job will be finished in a few weeks now and radio will found with a new, fresh and snappy organization.

The Beach San Francisco radio station operated by the Federal Telegraph Company, call letters "KFS," maintains a continuous watch on 2400 meters CW and 600 meters spark and operates transmitters on both wave-lengths in communicating with ships at sea. This station is operated exclusively for ship to shore communication and is successful in maintaining a regular and reliable service with Federal arc equipped vessels, both Shipping Board and privately owned, up to distances of 5000 miles. Pacific Mail steamers now running between San Francisco and Baltimore are in direct touch with the Beach station from the time they leave San Francisco until they return.

Research work in transmitting wireless telephone impulses without antenna, has been undertaken by Sergeant R. C. Tavers of the United States Signal Corps radio school at the Presidio with the result that music and speech has been transmitted several hundred miles, clearly and audibly, without outside wires. Sergeant Tavers, in his tests, used small squares of copper netting suspended edge-down in his operating room. Using one as an aerial and the other as a capacity ground he was able on Sunday night, October 30, to transmit music to Bakersfield, Sacramento, Eureka and a considerable distance out to sea. The netting was used experimentally and worked beyond expectations.

A new record was received in wireless circles November 4 when 400 members of the California Alpine Club, at their annual outing and camp craft show in Rattlesnake Canyon on the slopes of Mount Tamalpais, danced to wireless concert music played from the Fairmont Hotel, the Presidio and Los Altos, California. The "tapping" of distant hotel orchestra and record music by radio was accomplished by means of a wire thrown into a tree. This, in conjunction with a four-step amplifier unit, enabled the hikers to receive their entertainment high up on the mystery mountain as loudly as though in a ballroom. The concert continued for several hours, each of the named stations contributing a special program for the event.



CLUB FORMATION

The time has come when the C.W. Club of America must have officers! Chiefly: A corresponding secretary! The associate editor of Radio has been enabled, thanks to the kindness of many radio friends, and C.W. enthusiasts, to start the interest in a club direction, and it is moving along nicely, with many applicants for membership, and a growing interest being shown from many quarters.

It is with regret that the associate editor cannot "stay with the job," but a variety of other important matters—chiefly having to do with a typewriter!—do not permit of his giving the time that is necessary to the answering of the hosts of inquiries, etc., that pour in on his defenseless head! He has done his best to "weather the gale" of paper, and to satisfy all inquirers! Think not too harshly of him.

It is therefore suggested that all C.W. men write to the editor—N. B.: NOT the associate editor!—and to him state their candidates for president and secretary. There being no dues involved, a secretary-treasurer is not needed.

The associate editor stands ready, at any time, to offer such advice as may be asked of him, but he very earnestly begs to be relieved of the responsibilities of the future directing of the C.W. Club of America, as it is growing beyond the time that he can give to it!

R. P. MacKenzie, 1016 Fourth avenue, Los Angeles, Calif., is Radio 6ALV and not 6ADU as previously reported.

The requests to join the C.W. Club of America are so numerous and insistent that I am compelled to arrange a new schedule—that will appear in the January issue. This will divide the week into three sets of nights—two each—and in this way I hope to accommodate all C.W. enthusiasts. It is the only way out of the present dilemma, as by adding more working times to the present schedule, the last men, each night, are working into the next day!

LAWRENCE MOTT.

The Pacific Coast record for C.W. transmission is about to be announced. The C.W. Club of America will award the leather medal with the wooden string to the winner in the near future. The lucky station is 6IZ of San Diego County, which has received cards from 9BP and 9AJA residing at Evanston, and Chicago, Ill., respectively. Both 9BP and 9AJA report C.W. signals from station 6IZ calling 8FQ on October 1, 1921. A representative of RADIO when interviewing 6IZ was assured that these results were as nothing compared with what will follow in the near future. 6IZ has been thinking about getting a C.W. set assembled and if the mere thoughts of getting one

produce the results aforesaid he assures the world that when he really has his set going Greenland's icy mountains will begin to melt when the radiated watts percolate. In the meantime 6IZ would like to know the brand of hooch responsible for the keen reception away back there in Illinois. He wants to know if the hookup is degenerative or whether they are using oscillating carborundums.

C. D. CLUB NEWSLETS

6ZB having completed the 20-watt panel set, is now busy with C.W. on 200 and 375, and gives regular concerts by phone Sunday and Thursday nights, 7-8 p. m. on 200 meters. The circuit used is a modified Hartley with Heissing modulation. For fone one oscillator and one modulator, are used, each 5 watts, and from one to four tubes in parallel for C.W. A.C. and electrolytic rectifiers are used for plate and filament. The spark set is used when needed for calling.

6AQA AT HOME

No, this set is not on shipboard, as you might suppose from the scenery with its cleverly camouflaged port-hole, but is situated in "The Palms" apartment at 421 West Adams Street, Los Angeles, Calif., where George C. Tichenor nightly hears stations in the seventh, fifth and ninth districts.

The receiver and two-step amplifier are of Mr. Tichenor's own design, but were built to specifications by the Western Radio Electric Co. This set is regenerative from 150 to 25,000 meters,—using a CR-5 circuit up to 600 and honeycomb coils for greater wave lengths. The detector is changed to either circuit by two anti-capacity switches. A "window" in the panel allows for easy access to the tube. As the picture shows, there are meters on each tube.

The key and antenna change-over switch are both mounted on a bakelite base. The main leads are half inch copper tubing, which is efficient, and also helps to give the set a commercial appearance.

The C.W. transmitter is of 10 watts output and allows the use of voice or buzzer modulation or straight C.W. The spark set consists of a home made transformer, Dubelier mica condenser, Wesrad O.T. and an Amrad quenched gap with fan as blower. The set is mounted on a half inch bakelite panel.



6AQA at Los Angeles, Calif.

DX-CW LISTENING CONTEST

In order to encourage tuning and listening for Continuous Wave signals, the Associate Editor will donate, each month, to the operator who correctly reports having heard him, from the greatest distance, ten dollars' worth of radio apparatus, said apparatus to be purchased from firms whose advertisements appear in the pages of RADIO. There are but two conditions to the attaining of the prize: 1. That the receiving operator give details of his receiving apparatus, and 2, that he quote from the QST that he hears.

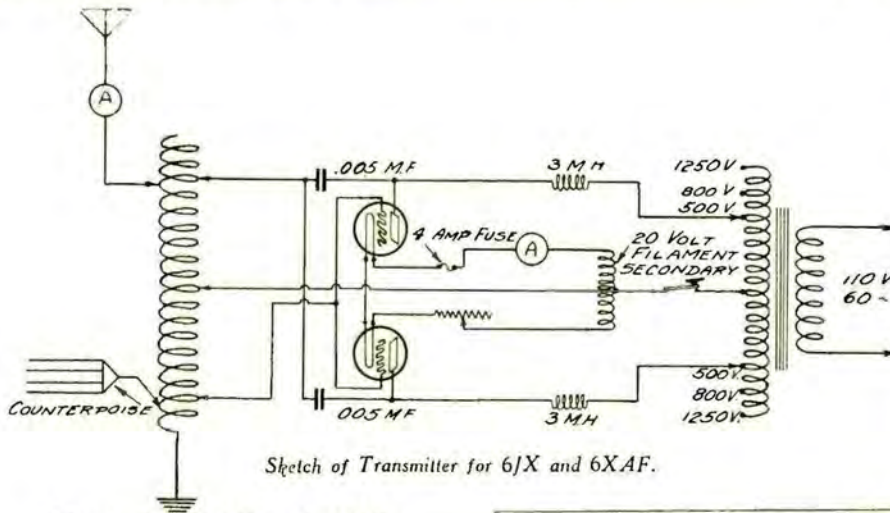
U. S. Deputy Game Warden Lawrence Mott's station is 6XAD, situate at Avalon, Catalina Island, California—thirty miles distant from the mainland, with Los Angeles as the nearest large city.

Mr. Mott will QST each night, beginning December 1, at the following hours, and on these wave lengths:

- 10 P. M.-10:10 P. M.—375 metres, C.W.
- 10:10 P. M.-10:20 P. M.—200 metres, I.C.W.
- 12 M.-12:10 A. M.—375 metres, C.W.
- 12:10 A. M.-12:20 A. M.—200 metres, I.C.W.

All reports received prior to the 8th of each month will be published in the next-following issue of RADIO, together with a description of the prize winning station. Photographs of contestant's stations will be published, if clear details are shown.

From 12:20 A. M. to 12:30 A. M. Mr. Mott will listen especially for DX signals, and will report these in RADIO.



Description of 6JX and 6XAF

Transmitting—Two 50 watt power tubes, with 500, 800 or 1250 volts 60 cycle a. c. on plates. Filaments operated on a. c. also. Hartley oscillating circuit used. Radiation varies from 1.8 amps on 500 volts plate to 4.1 amps on 1250 volts plate.

The details of transmitter are shown in accompanying sketch. Two different antenna inductances, one of 10 turns for 200 meters, and other of 30 turns for 375 and 450 meters, latter used when experimenting. Inductances are all Dubilier 4000 volt. All connections made with 385 strand Litz. All this apparatus will be permanently wired into a panel outfit as soon as a 300 watt Kenotron rectifying set is completed. Will then be able to use set for either telegraph as at present, or for telephone work.

A Kolster Type D. Decremeter is used to keep an accurate check on the wave length.

Receiving—A short wave regenerative receiver, not shown in the illustrations, is

occasionally used, but prefer flat wound Litz coil in honeycomb coil mounting, on regular receiving set, on account of flexibility. Receiver consists of detector and three stage amplifier, employing Western Electric tubes throughout, on 130 volts plate, and was entirely constructed by self. Detector uses well known Armstrong circuit, but amplifiers are of special design, to work with a Western Electric loud speaker. The set, which weighs 60 pounds, is considerably heavier than the average amateur amplifier, on account of the large number of choke coils, transformers and condensers necessary to produce distortionless transmission of music through three stages of amplification. Antenna consists of 8 wires of 7-18 phosphor bronze in form of inverted L, the mainmast being 55 feet high. The counterpoise is composed of 12 No. 10 B. & S. insulated wires, 8 feet above the ground and directly below the antenna. The antenna has a natural period of 165 meters and a capacity of .00058 m. f. Power input of a. c. transformer on transmitting set is 5 watts no load, 80 watts with both filaments running, and 410 watts with 1250 volts on plates and set radiating.

About distance worked, have received cards from five states, with reports of signals heard QSA. To date have not done much DX work on account of experimental work in progress, but expect to be on considerably this winter.

NEW MEMBERS C. W. CLUB OF AMERICA

Hugh Compton, 6AUB, 3369 28th street, San Diego, Calif.; Chas. W. Holdiman, 510 South Sixth street, San Jose, Calif.; Paul Socolovsky, 4BY, Loreburn, Sask., Canada.



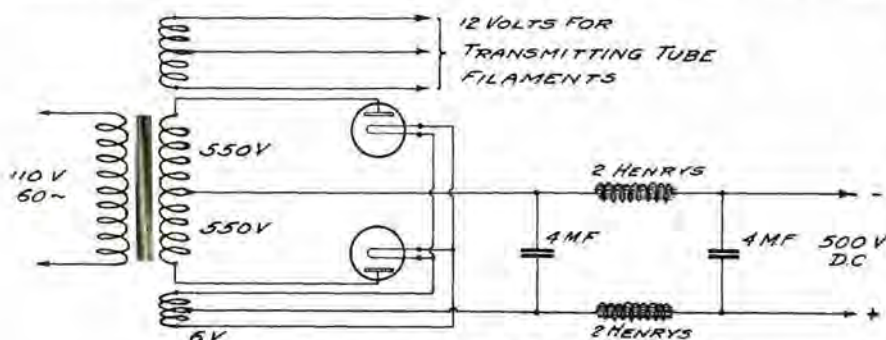
Gerald M. Best, 6JX and 6XAF, Who Answers Queries and Replies on C. W. Practice. (See Next Page.)

Queries and Replies on Continuous Wave Practice

This new department of questions and answers on continuous wave practice is conducted by Gerald M. Best, of the Engineering Staff of the Pacific Telephone and Telegraph Company. Because of his electrical studies at Cornell University, his radio service in France during the World War and his specializing work with the telephone company, Mr. Best is peculiarly well qualified to answer any question that may be submitted. Our readers are invited to send in their problems for solution.—The Editor.

Question: I want to build a C. W. set similar to the one used at 6XB but prefer a circuit using a step-up transformer and a. c. with a third tap for filaments.—D. C. S.

Answer: Since you have the circuit diagram of the transmitter at the Fairmont Hotel, 6XB, it will not be necessary to indicate it here. The circuit shown herewith is for rectifying 60 cycle 110 v.

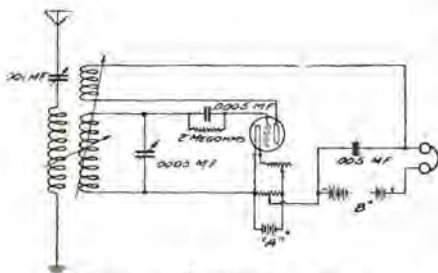


Circuit for Rectifying 60 Cycle 110 V. A. C. Into 500 Volt D. C.

a. c. into 500 volt d. c. and is complete up to the point where connection is made to the transmitting set.

Question: My big problem is how to hook up a set of Turney Spider Web Inductances consisting of two movable coils and a fixed coil, enclosed in a cabinet.—R. H.

Answer: There are a variety of circuits which can be used with this set of inductances, and perhaps the simplest would be the well known Armstrong regenerative circuit, which is shown herewith.



Armstrong Regenerative Circuit.

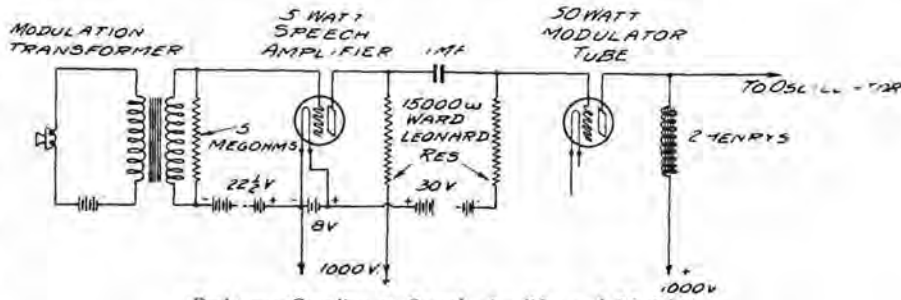
Use the center coil for the secondary, and the two movable coils for the primary and tickler, respectively. Should the vacuum tube fail to oscillate, try re-

versing the tickler leads, as you may have the secondary and tickler coils inductively opposed.

Question: I have a honeycomb coil receiving set for long waves. Why can I still hear faint signals when I remove the primary inductance from the circuit?—C. W.

Answer: You are probably picking up enough forced oscillations from a nearby

high power transmitter to operate your detector tube. However, if you are not



Resistance Coupling of Speech Amplifier and Modulation.

near a transmitting station, it may be due to leakage in your condensers, wiring and coil mounting, or to induction between the primary and secondary air condensers.

Question: Please publish the winding data for a transformer to connect a Radiotron 5 watt transmitting tube, used as a speech amplifier, to a Radiotron 50 watt power tube used as a modulator, in a 50 watt radiophone set.—A. H.

Answer: While a transformer that will answer the purpose can be constructed, a much simpler way would be to use a resistance coupling such as is shown in the following sketch.

LONG BEACH RADIO RESEARCH ASSOCIATION

The Long Beach Radio Research Association was organized in June, 1921, and is making real progress toward establishing a big radio station. The club is not a part of or has any connection with any club previously organized under a similar name as this is the only one besides the one in the high school.

The club house is being built now on the Earl Daugherty aviation field and will be used to some extent in connection with airplane communication in the vicinity, as there is a great deal of aviation on the Pacific Coast. Two eucalyptus poles about 70 feet high have been hauled to the grounds and are being placed in position. The station will have a 1 kw. spark set and a phone set of 20 to 50 watts power. It is expected that long distance communication will be a regular occurrence. The set will bark on 375 meters wave length.

A tour of inspection has been planned to include some of the larger stations in the vicinity so that members will have a

chance to see what is being done in the commercial and government way. This tour will include the large 30 kw. arc station under construction near Hynes; the radio plants aboard the warships at anchor in the harbor; the compass station in San Pedro, and the one at the Submarine Base.

Full information concerning the club and its activities may be obtained from Robert Portis, 2500 Elm avenue, Long Beach, Calif. The officers of the club are: Robert Portis, president; J. Cutting, and G. Shoeman, secretary; Will Kersting, treasurer, and Ralph Haynes, chairman of publicity.

Static Statistics from Everywhere

By Squawk McGuff

Rah! Rah! Rah!
Biff! Boom! Bah!

SEATTLE.

And now, my friends, I wish to announce that last, but not least, we have heard from the Totem City by the Puget Sound. They are vindictive souls—these Chinook warriors—and they wish it known to the pop-eyed world that they are alive and that when Tacoma and Portland take such cracks at their equipoise they have stirred up a community where the bald-headed eagles roost on the cuckoo clocks and the canary birds sing bass and the jack rabbits spit in the bull dog's eye. In other words, they are so tough that they scratch the enamel on the bath tub.

If you don't believe me, folks, just read the following letter and weep:

October 19, 1921.

Squawk McGuff,
Dear Sir:—

After digesting your page of this month's P. R. N. (future Radio) the Totem Radio Club has decided that Seattle was being left out of publicity really due her, but it is our own fault. We have not been asleep as you might think—as organizing 100 live, energetic members into a compact club is no joke.

But the look on that page of yours was enough to wake a dead fuse or a shot "B" battery. The only thing we saw about Seattle was: Tacoma says to Seattle, "Why all the high power for short distance work?" And in answer to that statement I might say that Seattle has some spark sets. You know it's pretty hard to get below 100 watts on a rotary, and, of course, that explains why Tacoma puts up a kick against Seattle; we ought to work on less wattage.

Seattle boasts over eight radio phones in operation, and quite a few "phones" coming up. One "phone," the P. I. radio-phone working on 1.3 amps., issues news bulletins from 9 to 9:30 p. m., along with the latest music. The P. I. phone is operated by the Northern Radio Company of Seattle. Another phone, 7XC, of the Northwestern Radio Company, gives concerts every night from 8 to 8:30, showing that Seattle hasn't been asleep.

The spark sets need not be mentioned, they speak for themselves.

As regards the Club: H. Mason, president; H. L. Jones, vice president; T. J. Bidner, secretary; E. R. Rebman, treasurer; S. G. Hagen, publicity agent.

If any more news is wanted of our Club, please write at the earliest possible moment and let me know when write-ups are to be in, Club news, etc. I am enclosing one of the write-ups in the Seattle

Times of Oct. 18, about the Totem Radio Club.

Yours very truly,
Sheldon Hagen, 7ON.

You tellum Seattle. We admire you fellows up there. Let's hear more about you please, and believe me, we will reserve the proper space on this little old page of fun (and otherwise) so that they may know from coast to coast, and then some, that the Totem Radio Club is actually a functioning organization. "73," MERRY XMAS.

LOS ANGELES

After the raise was over,

After the "feed" was done,
Brothers scraped mud off the wet walks,
As though it were excellent fun!

In course of time guy wires rust and become unsafe to those around the pole; therefore, 6EA and 6EB invited friends to assist in lowering the top section of a pole, it being 2x3 in size and 30 feet in length, to replace the rusty wires.

The day arrived, and also considerable rain, at times. 6ABG failed to come and afterwards, sent word by radio that he had a "cold"—and it was rather cold to get out of bed at that time, hi! But Mr. Foxley, chief op. at Edison Power Plant, and radio enthusiast, faithfully prepared to do or die; 6OL, also, as natty as one could wish; and 6KI, the good old stand-by, who helped put that pole up in 1812, was on hand as smiling as ever.

After consultation, they decided to go ahead. 6KI was highest on the pole and removed the bolts; 6EA was next below to receive and steady the pole and it was lowered without mishap for the new guys. It rained some more and when it was raised—say, fellows, you should have seen those on the adobe ground of a side hill, holding the guys—the neighbors thought they were practicing a new kind of sliding dance and were betting which could go furthest without coming down on all fours; but at last, it was over and they went into a warm room and a good, filling "feed," to talk for an hour or so, before separating.

The "Meteor Electric" went the limit for speed on Flower street and then disappeared in the "Pacific Radio," as to name, at 1108 W. Second street, but where it will be more luminous than ever. Already, the "Advance Electric" and "The Wireless Shop," were in the next block west and soon this may be known as Radio street, and when the tunnel is opened, a new crop of millionaires will likely spring up, like mushrooms, in the night. MERRY XMAS.

TACOMA

We notice an alarm clock in 7BA'S station which solves the mystery of why he starts calling DX stations at regular 3-minute intervals, who have not been on for the evening. It's a good thing that 7BA was not at the Chi banquet or Bessy would have been minus a "hot" drink. 7BA uses that stuff to oil his transmitter.

7BL is changing his location.

The Seattle P.-I. fone is very QSA, but someone had ought to donate him some new up-to-date records, also wish that they would give out news of the present day instead of a week old.

Tacoma noticed with much hilarity in the last RADIO the little note of exception Tacoma is given in the Portland traffic laws. We would like to ask our old friend Squawk if he is sure he did not misprint in one little place there. Instead of Tacoma being a "suburb" of Portland (being nearly 200 miles away) we thought maybe it should read, "Tacoma is the 'superb' of Portland."

I was down on a destroyer the other day chewing the fat with some of the ops. We were listening in to the various stations around 975 or 1000 meters when a noise somewhat similar to someone running their finger nails over a table top caused us to jerk off our fones in double quick time. I finally managed to explain to the excited ops that it was nothing wrong with old man either but was simply our old friend 7KM testing out his compressed victrola-record quench gap. I told the fellows all about Otto and his experiments and let me tell you, fellows, that even though we hear of Ott doing what is in our estimation "funny things," he is the boy that can work Portland, San Francisco or any of the eastern stations when we "wise birds" have to give up in despair. We visited Otto later on and managed to get a few snaps of his station. Things may be a little scattered around but there is a complete radio station before you and one of the best LD stations in the northwest.

Some of the brothers-in-swat claim I am getting worse but read the following I received from an anonymous source through the mails. It's a breach of etiquette to print anything that comes unsigned but this bird is so good here it is:

My Dear Squawk McGuff,
You arn't half crazy enuff
So I'm sending in sum stuff,
Hope it don't make u tuff.

BUCK SEZ:

The Raccoon runs the main line,
The Possum pulls the switch,
The Rabbit says, "Q R X, my friends,
My key hand has the itch."

Another long-standing record broken—Peterson dropped: "Rosie."

C. U. AGN NEXT MONTH.



With THE U-S-Radio Inspector

CONDUCTED BY MAJOR J.F. DILLON



A MONTHLY DEPARTMENT OF INFORMATION FOR OUR READERS

INSTRUCTIONS FOR CALLING

A number of cases have come to the attention of this office, in which it was very evident that amateur radio operators are either too lazy, or too careless to study the laws and regulations regarding calling, when using spark transmitters. The law requires that in calling the signal "KA" shall be made, once, the call of the station called three times, the letters "DE", once, followed by the call letters of the station calling three times. Nothing else, no finish, or other signal. In answering, the above procedure is followed, except that the station answering signs only ONCE, and gives the signal "K," meaning "go ahead."

I recently heard one amateur make the KA signal three times, the calls of the station he was calling three times, sign DE once (strange to say) and sign off his own call about five or six times, and then a series of strange noises followed, which sounded like the noises made by a loose wire, and the same foolishness was again repeated. All this for one call. If stations are near together, and there is very little doubt as to the called station's reception, it is permissible to call and sign off once, but a series of actions like those outlined above show either a careless disregard for the law, or an ignorant, green operator at the key—usually both. Brevity is essential in the transmission of radio signals today, in order there be as little interference as possible.

Radio telephone stations are quite at a loss to know how to call by voice, as it is obviously impossible to make the preliminary call signal, and all the conventional characters when calling. Until further and more definite instructions are issued, the following form is suggested for radio telephones. Assume Station 6XXX and 6YYY are to work, and that 6XXX wants to raise 6YYY, the conversation would be about as follows:

Call: "Hello 6YYY, hello 6YYY, hello 6YYY, 6XXX calling, 6XXX calling, 6XXX calling." (Station 6XXX only working.)

Answer: "Hello 6XXX, hello 6XXX, Hello 6XXX, 6YYY answering, all right, go ahead."

Business now to be transacted, each station giving his call letters, and the call letters of the station he is working with at the beginning and end of each transmission, unless working duplex.

