

B R O A D C A S T L I S T
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Vol-4 No-94

January 12

1924

RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

THE TYPICAL BOY SCOUT OF AMERICA IS A RADIO FAN



(C. Foto Topics)

Meet "Red" McDermott, who has been selected as the typical American Boy Scout. "Red" was christened "Arthur," but his buddies attended to that. He will shortly appear in a moving picture glorifying the Boy Scouts organization. Needless to say, "Red" is freckled, healthy, husky, happy and an ardent radio fan. He owns two receiving sets.



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Cut 3/4 Actual Size

The Little Wonder!

The smallest, yet most efficient Transformer ever made. Maximum reproduction value, minimum distortion, 100% shielded.

PREMIER "HEGEHOG"

Trade Mark

AUDIO TRANSFORMER

Mounts anywhere—save space in assembly. We guarantee it unconditionally. Try them in your next "hook-up." Ratio 1 to 3, 1 to 4, 1 to 5, \$3.50; 1 to 10, \$4.50. Ask your dealer. Write for bulletin No. 92.

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Federal Standard Radio Products
Standard of the Radio World, 130 separate units, each fully Guaranteed.
Write for Catalog.
Federal Telephone and Telegraph Co.
BUFFALO, N. Y.

Trade-**"THORIO"**-Mark
DETECTOR—AMPLIFIER

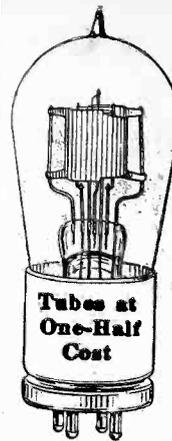
T. No. 1. Detector-Amplifier. 1 1/2 Volt Filament. 1/4 Ampere. Plate Voltage, 22 1/2-90.
T. No. 3. Detector-Amplifier. 3 Volt Filament. .125 Ampere. Plate Voltage, 22 1/2-90.
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Filament licensed under Patent No. 1422019 July 4th, 1922.

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Superior to any on the market for Volume, Clearness, Distance and lack of Tube Noise. Mailed Post Paid to any address in the United States at \$4.00 each.

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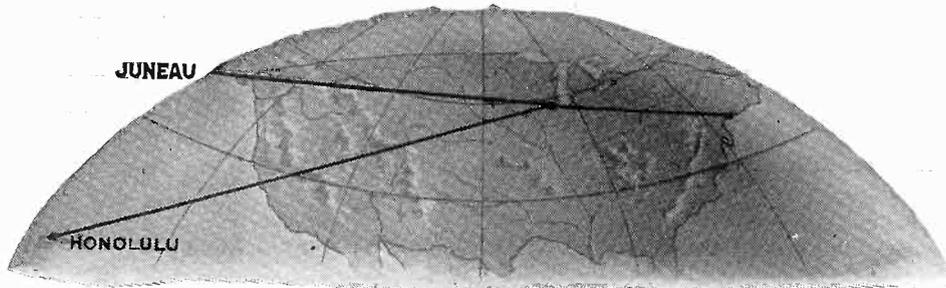
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Solve crystal troubles by installing an Erla fixed crystal rectifier. Once installed, no attention is required. Jolt and jar proof. List price, \$1

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Typical of the thousands who have discarded complicated multi-stage receiving units in favor of simple, efficient Erla reflex design, is J. G. Hamock, 1917 South Western Avenue, Chicago, who writes:

"During my first week with your three-tube hook-up, tuning through high power Chicago stations, I got Jefferson City, Dallas, Memphis, Atlanta, Omaha, Kansas City, St. Louis, New York, Springfield, Pittsburgh, Harrisburg, Louisville, Cincinnati, Fort Worth and Tampa.

"The Sunday following I added Fresno, Denver, Astoria, Ore., Los Angeles, Honolulu, Hawaii Naval Maneuvers, and Juneau, Alaska, the Alaska Electric Light and Power Company.

"The United States Stations all were clear on the loud Speaker. Also I re-tuned every station by checking them with my twelve-year old son, who would get them on the re-tune, whereupon I would, when required, sharpen the re-tune myself."

Such power, selectivity and ease of control, with three tubes, are attainable only through Erla reflex design, incorporating Erla synchronizing radio and audio frequency transformers.

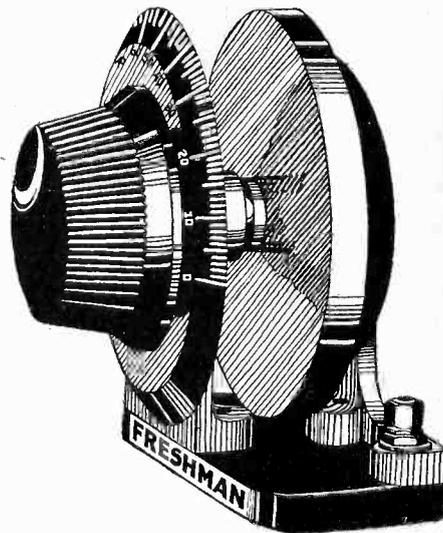
Guaranteeing the perfect synchronization of received and reflexed currents having the same phase characteristics, Erla transformers enable vacuum tubes to do triple duty, as simultaneous amplifiers of received radio frequency, reflexed radio frequency and reflexed audio frequency currents.

For complete details, ask your dealer for Erla Bulletin No. 16, giving Erla one, two and three-tube reflex hookups. Or write direct, giving your dealer's name.

Electrical Research Laboratories
Dept. W 2515 Michigan Avenue, Chicago

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the plates of which actually vary in area—an engineering feat never accomplished before—giving especially fine adjustment for selective tuning.



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"FRESHMAN SELECTIVE"

Mercury Variable Condenser

Will stand more than 5,000 volts. Plates are dust and dirt proof, thereby eliminating leakage which creates noises. No plate vibrations—absolutely quiet. Compact and attractive in appearance. Mercury plates give intimate contact with Mica Dielectric.

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Do not confuse the "Freshman Selective" Mercury Variable Condenser with any other heretofore on the market:

.0003 m. f. (equivalent to 17 plate)
.0005 m. f. (equivalent to 23 plate) ALL TYPES \$5
.001 m. f. (equivalent to 43 plate)

All Molded Parts and Dial of the Finest Bakelite. At your dealer, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue New York

RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

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January 12, 1924

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A New Radio Receiver With Double Auto Selection

By Prof. R. V. Lvovitch, Odessa, Russia

Translated by I. S. Shoolman

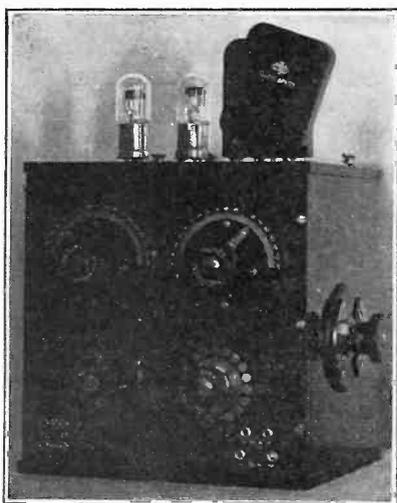


Fig. 3. The Lvovitch receiver as finally developed, using but two tubes.

IN 1901 I began experiments on the application of low frequency in receiving for tuning the period of a transmitter at The Wireless Telegraphy and Telephony Laboratory, Petrograd, Russia. As I developed it, the low frequency was introduced into the detector circuit by means of a transformer instead of the regular telephones. This low frequency was tuned by means of a variable condenser and the telephone was coupled with part of the circuit by means of a specially constructed coil.

By doing this, it became quite possible to receive signals of any one of several transmitters that were working on the same wave length, but due to the tuning of the apparatus their tones were changed. This allows close work on any receiver desiring to hear one station to the total exclusion of the other.

For instance, the reception of signals from Eiffel Tower in any of the Russian stations was impossible with ordinary receivers, because of the powerful station at Nauen, Germany, which was working on the exact

same wave length. The signals from the German station at Nauen (POZ) were so loud that one could receive them at will, without any ground, using the regulation receiver with a fairly long antenna, which is necessary for such long wave length work. However, upon the application of my principle the Paris station could easily be tuned in and heard without any disturbance from Nauen.

The bulkiness of the device and loss of energy in the low frequency circuit, however, were two marked disadvantages. The decreasing of the initial intensity of the signals could be compensated by the Brown amplifier, but again this complicated the set unnecessarily and therefore was another undesirable feature.

The appearance of vacuum tubes about that time, for practical use as detectors or amplifiers and the discovery and application of reaction coupling offered the possibility of even further developing the principle without incorporating heavy and unnecessary apparatus.

The tests of the circuit shown in Fig. 1 were made in the laboratory of a radio factory at Odessa in 1922. As depicted, signals were received on an ordinary receiver, amplified at high frequency, passed to my low frequency tuned circuit, then again amplified, and passed back through the phone circuit of the last stages to the reactance circuit of the middle or low frequency circuit. This gave exceptionally good intensity and extremely sharp and selective tuning. The negative wave of the arc stations which tires the ears of the operators very much after a short period, was eliminated.

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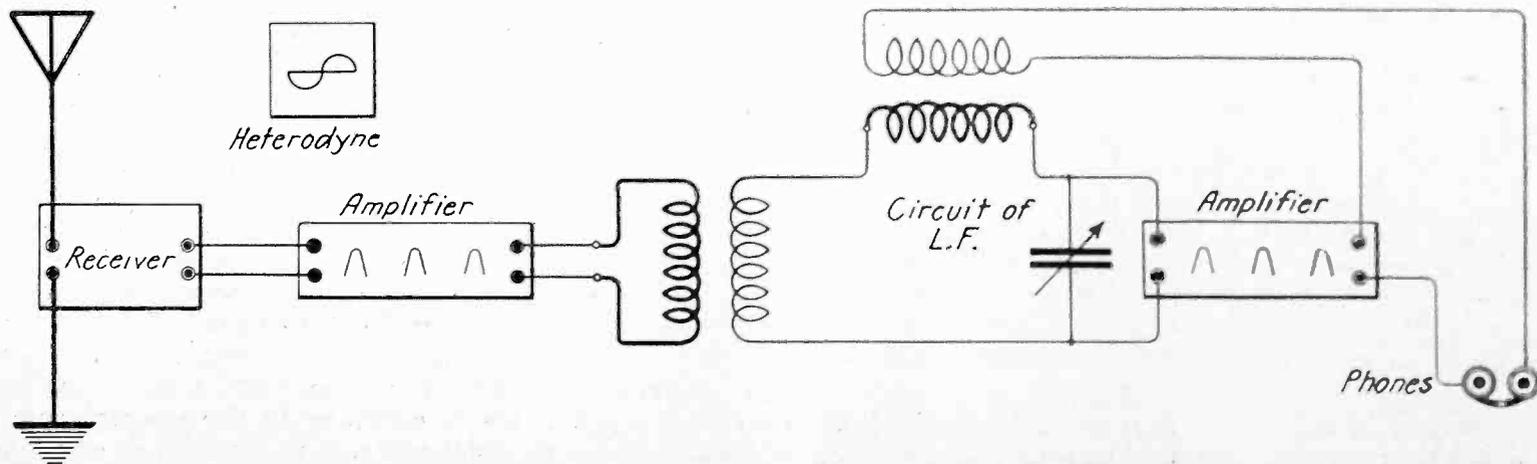


Fig. 1. How the original Lvovitch receiver was worked out. A separate heterodyne was used on the high frequency amplifiers when reception on continuous waves was desired.

(Concluded from preceding page)

inated. This advantage of the receiver in itself is one that is not to be passed over, as it enables arc reception to be made as simple as ordinary spark work, where there is no negative side to the wave.

The tone of spark stations, even below 500 cycles becomes clarified and musical and can be varied according to the desired pitch by the operator. In order to receive continuous waves, a heterodyne on the first circuit was necessary, but this was dispensed with on spark stations.

These results and the wish to simplify the construction of the apparatus even more, brought me to the idea which was finally used, and which is depicted in Fig. 2. This scheme as shown was worked out by I. S. Shoolman. As noted, only two tubes are applied to this set, which is shown complete in Fig. 3. One of these tubes is for the high frequency circuit and another for the low frequency. Both circuits have reaction coupling. The first circuit is tuned to the wave of the station and the second to the tone, thus giving absolute control of the receiver to the operator.

The value of the coupling in the low frequency circuit is regulated by means of a simple copper plate

between the reactance couplings. In order to receive telephone signals with the apparatus, the condenser across the grid-filament circuit is simply switched out of the circuit.

According to the certificate of tests of this set at the Board of Posts and Telegraphy, Odessa, Russia, the intensity of signals on both long and short waves was listed as very strong. As an instance, the station sending at Hanover, Germany, was heard at the other end of a large room when the tests were in progress.

The range of the set is from 500 to 30,000 meters, on spark, arc or telephone work. It is very easy to change the tone of the station (when working on continuous waves) by means of the condenser, thus choosing the most pleasant tone according to the need or desire of the operator. This can be done without detuning the station at all, and the intensity is at all times constant. It is possible to lower the tone to such an extent as to make the diaphragms of the phones resonate, which greatly increases the strength of the signals.

I am indebted to A. V. Beck for working out the construction of the receiver; I. S. Shoolman for his independent working out of the scheme and M. Serapin for his construction of the device as depicted.

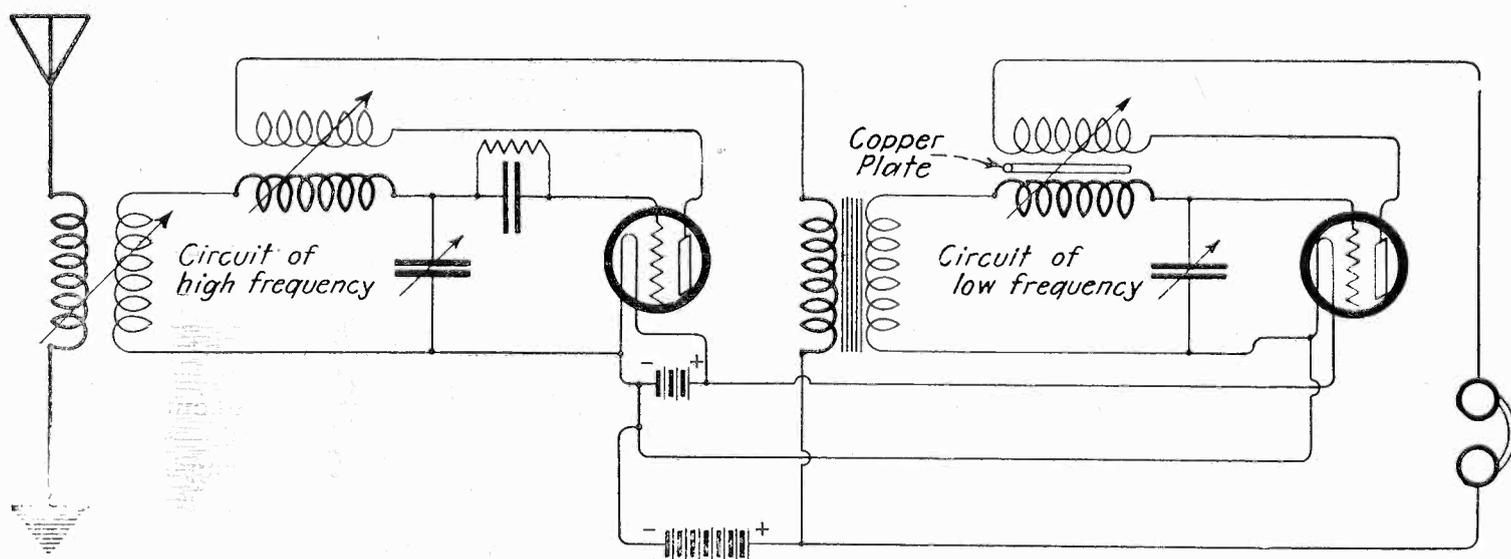


Fig. 2. The Lvovitch circuit as finally developed. It uses but two tubes, with feedback or reactance in both circuits, and a variable copper plate in the field of the second or audio-frequency side.

The Radio Woman

FRIEND HUSBAND was telling me the other day about what happened to our little nephew, Bobby. His mother was busy in the kitchen and left the child to his own devices. Now Bobby is about five years old, very inquisitive and likes to get his hands and fingers into everything (he got them into the washing machine and numerous times in the jam). Daddy came home and found Bobby with a great big red splotch on his face, and he told daddy that "it burned my face." It seemed that he was fooling around the storage battery, unscrewed the cap, stuck his fingers in and then rubbed his cheek. After putting some weak ammonia solution on it, and rubbing plenty of olive oil, butter and lard and egg on it, the burning stopped, but now Dad and Mom take care that the storage batteries are out of the way of Bobby's fingers.

* * *

Have you heard of the apartment house in Boston that is being erected with a triple plug in every room? There are three receivers in the pent house and each one is for a different type of broadcasting program.

That strikes me as a great idea. Whenever your guests feel like listening to jazz, put in the jazz plug and so with the other plugs.

A Dry Cell Tube Stunt

SOMETIMES the regulation dry cell tubes are extremely unstable when used in the ordinary regenerative circuit. They just won't stay "put" but will for no reason at all tumble all over the lot the moment you try for distance. Take a piece of ordinary stranded light cable and unravel about one inch of it, leaving an inch and a half or two inches stranded together. Put one end on the plate lead, and the other end on the grid side, making sure that the open ends are well insulated and do not touch. This forms a slight capacity which will help "keep it there" when it comes to putting the tube right up to the "spill over" point. This is contrary to the general rule of radio engineers which states that capacity in or around the plate circuit should be kept as low as possible—but it sure does help to hold 'em steady.

Adding This Device to the Gordon Circuit Gives Sharper Tuning

By Asa Schenck

(Issue - 43)

LATE last winter, January 20, to be exact, you published a WD11 tube single circuit, regenerative hook-up that was a "bear." I built one and was more than satisfied with the results.

This winter I was just a little disappointed in not being able to receive some of the stations I had been getting. This, of course, was not the fault of the set but was on account of the higher wave-length used by some of the stations.

To overcome this, I substituted a 75 turn DL coil for the one shown in the circuit. This solved my problem, but with it I could not get some of the stations I was getting with my 50 turn coil. Naturally, all that was necessary was to have two coils. One could be taken off and another put on, but I find it much easier to have both coils on and just disconnect one and connect the other.

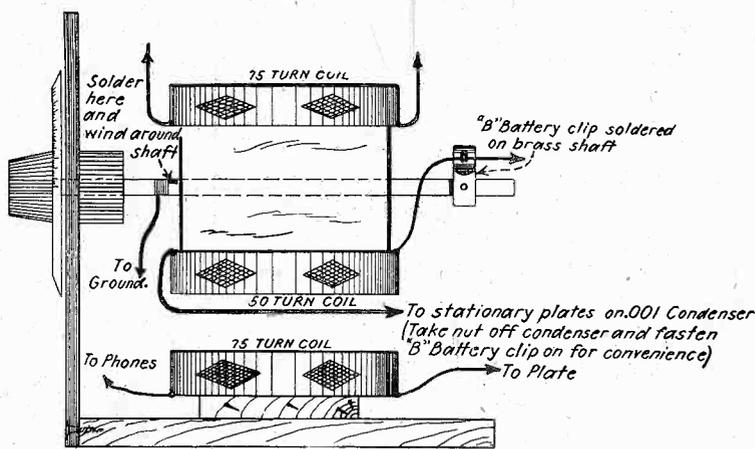
The diagram will give an idea of how I solved the problem. Wind both coils (50 turns and 75 turns) on the same piece of tubing about 1/2 inch apart and leave plenty of wire on either end of the coils to reach the parts to be connected. Connect one end of the coil to the shaft and then ground the shaft. This eliminates the capacity effect from the dial. There are only two connections to change and to simplify this operation solder a brass binding clip (from a discarded B battery) to the brass shaft. Take another one and make a hole in it and slip it under the nut on the .001 condenser. All that is necessary is to pull out the wires from one coil, give the dial 1/2 turn and slip in the wires of the other coil and you are ready to get another list of stations.

I might suggest leaving the leads at opposite sides

of the tube or core and mounting them on the shaft nearly parallel with the shaft, thus eliminating strain.

The same system may be used with ready-made honeycomb coils, which may be purchased unmounted. In this case, take a piece of cardboard tubing that will fit snugly inside of the honeycomb coils and mount on the shaft and touch with a little glue or shellac to prevent coils slipping off.

I have found that some stations come in better and a little sharper tuning may be had by shunting an 11 plate condenser across the plate and phone leads of the stationary coil. (I use 75 turn coil at all times in the plate circuit.) I have tried 180° couplers, split variometers and spiderweb coils on this same hook-up and can say that the honeycomb are the most efficient.



Schenck's method of reaching all the broadcasting wave lengths very conveniently on the Gordon receiver by the simple use of two different sized antenna coils on a movable axis.

New Broadcasters

LIST of limited commercial broadcasting stations licensed during the week ending December 21st, under Class A:

		Fre- quency Kcys.	Wave Length Meters	Power Watts
WABW	The College of Wooster, Dept. of Physics, Wooster, Ohio.....	1280	234	20
KFMS	Freimuth Dept. Store, Duluth, Minn.	1090	275	100
WFAT	The New Columbus College, Sioux Falls, S. Dak.....	1160	258	50
KFMU	Stevens Brothers. San Marcos, Texas	1250	240	20
KFMT	Young, Dr. George W., Minneapolis, Minn.	1300	231	5
WJAG	The Norfolk Daily News, The Huse Publishing Co., Norfolk, Nebraska,	1060	283	250

Transferred from Class C to Class A

The Radio Bug

By Henry M. Morton

I'M a radio fanatic, full of pep and vim and static
And I listen to the stations that are far away each night.
Oftentimes I should be snoozing when a feeling just comes oozing
And I hook up my loud speaker with a feeling of delight.

Lightning may have sometime hit me, or the radio bug bit me
And it left a burning fever that is with me day by day,
And there's just one way to cool it (it's no use to try to fool it),
I must listen to some singing and some jazz from KHJ.

Friends of mine say I'm afflicted, and, perhaps, I stand convicted,
But they never have been bitten so of course don't understand,
For no matter what they may say, I just tune in KDKA
And proceed to get an earful from a syncopatin' band.

"Life is short and time is fleeting," some one said right out in meeting,
And the one who made that statement spoke a mouthful, you'll agree,
For from Life a certain measure, we are due of joy and pleasure.

Why not get it? It's here for us—there's enough for you and me.

So my friends may keep on kidding, call me nutty—say I'm skidding,

But I pay them no attention when they spring a puny pun,
For the thing that may have hit me, or the bug that one day bit me,

Is not understood by others, though to me—it's lots of fun.

Neutrodyne Receivers

IF you are able to handle the antenna and ground lead of the set without causing any difference in the tonal or volume qualities of the receiver, it is properly neutralized. Otherwise it is not, and should be looked over. This does not mean bare leads, but the insulated wire that leads to the receiver.

Sarnoff Says Public Must Not Be Made To Pay for Radio Programs

WITH the general trend of thought among radio enthusiasts leaning toward the question, "Who will pay for broadcasting?" the remarks of David Sarnoff, vice-president and general manager of the Radio Corporation of America, in a recent address, are especially timely.

