

How to Build Heteroflex, the Four Tu
Gold Cup Standing; The A-B-C's of 7

Radio

EVERY
WEEK

PROG
DIGEST

REG. U. S. PAT. OFF.

Vol. XIV

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By Radio Digest Publishing Co.

SATURDAY,

HEAR DIVER IN DEEP SEA

MANY ASK STATION'S HELP TO FIND LOST RELATIVES

PITTSBURGH.—To several people, listening in England to programs broadcast from KDKA here, has come the idea of enlisting the aid of this station in their search for relatives in America, some of them lost for a half century. Several letters asking that messages be broadcast, have been received. The station was unable to give aid in the search for the relatives, as it cannot broadcast messages of this nature.

BROADCASTS FROM OCEAN BED VIA LAND

Second Test Successful

Remote Control From Bottom Carries Man's Voice Over Four Stations

ATLANTIC CITY.—"Down goes McGinty to the bottom of the sea," with a microphone in his diver's helmet and soon the fans away inland are hearing just what the wild waves are saying by remote control from Davy Jones' well-known locker.

Only in this case it was not McGinty who ventured into the depths but C. A. Jackson, deep sea diver for a Philadelphia salvage firm who carried the WIP special "mike" with him and broadcast recently from the bed of the ocean off the Steel Pier here.

This is the second time that WIP, the Gimbel station has attempted sub sea broadcasting. Both experiments have proven remarkably successful. The first time was July 31, 1924, the first time that the feat was ever accomplished. The broadcast this year, the second in history, was even more successful from a scientific standpoint than the first.

In the diver's helmet through a specially constructed microphone imbedded in soft sponge rubber, wires leading to it

(Continued on page 2)



KYW SHORT WAVE PICK-UP STARTED

Special Aerial Will Only Receive
KDKA 63 Meter Programs
For Rebroadcast

CHICAGO.—Westinghouse Station KYW is gradually completing its new short wave pick-up station here. Poles 75 feet high have been placed, representing the highest type of self-supporting wooden poles.

The additional expense of erecting wooden poles instead of steel, was considered practical because of the reduced electrical losses in wooden poles.

The type of aerial is a new one adopted by the Westinghouse company which permits the receipt of signals only from Station KDKA on 63 meters. This aerial is so arranged that signals can only be received from that one direction, and then only the special high frequency wave sent out by KDKA's short wave transmitter. These waves are picked up by KYW's short wave receiver and carried on telephone wires to the main station atop the Congress hotel, where they are rebroadcast on the regular 535.4 meter wave of KYW.

WGES Opens New Studio in Chicago—Plant in Oak Park

CHICAGO.—WGES, Coyne Electrical school here, which station is located at the Oak Park Arms hotel, Oak Park, Ill., has opened its elaborate new studio in the Baldwin Piano building, in the Chicago loop.



Peeping out from behind her attractive summer furs up in the left corner we have Luella Drew Wilson, who has charge of the "Juvenile Period" at WGBN, Chicago. Miss Wilson has had much theatrical and dramatic experience and is a niece of the famous John Drew. Way out in Utah, Ogden on the Overland Trail to be exact, Mary Fisher plays the same violin you see her holding here, at frequent intervals over KFWA. When the Two-in-One Players put "Her Engagement Ring" on the ether from WGE, May Schroer, right, will take an important part.



ROUSE BACKERS ARE SHOWING STRENGTH

THIRD MAN GAINS BUT MAC STILL LEADS CUP RACE

George Hay Now Trailing Leader by 13,000 votes—Others Change Their Standing

Although the name of Graham McNamee still stands at the top of the sixteen leading contestants in the 1925 Gold Cup Best Announcers' race and George D. Hay is still in the place position, things are not slowing up a bit in the field running behind the pacemakers. In fact, a spurt by one of the trailers last week shows that there is a probability of the final score sheet having a name other than that of the "Eastern Sage" or the "Solemn Old Judge" at its top. Gene Rouse of WOAW, Omaha, is the man who made the big jump in votes during the past week.

While Rouse did not change position his followers succeeded in putting him in the 20,000 class by submitting 4,719 votes. At the same time McNamee's listeners succeeded in putting over 13,000 marks between him and Hay, an increase of 4,000 over last week. Hay leads "G. R." by over 9,000.