The above is only suggested, and is not to be accepted as a hard fast rule, but should be followed generally, until more

explicit instructions are issued, covering the full details of radio telephone conversation, which will probably not be available for some time to come.

Respectfully,
D. B. McGOWN,
Assistant Radio Inspector.

R. Squire, 6AWG, 39 Granada street, San Francisco, closed for 30 days, starting October 24, 1921. Squire was warned to get down to 200 by this office in August, and did not do so. Was heard on 245 meters, and was given 30 days to think over whether or not he would obey the law.

CHANGES OF ADDRESS

R. A. Phillips, 6AHO, has moved from Moneta, Calif., to La Habra, Calif.

7XD is at the Billings Polytechnic Institute, Billings, Mont. Its listing in the old call book is erroneous and many cards have been therefore mis-directed. Prof. Glenn E. West is in charge.

R. M. White, 6OL, is now located at 1509 South Brand Boulevard, Glendale, Calif., instead of 717 East Windsor road, as previously reported.

Question: May I transmit with a spark coil providing I do not send outside of state or interfere with government stations?

Answer: No. You must obtain a license to use the spark coil.

New Sixth District Amateur Stations

6AWQ	J. W. Hadley	San Simeon, Calif.
6AWR	D. G. Hewitt	Box 596, Stanford University, Calif.
6AWS	H. D. Schmidt	383 Ocean St., Santa Cruz, Calif.
6AWT	B. Melinari	653 Union St., San Francisco, Calif.
6AWU	W. Stonerook	3702 Utah St., San Diego, Calif.
6AWV	C. H. Weatherhill	1509 G St., Reedly, Calif.
6AWW	L. Jones	Manteca, Calif.
6AWX	E. Sedlacek	267 W. Badello St., Covina, Calif.
6AWY	L. P. Bennett	428 B St., Hayward, Calif.
6AWZ	G. E. Gay	432 Linden Ave., Long Beach, Calif.
6BAA	Geo. W. Womer Jr.	5526 Telegraph Ave., Oakland, Calif.
6BAB	R. Lewis	31 Monte Ave., Piedmont, Calif.
6BAC	E. Miller	1645 American Ave., Long Beach, Calif.
6BAD	G. R. Martin	423 N. Curtis St., Alhambra, Calif.
6BAE	G. S. Morris	5132 Lincoln Ave., Los Angeles, Calif.
6BAF	G. L. Powell	375 Malino Ave., Long Beach, Calif.
6BAG	E. L. Ramer	2220 86th Ave., Oakland, Calif.
6BAH	V. E. Semran	940 So. Fair Oaks St., Pasadena, Calif.
6BAI	G. H. Dennis	Box 596, Stanford University, Calif.
6BAJ	H. M. Hines	1045 N. Stevenson Ave., Pasadena, Calif.
6BAK	R. Bunch	610 Pacific Ave., Santa Cruz, Calif.
6BAL	T. Howells	1777 Crystal Ave., Salt Lake City, Utah.
6BAM	F. L. Walker Jr.	Westwood, Calif.
6BAN	L. Vesper	2035 Alameda Ave., Alameda, Calif.
6BAO	James Kennedy Jr.	266 Carl St., San Francisco, Calif.
6BAP	W. F. Fredrick Jr.	670 Walsworth St., Oakland, Calif.
6BAQ	C. W. Smith	142 Shrader St., San Francisco.
6BAR	C. Anderson	3732 Seneca Ave., Los Angeles, Calif.
6BAS	William L. Burnett	2039 Deakin St., Berkeley, Calif.
6BAT	Salesian Club	666 Filbert St., San Francisco, Calif.
6BAU	C. H. Rockwell	R.R. C. Box 205, Tulare, Calif.
6BAV	H. M. Hughes	1631 Dale St., San Diego, Calif.
6BAW	Myron Albertson	852 Westchester Place, Los Angeles.
6BAX	F. R. Welch	Hanford, Calif.
6BAY	P. Grant	234 Union St., Watsonville, Calif.
6BAZ	Mrs. Mary O. Houston	3420 Union St., San Diego, Calif.
6BRA	H. D. Graves	1454 S. Broadway, Chico, Calif.
6BRC	P. Borden	Brea, Calif.
6BRD	C. L. Worthley	1118A Barendo St., Los Angeles, Calif.
6BRE	C. K. Burns	1835 Bancroft St., San Diego, Calif.
6BRF	Thos. H. Howells	L. D. S. University, Salt Lake City, Utah.
6BFG	J. R. Harding	Hartman Bay Enterprise, Butte Co., Calif.
6BRH	E. A. Nielsen	115 So. 21st Ave., Phoenix, Ariz.
6BBI	A. H. Schmith	Main St., Battle Mountain, Nev.
6BBJ	A. F. Miller	1328 18th St., Santa Monica, Calif.
6BBK	J. Guileran Jr.	222 W. San Carlos St., San Jose, Calif.
6BBL	R. A. Naja	179 34th Ave., San Francisco, Calif.
6BBM	M. A. Hawkins	2850 19th Ave., San Francisco.
6BBN	K. Dilks	1326 W. 16th St., Los Angeles, Calif.
6BBO	H. B. Chambers	780 Rialto Ave., Pasadena, Calif.
6BBP	J. C. Hooton	R. F. D. No. 1, Los Gatos, Calif.
6BBQ	P. Mack	184 S. El Belino Ave., Pasadena, Calif.
6BBR	W. E. Carman	165 Lincoln Way, Auburn, Calif.
6BBS	T. L. Up de Graft	1450 San Pasqual St., Pasadena, Calif.
6BBT	K. Walton	118 Second Ave., San Bernardino, Calif.
6BBU	E. Knorr	134 E. Center St., Covina, Calif.
6BBV	F. Pollard	200 W. Badillo St., Covina, Calif.
6BBW	W. C. Milhouse	429 S. Painter Ave., Whittier, Calif.
6BBX	C. Stewart	Fifth St., San Rafael, Calif.
6BBY	A. Penrose	210 University Ave., Los Gatos, Calif.
6BBZ	F. Anderson Jr.	166 Campus Ave., San Bernardino, Calif.
6BCA	G. Wilson	3635 11th St., San Jose, Calif.
6BCB	R. H. Speck	Upland, Calif.
6BCC	S. M. Roycroft	114 N. Isabel St., Glendale, Calif.
6BCD	G. H. Simpson	Box 130, Salida, Calif.
6BCE	V. M. Ashworth	174 N. 1st St., Provo, Utah.

Questions and Answers

By the Radio Inspector

Question: What are the requirements for passing an examination for a radio phone? G. E., Berkeley, Cal.

Answer: Exactly the same rules and regulations apply to telephone sets as to telegraph, viz.: The application must pass the regular amateur examination, including the ten word code speed test, and written examination, and must make application for station license in the usual manner after the operator's license has been obtained.

Question: I am licensed for a spark set which I have and want to do some C. W. experimenting on the side. If C. W. proves satisfactory I may change to it but do not want my license to be changed for C. W. as I do not know whether I will permanently use it. I intend to keep the spark set. Will my license be subject to cancellation or suspension if I do not have it changed? I do not care to have my license changed every time that

I desire to use a spark instead of C. W. J. K., San Jose, Calif.

Answer: You may not operate the CW set without authority, as unless it is designated in your license, or unless you have notified the office and received permission to use it, you would be working without a license. If you notify the office that you are going to make this change, and send the license back for correction, the use of CW will be authorized as well as the spark set now installed. This would allow you to experiment on either CW or spark, under the usual restrictions of an amateur license.

Question: I have a CW set that will not operate on a wave length below 325 meters, although I have tried all sorts of schemes to make it go down to 200. Can I, therefore, get a special license. I wish to use it for general amateur communication. K. M., San Francisco, Cal.

Answer: No. This does not constitute any grounds for a special license of any kind. Your attention is directed to Par. 63 of the Radio Laws and Regulations: "... a special license will be granted only if some substantial benefit to the art or to commerce aside from indiv-

idual amusement seems probable." Furthermore, even if you had the special license, you would not be allowed to use the special wave for general communication among amateurs. Special amateur stations are granted certain wave lengths differing from those assigned to other stations for specific purpose. These stations are only allowed to communicate with other special stations of the same class **ON THE SAME WAVE LENGTH.** For general amateur communication, you would be required to have and use the 200 meter wave. It seems probable, that if you would cut your antenna in half that you would get down all right.

Question: Please inform me of the number of words per minute that I must copy in order to pass the various grades for commercial examination. B. Y., Los Angeles, Calif.

Answer: All examinations include sending and receiving, as follows:

Commercial Extra First Class—25 American Morse and 30 Continental Morse.

Commercial First Class—1st grade, 25 words per minute.

Commercial First Class—2nd and 3rd grades, 20 words per minute.

Commercial Second Grade—1st grade, 25 words per minute.

Commercial Second Class—2nd grade, 20 words per minute.

Commercial Second Class—3rd grade, 12 words per minute.

Question: I hold an amateur first grade license at present and desire to get a commercial license. The amateur license does not expire for about a year. Is it necessary for me to wait until the present license expires before I can take a commercial examination? How long must a person hold an amateur license before he can take the commercial examination? C. M., Oakland, Cal.

Answer: Not necessary to wait for expiration of the amateur license. Holding of an amateur license has no bearing on the holding or applying for a commercial license, except that no one can hold two licenses at the same time. If you hold a commercial license of any grade or class this will suffice for operation of any amateur station.

Question: I have had 24 months on a commercial SECOND grade license. Can this apply to the 18 months experience required for the commercial first class first grade? This was all on merchant ships. J. L. N., San Pedro, Cal.

Answer: No. The regulations state: "First Grade—A year or more satisfactory commercial service IN THE SECOND GRADE—" and for second grade "Six months or more satisfactory commercial service IN THE THIRD GRADE." You would be eligible for the Second Class First Grade in your case, but not for the First Class, as your service was not on a license of proper grade.

New Sixth District Amateur Stations

6BCF	John Fishback	20 N. Greenwood St., Pasadena, Calif.
6BCG	Wm. A. Bryan	First Ave., Upland, Calif.
6BCH	Wm. Rosenthal	176 15th Ave., San Francisco, Calif.
6BCI	D. Skilling	2960 Linden Ave., Berkeley, Calif.
6BCJ	E. Salmira	St. Helena, Calif.
6BCK	A. J. Nachbaur	Vallejo, Calif.
6BCL	C. Bluffum	116 20th St., Monterey, Calif.
6BCM	G. R. Harris	Carolina St., Vallejo, Calif.
6BCN	H. Hutchinson	121 W. Center St., Covina, Calif.
6BCO	L. S. Green	Gridley, Calif.
6BCP	E. Atmore	R. F. D., Box 38, Santa Paula, Calif.
6BCQ	E. R. Hog	Mt. Wilson Observatory, Mt. Wilson, Calif.
6BCR	C. Foreman	1714 Alameda Ave., Alameda, Calif.
6BCS	J. Windley	Market St., Manteca, Calif.
6BCT	A. T. Lenoir	1330 E. Pierce St., Phoenix, Ariz.
6BCU	H. Bidwell	San Marcos, Calif.
6BCV	W. J. Robinson	2318 Santa Clara St., Alameda, Calif.
6BCW	F. T. Remer	231 Magnolia St., Modesto, Calif.
6BCX	O. S. Schlenker	2915 Magnolia St., Oakland, Calif.
6BCY	D. Dart	1315 Tamalpais Road, Berkeley, Calif.
6BCZ	H. Hadley	74 Henry St., San Francisco, Calif.
6BDA	H. Frank	1465 McAllister St., San Francisco, Calif.
6BDB	Osmund Stone	1831 Balboa St., San Francisco, Calif.
6BDC	W. W. Schmidt	605 19th Ave., San Francisco, Calif.
6BDD	S. Glassen	2319 Ashby Ave., Berkeley, Calif.
6BDE	W. A. Huber	1603 San Bruno Ave., San Francisco, Calif.
6BDF	E. Hendrickson	2036 7th Ave., Oakland, Calif.
6BDG	W. F. Betts	1533 19th St., Santa Monica, Calif.
6BDH	J. W. Eisenberger	105 N. Fourth St., Alhambra, Calif.
6BDI	D. Wright	Box 125 R. F. D., Glendora, Calif.
6BDJ	A. Clapper	141 E. Center St., Covina, Calif.
6BDK	C. Gutte	1034 Goshen Ave., Visalia, Calif.
6BDL	W. D. Cheney	2723 Benvenue Ave., Berkeley, Calif.
6BDM	J. R. Evans	Riverbank, Calif.
6BDN	G. S. Clark	P. O. Box 383, Bishop, Calif.
6BDO	M. C. Starkey	Taft, Calif.
6BDP	H. M. Williamson	674 6th St., Hollister, Calif.
6BDQ	T. L. Mayes	Coalinga, Calif.
6BDR	W. H. Baird	Fellows, Calif.
6BDS	L. J. Wren	911 13th St., Modesto, Calif.
6BDT	W. S. Shin	1941 Funchal Lane, Honolulu, T. H.
6BDU	Pacific Radio School	75 New Montgomery St., San Francisco.
	(R. Tinker)	
6BDV	R. F. Zinser Jr.	810 W. 48th St., Los Angeles, Calif.
6BDW	D. C. Helsey	232 N. Gower St., Hollywood, Calif.
6BDX	J. De Laney	367 E. 57th St., Los Angeles, Calif.
6BDY	H. Ramer	4547 Cleveland Ave., San Diego, Calif.
6BDZ	E. Barnes	1901 Oxley St., So. Pasadena, Calif.
6BEA	W. L. Evans	241 N. Hollenbeck St., Los Angeles, Calif.
6BEB	A. Reed	1800 Third St., San Diego, Calif.
6BEC	C. R. Noren	6016 York Blvd., Los Angeles, Calif.
6BED	C. H. Smith	126 Anza St., San Francisco, Calif.
6BEE	D. Hansen	3454 Percy St., Los Angeles, Calif.
6BEF	H. D. Hicks	3327 Jefferson Ave., San Diego, Calif.
6BEG	J. P. Weathers	1221 Trenton St., Los Angeles, Calif.
6BEH	B. E. Edwards	515 Sinclair St., Reno, Nev.
6BEI	C. D. Thomas	2801 La Salle Ave., Los Angeles, Calif.
6BEJ	F. McCullough	3161 College Ave., Berkeley, Calif.
6BEK	H. R. Green	1814 So. Vermont St., Los Angeles, Calif.
6BEL	J. P. Blindbury	618 Bushnell St., Alhambra, Calif.
6BEM	K. Kawachi	R. F. D. 1, Box 463B, Gardena, Calif.
6BEN	E. Bradford	Lost Hills, Kern Co., Calif.
6BEO	J. R. Winn	417 Ocean Front St., Venice, Calif.
6BEP	R. Julian	1260 E. 4th St., Long Beach, Calif.
6BEQ	G. H. Rufener	410 W. Santa Barbara Ave., Los Angeles.
6BER	T. Newman	4130 Bachman Place, San Diego, Calif.

New Apparatus and Supplies from the Radio Manufacturers

NOVEL GREBE MOULDED VARIOMETER

Among the many interesting improvements included in the latest types of Grebe radio apparatus is a moulded variometer of novel design.

This variometer consists essentially of five moulded bakelite pieces; a frame, two skeletonized cages for supporting the



New Grebe Variometer.

stator windings, and two half balls which make up the rotor. The cages containing the stator windings are bolted to the frame, while the rotor is assembled on the shafts. It is claimed the design of this unit reduces dielectric losses to insignificance, and that the extreme accuracy and constancy of dimensions gives a more stabilized design than would be possible with any other form of variometer.

A 2 K.W. VACUUM TUBE SET FOR PANAMA

A 2 K.W. radio tube transmitter, now installed and in operation at Almirante, Panama, has recently been completed by the General Electric Company for the Radio Corporation of America. Not only is this transmitter unusually powerful for a tube transmitter, but it was designed and built in record time, being finished, tested, and ready for shipment three months after receipt of the order.

The set consists essentially of equipment designed to supply direct current at 12,000 volts for the plate supply of the radiotron tubes, and for converting this power into radio frequency. Power is supplied to the transmitter at 440 volts, single phase, 60 cycles, and stepped up to

high voltage by means of a transformer, the output of which is fed into the rectifying system.

The rectifying system consists of two K.W. Kenetron tubes which supply 12,500 volts d. c. to the plate circuits of the radiotron generators. The ripple in the output of the rectifying system is smoothed out by means of a suitable filter system. The radio frequency power is generated by a system consisting of two 1 K.W. radiotrons with the necessary grid and plate coils, together with an antenna loading coil. Provision is made for controlling the power by a power change switch which alters the voltage on the primary of the plate transformer. The filaments of all tubes, Kenetrons and radiotrons, are operated on a.c. through transformers which step the supply voltage down to the operating voltages of the filaments.

The set is equipped with a wave changing switch which, by a single operation, changes the transmitted wave to any one of three lengths—600, 1,000 and 3,000 meters. The switch automatically selects predetermined points on the loading, plate and grid coils. Provision is also made for transmitting on interrupted continuous (ICW) as well as on continuous waves (CW). This is accomplished by means of a motor-driven interrupter in the grid circuit of the radiotron tubes, which starts and stops oscillations in the antenna at audio frequency, approximately 1,000 interruptions per second.

The rating of the transmitter is based on the power input of the antenna circuit, instead of on the output of the power equipment as is usual with spark transmitters. The rating of the tube transmitter is the product of the antenna resistance times the antenna current squared, equalling two kilowatts. While it cannot be predicted exactly what the range of this set will be, it is expected that it will equal if not exceed, the range of a 50 K.W. spark transmitter. As an example of its initial effectiveness, the set is now carrying on reliable and most satisfactory communication from Almirante, Panama, to New Orleans, La., not only at night but during the daylight period as well.

TRADE NOTES

Somerville Radio Laboratory, Boston, Mass., has issued a new illustrated price list of radio apparatus for the use of the amateur operator.

Atlantic-Pacific Radio Supplies Co., San Francisco, are distributing a revised list of prices on DeForest radio apparatus illustrated and described in Catalogues F, G, S-21 and S-22, which show the new DeForest CW equipment and parts.

Herbert E. Metcalf, publicity manager for the Magnavox Company, is instructor for the radio course offered by the Extension Division of the University of California in the Pacific Building, San Francisco, every Monday night.

H. S. Tenny, formerly chief electrician U. S. navy in the Adriatic service, and frequent contributor to these columns, is now manager Northern Radio & Electric Co., 418 Union street, Seattle, Wash.

Frank A. D. Andrea, New York, has issued an attractive new catalogue of Fada radio instruments and parts, including crystal detectors, vacuum tube detectors, amplifiers, rheostats, switches and transformers.

The Formica Insulation Co. has won the suits brought against it by the Westinghouse Company and the Continental Fiber Co. for alleged infringing patents for making and molding laminated articles.

F. Clifford Estey, president and secretary of the Essex County Radio Association of Radio Clubs in Essex County, affiliated with the American Radio Relay League, has become associated with the Clapp-Eastham Company, Cambridge, Mass., as sales manager. Mr. Estey will direct all sales and advertising work for the C-E line of radio equipment and electrical laboratory apparatus.

Mr. A. E. Evans, formerly of the Western Wireless Works, and Mr. J. L. Sabo, formerly with the Independent Wireless Telegraph Company as radio inspector, have opened a radio supply store at 1972 San Pablo avenue, Oakland, Cal. The new concern will be known as the Evans & Sabo Company. The Western Wireless Works has been absorbed by the newly founded concern. A complete line of all the standard makes of radio equipment will be carried in stock. Manufacturing of radio apparatus will be carried on to a large extent. A new type of 2 K. W. break key, high tension condenser, receiving equipment, etc., will be manufactured.

Radio men of San Francisco and bay cities will be glad to learn that Ben Linden, who was the Radio Inspector in charge of the sixth district during the war period, is now in charge of San Francisco's newest radio store, doing business under the name of Warner & Linden. The store was opened for business on November 1st, at 350 Market street. A complete line of all the standard makes of radio apparatus will be carried in stock. Mr. Warner has conducted a radio store for many months in Oakland, California, under the name of Warner Brothers.

CALLS HEARD

CALLS HEARD BY 6ABJ, E. R. SHARPE, MARTINEZ, CALIF.

(6AK), (6AV), 6BJ, 6BX, 6CH, 6CU, (6CV), 6DN, 6DY, 6FH, 6FI, 6FP, (6GR), (6GX), 6HC, (6IC), 6IG, (6IM), 6LA, 6LR, 6OG, 6ZE, 6ZU, (6ZX), 6AAM, 6ABC, 6ABE, 6ABH, 6ABP, 6ABW, (6ABX), 6ACM, 6AEG, (6AEW), 6AFN, 6AID, 6AJF, (6AGA), 6ALA, 6ALL, 6ALV, 6ALR, (6AMM), (6AMW), 6ARH, 6AWF, 6AVN, 6AVM, 6LA, 7MP, 7XD.

The above stations were heard with one step of amplification. All QSA. Anyone hearing 6ABJ please QSL.

HEARD AT 7XD, BILLINGS POLYTECHNIC INSTITUTE, BILLINGS, MONT.

Sept. 1-Oct. 1, 1921

5HK, 5LA, 5ZA, 6ABX, 6AEQ, (6AEZ), 6AFT, (6AIB), 6AIZ, 6ALEC.W., 6APE, (6ATQ), (6AWH), 6AXC.W., (6CV), 6FI, (6GR), 6IC, (6OT), 6WV, 6XG, (6ZU), 6ZM, 6ZS, (7HM), (7HW), (7IM), (7LY), (7OZ), 7UT, (7XQ), 7YA, 7ZE, (7ZG), (7ZJ), 7ZK, (7ZM), 7ZN, (7ZO), 7ZR, (7ZS), (7ZT), 8XAD, 9ABU, (9ABG), 9AEY, 9AFW, 9AGN, 9AMC.W., 9AMPC.W., 9ANF, 9ANK, 9AOU, 9ARZ, 9ASF, 9AYA, (9AYS), 9DLJ, 9DSG, 9DUD, (9EE), (9HM), 9HT, 9HW, 9JN, 9LC, 9LF, 9OE, 9OI, 9PN, 9PS, 9STK, 9XW, (9YAK), 9ZA, 9ZAC, 9ZC, 9ZN, 9ZUG, 9ZYC.W.

CALLS HEARD BY KOZR (FORMER 6AIW OF ROSEVILLE), IN BELLINGHAM, WASH.

9:30 to 11:30 P. M., Oct. 7, 1921

6AK, 6DI, 6EB, 6CH, 6GF, 6IC, 6OC, 6TU, 6GR (very QSA), 6AAT (C.W. QUI), 6GP, 6ALE(C.W. QSA very), 6AEZ, 6VK, 6XAJ (Oakland Hotel Concert), 7BK, 7CC, 7IW, 7MA, 7MP, 7KJ, 7YJ, 7YO, 7XD, 7JS, 7YL, 7ZM (QSS bad), 7YA, 7ZU.

STATIONS COPIED BY 6ASH (D. V. RUSSELL), BREA, CALIF.

Sept. 18-Oct. 18, 1921

5ZA, 6AK, 6AL, 6CH, 6CV, 6CY, 6DS, 6FH, 6FK, 6GI, 6GM, 6GP, 6GR, 6GS, 6GT, 6IC, 6IM, 6IV, 6JE, 6KC, 6KS, 6KY, 6MD, 6MS, 6OC, 6OD, 6OG, 6OL, 6PJ, 6PO, 6QR, 6RF, 6SK, 6UP, 6WR, 6ZX, 6XD (phone and music), 6ZB, 6ZR, 6ZU(C.W.), 6ZZ, 6AAG(C.W. and phone), 6ACY, 6AFU, 6AIF, 6AIM, 6ALP, 6ALU, 6ARP, 6AUD, 6AWH, 6XAK(C.W. and phone and music), 7MF, 7IF, 7XD, 7ZD, 7BP. Stations at least 25 miles away.

CALLS HEARD BY 6AME, BOX 218, RIVERBANK, STANISLAUS CO., CALIF.