"It has been said by a great many people and a great many corporations, some very large and able," said Mr. Sarnoff, "that broadcasting depends upon a solution of the problem whereby the consumer will pay for the entertainment which he receives. In other words, it has been said that unless some method is provided by which a means is created for collecting revenue from the user of a broadcast instrument, that the whole industry is founded on sand, and that it is bound to collapse in time, because there will be no means of supporting it.

"It is my firm conviction," continued Mr. Sarnoff, "that that sort of solution to the problem is not necessary, that broadcasting can be made commercially practicable without any means being found for collecting from the consumer, that the greatest advantage of broadcasting lies in its universality, free entertainment, culture, instruction and all the items which constitute a program, in doing that which no other agency has yet been able to do. It is up to us, with



David Sarnoff, vice-president and general manager, Radio Corporation of America, who advocates free broadcasting as against "narrowcasting."

intelligence and technique and broadness of spirit and vision as to the future, to preserve that most delightful element in the whole situation—the freedom of radio.

"Just so soon as we destroy that freedom and universality of radio and confine it to only those who pay for it—those who pay for the service, in other words—just as soon as we make of broadcasting 'narrowcasting,' we destroy the fundamental of the whole situation. And, therefore, I believe very definitely that broadcasting as constituted today is commercially sound, and that it will remain so in the future, although there may be selective methods and narrowcast methods which will do no harm. These may supplement the situation. There may be wired-wireless and the like. All of these will make their contributions. But fundamentally there will remain, and there must remain and be preserved that element of the broadcast situation which makes it possible for grand opera to go to the slums and to the districts of the poor as well as the rich, everywhere in the world, without any charge. The real picture of a \$15 or a \$25 set in the home of the slums, if you please, receiving the magnificent things in the air, is the picture we must preserve."

Listeners-in all over the country will undoubtedly be cheered by these views from an authoritative source.

Low Power Amateur Radio Transmitters to Be Tested by Australian Experimenter on Ship

SAN FRANCISCO, CAL.—In order to demonstrate whether the low power radio code transmitters commonly used by amateurs in the United States and Australia during the recent transpacific tests compare favorably with the high power expensive sets when adopted for regular commercial traffic, a special amateur station will be installed on the R.M.S. "Tahiti" leaving Australia about the middle of February, bound for this city.

The arrangements for this unique plan were made upon the advice of Charles Maclurcan, president of the Australasian Radio Relay League, who will supervise the installation on the ship and make the trip from Sidney to San Francisco and back. He will be accompanied by a 16-year-old experimenter, Jack Davis, of Vacluse, who has likewise made a name for himself in Australian radio circles.

Mr. Maclurcan, whose home is in Strathfield, was prominent in the amateur tests between America and Australia and his station, 2CM, is known throughout the commonwealth. The tremendous distances covered by the low power transmitters during these tests, con-

vinced him that the amateur-type stations were of commercial value.

Immediately after completing his plans for the voyage, the Australian experimenter wrote the American Radio Relay League Headquarters at Hartford, Conn., advising them of the project, and the American organization will arrange for his reception here and give their co-operation during the period of the tests.

The equipment to be installed on the ship will be a duplicate of Mr. Maclurcan's own amateur station at Strathfield. A constant watch will be maintained by the operators during the voyage and data recorded.

"It occurred to me that all this low power transmission record work should be turned to some account for the public generally," declared Mr. Maclurcan, in an interview with an Australian correspondent. "Many of my friends have been quoted big sums for the installation of wireless sending sets to cover a few hundred miles. This was generally due to the fact that the companies quoting, having no reliable data of the sure ranges of low power sets, had, in self protection, to contract for excess power."

Two-Way Contact Across Pacific Accomplished

TACOMA, WASH.—An unknown American radio operator in Tokio, Japan, recently sent a radio message to his mother at Cambridge, Ill., through the amateur radio station, 7HG, in this city, operated by Charles York, marking the first two-way short wave communication across the Pacific ocean. With only a fleeting contact, barely allowing time for the message to come through, York had considerable difficulty in distinguishing the foreign operator's call, JUPU.

While the signals of amateur transmitters in the United States have been reported by ship operators in remote sections of the Pacific, and as distant as the island of Ceylon in the Indian ocean, this is the first time an amateur has worked both directions across the 4,760 miles of ocean. The message was delivered via the American Radio Relay League traffic system.

The contact hardly had been made and the message copied when communication was interrupted by heavy interference. It was about 1:00 A. M. when York heard a station with pure CW calling on 200 meters and signing with the un-



(C. Keystone View Co.)

It doesn't take more than one glance to tell that this young lady will not exchange her radio Xmas present. It is a small crystal receiver standing on a tripod base, which can be made long or short. It is one of those affairs that you can take any place you go.

familiar Japanese call. For a brief interval signals were good at both stations.

The station operated by York is situated on one of the highest hills in the surrounding country. He has done a great deal of long distance work, his best previous two-way record being to communicate with Canadian amateur station 1AC, situated in Nova Scotia. He had also worked 6CEU in Hawaii and amateurs in every radio district in the United States with the exception of those in the second and fourth.

His antenna is supported by a 65' pole at the free end and a 40' pole at the lead-in end. It is a six-wire flat top 50' long with a counterpoise directly underneath. The transmitter uses the Hartley circuit with two Telefunken D.R.P. tubes.

Lost—53 Operators' Licenses!

FIFTY-THREE radio operators have reported to the Department of Commerce that they have lost their licenses. Supervisors and inspectors have been warned to see that unauthorized persons are not using these lost permits to transmit



(C. Keystone View Co.)

Jean Sargent, broadcast director of WNAC, Boston, the Shepard Stores broadcasting station, is probably the only announcer who signs off using her full name instead of just initials. She also holds the distinction of being the first woman to occupy a position at the microphone six days a week.

radio messages, and individuals finding such lost papers are urged to forward them to the Department for cancellation. One operator, an extra first class man, seems to have lost two licenses during the past year. Such carelessness on the part of operators is not understood by radio officials, who desire to warn operators to take better care of their official papers and save themselves time, money and embarrassment.

"Be It Ever So Humble"—

RADIO now has a place in many humble homes as well as in those of the more well-to-do. Christmas visits of American Legionnaires to the homes of sixteen practically destitute families in the District of Columbia, revealed the fact that five of the needy families had radio receiving sets. Most of the sets were home-made affairs, which, in all instances, seemed to have been good investments, since they brought spiritual aid and entertainment to those forced to remain at home a large part of the time.

Government Broadcasts Want Ads

THE Government is advertising by radio! But, although direct radio advertising is banned, there are few who will object, since the results achieved seem to indicate that the public is benefitted. Every Wednesday night, Mr. Morgan of the Civil Service Commission, broadcasts from NAA, Arlington, openings in government positions and announces examinations to be held for every kind of job from that of an unskilled laborer to those requiring highly trained scientists, statisticians and executives. Some replies indicate direct results, but as not all applicants state how they learned of the openings, an exact check is impossible.

The recent call for apprentices for the Washington Navy Yard, however, brought several phone calls and mail inquiries from fathers and mothers interested in securing first class training for mechanically inclined sons.

The openings annually announced over the radio phone cover as many as 1,000 different positions, Mr. Morgan states, and he is anxious for those seeking government work to listen in Wednesday evenings at



(C. International Newsreel)

Professor J. Ambrose Fleming, pioneer radio investigator and the man who is responsible for the Fleming valve, which is the grand daddy of all present day tubes, holding one of the few original models of his early type of two electrode valve. He is 74 years old.

7:25 and learn what is available. Some of the listeners-in, he says, proved to be only friends who called up the following day to talk with him, having recognized his voice.

Phone 500 Miles at Sea

PERFECT results with a new Marconi wireless telephone instrument, used at sea, are reported by the Lloyd Sabaudo Company. Messages were picked up and heard distinctly from a distance of 500 miles by the S. S. "Conte Rosso."

Features of Station WCBD, Zion, Illinois

By Laurence Blackhurst



(C. Western Electric Co.)
J. H. Depew, manager and chief announcer of the popular station WCBD, Zion City, Ill., before the "mike."

ON the shores of Lake Michigan, midway between Chicago and Milwaukee, two graceful sturdy steel antenna masts tower 150' above Zion, the unique city founded by the late Dr. John Alexander Dowię. They mark the site of Station WCBD, the radio telephone broadcasting station owned and operated by Wilbur Glenn Voliva, general overseer of the Christian Catholic Apostolic Church.

Station WCBD, of Class B type, is strategically located for perfect transmission. It is situated on a level plain a few miles south of the Wisconsin boundary where there are none of the disturbing elements which sometimes are troublesome to broadcasting stations and to their audiences. For instance, electric car lines; the nearest to Station WCBD is a half mile distant.

The equipment of the station consists of a Western Electric 500 watt radio telephone broadcasting equipment using Heising constant current method of modulation. On the Temple site, abutting the famous Shiloh Tabernacle at Zion, a structure costing approximately \$50,000 has been erected to house the station.

Visitors are always welcomed at both Station WCBD and Shiloh Tabernacle; it is a fallacy to think that Zion is a kind of Forbidden City, the portals of which are opened to only those who are adherents of the religious tenets observed by the citizens. Those who visit the station—and their number averages 500 each

Sunday—are ushered into a spacious reception hall, comfortably and invitingly furnished.

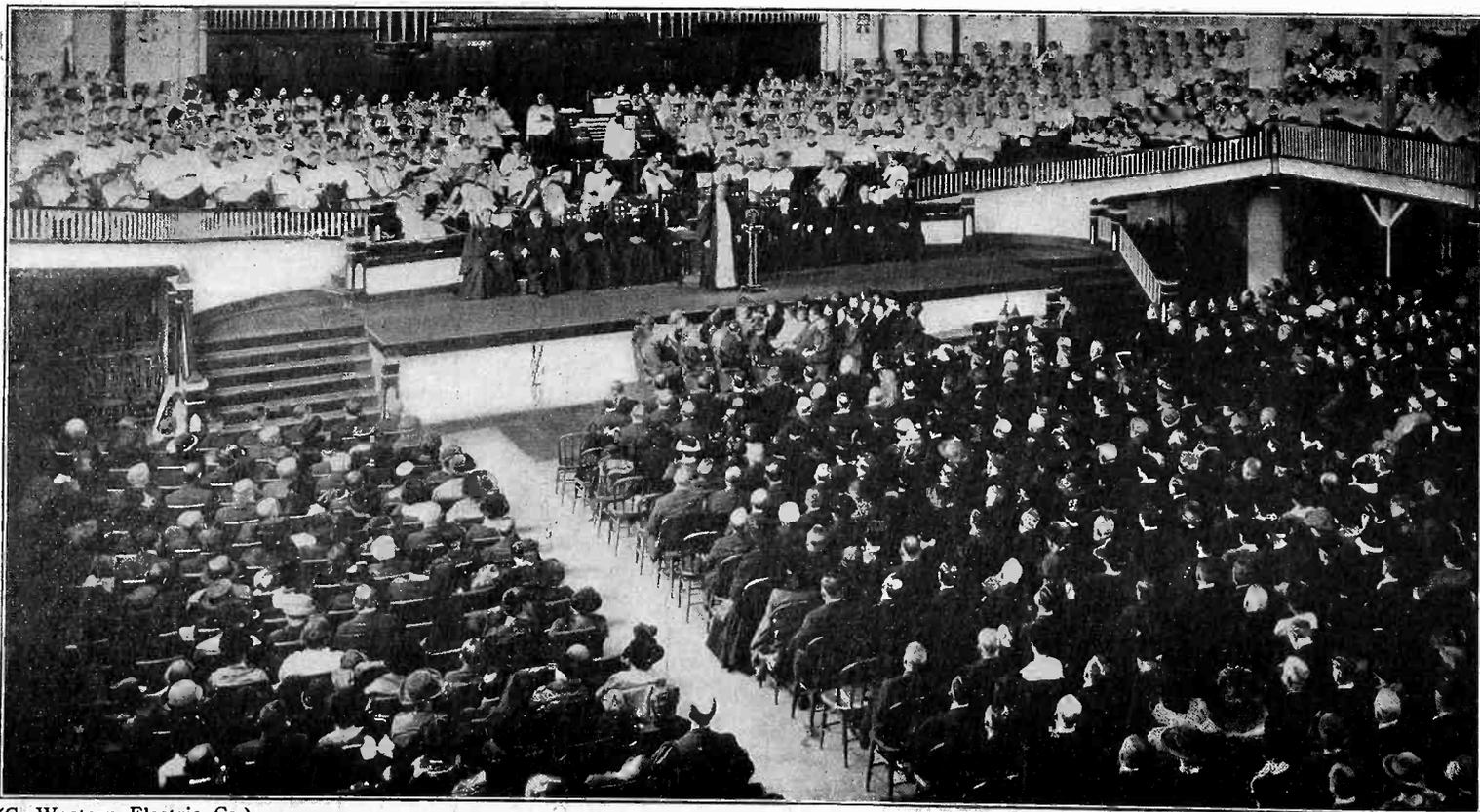
On the left of this room is the studio where, on a wave length of 345 meters, concerts for which WCBD is famed are produced every Monday and Friday evening (8 P. M. Central Standard Time) and every Wednesday and Friday afternoon (2:30 to 3:45 P. M. Central Standard Time). The blue and gold fabric used for the wall coverings of the studio was specially made so that reverberations are damped to exactly the right degree.

On the right of the reception hall is the room where stand the Western Electric 500-watt radio telephone transmitter, power central switchboard, monitoring radio receiver and radio volume control panel.

From the microphone in the studio (or one of the microphones in the Tabernacle whence services and organ recitals are broadcast on Sundays) electric currents, carrying the speaker's voice or the music, go through four stages of amplification and then to two 250-watt modulator tubes. Here they control the output of two 250-watt oscillator tubes and send out to the antenna a high frequency current the strength of which is an accurate copy of the vibrations of the voice or other input.

The antenna, four wire T type whence the waves are radiated, is suspended between two steel towers 150' high. It is 95' long with lead-in wires falling vertically 125'. The motor-generator set that furnishes power for the tube filaments and the plate circuits is housed in a room adjoining the apparatus room.

On Sunday mornings from 9 to 9:30 (C.S.T.) programs by the Zion Orchestra are broadcast from a studio in Shiloh Tabernacle. Sunday afternoons from 2:30 to 5:30 the principal service is broadcast from the Tabernacle direct. During this period there is an organ recital or special music by the Zion Band and Zion White-robed Choir of 500 voices. The an-



(C. Western Electric Co.)

Interior of Shiloh Tabernacle, Zion, Ill., showing the famous Shiloh Choir which has been heard from coast to coast by radio. Overseer Voliva is standing before the microphone.

nouncer's booth is so arranged and equipped with a signal system that the announcer can at all times see the speaker or singers and instantly communicate with the operator.

It is quite probable that many persons in the great invisible audience that listen in to WCBD do not know of the painstaking care taken to provide the citizens of Zion with musical culture. Believing that good music is a vital element in education, the people of that city maintain a Conservatory of Music where the musical ability of individuals is developed and encouraged. All branches of music and the theory of composition are taught by a staff of twenty competent teachers. Tuition is free, and at the present time 939 students are enrolled.

It is no easy task to prepare programs that will give pleasure to a host of invisible listeners, but WCBD seems to have been singularly successful in so doing—judging by the letters received at the station.

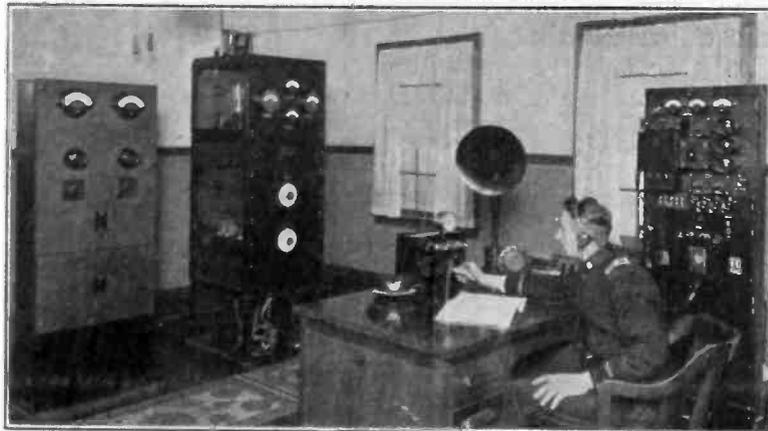
The programs are made up of numbers by the Zion Junior Choir of mixed voices of 150 children, ranging from 8 to 12 years of age, Zion Male Choir of 40 voices, Zion Women's Choir of 20 voices, Zion Band of 50 pieces, Zion Orchestra of 40 pieces, and the Zion White-robed Choir of 500 voices. It is said that this choir is the largest that sings regularly every Sunday.

Mr. Wilbur Glenn Voliva, the general overseer, in commenting on radio said that it is a universal boon in that it makes for a more intimate acquaintance and promotes better understanding among all peoples. It widens the outlook and adds to the enjoyment of myriads.

Mr. Voliva predicts that radio will revolutionize

public speaking. He pointed out that usually radio will bring out the best that is in a speaker who will accustom himself to making addresses into the microphone, for then he will be freed of having to think of anything except what he is going to say.

No one after talking with the general overseer can fail to see that he is intent on giving the audience of WCBD the best programs within his ability. The men who are so ably assisting him in accomplishing his purpose are, J. H. Depew, manager and chief announcer; John D. Thomas, program director and conductor of Zion White-robed Choir; P. B. Newcomer, conductor of Zion Band; L. J. Hire, conductor of Zion Orchestra; Fred Faassen, organist Shiloh Tabernacle, and Henry H. Albrecht, radio operator.



Operating room of Station WCBD, Zion, Ill. On the extreme right is the Western Electric speech amplifying control board. In front of the operator on the opposite side of the room are the transmitter control panel and the transmitter tuning panel.

RADIO PRIMER

STORAGE CELLS: CARE AND OPERATION—

Most people take a dislike to storage cells, because they consider them unsightly and unnecessarily dirty.

If you live where alternating current is used it will be necessary to have an alternating current battery charger, of either the electrolytic rectifier or the tungar (two-electrode vacuum tube) type. Cells should always be kept fully charged and clean. Wiping off the tops of the cells and the sides of the battery with a cloth to keep the acid from "creeping" and taking care that the tops of the cells are always on tight, except when the battery is being charged, will keep the battery in good condition. If a little vaseline is spread over all the metal parts around the battery (lugs, connectors, etc.), there is little chance of corrosion taking place.

When charging the battery, make sure that the tops of the cells are off, and that the battery is standing in a well ventilated place. Do not allow open flame in a room where a battery is being charged, especially when it starts to "gas" freely. The gas that is liberated is oxygen and hydrogen forming a very highly explosive combination which is easily ignited. Never examine the solution in a battery by the use of a match. Use an electric torch.

If the battery is to be out of commission for a period of four months or more, and cannot be kept charged, the safe thing to do is to "dry store" it. Give it an overcharge, first adding the necessary water to keep the level in the cells above the elements. After it has had the overcharge, test each cell with a hydrometer to see that it is fully charged. Obtain three large mason jars, or other jars, and open one cell, putting waxed corks in the others to assure their not leaking. Pour the electrolyte into the jar, numbering both jar and cell, so that the same electrolyte may be returned to the cell that it was drawn from. In turn, remove the electrolyte from each of the cells, and

tightly cork it up. Do not use any jars that have metal covers, or pour the solution into any metal cans. Use glass or hard rubber, and see that each container is corked air-tight.

Let the battery stand upside down in some place where it is not liable to spoil anything, and let all the solution that is left drip out. Then wipe off the tops, wash with water, and replace the caps on the cells after filling all cells with distilled water. Place it in some dark corner, where there is no chance of a great change in temperature, yet where there is no great heat. If the solution that you took out is dirty, let it settle, then drain the clean part off. Take extreme care while doing this that the acid is not allowed to touch anything. Or if it does, wipe the place off immediately with a cloth dipped in aqua ammonia. This effectively stops the action of the acid. Do not allow the ammonia to get near the solution, or in the solution, as it will spoil it.

A certain amount of sulphation will take place in the battery when it is standing. Therefore, when placing the battery back in commission, give it an overcharge while the distilled water is still in the cells. Run an ordinary discharge on it for about three hours, then pour out the water. At this point, it is good to look at your separators. They might need replacing, so if that is the case, remove the tops of the cells and take the elements out. Remove the wood separators and replace them with new ones. This gives you a chance to clean the bottom of the jars. Run water through them, and scrape them with a knife to remove the "muck." Replace the elements, pour the electrolyte in, and put on the insulating compound. Then give the battery another charge. The battery is now ready for regular work.

This may seem a lot of work, but a few hours taken in the care of a battery will repay the owner in long and faithful life. In the city, however, it is best to put the battery in the hands of a service station man, as he is doing the same thing day after day, and will for a few dollars take care of it all.

Stopping Squeals and Howls by Stabilizing the R. F. Amplifier

By Brainard Foote

MUCH has been written about tuned radio-frequency circuits and many methods for controlling their oscillation have been successfully presented. Yet there are thousands of transformer-coupler radio-frequency amplifiers in use today with which trouble of this very kind is being encountered. Oscillation in this type of amplifier varies in its nature and the usual difficulties may be listed as follows:

1. One tube heterodyning another.
2. Second tube oscillating with less grid bias than the first.
3. Persistent oscillation of any one tube.

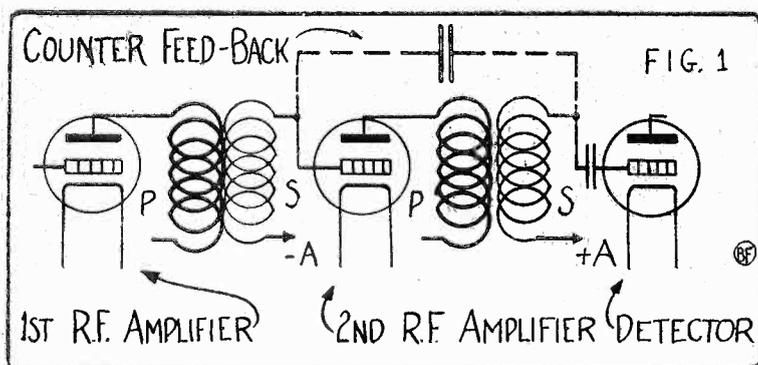


Fig. 1. Self-oscillation in a radio-frequency amplifier may be controlled by using a small condenser so arranged that it feeds back energy of opposing voltage to that which is causing the oscillation.

Before the matter can be adjusted, it is necessary that one know exactly what form of oscillation exists in his R.F. amplifier. The first form of trouble may easily be detected with the antenna disconnected. If numerous "squeals" are heard as the secondary condenser is rotated, one may be sure that the first R.F. tube is heterodyning the other, or one of the other R.F. tubes. Most manufacturers of radio-frequency transformers recommend the use of transformers constructed differently, so that one transformer does not tend to oscillate at a wave length close to the oscillation point of one of the others. Thus, the first transformer might have a "peak" at 400 meters, and the other one have a peak at 375 and another at 450.

The most obvious method for avoiding heterodyning is to alter the wave range of one of the windings, and a small shunt capacity for either of the plate circuits will usually suffice. A .00025 mfd. fixed condenser connected between the "P" and "B" binding posts of one of the transformers is the cure.