Counting the ballot printed above there are only three left to be voted for your favorites. Owing to the bonus system of voting a large flood of ballots is expected from now on as the leaders come into the home stretch. Many things can happen between now and the time the winner passes under the wire and you who have been holding out votes until the last can be very instrumental in making these things happen. It is folly for the Gold Cup editor to predict even at this late date the name of the winner. You who have the voting power know more about it than we do. All we can say is "May the best man win!"

Seven Position Changes

That the bonus votes are beginning to get in their work is evidenced by seven changes in standing from the eighth position down. Leo Fitzpatrick, who rated tenth last week, has passed Bill Hay and Lambdin Kay, and now stands eighth with the other two at nine and ten respectively, each a notch below their previous standing. Robert Emery went up two pegs from fourteen to twelve and at the same time Stanley Barnett dropped to the fifteenth place.

Jerry Sullivan got Emery's old billet at fourteen, Charles Erbstein remained at the lucky thirteen marker, and O. E. Becker is marking time at the bottom of the sixteen chosen leaders. But, as we said before, even with the end in sight we would rather bet against Sande to even show in a horse race on a good mount than to try and pick the Gold Cup winner.

The Johnny Walker Sweepstakes

And now just as we were about to end this story and run out for a bottle of NEAR beer, comes a note from Frank R. Haines up in Canada, "where there ain't no eighteenth amendment and a man can quench his thirst," saying in part: "I had a party of friends at the house one night last week and we decided to run a little Gold Cup contest of our own. After tuning in 25 stations we took a vote resulting thusly: O. E. Becker, 17; G. D. Hay, 3; H. W. Arlin, 3, and G. McNamee, 2. We have decided to present Mr. Becker a bottle of 'Johnny Walker' pre-war. But what is worrying us is how are we going to send it to him. Anyway, it is here and the best thing Mr.

Becker can do is to take a run over the line and get it."

Oh, yes, the standing is as follows:

Position	Name and Station	Votes
1.	Graham McNamee, WEAJ	42,811
2.	George D. Hay, WLS	29,667
3.	Gene Rouse, WOAW	20,372
4.	Henry Field, KLFN	15,080
5.	Hired Hand, WEAJ	10,302
6.	H. W. Arlin, KDKA	10,055
7.	Frank Lane, KPRU	9,127
8.	Leo Fitzpatrick, WDAF	6,186
9.	W. G. (Bill) Hay, KFKX	5,074
10.	Lambdin Kay, WSB	4,954
11.	N. Dean Cole, WRO	4,819
12.	Robert Emery, WEL	4,548
13.	Charles Erbstein, WTAS	4,401
14.	Jerry Sullivan, WJL	4,213
15.	Stanley Barnett, WOC	4,014
16.	O. E. Becker, WGR	3,427

How to Vote and Get Bonus
Don't miss a single ballot, for when

BOOM! GOES RADIO AS COIL EXPLODES

MISHAWAKA, Mich.—A thin coating of collodion, which is nothing more than gun cotton when dry, holding the wires on a bank wound coil firm exploded when a heavy static charge hit the receiver of George D. Getz near here during a severe electrical storm recently and blew the set an inch and a half out of the cabinet, though three half-inch wood screws held it in place. The remainder of the set including the five tubes was unharmed. An insurance company paid Mr. Getz \$3.50 for the damage. The current choose to break down the insulation on the primary of the antenna coupler rather than jump the eight-inch gap of the lightning arrester.

these are turned into Radio Digest in a group of CONSECUTIVE numbers, extra bonus votes are allowed the announcer for whom you are voting.

The ballots, top of page two, numbered consecutively, will appear in each issue of the Radio Digest until the close of the contest, with the August 22 number.

Each of these ballots will count for one vote when sent in separately. You can hold these ballots until you have 4 that are consecutively numbered, and when they are sent in a bonus of 8 votes will be allowed for your favorite announcer.

For each 8 consecutively numbered ballots your candidates will receive a bonus of 20 votes. For each 12 consecutively numbered ballots, 30 votes. For each 16 consecutively numbered ballots, 40 votes. For each 20 consecutively numbered ballots, 50 votes, and for each 22 consecutively numbered ballots, 60 votes bonus will be allowed.

Send nominations or ballots to the GOLD CUP AWARD EDITOR, Radio Digest, 510 N. Dearborn St., Chicago.

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Looking Ahead

The Much Discussed Oscillating Crystal, next week, will be taken up by Frederic M. Delano, our Paris representative, who followed M. Vinogradov over half of Europe to get the story from one who knew the subject thoroughly and knew, first hand, of the experiments of M. Lossev.