From Sept. 21-October 21, 1921

Heard on one-tube and honeycombs. All signals at least fairly QSA. Spark stations: 5ZA, 6AB, 6AF, 6AG, 6AN, 6AR, 6AN, 6AX, 6CH, 6CS, 6CV, 6EB, 6ED, 6EG, 6EN, 6ER, 6FC, 6FH, 6FK, 6FS, 6FT, 6GB, 6GI, 6GL, 6GP, 6GT, 6GX, 6HC, 6HY, 6ID, 6IG, 6IM, 6IN, 6IS, 6JE, 6JC, 6KA, 6KC, 6KH, 6KM, 6KP, 6KS, 6LB, 6LU, 6MF, 6MH, 6MZ, 6NC, 6OD, 6OE, 6OL, 6OY, 6QR, 6RB, 6RD, 6RF, 6RR, 6RT, 6SC, 6SK, 6ST, 6SU, 6SV, 6TF, 6TG, 6UO, 6VY, 6XX, 6ZB, 6ZU, 6ZR, 6ZS, 6ZX, 6ZZ, 6AAH, 6AAT, 6AAN, 6ACY, 6ADL, 6AEZ, 6AGF, 6AGG, 6AGH, 6AGL, 6AIB, 6AID, 6AIO, 6AIP, 6AJE, 6AJH, 6AKL, 6ALU, 6ALP, 6AMI, 6AMN, 6APH, 6ARK, 6ARW, 6ATF, 6ATQ, 6AVB, 6AVD, 6AWK, 7AC, 7BL, 7CK, 7DB, 7DW, 7ED, 7FL, 7GA, 7GR, 7IC, 7IM, 7IN, 7IV, 7IW, 7JU, 7KB, 7KJ, 7KG, 7LT, 7MA, 7MF, 7MP, 7MU, 7NA, 7NR, 7NW, 7OZ, 7QO, 7RM, 7RU, 7RW, 7TJ, 7VO, 7XD, 7XJ, 7XM, 7YJ, 7ZB, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZS, 7ZT, 7ZU.

Additional spar stations heard with sun shining: 6AC, 6AK, 6AM, 6FH, 6GC, 6GF, 6GR, 6HF, 6HX, 6IC, 6KW, 6OC, 6TU, 6UF, 6VM, 6AAJ, 6ABX, 6AEI, 6AFN, 6AJD, 6AJU, 6AJW, 6ALW, 6ATF, 6ANB.

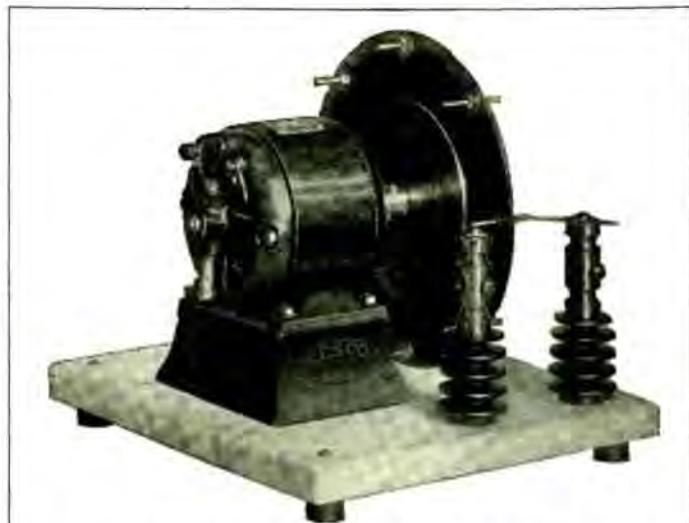
C.W. stations: 5ZA, 6AT, 6AV, 6EF, 6EN, 6ME, 6RA, 6WV, 6XR, 6ZA, 6ZN, 6AAT, 6AHC, 6AIO, 6ALE (day), 6ALU, 6AQT, 6ARF, 6ART, 6AWE (day), 6AWC (day), 6AWH, 6AWV, 6XAC, 6XAD, 7XF, 9AMB.

Phone stations: 6AK, 6FI, (day), 6XD, 6XE, 6XG (day), 6XW, 6AWY (day), 6XAC (day), 6XAK, Hotel Oakland, (6?) 7XF and 9 (?)AF. (Reynolds Radio Co., Denver, Colo.)

SPECIAL

Christmas Sale of Radio Apparatus

To reduce our large stock before taking annual inventory, we are offering the following equipment and apparatus to you at 25% to 75% per cent less than the regular price. Every piece new. Every piece standard. Every piece guaranteed. On many items you save more than half. Check over the list carefully, then send in your order AT ONCE, so we can supply you before we are out of what you want.



CESCO \$75 ROTARY GAP FOR \$40

Cesco Type R300 Rotary Spark Gap with Westinghouse 3/8 H.P., 3450 R. P. M., induction type motor. The disc is of bakelite 9 inches in diameter with 12 revolving electrodes. Gives beautiful, clear penetrating note that is readable through static and interference. Mounted on gray marble, brass parts highly nickered, and beautifully finished. Regular price \$75. **SALLES PRICE \$40.**

DeForest CV 500-.0005 Condensers	\$ 3.70
DeForest LC 101 Coil Mounting.....	9.25
DeForest P 300 Detector and 1 Stage Amplifier.....	40.00
DeForest T 200 Tuner	50.00
DeForest P 100 Audion Control	35.00
Kennedy Long Wave Receiver	100.00
Kennedy Three Stage Amplifier	50.00
Kennedy Two Stage Amplifier	35.00
Radio Shop Short Wave Regenerative Set.....	25.00
Clapp Eastman Balanced .001 Condensers	2.85
Clapp Eastman Balanced .0005 Condensers	2.25

Be sure to mail orders at once.

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643 Mission Street, San Francisco

Radio Supplies That R Right

WITH A BED SPRING AS AN AERIAL FLORIDA TO CALIFORNIA

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Mr. Proudfoot—I received your plug several days ago, and I thank you very much. The amplifier which I purchased from you certainly does work well. I am able to read NPL using my bed-spring as an aerial with only one step of amplification. Thanking you very much for your courtesy, I remain, very truly, yours.

READ THIS

CHARLES CROWLEY, Box 386, Clearwater, Fla.



DETECTOR AND TWO-STEP AMPLIFIER

\$35.00

Highest Quality Lowest Prices

is duplicate of above only one unit less

**Detector and One-Stage Amplifier
\$25.00**



LOUDEST AND CLEAREST SIGNALS

Made possible by SPECIAL DESIGN—(Different ratios of winding in transformers in each step of amplification.) The smoothest working rheostat—inlaid resistance units, do away with ugly screw heads in panel. Very sensitive adjustment.

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\$35.00

The Operating Characteristics of All Our Instruments Are Equal to Any on the Market Regardless of Price.

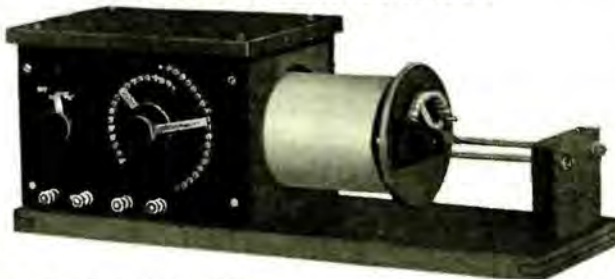
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QUARTER SAWED OAK
WITH WAX FINISH—
MAHOGANY FINISH
IF DESIRED

NOTICE
CLEAN CUT WIRING

MANUFACTURERS' PRICE
Instruments being sold direct from Manufacturers to you—thus saving you 30 to 40%.

This instrument has a range of 140 to 3500 meters, base of 18 by 6 inches and wire of green silk covered copper. The metal is a polished nickel and the woodwork is a fine hand rubbed mahogany finish. Panel 9/32 inch hard rubber.

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ALL INSTRUMENTS
TESTED IN LABORATORY
AND
UNDER WORKING
CONDITIONS

EVERYTHING
GUARANTEED

**MONEY BACK AFTER
3 DAYS**

If you are not satisfied as represented. The primary has 16 spaced taps, 18 single taps, so that a very fine tuning can be obtained. This feature along with 12 taps in secondary and dead end switch shown at left in panel, makes this instrument reliable for experimental work in schools and laboratories.

361 E. OHIO STREET

G. M. PROUDFOOT

CHICAGO, ILLINOIS

We manufacture our own jacks, which allows **shortest connections possible** and more permanent construction than with telephone jacks. Automatic filament control by plug, \$10.00 additional.

THE BLANK RADIO CALL BOOK

(For Amateurs)

A Wonderful Help to All.

An Absolute Necessity to the C. W. Man.

IF YOU HAVE A BLANK PAGE LIKE THIS PRINTED IN BRILLIANT RED:—

Station	Coupling	Primary	Grid Var.	Plate Var.	Location	Notes
AA						
AA						
AA						
AB						

AND FILL IT IN LIKE THIS:—YOU'LL KNOW WHERE TO FIND HIM NEXT TIME

Station	Coupling	Primary	Grid Var.	Plate Var.	Location	Notes
AA	20%	12 turns	40%	32%	170 Mi. North	CW-QSA-Worked Oct. 16
AA						
AA						
AB						

A place for your instrument readings for 4500 stations. Adaptable to any receiver columns left blank can be used in connection with a receiver of any design. Durable cover. Pages 8x11 on paper which will stand repeated erasure. \$1.50 will bring this new station help to you by return mail.

F. M. Ende, Publisher, Fort Riley, Kansas

Say Radio to the Advertiser, it will help you.

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—Make a Good Start
with your Christmas
Money—A Few
Suggestions



ROBBINS & MEYERS, MOTOR GENERATORS AND GENERATORS FOR C.W.

100 V. A. C. 500 V. D. C.

100 watts output 1750 R.P.M. \$74.75. Ship. wt. 95 lbs.
200 watts output 1750 R.P.M. \$89.80. Ship. wt. 120 lbs.
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110 V. A. C. 1000 V. D. C. (Double Commutator)

200 watts output 1750 R.P.M. \$197.40. Ship. wt. 185 lbs.
200 watts output 3400 R.P.M. 181.40. Ship. wt. 150 lbs.
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500 watts output 3400 R.P.M. 208.80. Ship. wt. 220 lbs.

Generators Only, Belt Driven, With Pulley—500 Volts

100 watts output 1750 R.P.M. \$42.00. Ship. wt. 50 lbs.
200 watts output 1750 R.P.M. 50.60. Ship. wt. 65 lbs.
200 watts output 3400 R.P.M. 44.00. Ship. wt. 50 lbs.

1000 Volts (Double Commutator)

200 watts output 1750 R.P.M. \$77.60. Ship. wt. 65 lbs.
200 watts output 3400 R.P.M. 98.20. Ship. wt. 80 lbs.
500 watts output 1750 R.P.M. 145.60. Ship. wt. 140 lbs.
500 watts output 3400 R.P.M. 98.20. Ship. wt. 80 lbs.

These generators are positively the last word in efficient design. Workmanship and appearance unsurpassed.

Prices are all F.O.B. San Francisco.

NEW WESTINGHOUSE SINGLE PHASE 110-VOLT INDUCTION MOTORS!

A Limited Quantity. These Prices
Cannot Be Equalled Anywhere.

	Reg. Price	
1-20 H.P.	\$13.70.	Ship. wt.
16 lbs.		\$18.30
1-8 H.P.	\$17.00.	Ship. wt.
20 lbs.		22.70
1-6 H.P.	\$19.75.	Ship. wt.
23 lbs.		24.15
1-4 H.P.	\$21.50.	Ship. wt.
24 lbs.		25.20

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purposes. Complete stock.

Shipped Postpaid
Standard Prices

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606 Mission Street



Kohlmoos
San Francisco, Cal.



JEWEL ELECTRIC METERS

Pattern 33. 3 1/4" dia. Flush Type Milliammeters, D.C. for plate current, 0-100, 0-200, 0-250, 0-300, 0-500 mill... \$6.50
Ammeters D.C. for filament current and battery charging. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5, 0-8, 0-10, 0-15, 0-20, 0-30 amps. \$6.50
Voltmeters D.C. for trans- 0-150 volts 8.75
mission and reception. 0-3, 0-300 volts 9.75
0-7.5, 0-10, 0-15, 0-20, 0-25, 0-500 volts 14.50
0-1000 volts 21.50
0-30, 0-40, 0-50 volts. \$ 6.50 0-1500 volts 27.50

Pattern 25, same case as pattern 33 Thermo Couple, Radiation meters, Radio Frequency Ammeters. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-5, 0-10 R. F. Amps. \$9.05

Pattern 54 3 3/4" dia. (new type) Flush Mtg. Milliammeters D.C. for plate current. 0-100, 0-200, 0-250, 0-500 mill-amps \$8.40
Ammeters D.C. for filaments and battery charging. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5, 0-8, 0-10, 0-15, 0-20, 0-30, 0-40, 0-50, 0-75 \$8.40

Voltmeters D.C. for trans- 0-150 volts 9.60
mission and reception. 0-3, 0-300 volts 12.25
0-7 1/2, 0-10, 0-15, 0-20, 0-30, 0-500 volts 16.75
0-1000 volts 23.75
0-1500 volts 29.80

Pattern 64, same case as pattern 54 Thermo Couple Radiation meters. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5 R. F. Amps. \$12.40

Pattern 74 same case as patterns 54 and 64 Ammeters A.C. For A.C. Power Supply and Filament Current. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-5, 0-10, 0-15, 0-20, 0-25, 0-30 Amps. \$8.30

Voltmeters A.C. for A.C. 0-20, 0-30, 0-40, 0-50.
Power Supply and Pila- 0-75 volts \$8.30
ment Voltage. 0-10, 0-15, 0-150 volts 9.60
0-300 volts 12.25

The above prices are subject
to additional postage from San
Francisco.

All our meters are provided
with movements specially insu-
lated from the case—built to
our order at the factory of the
Jewell Instrument Co.

—All orders filled
from stock on any
standard equipment



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Every RADIO Enthusiast wants real apparatus. What, then, could be more welcome as an Xmas gift than a genuine

Federal Head Telephone

These popular head telephones were originally designed to meet the exacting requirements of army and navy specifications—professional equipment in every sense of the word.

Super-sensitive, carefully matched in tone; every part made and inspected with extreme care.

No. 52-W 3200 ohm.....\$10.50
No. 53-W 2200 ohm..... 8.00

Write for Bulletin No. 103-WB

Federal Telephone & Telegraph Co.

Buffalo, N. Y.

HEARD BY 6AUN
6AK, 6AR, 6CV, 6CZ, 6DP, 6EA, 6EB, 6EN, 6ER, 6FT, 6GF, 6GI, 6GR, 6GJ, 6GX, 6HH, 6HY, 6IC, 6ID, 6IS, 6JC, 6JE, 6JY, 6KA, 6KC, 6KR, 6KS, 6KY, 6MH, 6MK, 6MN, 6PJ, 6PO, 6QI, 6QR, 6SK, 6TI, 6TU, 6TV, 6VR, 6VY, 6ZB, 6ZN, 6ZX, 6ZZ, 6AAT, 6ABX, 6ACR, 6ACY, 6ADL, 6AEI, 6AFN, 6AGM, 6AIB, 6AID, 6AKL, 6ALE, 6ALU, 6ATX, 6ATQ, 6AVB, 6AWH, 6AWS, 6AWY, 6XAC, 6ZAD, 7BK, 7BP, 7ED, 7FI, 7IN, 7IU, 7JW, 7KB, 7KG, 7KJ, 7LU, 7MF, 7NL, 7TO, 7XD, 7XF, 7YA, 7YS, 7ZK, 7ZJ, 7ZM, 7ZT, 7ZU, 5ZA, 9BD (Canadian), 9HM, 9AMB (C.W.).

CALLS HEARD BY B. MOLMOSI 6AWT
5ZA, 6AK, 6AR, (6CV), 6IP, (6EA), (6EB), 6EN, 6ER, 6FH, 6FT, 6GI, (6GR), (6GR-C.W.), 6GF, 6GX, 6HH, 6HY, 6IC, 6ID, 6IF, (6IS), 6JE, 6JC, (6KA), 6KC, 6KR, 6KY, 6MH, 6MN, (6PO), 6QI, 6QR, 6SK, 6TI, 6TU, 6VY, 6VR, 6ZB, 6ZU, 6ZX, 6AAT-C.W., 6ABX, 6ABG-C.W., 6ADL, 6AEI, 6AFN, 6AGM, 6AIB, 6AID, 6AJH, 6AKL, (6ALE-C.W.), 6ALU, 6AVB, 6AWH, 6AWV-C.W., 6XAC-C.W., (6ZAD-C.W.), 7BK, 7BP, 7ED, 7FI, 7IN, 7IU, 7JW, 7KB, 7KG, 7KJ, 7LU, 7MF, 7NL, 7TO, 7XD, 7XF-C.W., 7YA, 7YS, 7ZK, 7ZJ, 7ZM, 7ZT, 7ZU, 9HM, (9BD-Canadian).
6DWT reported QSA on tube by 9BD Canadian.
Anyone hearing 6DWT please QSI B. Molinari, 653 Union Street, San Francisco.

PARTIAL LIST RECEIVED AT 6WI DURING SEPTEMBER
(Anybody Hearing 6WI Please QSL By Mail, Etc.)

5ZA, (6AAT), 6AAW, 6AK, 6ABM, (6AJH), 6ATQ, (6AVB), 6ADA, 6ABU, 6AIE, 6ACA, 6ACR, 6AUL, (6ARNK), 6AFN, (6ACF), 6BW, 6CP, 6CV, 6DA, 6FK, 6CF, 6CR, 6IC, (6KC), 6OC, 6OH, (6PJ), 6SK, (6TV), (6VX), 6WZ, 6ZU, (6ZI), 7ZJ, 7ZM, 7ZT.

HEARD AT 6FB, REDONDO, CALIF.

Aug. 29-Oct. 23
5ZA (CW&SPK), 6AK, 6AS, 6CP, 6CV, 6DP, 6EX, 6FH, 6FK, 6GF, 6GR, 6IC, 6IM, 6KC, 6KM, 6OC, 6PJ, 6PR, 6QR, 6QT, 6TU, 6VK, 6WO, 6VG, 6ZB, 6ZU, 6ZX, 6ZZ, 6AAT, 6ABH, 6ABU, 6ABX, 6ACH, 6ACM, 6AFO, 6AGF, 6AJH, 6AMK, 6ARW, 6ATQ, 7BP, 7FI, 7IN, 7IW, 7KB, 7MP, 7MI, 7XD, 7YA, 7YG, 7YS, 7ZT, 7ZU, 9HT, 9IN, NK.
Log report can be given.

STATIONS HEARD AND WORKED AT 7BK, SEATTLE

September 15-October 15
Canadian 5CJ, Canadian special (9BD), 6AK, 6AAT, 6AAU, (6AAW), (6ABH), (6ABU), 6ABW, 6ABX, 6AEZ, 6AFM, 6AFN, 6AFO, 6AGF, (6ALE), 6ANG, 6APH, 6ARK, 6AVB, 6AWV, (6CH), 6CF, 6CV, 6DP, 6EA, 6EB, 6ER, 6EX, 6FH, 6GF, (6GR), 6GX, 6HY, 6IC, 6IM, 6IS, 6KP, 6LU, (6MH), NK, 6OC, (6OH), (6PJ), 6PO, 6QR, 6QT, 6SK, (6TU), (6VK), 6VM, (6VX), 6WZ, 6XAC, 6XG, (6ZU), 6ZX, 7BH, (7BP), 7CC, 7ED, (7FI), 7GA, 7HF, (7IN), 7IO, (7IW), 7JU, (7KJ), 7MF, (7NL), 7TA, (7TJ), 7XD, 7YA, (7YJ), (7ZM), 7ZT.

HEARD BY 5BR, VANCOUVER, B. C.
Sept. 1-Oct. 20, 1921

Canadian "5S" too numerous. 7ZT, 7KM, 7ZS, 7ZB, 7KB, 7ED, 7BP, 7BK, 7IN, 7MF, 6AH, 6EX, 6CH, 6GR, 6ZU, 6ALE, 6XAD-C.W., 6ABX, 6AFN, 6LU, 6AUA, 6IM, 6FH, 7ZJ, 7ZN, 7CC, 7XP, 7XD, 7ZM, 7LY, 7MF, 7MH, 7IW, 7FI, 7YJ, (7IC), 6QR, 6KA, 6KM, 6AWT-C.W., 6IM, 6AGF, 6WZ, 6VX, 6GR, 6FN, 6FH, 6AK, 6LU, 6GX, 6ANG, 6AEZ, 6ZX, 6IK, 7YJ, 7KM, 7BH, 7UJ, 7RA, 7BR, 7GA, 7CW, 7ZU, 7TJ, 7MP, 7LU. Loudest 6 station is 6QR in Reno, Nevada. Loudest 7 stations are 7BP, 7ED, 7ZT and 7ZU.

CALLS HEARD AT 7MF, EUGENE ORE.

Canadian 5BA, (5BR), (6AE), 6AK, (6AS), 6AE, 6AR, 6BJ, 6CL, 6CV, 6CY, 6DD, 6DP, 6EA, 6EB, 6EX, 6FH, 6FK, 6GF, 6GI, 6GR, 6IC, 6IM, 6IS, 6KA, 6KM, ER, 6MF, (6OC), 6OH, (6PJ), 6SK, 6TV, 6VK, 6VX, 6WZ, 6ZA, 6ZE, 6ZH, 6ZX, 7AC, (7AY), (7BK), (7BC), (7BJ), 7CN, 7YS, 7ZA, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZTACTIN 7ED, 7EX, 7FG, 7GO (C.W.), 7HW (C.W.), 7IN, 7IM, 7JW, 7KB, (7KJ), 7KM, 7LW, 7MO, (7MW), 7NL, (7NW), 7OT, 7SP, 7TO, 7XF (phone, music, C.W.), 7XD (CQ), 7YA, 7YS, 7ZA, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZS, 7ZT, 5ZA (C.W.), 5IF, 6AAT (C.W.), 6ALE (C.W.), 6AQT, 6ARK, (6ABW), 6ABX, 6ABU, 6ABM, 6ABH, 6XAD (C.W.), 6XAC (C.W., phone), 6XG (C.W., music, phone).

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suitable for receiving ship amateur, or long wave signals.

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complete with motor generators or gas engine driven generators.

ACCESSORIES (except vacuum tubes) of every description, suitable for experimental or research purposes.

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The surplus materials the Navy has available for sale have been grouped as shown below and catalogues describing these materials will be sent on your request.

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All Materials
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Books,
Brass,
Canvas and Tents,
Chemicals,
Cloth and Textiles,
Clothing,
Copper,
Electrical Equipment and Supplies,
Furniture,
Hardware,
Iron,
Lead,
Machinery,
Mess and Galley Equipment,
(Kitchen and Dining Room).
Monel,
Musical Instruments,
Navigating and Instruments of Precision,
Oils and Greases,
Paint and Paint Materials,
Provisions,
Radio Equipment,
Rope and Twine,
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Steel,
Tin,
Tools—Hand, Machine and Contractors,
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Zinc.

CENTRAL SALES OFFICE
Navy Dept., Washington, D. C.

The Season's Greetings!

Xmas Presents and a *New Year* Resolution are in order. *A Radio Gift* is a lasting, pleasing and instructive one. Order Early. Make your *New Year* resolve to buy your Wireless Apparatus where you obtain:



Remler Vario-Coupler

- Type 503\$5.40
- Type 504, with dial..... 6.40
- Type 505, panel mtd...12.75

The Brand of Service that gives you what you want when you want it, and at a price that is right.