Sometimes it is found that the "squeal" or beat note of the broadcast station cannot be heard when the potentiometer is moved toward the negative side of the filament. The click will be heard but the carrier wave cannot be picked up. The set, in this condition, lacks selectivity and three or four broadcast stations may often be heard interfering with one another. This may happen even with the loop antenna. The click heard is evidence that the second or third R.F. tube is starting to oscillate, but it is necessary for the first tube to oscillate before the carrier wave can be tuned in. And unless it is possible to come very close to the point of heterodyning between the broadcast station's carrier wave and the oscillation of the first tube it is not possible to accomplish much in the way of DX nor to tune sharply.

This fault is more common than might be supposed,

and is an indication that one of the other tubes oscillates more easily than the first. In a two-step R.F. receiver, where this condition is noticed, the grid return or "F" post of the detector grid circuit is made to the plus side of the "A" battery, while those of the R.F. tubes go to the negative or to the movable arm of the potentiometer. There are two ways of overcoming this trouble.

An extra potentiometer might be incorporated in the set, and the grid return of the second tube brought to its movable contact. Then, this extra potentiometer could be set near the plus side, where oscillation is opposed, and the first one brought around to the negative until the incoming carrier wave is heterodyned. After careful tuning, the volume may be boosted by swinging the extra potentiometer contact towards the negative, to a point just below oscillation of that tube.

Another method which is nearly as effective consists in inserting a capacity to cause an opposing feed-back. Oscillation of any tube is caused, as a rule, by capacitive feed-back within the tube—from the plate to the grid. If the oscillation is caused by a negative feed-back, it is only necessary to introduce a positive feed-back to counteract it. Fig. 1 shows the plate and grid circuits of a two stage R.F. amplifier, and indicates the best position for the counter-feed-back condenser. Such a condenser may be purchased if desired. The commercial article is of small size and is called a "compensating" condenser. This device has two fixed plates and one movable plate, which can cover either of the fixed plates or be partially over each.

Fig. 2 illustrates a surprisingly simple feed-back condenser, which is nothing more than two lengths of insulated (bell) wire about 10" long. The connections are shown also, and the wires are twisted together for about 2" of their length and the remaining ends

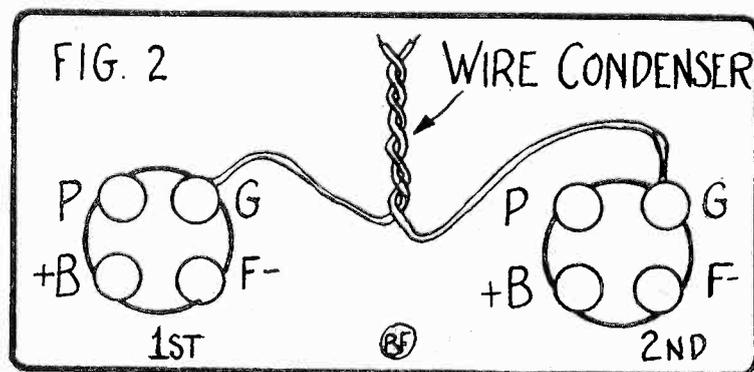


Fig. 2. A simple form of feed-back condenser made of two wires twisted together as the feed-back capacity shown in Fig. 1.

left apart, temporarily. Then the R.F. tube filament is carefully adjusted and a broadcast station tuned in. The wires are twisted together until it is found that it is possible to hear the carrier wave beat note very loudly when the potentiometer is moved over toward the negative side. The adjustment of the filaments will be found quite critical also. This remedy may find frequent application for R.F. amplifiers in which the UV-201-A tube has replaced the older 201's. The new tubes oscillate very easily, but once in proper control, far better amplification is obtained with them. If the twisting of the wires is carried too far, the feed-back will be so great that the second tube is not near the point of oscillation and as a result, the sensitivity

will be impaired. Hence a certain amount of "twist" will be enough. The wires may then be clipped off.

Persistent oscillation of any one tube may usually be controlled by arranging a similar feed-back condenser. Remember that a capacity placed between the grid and the plate of the same tube will assist oscillation while one between the grids of two successive tubes opposes oscillation.

If one decides to use a compensating condenser, the best connection for a three step R.F. amplifier is to join the movable plate to the first grid. One of the fixed plates of the condenser is then connected to the plate terminal of the second R.F. tube while the other fixed plate goes to the plate terminal of the third R.F. tube.

The compensating capacity may be used with a two stage R.F. transformer-coupled amplifier as follows: Connect the movable element to the grid of the first tube. Then join one of the fixed elements to the grid of the second tube and the other to the grid post of the transformer which is in the detector circuit. This

method provides a means for introducing feed-back to cause oscillation or for opposing oscillation, and will give good control, in conjunction with the potentiometer. The twist wire scheme, however, is quite as effective, and the ambitious "bug" may feel inclined to try an extra capacity of this type between two different grid circuits as offering even better control.

There is a little stunt which will tell instantly just which tubes of an R.F. amplifier are oscillating. A long pencil should be held firmly between the fingers and touched to one grid terminal after another. A sharp "click" is a certain sign that a particular tube has been oscillating and is stopped by the small capacity inserted. The application of capacitative feed-backs to the radio-frequency amplifier will render it as sensitive as any neutrodyne or other tuned R.F. receiver, and there are many who still believe that transformer coupling is superior because of the fact that both grid and plate circuits are tuned approximately, whereas in the tuned R.F. system only one of these circuits is accurately adjusted.

List of U. S. Broadcasting Stations Completed

Corrected to January 1, 1924, Canada, Cuba and Porto Rico Included

Call	Owner	Location	Meters	Kcys.	Call	Owner	Location	Meters	Kcys.
WRAD	Taylor Radio Shop	Marion, Kans.	248	1210	CFCH	Abitibi Pow. & Paper Co., Ltd.	Iroquois Falls, Ont.	400	750
WRAF	The Radio Club, Inc.	Laporte, Ind.	224	1340	CFCI	Motor Products Corp.	Walkersville, Ont.	440	680
WRAH	Stanley N. Read	Providence, R. I.	231	1300	CFCL	La Cie de L'Evenement	Quebec, Que.	410	730
WRAL	Northern States Power Co.	St. Croix Falls, Wis.	248	1210	CFCK	Radio Supply Co., Ltd.	Edmonton, Alta.	410	730
WRAN	Black Hawk Electrical Co.	Waterloo, Iowa	236	1270	CFCL	Centennial Methodist Church	Victoria, B. C.	400	750
WRAO	Radio Service Co.	St. Louis, Mo.	360	830	CFCN	W. W. Grant Radio, Ltd.	Calgary, Alta.	440	680
WRAR	Jacob C. Thomas	David City, Nebr.	226	1330	CFCO	Semmelhaack-Dickson, Ltd.	Bellevue, Que.	450	670
WRAV	Antioch College	Yellow Springs, O.	360	830	CFCW	The Radio Shop	London, Ont.	420	710
WRAW	Avenue Radio Shop	Reading, Pa.	360	830	CFCX	London Advertiser	London, Ont.	430	700
WRAX	Flaxon's Garage	Gloucester City, N. J.	268	1120	CFPC	Inter. Radio Devel. Co.	Fort Frances, Ont.	400	750
WRAY	Radio Sales Corporation	Scranton, Pa.	280	1070	CFOC	The Electric Shop, Ltd.	Saskatoon, Sask.	400	750
WRAZ	Radio Shop of Newark	Newark, N. J.	233	1290	CFCT	Bell Telegraph Company	Toronto, Canada
WRC	Radio Corp. of America	Washington, D. C.	469	640	CFUC	University of Montreal	Montreal, Que.	400	750
WRK	Doron Bros. Elec. Co.	Hamilton, Ohio	360	830	CFVC	Roy Russell Brown	Courtenay, B. C.	450	670
WRL	Union College	Schenectady, N. Y.	360	830	CFYC	W. W. Odium, Vancouv. World	Vancouver, B. C.	400	750
WRM	University of Illinois	Urbana, Ill.	360	830	CFZC	Canadian Westinghouse Co.	Montreal, Que.	400	750
WRR	City of Dallas	Dallas, Tex.	360	620	CHAC	Radio Engineers, Ltd.	Halifax, N. S.	420	710
WRW	Tarrytown Radio Research	Tarrytown, N. Y.	273	1100	CHBC	The Albertan Pub. Co.	Calgary, Alta.	410	730
WSAB	S. E. Mo. State Teachers Col.	Cape Girardeau, Mo.	360	830	CHCB	Marconi Company	Toronto, Ont.	440	680
WSAC	Clemson Agricultural College	Clemson College, S. C.	360	830	CHCC	Canadian Westinghouse Co.	Edmonton, Alta.	400	750
WSAD	J. A. Foster Company	Providence, R. I.	261	1150	CHCD	Canadian Wireless & Elec. Co.	Quebec, Que.	410	730
WSAG	City of St. Petersburg	St. Petersburg, Fla.	244	1230	CHCE	W. Canada Radio Supply, Ltd.	Victoria, B. C.	400	750
WSAH	A. T. Leonard, Jr.	Chicago, Ill.	248	1210	CHCF	Radio Corp. of Winnipeg	Winnipeg, Man.	430	700
WSAI	U. S. Playing Card Co.	Cincinnati, Ohio	309	970	CHCL	The Vancouver Merchants Exchange, Ltd.	Vancouver, B. C.	440	680
WSAJ	Grove City College	Grove City, Pa.	360	830	CHCO	Western Radio Company	Calgary, Alta.	400	750
WSAL	Franklin Electric Co.	Brookville, Ind.	246	1220	CHCS	Radio Shoppe	London, Ont.	410	730
WSAN	Allentown Radio Club	Allentown, Pa.	229	1310	CHCX	B. L. Silver	Montreal, Que.	420	710
WSAP	7th Day Adventist Church	New York, N. Y.	263	1140	CHCZ	Toronto Globe	Toronto, Ont.	420	710
WSAR	Doughty & Welch Elec. Co.	Fall River, Mass.	254	1180	CHFC	J. Milliken Sons	Toronto, Ont.	410	730
WSAT	Donohoe-Ware Co.	Plainview, Tex.	268	1120	CHIC	Canadian Westinghouse Co.	Hamilton, Ont.	400	750
WSAU	Camp Marienfield	Chesham, N. H.	229	1310	CHOC	Canadian Westinghouse Co.	Vancouver, B. C.	400	750
WSAW	J. J. Long	Canandaigua, N. Y.	275	1090	CHVC	Metropolitan Motors	Toronto, Ont.	410	730
WSAX	Chicago Radio Laboratory	Chicago, Ill.	268	1120	CHXC	J. R. Booth, Jr.	Ottawa, Ont.	450	670
WSAY	Irving Austin	Portchester, N. Y.	230	1300	CHYC	North Electric Co., Ltd.	Montreal, Que.	410	730
WSAZ	Chase Radio Co.	Pomeroy, Ohio	258	1160	CJBC	Dupuis Freres	Montreal, Que.	420	710
WSB	Atlanta Journal	Atlanta, Ga.	429	700	CJCA	The Edmonton Journal, Ltd.	Edmonton, Alta.	450	670
WSL	J. & M. Electric Co.	Utica, N. Y.	273	1100	CJCB	J. G. Bennett	Nelson, B. C.	400	750
WSY	Alabama Power Company	Birmingham, Ala.	360	830	CJCD	T. Eaton Company	Toronto, Ont.	410	730
WTAB	Fall River Daily Herald	Fall River, Mass.	248	1210	CJCE	Sprott-Shaw Radio Co.	Vancouver, B. C.	400	750
WTAC	Penn. Traffic Company	Johnstown, Pa.	360	830	CJCF	The News Record, Ltd.	Kitchener, Ont.	420	710
WTAD	First Presbyterian Church	Carthage, Ill.	229	1310	CJCG	Manitoba Free Press	Winnipeg, Man.	410	730
WTAF	Lewis J. Gallo	New Orleans, La.	268	1120	CJCH	United Farmers of Ont.	Toronto, Ont.	410	730
WTAG	Kern Music Company	Providence, R. I.	258	1160	CJCI	Maritime Radio Corp., Ltd.	St. John, N. B.	400	750
WTAH	Carmen Ferro	Belvidere, Ill.	236	1270	CJCN	Simons, Agnew & Co., Ltd.	Toronto, Ont.	410	730
WTAJ	The Radio Shop	Portland, Me.	236	1270	CJCS	Eastern Tel. & Tel. Co.	Halifax, N. S.	410	730
WTAK	Swan-Bower Company	Steubenville, Ohio	266	1130	CJCX	Percival Wesley Shackleton	Olds, Alta.	400	750
WTAL	Toledo Radio & Elec. Co.	Toledo, Ohio	252	1190	CJCY	Edmund Taylor	Calgary, Alta.	420	710
WTAM	Willard Storage Battery Co.	Cleveland, Ohio	390	770	CJDC	The T. Eaton Co., Ltd.	Toronto, Ont.	410	730
WTAN	Orendorff Radio Co.	Mattoon, Ill.	240	1250	CJGC	London Free Press Prtg. Co., Ltd.	London, Ont.	430	700
WTAP	Cambridge Radio Elec. Co.	Cambridge, Ill.	242	1240	CJNC	The Tribune	Winnipeg, Man.	400	750
WTAO	S. Van Gorden	Oseo, Wis.	226	1330	CJSC	The Evening Telegram	Toronto, Ont.	430	700
WTAQ	Reliance Radio & Elec. Co.	Norfolk, Va.	280	1070	CKAC	La Presse Pub. Co., Ltd.	Montreal, Que.	430	700
WTAR	Geo. D. Carpenter	Elgin, Ill.	275	1090	CKCB	T. Eaton Company	Winnipeg, Man.	450	670
WTAS	Ruegg Battery & Elec. Co.	Tecumseh, Nebr.	360	830	CKCD	Vancouver Daily Providence	Vancouver, B. C.	410	730
WTAU	Agricultural & Mech. College	College Stations, Tex.	254	1180	CKCE	Canadian Independent Tel. Co.	Toronto, Ont.	450	670
WTAX	Williams Hardware Mfg. Co.	Streator, Ill.	231	1300	CKCK	Leader Publishing Co., Ltd.	Regina, Sask.	420	710
WTAY	The Oak Leaves	Oak Park, Ill.	226	1330	CKCR	Jones Electric Company	St. John, N. B.	400	750
WTAZ	T. J. McGuire	Lambertville, N. J.	280	1070	CKCS	Bell Telephone Company	Montreal, Que.
WTG	Kans. State Agr. College	Manhattan, Kans.	360	830	CKCZ	Canadian Westinghouse Co.	Toronto, Ont.	450	670
WWAC	Sanger Bros.	Waco, Tex.	360	830	CKKC	Radio Equip. & Supply Co.	Kitchener, Ont.	410	730
WWAD	Wright & Wright, Inc.	Philadelphia, Pa.	360	830	CKOC	Wentworth Radio Supply Co.	Hamilton, Ont.	410	730
WWI	Ford Motor Company	Dearborn, Mich.	273	1100	CKOC	Radio Supply Company	London, Ont.	410	730
WWJ	Detroit News	Detroit, Mich.	517	580	CKUC	Canadian National Rys.	Toronto, Ont.	440	680
WWL	Lavola University	New Orleans, La.	280	1070	CKY	Manitoba Telephone System	Winnipeg, Man.	450	670
WWT	McCarthy Bros. & Ford	Buffalo, N. Y.	360	830	CKZC	Lynn B. Salton	Winnipeg, Man.	420	710
CFAC	The Calgary Herald	Calgary, Alta.	430	700	CZ	Granby Consolidated Min. & Power Company	Anyox, B. C.	600	500
CFBC	King's Radio Shop	Timmins, Ont.	450	670	DA	Whalen Pulp & Pap. Co., Ltd.	Swanson Bay, B. C.	600	500
CFCA	Star Pub. & Printing Co.	Toronto, Ont.	400	750	PWX	Cuban Telephone Co.	Havana, Cuba	400	750
CFCB	Marconi Company	Vancouver, B. C.	440	680	WGAD	Sp. Am. Sch. of Radio Tel.	Ensenoda, Porto Rico	300	1800
CFCD	Canadian Westinghouse Co.	Winnipeg, Man.	440	680	WKAQ	Radio Corp. of Porto Rico	San Juan, Porto Rico	360	830
CFCE	Marconi Company	Halifax, N. S.	440	680					
CFCF	Marconi Wireless Tel. Co. of Canada	Montreal, Quebec	440	680					

Experimenting—How to Use Radio Apparatus for Something Besides Broadcast Reception

By Leroy Western

AFTER the round of lectures, sermons, solos and jazz becomes wearisome and one tires of sitting and listening to whatever happens to be on the air, what happens to the radio set? Sometimes it is neglected for days. This happens far too often and, if the owner only knew it, pleasure as great if not greater than listening to broadcasting awaits him.

This pleasure not only entertains for the moment, but is instructive at the same time and leads its followers on to more and more fascinating fields. This method of enjoyment is known among the initiated as *experimenting*. It consists mainly of knowing your apparatus and finding out just how much work you can make it do and how to make it operate at its greatest efficiency. The man who enjoys the use of an automobile is not one who every time something goes wrong takes it to the garage and tells them to fix it, but he is the one who "gets out and gets under." So it is in radio. If you do not know what each and every instrument does, brush up on the subject and find out just what goes on inside your set. Then, when something goes wrong, you will not have to go around asking innumerable questions, but you will be able with a little application of common sense to locate the trouble. The object of this article is not to teach the use of every piece of apparatus, but to give a few hints on how to use that apparatus in an experimental way.

In the first place, if all your instruments are mounted in a cabinet and fastened securely to a panel, your set is not of much use in an experimental way and particularly if it is wired with heavy wire and soldered joints. For our use in experimenting, the best method in the writer's opinion, is to have each instrument separate. In other words, adopt the so-called unit system which one manufacturer tried but failed to popularize. The writer does not believe that the system failed because of lack of merit, but rather because of the expensive manner in which it was put out. However, one handy with tools can make any of the apparatus sold today into unit instruments with very little trouble and at comparatively small expense. When one decides to use this unit system he (or she) can very frequently find in a radio store small squares of bakelite or radion which are sold very cheaply. These can be made into individual panels for instruments and while providing a ready means of locating the apparatus on the table so that it may be handled quickly, it at the same time gives the best possible insulation.

Instruments such as variocouplers, variometers, variable condensers, rheostats, potentiometers, and honeycomb coil mountings may be arranged on these unit panels and binding posts placed in front of them. These binding posts should be of the type capable of clamping at least three wires rigidly and at the same time allow fairly quick removal of any one of the wires. Such binding posts when tightened up properly make a very solid connection and when they are to be used only for a short time, the connection so made will equal soldered joints in conductivity.

When one gets down to brass tacks, he finds that the usual experimenting consists of changing around the tuner and using various combinations of coils and condensers. Occasionally, radio-frequency amplification is experimented with. Therefore, the writer's suggestion for experimental

apparatus is as follows, and in his possession he has just these instruments and finds them very useful for trying the various circuits. They are mounted in unit form: Two variocouplers, two variometers, two .0005 mfd. variable condensers, two .001 variable condensers and two vacuum tube sockets with rheostats, each socket and rheostat mounted in a single unit. A separate unit consists of a detector and two stages of audio-frequency amplification. This can be mounted (and is mounted, in the writer's case) in a single cabinet as small as possible and should use either jacks or a switching system so that the detector, one stage or two stages of audio-frequency amplification may be used as desired. Along with the apparatus mentioned above, there is a miscellaneous assortment of radio-frequency transformers, fixed condensers, a few honeycomb and spiderweb coils, two pairs of phones, a loud speaker, four or five 22½ volt block "B" batteries, four or six dry cells and a storage battery.

With a layout similar to that described above, the experimenter is ready to try out practically every known circuit or any circuit which may be brought forth as being new. He can also do considerable experimental work on his own hook and can try out connections of which he has never heard. Sometimes the addition of a small fixed condenser here or there, or the placing in series of a few turns of wire in one of the circuits will make all the difference in the world in the reception of signals.

The experimenter should, of course, have on hand two or three standard authentic text books describing in detail the action of the vacuum tube and various tuning apparatus. From the fundamental theories he can undoubtedly evolve theories of his own which will aid in his work. Another point which must be observed is that once the amateur conceives what he thinks is a new circuit, he should sit down and put it on paper. It can then be studied carefully and each individual circuit traced out to see that everything is correct. After the circuit is carefully checked for polarities and short circuits, it can be hooked up and tried out. After doing this, do not be content with a few minutes work in tuning and then say that the set does not operate properly. Rather stick to it for an hour or so; sometimes even more time than this is necessary until you have mastered the tuning of the set. Very often it will then be found to work satisfactorily.

The reader need not by any means stick to the outline mentioned above, as it is meant merely as a suggestion. He should rather get off the beaten track a little and find out things for himself.

Above all, when you experiment, keep notes of everything you do. If you do not do this, much valuable time and work may be lost thereby, and much work may be duplicated unthinkingly. Keep a loose leaf notebook handy so that circuits of various sets tried out may be instantly jotted down and kept for future reference. Also along with each circuit, make notes on the operation of it indicating the volume with which it receives signals, its selectivity and its noticeable good and bad points. All this work may in time lead to something big and who can tell but a future Armstrong or Marconi may "come up from the ranks" and surprise us all with a "trick" circuit that really works?

A Single Control DX Receiver for \$11.00

By Byrt C. Caldwell

THE time is not far distant when there will be a radio set in every American home. There are millions of sets in active service now, nightly bringing the news and the music of the world to the firesides of many millions of homes. We cannot go on even a short walk without seeing dozens of antenna strung up on the roofs of houses, and between trees and poles. Nevertheless, when we go on a little "question" tour among our acquaintances, to find out the number of sets in use in our immediate neighborhood, we find that the percentage is remarkably low. In many cases, the reason for this is that looking through

tube, the price comes to about \$11.00. Truly, this is low enough for anyone. The price of the set has nothing to do with the range, for it will operate easily over a range of one thousand miles as well as a set which costs three times as much.

Fig. 1 shows the layout of the panel. It is 7" x 9" and is made of radion. Fig. 2 shows the rear of the panel. The inductance coil consists of 50 turns of No. 22 or 24 SCC wire, wound in a single layer on a cardboard tube 2" long and 3" wide. This is fastened to the base with a small bracket, close to, and to one side of the condenser. The condenser may be either the

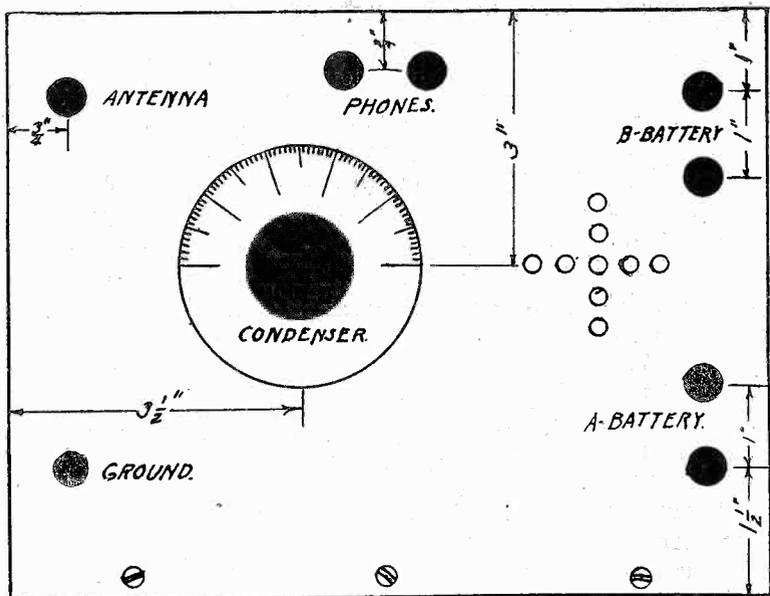


Fig. 1. Panel layout for the single control receiver.