WEAF, Chief of the Link Stations, will be pictured and described in the next issue of Radio Digest. The American Telegraph and Telephone station in New York is one of the most beautiful in the country. Pictures of the studios and members of the personnel will be shown.

Three More Weeks for the Gold Cup Award to run, and who will win? Follow the standing from week to week. The contest closes with the August 22 issue, and competition is intense. Have you voted for your favorite?

Suppression of Radio Inductive Interference, as found by actual experience, is presented in detail by the department of marine and fisheries, Canada, as a sequel to this week's article on the sources of this interference.

Operation of Vacuum Tubes will be discussed by Professor Moreton in his next article of the A. B. C. Course. In this issue he tells why the various parts are placed within the bulb and next week he therefore describes methods of getting the most from these parts.

Newsstands Don't Always Have One Left

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HEAR DEEP SEA DIVER

(Continued from page 1)

ran through the helmet through a specially constructed opening which withstood the powerful pressure of the ocean at a depth of fifty feet, and allowed passage of the wires. The wires ran from his helmet to the small boat floating on top of the ocean, which in turn, was connected by waterproof cable to the Steel Pier.

The Steel Pier, on which WIP maintains its Atlantic City remote control station, is approximately a quarter of a mile in length. Microphone wires from the boat were connected to the microphone outlet at the end of the Pier, then to the remote control station where they were amplified and sent over special long distance telephone wires to the transmitter of WIP located in the Gimbel Brothers' store, Philadelphia, after having passed through three separate amplifiers, and under the Delaware river.

Searchlight Added Feature

A remarkable feature of the broadcast on Saturday was an experiment conducted in conjunction with the Westinghouse Lamp company of sub-sea searchlights. This company has made sub-sea search lights of small caliber for use in salvaging wrecks and locating bodies. Recently, they received a request for lights of ocean strength and able to withstand ocean pressure and projecting a beam of light through the dense ocean water.

The lights were built for use with the diving broadcast, being the most powerful sub-sea lights ever constructed. They consist of 1000-watt globes, the shell of the glass being more than a quarter inch thick. They were placed in large polished metal reflectors with a suitable handle, and connected to the high tension lines on the Steel Pier by waterproof cable.

Lights Prove Huge Success

These lights were so powerful that while the diver was on the floor of the ocean using them in his explorations, people watching the scene from the Pier were able to follow the diver in his movements by the reflection of the light on the surface of the water. Westinghouse engineers proclaim the experiment a remarkable success, and have proved satisfactorily that electric searchlights of a sea-resisting strength are now practical.

The broadcast of the diver from the Steel Pier was carried to Radio fans by a complete chain of Radio stations led by WIP from whose studio the energy originated. Station WGBS, Gimbel Brothers in New York City; Station WMAF, Col. Green's famous broadcaster at South Dartmouth, Mass., and Station WPG, the Atlantic City municipal station, were linked with WIP for simultaneous broadcasting of this great event.

Announcement has also been made that this chain of stations will in the future be allied for simultaneous broadcasting, and is destined to become a powerful figure in the Radio count of this country.

New Stations

Oakland, Calif., will have a new 1,000-watt broadcasting station when KTAE, the Tenth Avenue Baptist church, goes on the air this week. Church services will be broadcast Wednesday and Sunday. The rest of the week the programs will be high grade though not necessarily sacred. Miss Ada Morgan O'Brien, formerly program director at KPO, is the director. A 500-watt station is opening in Oakland owned by the Oakland Educational society. This station using the call KFWM may be heard by dialing 224 meters.

KOIL, the new Mona Motor Oil station at Council Bluffs, Iowa, is owned by the Monarch Manufacturing company and operates on 278 meters, 500 watts. Tom Mackey is the announcer.

Other new stations licensed this week are: KFWE, St. Louis, Mo., 250 watts, 214.2 meters; WIBT, New York, N. Y., 100 watts, 211.1 meters (portable); WIEU, Poynette, Wis., 20 watts, 200 meters; WSAU, Chesham, N. H., 10 watts, 229 meters; WSAV, Houston, Tex., 100 watts, 248 meters; WTAD, Carthage, Ill., 50 watts, 236 meters.

Among the new superpower stations is WOK, Homewood, Ill. This broadcaster has opened a Chicago studio located in the Terrace Garden, Morrison hotel. Many other stations are increasing their power for the summer months. WCBD and WCCO are using 5,000 watts; WEAJ, 3,000; WTAM, 2,500; WTAS, 1,500. WAFD, Port Huron, Mich., and WMAZ, Macon, Ga., are now listed at 500 watts. WHEAT, formerly KEMT, Minneapolis, is also operating on 500 watts.