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Remler Detector Panel

Type No. 330. Price.....\$8.00

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- No. 2156. Navy Type. 22½ volt with 18 volt tap for G.E. tubes. Size 3"x4"x6½". Price.....\$3.00
- No. 5156. Medium Type. 22½ volt, with 9, 13.5, 18, 19.5, 21 and 22½ tap. Size 2¾"x2 9/16"x4 ¼". Price\$2.75
- No. 4156. Signal Corps Type RA-2. 22.5 volt. Size 2 ½"x2"x3 ¾"\$2.25

GREBE RECEIVERS

- CR-3. 150-Meters\$65.00
- CR-5. 150-3000 Meters, includes detector control.\$80.00
- CR-8. 150-1000 meters, includes detector control.\$80.00
- CR-9. 150-3000 meters, includes det. 2-step....\$130.00
- CR-6A. 150-20,000 meters, includes det. 3-step..\$375.00

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F658 Antenna Switch.....	\$12.50
Boston Key	7.50
F745 Fixed Condenser.....	1.50
43 Plate Condenser	4.75
17 Plate Condenser	4.00
F743 Graphite Potentiometer ..	3.00
F744 High Frequency Buzzer....	1.75
ZRV Variometer, less Dial	5.75
Type QU Amplifying Transformer	4.00
ZRC Variocoupler, less Dial	7.50

REMLER APPARATUS

S10 Jr. Rheostats	\$1.00
S11 Rheostats	1.75
S13 3 Amp. Rheostats	1.75
92 VT Socket	1.50
330 Audion Detector Panel	8.00
331 Amp. Panel	6.00
333 Amp. Panel	9.00
400 3 Coil Mounting	6.50
96 Variable Grid Leak .....	.60
97 Grid Condenser .....	.35
503 Variocoupler	5.40
500 Variometer	6.00

WESTINGHOUSE APPARATUS

RA Short Wave Tuner	\$65.00
DA Detector Two Stage Amplifier	65.00
CR Loading Coil	5.00
RC Short Wave Receiver with Det. 2 step	125.00
DB Crystal Detector	5.00
RE Aeriola Jr. Receiver	25.00
AD Antenna Outfit	7.50
PA Antenna Protective Device ..	2.00
SA Lightning Ground Switch....	4.00
ME 100 watt MG Set 500VDC 110-V., 60-Cycle, Ac.....	85.00
MH 250-watt MG Set, 1000VDC, 110-V., 60-Cycle, AC.....	145.00
Rectigon 2 1/2 A Battery charger..	18.75
Rectigon 6A Battery Charger.....	29.50
Rectigon 2 1/2 Renewal Bulb.....	4.40
Rectigon 6A Renewal Bulb.....	8.80
LS Victrola Attachment	15.00
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ACME APPARATUS COMPANY

250W Fully Mounted Transform- er	\$17.60
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500W Fully Mounted Transform- er	24.20
1000W Fully Mounted Transform- er	36.30
50W CW Fully Mounted Trans- former	16.50
209W CW Fully Mounted Trans- former	22.00
500W CW Fully Mounted Trans- former	27.50
75W Fil. Heating Transformer..	13.20
150W Fil. Heating Transformer..	17.60
150MA Single Choke Coil 1 1/2 H..	4.40
150MA Double Choke Coil 1 1/2 H..	6.60
500MA Double Choke Coil 1 1/2 H..	8.80
500MA Single Choke Coil 1 1/2 H..	6.60
Acme Sent Mid. Amp. Transform- er	5.00
Acme Unmtd. Amp. Transformer.	4.50
Acme Mounted Amp. Transformer	7.00

A. H. GREBE CO.

CR5 Receiver	\$83.00
CR6 Receiver	210.00
CR7 Receiver	221.00
ROCK 2 Step Amplifier	57.50

VACUUM TUBES

C300 Cunningham Tubes	\$ 5.00
C301 Cunningham Tubes	6.50
C302 Cunningham Tubes	8.00
C303 Cunningham Tubes	30.00
UV200 Radiotron Tubes	5.00
UV201 Radiotron Tubes	6.50
UV202 Radiotron Tubes	8.00
UV203 Radiotron Tubes	30.00
Electron Relay	5.00
Vt Amplifier	6.50

RADIO CORPORATION

UV216 20 watt Kenetron	\$ 7.50
UV217 150 watt Kenetron	26.50
UV712 Intervalve Transformer ..	7.00
PR536 A Battery Potentiometer..	2.00
UP1368 325 watt CW Transformer	25.00
UP1016 750 watt CW Transformer	38.50
UL1008 Oscillation Transformer..	11.00
UP415 Plate Circuit Reactor	5.75
UP1719 Transmitter Grid Leak 5 watt	1.10
156 Socket Bakelite	1.50

UP1718 Transmitter Grid Leak 50 watt	1.65
UP414 Microphone Transformer ..	7.25
Radio Corporation Catalog.....	.25

FEDERAL TEL. & TEL. CO.

226W Amplifying Transformer...\$	7.00
168 High Frequency Buzzer.....	2.50
1424 Anti Capacity Switch	2.80
1426 Anti Capacity Switch	2.55
1427 Anti Capacity Switch	2.65
1421 Jacks .....	.70
1422 Jacks .....	.85
1423 Jacks	1.00
1436 Jacks Automatic Filament Control	1.20
1438 Jacks Automatic Filament Control	1.50
1428 Plug	2.00
250 Hand Microphone	7.00
261 Desk Microphone	6.50

BALDWIN RECEIVERS

Type C Receivers	\$12.00
Type E Receivers	13.00
Type F Receivers	14.00

BRANDES RECEIVERS

Superior	\$ 8.00
Trans-Atlantic	12.00
Navy	14.00

CHELSEA

No. 1 Mounted 0011	\$ 5.00
No. 2 Mounted 0006	4.50
No. 3 Unmounted 0011	4.50
No. 4 Unmounted 0006	4.00
3/16 Bakelite Dial and Knob.....	1.00
1/4 Bakelite Dial and Knob.....	1.00
21 Variable Grid Leak	3.00
31 Oscillator	3.00

GENERAL RADIO

0-1 Hotwire Meter	\$ 7.75
0-2 1/2 Hotwire Meter	7.75
0-5 Hotwire Meter	7.75
0-10 Hotwire Meter	7.75
231A Amplifying Transformer...\$	5.00
231M Modulation Transformer ...	5.00
214 2 1/2 Amp. 2 ohm Rheostat....	2.50
214 1 1/2 Amp. 7 ohm Rheostat....	2.50
156 Socket Bakelite	1.50

We Carry a Complete Stock of Radio Corporation C. W. Apparatus.

Every Wireless Experimenter should have a copy of our 200-page manual. 35 cents in stamps will bring it to your door, or it will be sent upon the receipt of an order covering \$1.50 purchase.

428 Market Street
San Francisco, Cal.

LEO J. MEYBERG CO.

550 South Flower Street
Los Angeles, Cal.

Operating the Fairmont Hotel
Radio Station 6XG
San Francisco

Send for Our Concert Schedule

Operating Hamburger's
Radio Station 6XAK
Los Angeles

Send for Special Circular on C. W. Transmitting Apparatus



MYCO

RADIO RECEIVING SET

Licensed Under
the Armstrong
Patents

150-3000 Meters

Price

\$55.00

—it constitutes
the most desir-
able combination

known for the reception of phone concerts

- Vacuum Tube Socket: Metal Shell type with positive contact springs.
- Fixed Capacities: Correct proportions for modern tubes.
- Metal Parts: Brass. Exposed parts satin nickel plate.
- Wiring: Approved Busbar of large hard drawn conductor.
- Front Panel: Grained Formica Plate.
- Binding Posts: Nut type; assuring positive connection.
- Reostat: Ruggedly constructed to give correct adjustment of modern vacuum tubes without excessive heating.
- Cabinet: Hard Wood with Artistic Weathered Oak Finish.
- Dials: Bakelite with convenient shaped knob.
- Tickler: Capable of giving regeneration over entire range of wave length.
- Engraving: Gorton; filled in with permanent Brilliant White.
- Inductances: Genuine bank wound with liberal size conductor giving maximum efficiency.
- Variable Condenser: Counter balanced type of ample proportions and trouble proof.

THE MYCO TYPE R RECEIVER is the ultimate result of design and experimentation to develop a receiver that is especially applicable to wavelengths between 150 and 3000 meters; both Spark and C. W. Telegraph and Telephony. It is so designed to tune in such stations in a minimum time and with wonderful ease and positiveness. The Myco Universal Receiver has been designed and built after exhaustive experimentation to meet these requirements and does so to perfection. All unnecessary controls have been eliminated so that the only changes necessary to vary wavelengths are one Variable Condenser and the inductance Switch. Such adjustments are not critical but after the desired station has been heard they can be amplified very greatly by increasing the tickler control. This arrangement means that practically any station within range can be picked up and tuned in to maximum amplitude in a few seconds of time.

This receiver is offered in one model only employing some original ideas in construction. Combined with the receiver in the same cabinet is an efficient vacuum tube control resulting in a set complete ready to connect on to batteries and aerial and ground.

Entire assembly complete on panel which permits of easy removal for inspection of interior. Each receiver shipped in heavy wooden case guaranteed against damage and full instructions inclosed.

For those who desire a greater amplitude of signals than is obtainable with our Universal Receiver alone, we offer a two-stage amplifier unit to be used in conjunction with same.

The unit is exactly the same height and depth as Myco Universal and is intended to set along side. The connection lugs are furnished with the amplifier.

Myco Two-Stage Amplifier f. o. b. San Francisco, \$55.00

See your dealer who has information on this set or write for Bulletin 1000A giving detailed instructions of the Myco Type R Receiver and Amplifier.

428 Market Street
San Francisco, Cal.

LEO J. MEYBERG CO.

950 South Flower Street
Los Angeles, Cal.

Operating the Fairmont Hotel
Radio Station 6XG
San Francisco

Send for Our Concert Schedule

Operating Hamburger's
Department Store
Radio Station 6XAK
Los Angeles

MOVED

—and it was some job

But Remember—We have a lot of orders ahead, and if you want prompt deliveries we cannot urge you too much to place your order at once. We will try hard to keep our shop producing enough condensers to take care of the orders, but the way orders are arriving every day now, it looks as if we would be swamped.

There Must Be a Reason Why "Wireless Shop" Condensers Are So Much in Demand. We know the reason, but perhaps no one has ever let you in on the secret. "Quality"—that's the reason. If you have ever seen one you know, but for those fellows who have never had the opportunity of looking them over, we'll tell you that it's *Quality* that sells "Wireless Shop Condensers." With the fellow who knows, *the Best* is what he wants. If you happen to be one of those who don't know, write us for a copy of Bulletin No. 1, which describes and illustrates the complete line of "Wireless Shop Condensers."

They are made in three types and fourteen sizes—one for every need.

SERIES "T"

Three-inch stationary plate. For receiving circuits. Easy to mount back of your panel. Fitted with knob and pointer.



No. 20 2-plate Vernier Condenser	.....\$2.00
No. 70 7-plate, approximately .0001 m. f. maximum capacity	..... 2.35
No. 130 13-plate, approximately .0002 m. f. maximum capacity	..... 2.75
No. 170 17-plate, approximately .0003 m. f. maximum capacity	..... 3.15
No. 230 23-plate, approximately .0005 m. f. maximum capacity	..... 3.60
No. 310 31-plate, approximately .0007 m. f. maximum capacity	..... 4.30
No. 430 43-plate, approximately .001 m. f. maximum capacity	..... 5.25
No. 630 63-plate, approximately .0015 m. f. maximum capacity	..... 7.50

Include postage for one pound to your postal zone, and insurance.

SERIES "CW"

Four inch stationary plate. Wide spacing for "CW" work. Fitted with knob and pointer. Solid Formica End supporting plates.



No. 1500 15-plate, approximately .0004 m. f. maximum capacity	.....\$6.00
No. 2500 25-plate, approximately .0006 m. f. maximum capacity	..... 7.50
No. 3500 35-plate, approximately .0008 m. f. maximum capacity	..... 9.00

Include postage for two pounds on No. 1500 condenser, and for three pounds on No. 2500 and 3500, and insurance, to your postal zone.

And, Remember, That Quality Will Always Predominate With



1262 West Second Street

Dept. R

Los Angeles, Cal.

Say Radio to the Advertiser, it will help you.

CALLS HEARD BY 7GO, SALEM, ORE.
Sept. 10-Oct. 5—(One Stage)

6AS, 6ADH, 6ABM, 6ABW, 6ACR, 6AEW, 6AEZ, 6AFN, 6AGF, 6AID, 6ALE(C.W.), 6AJH, 6ATQ, 6AWH, 6AWT(C.W.), 6BAF, 6CP, 6EA, 6EX, 6GI, 6GF, 6GR, 6IC, 6ICN, 6IS, 6KA, 6C, 6TU, 6TV, 6VX, 6WJ, 6WZ, 6XG(C.W.), 6ZAD(C.W.), 6ZB, 6ZM, 6ZR, 6ZU, 7CE, 7HK, 7DI, 7ED, 7FI, 7GA, 7IM, 7IU, 7IY, 7KB, 7KM, 7KJ, 7KW, 7LY, 7MO, (7MW), 7NL, 7TZ, 7XD, 7XF(C.W.), (7YJ), 7ZJ, 7ZM, 7ZS, 7ZT, 9HM, 9AX (Canadian 9AX?)

CALLS HEARD BY GWR, PASADENA, CALIF.

July 30-Sept. 15

All work was done with a single audion tube and variometers.

(6AE), 6AK, 76AR), and "NK," 6CV, 6EP, (6FK), 6GF, 6HC, 6IC, "JS," (6KC), 6KX, 6MK, 6MY, 6OC, 6OH, (6PJ), 6TU, (6TV), 6VK, (6VX), 6WZ, 6ZB, 6ABM, 6ABU, 6ABW(C.W.), 6ABX, 6AEZ, 6APE, 6AGB, (6AGF), 6AID, (6AJH), 6AKL, (6ALE(C.W.)), 6ANG, 6APE, 6ARW, 6ATW, 6AND, 6AUV, 6AWH, (6AWI), 6BAW(C.W.), 7ZT, 7BP.

HEARD AT 6AAK, SANTA BARBARA, CALIF.

CL-fone, 6AH, 6IC, 6ZX, 6AK, 6MH, 6AAT-C.W., 6BW, 6MZ, 6ARW, 6CR, 6OH, 6ABX, 6CV, 6PJ, 6ACR, 6EX, 6SK, 6AGF, 6FK, 6TV, 6AJH, 6GF, 6TU, 6APE, 6GR, 6VK, 6ATV, 6KA, 6VX, 6KC, 6WZ, 6KS, 6ZR, 6LR, 6ZU.

HEARD AT U. S. FOREST PATROL STATION S.B., SANTA BARBARA, CALIF.

BY 6AAK

6AH, 6AK, 6BW, 6CR, 6GF, 6KC, 6KS, 6PJ, 6SK, 6TU, 6TV, 6VX, 6ZU, 6ABW, 6AGF, 6AJH, 6APE, 6DLU, (...N78) 1/4 6AH, 6AK, 6RW, 6CR.

CALLS HEARD BY RADIO 7QB, C. V. ANNIN, MYRTLE POINT, ORE.

Sept. 27-Oct. 28

On Crystal detector and 3500-meter loose coupler: 6AK, 6BB, 6CV, 6GF, 6GR, 6HY, 6IC, 6IM, 6KA, 6KM, 6PJ, 6QR, 6VX, 6WZ, 6ZU, 6ZX, 6AAU, 6ABX, 6AFN, 6AGF, 6AID, 6APE, 6AVY, 7BH, 7BK, 7BP, 7ED, 7FI, 7GA, 7IN, 7IW, 7IY, 7KJ, 7MF, 7MU, 7MY, 7RF, 7VX, 7YJ, 7ZM, 7ZS, 7ZT, 9AX, 9BD.

HEARD AT WJK, TAFT, CALIF.

5ZA, 6AH, 6AJ, 6AN, 6AAX, 6AAW, 6ADI, 6ADJ, 6ANF, 6AMX, 6AJT, 6AEI, 6ARO, 6AIV, 6ARW, 6ATF, 6ATQ, 6BW, 6CP, 6DA, 6EX, 6PX, 6FY, 6GF, 6GT, 6IF, 6II, 6IV, 6KC, 6KX, 6LY, 6MK, 6PJ, 6SK, 6TU, 6TV, 6VK, 6VM, 6VX, 6XAC, 6XAD, 6ZB, 6ZTD, 6ZU, 7XD, 7YG, 7YA, 7LY, 7ZT, 7ZU, 7ZAF, 9ZA calling 9ZN and 9PS (9:08 p. m., Oct. 10th).

It might be of interest to know that the Bakersfield Californian is operating two five-watt radiophone sets, one at Bakersfield and the other at Taft. We are getting one and a half amperes radiation on 400 meters. Our signals are reported as heard by 7YA at Boise, Idaho, and the West Carmargan, a freighter, while 100 miles out of Honolulu. We have been sending out the baseball reports of the world series play by play as received from the AP and would appreciate a card from anyone having heard these signals.

PHILLIPS THYGESON, Op. at WSK.



The Radio Shop

type "RS 1-24" Receiver

THE demand for this receiver has exceeded our expectations. Advertising was withheld in order to allow us to fill the orders. Insure delivery of your Xmas set by ordering now.

AN original application of regenerative tuning to a receiver that covers, with the utmost efficiency, every wavelength in use today.

Write for circular.

Panels Engraved

Let us engrave your panels on our new Gorton Engraving Machine
WRITE for PRICES ON THIS WORK

THE RADIO SHOP

SAN JOSE, CALIFORNIA

Beacon



Radio & Electric Co.

McNISH AND OWEN

ANNOUNCES

the opening of their new store at 246 Greenwich St., near Park Place, New York City.

This store will be under the management of B. K. Owen, formerly of 235 Fulton St., New York City.

FAMOUS "CHI-RAD" K. D. VARIOMETER PARTS



All parts to build two variometers and one coupler. ALL WINDINGS IN PLACE—nothing to do but screw on bearings and connect up. Complete set can be assembled in 30 minutes. The biggest value on the market—order a set today. Immediate Delivery.

Price, complete as shown, \$10.00. Add PP on 6 lbs.

SPECIFICATIONS

Variometer forms 4 1/4 in. Sq., 3 in. wide when assembled. Coupler primary Bakelite 3 1/4 in. diam., 3 3/4 in. high. All shafts 1/4 in. diameter. 7 Primary Taps.

Range 150-175 meters. Special condenser to shunt secondary and increase range to 650 meters supplied for 35c extra.

Made specially for panel mounting—all screws covered by dials when assembled.

Immediate Delivery—Money Back Guarantee.

CAUTION

Due to the great popularity of "Chi-Rad" Variometer Parts they are being imitated. For your protection our name appears on every instrument. Accept no substitutes—insist on "Chi-Rad." Solid Mahogany Variometer Parts. Your dealer will get them for you.

Dealers: Write for discounts on these Variometer parts. They will move fast and make you a handsome profit. We

are also jobbing all standard lines of Radio Apparatus. Why not buy all your Radio material from one, old reliable house and get full dealer's discount, plus "Immediate Delivery" from Chicago stock? Write for full information.

Chicago Amateurs: Come and inspect our new stock—largest and most complete in the Middle West.

CHICAGO RADIO APPARATUS CO., Inc.

Phone: Harrison 1716

508 South Dearborn Street

CHICAGO, ILL.

CODFISH FOR CHRISTMAS

(Continued from Page 203)

subscriber to a popular wireless magazine, whose full-page ads of magnificent apparatus quickly brought him to an unhappy realization of the comparative poorness of his own equipment. With almost childish eagerness he would study for hours the beautiful illustrations of imposing long-wave receivers, alluring two-step amplifiers, and all the other splendid apparatus. He swamped himself with a multitude of catalogs and earnestly longed to buy everything in all of them; all the while realizing that he could not afford to buy anything in any of them. It taxed his resources to buy enough coal to keep from freezing to death through the long Alaskan winter with its fierce snow-storms and shrieking northwest blizzards.

So Old Judge had studied the handsome array of apparatus in his catalogs with a sort of despairing worship, until one day Samuel Jones had a falling-out with a certain Siwash belle of Unga, and immediately developing an acute attack of the wanderlust, announced that he was going to pull out for San Francisco. Then it was that there had dawned upon Old Judge's horizon the dazzling possibility of his getting the berth at K-V-I with its free coal and provisions and a

(Continued on Page 224)



GEN Works 1000 Miles on 10 Watts CW

You Can, Too!

With Apparatus Designed for

RESULTS EFFICIENCY SERVICE



The "STANRAD" inductance is built for RESULTS—that's what you want—RESULTS!

It has 54 turns of copper wire wound on a 4-inch threaded formica tube. The wire cannot slip or come loose.

The margin at each end makes it easy to mount by means of brackets, mounting posts, etc.

One or two-coil winding. \$5.00
Threaded tube only. 3.75
Inductance for 100 watts. 10.00

The choke coils are wound on fiber spools. This eliminates break-downs. Binding posts are provided for connections, and aluminum feet to simplify the mounting. The inductance, approximately 3 henrys, is enough to clear the worst hum.

500 M. A. \$7.50
150 M. A. 6.00

If your dealer cannot supply you, write direct.

STANDARD RADIO COMPANY

1048 So. Olive St., Los Angeles, California



*Things that never happened here
Are really heard in Lap-
land clear.*

Say Radio to the Advertiser, it will help you.

Acme

C·W·APPARATUS

ONE OUT OF A THOUSAND
COME BACK

During all the time Acme has built C. W. apparatus, less than one instrument out of every thousand has come back for replacement, or even repairs.

Take the uncertainty out of C. W. by using Acme apparatus thruout.

Acme was the first to prepare for C. W. Years ago we began to develop an Acme instrument to anticipate every C. W. need. Today Acme has the most complete line of C. W. apparatus in existence. Each in-

strument is the fruit of exhaustive research and all are designed with careful reference to the others. Before you start your C. W. outfit, get the Acme bulletins. And when you do build, use Acme apparatus throughout!

ACME APPARATUS COMPANY

182 MASSACHUSETTS AVENUE
CAMBRIDGE, 39, MASS.



And don't forget the little Acme detector and amplifier unit. Compact, efficient, guaranteed, reasonably priced. At all dealers.



Modulation Transformer



Filament Heating Transformer



C. W. Power Transformers



1 1/2 Henry Choke Coil



C. W. Inductance



Everything for the Radio Man!

Our Stock of Radio Equipment is Complete. Everything from the Aerial to the Ground.

*Vacuum Tubes of All Makes
Supplies and Accessories*

Get Your Xmas Radio Goods Here

Electric Supply & Repair Co.

520 Market Street, San Francisco

“Elements of Radiotelegraphy”

By LIEUT. E. W. STONE

A 400 Page Book that contains much valuable information on many Radio Systems. Price \$2.50 Per Copy, Postpaid.
“RADIO,” 465 Pacific Bldg., San Francisco, Calif.

SOMETHING NEW

Made to Please You and Priced to Please Your Pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy, easily mounted socket that is heat proof, has bakelite-dielectric insulation, handy binding posts, etc., all for 75c.



And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.



Type 126, Tube Socket
Price 75c Postpaid

Type 122 Rheostat
Price 90c Postpaid

THE WILCOX LABORATORIES
LANSING, DEPT. J., MICHIGAN

CODFISH FOR CHRISTMAS

(Continued from Page 222)

salary of a hundred and fifty dollars a month.

Losing his head in a whirl of joyful excitement at the mere prospect, Old Judge dispatched an order to a wireless supply house for over three hundred dollars worth of apparatus. He felt that even if he became operator over at K-V-1 he would still want his amateur set for amusement and for conversing with the passing ships. He sent a small draft with his order and trusted to a belief that he would be able to draw from the codfish company an advance salary check to meet the C. O. D. bill of more than two hundred and fifty dollars when the apparatus arrived.

AND now, in one short afternoon, his hopes had been wrecked, his dreams shattered. Sadly, Old Judge regarded the newly-arrived packages. They would have to go back now. There was no doubt about that. Well, at any rate, being postmaster gave him the opportunity to unwrap the instruments and look at them, at least, before sending them back.

Without much enthusiasm, Old Judge untied one of the heavy packages, carefully removed the wrappings and brought to view a big, powerful-looking six-inch spark-coil. It was clearly a splendid instrument. Its polished mahogany case shimmered richly and its finely built vibrator with large, accurate contacts bespoke its quality. Old Judge set it on his instrument table and ruefully compared his own little coil, so small and inferior-looking beside the glistening big beauty. What distances he could do with the boys on the ships with this coil! Sixty miles any time, perhaps a hundred. And he had to send it back.

Fumblingly, Old Judge opened the next package. It contained a magnificent regenerative receiver. It was a superior instrument, its flawless panel, perfectly-grained, setting off artistically the glossy black dials, beautifully engraved, turning true and with a velvety smoothness.

Service Radio Equipment



Service Unit Receiver

SERVICE equipment fills the needs of every Amateur. Built into each instrument is the care and precision that will insure perfect operation and long life. And to back this statement is a guarantee that absolutely protects the purchaser.

Send for our bulletins now and let your next order be for SERVICE EQUIPMENT. Register on our mailing list and keep informed of the latest in radio development.

We have three ideals—
The first is SERVICE—so are
the other TWO

SERVICE RADIO EQUIPMENT
Box 340 Central Sta. Toledo, Ohio

But splendid piece of apparatus as was the regenerative receiver, it was outdone by a long-wave tuner with a complete set of honeycomb coils, and by a two-step amplifier that fairly took Old Judge's cabinet work, lustrous black insulation, and heavy rich nickel—a superb instrument.

For a long while Old Judge sat entranced, inhaling the faint odor of fresh insulation and metal that emanated from the tableful of handsome apparatus. How tarnished and dilapidated his own little set looked beside this magnificent equipment.

A passionate desire to keep all these beautiful instruments swept over Old Judge. What stations might he bring in; countless ships, land stations near and far, perhaps sometimes an amateur from the distant outside, certainly dozens of high-power arcs from everywhere. Old Judge had always wanted to tune in the arcs. He had often listened to them over at K-V-I, and had longed for a set that would bring them in.