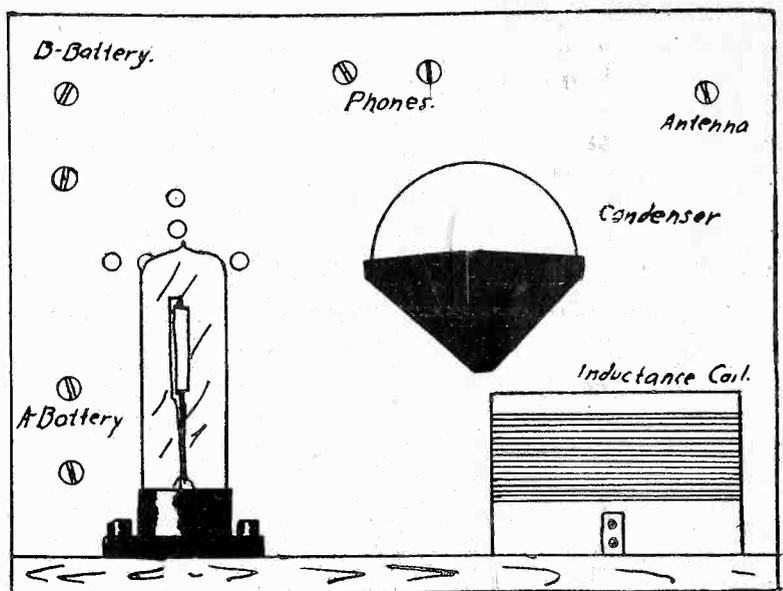


Fig. 2. The interior of the set, showing location of the apparatus.

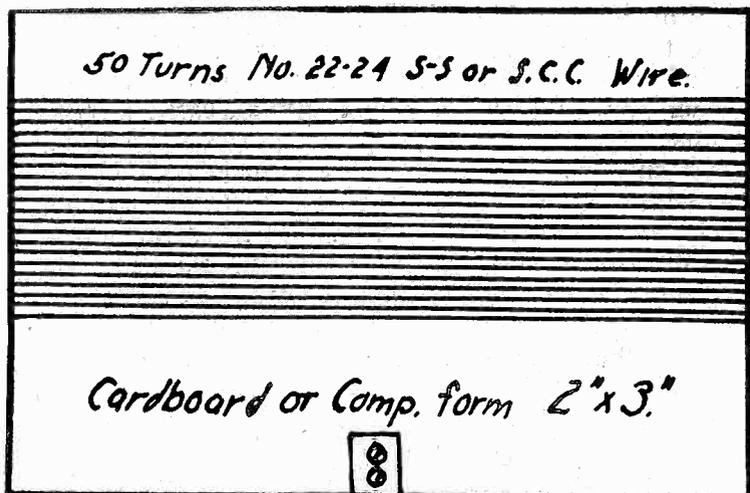


Fig. 3. Tuning inductance used in the receiver. This is the only coil used.

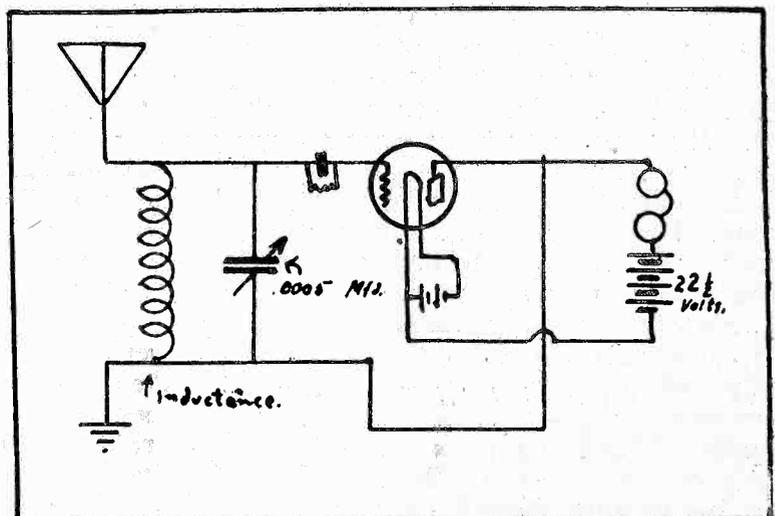


Fig. 4. The circuit is the DeForest ultra audion, single circuit receiver.

the catalogs of radio apparatus, the prospective "radioist" is discouraged by the high prices asked for tube sets. The days of the crystal set, except in a few cases, are numbered. The person buying a set now, wishes nothing less than a tube set, for the crystal set, ninety-nine times out of a hundred, will not receive more than just the local stations, no matter what kind of a fancy hook-up is used.

For those who cannot afford an expensive outfit, this article is written. The cost of this set is less than one-half the cost of the tube alone—to be more specific, \$2.50 approximately. Prices for the parts will vary slightly from place to place. With the addition of an inexpensive pair of phones, dry cell batteries, and a

multiplate or the book type. The latter variety is more efficient and is also lower in price. The tube, which is one of the dry cell type, is placed close to the condenser and on the opposite side to the coil.

Fig. 4 shows the hook-up. This is very simple as well as very efficient. It is an ideal hook-up for the beginner to use, as there is no intricate wiring scheme to follow, as is the case when one attempts to build a three-tube "super," or a three or four-tube reflex. If it is made with any reasonable amount of care, it can't help but work.

A good plan for the beginner to follow, and in fact for anyone when wiring his set, is to start at any point
(Concluded on next page)

Radio Engineer to Handle Lighthouse Service Problems

By Carl H. Butman

WASHINGTON, D. C.—Radio has come to form so vital a part in the work of the U. S. Lighthouse Service that the aid of a radio engineer has just been secured to apply the best means of radio communication and position finding in this coastwise service. John L. Preston, a radio engineer who has been active in the Radio Laboratory of the Bureau of Standards for the past five years, has been transferred to the Lighthouse Service, where he will shortly take up his new duties.

Radio has been employed in the Lighthouse Service for several years, handled through the efforts of the engineers on duty there with the cooperation of the Bureau of Standards; but, with the extension of the work in radio direction finding as well as communication, a specialist has been found necessary.

Of the vessels used in the coastwise safety service, 57 are now equipped for communication by radio. Of this number, 30 are steamers and 27 lightships anchored off the Atlantic and Pacific coasts. Ten radio beacons, or fog signal stations, are now in operation afloat and ashore. These stations, situated at dangerous or important points on the sea or lakes, transmit by automatic apparatus radio signals during fog or thick weather by which vessels provided with radio compasses may take definite bearings to guide them en route or toward harbors. Although invisible and perhaps 100 or more miles distant, these beacons become "visible" by virtue of distinctive radio signals and their bearings may be readily reckoned. Five other beacons are now under construction and 32 more are proposed as soon as funds are available for their equipment.

The Lighthouse Service advocates the use of a radio compass aboard ships and not on the shore as in the Navy Department system. Most of the vessels employed by the service are now equipped with radio compasses, by virtue of which they can not only locate stations and beacons but find the bearings of other vessels transmitting or in need of aid.

Part of Mr. Preston's work will be to determine what type of apparatus now on the market is suitable for the service. He will investigate four or five types of radio compasses, for example, and may recommend a standard

type for the ships in the service, to which the lighthouse officials are as yet not committed. All radio phenomena will be investigated as well as all forms of transmitting and receiving apparatus, suitable for off shore signaling. In a word, the duties of the new engineer will be to correlate the pure and applied science of radio.

Besides the strictly official use of radio throughout the service, its application has been found very beneficial as a means of emergency communication and for entertainment. So much interest has developed among lighthouse personnel, that a radio club with a periodical publication has been in existence some time. Transmitting and receiving sets, built by the keepers of lights themselves, where no standard equipment was installed, in many instances have brought them into touch with the world, saved lives in emergencies and enabled the keepers to send or receive important information. All of this has added to the efficiency of the service.

A case in point took place at Tree Point Light Station, off Alaska, where no regular transmitting station exists. The enterprise of the second assistant keeper, however, in having built a home-made transmitting set, probably saved the life of his wife. When she was suddenly taken ill, he was able to radio to a neighboring radio station for aid. The tender "Fern," coming from Ketchikan, Alaska, took his wife back to a hospital for treatment.

An emergency radio-telephone transmitter constructed from spare parts aboard the tender "Mandrone" by Operator George Owens, enabled the engineers to test out a radio-telephone set at the light station they were installing at St. George Reef, California, as soon as it was finished, saving time and expense. This set proved good up to within 12 miles from the new station.

Means of radio communication have enabled the service to replace lights extinguished in record time, warn vessels of dangerous positions, call for aid, in some cases to render aid to ships, and generally expedite life saving work as well as to furnish entertainment through receiving sets alone at many smaller outlying ships and stations not supplied with radio operators, and where mail is irregular and no other means of communication exists.

(Concluded from preceding page)

on the set, and connect two points. Then on the diagram, trace over this line with a pencil. When the whole diagram is thus lined in, you will know that your set is all wired correctly. And while you are about it, if this is your first set, buy some bus wire, solder, and a soldering iron, and get into the habit right now at the start, of soldering thoroughly every connection that you ever make in a set which is to be permanent. This will eliminate many discouragements later on when you have "the bug" in earnest, and are making all the latest sets.

A good antenna for use with this set is made by stringing up a single strand about 70' long, of bare copper wire, well insulated, as high as possible, and as far as possible from objects of any kind. The ground should be made by soldering a good heavy wire to the water pipe. A counterpoise may be used for better results. This is made by hanging a wire the same length as the antenna, directly underneath the an-

tenna, and about 8' or 10' from the ground. Connect this to the ground binding post.

In operating the set, the only control is the condenser. No rheostat is necessary with the dry cell tubes on the market, although if the UV200 tube is used, the rheostat will be required. The apparatus necessary is: One inductance coil; 1 variable condenser; 1 grid leak and condenser; radion panel, binding posts, dial, tube, phones and batteries.

Worth Trying

THE ordinary hand phone of the regular line telephone has heavy magnets and coils, and will stand quite a lot of "juice." Try using one of them (you can buy them cheap from the telephone exchanges) with an ordinary megaphone, and see the nice loud speaker you can make for a cost of about \$1.00.

The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers.

In RADIO WORLD for December 1, you published a circuit diagram of a three-tube super-regenerative circuit. I have been told by an operator that such a set is almost impossible to work on account of a whistle due to its super-regeneration. He states that this whistle destroys the programs. Also, what is it that lies between the filter condenser and the negative wire of the filament circuit between the first two tubes?—Gene Skinner, 640 Sixth Ave., San Diego, Calif.

You have been incorrectly informed. This circuit is capable of extremely good work and very loud signals when properly operated. The whistle he speaks of is the variation frequency, without which the receiver will not function properly. However, this whistle is so high in pitch when the circuits are in resonance that it is almost out of range of hearing. At no time is it objectionable, and can only be heard when there is no program or music on as a faint suggestion of a high hiss. For volume on three tubes without antenna there is probably no circuit that can approach it. It is easy to operate and construct, if ordinary care and good apparatus is used. The part you mention is the second DL1500 coil (radio-frequency choke coil).

* * *

What capacity is the condenser marked K in the diagram printed on page 10 of RADIO WORLD for December 12. What size and kind of coil is the one directly under it? Could I use a 35 and 75 coil in place of the coupler specified?—Kenneth Gerneshausen, Box 4, Sonoma, Calif.

The condenser is not marked K. That is the arrow, coming from the designating capacity marked .001, which is the capacity of that particular bank of condensers. The coil underneath it is a 1500 DL or honeycomb coil. Stick to the specifications for all the details, and do not try to simplify them in any way. You are playing with a super-regenerative, not a single circuit tuner.

* * *

I have constructed the three-circuit regenerative receiver using tickler feedback coupling to produce regeneration. I desire to get greater selectivity, as I find that no matter what combination of coils I use I cannot tune out the code when I get above 400 meters. What will accomplish that?—Malvin Alexander, 116 West 10th St., New York City.

The only method of solving this difficulty is by the use of a wave trap, several of which have been described in past issues of RADIO WORLD. The complete elimination of code work is a practical impossibility, when the wave lengths are so close; however, a good wave trap will absorb a great amount of it and make it much less noticeable.

* * *

Is there any audio-frequency transformer made incorporating a tapped primary and secondary so as to obtain different ratio settings at will? If so where can they be obtained? Would they improve the amplification of a receiver any?—Buell Walker, Peekskill, N. Y.

There is no such apparatus being manufactured. It is doubtful if any advantage would be gained by so doing as the internal impedance of given tubes does not vary greatly, and transformers are designed to take these factors into consideration. As experimental work, however, it should prove interesting, but not worth manufacturing on a large scale.

* * *

I am situated on the top of a high mountain, in such a manner that the erection of an antenna is almost a physical impossibility, without making or using a high wood or metal mast. I have at times tried out different receivers, but they all fail to bring in the distant stations. My nearest stations are over 200 miles away. What receiver would you recommend, using a loop or small antenna on top of the cabin, that would enable me to get the "big fellows"? I am prepared to spend up to \$400 for a good one, or to buy parts and make it.—A Radio World Reader, Denver, Colo.

The receiver that seems to fit your case is either a neutrodyne, a good radio-frequency receiver—or a super-heterodyne. They will allow good distance reception on a loop. Unless, however, you have some means of charging a storage battery, you will not be able to operate either without a storage battery, as they do not operate on dry cell tubes.

* * *

I am about to construct the radio frequency unit to go with the RC receiver as outlined in RADIO WORLD for August 25, 1923, by R. L. Dougherty. Could I also put another unit ahead of the tuner (outlined by C. White in RADIO WORLD for December 8.) This would give me two stages of RF amplification. I intend to use WD12 tubes in the RC unit, but UV199 or 301A tubes in the C. White unit. Is this advisable?—Harry B. Walton, 16 East Lynwood Ave., Glenside, Pa.

You could do as you suggest, using the two units. However, do not use WD12 tubes in the circuits. They are entirely unsuited to the work. Use either UV199 or UV201A tubes throughout the radio-frequency. The manner in which you intend working the set out, however, leads us to think that you are doing needless work. By simply constructing the one White unit, you will accomplish the double purpose of choking the re-radiation and at the same time be gaining the advantage of a stage of tuned radio-frequency which, as designed, is flexibility in itself.

* * *

Will you please advise me just what tubes Mr. Herron recommends for his two-stage radio-frequency receiver as outlined on page 13 of RADIO WORLD for December 8, 1923? Can one or two stages of audio-frequency amplification be added to this circuit?—Erde C. Howland, Malden, Mass.

You may use either UV199 or UV201A tubes. Dry cell tubes (WD11 or 12 or any other 1½ volt tubes) do not function properly in this circuit. You may use two stages of audio-frequency amplification.

* * *

I am an amateur but want to construct a three-tube receiver that is good. Which do you advise, the Cockaday three-tube set, or the Armstrong three-tube regenerative receiver?—Dr. J. Singer, 27 Lenox Ave., New York City.

In the hands of the amateur builder better success will be had with the Cockaday. The three-circuit Armstrong is rather hard to operate unless you are used to handling this type of set, as there are several methods of tuning in stations, but only one correct one. This one mentioned is selective and sensitive enough for the average fan who does not desire to get enormous distances.

* * *

Where can I locate a combined tickler and coupler coil, listed under the trade name of Tri-4-Koil?—J. J. Scanlon, International Tire Co., 26 Maple Ave., Hartford, Conn.

We have no record of any such apparatus or trade name. Some coils and couplers are manufactured and distributed locally and get quite a lot of publicity in one district, but are unknown outside.

* * *

In RADIO WORLD for December 1, you published a three-tube super-regenerative circuit by B. C. Caldwell. I am a novice at the game and want to get blue prints and layout for the set. Where can I obtain them? Where can I get in touch with Mr. Caldwell?—C. I. Bagaut, 606 West 43rd St., Los Angeles, Calif.

We do not handle blue prints. Get in touch with S. Newman and Co., 74 Dey street, for blue prints and layouts of circuits. Mr. Caldwell's address is 235 Lamartine street, Boston 30, Mass.

* * *

What is your opinion of the enclosed circuit? I desire to use it as I have all the necessary apparatus and think that it will prove a good circuit. Will one potentiometer do? What resistance should it be?—W. Alton Clifton, 136 Broad St., Eufaula, Ala.

The circuit is all right with but one exception. Instead of tapping off the primary of each of the tuned radio coils at 40 turns for the B battery and bringing the compensating condenser to the end of the coil, bring the B battery lead to the end, and let the tap function as the compensating point. This will improve the receiver and lessen any chance of feedback. The way it is now, you have a great chance of capacity feedback instead of neutralization. The one potentiometer should be 400 ohms.

* * *

Where can I obtain a diagram of the set described in RADIO WORLD for November 24, page 11? The set is made by Charles Hall.—O. W. Kassube, care G. M. Pass. Stn., Minneapolis, Minn.

Blue prints are not available on this circuit. However, it is nothing more than a three-circuit receiver with two stages or radio-frequency between the tuner and the detector, and feedback arranged from the plate circuit of the detector to the secondary, as usual.

* * *

Please advise me if it is possible to obtain the special coupler as outlined in Mr. C. White's article, "Quiet Selective Regeneration," published in RADIO WORLD for December 15? Can this coupler be procured as a regular commercial product?—Haves Replogle, 2106 S. 48th St., Court Cicero Branch, Chicago, Ill.

This coupler is to be home constructed. It is not made by any company. Most all of White's

articles contain all the data for the construction of the inductances and couplers.

* * *

Where can I get a super-heterodyne, using tuned radio-frequency and resistance coupled audio-frequency amplification?—S. O. Harris, Room 233, Good Samaritan Hospital, Los Angeles, Calif.

To the best of our knowledge, there is no firm making these as a commercial project. As to the tuned impedance radio-frequency and resistance coupled audio-frequency, there have been several unfavorable comments made on this type, as it is wasteful in a great degree of both energy and B battery. Write to the Experimenters Service, Inc., 534 West 46th street, New York City, for information concerning sets. They do not build them there for sale, but will furnish you with details and give you the whereabouts of some one that will build one for you.

* * *

I have a receiver using UV201 and 200 tubes. My dealer advises me to throw away and use C301A and UV201A tubes and change my rheostats. As it is now it is somewhat noisy and difficult to tune. What is the best receiver on the market for distance? Can you suggest any changes on the receiver that I mention?—H. H. Simpson Motor Co., Stevenson, Ala.

The dealer is wrong. Any set will operate on the first tubes you mention. They need not be changed for the C or UV-A tubes. There will be no advantage in changing the receiver. The best receiver on the market for distance is the super-heterodyne. We cannot suggest any changes in the receiver you mention. It is a commercial product of the highest type, and is very efficient when operated correctly. Suggest that you learn to tune it before you try to improve anything—and then you will find that there is nothing to improve. Low voltage B should be used on the detector—from 18 to 22½ volts, no higher. 45 volts is satisfactory for the amplifiers.

* * *

Enclosed please find three circuit diagrams. Kindly tell me which is the best one for volume, clarity and distance. What are they by name?—Caesar Berthney, 168 West 4th St., New York.

Would suggest number two as being the best for the purpose you mention. It is simplest to tune and gives good results. By name the circuits are 1—three-circuit regenerative Armstrong. 2—three-circuit Armstrong using but one plate variometer. 3—single circuit tickler feedback regenerative. The second as before stated will give you the best practical results for the least amount of labor and expense.

* * *

I have recently constructed a tube set using the Sodian detector tube, and cannot seem to get the volume out of it that I get out of my one-tube single-circuit regenerative. They state that the tube will not oscillate and that it is of no use to use tickler feedback or variometers in the circuit. It is just about a little more sensitive than a straight tube detector, which all in all is not as sensitive as necessary now. Is there any special manner of hooking this up that will make it sensitive outside of the manner shown in one of the back numbers of RADIO WORLD?—J. Dennison, 414 South St., Chicago, Ill.

The makers of this tube state that it is impossible to incorporate it in a regenerative circuit. It should be used with radio frequency to bring it up to the standard of volume that you want. The circuit will be forwarded to you if you apply to the Connecticut Telephone & Electric Co., Meriden, Conn., the makers of the tube.

* * *

In regard to the "superdyne" receiver, would it hurt to use a wood rotor for the tickler or negative feedback instead of the regulation composition one? Why is a double-pole double-throw switch necessary? Cannot I use two rotating switches just as well?—Kenneth Belmont, 121 Peachtree St., Atlanta, Ga.

You may use the rotor of wood if it is the right size. You may also use the switches you name. The double-pole double-throw switch was given to simplify the tuning and cut down the number of controls.

* * *

I am thinking of constructing the "superdyne" receiver. Would it be O. K. to use the Naval VT1 tubes (Western Electric)? They are used successfully as detector, amplifiers and radio-frequency tubes, in all the naval circuits. If this is possible, I could use one 45-volt battery as these tubes will operate as detectors on that voltage.—F. E. Melton, R. M. 1/C U. S. S. O-11, Navy Yard, Philadelphia, Pa.

You may use these tubes to good advantage; however, would suggest that you stick to the hook-up as to the detector plate voltage. While these tubes will stand the voltage, they have been tested and shown better results as detectors in a circuit using from 14 to 25 volts. Above that voltage they show a tendency to oscillate violently, and are hard to control. As to using the tubes otherwise, they are very good, and the reason for not mentioning them in the article is that they are hard to get, and are what are known as "juice eaters."

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JANUARY 12, 1924

How High Is Up?

RADIO WORLD receives a very large mail. While a great deal of it refers to the business of the paper, a considerable proportion is devoted to the single function of asking questions. Most of these queries are taken care of by the editors assigned to The Radio University, our question and answer department. Some are answered by mail, but those deemed of general interest to our readers are published with our answers. As a rule, these letters of inquiry are written by people really in search of knowledge who have carefully considered just what it is they wish to learn, and who have expressed themselves briefly and to the point. It always is a privilege and a pleasure to answer such questions. But there is another class, happily a small one, which is not considerate of the editors' time and patience. They deal in trivialities such as: "Last night I was listening in on about 400 meters. I heard some one cough and then a ukulele solo followed. What station was it?"

Interference by Re-radiation Must Be Stopped!

COMPLAINTS by the thousands recently have been voiced by owners of radio receiving sets against the several kinds of interference which prevent the clear and uninterrupted reception of broadcast programs. Interference has reached such a point as to, at times, almost nullify the best efforts of the broadcasters. Thus is given, quite unnecessarily, a setback to radio which rapidly is assuming serious proportions. It must and can be stopped and now is the time to set about it.