KFAB, Lincoln, Nebr., is now a Class B station operating on 340.8 meters. WSBF are the new call letters of Stix, Baer and Fuller at St. Louis. This station formerly used WCK, WSY, Auburn, Ala., will re-open in the fall with a Class B license and will probably use the call WAPL.

NEWS BRIEFS FROM THE BROADCASTERS

WOR, NEWARK, OBSERVES THIRD ANNIVERSARY

KOA, Denver, Players to Act Monday—WHAD, Milwaukee, Adds Open-Air Band Concerts

WOR, L. Bamberger's station at Newark, N. J., recently celebrated its third birthday with a special program arranged by Joseph M. Barnett, director and chief announcer. A number of famous names were heard announced, including Dr. Frank H. Vizetelly, famous lexicographer, and Houdini, noted psychic investigator and "Handeuff King."

Dramatic night, Monday, August 3, at KOA, Denver General Electric station, will be observed with a sketch from "Madame Butterfly," and a one-act fantasy, "The Maker of Dreams." The KOA Players, under the direction of Iris Ruth Pavey, will give the performances.

The municipal open-air band concerts, which have been a feature of Milwaukee summer recreation for a good many years are having a still wider audience this summer. Arrangements have been made by WHAD, Marquette University-Milwaukee Journal station, to broadcast two of these concerts each week. Sunday at 3:15 p. m. and Wednesday at 8 p. m., Central time, the concerts are scheduled.

Joseph Plunkett's Plunketteers of the Mark Strand theater, New York, are just one year old as a broadcasting unit, but now known to the hundreds of thousands of fans throughout the East.

As a means of educating the public in traffic laws, particularly as applied to the operation of motor cars, WGY, the Schenectady station of the General Electric company, recently gave "A Night in Magistrate's Court," a three-act tragedy with a moral in every act.

BAND CONCERTS PROVE POPULAR

WEAF Goldman Musicians Take Even in Crowded Summer Ether Schedules

NEW YORK.—"Such popularity must be deserved" is a slogan that could well be applied to the Goldman band concerts heard countrywide through WEAF and eight other stations three nights each week.

Starting to broadcast at a time of year when band concerts were literally a nightly occurrence on the air, and when the market was seemingly glutted with this type of music, Mr. Goldman overnight became one of the most popular of WEAF features. Within two weeks, over 5,000 letters have been received and they are now pouring in at the rate of about 750 a day.

Several factors can be held accountable for this response—the summer Radio audience seems to want music, not necessarily light, but at any rate, familiar. Mr. Goldman arranges exceptionally well rounded programs, usually opening with well-known "heavy" numbers, then gradually lightening up as the evening advances.

On Sunday, August 2, WEAF, WEEI, WJAR, WCAP, WCTS, WWJ, WCAE and WFI will be linked for the concert starting at 9:15 p. m., Eastern daylight saving time. A Bohemian program will be broadcast on Monday, August 3, starting at 8:45 p. m., from WEAF, WOO and WWJ.

King of Sweden Decorates General Electric Engineer

NEW YORK.—E. F. W. Alexanderson, consulting engineer of the General Electric company whose invention of the Alexanderson high frequency alternator first made trans-oceanic Radio communication practical, was decorated by King Gustav V of Sweden recently with the Order of the North Star, the highest decoration within the power of the king to scientific or distinguished persons.

License Evaders' Army Swells

LONDON.—The number of unlicensed listeners here has reached an alarming figure. It is considered that there are at least 1,250,000 who have not paid the license fee. Some months ago the figure was computed at 150,000; then it crept to 250,000, and a month later 500,000.

The figure has grown to one and one-fourth millions since the Radio bill, which imposed the right of search and other penalties, was abandoned by the present Parliament.

RADIO IN HOSPITALS FOR LONDON PUBLIC

LONDON.—"A Radio set for every bed in every public hospital in London," is the benevolent and ambitious aim of the Radio hospitals fund which has been organized here. Already the fund has collected \$70,000 in money and equipment. Three large hospitals are about completely equipped, those containing the greatest number of beds being given first preference. Some 4,000 beds in twelve different hospitals will be equipped. It is probable that special programs will be broadcast by the British Broadcasting company.