A damp, chilly draft brought Old Judge back to earth. The fire was out and the room cold and cheerless. Taking his coal-hod, he went out into his little kitchen and scraped up a few scant shovelfuls of siftings from the bottom of his empty coal box. It took six tons of coal to see Old Judge through a winter—and coal cost forty-five dollars a ton down at the codfish company's shed. Besides, there were still costlier provisions to be bought.

Heavy at heart, Old Judge carefully rewrapped all the instruments and took them back into the room which he used as a postoffice. The mail boat was now at Dutch Harbor, to the westward, and upon her return the apparatus would go back with her.

Glancing at his calendar, Old Judge noticed with a shock that the mail boat was scheduled to touch at Unga, east-bound, on Christmas Day. It looked as if it was going to be a cheerless sort of Christmas for Old Judge.

Every year the codfish company sent up a few crates of live turkeys from San Francisco on the winter supply-schooner; and despite their sky-high prices, Old Judge had always managed to have one—but he was not going to have one this year. The postoffice wasn't bringing in much of late; weddings seemed to have gone out of style, shutting off that source of revenue; and the sourdoughs' guns were rusting from lack of use, with the result that even the eight-dollar court fee seldom came any more.

No, clearly, Old Judge would have no turkey this year. The company generously gave free codfish from the tanks to anybody who wanted it; and Old Judge would have to get along with fish. Codfish for Christmas wasn't a very

(Continued on Next Page)

TRADE **ESCO** MARK

GENERATORS—MOTOR-GENERATORS—DYNAMOTORS



4 to 32 Volts for Filament—350 to 2000 Volts for Plate.
Capacity 20 to 2000 Watts—Liberal Ratings.
Write for Bulletin 237, which lists over 200 Combinations.

**MOTORS AND GENERATORS DEVELOPED
FOR SPECIAL PURPOSES**
PIONEERS IN MANUFACTURING

High Voltage Direct Current Radio Generators

Electric Specialty Co. 

STAMFORD, CONN., U. S. A.
217 South Street

Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

- Puget High Voltage Transformer, Puget Variometers
- Puget Vacuum Tube Panels, Puget Transmitting Condenser,
- Puget Protective Devices, Puget Amplifier Sets
- Puget Short Wave Regenerative Sets
- and Others

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

SEATTLE WASHINGTON

"ILLINOIS" THE RELIABLE

MADE RIGHT - STAYS RIGHT



STYLE No. 1.



STYLE No. 2.

Three Styles; No. 1. Panel; No. 2. Open Type as shown; No. 3. Fully Encased. Anti Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



VERNIER

Options:—With Style No. 1—Instead of Scale and Pointer, a 3. inch Metal Dial at 50 cents extra, or a 3. inch Bakelite Dial at \$1.00 extra. Large Knobs. Both excellent values. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price
 Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.
 Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave. Springfield, Illinois

CODFISH FOR CHRISTMAS

(Continued from Preceding Page)

cheerful sort of prospect, but Old Judge felt that he could face it with a smile if only he could keep those magnificent instruments.

Had Samuel Jones known all of these things, he would undoubtedly have put Old Judge in at K-V-I. Old Judge realized this, but old and needy as he was, he had some pride. If he wasn't good enough for the job, he didn't want it given to him as charity.

Three weeks later, a wintry blizzard came shrieking over the Shumigans. Towering green seas boomed and thundered on the ocean-exposed shores of Unga Island, and the bitter northwest wind, sweeping down the sides of the white-clad island mountains, brought swiftly-flying gusts of hard, frozen flakes and crashing cannonades of sleet, until all the world seemed turned to snow and ice.

Provisions and coal were exhausted at the company store and the uneasy village was anxiously awaiting the arrival of the schooner "Anangashak," bringing a full cargo of fuel and food supplies, and the annual shipment of Christmas goods. Since the schooner carried no wireless, the time of her arrival was a matter of conjecture.

For five days the blizzard held on, steadily increasing in fury. Samuel Jones paced restlessly back and forth in his receiving room, or stood before his bay window and gazed out over the storm-swept sea toward the opposite island of Nagai, ten miles distant, whose lofty white peaks were occasionally visible during brief lulls in the blanketing snow-squalls.

Darkness fell. The roaring blizzard shrieked fiercely around the eaves of the wireless house; and the rocky ledge upon which the building stood quivered jarringly under the thundering impact of the towering rollers that hurled themselves against its granite base and enveloped the ice-crusting cliffs with white sheets of flying spray and sea-water which came swishing momentarily on the window-panes of the receiving room.

Standing in the darkness, gazing out into the night, the lone operator suddenly saw a far-distant fiery red serpent shoot skyward and burst into a shower of tiny glowing stars. Again and again a sinuous tongue of flame flashed like a little electric spark before a background of black velvet, until the watcher realized that distress rockets were being fired from over on Nagai Island.

Next morning the storm lulled, giving way to silently falling snowflakes that grew into great drifts around the buildings and sheds and made somber white ghosts of the mountains that girded the harbor round. Taking advantage of the pause in the storm, a power-boat ven-

(Continued on Page 228)



HERE IT IS—

This is the plug you have been waiting for. It is entirely different from anything on the market.

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Universal Plugs

made of Bakelite and designed to take any type of conductor without soldering; are attractive in appearance; simple in construction.



For plugging in head telephone sets, power supply, microphone transmitters, transmitting keys, or as many other things that an ingenious radio operator may think of.

A decided improvement over the ordinary telephone switchboard plug.

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Dealers write for special proposition.



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HUFFALO, N. Y.

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Get a MAGNAVOX now for Christmas, the one reproducer that will give you all the volume you want, without any distortion and without injuring your apparatus. Specify Type R-3 MAGNAVOX and get the big, new 14'' horn without any additional cost—price complete \$45.

Throw away the uncomfortable head set that chains you to your outfit. Get a MAGNAVOX. Delight your friends with radio concerts and wireless dance music. Make your set the source of pride and center of enjoyment it should be.

And be sure it's a MAGNAVOX, the **only** reproducer with the **movable coil**. Look for the trademark on the horn. If your dealer cannot supply you, write us direct. Do not accept a substitute.

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The reproducer with the movable coil

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Price \$12.00

Get Our New Radio Instrument Circular From Your Dealer

JEWELL ELECTRICAL INSTRUMENT CO.
CHICAGO

CODFISH FOR CHRISTMAS

(Continued from Page 226)

tured over to Nagai—and returned bringing the crew of the schooner "Anangashak."

Lost in the blizzard, the vessel had struck on Nagai. The crew got ashore, but the ship and all her cargo was a total loss.

Seeking out the skipper of the "Anangashak," Samuel Jones inquired for his relief operator.

"Him wouldn't come," replied the brawny shipmaster. "Seems like him didn't know vere ve vas going ven he comed aboard, but yust ven ve vas pulling out, somebody telled him an' he skijoodled ashore without efen his dunnage. Ay fancy him neffer vent back to der offis, an' them bane tankin' him vas aboard."

The news of the shipwreck spread quickly through the village. Soon a knot of anxious fishermen, all with numerous healthy kiddies to be fed, were gathered in the company store. The superintendent joined them.

"We'll have to get relief from Dutch Harbor or we'll be up against it," he said. "We divided the last sack of flour in the store yesterday. There's no fish on the grounds in this weather, and what little we had in the tanks has already been cleaned out. I went to get Old Judge a piece this morning, but there wasn't a fin left."

SHORTLY afterward, Samuel Jones emerged from the company store with a message for the Alaskan revenue cutter service at Dutch Harbor, explaining the plight of the village and asking for a relief cutter with supplies.

Staggering through the storm, which was again sweeping over the island with renewed fury, Samuel Jones was overtaken by Johnny Topsy, a rosy-cheeked youngster with a passion for wheels and machinery. With his ingenious, merry smile, Johnny had established a right of unquestioned admittance to K-V-I, where he spent much of his time keeping the station's engine looking as if it had just arrived from the factory.

"Stormy Gus come over from Pirate Cove while it wasn't blowin' so hard this mornin'," announced Johnny, as he followed Samuel Jones into the station and began shaking the snow off himself. "He says both 'a Hell-Fire's wireless masts bin blowed off into th' ocean, an' a freeze-up's busted th' cylinder of his diesel-engine. He's all on th' bum, ain't he?"

Samuel Jones did not reply. He was disappointed and angry over that chicken-hearted relief operator who had crawled and left him facing the prospect of being stuck at Unga indefinitely.

If only Old Judge wasn't such a hopelessly rotten operator—but as Samuel

(Continued on Page 234)

10c Charges Your Battery AT HOME WITH AN F-F Battery Booster



and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament Storage Battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? The F-F Battery Booster is a Charging Apparatus, unfailing in its ability to deliver service day and night; is rugged, foolproof and requires no skill to operate; charging automatically and operates unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. Ammeter shows amount of current flowing. Everything Complete in One Compact, Self-Contained, Portable Unit. The F-F Battery Booster is a Magnetic Rectifier for 165 to 125 Volt 60 Cycle Alternating Current. New Models at PRE-WAR Prices.

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The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights, complete with Ammeter and Battery Clips, 12 to 15 lbs. Order from your Dealer, or send check for Prompt Express shipment. If via Parcel Post, have remittance include Postage and insurance charges, or have us ship C. O. D.

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 Now!

Doctor Thru



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" 300	1.75	.85	
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After successfully conducting one of Oakland's largest radio supply stores for the past year, Warner Bros. take pleasure in announcing the opening of a San Francisco radio supply house under the name of *Warner & Linden*.

Mr. Linden is in charge of the San Francisco store and extends a cordial welcome to radio men of the city and Bay Districts to inspect the new sales rooms.

Expert radio advice and service for everybody. You will be pleased with our service and apparatus. Give us a trial.

KENNEDY EQUIPMENT

Other Lines:

ACME
GEN. RADIO
MURDOCK
and a large
stock of small
parts.

REMLER
CHELSEA
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MAGNAVOX AMPLIFIERS

Besides our line of Radio Apparatus we also carry Electrical Household Appliances and Electrical Equipment.

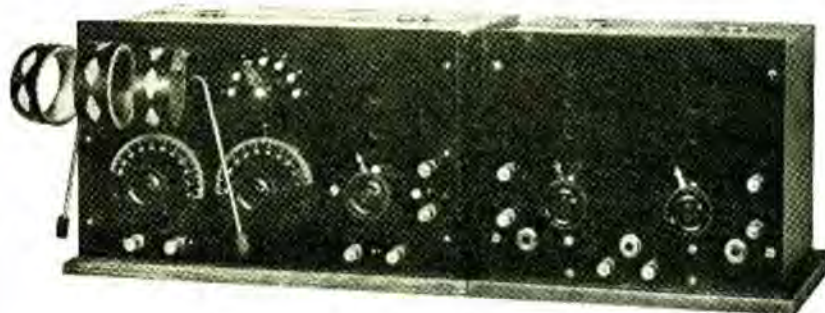
WARNER & LINDEN

T W O
STORES

SAN FRANCISCO
350 Market St.
Phone Douglas 4630

OAKLAND
22nd and Telegraph Ave.
Phone Oakland 3209

The Live Wire Concert Receiver



Receiver and Amplifier for Concert Reception.

Hear All the Radio Concerts with This New Receiver and Amplifier

This new radio Concert Receiver and two-step Amplifier is the latest addition to our ever-growing stock of radio apparatus. It is an ideal instrument for spark and C.W. reception, and can be used for any wave length with the aid of the various sizes of honey-comb coils. The illustration shows the front view of the two instruments. One unit contains the tuner, condensers, switches and vacuum tube control. The other unit is a two-step amplifier. Both units can be connected together, thereby making this a complete tuner, detector and two-step amplifier. The variable condensers have 23 plates each. Rheostats and sockets are of Remler manufacture. The panel is of bakelite—highly polished. The necessary binding posts are mounted on the front of the panel. General Radio amplifying transformers, Federal Jacks and bus-bar wiring are the features of the amplifier unit.

This does not include honey-comb coils or vacuum tubes. We can supply these separately. All leading makes of tubes carried in stock.

Price \$80.00

San Francisco, Cal.

Separate Instruments

The illustration shows the two concert units ready for operation. Units can be purchased separately, if desired. The tuning cabinet and vacuum tube control, as illustrated are priced at \$37.50. No tubes or honey-comb coils are furnished at this price.

The two-step Amplifier unit can also be had separately at the cost of \$45.00, less tubes, "A" and "B" Batteries.

Cabinets are of oak, mission finish, with hinged top to allow inspection of the interior.

Everything for the Experimenter

1230 Polk Street

Special Sets a Specialty



Say Radio to the Advertiser, it will help you.

KEYSTONE RHEOSTAT



The "Keystone" is one of the finest constructed rheostats on the market, and is made of the best heat resisting and durable material possible to obtain. Neat in appearance, is 2 1/4" diam, 3/4" deep, and 3/8" shaft. All parts are made of brass, and pointer is of heavy brass, nickel plated and polished. Resistance is 6 ohms, 1 1/2 amps. carrying capacity. Can be easily mounted on back of panel by only drilling two holes, also dial can be used, instead of the knob and pointer furnished. Resistance is wound tightly on an insulating strip and can not become loose. Sold on a guarantee of satisfaction or purchase price will be refunded.

PRICE \$1.25

Amateurs and constructors, don't miss sending 5 cents in stamps for our complete set of bulletins on raw materials, machine screws, wire, standard apparatus, audion and amplifying apparatus, and save money and time.

Keystone Radio Company
Greenville, Penn.

LEARNERS SETS



With code, instructions, and the AJAX BUZZER \$1.80.

60c—AJAX HYTONE BUZZERS—60c external tone adjustments. All postpaid. AJAX ELECTRIC CO., 8 Palmer St., Cambridge, 38, Mass.



Catalogue

A marvelously easy to understand instruction book on most advanced radio methods, because it describes in detail the unusual mechanical and electrical features and simplicity of the complete ABC line. Sixteen pages, clearly illustrated, in two colors. Every price quoted in this catalog represents a new low level for apparatus of recognized quality.

Send 10c for latest ABC catalog, "Professional Radio Equipment at Amateur Prices." Request Catalog CX11.

WIRELESS EQUIPMENT CO. Inc.
32 Austin Street, Newark, N.J.

CODFISH FOR CHRISTMAS

(Continued from Page 228)

Jones stood watching Johnny industriously oiling-over the engine, he reflected that the acute situation existing in Unga at the moment showed what a risky thing it would be to leave K-V-I in charge of an incompetent man. The only other wireless station in the Shumigans out of commission, gales and blizzards whipping the open sea into a maelstrom where no small vessel could live, and here an isolated village without food or coal in midwinter—where would its people be should the wireless fail? K-V-I must run.

And making K-V-I run was not any too easy. Only a few weeks before, a sending transformer secondary had gone up in smoke, and the last spare winding in the station was now on the transformer. It was not a very sturdy-looking secondary either, and had to be watched. If it were to shoot—

Johnny had the engine going now. Stepping over to the transmitter panel, Samuel Jones reached around behind to switch in a big auxiliary oil-condenser that he used in the closed circuit on the 2400 meter navy wave. The transmitter was controlled by an automatic break-in key mounted on the front of the panel; and as Samuel Jones worked shifting the condenser bus-bars, his elbow came against the armature-lever of the break-in key.

Instantly, the spark crashed in the gap—and Samuel Jones with his hands on bare bus-bars, jerked violently and doubled up like a jack-knife. He fell back upon the swiftly-running belt between the engine and the alternator, rode upon it a few feet, was hurled against an iron bench-vise at the opposite side of the room, and slumped to the floor senseless, a deep gash cut in the side of his head.

The spark had flamed in the gap but a mere instant. In that terrific involuntary jerk when he took the current, Samuel Jones had pitched the condenser connections together in confusion; and now a wreath of pale blue smoke curled up from the transformer secondary.

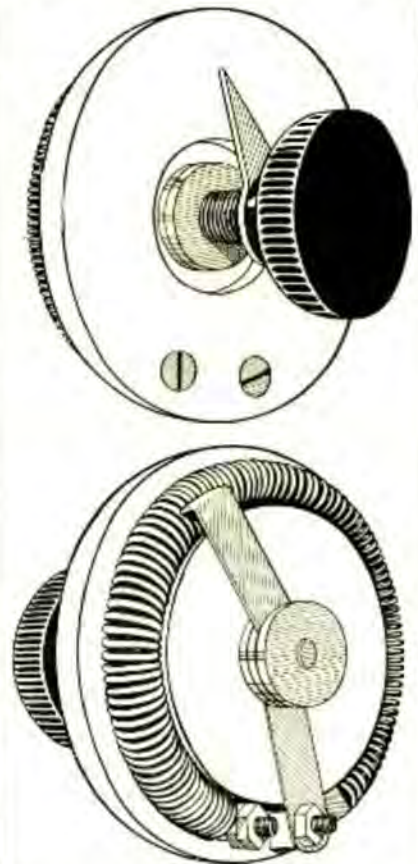
Badly-frightened Johnny had presence of mind and knowledge enough to pull back the jammed lever of the break-in key. Then he stopped the engine and went for help.

HALF-A-DOZEN fishermen carried Samuel Jones over to Old Judge's house on a mattress. There is no doctor at Unga; and in addition to his many other profitless duties, Old Judge is the village's first-aid.

But when Old Judge essayed to dress the wound in the operator's head, he saw that the injury was something too serious for him; it required the presence of a genuine doctor at once.

Old Judge went over to the station.

(Continued on Page 236)

SHRAMCO
-- REO --

For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

A BACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2 1/2 in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt. Detector

and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2 1/2 in. base.

SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

Detector and two stage amplifier Type SR-2.
Size of panel 10 1-2x12 3-4. Complete less tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

Prices Reduced on **Eveready Wireless B Batteries**

Eveready Wireless B Batteries, the long-lived, moisture resistant batteries that are designed and made especially for radio uses, are now offered at better prices. All of our wireless B Batteries are included in the reduction.

The new prices, effective immediately, are:

- No. 774—A 43-volt Battery with 6 positive terminals, allowing a range of from 18 to 43 volts in steps of 4½ volts\$4.50
- No. 766—A 22½-volt Battery with 5 positive leads, giving a range of from 16½ to 22½ volts in steps of 1½ volts.....\$3.00
- No. 765—A 22½-volt Battery with one positive terminal. A dandy Battery for beginners \$2.00
- No. 746—The big 108-volt Battery for amplification.....\$15.00

These batteries have made good. Amateurs and seasoned operators may specify Eveready Batteries with an assurance that they will be found equal to every demand.

National Carbon Company, Inc.

599 Eighth St., San Francisco, California.

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Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

HERROLD LABORATORIES

"Everything for the Amateur"

467 SOUTH FIRST STREET

WONDERFUL
REGENERATIVE
SIGNALS

NO MAGNETIC
LEAKAGE

\$5.50
Plus 30c
Postage

NEW DUPLEX
1000 METER
SET ON HAND

SAN JOSE, CALIF.

Dubilier C. W. Condensers, Type 580

This latest addition to the already remarkably complete line of the Dubilier Condenser Company will meet a long-felt want of all amateurs interested in C. W. Transmission.



The Type 580 Dubilier Condenser is made in the following standard capacities:

	Cat. No. 310—Triple capacity.	
0.0003 Mfd.	0.0004 Mfd.	0.0005 Mfd.
	5000 Volts	4 Amps.

The Type 580 is supplied also in the following single capacities:

Cat. No.	Capacity	Voltage
311	0.001 mfd.	5000
312	0.002 mfd.	5000
313	0.005 mfd.	2500
314	0.01 mfd.	2500
315	0.02 mfd.	2500

Prices on Other Capacities Upon Application

Pacnet Electric Company, Inc.

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44 Broad Street

Read about what's going on among the Commercial, Navy and Army operators

ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 Yearly, 15 Cents a Copy

CODFISH FOR CHRISTMAS

(Continued from Page 234)

Johnny explained as well as he could what had happened.

"An' that ol' black gillhooley with th' yellow doughnut thing on it blowed up again," he concluded, pointing at the burnt-out transformer. "It was th' last doughnut, too—there was some new ones comin' on th' 'Anangashak.'"

Looking at the secondary, fairly burned to charcoal, Old Judge saw that it was manifestly beyond hope. But a message had to be sent out some way—and quickly.

Going into the receiving room, Old Judge's eyes fixed themselves upon the half-inch spark-coil that Samuel Jones used for short-distance work. Old Judge knew there were no ships in the vicinity, and therefore no chance of raising anybody on that little coil, but the sight of it vaguely reminded him of something—he didn't know just what. For a long time he puzzled. Why, of course—the six-inch spark coil over in the postoffice!

Half-an-hour later, Old Judge had the big coil on the desk hooked up in the place of the half-inch instrument. The powerful coil worked splendidly on K-V-I's big aerial and for a time Old Judge called N-P-R hopefully, but with the approach of midnight he finally realized that he was not radiating enough power to possibly raise the naval station almost three hundred miles away.

Taking the coil off the storage-battery upon which he had been operating it, Old Judge connected it through a battery-charging resistance to the 110 volt exciting-generator current. A much heavier spark resulted, but still it was not enough. Old Judge heard N-P-R clearing N-P-Q on the 3 A. M. schedule; and though he called repeatedly he could not attract the navy operator's attention.

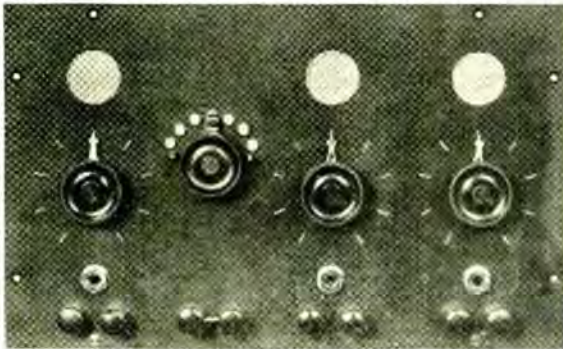
Old Judge reduced the resistance in the coil's primary circuit until the vibrator contacts arced heavily and grew so hot that Johnny, still faithfully on the job, had to cool the vibrator with a wet rag while Old Judge called again and again. The cold grayish light of a gloomy mid-winter morning found him still at the key, the big coil's contacts now quite burnt up, the vibrator ruined, and sticking hopelessly.

Old Judge spent the forenoon doctoring Samuel Jones. The injured operator was developing a fever; and Old Judge saw that help must come quickly.

With the germ of an idea in his head, that afternoon he went back to the station and studied the burnt-out transformer on the main set. Going into the receiving room, he attacked the big spark-coil with a screw-driver and took off the cover. Procuring a dish-pan, he set it on the stove and laid the coil in it to melt out the wax compound that filled the

(Continued on Page 238)

A Super Amplifier—



Front View of Detector and Two-step Amplifier

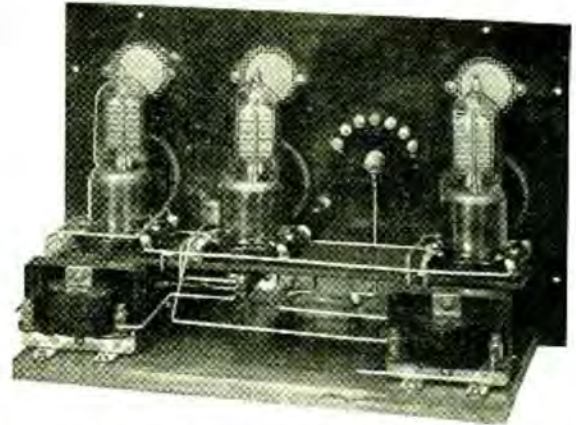
PRICES

Detector Panel	\$ 9.00, with Cabinet	\$12.50
Detector and 1-step Panel	\$22.50, with Cabinet	\$26.50
Detector and 2-step Panel	\$40.00, with Cabinet	\$45.00
Detector and 3-step Panel	\$55.00, with Cabinet	\$60.00
One-step Amplifier Panel	\$13.50, with Cabinet	\$16.50
Two-step Amplifier Panel	\$30.00, with Cabinet	\$34.00
Three-step Amplifier Panel	\$45.00, with Cabinet	\$50.00
Grid Condensers .....		.65 cents

DEALERS! Write at once for our Profitable Trade Proposition.