Interference from spark transmitters, principally used in ship to shore communication, can be corrected by the proper officials of the Department of Commerce. It is understood that they already are at work on this problem and it safely may be left in their hands for ultimate solution.

The greater and even more annoying interference comes from re-radiating sets in the hands of inexperienced amateurs. These cause the howls and squeals superimposed on the reception of broadcast programs, sometimes completely drowning out the latter and often making them practically unintelligible. This type of interference is beyond the reach of the Department of Commerce and must be stopped in some other way.

RADIO WORLD considers that the best method of correcting the re-radiation evil is to enlist the intelligent support of present owners of the offending type of receiving set. We believe that if such owners

were shown how to avoid creating interference, either by proper tuning or by easily revamping their sets, they would respond with a wholeheartedness which soon would banish the annoying evil. There always has been a sort of unwritten bond of sympathy and brotherhood among radio fans. With this as a background it is believed that a unanimity of action can be created which quickly will accomplish the object sought.

In our opinion, the best method of securing the mass action necessary in this case is to create it by education—to show the cause of the bad practice and then carefully to explain the simple and inexpensive means of curing it. The big task is to reach as many of the offenders as possible in the shortest time.

With this object in view, RADIO WORLD has arranged to hold a meeting of those people best able to put across an educational campaign of the character required. Methods of approach and procedure will be discussed, all looking toward the development of a cooperative plan of action which will accomplish the very desirable end sought. We are assured of the presence and advice of some of the most potent influences in the radio field. When the plan of campaign has been mapped out and adopted we shall advise our readers and feel confident that we may count upon their active assistance. Further details will be announced in the next issue of RADIO WORLD.

Value of Radio Shows

THE value of the radio show need no longer be in doubt. At the one held recently in Chicago there was an attendance of over 91,000. Manufacturers have estimated that a million dollars worth of orders were placed by dealers from all parts of the country who attended the show. It is such concrete results that count with exhibitors and which lead them to patronize radio shows year after year. The old days of making exhibits to gratify personal vanity or because the other fellow does it are gone. The radio manufacturer of today regards the exhibition of his wares to dealers and the public as legitimate trade propaganda to be consistently pursued just as long as the returns warrant the considerable expense involved.

Cast Your Ballots

IN our last week's issue we published a voting coupon which our readers were asked to use to indicate their choice of the many entertainers heard on the various broadcasting programs. Another coupon appears elsewhere in this issue. We want to do something nice for the most popular entertainer and ask the readers of RADIO WORLD to cooperate with us in finding out who it is. You may choose a woman, a man, a quartet, a band, an orchestra or any other feature that makes a special appeal to you. Please use the coupons and send in your votes to the Broadcasting Manager of RADIO WORLD as soon as possible. Remember that the inspiring applause which encourages the actor on the theatre stage is missing to the radio entertainer.

Broadcast Talent You Have Enjoyed



1. "The Harmonious Harmonizers," Gertrude and Gladys Clune, who on occasions entertain listeners to WJZ. 2. The St. James Male Choir, whose renditions of sacred music are received with pleasure. 3. Florence Macbeth, coloratura soprano of the Chicago Civic Opera Company, who is a great favorite with fans who listen in. 4. Daniel Frohman, well-known producer, who made an instantaneous hit with everybody when he gave a little talk through WJZ. 5. George Knoches Dance Orchestra who have been heard and appreciated by the listeners in of WJZ. 6. Charles Ray has just finished playing in the film version of the "Courtship of Miles Standish." He broadcast recently from WEA. 7. Miss Ruth Shilling, one of the favorites of the WGY Players, who broadcast dramas and comedies via the air every week. 8. Howard Chandler Christy, the famed artist and portrayer of beautiful girls, speaking through WJZ. 9. Richard D. Wyckoff, Editor of the Magazine of Wall Street, who gives interesting talks about investments through WEA.

Here Are Good Broadcast Programs

Station WHAS, Louisville, Ky.

400 Meters (750 Kilocycles). Central Standard Time. January 11.—4 to 5 P. M.—Selections by the Strand Theater Orchestra; Harry S. Currie, conductor. Police bulletins. Weather forecasts for Kentucky, Indiana and Tennessee. "Just Among Home Folks," a daily humorous column appearing in the Courier-Journal. Selections by the Walnut Theater Orchestra; Walter Davison, conductor. Late important news bulletins. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30 to 9 P. M.—Full concert by the Delta Omicron Sorority; Mrs. Carl D. Jones, director. Reading: An Interesting Historical Episode. Late important news bulletins. Official Central Standard time announced at 9 o'clock.

January 12.—4 to 5 P. M.—Selections by the Walnut Theater Orchestra; Walter Davison, conductor. Police bulletins. Weather forecast for Kentucky, Indiana and Tennessee. "Just Among Home Folks," a daily column appearing in the Courier-Journal. Selections by the Strand Theater Orchestra; Harry S. Currie, conductor. Late important news bulletins. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30 to 9 P. M.—Concert by Sylvian Trio. Fifteen minute concert by Barney Rapp and his Orchestra. Reading: An Interesting Historical Episode. Late important news bulletins. Official Central Standard time announced at 9 o'clock.

Station KDKA, East Pittsburgh, Pa.

326 Meters (920 Kilocycles). Eastern Standard Time. January 11.—9:45 A. M.—Union Live Stock Market Reports. 11:55 A. M.—Arlington time signals. 12:00 M.—Weather forecast and United States Bureau of Market Reports. 12:10 P. M.—Noon-day Concert. 6:15 P. M.—Organ Recital by Lucile Haje from Chicago Motion Picture Theater, Pittsburgh, Pa. 7:15 P. M.—Radio Boy Scout meeting. 7:45 P. M.—The Children's Period. 8:00 P. M.—Market Reports. 8:15 P. M.—Sunday School Lesson for January 13, presented by Dr. R. L. Lanning. 8:30 P. M.—Concert by Girls' Glee Club, Carnegie Institute, under the direction of Edward C. Riehl. 9:55 P. M.—Arlington time signals. Weather forecast.

January 12.—9:45 A. M.—Union Live Stock Market Reports. 11:55 A. M.—Arlington time signals. 12:00 M.—Weather forecast and United States Bureau of Market Reports. 12:10 P. M.—Noon-day Concert. 6:15 P. M.—Concert by Westinghouse Band under the direction of T. J. Vastine. 7:30 P. M.—"Bringing the World to America," prepared by "Our World." 7:45 P. M.—The Children's Period. 8:00 P. M.—Feature. 8:15 P. M.—"The Federal Reserve System," Montfort Jones, assistant professor of finance, University of Pittsburgh. 8:30 P. M.—Concert by Westinghouse Band, T. J. Vastine, conductor. 9:55 P. M.—Arlington time signals. Weather forecast.

Station WGI, Medford, Mass.

360 Meters (930 Kilocycles). Eastern Standard Time. January 11.—12:00 Noon—Noonday program. 12:40 P. M.—New England weather forecast. 12:45 P. M.—Closing report on Farmers Produce Market Report. 3:00 P. M.—Talk by Miss Dorothy H. Goodwin; Afternoon Musicales. 5:30 P. M.—Closing Stock Market Reports. Government Reports. Live Stock Markets report. 6:15 P. M.—Code Practice, Lesson Number 212. 6:40 P. M.—Boston Police Reports. 7:30 P. M.—Selected verses by Mr. Charles L. H. Wagner, Radio Poet. Red Cross Health Talk by Henry Copley Green. Evening's Musicales.

January 12.—6:45 P. M.—Code Practice, Lesson Number 213. 7:05 P. M.—New England Weather Forecast; New England Crop Notes. 7:30 P. M.—Arthur Murray's Course in Ball Room Dancing by Radiophone; Evening Musicales.

January 13.—4:00 P. M.—"Adventure Hour," conducted by the Youths' Companion; Afternoon Musicales. 8:30 P. M.—Talk on "World Unity" under the auspices of the Greater Boston Federation of Churches; Evening Musicales.

Station WRC, Washington, D. C.

469 Meters (640 Kilocycles). Eastern Standard Time. January 11.—5:15 P. M.—Instruction in Code Practice. 6:00—Children's Hour by Peggy Albion. 8:00—"The Care of the Skin" by Elizabeth Arden. 8:15—Song Recital by Caroline Manners, contralto. 8:30—Piano Recital by Gertrude Small. 8:45—Trio from the Bluebird Orchestra. 9:00—Song Recital by Ruby Patrick, soprano. 9:15—Dance program by Hal Levin's Southern Syncopators. 9:55—Re-transmission of Time Signals and Weather reports.

January 12.—3:00 P. M.—Fashion Developments of the Moment. 3:10—Song Recital by Babette Evans, soprano. 3:25—The Magazine of Wall Street. 3:35—Piano Recital by Ellen. 3:50—Current Events by The Review of Reviews. 4:00—Travel Talk prepared by the National Geographic Magazine. 5:15—Instruction in Code Practice. 6:00—Children's Hour by Peggy Albion.

Station WJZ, New York City

455 Meters (660 Kilocycles). Eastern Standard Time. January 11.—3:00 P. M.—Organ recital played by Leo Riggs on the Hotel Astor Organ direct from the Hotel Astor. 4:00 P. M.—Maxine Wilson, in a request program. 5:30 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Conditions of the Leading Businesses"; Evening Post News. 7:30 P. M.—Burr McIntosh, the Cheerful Philosopher. 7:45 P. M.—Looseleaf Current Topics. 8:30 P. M.—Royal Male Quartette Concert. 9:00 P. M.—"Keeping Fit at Sea," by Frank Wheelton, physical director of the S.S. "Majestic." 9:55 P. M.—Time signals and weather forecast retransmitted from the government station NAA at Arlington. 10:30 P. M.—Paul Specht and his Alamac Hotel Orchestra dance program, direct from the Congo Room of the Alamac Hotel.

January 12.—3:00 P. M.—Recital arranged by Emily Harford Avery. 4:00 P. M.—Tea Concert by the Hotel Belmont Stringed Ensemble, Harry Lerner, leader, direct from the Balcony of the Tea Room of the Hotel Belmont. 5:00 P. M.—Warner Hawkins, celebrated pianist. 5:30 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Bradstreet's financial report; Evening Post News. 7:00 P. M.—"Uncle Wiggily Stories," by Howard Garis. 7:30 P. M.—Sydney Brakow, violinist. 7:45 P. M.—Harper Brothers' Literary Talk. 8:15 P. M.—Hampton Institute Quartette Concert. 9:55 P. M.—Time signals and weather forecast retransmitted from the government station NAA at Arlington. 10:30 P. M.—Harold Stern and his Hotel Majestic Orchestra dance program, direct from the Hotel Majestic.

January 13.—11:00 A. M. to 1:00 P. M.; 7:00 P. M. to 10:30 P. M.

Station KYW, Chicago, Ill.

536 Meters (560 Kilocycles). Central Standard Time. January 11.—9:30 A. M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four.) 11:35 A. M.—Table talk by Mrs. A. J. Peterson. 12:30 P. M.—"The Progress of the World," by Review of Reviews. 6:50 P. M.—Children's bedtime story. 10:00 to 12:30 A. M.—Midnight Revue.

January 12.—9:30 A. M.—Late news and comment of the financial and commercial markets. This service is broadcast every half hour during the twenty-four.) 10:30 A. M.—Farm and Home Service. 11:35 A. M.—Table talk by Mrs. A. J. Peterson. 6:30 P. M.—News, financial and final market and sport summary furnished by the Union Trust Company and Dun's Review. 6:50 P. M.—Children's bedtime story. 8:00 P. M.—This evening is being held for opera. 9:05 to 9:25 P. M.—"Under the Evening Lamp" service furnished by the Youth's Companion.

January 13.—11:00 A. M.—Central Church Service broadcast from Orchestra Hall, Chicago, Dr. F. F. Shannon, pastor. Musical program under the direction of Daniel Protheros. 6:30 P. M.—Excerpts from the New Testament, An American Translation, by Prof. E. J. Goodspeed, read by William Ziegler Nourse. 7:00 P. M.—Chicago Sunday Evening Club service broadcast from Orchestra Hall, Chicago. Special musical program under the direction of Edgar Nelson.

Station WFAA, Dallas, Texas

476 Meters (630 Kilocycles). Central Standard Time. January 11.—12:30-1:00 P. M.—Address, Dr. Robert Stuart Hyer, Southern Methodist University, on the Sunday School Lesson. 8:30-9:30 P. M.—Faculty recital by representatives of North Texas State Teachers' College, Denton, Texas.

January 12.—12:30-1:00 P. M.—Address, George S. Thomas, Southern Methodist University, on "Modern History Comment." 8:30-9:30 P. M.—McFall's Merry-Makers in popular music. 11:00-12:00 P. M.—MacDowell Sisters in Hawaiian song and instrumental recital.

January 13.—6:00-7:00 P. M.—Radio Bible Class Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; half hour of Bible study and half hour of gospel song. 9:30 p. m.—Five-minute talk on Safety, the beginning of Safety Week. 9:35-10:05 P. M.—Choristers from East Dallas Christian Church. Mrs. Mary V. Culp directing. 10:05-11:00 P. M.—Jack Gardner's Orchestra in dance-music recital.

Station WLW, Cincinnati, Ohio

309 Meters (870 Kilocycles). Central Standard Time. January 11.—10:30 A. M.—Weather forecast and Business Reports. 1:30 P. M.—Market Reports. 3:00 P. M.—Stock Quotations. 4:00 P. M.—Half Hour Lecture-Recital.

January 12.—10:30 A. M.—Weather Forecast and Business Reports. 1:30 P. M.—Business Reports.

Station WOC, Davenport, Iowa

484 Meters (620 Kilocycles). Central Standard Time. January 11.—10:00 A. M.—Opening Market quotations and Household Hints. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and River forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes Concert. 2:00 P. M.—Closing gram—Lecture by C. A. Russell (to be announced), stocks and markets. 3:30 P. M.—Educational Pro-5:45 P. M.—Chimes Concert. 6:30 P. M.—Sandman's Visit. 6:50 P. M.—Sport News and Weather forecast; "The Nature and Uses of the X-Ray," by C. A. Russell, D. C. 7:20 P. M.—Sunday School Lesson—International lesson for next Sunday discussed by Dr. Frank Willard Court. 8:00 P. M.—Musical Program (1 hour)—Erwin Swindell, Musical Director.

January 12.—10:00 A. M.—Opening Market quotations and Household Hints. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and River forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes Concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational Program—(Musical numbers to be announced); Lecture by C. C. Hall, "The Manufacture of Silk." 5:45 P. M.—Chimes Concert. 6:30 P. M.—Sandman's Visit. 6:50 P. M.—Sport News and Weather forecast. 7:00 P. M.—Educational Lecture—"Just Dad," by Mrs. E. Mildred Light. 9:00 P. M.—Orchestra Program (1 hour), P. S. C. Orchestra. Gerald M. Barrow, director; (Popular selections broadcast through the National Association of Broadcasters, of which WOC is a member).

Station WOR, Newark, N. J.

405 Meters (740 Kilocycles). Eastern Standard Time. January 11.—2:30 P. M.—Lulu Vollmer, "Difficulties of a Playwright." 2:50 P. M.—Lucille La Verne, 3:10 to 4:00 P. M.—Murray Wachsmann Entertainers. 6:15 P. M.—Dr. Philip Welsh on "Mouth Hygiene." 6:30 to 7:00 P. M.—"Man in the Moon Stories for the Children." 7:00 P. M.—Francis W. Stoddart tenor.

January 12.—2:30 to 4:00 P. M.—Program for children, 6 to 16 years of age, directed by Harry A. Schulman, President of the National Stage Children's Association, and Dr. Winifrid Sackville Stoner, Director of the Kiddies' Theater. 6:15 to 7:15 P. M.—"Music While You Dine" by Joseph Adoff's Orchestra. 7:15 P. M.—Fred J. Bendel, "Sporting News Up-to-the-Minute." 8:00 to 9:00 P. M.—Gene Ingraham's Hotel Berwick Club Orchestra. 9:00 P. M.—Talk by Jessie Lynch Williams, author and playwright. 9:20 P. M.—Gertrude Herold Bronenkant, lyric soprano. 9:35 P. M.—William J. Dougherty, "Moonshiners" in the Song Industry." 9:50 P. M.—May Barron, contralto. 10:05 P. M.—Arline Foster on "Interviews With Men of Achievement." 10:25 P. M.—Solos by May Barron. 10:45 P. M.—Gertrude Herold Bronenkant, lyric soprano.

Station WBZ, Springfield, Mass.

337 Meters (890 Kilocycles). Eastern Standard Time. January 11.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield Market reports. 6:00 P. M.—Dinner Concert by the WBZ Quintette. 7:00 P. M.—"By Flashlight" story by the Youth's Companion. 7:30 P. M.—Twilight Tales for the Kiddies. Current Book Review by R. A. MacDonald. 7:50 P. M.—Talk by a member of the Eastern States Farmers' Exchange. 9:55 P. M.—Arlington time signals. 11:00 P. M.—Program of Chamber Music by the WBZ Quintette; and Mrs. Cecelia Cox Denton, contralto.

January 12.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield Market reports. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio, direct from the Hotel Kimball dining room; Jan Geerts, director. 7:30 P. M.—Twilight Tales for the Kiddies. "Bringing the World to America." 8:00 P. M.—Concert by Mrs. McCoy, pianist; Mrs. John R. Fausey, soprano; Mrs. Harry C. Fletcher, accompanist. 9:00 P. M.—Bedtime Story for Grownups, by Orison S. Marden. 9:55 P. M.—Arlington time signals.

Station KFI, Los Angeles, Calif.

469 Meters (630 Kilocycles). Pacific Time. Standard Schedule—Remote Control Stations: Los Angeles Evening Herald—5:00 to 5:30 P. M.—Daily except Sunday. 8:00 to 9:00 P. M.—Monday, Wednesday, Friday. Los Angeles Examiner—5:30 to 6:00 P. M.—Daily except Sunday. 9:00 to 10:00 P. M.—Daily. Hotel Ambassador—8:00 to 9:00 P. M.—Sunday, Tuesday, Thursday. 10:00 to 11:00 P. M.—Monday. 11:00 to 12:00 P. M.—Wednesday, Friday, Saturday.

January 11.—6:45 to 7:30 P. M.—Wa-Wan Juniors Concert. 10:00 to 11:00 P. M.—Vocal and instrumental concert.

January 12.—6:45 to 7:30 P. M.—Vocal and instrumental program. 8:00 to 9:00 P. M.—Special dance program. 10:00 to 11:00 P. M.—Vocal and instrumental concert.

January 13.—10:00 to 10:45 A. M.—L. A. Church Federation Service. 4:00 to 5:00 P. M.—Church Musicians. 6:45 to 7:30 P. M.—Opera story and Coral Atkins. 10:00 to 11:00 P. M.—Theron Bennett and Packard Six.

More Good Broadcast Programs

Station WWJ, Detroit, Mich.

517 Meters (580 Kilocycles). Eastern Standard Time. January 11.—9:30 A. M.—“Tonight’s Dinner” and a special talk by the Woman’s Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time relayed by the Western Union. 12:00 P. M.—Dance music by Jean Goldkette’s Orchestra, broadcast from the Graystone Ballroom. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 7:00—The Detroit News Orchestra. Anne Campbell, Detroit News poet; Finzel’s Orchestra.

January 12.—9:30 A. M.—“Tonight’s Dinner” and a special talk by the Woman’s Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time relayed by the Western Union. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 7:30 P. M.—The Detroit News Orchestra.

January 13.—7:30 P. M.—Services of St. Paul’s Episcopal Cathedral broadcast from the cathedral. 2:00 P. M.—The Detroit News Orchestra.

Station KHJ, Los Angeles, Calif.

395 Meters (760 Kilocycles). Pacific Time. January 11.—12:30 to 1:15 P. M.—News items. Music. 2:30 to 3:30 P. M.—Matinee musicale. 6:45 to 7 P. M.—Children’s program. 7 to 7:30 P. M.—Organ recital from First Methodist Episcopal Church. Arthur Blakely, organist. 8 to 10 P. M.—Chorus of Broadway Department Store. Ruth Annette Sabel, director. 10 to 12 P. M.—Art Hickman’s Orchestra by line telephony from the Los Angeles Biltmore Hotel.

January 12.—12:30 to 1:15 P. M.—Maud Fenlon Bollman, soprano. 2:30 to 3:30 P. M.—Matinee musicale by Maud Fenlon Bollman, soprano. 6:45 to 7:30 P. M.—Children’s program. 8 to 10 P. M.—160th Infantry Band of C. N. G., H. C. Bradley, leader, and Hatch Graham, Banjo and singer. 10 to 12 P. M.—Art Hickman’s orchestra by line telephony from the Los Angeles Biltmore Hotel.

Station WGY, Schenectady, N. Y.

380 Meters (790 Kilocycles). Eastern Standard Time. January 11.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce Market report. 12:45 P. M.—Weather forecast. 2:00 P. M.—Music and household talk. “The Woman Who Paints.” 6:00 P. M.—Produce and stock market quotations; news bulletins. 6:30 P. M.—Children’s program. 7:35 P. M.—Health talk. N. Y. State Department of Health. 7:45 P. M.—Selections from “Carmen.” 10:30 P. M.—Radio drama, “Arms and the Man,” by WGY Players.

January 12.—11:55 A. M.—U. S. Naval Observatory time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Dance music by Jack Symonds’ Orchestra, Hampton Hotel, Albany, N. Y.

Station WOS, Jefferson City, Mo.

551 Meters (680 Kilocycles). Central Standard Time. January 11.—8:00 P. M.—Emerson’s Orchestra broadcast by remote control from Miller Theatre. 8:30 P. M.—Address by John F. Case, President of the Missouri State Board of Agriculture.

January 13.—7:30 P. M.—Entire services by remote control of the Central Evangelical Church, Rev. E. W. Berlekampf, Pastor.

January 14.—7:30 P. M.—Program of Missouri State Farmers’ Week, Columbia, Mo., by line telephony; address by President Stratton E. Brooks of Missouri University. Lecture on “Farm Homes Across the Water,” by Mrs. Izzetta Jewel Brown, of West Virginia.

Station WJY, New York City

405 Meters (740 Kilocycles). Eastern Standard Time. January 11.—7:30 P. M.—Frank Shevit, “Income Taxes” talk. 7:45—Concert by the Brooklyn Edison Chorus. 8:15 P. M.—“The Work of the New York State Assembly” by Julius Berg, Assemblyman from the Bronx. 8:30 P. M.—Concert by the Brooklyn Edison Chorus. 9:00 P. M.—Marshall Bartholomew, “Negro Plantation Songs and Melodies.” 9:15 P. M.—Writ Barnitz, “Robin Hood’s Forest,” a radio travelogue. 9:30 P. M.—Marshall Bartholomew, “Negro Plantation Songs and Melodies.” 9:45 P. M.—Mrs. Evelyn Spence of the United States Bureau of Fisheries, Department of Commerce; “How to Cook Fish.”

January 13.—2:30 P. M. to 5:00 P. M.; 8:00 P. M. to 10:30 P. M.

Station KSD, St. Louis, Mo.