SCOTCH COUPLE IS WED BY FREE MUSIC

NEW YORK.—Hardly a day goes by that one or two requests, either by telephone or letter, are not received by WEAF, New York, for Lohengrin's "Wedding March." If these requests were complied with this famous march would become most abused. However, an exception was made recently when Joseph Knecht's orchestra furnished the march for a wedding ceremony in a distant town where Radio music was the only kind available. The bride and bridegroom, by the way, had just come from Scotland.

PLAYS SWEET HAWAIIAN STRAINS



When Henryetta Turner, the ukulele girl, plays and sings sweet Hawaiian melodies from WEEJ, New York, all the boys want to start westward to the land of liquid sunshine, but when they see this picture they will hop the Broadway Limited.

Crosley Yacht to Give Music to Great Lakes

"Muroma" Will Be Equipped with Broadcaster

DETROIT.—Summer campers and cottagers along the Great Lakes and especially in the Georgian Bay region, will soon be provided with Radio programs broadcast from the Muroma, Powl Crosley, Jr.'s 65-foot motor yacht.

Special broadcasting equipment is to be installed aboard the yacht before she leaves the Detroit Yacht club with her owner and guests for a vacation trip. The call letters will probably be WLW, Jr., which will serve to identify the floating station with that of the Crosley superpower station WLW in Cincinnati.

Invitations will be extended to campers to participate in the programs to be broadcast when the yacht makes port for the night.

After a summer season on the lakes the Muroma will be taken to Florida. It will be re-fitted enroute and be ready to provide Radio entertainment for sojourners in Florida this coming winter, as well as recreation for Mr. Crosley and his guests.

Welsh Miners Talk Over Private Radio

First Two-Way Private Line in Great Britain

LONDON, Eng.—What is believed to be the first private two-way Radio telephone installation in Great Britain is now being operated by the Powell Duffryn Steam Coal company, between its collieries at Llantrisant and Bargoed, Wales, over a distance of 35 miles.

Each station has an apparatus for both reception and transmission, and the company proposes to link up another colliery at Aberaman, so successful has the installation proved. For special purposes it has been found much superior to the ordinary telephone.

New Swiss Station Looms

BASEL, Switzerland. — Broadcasting equipment has been installed at the new station here. The principal wave lengths to be used will be 900 and 1,300 meters.

There are now four broadcasting stations in Switzerland, the other three being located at Zurich, Geneva and Lausanne.

'KENTUCKY HOME' IS GIFT IF WHAS ERRS

LOUISVILLE PLANT IS OUT TO MAKE SLOGAN GOOD

Catch Them Quiet 8 Seconds During Program and Receive Foster Song Book

LOUISVILLE.—Still determining to live up to their slogan, "The Snappiest Radio Station in the World," WHAS here has renewed the offer, "Catch us silent for eight minutes and win a prize," made on their birthday night, for the next 365 7:30 to 9:30 evening concerts.

Very distinctive of Louisville and the Blue Grass state is the prize offered to the Radio world. It is a copy of Stephen C. Foster's Ten Best Songs, arranged especially for vocal quartet and dedicated to Station WHAS by Zudie Harris Reinecke, with Foster's "My Old Kentucky Home" occupying a prominent position in the volume.

A musical paper reviewing these particular arrangements said: "This is the most valuable service ever done to Stephen C. Foster. The arrangements breathe the very spirit of the South and they are never overdone, as too frequently happens. Their outstanding charm is the exceptional intelligence with which they are handled."

How to Get Book

Everyone can get a copy of this book by catching WHAS silent for as long as eight seconds during any of their next 365 evening concerts, except when such silences are due to local thunderstorms, tube blow-outs, or other unavoidable mechanical breaks. In so much as this station has lost less than sixty minutes from these causes during the last 400 hours of evening broadcasting, they do not anticipate much similar trouble in the future.

All letters claiming a WHAS song book on the above conditions must contain five cents in stamps for mailing charges and also be confirmed by another signature; the exact date, hour, and other helpful information being carefully noted.

OPERA OF 2 KINDS ON EVENING BILL

WEAF to Broadcast Both Heavy and Light Musical Plays Same Night

NEW YORK.—Opera in its two forms, the stirring tragedies of the grand opera and the light operetta of the contemporary theater, will be heard on the WEAF wave length Tuesday, August 11, at 10 p. m.