Borch Radio Laboratory

716 Peralta Ave., Berkeley, Calif.



Rear View of Detector and Two-step Amplifier

MURDOCK No. 56 RADIO RECEIVER



2000 Ohm Double Set 3000 Ohm Double Set

\$5.00

\$6.00

RELIABLE SERVICE—UNEQUALED VALUES
GUARANTEED TO SATISFY

Sold on 14 Days' Trial—Money Back if not Satisfied
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WM. J. MURDOCK CO., CHELSEA, MASS.
40 CARTER STREET

500 MISSION STREET, SAN FRANCISCO

FORMICA

SHEETS - TUBES - RODS

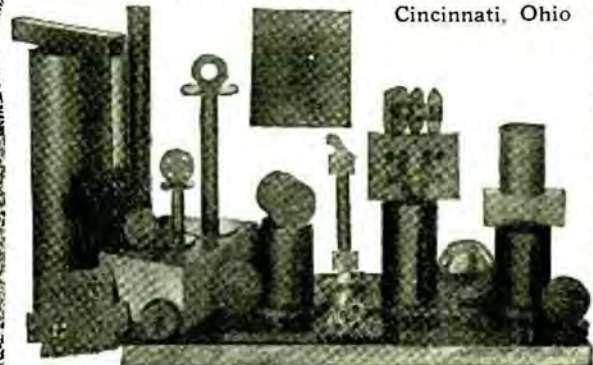
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



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Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco;
Wireless Shop, 511 W. Washington St., Los Angeles;
Northwest Radio Service Co., Seattle, Washington.

Phone San Jose 2126-J Established 1909
1200 Students

OUR WAR RECORD—200 Men Trained—130 Placed in Service

HERROLD COLLEGE OF ENGINEERING AND RADIO

SPECIAL ATTENTION TO EXPERIMENTERS
AND AMATEURS

467 South First Street SAN JOSE, CALIF.

Best Christmas Greetings from Atlas

Fellow Amateur, when you sit with expectancy before that set on Christmas Eve and hear the gang come rolling in from far and near, just pause a minute and remember that behind a goodly portion of those signals are ATLAS TRANSFORMERS—wishing you radio's best.

ATLAS EFFICIENT TRANSFORMERS

Amplifying transformer	\$ 5.00
Modulation transformer	5.00

POWER AND FILAMENT HEATING TRANSFORMERS

500 watt, 1000-1500 volts	\$19.00
200 watt, 350-550, fil. 12 volts	15.00
50 watt, 375, fil. 10 volts	11.00
150 watt, fil. 10-12 volts	12.00
75 watt fil. 8-10 volts	8.50

CHOKO COILS

1½ Henry, 500 M. A.	4.00
1½ Henry, 150 M. A.	3.00

RHEOSTATS

6 ohm. 1½ Amp.	\$1.00	50 ohm. 3 Amp.	\$ 5.00
6 ohm. 7 Amp.	2.00	50 ohm. 7 Amp.	10.00
4 ohm. 16 Amp.	5.00	50 ohm. 15 Amp.	15.00

CW. TUNING INDUCTANCES 25, 30, 35 turn \$8, \$9, \$10

DX-52 SPARK O. T. \$25.00

MAIL ORDER SERVICE includes all standard makes of apparatus—sorted and tested vacuum tubes—all raw materials—quick service.

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Conducted by the greatest and most experienced radio telegraph organization in the world.

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Write today for full information.
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**The "QSA" Line of Equipment
COMBAT**

A Storage Battery especially designed for Radio work. The only Battery with non-corroding binding posts. Write for particulars and incidentally get your name on our mailing list to receive our monthly bargain sheets.

Here is one of the many items listed for December:
Dry Cell B-Battery 45 volts \$1.85 ea.

**INDEPENDENT RADIO SUPPLY
COMPANY**
3716 W. Douglas Blvd., Dept. P-12
Chicago, Ill.
"Better Results with Less Effort"

CODFISH FOR CHRISTMAS

(Continued from Page 236)

case. This done, he set about taking out the secondary, and after being forced to break the coil case to pieces, he at length got the winding out, intact.

With Johnny's help, he dismantled the sending-transformer, removed the burnt secondary, and attempted to put the spark-coil winding on in its place. Finding the transformer core much too large for this, he pulled the leg of the core to pieces and with a pair of snips cut a number of the soft iron laminations into strips narrow enough to enter the spark-coil secondary. After hours of tedious labor reassembling the iron core pieces,

BANG

Smashing "B" Battery Prices
"WIZARD"



From Manufacturer to User All Batteries Sent Postpaid

Announcing:
Wizard's 2 new improved type "B" Batteries

No. 1632, 1 Tap, 45 Volt Variable Battery.
Size 6 in. x 5 in. x 2-38 in.
Price \$2.80. Weight 3¼ lbs.

No. 1630, 6 Taps, 27 Volt Variable Battery.
Size 6 x 3 x 2-38 in.
Price \$1.80. Weight 2½ lbs.

These new types are not made of the same size cells as a small size "B" Battery. The volume of a cell used in these types is 4.7 cubic inches, as compared with 2.5 cubic inches, the volume of a cell used in the small "B's".

You can easily see that the life of these two types are almost double the life of the small "B's".

No. 1632 has one tap at 22½ volts.

These prices seem unbelievable, as do all other "WIZARD" prices, but are made possible only by dealing direct with the consumer.

Thousands are realizing the money that can be saved in the course of one year by purchasing from "WIZARD." Always remember we pay all P. P. charges. Write for Bulletin No. 6. Other "WIZARD" types:

Cat. No.	Size	Taps	Volts	Wt. lb.	Price
1623 Plain	3¾ x 2½ x 2	22½	1	\$1.00	
1623 Variable	3¾ x 2½ x 2	5	22½	1.20	
1625 Plain	6¾ x 4	x3	22½	5 1.85	
1625 Variable	6¾ x 4	x3	5	22½ 5 2.25	
1626 Plain	6¾ x 8	x3	45	10 3.75	
1626 Variable	6¾ x 8	x3	6	45 10 4.15	

Send all money orders to

Wizard Battery Co.

1315 42nd St. Brooklyn, N. Y. Dept. R

he at last had the transformer back in its mounting with the improvised secondary connected into the set.

Johnny started the engine. After getting the condenser connections straightened out, Old Judge carefully cut the alternator voltage down to the lowest limit and gingerly pushed over the lever of the break-in key on the panel.

A spark, rather small, but smooth and clear, flashed across the teeth of the synchronous-gap; and the hot-wire ammeter climbed up to five amperes. After testing a few minutes, Old Judge felt the secondary winding and found it still cool. He had studied his books enough to understand that the fine wire with which it was wound was liable to melt instantly if too much current were pulled from it. Gradually raising the alternator voltage, he brought the ammeter reading up to seven amperes before the secondary began to feel warm.

Trembling with excitement, Old Judge hastened into the receiving-room and listened in. He heard no signals, but it was still early in the evening and the navy operators would be on the job. Old Judge grasped the key and shakily called N-P-R.

There was no response.

Again he called, and yet another time, followed by a C-Q, but still no answer. A cold fear clutched at Old Judge's heart for a minute; then he discovered that no signals could be brought in anywhere on the tuner. He had seen Samuel Jones have the same trouble and he knew just where to look. Hurrying into the power-room, he examined the break-in key. Industrious Johnny had over-oiled the key-armature; and the lubricant had gummed the contacts on the receiving side.

Quickly cleaning the key, Old Judge returned to the receiving set and got the phones on just in time to hear the familiar spark of N-P-R coming in strong. The sending had an angry snap in it.

"Say, didn't I tell you to keep off that key, you confounded old lummox!" the gob was yelling. "Get out 'a there an' stay out—you spoil th' air!"

Old Judge was nervous and frightened, but he was not to be bluffed this time. With gritty determination, he steadied his shaky wrist.

"Excuse me, N-P-R," he replied. "I know you don't like to work with me, but S-J is hurt. Will you take a message to the revenue service?"

The gob came back on the air and spluttered around apologetically for a moment.

"Awright," he finally returned. "You seem to have improved a little since last time, anyway—guess we can get along."

IT WAS Christmas Day—an Alaskan Christmas Day, cold and quiet, with the big white snowflakes falling thick and fast, piling the smaller
(Continued on Next Page)

CROSLEY

RADIO APPARATUS

"BETTER—COSTS LESS."

A SMASHING HIT

Crosley V-T Socket



60c

"Better—Costs Less"

Here are the reasons why this socket won instant popularity

—why it was the hit of the Chicago Radio Show—why today it is the biggest seller. It's the only socket made for both base and panel mounting. It's made in one piece, entirely of porcelain—there is no metal shell—hence no "ground hum". Its design eliminates possibility of short circuiting filament across high voltage "B" Battery. It is better—and costs only 60 cents. Be sure to use CROSLEY SOCKETS in the radio set you are building. Every live dealer handles them—if yours doesn't, send us his name and order direct—we will ship prepaid.

Harko Radiator Receiver



Complete with battery and interrupter for crystal testing, crystal, etc. Price \$9.00. Phones extra. DEALERS: This will help you get 'em started.

No batteries, tubes, etc., required. Hook it to your aerial and phones. It will tune from two hundred to six hundred meters, bringing in spark, voice, and music, with an average amateur aerial.

Crosley Cabinets



The Crosley Variable Condenser

(Pat. Pending)

"BETTER—COSTS LESS."



This Condenser works on an entirely new principle. The two plates are hinged and are opened and closed like a book by means of a specially designed cam. The plates are surfaced with copper. One copper sheet is covered with mica so that

when the two plates are clamped tightly together the maximum capacity is obtained. The maximum capacity of this Condenser will average about .0008. We rate it conservatively, however, at .0005.

This Condenser has several advantages over the ordinary type of air condenser. Will stand 1000 volts without breaking down. It can therefore be used for C.W. work. Has no body or hand capacity effect. Has much greater signal strength due to the fact that mica is a much more efficient dielectric than air. The calibration curve of this Condenser is almost a straight line. Has unusually low zero capacity—.00006.

Price without knob and dial \$1.25
With knob and dial 1.75
Mounted in cabinet with knob and dial 2.50

Sold on a GUARANTEE of absolute satisfaction or money refunded.



The tendency in the radio field today is to put apparatus in cabinets not only for appearance's sake, but as a protection from dust, dirt, atmospheric conditions, etc. Realizing the demand for attractive stock cabinets of various sizes, we are building them in quantities in our large wood working plant. These cabinets are all uniform in style. The panels are rabbeted in to the front. As the outside dimensions and inside dimensions are either larger or smaller than the panel itself, we show panel size and also inside dimensions. Prices quoted do not include the panels.

All cabinets are waxed antique mahogany finish. Wood used is either gum, genuine solid mahogany or quartered oak. Lids or tops are hinged. Sizes and prices are shown below:

For Panel Size	Inside Dimensions			Mahogany or Quartered	
	High	Wide	Deep	Gum	Oak
6x7	5 1/2"	6 1/2"	7"	\$2.50	\$3.85
6x10 1/2	5 1/2"	10"	7"	2.75	4.40
6x14	5 1/2"	13 1/2"	7"	3.30	5.55
6x21	5 1/2"	20 1/2"	7"	3.90	7.30
8x14	8 1/2"	13 1/2"	10"	3.70	6.80
12x14	11 1/2"	13 1/2"	10"	4.40	6.80
12x21	11 1/2"	20 1/2"	10"	5.25	10.60

Cash must accompany order. No C.O.D.'s. We pay transportation charges.

We can furnish genuine formica panels 3/16" thick, cut to the following dimensions: 6x7, 6x10 1/2, 7x9, 6x14, 7x12, 6x21, 7x18, 9x14, 12x4, 14x18, 18x21. Price of panels—21¢ per square inch. For odd sizes order the next largest size; we will trim. We pay postage.

Every article bearing the name "CROSLEY" is GUARANTEED to give absolute satisfaction or money will be refunded.

We shall be pleased to send literature describing the above mentioned and other radio apparatus to any one free of charge upon request. Get your name on our mailing list to receive latest Bulletins of other new Crosley products. If your dealer does not handle our goods, order direct and send us his name.

Dealers: It will pay you to handle our line. Write for particulars.

CROSLEY MANUFACTURING CO.

Radio Dept. P-2

Cincinnati, O.

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Our monthly Bargain Circular Contains dozens of Holiday Suggestions. Write for it now.

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Everything Your Boy Needs for His WIRELESS Set

From the simplest outfit for the beginner to the larger plant of the ambitious and more expert amateur operator—everything will be found in our Wireless Department.

- Aerial Wire, stranded.
- Magnet Wire, enameled and cotton covered.
- Audion Globes.
- "Eveready" Wireless "B" Batteries.
- "Eveready" Storage Batteries.
- Detector Panels.
- "Bakelite" Dials and Knobs.
- Variable Grid Leaks.
- Amplifier Panels.
- Q. S. A. Coils, mounted and unmounted.
- Variocouplers—Variometers.
- Contact Points, Binding Posts.



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Cat. No.	Plain	Size	Voltage	Lbs.	Taps	Price
623	Plain	2 1/2 x 2 x 3 1/8	22 1/2	1		\$1.50
623	Variable	2 1/2 x 2 x 3 1/8	22 1/2	1	5	1.75
625	Plain	3 x 4 x 6 3/8	22 1/2	5		2.50
625	Variable	3 x 4 x 6 3/8	22 1/2	5	5	3.00
626	Plain	3 x 8 x 6 3/8	45	10		5.00
626	Variable	3 x 8 x 6 3/8	45	10	6	6.00



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Write for Cat. # 20. Ace batteries are silent, moisture proof and absolutely guaranteed. DEALERS—Get in on this fast selling item.
264 Atlantic Ave. ACE BATTERY MFG. CORP. Brooklyn, N. Y.

CODFISH FOR CHRISTMAS

(Continued from Preceding Page)

drifts into big hills and building the big hills into great white mountains.

Samuel Jones, wearing a bandage around his head, but otherwise quite his usual self, sat in Old Judge's den reading a magazine and soaking in the mellow warmth that pervaded the room. The heater glowed redly, and a big bucketful of coal stood waiting beside it; for the superintendent of the codfish company argued that since hardly any fuel was being used out in the wireless station, Old Judge was entitled to free coal for his house.

Excited juvenile shouts out in the village attracted Samuel Jones' attention; and looking out through a window, he saw two obstreperous young Alaskans on the opposite hill-side fighting frantically for possession of a shiny new coaster-sled, while a dozen or so youthful spectators all clutching big brilliantly-striped sticks of candy in their mittened fists, looked on and yelled at the top of their lungs.

Samuel Jones suddenly turned around and sniffed, expectantly. From the kitchen, where Old Judge was bustling about with a great stir, there emanated a Christmassy odor of turkey and cranberry.

"By jingo, it's a funny thing—somehow I can't feel very sorry over havin' got this gash in my bean," remarked the ex-operator of K-V-I, a little later as he jabbed his fork into a big piece of delicious white meat. "Mebbe I'm a kind of a fatalist; but someway I always figure that everything turns out for the best."

Old Judge gazed fondly at the regenerative receiver, the long-wave tuner and the two-step amplifier, all glittering in magnificent array on the little table in his den; and he felt that perhaps Samuel Jones was right.

CALLS HEARD AT 70Z, G. LEWIS, 1745 WILLAMETTE, EUGENE, ORE.

All CW unless otherwise specified. One-stage: 2TT, 2WJ, 4ARK, 4CI, 5AT-spk., 5ZA-spk., 6MK, 6WV, 6XAC, 6XC, 6XAD, 6XG, 6XKA, 6ZH, 6ZN, 6AAT, 6AIX, 6ALE, 6OO, 6ALO, 6ARC, 6ASJ, 6AUL, 6AWV, 7CE, 7XP, 7TQ, 8BON, 8GV, 8UJ, 8XM, 8II, 8DK, 9AAU-spk., 9ANP-spk., 9AUP, 9AGN-spk., 9ARG-spk., 9VH, 9AYV, 9AEG, 9FR, 9UN, 9XI, 9AUO-spk., 9AMB, 9ZY, 9AK, 9ZN-spk., 9RT.

Daylight sparks: 6AK, 6IM, 6CZ, 6CI, 6IC, 6PH, 6GF, 6GR, 6IC, 6JE, 6HN, 6OC, 6PR, 6QR, 6TUL, 6AFN, 6ALW, 6ATV, 6AUD, 6AVR, 7CE-CW, 7IN, 7KS, 7MI, 7MO, 7TQ-CW.

Well, fellers, how do you like 7MF? His spk is reaching out. He is of the opinion that he worked 9AGN the other day, but is waiting for verification. 7OZ has only a 150-watt st. gap set now. Going to put in 1 K.W. soon. 7HF has come to life and is working everywhere, at last. Something like 6AS used to be 7IW is still hammering away with his half. 7SR will be on with 1 K.W. soon. That will make five relay men here, although 7OZ and 7MF will devote some time to calling nines. We have very good results in Eugene now, as a glance at calls heard will show. 2TT has been heard consistently by almost everybody in town. There is some slight trouble here due to local qrm from 6QR, who is audible at 7OZ, over 200 feet from fones. Let's have a description of 6QR.

Wishing "RADIO" continued success. GARRETT LEWIS.

KENNEDY
EQUIPMENT

QUALITY PRE-EMINENT

*Kennedy
Type 220
Intermediate-Wave
Regenerative
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*Licensed Under
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WE have been equally careful in the selection of our distributors. The purchaser of Kennedy Equipment must have service in keeping with the quality of the apparatus and we have therefore chosen only firms of the highest standing to represent us. Arrangements are being made for other distributors in centers where we are not as yet represented. Our present distributors in some of the large cities are listed below:

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- CLEVELAND.....THE NEWMAN-STERN CO.
- DENVER.....REYNOLDS RADIO CO.
- DETROIT.....WM. J. HARTWIG CO.
- KANSAS CITY.....CENTRAL RADIO CO.
- LOS ANGELES.....ELECTRIC LIGHTING SUPPLY CO.
AND SOUTHERN CALIFORNIA ELECTRIC CO.
- MINNEAPOLIS.....STERLING ELECTRIC CO.
- NEW YORK.....MANHATTAN ELECTRICAL SUPPLY CO.
- PHILADELPHIA.....FRANK H. STEWART ELECTRIC CO.
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10 WATTS

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SPARK
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Do YOU believe in NOISE, HIGH VOLTAGES, BLINDING FLASHES, BROAD INTERFERING WAVES, or do YOU appreciate the fact that a LOW POWERED C. W. set will cover great distances with little or NO NOISE, comparatively LOW VOLTAGES and with the additional feature of TRANSMITTING the VOICE, beside ELIMINATING the Q R M by means of sharply tuned waves.

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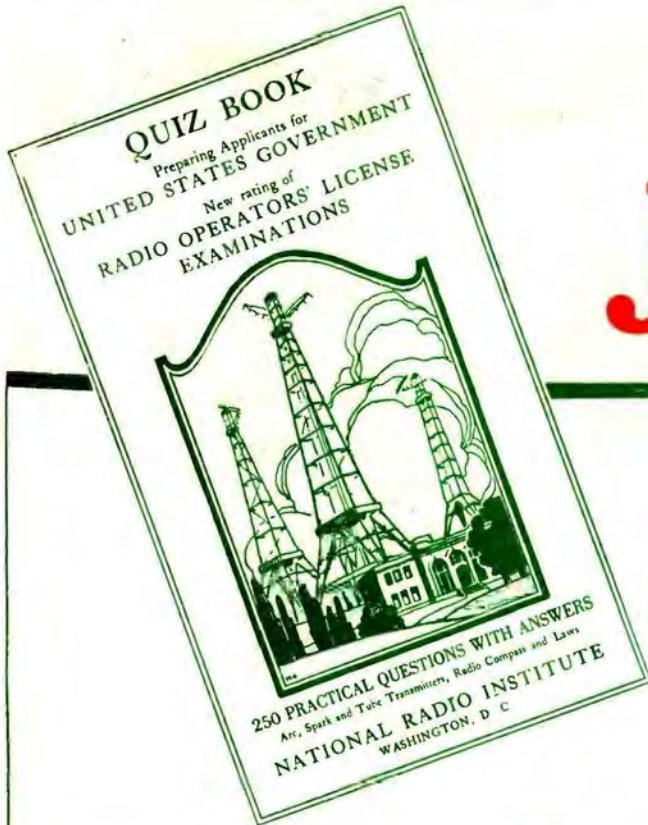
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 Types of Antennae and Aerials.
 Damped Wave Receivers.
 Latest Types of Undamped Receivers.
 International and U. S. Radio Laws and Abbreviations.
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YOU CAN NOW get all the splendid performance of *ABC UNITS* at un-heard-of low prices.

For *CLIMAX UNITS*, tho' costing less, bring you every necessary feature for a commercial-grade receiving station. The illustration shows the *CLIMAX* receiver, VT detector, and two one-step amplifiers, hooked together to form one compact, result-getting set. This entire outfit sells for only \$54.25 (less tubes and batteries.) You can buy one Unit at a time, and yet get remarkable results from each succeeding combination as you go along.

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Receiver \$13.50
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PROMOTING SALE OF RADIO EQUIPMENT

(Continued from Page 196)

chased by people who are willing to spend from \$200 to \$400 for high class equipment. Receiving sets are installed at the Claremont and Mt. Diablo Country Clubs, and last week when the world series baseball returns were being sent out from our station at the California Theatre—every ball and strike just as fast as you saw them posted on the newspaper bulletin boards—the players out on the golf course could hear these returns over a mile from the club house, through the use of a Magnavox similar to the one we have here.

Let me tell you a little more of what the radio jobbers and manufacturers are doing locally to create demand. There are five radio telephone stations in operation within 40 miles of San Francisco, on different time schedules and wave lengths, so that it is possible to receive at least two and often as many as five radio concerts a night in every home. Grand opera concerts were broadcasted by radio twice this year from our California Theatre station and from the Meyerberg station at the Fairmont Hotel. These concerts were received over distances upwards of 1000 miles. The returns of the Dempsey-Carpentier fight, Sunday morning symphony concerts, and Sunday sermons by clergymen—you see you may have your choice—have been other special features. Semi-technical talks with demonstrations have been given before all the local business organizations. The public is being sold to radio. All that is needed is to round out distribution, and the electrical trade is the logical medium to accomplish this.

There are between 400 and 500 stores handling radio apparatus in the United States today, but this is not enough. More dealers are needed. Let us see what requirements the radio dealer must meet—a stock investment of from \$500 to \$1500, which can be turned over rapidly, and, as I have said before, a salesman who knows the line. There are about 12,000 electrical dealers and jobbers with retail departments and 3000 central station companies selling electrical merchandise in this country. This gives a total of 15,000 possible distributors for radio apparatus. This number is not too great because there are 700,000 bona fide amateurs as well as your farmers and private home users to reach. Needless to say, those of you who get in at the start are the ones who will reap the greatest profits. Let your radio department grow up with this business and your profits will grow likewise.



C. W. Condensers
.0004 M. F. . . \$4.75
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All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob. Resistance is 5 ohms, carrying capacity 2 amps.

No. 77 Parkin Dial Rheostat, postpaid . . . \$1.75

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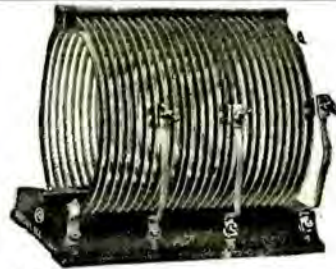
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The Radio Corporation's C. W. Tube Transmitters consist of scientifically co-ordinated parts, which, when connected together provide a thoroughly reliable C. W. Tube Transmitter. All uncertainty of operation is eliminated. The demand for R. C. A. Continuous Wave Apparatus is unprecedented.



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Telmaco's policy is to give better values. That's why we are forced to work overtime to fill orders. The Telmaco Short Wave Receivers are completely assembled; lugs are in place on which to solder wires; No. 14 silver finished wire, as well as necessary tubing is furnished.



The Cabinet is constructed of quarter sawed oak, stained inside and out, with waxed finish. Panel is of grade M 3/16 in. Formica, 6 1/8 in. x 16 1/4 in. satin grained finish, mounted on special drawer sub-base. Metal parts are nickel plated and oxidized. Binding Post Construction is of Telmaco special design extending through back of cabinet, thus removing all external wiring from front of panel.

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to match the above. Same general construction, height and depth. All amplifying transformers fully mounted and all amplifying units furnished with full Automatic Filament Control jacks, and special Radio plug.

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SPECIAL BEGINNER'S SET

Telmaco's beginner's complete receiving outfit includes 2000 ohm double phones, detector, mineral, condenser, double slide tuner, 160 ft. aerial wire, insulators, and book of instructions. A first class outfit. Very popular. Price \$12.00.

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Radio Division

Telephone Maintenance Co.