546 Meters (550 Kilocycles). Central Standard Time. January 12.—3:00 P. M.—Program by a group of children under 14 years of age. 7:15 P. M.—Orchestra concert, organ recital, vocal and instrumental specialties, broadcast direct from the Missouri Theater.

Station WJAX, Cleveland, Ohio

390 Meters (770 Kilocycles). Central Standard Time. Condensed Program—9:00 to 9:45 A. M.—Bond gossip, financial news and grain markets. 10:00 to 10:45 A. M.—Quotations upon foreign exchange, live stock, grain, bonds and stocks; financial news bulletins and weather reports. 2:00 to 2:45 P. M.—Quotations upon grain, stock butter, eggs and poultry; foreign exchange and bonds; financial news bulletins and weather reports. 3:00 to 3:45 P. M.—Quotations upon fruits and vegetables, butter, eggs and poultry, live stock, hay and grain, flour and feed, foreign exchange, bonds and stocks; weather reports. This is for Monday, Tuesday, Wednesday, Thursday and Friday each week. First half holds for Saturday morning. Saturday afternoon and Sunday, no broadcasting from WJAX.

Station KPO, San Francisco, Calif.

423 Meters (710 Kilocycles). Pacific Time. January 13.—Radio church services under direction of Dr. R. J. Craig, principal and pastor of Bible Institute of San Francisco. These services are undenominational and non-sectarian. 8:30 to 10:00 P. M.—Rudy Seiger and his orchestra will give their usual fine concert in the lobby of the Fairmont Hotel, which is broadcast by remote control.

January 14.—8:00 to 9:00 P. M.—G. Herold Montague Schulteis on the Robert Morton organ. 9:00 to 10:00 P. M.—Program under direction of Miss Jessie S. Moore. 5:30 P. M.—Children’s half-hour; stories for children. 10:00 to 11:00 P. M.—Palace Hotel Dance Orchestra, by remote control.

Station WDAP, Chicago

360 Meters (830 Kilocycles). Central Standard Time. Standard Program—Market reports daily, except Sunday, at 9:35, 10:01, 10:31, 11:01, 11:31 A. M.; 12:01, 12:31, 1:01, 1:25, 6:00, 10:30 P. M. Concert periods—1:35 P. M.—Luncheon concert daily, except Sunday. 7:00 P. M.—Dinner concert daily, except Sunday and Monday. 9:15 P. M.—Sunday only. 10:00 P. M.—Dance program and popular concert daily, except Sunday and Monday.

Station WKAQ, San Juan, Porto Rico

360 Meters (830 Kilocycles). Porto Rico Time. Standard Program—WKAQ, Radio Corporation of Porto Rico, broadcasts on 360 meters, every Tuesday and Friday, from 9 to 10:30 P. M., and Wednesday from 8 to 9 P. M., Porto Rico time, which is one hour earlier than E. S. T. Slogan: Porto Rico, the Island of Enchantment in the Caribbean Sea.

Station WOS, Jefferson City, Mo.

441 Meters (680 Kilocycles). Central Standard Time. Standard Program—8:00 A. M.—Estimated receipts at Kansas City, St. Joseph, St. Louis and Chicago; announcements. 9:00 A. M.—Repeating estimated receipts; Chicago hog market; Eastern meat trade conditions; announcements. 10:00 A. M.—Weather forecast; St. Louis and Kansas City hog market; St. Louis and Chicago optional grain opening; announcements. 11:00 A. M.—Kansas City and St. Joseph flashes; St. Louis live stock market report; Chicago live stock market report; St. Louis and Chicago optional grain at 10:30; announcements. 12:00 Noon—Kansas City live stock market report; St. Joseph live stock report; St. Louis and Chicago optional grain at 11:30; announcements. 1:00 P. M.—Poultry, butter and egg report Chicago, New York, St. Louis; announcements. 2:00 P. M.—Advance estimates closing live stock markets Chicago, Kansas City, St. Louis; Chicago and St. Louis cash grain close; announcements. 5:00 P. M.—Music; marketgram; music; address; music; announcements. 8:00-9:30 P. M.—Monday, Wednesday and Friday nights; Concerts, agricultural lectures and public addresses.

Station WFI, Philadelphia, Pa.

395 Meters (760 Kilocycles). Eastern Standard Time. Standard Program—Daily 10:15 A. M.—Produce market and livestock report. 1:00 P. M.—Meyer Davis Bellevue Stratford Hotel Concert Orchestra. 1:50 P. M.—Agricultural report. 3:00 P. M.—Concert. 6:30 P. M.—Meyer Davis Bellevue Stratford Hotel Concert Orchestra. 7:00 P. M.—Talks to children. On Tuesday, Thursday and Saturday evenings special features starting at 8:00 o’clock. On Sunday chapel service at 4:30 P. M., and services of the Arch Street Presbyterian Church, Philadelphia, alternating 10:30

Station WEAJ, New York City

492 Meters (610 Kilocycles). Eastern Standard Time. Regular Schedule—Mornings—Tuesday to Friday, inclusive, 11:00-12:00 A. M. Afternoons—Monday to Saturday, 4:00-5:30 P. M. Evenings—Monday, Tuesday, Wednesday and Friday, 7:30-10:00 P. M.; Thursday, 7:00-12:00 P. M.; Saturday, 7:30-12:00 P. M. Sunday, 2:45-5:30 and 7:20-10:00 P. M.

Station WJAZ, Chicago

448 Meters (660 Kilocycles). Central Standard Time. Standard Program—Including a special “North Pole” Wednesday night program. WJAZ is “on the air” from 10:00 P. M. to 2:00 A. M. Tuesday, Wednesday, Thursday, Friday and Saturday; and 6:00 to 10:30 P. M. on Sunday.

For Nocturnal Dial Twisters

(Paste this on your table for reference)

Station	Wave Length	Frequency Kcys	On the air during the week, except Sunday.
WDAP Chicago, Ill.....	360	830	7:00-2:00 Tuesday to Saturday.
KSD St. Louis, Mo.....	546	550	9:00-11:00 Except Wednesday.
WGY Schenectady, N. Y.	380	790	7:50-11:00 Mon. Tues.-Thurs.-Fri.
WHB Kansas City, Mo..	411	730	9:00-11:00 Tuesday-Thursday.
WOC Davenport, Iowa..	484	620	8:00-9:30 Monday-Thursday-Friday.
			11:00-12M. Wednesday.
			10:30-11:00 Saturday.
WLW Cincinnati, O.....	309	970	8:00-10:00 Monday-Wednesday.
WSB Atlanta, Ga.....	429	700	10:00-12M. Tuesday-Thursday.
			9:00-1:00 Monday-Tuesday - Wednesday - Thursday - Friday - Saturday.
WOAW Omaha, Neb.....	526	570	10:00-11:00 Every night but Wednesday
PWX Havana, Cuba.....	400	750	9:00-11:30 Wednesday-Saturday.
WBAP Ft. Worth, Tex....	476	630	10:30-11:30 Monday to Friday.
KFI Los Angeles, Calif.	469	640	9:45-2:00 Every night.
KHJ Los Angeles, Calif.	395	760	9:45-1:00 Every night.
KYW Chicago, Ill.....	345	870	8:00-10:00 Tuesday to Saturday..
WFAA Dallas, Tex.....	476	630	9:30-10:30 Except Wednesday.
WJAZ Chicago, Ill.....	448	670	10:00-2:00 Tuesday to Saturday.
WJAX Cleveland, O.....	390	770	7:00-9:30 Tuesday and Thursday.
WMC Memphis, Tenn....	500	600	9:00-10:30 Monday - Thursday - Saturday.
			9:00-1:00 Tuesday-Thursday.
WCX Detroit, Mich.....	517	580	8:30-10:00 Monday - Wednesday - Thursday-Friday.
			8:30-1:00 Tuesday.

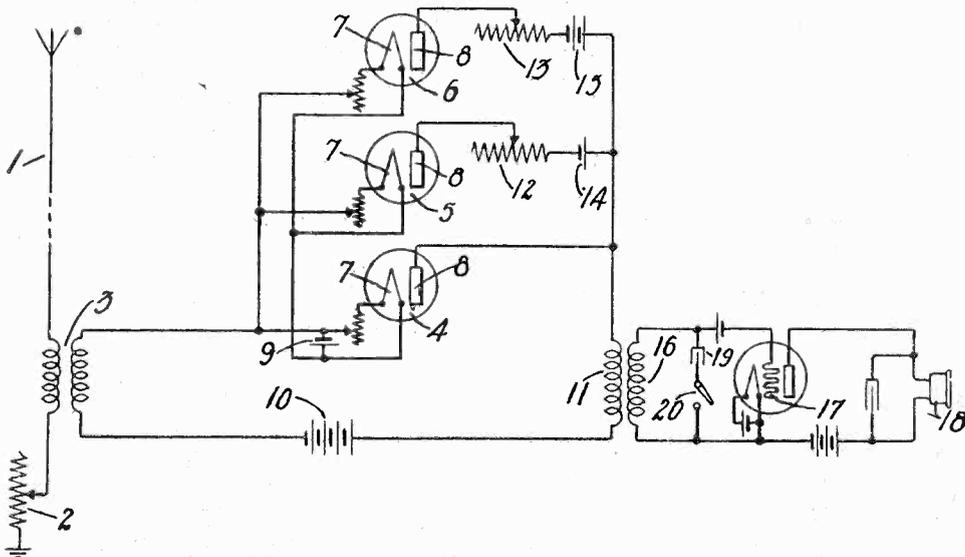
Latest Radio Patents

Current-Controlling and Static-Reducing System

No. 1,477,017: Patented December 11, 1923. Patentee: C. A. Sprague, East Orange, N. J.

The present invention in its broad aspect relates to a method and means for combining the properties of a plurality of electric discharge devices, or their equivalents, arranged in parallel relation, to secure a desired resultant property. It involves controlling the order and extent of operation of the discharge devices,

rent wire systems and in systems of great capacity, such as the submarine cable. Without some correcting means for these large undesired currents, the receiving instrument or the operator's ear may be temporarily rendered insensitive or permanently injured, or at least it may be impossible to receive the signal during the persistence of the disturbances owing to it being "swamped" by the disturbing



Means for reducing static disturbances by stabilizing them against the received signal energy

which may be thermionic tube devices.

In a more specific aspect the invention relates to the reception of relatively weak signal energy in the presence of large electrical disturbances. It is particularly adapted to the reception of electromagnetic signal waves at radio receiving stations during atmospheric or other disturbances, but is not limited to such use, since it is applicable also, for example, to wire or cable signaling systems in which disturbing current waves are received together with the signal waves.

The invention is designed particularly for overcoming the disturbing effects of abnormal surges of energy of low periodicity compared with the signal currents. These relatively slow impulses of great amplitude are very troublesome and are difficult to control not only in radio signaling, but in high frequency carrier cur-

rent waves. Protective devices are known for preventing too large current from reaching the receiver but such devices wipe out the message as well as the excess current. It is an object of the invention to prevent too large current from reaching the receiver, but at the same time to permit the signal currents to be received.

A feature of the invention relates to the method of and means for attenuating currents of abnormal magnitude while permitting signal currents to be received.

Another feature of the invention relates to the control of a signal current by the abnormal current for determining one or another path for the passage of the signal currents.

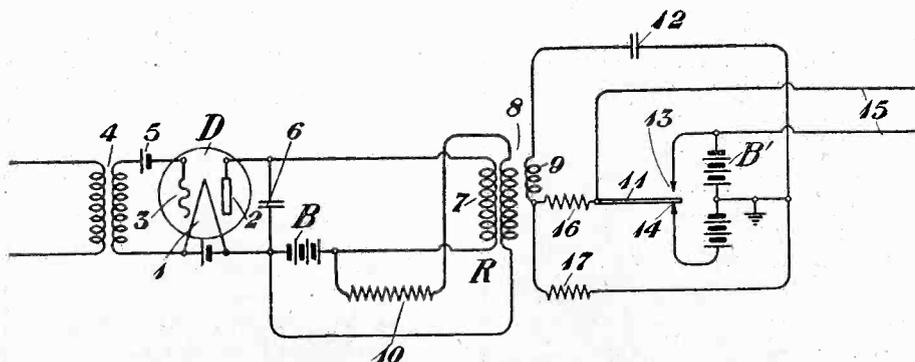
A further feature of the invention relates to the separate treatment of the normal signal currents and the currents received during the disturbances.

Detecting Circuit

No. 1,474,408: Patented November 20, 1923. Patentee: R. W. Deardorff, Brooklyn, N. Y.

This invention relates to receiving apparatus and more particularly to receiving apparatus to be used in connection with trans-

mission systems in which carrier currents are employed. One of the objects of this invention is to provide a detector circuit for use in con-



Means for including a sensitive relay in the plate circuit of a receiver.

mission systems in which carrier currents are employed.

One of the objects of this invention is to provide a detector circuit for use in con-

nection with a system for transmitting signals such as telegraphic signals by means of a high frequency carrier transmitted either over wires or through the ether, the detecting circuit being of such character that a polar relay may be used for recording the signals. Another object of the inven-

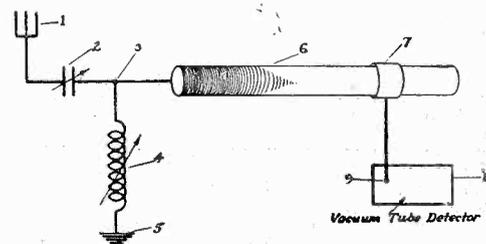
Electrical Signaling

No. 1,476,691: Patented December 11, 1923. Patentees: L. Cohen and J. O. Mauborgne, Washington, D. C.

The object of the present invention is to eliminate electro-static disturbance and other interferences in the reception of radio signals and thus improve the clearness and reliability of radio communication.

In pending applications, Serial Numbers 401752 and 519383, we have described a method for receiving radio signals in which resonance wave coils are made use of and utilizing the wave development effects produced by electrical excitation acting on the antenna. The present invention is another modification of the same general idea, embodying novel features with a view of securing still greater improvements in the results desired, namely, more effective elimination of static disturbances and other interferences in the reception of radio signals.

The method consists in connecting a wave coil to a relatively high potential point of a tuned antenna circuit, transmitting the received signal energy over the wave coil and detecting the signals by connecting electrically a suitable detector to a point on the wave coil. The principle involved appears to be as follows: By tuning the antenna circuit to the frequency of the signal to be received, and suitably adjusting the capacity and the inductance reactances of the antenna circuit, the potential of the signal energy across the condenser or the inductance may be increased to many times through the resonance process so that the signal energy is transformed to high potential energy, and this high potential is impressed on the wave coil. The term "wave coil" is understood to mean a coil having a sufficient length of wire on it in relation to the wave length of the signal to secure a wave development on the coil. The coil may be made in many forms, preferably in the form of a long helix



Method of using a tuned resonance coil for the reduction of interference as well as electrostatic disturbances.

wound uniformly with fine wire so as to obtain a coil of distributed inductance and capacity and thus the equivalent condition of a long line in the matter of wave development. If the length of the coil is properly adjusted in relation to the wavelength of the signals, one or more maximum potential points is developed on the wave coil, and by connecting the detector, preferably the grid of a three electrode tube, to a point of maximum potential on the wave coil, a large signal effect is produced in the detector. In case of any other electrical effects acting on the antenna, such as interfering signals of different frequencies or electro-static effects, the conditions for the potential building-up process through resonance which obtain in the case of signals of the frequencies for which the system is adjusted, do no longer exist, and consequently, their effect on the detector is relatively small.

How to Get Copies of Patents

Copies of any of these or previous patents may be obtained by sending ten cents in coin to the Patent Office, Washington, D. C., mentioning the patentee and patent number.

Good DX Weather Helps The Nite Owls' Records

DX Nite Owls, Attention!

THE DX season is now upon us.

All faithful DXers are requested to get ready for the fray and prepare themselves for the night vigil.

Send your records to the DX Editor of RADIO WORLD.

Write only on one side of the paper and write clearly.

Give full particulars of your location, your set, your aerials and other items of interest.

Here is a Good One to Look Over

From A. Mack, 1020 Cherry St., Norristown, Pa.

I am a regular reader of the RADIO WORLD and find it a very interesting and helpful publication. I am sending you my DX Nite Owl record, but as I work nights every other week and therefore only listen in at the rate of about four nights in two weeks, I cannot be classed with the regular nightly DX Nites. I am using a single circuit regenerative circuit with two stages of amplification I built myself. My aerial is a single wire 75 ft. long with a lead in of about 50 ft. I am situated 17 miles from Philadelphia, which means I have to buck against and tune around four powerful stations (WOO, WFI, WIP & WDAR).

In all I have tuned in 80 stations from 20 different states. My best record being 27 stations in one night and on one night 16 stations in three quarters of an hour.

I have tuned in the following stations: WDAR, WWAD, WNAT, WOO, WIP, WFI, Philadelphia; WFAF, WJY, WJZ, WDT, WHN, WOAX, 2XB, New York; WRC, WCAP, WJH, NAA, Washington, D. C.; KOP, WWJ, WCX, Detroit; WJAZ, WDAP, WPAW, WMAQ, KYW, Chicago; WHB, WDAF, Kansas City; WSB, WGM, Atlanta; WTAM, WJAX, Cleveland; WSAI, WLW, WHAG, Cincinnati; WBAP, Fort Worth, Tex.; WFAA, Dallas, Tex.; WRAX, Gloucester, N. J.; WOR, Newark, N. J.; 3XS, Camden, N. J.; WBAK, Harrisburg, Pa.; WHAZ, Troy, N. Y.; KDKA, WCAE, Pittsburgh, Pa.; WGY, Schenectady, N. Y.; WGA, Buffalo, N. Y.; WNAC, Boston, Mass.; WGI, Medford, Mass.; WBZ, Springfield, Mass.; WJAR, WEAN, Providence, R. I.; WMAF, Dartmouth, Mass.; WHAS, Louisville, Ky.; WMC, Memphis, Tenn.; WBT, Charlotte, N. C.; WNAV, Knoxville, Tenn.; WBAV, Columbus, O.; WOS, Jefferson City, Mo.; KSD, St. Louis, Mo.; WOAW, Omaha, Neb.; KFKX, Hastings, Neb.; WOC, Davenport, Iowa; WLAG, Minneapolis, Minn.; WCBD, Zion, Ill.; WTAS, Elgin, Ill.; WOAG, Belvidere, Ill.; WFAB, Syracuse, N. Y.; KFI, Los Angeles, Cal. (2); PWX, Havana, Cuba; 6KW, Tuinucu, Cuba; 9CE, Sudbury, Ont., Can.; 3ABW, Haddonfield, N. J.; 3AQS, Pennsgrove, N. J.; 3BIF, Lansdowne, Pa.; 3XA, Philadelphia, Pa.; 3BZN, 3ABR, 2XI, 2XY.

All On a Peanut Tube

From P. P. Hartley, Jasper, Alta, Can.

I am sending in a list of stations which I have heard. I am using the one-tube regenerative receiver published in RADIO WORLD of July 28, 1923. I use an R215A tube, 11 and 23 plate condensers and a home-made transformer, and Baldwin phone. The set is in a cabinet only 5x5x10 in. The following is my list: CFAC, CFCN and CHBC, Calgary; CFCK and CICA, Edmonton; CHCE, Victoria; CJCE and CKCD, Vancouver; CJCI, St. Johns, N. B.; CKY, Winnipeg; CKCK, Regina; (U. S. A.) KDKA, Pittsburgh; KDYS, Great Falls; KDZE, KJR, KIJC, KTW, Seattle; KFAJ, Boulder, Colo.; KZN, Denver; KFAU, Boise City, Idaho; KFBK, Sacramento, Cal.; KPDA, Baker, Ore.; KFEC, KGW, KGG, Portland, Ore.; KFIQ, Yakima, Wash.; KFHJ, Santa Barbara, Cal.; KFI, KHI, Los Angeles; KUO, KPO, San Francisco; WDAF and WHB, Kansas City; WFAA, Dallas, Tex.; WGY, Schenectady, N. Y.; WJY, New York; WOAW, Omaha; KFKX, Hastings, Neb.; WSAI, Chicago.

"Hop Onto This One, Fellas"

From Al. E. Fischer, 756 "B" St., Hayward, Cal.

In recent issues of RADIO WORLD I have noticed the records that have been sent in by different "nob-twisters." After reading over their lists I was surprised to notice that not a single one showed any distance over 2,000 miles. I have built numerous receiver and at present am using a three circuit honeycomb receiver with a 100-foot inverted L aerial sloping gradually from a

72-foot mast to another on the roof of my home 60 feet high. I am *not* using any radio frequency or fancy named "Supers" but just the common detector and one step A F. I have heard 102 stations to date. The following are the ones located 1,000 miles or more from my receiver. They have all been verified by Brother BCL's who have held the "Baldys" to their ears. Am located 14 miles south of San Francisco, Cal., near the Pacific. CFCN Calgary, 1,100; CHCQ Calgary, 1,100; CFAC Calgary, 1,100; CJCA Edmonton, Alta., Can., 1,200; KPAF Denver, 1,000; KLZ Denver, 1,000; WHB Kansas City, 1,400; WDAF Kansas City, 1,400; WOAI San Antonio, Tex., 1,390; WKY Oklahoma City, 1,325; WBAP Fort Worth, Tex., 1,355; WDAP Chicago, 1,850; WJAZ Chicago, 1,850; WCX, Detroit, 2,000; KSD, St. Louis, Mo., 1,425; WOC Davenport, Ia., 1,700; WMC Memphis, Tenn., 1,810; KFFZ Dallas, Tex., 1,460; WFAA Dallas, Tex., 1,460; WOAF Tyler, Tex., 1,560; WSB Atlanta, Ga., 2,140; WJAX Cleveland, O., 2,170; WTAM Cleveland, O., 2,170.

Come on you DX night hawks! Winter's here (even in California). Expect to add a dozen more 2,000 milers to my list before summer static "does its stuff."

32,000 Miles in One Night Isn't Bad

From J. H. Taylor, 1408 Meridian Pla., Washington, D. C.

The following is my receiving record. I received 42 stations on a single circuit regenerative set detector with two stage audio-frequency. I covered a distance of over 32,000 miles in 8 hours: CHBC; CKY; KDKA; KFI; KHJ; KJR; KSD; WAAM; WBAP; WBAV; WBZ; WCAE; WCX; WDAF; WDAP; WDAR; WDT; WFAF; WEAN; WEAR; WFAA; WFI; WGI; WGR; WGY; WNAM; WHAS; WHN; WIP; WJAX; WJY; WJZ; WLW; WMAF; WNAC; WOAV; WOAW; WOO; WSAI; WSB; WWJ.

Not One Local Mentioned

From Leo Weisberg, 684 West 161st Street, New York City.

I am sending in my DX list I recorded on my single tube (WD11) set. They are: WBT, WLAG, WGM, WSB, KSD, WMAY, WOS, WHB, WDAP, WJAZ, WMAQ, KYW, WSB, WOO, WIP, WCAU, WDAR, WFI, WWJ, KOP, WCX, WHAZ, WGY, WHAM, WMAK, WGR, WHAS, KDKA, WGAU, WOC, WIAS, WGI, WNAC, WBZ, WMAF, WMC, WHA, WDAJ, LAK, PWX, WNAY, WSAI, WLW, WRAX, WHAR, BVL, QBD, WCAE, WCAP, WRC, WJAX, 6KW, NAA, WJAD, WJAF, WDAF, WIAR, WTAM, WSY, WCAK, WHK, WABM, WPAW, CAW, CKAC, WCAI, WPAH, KFKX, WLAS, KFKB, KEIX, WFAA, WTAN, WFAB, WJAN, WMAJ, WWAE, WIAD.