17 N. LaSalle Street, Chicago, Ill.

LETTERS TO THE EDITOR

(Continued from Page 199)

more satisfactorily and efficiently ten years ago than it is at present? Can he prove that ships such as the Matson fleet enjoyed the "quick come back" when far out at sea, or the selectivity of tuning, as they do at present, when using the old Type D tuner, crystal and old straight gap of 1910 or 1912? We are not old operators, having been at sea only seven years, but we have operated the misconceptions of the United and Shoemaker Wireless Telegraph Company, and have watched the growth and improvements of radio during the years. Although freak distances were occasionally covered with these old sets, directly coupled, with a decrement unlimited and waves as broad as the Pacific; still we must remember that at this early date there were comparatively few ships equipped with radio on the Pacific, and the coast stations would spend hours and even nights to make a record, as they then had no other traffic to handle.

We admit that there are some so-called operators who make their station an experimental laboratory, who dismantle their apparatus to conform to their own ideas of efficiency (?) and who bring discredit on the entire profession. This type of operator was as prevalent at the initiation of radio as he is at the present day, and is no argument against the profession as a whole. The fault lies with the employer. Is it necessary that they hire one of these incompetents to go out in charge of a ship's radio when there are many capable operators out of work? Perhaps they do everything within their power to get rid of these men, but there will always be a certain percentage of this class, no matter whether they are using their own or ship's apparatus.

We know of no instances where commercial operators have spent \$300 to \$400 for the privilege of hearing POZ on the Pacific, as Mr. Soderstorm states they do, but we do know of many who have invested \$30 or \$40 to enable them to get reliable time signals, press broadcasts and hydrographic information on offshore voyages. Many of these had the necessary apparatus at home on their amateur sets. There is no need of dismantling the regular set to set up an audion. About two leads may have to be changed to receive on either audion or crystal, so there is no chance of the "private apparatus" interfering with the operation of the equipment provided. It is the practice on many ships for operators to have entirely separate receivers for long wave. A single lead to the antenna is the only additional connection to the installation, and while the operator receives his press through one ear piece, the other remains connected to the ship receiver and the

(Continued on Page 250)



"Signal" Radio Apparatus Pleases Professional and Amateur

Because it is built to the exacting requirements of the professional radio-electrician, SIGNAL wireless products are bound to fulfill every requirement of the exacting amateur. And the name SIGNAL is the only thing to be certain of in buying!

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Reduced to fewest words, the superiority of this SIGNAL Switch is due to the fact that it has the good features found in highest priced amateur change-over switches, plus all the qualifications of the modern antennae switch. Lack of room prevents recounting these features here; one point alone should suffice, however, as an ex-



Transmitting Side

ample: That is the arrangement whereby the aerial is drained of any accumulated charge before the switch reaches receiving position. Search and you'll find this feature only in the most



expensively built commercial aerial switches. And any operator who is "wise" to the nasty kick in telephone receivers, when shifting quickly from send to receive, will appreciate this SIGNAL advantage.

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The only vacuum tube socket on the market today that will take any of the standard four-prong tubes, either Detector, Amplifier or Oscillator, without changing or adjusting. And this is not the only distinguishing mark of this SIGNAL socket—the others are all told



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Complete as shown with
Green glass insulators
Removable point disc (machine stamped)
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Cunningham and Radiotron Tubes.
Postage Prepaid Anywhere in U. S.

ETS-HOKIN & GALVAN
Wireless Engineers
10 Mission Street San Francisco



Unwired Regenerator \$22.50



Detector & 2 Stage Amplifier \$25.00

With Three Tubes Matched to Transformers \$40.00

These apparatus are constructed with the best materials and workmanship. They have no superior at any price. Apparatus fully guaranteed. Send for descriptive bulletin immediately.

FREDERICK WINKLER, Jr.
304 Columbus Ave., New York, N. Y.

Assemble Your Own Apparatus

We are now manufacturing Radio Apparatus of improved designs, and furnish stock parts for those who desire to build their own cabinets. These prices can not be beat.

COMPARE THESE PRICES

Triple Honeycomb Mounting (for panel mounting).....\$5.00
Variometer wood parts (unassembled and unmounted)..... 2.00
Miniature D. P. D. T. panel Switch. 1.00
Vario-coupler Rotor..... .60
"Paragon" equipment is not merely assembled - - - but BUILT."

Send 10 cents for Bulletin and future announcements.

PARAGON ELECTRIC CO.,
215 North 6th Street, H.
Newark, New Jersey

You Should Be a Subscriber

LETTERS TO THE EDITOR
(Continued from Page 248)

600 meter watch is thereby kept. This is also regular navy practice.

As far as interviewing the skipper about the installation, this is the proper thing to do if it does not comply with the law. But if the skipper has been used to results obtained by operators using audions and you fail to produce the same, his answer when broached regarding purchase of additional equipment is invariably, "It has worked all right before, I don't see why it doesn't do the same now," and no amount of argument can convince him otherwise. Rather than be thought an incompetent operator, most radio men provide their own audions or other efficient equipment.

There is no reason to bore the table or bulkheads full of holes, or litter the shack with a jumble of loose connections, switches or other material, as Mr. Soderstorm states. Any operator who does this is incompetent to operate the set and may wreck some vital part of it, and has no place in radio. An audion or other proven efficient reception apparatus can be installed in cabins to be an asset to the appearance rather than detrimental, and "hay wire" is unnecessary. No, Mr. Soderstorm, we have never seen a chief engineer bring a feed pump aboard a steamer, but we have seen him and his associates bring aboard their own tools and other small portable conveniences not provided by some steamship companies. Moreover, we have noticed that it is a custom for all mates to bring their \$60 to \$100 sextants, and in a good many cases, glasses, aboard, because they were unprovided in the majority of ships, and which are of vital necessity in navigation. The radio man is establishing no precedent by bringing along a few conveniences for reception, any more than if he happens to bring along a typewriter of his own, as long as he does not bring aboard some integral part of the equipment—as a motor generator or transformer—to supersede the company equipment.

The right operator is not referred to sarcastically by the ship's officers, as Mr. Soderstorm insinuates. He holds his place on his merits as a man, and is respected as such in accordance.

As far as we know there is no law against the use of audions as long as emergency storage batteries are not used for the operation of same. Radio inspectors in ports of the United States have entertained no objection to such use. We cannot see where patent rights have anything to do with Standard Oil or other ships controlled by the Radio Corporation which own and control the rights for the use of audions.

Moreover, the audion receiver or detector affords the certainty of an efficient
(Continued on Page 252)



THE—
Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00
(In mahogany cabinet, as shown)
Laboratory Type, \$25.00
(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3-4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY
Dept. G8, 4 West Park St.,
NEWARK, N. J.

WIRELESS RECEIVERS

High Resistance

SUPER-SENSITIVE Superphone TELEPHONE DEVICES

MAGNIFYING APPARATUS

A Set of Receivers Offering a Combination of a Silent and loud reproduction of Wireless Signals.

Efficiency of the Superphone Receivers

Sound is transmitted from one medium to another in vibrating waves. These waves travel in every direction unless they are forced into one particular direction. Attached to the second cap, close to the diaphragm is a small round tube, this tube is made so that it fits snugly into the operator's ears. The sound waves are now forced into one direction—the operator's ears. This attachment makes the loss of sound impossible, giving the maximum reproduction. The feature that aids the clear reproduction is the resonant chamber directly below the diaphragm and above the magnet and coils.

THIS CUT ILLUSTRATES THE RECEIVERS WITH HORN ATTACHED

The high tension metal used as a spring forces the receivers close to the ears. The receivers are so attached to the head band that they rest against the ears in a vertical position. This makes it comfortable for the operator.



Patent Pending

Superiority of the Superphone Receivers

The features that are enjoyed by only the Superphone receivers, that of the Loud Talking Horn attachment and the attachment that fits into the operator's ears, make them superior to any set of receivers on the market at present. The construction and arrangement, not to say anything of the matched tones of the two receivers, place them far above the ordinary receivers.

Superphone Receiving Set with Cord and Headband

2000 ohms	\$12.00
3000 ohms	15.00
4000 ohms	20.00
With Horn Attachments as above, extra	5.00

High Resistance Loud Talking Horn Apparatus for Use on Wireless Instruments Direct



Model No. 50, 12 In. Long Price \$12.00

Low Resistance

SUPER-SENSITIVE Detectagraph MICROPHONE DEVICES

Practical Instruments for Commercial and Scientific Purposes Amplify Your Radio Signals.

With the new Detectagraph-Transmitter, the amateur can amplify radio signals to such an intensity that he can hear the signals about his station without the need of the telephone head set.

The manner in which the amplifying process is attained is by attaching with tape the Detectagraph-Transmitter to the regular wireless receiver.

By the addition of a loud talking telephone he is able to hear the messages many feet away from the instrument.

The super-sensitive Detectagraph-Transmitter herewith shown is two and three-eighths inches in diam-

eter, five-eighths of an inch thick and weighs less than three ounces. It is the most sensitive sound-detecting device ever brought before the public.

Not only is this instrument applicable for amplifying radio signals, but it can be used with equal satisfaction for amplifying other sounds. Phonograph music can be transmitted from one place to another by means of this instrument, and those who are afflicted with deafness will find enormous benefit by using this transmitter.

Can be used for any purpose where a sensitive detecting instrument is required.

Our Special Loud Talking Telephone Transmitter No. 5, Price \$12.00

This model is especially made for Loud Talking Telephone reproduction. This transmitter can be used to advantage in connection with our Loud Talking Receivers or Horn Apparatus by wireless operators, window demonstrators, and in fact by every one desiring to build up their own loud talking telephone apparatus.



The Detectagraph Junior Deaf-phone, \$18.00



Our Super-Sensitive Detectagraph Transmitter No. 2 Price, \$8.00 Complete



Adjusted Model No. 60 Horn, High Grade Loud Talking Receiver, Cord Plugs and Desk Stand Base. Price, \$15.00 Complete



Detectagraph \$18.00
This detecting instrument of marvelous sensitivity can be used for detecting secret conversations. Outfit consists of Sensitive Transmitter, 25-ft. Black Cord, Receiver, Headband, Case and Battery.



Our New Special Loud Talking Receiver No. 25 Price \$7.50



Detectagraph Rheostat, especially made for amplifying circuits. Price, \$2.00 Complete.

Equal to any \$35 instrument made. Outfit consists of Super-Sensitive Transmitter with cord connector; Super-Sensitive Ear Piece with small black cord; Black Single Headband; Black Case and Two Batteries.

G. BOISSONAUT COMPANY

25 DEY STREET (Incorporated) NEW YORK CITY
Factory: Whitestone, L. I. Makers of Super-Sensitive Hearing and Talking Devices

Know the **TRUTH**

Type JT
Thermo-lanction
Radiation
Ammeter



Use a
0-1½, 0-3
0-5, 0-10
Amp.
Ranges

\$12 POST PAID

Generous size—3¼ in. diam. Extremely accurate and rugged movement. Jewelled bearings. Supersensitive Thermo-Couple. No zero adjustment necessary.

Double the life of your UV 202 by using our now famous **Type JX 0-15 A. C. Voltmeter**. Jewelled bearings. Magnetic vane movement. Matches the **TYPE JT** 3¼-in. diam.

(Also available) (in 0-10 Amperes), \$8.00 Postpaid.

Somerville Radio Laboratory
178 Washington Street
New Address BOSTON, MASS.

General Machine Works
Mechanical or Electrical General Manufacturing, Experimental Work, Telephone and Wireless Parts Manufactured, Tools, Fixtures, Dies, Jigs, Etc., Stamping.

Engineering Dept. of
G. Boissonault Co., Inc.
26 Cortlandt Street, New York
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WHITESTONE, L. I.

The Biggest Radio Offer You Ever Heard Of!

By special mutual arrangement between the publishers, the three big radio magazines of the country are made available for a limited time at a special rate when ordered together—

"Pacific Radio News," pioneer journal of Western Radio Development;

"Q S T," devoted wholly to amateur communication, and the official organ of the A. R. R. L.;

"Radio News," the newest and best illustrated radio periodical in the world.

Don't miss this opportunity to secure the best contemporary radio literature of America coming to your door every month for a year—at a saving in real money, too. Send in your subscription today!

All for For One Year **\$5.00**

Pacific Radio Publishing Co., Inc.
465 Pac. Bldg., San Francisco, Cal.

LETTERS TO THE EDITOR
(Continued from Page 250)

watch, with no chance, as in the case of a crystal, of it going dead each time you send, or of having to fuss around for a good point.

Mr. Soderstorm apparently assumes that all operators who use audions and other equipment of proven value, are fools or worse, or dismantle their sets and imperil the safety of all ships by the installation of unreliable apparatus. He has only to visit a number of ships in charge of competent operators to note that such apparatus is, in the majority of cases, as efficiently and neatly installed as that provided by the company.

Respectfully,
S.S. "Admiral Schley" H. MacGOWAN,
Oct. 9, 1921. At Sea. N. H. ALLEN.

Radio Amateurs of COLORADO, UTAH, NEBRASKA and WYOMING, do you know

DENVER—

Has the Largest Wireless Supply Store in the Middle West—Everything in Radio Supplies.

We Are Distributors of
REMLER, COLIN H. KENNEDY CO.,
DeFOREST RADIO and
W. J. MURDOCK
Equipment and Parts.

We Make Immediate Delivery
Start with the "interpanel" system and thus avoid discarding apparatus

Write for our Bulletins and Price List. We will give prompt Mail Order Service by Parcel Post or Express, as requested.

Our "REYNRAD" Short-wave Coils are best on the market, \$2 each.

REYNOLDS RADIO CO., Inc.
613 19th St. DENVER, COL.

500 Volt Generators
\$35.00

125 Watts, ball bearing 42 segments in commutator, shunt wound, our own make.

IF YOU DO YOUR OWN WINDING

We supply parts complete excepting wire, for \$18.00.

¾ H. P. 1800 R. P. M. 60 cycle 110 V. Motors, \$18.40 each.

STORAGE BATTERIES; heavy duty 60 ampere hour, large plates; can be used for automobiles, \$21.00 each.

All of the above F. O. B. Canton, O.

The Electric Motor & Engineering Co.
CANTON, OHIO



A Desirable Xmas Gift

Christmas is a good time to improve your radio station. What more desirable addition could you wish for than a

FEDERAL
Loud Speaking Pleiophone

No station is really complete without it.

This is a high grade instrument in every way. Built with the same degree of care and accuracy that marks all Federal products. For use in connection with one or more stages of amplification.

Write for Bulletin No. 103 WB, Describing Federal Radio Apparatus.

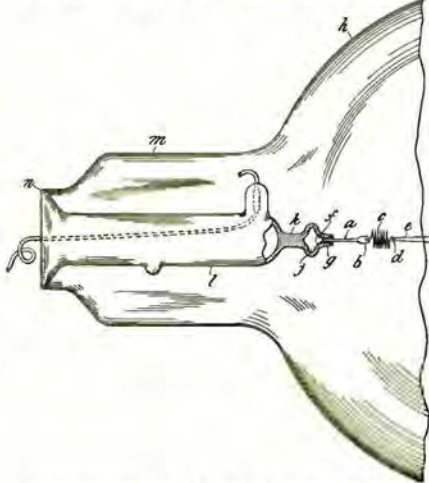
Federal Telephone & Telegraph Co.
BUFFALO, N. Y.

RECENT RADIO PATENTS

(Continued from Page 204)

C. H. Harvey, No. 1,389,351—August 30, 1921.—Means for Supporting Electrodes in Ionic Tubes.

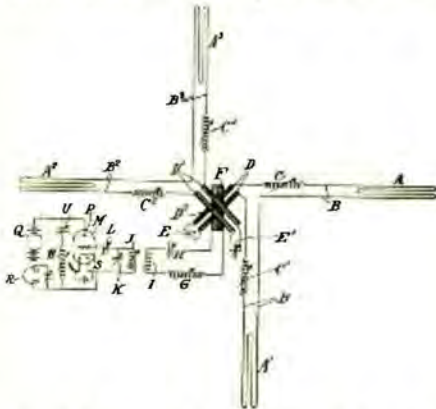
A construction for the support of the heated cathode e is described, which has the object of permitting large variations



in temperature without danger of cracking the glass. This is effected by molding the anchor wire a loosely in the recess j instead of fusing it into the glass as done heretofore. The usual spring c is interposed between the anchor a and the filament e.

R. A. Weagant, No. 1,389,800—September 6, 1921.—Radiosignaling Apparatus.

A static eliminating means is described for a receiving station. For this purpose, a number of antennae A, A1, A2, and A3 are arranged angularly with respect to each other, adjacent pairs as A and A1 being connected to coil D in a tuned-closed circuit. Other pairs of antenna



may be connected to coils in a similar manner, as D'. These coils are angularly displaced and are all in inductive relation to a rotatable coil F connected to a conventional receiver circuit. It is stated that by properly positioning the coil F, the effects of static may be neutralized, since the phase of the static is made to differ substantially in the two coils D and D'.

An Amateur C. W. Set That You Can Easily Assemble Yourself



Connects directly to 110 volt A.C. lighting circuit — Approximate Range 400-500 Miles — Conservative Range 250 miles.

The approaching Radio season will well show a decided increase in C. W. transmission.

The remarkable ranges which may be obtained by even the most simple C. W. transmitter have changed the entire amateur outlook. Previous to the event of C. W. transmission a range of 50 to 100 miles was average work. Today an amateur—skilled or unskilled—can assemble a simple C. W. trans-

mitter which will surpass his expectations. The illustration above shows a simple C. W. set, the parts of which are attached to a base-board. Anyone can assemble this outfit and wire it up. We have selected the necessary units for assembly, as follows:

Parts for Amateur C. W. Outfit

1 "Acme" 200 watt power transformer.....	\$20.00
2 Radiotron UV 202 5 watt transmitting tubes.....	16.00
2 "General Radio" tube sockets.....	3.00
1 "National" Rheostat, 3 ohms, 6.5A.....	5.00
1 "Tuska" 3-circuit inductance.....	12.50
1 Grid Leak, 10,000 ohms.....	1.25
3 condensers.....	3.00
1 C. W. Key.....	3.00
1 Radiation meter 0-2.5A, T. A. W.....	5.00
1 B. D. Panel for meter (with pole and binding post)....	1.50
1 Wood base(stained).....	1.50
Complete parts, packed, ready for shipment.....	\$72.25

ATLANTIC RADIO CO., Inc.

727 Boylston Street
Boston, Mass.

We have a liberal supply of the Radio Corporation's new Instruction Book on C. W. Operation, and will gladly send you a copy direct, at once, on receipt of 25 cents.

Branch, 15 Temple St.
Portland, Me.

Adjusting a C-W Transmitter



Results with a CW set are not obtained by sending: "CQ—How are my sigs OM?" The circuits from input to output must be adjusted by ammeters.

The hot wire ammeter is the universal meter for this service. It is adapted for d.c., low frequency a.c., or radio frequency. It can be checked at any time on d.c. and will be equally accurate on radio frequency. As its action depends on the fundamental I²R law, it always measures actual effective amperes.

Our Type 127—3" Hot Wire Ammeter was made for exactly this service. It is made in front-of-board and in flush models, as illustrated and in a variety of ranges.

PRICE \$7.75.

Send for Free Bulletin 909C

GENERAL RADIO CO.

Standardize on General Radio Equipment Throughout CAMBRIDGE 39, MASS.

QUALITY **CE** SERVICE



\$38.00 REGENERATIVE RECEIVER
Type Z. R. F. 175-600 Meters

"Licensed Under Armstrong U. S. Patent No. 1, 113, 149."

An A-1 set in every respect of design, material, and workmanship for only \$38.00. Will give remarkable results in long distance short wave work. In-

ductance values have been very carefully worked out and a special effort made to reduce losses to a minimum, making this an extremely efficient set.

Type Z. R. V. \$6.50
VARIOMETER

Unit construction insures permanent positive regulation of inductance from 1.25 millihenry to .1 millihenry—an unusually wide range for instruments of this type—and completely prevents trouble from misalignment of bearings. Brush contacts enable the rotating element to be continuously turned without breaking connections. Price, furnished with knob and dial, \$6.50. Without knob or dial, \$5.75. Send 6 cents in stamps for complete Radio Catalog.



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RADIO ENGINEERS and MANUFACTURERS

140 Main Street, Cambridge, Mass.

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San Francisco and Los Angeles

THE MODULATOR

Published by Members of the
RADIO ASSOCIATION OF GREATER NEW YORK
"Written for Amateurs by Amateurs"

THE MODULATOR is the only magazine devoted exclusively to C. W. Real practical "How to Make" articles, written by men who know.

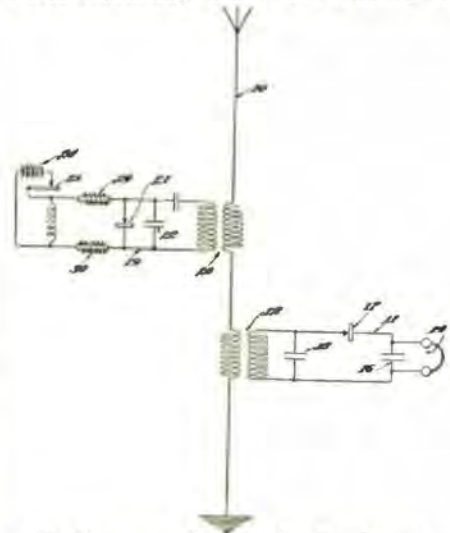
Subscribe now at \$1.00, per year as the rate will soon be raised to \$1.50. Help your brother amateur put it over.

THE MODULATOR PUBLISHING COMPANY

170 Greenwich St., New York City.

V. Bush, No. 1,389,026—August 30, 1921.—Radio Receiving System.

A scheme is described for breaking up the radio frequency oscillations received into groups at audio frequency. This is accomplished by an absorbing circuit coupled to the antenna at 20, so arranged that it is periodically capable of absorbing a large portion of the received energy, so that the amount transmitted to the telephone circuit is insufficient to operate it. The absorbing circuit is rendered alternately active and inactive at



audio frequency by periodically short-circuiting the condenser 22 of this circuit by the crystal detector 21. To cause the crystal detector to be alternately conducting and non-conducting, an a.c. voltage of audio frequency generated by the interrupter 24, 25 is applied to it. Since the a.c. current can flow only in one direction through the detector 21, the periods of activity of the absorbing circuit occur at the frequency of the alternating current source which is that within the range of audibility.

L. R. McDonald, No. 1,389,255—August 30, 1921.—High Frequency Electrical Oscillation Apparatus.

An oscillation circuit is described in which a single piece of apparatus E serves both as a transformer and as a condenser. This apparatus is inserted between the source 3, 4 and the work circuit 7, 7, and consists of coiled conductors, 8, 9,

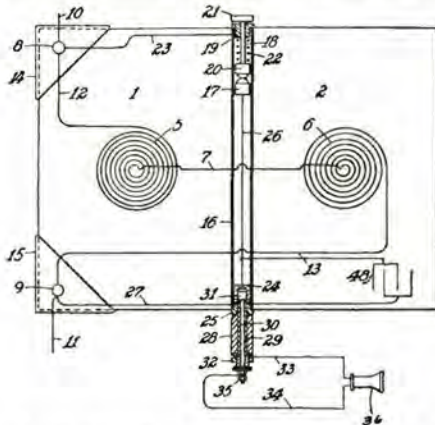


and 11 separated by insulation. The inner conductors 8 and 9 are not in metallic connection, but serve merely as plates of a condenser. The outer conductor 11 serves as the secondary to which this work circuit is connected. The electrostatic lines of force in apparatus E are perpendicular to the electro-magnetic

lines of force, and it is claimed that much better regulation of very high frequencies can be obtained by this apparatus than those hitherto used.

H. St. J. de Aula Donisthorpe, No. 1,388,936—Aug. 30, 1921.—Radio Telegraphic and Telephonic Apparatus.

A pocket receiving set is described, which is adapted to be connected to aerial and earth at 8 and 9. It consists of a pair of hinged members 1 and 2 which may be opened and closed like the leaves



of a book. Each member carries the coil 5 or 6, and by varying the book opening, the receiver set may be tuned to the desired wave length. The hinge accommodates the detector elements 17, 20, as well as the plug for the telephone 36.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Radio (formerly Pacific Radio News) published monthly at San Francisco, Calif. for October 1, 1921.

State of California, City and County of San Francisco, ss:

Before me, a notary public in and for the state and county aforesaid, personally appeared A. H. Halloran, who, having been duly sworn according to law, deposes and says that he is the editor of Radio and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Pacific Radio Publishing Co., 465 Pacific Bldg., San Francisco, Calif.
Editor, A. H. Halloran, 465 Pacific Bldg., San Francisco, Calif.

Managing Editor, A. H. Halloran, 151 Minna St., San Francisco, Calif.