Here Is a Pippin!

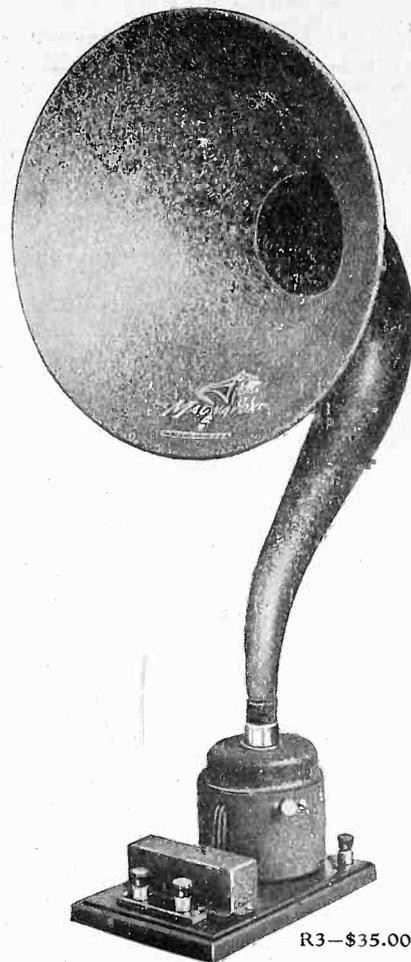
From C. F. Rendollar, 515 D Street, San Rafael, Cal., December 16th, 1923.

I am enclosing list of stations, other than locals, which I have received this winter on my Aeriola Sr. receiving set, without the use of any amplification. My aerial is about sixty feet long and fifteen feet above the ground. I am able to bring in the Eastern stations every night.

CFAC, Calgary, Canada; CHBC, Calgary, Canada; CGCN, Calgary, Canada; CFCB, Vancouver, B. C.; CFCN, Vancouver, B. C.; CJCE, Vancouver, B. C.; CHCE, Victoria, B. C.; CKCK, Regina, Canada; CJCI, St. Johns, N. B.; KDZE, Seattle, Wash.; KFC, Seattle, Wash.; KHC, Seattle, Wash.; KJR, Seattle, Wash.; KTW, Seattle, Wash.; KFCF, Walla Walla, Wash.; KFAE, Pullman, Wash.; KFBG, Tacoma, Wash.; KMO, Tacoma, Wash.; KPF, Spokane, Wash.; KZV, Wenatchee, Wash.; KGG, Portland, Ore.; KGW, Portland, Ore.; KFJC, Portland, Ore.; KFIF, Portland, Ore.; KFCE, Portland, Ore.; KGB, Portland, Ore.; KDYL, Salt Lake, Utah; KZN, Salt Lake, Utah; KHJ, Los Angeles, Cal.; KJS, Los Angeles, Cal.; KWH, Los Angeles, Cal.; KFI, Los Angeles, Cal.; KFCL, Los Angeles, Cal.; KMJ, Fresno, Cal.; KWG, Stockton, Cal.; KGW, San Jose, Cal.; KFHJ, Santa Barbara, Cal.; KFAW, Santa Ana, Cal.; KDZB, Bakersfield, Cal.; KFBK, Sacramento, Cal.; KDZA, Tuscan, Ariz.; KFAD, Phoenix, Ariz.; KFAF, Denver, Colo.; DN4, Denver, Colo.; KLZ, Denver, Colo.; KFAJ, Boulder, Colo.; KFAU, Boise City, Idaho; KFAF, Butte, Montana; KDYS, Great Falls, Montana; WBAP, Fort Worth, Tex.; WOAI, San Antonio, Tex.; WFAA, Dallas, Tex.; WCM, Austin, Tex.; WAAW, Wichita, Kan.; WHB, Kansas City, Mo.; WDAF, Kansas City, Mo.; WOS, Jefferson City, Mo.; KSD, St. Louis, Mo.; WOAW, Omaha, Neb.; WOC, Davenport, Iowa; WLAG, Minneapolis, Minn.; WDAP, Chicago, Ill.; WJAZ, Chicago, Ill.; WMAQ, Chicago, Ill.; WCBD, Zion, Ill.; WMC, Memphis, Tenn.; WLW, Cincinnati, Ohio; WTAM, Cleveland, Ohio; WHAS, Louisville, Ken.; WSB, Atlanta, Ga.; WRC, Washington, D. C.; KDKA, East Pittsburgh, Penn.; WGY, Schenectady, N. Y.; WJZ, New York, N. Y.; WGAM, Orangeburg, S. C.; CYR, Mazatlan, Mexico; KFBK, Havre, Montana; PWX, Havana, Cuba; KFJR, Stevensville, Mont.

MAGNAVOX

Radio Products



R3—\$35.00

THE Magnavox Reproducer illustrated above is the most popular and largest selling Radio Reproducer. R3 has the famous electro-dynamic construction which insures recreation of programs according to the original pitch, quality and volume.

Magnavox Reproducers

- R2 with 18-inch curvex horn \$60.00
- R3 with 14-inch curvex horn \$35.00
- M1 with 14-in. curvex horn. Requires no battery for the field . \$35.00

Magnavox Combination Sets

- A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification \$59.00
- A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification \$85.00

Magnavox Power Amplifiers

- A1—new 1-stage Power Amplifier \$27.50
- AC-2-C—2-stage Power Amplifier \$55.00
- AC-3-C—3-stage Power Amplifier \$75.00

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

The Magnavox Company
Oakland, California

New York Office: 370 Seventh Avenue

Canadian Distributors
Perkins Electric Company, Ltd.,
Toronto, Montreal, Winnipeg

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 0776 and 2083

Americans Should Protect Patents in Japan

RADIO WORLD has received the following communication from R. A. Lundquist, Chief of the Electrical Equipment Division, Bureau of Foreign & Domestic Commerce, Department of Commerce:

"For your information I am quoting the following cable just received from Acting Commercial Attache Babbitt, at Tokyo, Japan:

"Government issues complete regulations permitting private enterprises broadcasting wave stop maximum distance hundred miles wave meter length three sixty three eighty five electric energy one point five kilowatts annual fee five hundred yen maximum distance twenty miles wave length two fifteen two thirty five power two fifty watts fee three hundred yen receivers two hundred two fifty and three fifty four hundred wave length annual fee two yen stop Applications assigning broadcast distances through minister communications submitting prospectus specifications plans estimates construction estimates and explanations receipts disbursements stop No discrimination against foreign enterprise or materials suggest manufacturers protect patents stop Tariff probably twenty per-cent."

"In connection with Mr. Babbitt's suggestion that manufacturers protect patents, you are referred to a circular just issued by the Division of Foreign Tariffs entitled 'Restoration of Japanese Patent Office Records.'"

Radio and Electrical Business Opportunities

Rate: 40c a line. Minimum, 3 lines.

WILL represent concern marketing meritorious article; have office and auto, which would use; able to organize and manage sales force; represented Western concern four years till recently; references exchanged. L. Robbins, 152 West 42d st., New York City.

RADIO—We have complete special equipment for production of improved radio accessory for which there is tremendous market, and seek connection with party to finance large-scale output; unquestionable security. Metal Craft Co., 432 East 71st st. Rhineland 3362.

Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD.

Cut off. Fill out. Mail today.

BROADCASTING MANAGER, RADIO WORLD,
1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is..... Station.....
My second choice is.....

Name.....
Street Address.....
City and State.....

Ain't It the Truth!

There, little drug store,
Don't you cry;
You'll be a radio shop
Bye and bye!

—Philadelphia Public Ledger.

Coming Events

SECOND ANNUAL RADIO SHOW,
Biltmore Hotel, Los Angeles, Calif., February 5 to 10, 1924.

INTERNATIONAL RADIO & ELECTRIC SHOW, Baltimore, Md., March, 1924.

DETROIT RADIO SHOW, Arena Gardens, Detroit, Mich., Jan. 15-17, 1924.

Radio Trade Notes

Alton W. Chase, 38 Bay street, New Bedford, Mass., has started a radio mail order business.

* * *

Moss Radio Supply Company, Inc., 116 Fulton street, New York City, has made an assignment to Nathan Feuerstein of 751 Forest avenue. Morris A. Moks is president of the company.

* * *

G. C. Field, Jr., has started a radio business at Fieldale, Va.

Crosley Production Growing Rapidly

IN a New Year's message to the radio trade by Powell Crosley, Jr., president of the Crosley Manufacturing Company and The Precision Equipment Company, Cincinnati, Ohio, he says:

"Right now our average production is around 800 sets per day, at least double what we expected would be required in making our plans last summer, and it is several times as many receiving sets as any other radio manufacturer is producing.

"Within a few days another plant with a capacity of 600 radio sets a day will be in operation, giving us facilities for producing about 1,500 sets every day. I question whether it will be possible, or necessary, for us to go beyond that number during the balance of the season."

Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

C. C. Dalzill, 1319 Main st., Great Bend, Kansas. (Distributor.)

M. Lightner, 403 West 12th st., Trenton, Mo. Ernest F. Bohne, 1136 Grant ave., Fort Wayne, Ind.

George F. Hill, 803½ Young st., Charleston, W. Va.

I. S. Corsbie, Van Wert, Iowa. Columbia Radio Shop, 4031 Shoshone, Denver, Colo.

George Wagner, Box 56, Lewistown, Montana. Charles L. Furry, Alden, Iowa. (Wants wholesale catalogue.)

Alton W. Chase, 38 Bay st., New Bedford, Mass. A. K. Fleming, 37 Albany st., New Brunswick, N. J.

W. E. Nickerson, Jr., 621 Chestnut st., Bridgeville, Pa. (Builds sets.)

G. C. Head, Jr., Fieldale, Va. The Radio Shop, N. Main st., Goldfield, Iowa. (Wholesale distributor and retailer.)

L. J. Lausa, 1625 Thalia St., New Orleans, La. (Radio repairs.)

M. B. Schickley, Gillette, Wyoming. (Retailer.) W. R. Moths, R. 1, Coopersburg, Pa. (Interested in transmitters.)

A. P. Kniss, Brooklyn, Ill. (Retailer.)

1924 Looks Good to Bankers

THE Guaranty Trust Company of New York, in a recent statement, said:

"Nineteen twenty-four promises the continued dominance of those factors that made 1923 a year of well-sustained, although irregular, prosperity.

"Favorable crop yields and advances in the prices of many farm products during 1923 resulted in a substantial betterment of the economic position of most farmers, with an indicated aggregate value of crops exceeding that for 1922 by nearly \$900,000,000.

"The banking situation remains eminently sound. The peak of the Fall demand on the banks was met without strain, and there is ample credit for all essential business needs.

"The outlook at the beginning of the New Year indicates the maintenance of production and distribution of commodities at high levels."

New Radio and Electric Firms

Ganio-Kramer Co., New York City, radio appliances; \$30,000; F. F. Ganio, H. Kramer, K. Binder. (Attorney, J. S. Eaton, 164 Broadway.)

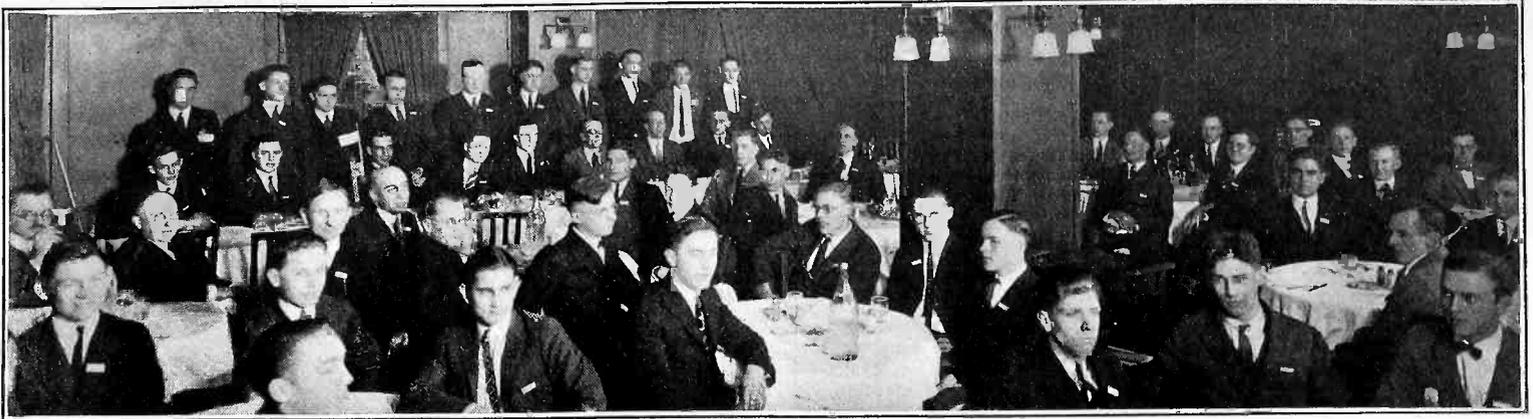
Globe Wireless Co., apparatus, \$1,000,-000; Byron A. Falk, John F. Malloy, John T. Ahrens, Wilmington, Del. (John F. Malloy, Wilmington.)

Experimenters' Bureau, New York City, electrical engineers, \$1,000; H. V. Stebins, J. W. Pötter, H. C. Jackson. (Attorney, R. E. Swezey, 50 Pine St.)

Overstates Electric Co., Hastings, N. Y., \$20,000; J. Rose, C. April. (Attorney, E. N. Baar, 51 Chambers St., New York City.)

Another Bouquet

"I am very much pleased with the make-up and general atmosphere of RADIO WORLD."—W. E. Nickerson, Jr.



Annual Dinner, The Milwaukee Radio Amateurs' Club, Inc., Maryland Hotel, Milwaukee. Officers and speakers seated at long table from left to right are: M. F. Szukalski, Jr., 9AAP, Milwaukee A. R. R. L. City Mgr.; E. W. Ruppenthal, 9AYA, treasurer; E. T. Howell, 9CVI, president and toastmaster; F. J. Marco, 9CD, president of the Armour Institute (Chicago) Radio Club; R. H. G. Mathews, 9ZN, League Central Division Manager; A. F. Parkhurst, 9RI, U. S. Radio Inspector; C. N. Crape, 9VD, Milwaukee County A. R. R. L. Dist. Supt.; L. S. Hillegas-Baird, business manager, and F. W. Catel, 9DTK, assistant treasurer.

Milwaukee Amateur Activities Include Annual Dinner

AN American Radio Relay League traffic meeting and an annual dinner were big features in recent activities of the Milwaukee Radio Amateurs' Club, Inc. At a well attended Saturday afternoon traffic gathering under the chairmanship of C. N. Crape, 9VD, local operating department officer, U. S. Radio Inspector A. F. Parkhurst, 9RI, Chicago, spoke of "The Relation of the Work of the Department of Commerce to the Radio Amateur"; R. H. G. Mathews, 9ZN, A. R. R. L. central division manager, discoursed on new points and policies of league organization; and F. J. Marco, 9CD, president of the Armour Institute Radio Club, Chicago, described the activities of the Chicago Radio Traffic Association, of which he was recently secretary. A lively discussion ensued in which M. F. Szukalski, Jr., 9AAP, Milwaukee League

city manager, made a strong plea for the idea that on the relaying of messages free of charge to the public depended the continued existence of the amateur.

On the evening of the same day the annual dinner was held at which Inspector Parkhurst entertained the gathering with a talk entitled "Reminiscences of an Old-Time Operator." L. S. Hillegas-Baird, business manager and one of the founders of the club, spoke on his pet topic, "The Radio Club in Milwaukee," and Mr. Mathews again enthusiastically addressed the assembly on "The Central Division as a leader in A. R. R. L. Affairs." Mr. Marco spoke briefly of 100-meter reception, and Mr. Crape talked on "A Pre-War New England Amateur in Milwaukee," for before the war he was 1AUW and 1EIN and secretary of the Plymouth County Wireless Association, Brockton, Mass.

Previous to the date of the dinner and at a regular club meeting, Karl E. Hassel, 9ZN, research engineer of the Chicago Radio Laboratory, spoke on "The Underlying Characteristics of Receiver Design."

The technical committee continues to be active, recent reports being "The Nodal Point," by G. Forrest Metcalf, 9CKW, Wauwatosa; "Experiments in Measurement of Distributed Capacitance," by E. T. Howell, Sc. M., 9CVI; "Synchronous Rectifiers," by J. W. Blauert, 9EIV; and "Wave Traps," by C. F. Quentin, 9CII, South Milwaukee.

The society recently entertained D. J. Angus, 9CYQ, an officer of the Indianapolis Radio Club, who, though he came to learn something of this organization, spoke of amateur activities in Southern Indiana and their work in connection with railway dispatching.

A Carefully Designed A. F. Transformer

"QUALITY in radio music depends largely upon the characteristics of the audio-frequency transformers employed. It is usually the amplifying transformer that determines whether the received programs will be music or noise."

With the above predetermined facts in mind, the engineers of the Kellogg Switchboard & Supply Company were given the problem of producing an audio-frequency transformer which would accurately repeat music and speech. It was soon determined to their satisfaction by tests with all types of transformers available, that no one had solved the problem of true reproduction through an audio-frequency transformer. The difficulty involved in designing an audio-frequency transformer, it was found, was a problem of providing a transformer that would function equally as well on low (or bass) voice, as on the high frequency (or 5th position of the violin).

Experts on both sides of the continent

were interviewed with the idea of obtaining from them some valuable data. Universities, where very delicate testing apparatus is available, were also called upon to assist.

Fig. 1 shows the winding that was finally developed and found to be the one most efficient for Kellogg transformers. Its problems involved the finding of the proper thickness of paper, the proper kind of insulated wire to provide the correct number of ampere turns and impedance.

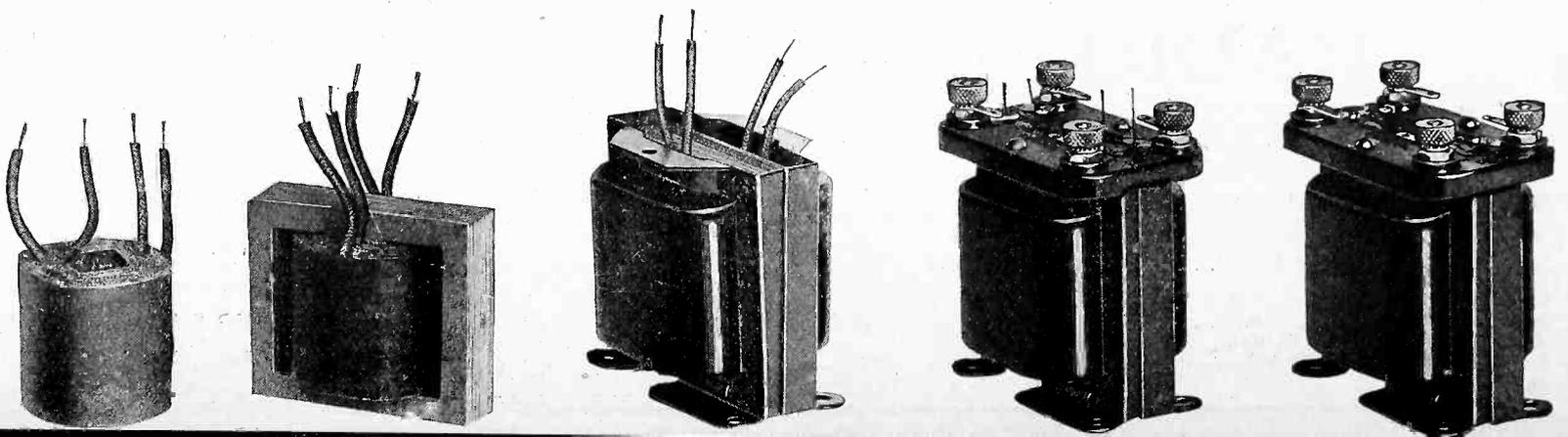
Fig. 2 illustrates the one-piece laminations of silicon steel, showing the lack of punched holes, which in many transformers cause eddy currents and losses. This one-piece lamination is exclusively a feature of the Kellogg transformer. It provides an exceptionally true electro-magnetic core. The steel is a special thickness and undergoes special chemical analysis.

Fig. 3 illustrates the enameled brass housing or shielding. To correctly shield these

transformers that they may be mounted in any position desired without losses, this brass shield was designed. It is so arranged that both sides are interchangeable, locking together at the base.

Fig. 4 shows the assembly with the top panel and leads extended for soldering. Provision has been made to protect these leads against breakage in that they are soldered to the terminals in plain sight where they may be inspected. Some transformers with enclosed terminals are soldered with soldering paste which in time cause deterioration and "opens." This is entirely overcome in the Kellogg transformers.

Fig. 5 shows the complete transformer with leads trimmed and soldered to punched and tinned terminals, which are under the nickel plated knurled screw heads, complete and ready to be installed in any set in short order. Each binding post is plainly marked so that it is impossible to make incorrect connections.



Montreal Likes KFAE

"I HEARD your station come in very plainly indeed," writes W. W. Chipman, of Montreal, to Broadcasting Station KFAE at the State College of Washington, Pullman, Wash. "Your concert was excellent, and came in very clear; I enjoyed every minute of it. Wish you the best of luck in future and hope to hear you as much as possible."

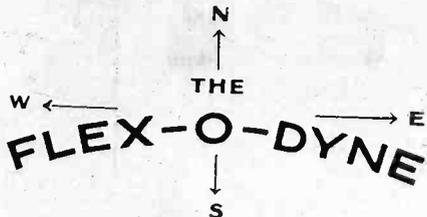
Seven states reported similar good re-

ception last week. Marene Hoel, of Glendale, Ariz., who is running in a radio contest, reported hearing the Women's Glee Club concert "very loud and clear." The superintendent of the lighthouse on the Farallon Islands wrote: "Wish to inform you of the splendid reception of your evening's entertainment. 'Louisville Blues' came in so loud that with a detector and one step your signals were heard all over the room."

Fred Hetherington, on a rural route out of Indianapolis, says he heard and enjoyed the program which came in very clear on his single tube set. Donald Jellings, a Poynette, Wisconsin, boy wrote that the announcing came in "as clear as a bell." Charles H. Getchell, of Billings, Mont., reports: "You came in clear and strong. Your program was very good."

John Fallon, second operator for EFHJ at Santa Barbara, Calif., said he heard KFAE "very QSA. Modulation was very good, there was no QSS," which is translated "very clear, no static." Mrs. Lillian G. Hampton, at Echo, Oregon, is already asking for the basketball broadcast schedule, which will be announced shortly. She is an ex-'17 student of W. S. C. Frank Trumble, of Buckley, Wash., is another listener who is getting excellent results with a loose coupler crystal detector.

Perhaps the most interesting letter of all comes from Mollie Patterson, who lives on a river dredge, "often miles away from anyone, so you can guess how nice my radio seems to me. I am now 30 miles away from South Bend on a little river that runs into Willapa Bay. I am quite an old lady, but I sure love to sit and listen in on all the good times you young folks are having, and have many a good laugh while all the rest on the dredge are asleep. I heard every word you said."



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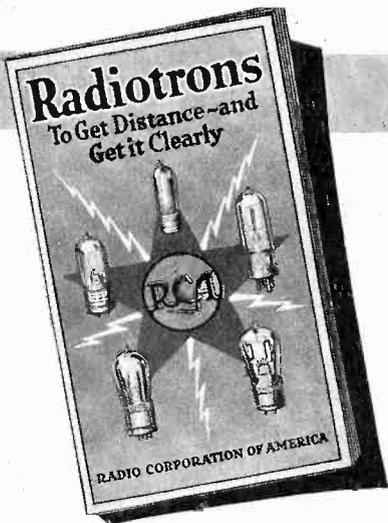
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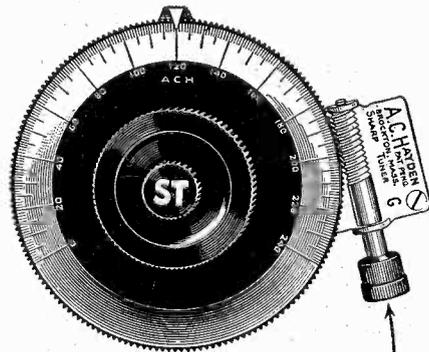
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Urge Your Congressman to Help Radio

THE following circular letter, signed by C. B. Cooper, chairman of the broadcasting committee, has been sent to all members of the Radio Trade Association of New York City:

"Congress will shortly be asked to give an increased appropriation to the Department of Commerce for the radio inspection work.

"While there seems no reason that this appropriation should not be increased it is felt that a good letter from every member of the association to his congressman would help in insuring this increase.

"The Department of Commerce has only 53 in the field personnel for the radio inspection work. Only 29 of these are actual inspectors. These field workers get an average salary of \$1300 per year—lower than any one could employ workers of equal ability.

"These inspectors have it in their power to do a great deal for the fan in reducing interference from ship and shore stations, but with their limited number they cannot get around to inspections fast enough to keep all the transmitters properly inspected.

"The increased appropriation, small in itself, will enable the department to do much better work in policing the air, and their work should have the support of every member.

"Members are urged not only to write to their congressman, but to have retailers, fans and other associates in the trade do the same thing."

Don't miss a number of Radio World. Subscribe by the year. \$6.00, fifty-two numbers, postpaid.

Ship Radio Maintenance Contracts Awarded

THE contract for the maintenance of radio service of the S. S. "George Washington" of the United States Lines, has been awarded to the Independent Wireless Telegraph Company, Inc. Special additions have been made at the company's high power continuous wave radio station at East Moriches, Long Island, to maintain constant communication with the vessel during the voyage to Bremerhaven, Germany, and return. The S. S. "President Polk" also has been assigned to the Independent Wireless Company for radio maintenance.



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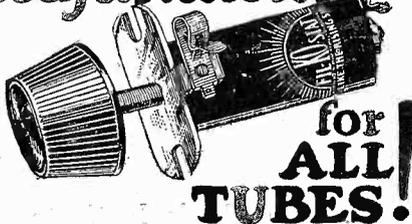
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A Portable Relay Broadcasting Set

A SHORT wave radio transmitting set which may be transported to the scene of church services, concerts, dramatic performances or lectures, as easily as a motion picture cameraman is sent on news-weekly assignments, has been introduced as part of the broadcasting equipment of WGY, the Schenectady, N. Y., station of the General Electric Company.

This set is not used to broadcast directly to the listener, but is a radio relay which conveys the program to the broadcasting station. This first radio transmission cannot be tuned in on the average radio receiver.

The portable transmitting set is conveyed to the hall or church from which it is desired to broadcast an entertainment or sermon. Wire connection is established between microphone or pick-up within the hall or church and the transmitter of the portable set outside. The wave length is too low to interfere with the usual receiving sets or broadcasting stations, and it is also so low that there can be no interruption from spark transmitters by amateurs.

By means of a sensitive receiving set located near WGY, the electrical vibrations into which speech or music has been converted are picked up, amplified and then conveyed to the main transmitting equipment of WGY, from which the program is put on the air on the licensed wave length of the station, 380 meters.

Prior to the introduction of the radio relay it was customary for WGY to connect church and radio station by wires. Wire installations required considerable preparatory work and because of the time involved in making the necessary installations some programs that might have proved instructive and enjoyable had to be omitted. The small transmitting set is mounted in a covered truck and may be taken to hall, theatre or church, where in a short time the installation will be complete and ready for service.

Re-broadcasting does not affect the quality of music or speech. WGY has made frequent use of radio relay methods and listeners were at no time aware that a radio transmitting set working on a low wave length had supplanted the wire link in the system.

There is another and even more important use for the small transmitting set in radio relay and this use suggests a particularly interesting development for radio in the future.

For example, such a receiving set might pick up the best of the WGY program from Schenectady and then a special feature from WJZ or other station and by the use of the transmitter re-radiate to the countryside within a limited distance of the station.

This would give the man with the small receiving set the advantage of listening to a selected program, the best of the main stations. In this manner he would be able to get programs, and music that would not otherwise be available to him on his set. Many of the distant stations can be tuned in at will when atmospheric conditions are right, but there are nights and days when the average set has difficulty in getting distance. The small re-broadcasting or relay station practically assures success to all the fans within a hundred miles, at least.

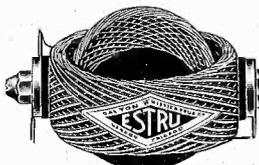
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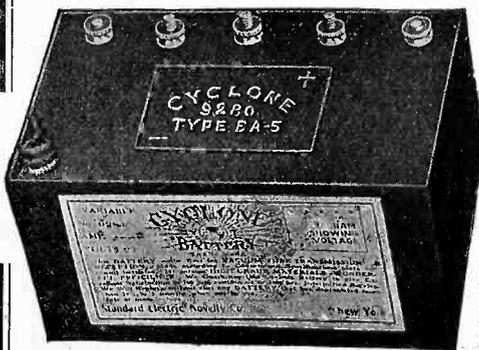
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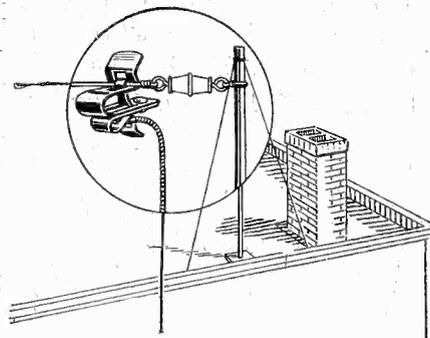
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Since his previous announcement that he would devote Thursday nights for the try-out of the songs of both known and unknown writers, Specht has been greeted by a storm of approval from both the press and public and has already discovered several songs of unusual merit which will soon be published. A recent action on the part of the American Society which blocks Specht's performance of both English popular songs and syncopated versions of copyrighted classics over WJZ in addition to his inability to play most of the copyrighted American popular songs leaves the noted-orchestra leader no other recourse, he claims.

The fact that Paul Specht is a Keith vaudeville headliner, director of four Columbia phonograph orchestras, leader of the Alamac Hotel orchestra, radio broadcaster and manager of many orchestras in England and America will give the unknown writer an opportunity that he has never been given before.

Specht is working with the Musical Industry Chamber of Commerce in their campaign against the song sharks and to assist the unknown writer.

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The announcement was broadcast the same evening it was received, and was heard by Miss Donald, of the Albany Hospital, who was listening in to the program of the evening. She is an acquaintance of Miss Wood, whom she succeeded in locating in Albany and advising her of the message. Miss Wood at once started for her home in Iowa.

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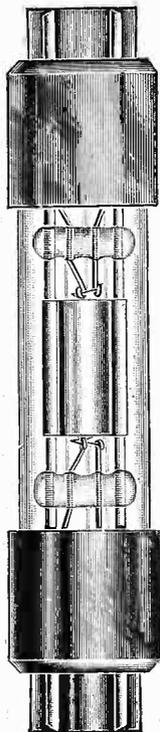
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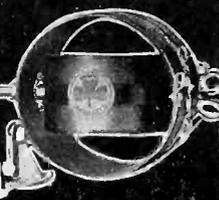
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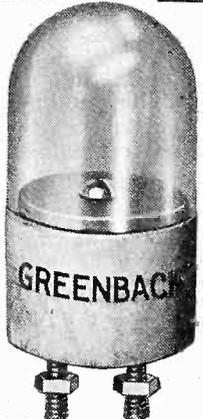
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OUT OF THE ETHER
Chats About Broadcasting Stations

By Hirsch M. Kaplan
The Cafe Houston double male quartet served a delightful program of both classical and popular music from station KDKA. Somehow or other male quartets, especially double male quartets, make a hit with me.

At station WFI Governor Pinchot, of Pennsylvania, was heard delivering an address in which he proclaimed the observance of Harding Memorial Week.

Thomas Scalise playing some very pretty violin obligatos was tuned in while rendering his program from station WLW. Judging from the way in which he handled his instrument Mr. Scalise must be an artist of high calibre.

Sh! I am going to let you in on something provided you will promise to keep it secret. In the very near future station WHN is going to have a silent night! The date has not been selected as yet but from all indications it seems as if it will be a Wednesday night. Now how will this suit you DX fans, especially those living in New York City and vicinity?

Have you ever heard an opera via the air? The answer from many of you will be no. Well, if you are interested in this class of entertainment keep your ears open for the Chicago stations and KSD of St. Louis. This time it was station WMAQ who was tuned in while broadcasting the opera "Manna Vanna." For one who has never seen an opera but who has heard about them and the individual stars, then this delightful source of entertainment would be a treat. Of all the opera that I have heard via the air, this one was handled in what I would call "real class."

Just a word to let you folks know that station WAAM has returned to the air, after a brief intermission, during which the station was undergoing repairs. If the managers of this station continue to offer those excellent programs as they did in the past, then it is going to make a bigger and better name for itself than it ever had. Here is wishing the station the best of luck.

Station WFAA, Dallas, Texas, came through with flying colors the other evening; that is to say, they came through my loud speaker loud enough to be heard all over the house. Mind you, I am only using a three-tube tuned radio-frequency reflex set and a loud speaker which sells for about thirty dollars. This only goes to show that the real DX weather must be in our midst. Now you DX hounds can have something to try for and here is hoping that I will hear from many who can equal or better this record.
(Concluded on next page)

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Use Our Card Catalog Directory in use now with over 200 Radio Manufacturers and Jobbers
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MAKE IT RIGID and STRONG
NO WARPING SPRINGING NO SHORT CIRCUITS BROKEN WIRES
NO MORE CABINETS
JUST APPLY FLAT MAHOGANY OR PLATE GLASS COVERS TO THE FRAMES
A SIZE FOR YOUR SET. PRICE **85c. Each**
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Tells you why and shows you how to get the best results. Unusually successful circuits described and illustrated with B-T photo diagrams. Sent on receipt of 10c.
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WILL MAKE TO ORDER, Single Tube Circuit
—Excellent for local and DX stations. Complete, tube, antenna, phones, etc., \$40.00, with two-stage audio frequency, \$80.00. NO BATTERIES. RESULTS GUARANTEED. H. C. HEBIG, 110 E. 42nd Street, New York City

Out Of The Ether

(Concluded from preceding page)

Another station that comes through exceptionally well these days is WJAX. This time they were heard broadcasting a program of classical music as played by the Cleveland News Orchestra. This collection of music masters certainly can be proclaimed as being on a par with many of those who play through stations located in our largest cities.

Much to our surprise, I found that on turning my loop in a northwesterly direction and tuning to 417 meters, that station WLAG came pounding in with a splendid array of jazz music. On further investigation, I learnt that they were conducting a play-off of a jazz piano contest which had ended in a tie on September 27. Mighty interesting. It seemed to me as if one pianist was as good as the other. Not a bad suggestion for other stations to adopt.

Roxy's feature for last week was the piano duo played by Victor Hall and Paul Arden. These gentlemen are some ivory ticklers. By the way, did you notice the peculiar manner in which Roxy did the announcing? Seemed as if there was something wrong. Hope not! Is it because you folks who are enjoying his delightful programs are not writing him at least a few words of encouragement? So stop here and write a few words of praise to the one who is helping you pass many a pleasant Sunday evening.

May I suggest to the announcers at station WCBD, that they give a little more attention to the announcing of the call letters of their outfit? I have found that when they announce the call of the sta-

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tion it sounds like anything but what it really is. The only way one can tell what station they are listening to is when they announce the location. Place a little more articulation on the individual letters of your call and then I am sure that we will get you straight.

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At rock-bottom prices you get the efficiency of sets costing three times as much. Users tell us that Miraco Radio frequency receivers pick up stations from coast to coast. Operate either on dry cells or storage battery. Solid mahogany cabinets—finest workmanship throughout. Order direct or send for bulletin.
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21" FIBER HORN
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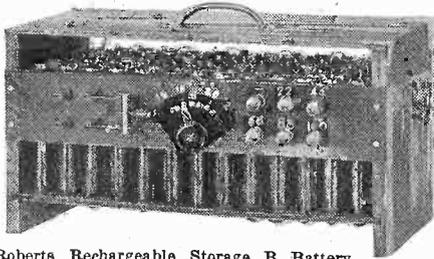
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A swing of the Switch Levers gives instant voltage, changes on detector and amplifying tubes.

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Type A—100 volts with variable detector from 16-22 volts, \$20.50.

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Type D—140 volts with variable detector from 16-22 volts, and variable voltage from 44-140 volts for amplifier, \$30.00.

Batteries can be obtained from the following dealers:

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Near Bway. and Myrtle Ave. Tel. Pulaski 2023

W. Roberts Storage B Battery Co.,
1120 Myrtle Avenue, Brooklyn, N. Y.
Both Above Open till 9 P. M. daily.
Dealers write for terms.

Mme. Laets Swen, Station ZXY

THE Binghamton, N. Y., "Morning Sun" recently included in its daily radio programs the following item:
"ZXY, Baltimore. 8:30 P. M.—Mme. Laets Swen in impersonations."

The next day the "Morning Sun" published this editorial:

"At the request of numerous readers interested in radio, The Morning Sun went to the trouble and expense of entering into an arrangement with all of the important broadcasting stations whereby their daily programs are furnished for publication in this newspaper. It is impossible to publish these programs in full, but The Sun's Radio Editor goes through them each day and selects the features believed to be of the greatest amount of interest. That this service is appreciated is indicated by letters from readers who 'tune in' nightly on the concerts and other programs, and who look to The Sun for this information.

"This service The Sun is glad to render its readers, despite the fact that it requires considerable time and valuable space.

"An apology is due the radio public, however, though we believe radio fans will forgive us for adding our tittle to the gayety of nations. On Thursday morning there appeared among the programs from various stations one from 'ZXY-Baltimore' announcing that at 8:30 P. M. 'Mme. Laets Swen' would give some impersonations. There is no station ZXY at Baltimore, and there is no 'Mme. Laets Swen!'

"Just why the Binghamton Press happened to make the same mistake in its radio programs of Thursday evening is not difficult to understand.

"Those who require an explanation are invited to spell the name of the artist backwards!"

One of RADIO WORLD's correspondents, Charles W. Gray, of Brisben, N. Y., writes as follows:

"This program stung a number of the fans who depend upon the daily papers rather than on the radio journals for their information regarding the broadcasting stations and the dials on a number of sets were warm from trying to tune in the mythical new station."

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SLEEPER-MONOTROL
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Four tube set, \$140 Three tube set, \$115
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6 Volt, 100 Amps. \$12.50
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2 VOLT STORAGE
BATTERY for
WD11 -- WD12 \$5.00
6 V. 60 Amps. \$8.50
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Cockaday Coil Set \$2.50

Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.

Coils are fully assembled, made exactly as specified by Mr. Cockaday, D coil bank wound. Far more efficient than any home-made coils.

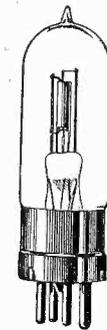
Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier, rheostat, socket, double jack, dials, switch, contact points, posts, busbar, wire, spaghetti, etc. (no tubes or phones).

Complete for \$11.65

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UV-200	...	2.75	UV-201A	...	3.50
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MARVELOUS mixture renews old batteries. Cheap, easily made, save money. 25c silver. Bornkey-RW, Lock Box 617, BURNHAM, Pa.

ARE YOU BOTHERED BY SQUEALS AND HOWLS? If you are, it is a safe bet to state that you are probably creating your own little bunch of them yourself. Help yourself and your friends by cutting this terrible pest out. See RADIO WORLD for Dec. 8. C. H. White, Consulting Engineer, tells how to stop this, simply, easily and inexpensively. 15c per copy, or start your year's subscription with that number.

BARGAINS—Kennedy Intermediate tuner and detector, 3,000-meter wave length, used three months; perfect condition; \$113.00. New UV201 tubes, \$3.95. Two Willard storage B batteries, used about one month, \$5.00 each. N. W. HILL, HUNTINGDON, PA.

EMERSON MOTOR GENERATOR, fifteen hundred volts, \$110.00. Parts for 100-watt—Cheap! Irving Rasnussen (9BCH), 205 Parkway, Oshkosh, Wisconsin.

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Our prices are the lowest on all standard sets and apparatus. If you wish to buy an article which is not listed below, ask us for our price. We pay postage and express on all purchases, and give our guarantee of satisfaction, in addition to that of the manufacturer. All apparatus and sets are brand new.

List	Our Price
\$35.00 Magnavox R-3, M-1. Music Master 21" horn.	\$28.00
25.00 Trinity Loud speaker (See ad in Radio World)	20.00
65.00 Crosley Model X-J. "Better. Costs less."	55.00
6.50 Tubes. U.V.199, U.V.201A, W.D.11, W.D.12	5.50
Conrad Variometers and Variocouplers. The most efficient made. Especially adapted to the Autoplex circuit	2.00

SPECIAL!

\$20.00 Two only. One tube DX receivers. Equal to sets employing two stages radio frequency amplification and detector. Range—up to 3000 miles. Only antenna needed. Panel size 7" x 9". A wonderful, beautiful set. Price.	10.00
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Biltmore Set Outfits contain complete parts for all kinds of sets. Drilled panel, directions, etc. Everything complete ready to assemble and wire. Save money and avoid disappointments and delay by buying everything at the same time. If the set you wish to build is not listed below, write us. We have all standard good sets in stock.

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Reinartz, Cockaday, Kaufman, super-regenera-tors—we have them all.
SATISFACTION GUARANTEED
BILTMORE RADIO COMPANY
 238 Lamartine St. Boston 30, Mass.

Samoa Picks Up Chicago Message to WNP

ALL records were broken the other day when the Zenith-Edgewater Beach Station WJAZ, Chicago, was heard fully 7,300 miles away—almost half way around the earth. At midnight, Central Standard Time, each Wednesday Station WJAZ changes to its experimental call 9XN for the purpose of broadcasting messages and news to Donald B. MacMillan and his exploration party aboard the "Bowdoin," now frozen in within 11 degrees of the North Pole. Wednesday night is "MacMillan Night."

On Thursday morning at 1:45 the regular program was being put on for Capt. MacMillan and his crew and E. F. MacDonald, Jr., of the Zenith-Edgewater Beach Station and president of the National Association of Broadcasters, was delivering the many messages to them from their friends and relatives, together with news of interest to the explorers.

At this time, way down in Samoa, 12 degrees south of the equator, Operator Roberts of Naval Station VMG was listening for news from the world abroad when he picked up Station WJAZ and sent the following message to the Director of Naval Communications at Washington, D. C., who, in turn, forwarded it to Chicago:

"Please inform Zenith-Edgewater Beach Hotel radio station that Chicago messages and music to MacMillan, North Pole, were received by me at 7:45 Samoa Time, December 19.—Roberts."

It is of considerable interest to note that a message intended for Donald MacMillan, now within 11 degrees of the North Pole, should be heard by Mr. Roberts in Samoa, 12 degrees south of the equator in the western part of the Pacific Ocean.

You Don't Need Tubes

to get out of town. If you want new stations on your crystal set WRITE ME TODAY. Mine works 400 to 1,000 miles without tubes or batteries! Thousands have bought my plans and now get results like mine. CHANGES OFTEN COST LESS THAN A DOLLAR. Send self-addressed envelope for further information. Leon Larbert, 504 South Volusia, Wichita, Kansas.



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WD-11 or WD-12, \$3.50 C-302 or UV-202, \$3.50
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**heavy Bakelite shell
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My! how they stand the racket! That's because they are housed in strongly molded brown Bakelite. Then there is just the right gauge of wire and number of turns to get the stuff hot and sassy right out of the "blue." No sliding contacts; nothing to wear or short. Rotor ball turns accurately on big husky bearings. A spring takes up the play—no back lash.

Built for heavy work, Brother Bug. The standard price is \$8.00—but you never think of that when you put this baby to work.

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Audio-Frequency Transformer



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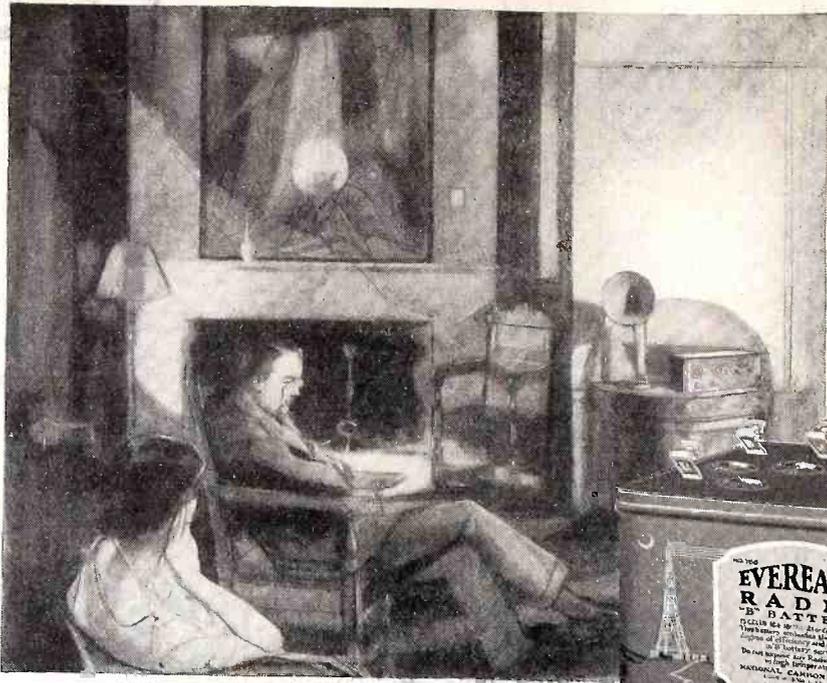
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TWENTY-ONE years ago, when wireless telegraphy had its first birthday, National Carbon Company's dry cell batteries were nine years old. Even then its batteries were world famous as convenient, economical and efficient sources of electric energy.

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Headquarters for Radio Battery Information

If you have any battery problem, write to RADIO DIVISION, NATIONAL CARBON COMPANY, INC., 200 Orton Street, Long Island City, N. Y.

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