Business Manager, H. W. Dickow, 151 Minna St., San Francisco, Calif.

2. That the owners are: Pacific Radio Publishing Co., 151 Minna St., San Francisco, Calif.; H. W. Dickow, 151 Minna St., San Francisco, Calif.; A. H. Halloran, 151 Minna St., San Francisco, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: None.

A. H. HALLORAN.

Sworn to and subscribed before me this 27th day of September, 1921.

CHAS. EDELMAN.

(My commission expires April 17, 1922.)

Fully Assembled Instruments

Wired and Unwired

Your choice of two types. Commercial or Amateur. The commercial type is assembled from parts heretofore considered too costly for amateur work. The R A D I O Corporation's new UV-712 transformers are but one feature indicating the quality used throughout.

The amateur type is an exact duplicate, except that transformers and tube receptacles of high efficiency, but lower cost are used.

PRICES, F. O. B. NEW YORK

Commercial type, wired	\$65.00
Commercial type, unwired	55.00
Amateur type, wired	57.00
Amateur type, unwired	47.00



Detector and Two Step Amplifier

Wire Your Own—Save \$10.00

The "Standard" Plan brings you assembled instruments of commercial grade in appearance and results, at little more than the cost of separate parts.

There are two items in building finished radio instruments, the actual assembly, and mounting, and wiring. The assembly is machine work. It cannot be duplicated without the necessary machinery and equipment. But because it is machine work, it is really the less expensive part of the entire operation.

Wiring is hand work, and you can do it as well as it can be done at the factory. Besides, you probably have your own ideas in wiring, which you would prefer to experiment with.

By using Standard unwired instruments, you get the combination of machine work where it is

necessary, and you save money by doing the wiring yourself. Only in this way can you get the superior appearance and performance of correctly assembled instruments at prices only slightly above what the un-assembled parts would cost you.

The Detector and 2-Step Amplifier shown above, or any other Standard instrument, will be shipped to any part of the U. S. on receipt of one-third the purchase price. Examine the instrument, and if you are not fully satisfied that it represents the best value for your money, return it at once, and we will refund your money, after deducting carrying charges. But we feel confident that you will be delighted with your purchase, and you will be glad to remit the balance and keep the instrument.

For those who desire to save on the cost of assembly "Standard" Instruments are also offered knocked-down, consisting of engraved drilled Formica Panels, Nickered Support Rods, Rheostats, Sockets, Condensers, and like units, sufficient Nickered Bus Wire, Screws, Nuts, etc., together with Wiring Diagram.

Complete parts for Commercial Type Det. and 2-stage Ampf... \$42.00
Complete parts for Amateur Type Det. and 2-stage Ampf.... 35.00

Order direct from this ad, or send stamp for literature describing the complete line of Standard Instruments.

Standard Assembling Co.

19 Bridge Street, Dept. A, New York



It will Pay You Well to read this Carefully!

1. This Short Wave Regenerative Receiver is correctly constructed and is equal to others at double the price. Formica insulation used exclusively. Ball variometers; rotors turned from hard maple; stators from Formica.

2. Chelsea dials now used. Cabinet is solidly constructed of oak. Workmanship cannot be questioned.

3. We send you a receiver on receipt of \$10. Balance, C.O.D.

4. Price only \$30 complete. Order from this ad for quick results.

Free Circular gives additional information. Dealers, send for proposition.

Here is a Christmas Present for that Radio Bug!

THE RADIOMART CO., 1236 American Ave., Long Beach, Calif.

Say Radio to the Advertiser, it will help you.

You Should See

RADIO TOPICS

In its new Rotograve form

It is the most attractive and interesting Radio Magazine that you have ever seen.

The November number is published in this new modern Artgrave style.

Send 15 cents for a Sample Copy



RADIO TOPICS
A Journal of Human Interests

RADIO TOPICS
4533 N. Sawyer Ave., Chicago, Ill.

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/2 x 3 1/4	1 3/4	\$5.00
2	.0006 m. f.	Mounted	4 1/4 x 4 1/2 x 2 3/4	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/2	1 1/4	4.25
4	.0006 m. f.	Without Dial	4 1/4 x 3 x 3 1/2	1 1/4	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.
Bulletin upon request.

CHELSEA RADIO COMPANY
13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

Do You Need a Vacuum Tube?

We will send you one free of charge if you secure 3 yearly subscriptions to "RADIO." You can have your choice of any standard receiving tube. Send \$6.00, the 3 subscriptions, and 25 cents for mailing the tube.

RADIO, 465 Pacific Building, San Francisco, Calif.

Make Your Tubes "Burnout" Proof

This tiny fuse, slipped directly on filament terminals of any standard bulb, protects your tube against burning out.



RADECO SAFETY FUSE

(Patent pending)

NOW, while your tube is in perfect condition, pin one dollar to this advertisement and be guarded against all future vacuum tube expense.

RADECO Safety Fuses come in 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2 and 3 amp. sizes. Slip directly on filament terminals of any standard bulb. Used in any standard socket.

FOUR FOR \$1.00

We carry complete stock of all radio apparatus. Order from any Standard catalog.

MAIL ORDERS
Be sure and specify the size or sizes when ordering by mail.

Radio Equipment Co.

630 WASHINGTON STREET,
Boston, Mass.

Classified Advertisements

Advertisements in this section are three cents per word net. Remittances, in form of currency, money order or stamps, must accompany order.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bld., San Francisco, Calif.

STOP! LOOK! AND ACT! V. T.'s. With each Radiotron UV200 V. T. detector or A-P Moorhead V. T. detector or Radiotron U. V. 201 V. T. amp. or A-P Moorhead V. T. amp., we will supply free of charge your choice of either a Murdock V. T. socket, improved contact type, or a Remler Bakelite smooth running rheostat, latest type. Radiotron UV200, \$5. Radiotron Amp. V. T. UV 201, \$6.50; Moorhead A-P detector, \$5.00; Moorhead A-P Amp. V. T., \$6.50; Remler Bakelite rheostat, latest type, \$1.00; Murdock V. T. socket, \$1.00. We absolutely guarantee the foregoing apparatus. Only new and high-grade equipment carried in stock. All orders are filled within twelve hours and shipped postpaid and insured, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. P, Abilene, Kansas.

DON'T READ THIS! Detector and two-stage \$40; Spider Webs 180-450, \$4.50; large 180-1000, \$14; Remler Control Panel, \$7; Panel Mounting Variable Condenser 43 plate, \$4.50; Murdock fones, 3000 ohms, \$4.75; Duck's Navy Coupler, \$17.50. Everything for \$85. All articles P.P. Insured. W. C. AICHILL, 844 Central Ave., Hollister, Calif.

TO THE READERS OF RADIO. Do you know that you can save considerable of your money by buying your audion control panels from us? Our controls are very small and compact. Our Det. and one-step is six by nine inches, front space, and our Det. and two-step six by nine front. Watch this magazine for our future advertisements. **DEVORE RADIO SUPPLY CO.**, Gibson City, Illinois.

NEW AND ORIGINAL—The KLAUS switch lever is all of that. The knob and nickel plated blade are all of the switch that moves, allowing you to solder connection directly to shaft of switch. Absolutely no possibility of switch loosening. Silent and sure. Klaus switch, 60c, 2 for \$1.10. As a special offer, our switch with 6 switch points, 65c. **PORT ARTHUR RADIO LAB.**, Port Arthur, Texas.

SHORT WAVE REGENERATIVE SET gets results, \$20; DeForest Honeycomb panel, mounting 3 coils, 2 L25, 1 L35, \$8; Loose coupler (crackerjack), \$5; Tresco C. S. tuner, \$8; Krag rifle .30 (U.S.) first class, leather sling, 120 rds. ammunition, \$20. Write quick for particulars. **JOHN A. KINDLE**, Monroe, Wash.

AT LAST—A real vt. socket. Fused, no danger of burning out that expensive tube; take your choice of 5w. tube socket or receiving tube socket, contact over whole surface of prong on tube base, precluding the possibility of noisy connections; super-efficient for CW. The unusual Victor socket, \$1. **PORT ARTHUR RADIO LAB.**, Port Arthur, Texas.

IKUMA YRLSBUG. 240 beginners tell how memorize wireless code in half hour to two hours. 28-page booklet and 10 supplementary pages mailed for 10 red stamps. **DODGE**, Box 220, Mamaroneck, New York.

WE CALIBRATE wavemeters up to 1000m for 35c per point, 3 points \$1. **PORT ARTHUR RADIO LAB.**, Port Arthur, Tex.

FOR SALE—Complete sending set. Price cut to less than half. 6APH station. Perfect condition. One .01 dudilier condenser, \$20; one 1-8 h.p. induction motor 3600 r.p.m., \$15; 1 K.W. Acme transformer, \$12; O.T. 1-2 inch copper tubing, \$5 (key and switch thrown in); super benwood gap, 16 points (ENCLOSED) \$18. Total, \$70. (ALL EQUIPMENT ALMOST NEW.) Receiving Set—Detector panel in oak box 10x12, \$12; DeForest two-step, \$30; 6 coils and honeycomb stand, \$4; Baldy fones, type F, \$12.50, two condensers, \$6. Total, \$64.50 (tubes and "B" batteries thrown in.) 6-volt "A" battery and rectifier (Westinghouse), \$15. Would like to sell either outfit, or both, complete as would not care to sell separately for the reason that I haven't the time to devote to it. First come, first served. **RADIO STATION**, 318 Valley St., San Francisco.

GOOD APPARATUS FOR SALE CHEAP. 1 Jewell 0 to 1 ammeter, \$5; 1 Jewell 0 to 10 voltmeter, \$5; 1 variable potentiometer, \$1; 1 variable (semi) bridging cond., \$1; 2 DeForest L-500 honeycomb, \$1.10 each; 2 DeForest L-300 honeycomb, \$1.00 each; 2 DeForest L-200 honeycomb, \$1 each; 1 DeForest L-150 honeycomb, 70c. All coils have plugs attached. Have several other good bargains. Write me. **RADIO OPERATOR**, 2630 Ridge Road, Berkeley, Calif.

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TELEGRAPHY—(Morse and Wireless) and Railway Accounting taught thoroughly; big salaries; great opportunities. Oldest, largest school. All expenses low—can earn large part. Catalogue free. **DODGE'S INSTITUTE**, Hass St., Valparaiso, Indiana.

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The user of a Z-Nith Regenerator has the radio world at his will. Radiofone, C.W. and spark stations inaudible on ordinary equipment can be copied with ease on this new improved set, with *balanced vari-*



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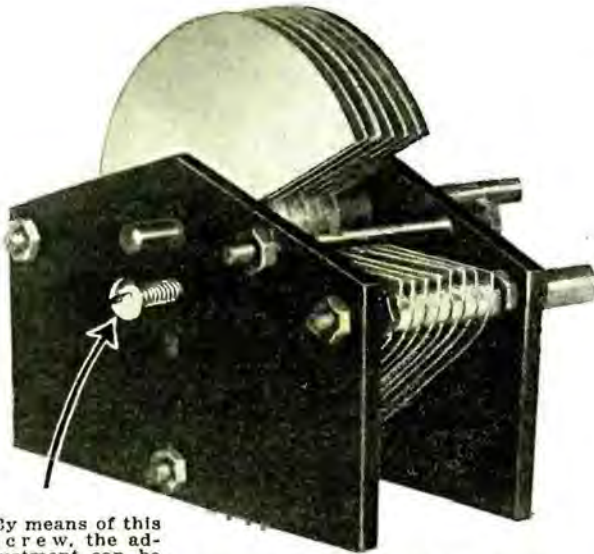
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Buy your apparatus where you get the service that should go with every piece of equipment you purchase. Buy your apparatus from The Radio Telephone Shop, which has equipment and machinery complete to give every purchaser, no matter where he may live, a full measure of personal service during the entire life of each piece of apparatus he buys.

THE NEW "PEN BRAND" VARIABLE CONDENSER



By means of this screw, the adjustment can be stiffened to prevent the variable plates from slipping after the desired wave length has been secured.

Postpaid to any address in the United States.
Dealers write for proposition.

An Improved Type

This is the new Radio Telephone Shop Series X Variable Condenser, manufactured with a special screw by means of which the adjustment may be tightened to prevent the variable plates slipping after the proper wave length has been secured. Connections can be made either by soldering or with nuts. The plates are die stamped from No. 22 Gauge hard-rolled aluminum, and the entire condenser is of typical "Pen Brand" quality and rugged construction throughout, particular attention being paid in the manufacture to making it sturdy and accurate, so as to give perfect service over a long period of time. Radio Telephone Shop service goes with every one sold, and each one is fully guaranteed. Sizes for every purpose.

Price: 2 plate, \$2.00; 23 plate, \$3.60; 43 plate \$5.25. With Pen Brand condensite dial 75c extra

Apparatus made to your order

WE MAKE DIES

The Radio Telephone Shop has recently installed special machinery and complete equipment to make manufacturing dies and handle die stamping work. Manufacturers will save time and money by procuring their dies here. Inventors—we can manufacture your apparatus. Write us for full particulars.

The special two-step amplifier illustrated at the right is a sample of some of the beautiful equipment the Radio Telephone Shop is manufacturing to the buyer's own specifications. If you want a set for some particular use, let us make it to order for you. If you can't buy what you want ready-made, have it made. Don't be satisfied with substitutes. We are completely equipped to make apparatus to order, from the smallest part to the most magnificent and most complete set. Tell us what you have in mind and let us submit a figure.



Of course we also have a complete line of standard equipment, and with every piece of equipment we sell goes the positive Radio Telephone Shop guarantee and the helpful Radio Telephone Shop service during the entire life of the apparatus. If you are not already one of our enthusiastic patrons, get wise. Try us. Get everything you are entitled to at the lowest price, and get it quick. Your regular needs, your special needs, and all your needs will be faithfully filled by—

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BLISS

Unit Amplifiers and Panels



The most pleasing feature of this Amplifier is its compactness. All the instruments are mounted on the panel, and when mounted in a cabinet the panel is very easily removed, making all parts easily accessible at all times. The Transformers are General Radio make and are designed for the U. V. 202 Radiotron. Tube Sockets are standard, four-prong type. Panel is of well finished XX Bakelite and may be mounted on a base or in a cabinet with other units. Supplied without tubes or batteries. Wiring diagrams accompany each amplifier. AN IDEAL AMPLIFIER.

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| No. W-609 One stage Amplifier.....\$15.00 | No. W-612 Paragon Rheostat with Bliss Moulded Bakelite Knob\$ 2.00 |
| No. W-610 One stage Amplifier Panel..... 2.25 | No. W-613 Insulated Binding Posts..... .12 |
| No. W-611 Tube Socket Mounted on back of Transformer 6.25 | No. W-614 Complete set of Parts for W-609 Amplifier without wire and connections and not assembled..... 11.34 |



No. 301 BLISS Improved Switch, as illustration, Edgewise contact type with a genuine molded Bakelite Knob. 1 3-8 in. in diameter with a radius of 1 3-8 inches. Nickel plated lever.....\$.60

No. P-501 BLISS Moulded Bakelite Knob. 1 3-8 inches in diameter. POSTAGE PREPAID30

R. W. BLISS COMPANY

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42 Davis Street

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Guaranteed DeForest Parts for C. W. Apparatus Below Cost!



Inductances for transmitters up to 50 watt capacity. 50 turns of wire wound on threaded formica tube. 7 or 26 positive taps. Proper spacing between turns for maximum efficiency. \$8.50.



Acme C. W. power transformers. Unmounted. For 60 cycle, 110 volt supply, 3 secondary windings. 6, 12 and 1000 volts, with center tap on high voltage. Designed to furnish 500 volt D. C. when using standard rectifier tubes. Works efficiently with all makes of tubes. \$12.50.



Guaranteed ESCO dynamotors, 110 volt D. C. to 500 volts D. C., 100 watts. Ball bearing type; one unit. This is the best possible outfit for C. W. plate supply. Smooth running. Noiseless in operation. Large overload factor of safety. Reduced to \$65.00.

SPECIAL BARGAINS

Stromberg Carlson block Condensers, 1 mfd., 4 3/4" long x 1 3/4" wide, 1" thick @ \$1.40 each

Black Sheet XX Bakelite, cut to any size less than 24" x 24". In thickness 3/8"-5/8" @ 10c per cubic inch

Brown Formica Panels 3/4" x 7 7/8" x 7 7/8" @ \$1.25 each

Brown Formica Panels, cut to any size less than 18" x 20", 1/2", 5/8" or 1" thick @ 9c per cubic inch



Guaranteed standard makes of head telephones below cost—
 Murdock No. 55—3000 ohms.....\$4.50
 Federal No. 53W—2200 ohms..... 7.00
 Federal No. 52W—3000 ohms..... 9.50
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Acme A3 modulation transformers on mounting brackets. Exceptionally efficient input transformer for Radio telephone work. \$5.00.

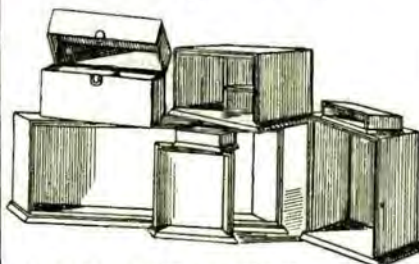


Guaranteed standard inductance instruments at manufacturer's cost—

Hot Wire Ammeters—General Radio—scale 0-7, \$7.00; Hot Wire Ammeters—General Radio—scale 0-2, \$7.00; High Frequency Ammeters—Roller Smith—scale 0-5, \$22.50; Filament Ammeters—Roller Smith—scale 1.5-0-1.5, \$8.00; W. Filament Ammeters—Weston—scale 6.0-0-1.5, \$9.00; D. C. Ammeters—Splitdorf—scale 0-2, \$5.75; D. C. Ammeters—Splitdorf—scale 0-3, \$5.75; D. C. Ammeters—Splitdorf—scale 0-5, \$5.75; Hot Wire Ammeters—General Radio—scale 0-10, \$7.00; D. C. Milliameters—Splitdorf—scale 0-150, \$5.75; D. C. Milliameters—General Radio—scale 0-250, \$7.00; Filament Ammeters—Amer. Ever-ready—scale 1.5-0-1.5, \$3.80.

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Hand rubbed, waxed early English finish. Quartered oak.



PANEL Width	SIZE Height	CABINET DEPTH	
7 1/2"	7"	8"	..... \$3.00
9 1/2"	7"	9"	..... 3.50
7 1/2"	11 5/8"	6 1/2"	..... 3.00
7 1/2"	6"	2"	..... 1.25
7 1/2"	7"	5 1/2"	..... 2.50
18 1/2"	11 1/2"	7"	..... 4.90
11 1/2"	11 1/2"	6 3/4"	..... 4.25
11 1/2"	14"	6 1/2"	..... 5.25
8 3/4"	1 3/4"	4"	..... 1.50
13 1/2"	7"	10"	..... 5.00
9"	9"	6 1/4"	..... 6.75
8"	9"	6 7/8"	..... 5.25
10 1/2"	9"	6 7/8"	..... 5.00
15"	9"	6 7/8"	..... 5.75
14"	9"	6 7/8"	..... 4.00
18 1/2"	9"	6 7/8"	..... 6.25
23"	9"	6 7/8"	..... 7.50
27 1/2"	9"	6 7/8"	..... 9.00
32"	9"	6 7/8"	..... 10.00
8 1/2"	17 1/2"	18 1/4"	..... 7.00
9 1/2"	7"	4 1/4"	
		with hinged cover..	3.50
11 7/8"	8"	4 1/4"	.....
		with hinged cover..	2.00
4 1/2"	4 1/2"	1 3/8"	..... .90

Catalogues describing DeForest apparatus as listed below will be sent upon request:
 A Commercial Transmitting and Receiving Equipmen.
 E Receiving and Transmitting Equipment for Amateurs.
 F Duo-Lateral Honeycomb Coils and Coil Mountings.
 G Miscellaneous parts.



Panel type microphone on japaanned arm ready for mounting. Low resistance. No. 262W. \$4.00.

SPECIAL BARGAINS

Black best grade of hard rubber sheet, cut to any size less than 24" x 48", 3/8" or 1/2" thick @ 6 1/2c per cubic inch
 Tubing for coupling coils or small Helices:

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 Bakelite—3 3/8" O.D. x 3 1/4" I. D. @ \$1.80 per ft.
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De Forest Radio Telephone & Telegraph Company

1391 Sedgwick Avenue, New York, N. Y.

ATLANTIC-PACIFIC RADIO SUPPLY CO., 638 Mission St., San Francisco, Cal., Pacific Coast Distributors.

CONTINENTAL NEWS

DECEMBER 1921

PUBLISHED EVERY MONTH IN "RADIO" BY THE CONTINENTAL RADIO AND ELECTRIC CORPORATION

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IN AN EFFORT to reduce the H. C. of Radio, we announce this important price reduction. It is based on present day replacement costs for raw materials; on increased production; and on our willingness to sacrifice profits to start things moving in the right direction.

The famous R. A. Ten—now \$15.50 lower than ever before! The identical instrument that hundreds of amateurs have endorsed so heartily!

All the famous Paragon features are still the same: the remarkable amplification that has astonished all hearers, the wide range to which Paragon Engineers have applied this amplification, the 24% greater sensitiveness and selectivity than even, the noted R. A. 6; and all the little niceties of design that have made

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Now is your opportunity to make your station pride of your district. Buy a genuine Paragon at this revised price, and save enough for a VT Detector outfit.

Continental stands back of every Paragon to see that you get full value out of its years of service. Ask your radio dealer to show you the splendid construction of a Paragon receiver. If he hasn't one in stock, he will gladly get it if you ask him.

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The Continental Store in New York has long been famous as the fairest, pleasantest and quickest place to buy radio goods in the city.

The Continental Mail Order Dept. is now noted throughout the United States, for these same reasons.

Let Continental Service serve you, order direct from this advertisement, and expect:

Accuracy Speed
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Western Amateurs can examine PARAGONS at

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2ZL Says:

The Paragon has proved especially satisfactory in C. W. work, because of the entire absence of any capacity effect.



2ZM Says:

Heard a number of DX stations that were never heard before, even in the winter time, with any other receivers.

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Use A-P Tubes for Efficiency



THE A-P VT AMPLIFIER OSCILLATOR
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—the most sensitive detector of spark signals known to the radio art. Price \$5.



THE A-P TRANSMITTER TUBE
—an efficient undamped wave transmitter for use in radio telephony. Price \$7.50.

New Magnavox Apparatus Designed for Use with A-P Tubes

EXCLUSIVELY

Exhaustive tests by the Magnavox Company of Oakland, California, prove A-P Tubes so much more efficient than all other tubes on the market that the Magnavox Company have designed their new two and three-step Power Amplifiers for use with A-P Transmitter Tubes exclusively. These tests indicate A-P Tubes produce far better results because of the following superiorities: 1. Higher vacuum. 2. No adjustments necessary. 3. High amplification constant. 4. Low filament current.

For better results, for the best results, for sure results, use A-P Tubes exclusively. There is an A-P Tube for every use. Use A-P Tubes for efficiency.

A-P Tubes are licensed by the Radio Corporation of America under the De Forest Audion, Fleming and patents for amateur and experimental use in Radio communication.

—and DeForest Quality Equipment

New Low Prices

On DeForest Duolateral Honeycomb Coils.

DL—25	\$ 1.45	DL—300	\$ 1.85
DL—35	1.50	DL—400	1.90
DL—50	1.60	DL—500	2.10
DL—75	1.60	DL—600	2.30
DL—100	1.65	DL—750	2.50
DL—150	1.70	DL—1000	2.75
DL—200	1.75	DL—1250	3.20
DL—250	1.80	DL—1500	3.70

Inductance Coil Mountings

Cat. No. LC-100. Geared Inductance Coil Mounting for panel mounting.....\$9.55
Cat. No. LC-101. Geared Inductance Coil Mounting on Oak Base and Pedestal..12.75
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The above are all three coil mountings. Connection to the movable coils is made through heavy Litz wire, eliminating all trouble from loose connections.
Type F-500 Reversible Filament Rheostat \$1.75. Moulded of Condensite, Phosphor-Bronze Contact, complete with DeForest 1½-inch knob, for front or back mounting.
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And for the best book on Radio, ask your dealer for "Elements of Radio-Telegraphy" by Lieut. Ellory W. Stone, U. S. N.

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MP-100 Audion Control	\$ 14.30
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A complete line of Radiophone transmitting and receiving equipment. If your dealer cannot supply you with DeForest Quality equipment do not accept a substitute. Write us direct. The results you get depend upon the equipment you use. Insist upon DeForest Quality equipment, the best that money can buy, at the price of ordinary equipment.

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