"La Gioconda," Ponchielli's adaptation of Victor Hugo's drama, "Angelo," will be sung by the WEAF Grand Opera company under the direction of Cesare Soderò for the audiences of that station, WEEI, WFI, WCAE, WGR and WWJ. "La Gioconda" is a product of those happy days when the untamed music lover was considered, but at the same time, full of charm for the experienced musicians, has plenty of melodies generously embellished with interesting harmonies and with colorful orchestrations. "The Dance of the Hours" is today one of the most popular of orchestral selections.

The WEAF Light Opera company returns to the microphone of the New York station Saturday, August 1, when it will broadcast at 7 p. m. and later at 8 p. m. a program of music of the type which its name indicates. Marie Oplinger, soprano; Joy Sweet, contralto; James Haupt, tenor, and Chester Moffat, bass, comprise the four members of this popular group.

WBAP Erects New Aerial; Silent During Building

FORT WORTH, Texas.—Plans for the erection of a new antenna system have just been completed by WEAF, The Star-Telegram Radio station, and construction work has started.

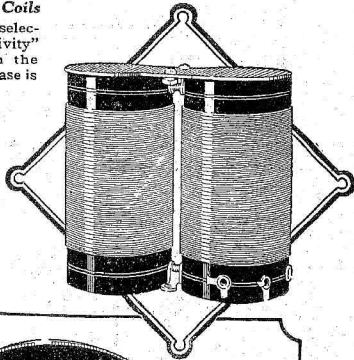
The new antenna will reach a height of over 300 feet when it is swung between the two towers and will be visible for a distance of several miles.

Programs will be suspended during this work.

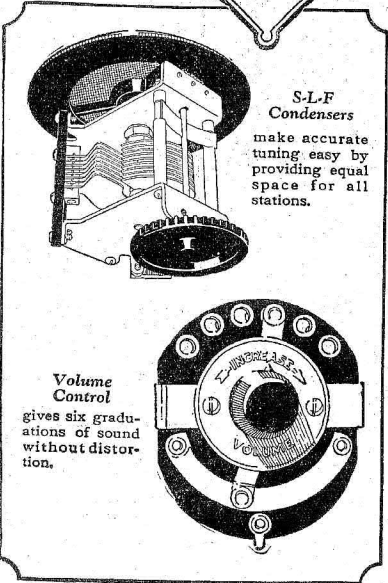
Constantinople Hears U. S.

WASHINGTON, D. C.—Operating on a wave length of 80 meters, an experimental short wave set at the Naval air station, Lakehurst, N. J., has been heard in Constantinople, a distance of over 5,200 miles, according to word recently received in the navy department from the U. S. S. Scorpion of the U. S. naval forces in the Mediterranean. The Scorpion reported that the signals were so strong as to be heard with the detector below oscillation.

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S-L-F Condensers make accurate tuning easy by providing equal space for all stations.

Volume Control gives six gradations of sound without distortion.

lies in the ability of your set to select any desired station and cut out all the rest; to vary the volume to please your ear without in any way distorting the sound; to give you distance without any disturbance from local stations; to permit accurate tuning easily and speedily.

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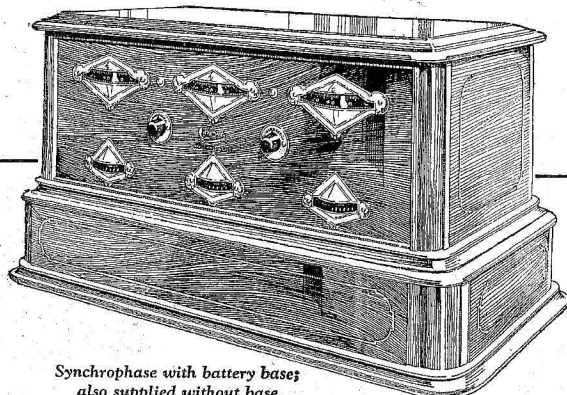
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Doctor W. P. H.



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Synchronphase with battery base; also supplied without base

WTAM, "The Voice from the Storage Battery"



Above, Arthur R. Herske, chief announcer and a regular Coo Coo, in fact Art is master of ceremonies of the famous Coo Coo Club.

Miss Ruth King, program director and announcer from the Euclid Music studio.

Left, L. W. Zimmerman, program director of WTAM, is one of the best writers around the plant. He is an elocutionist of note and often delights the station's audience by his readings. The young man looking so seriously at the microphone is Austin J. Wylie, director of his own orchestra which broadcasts by remote control from a leading Cleveland restaurant. Wylie also announces the musical numbers they play. The spacious, cool looking room in the upper center is WTAM's reception room.

"THE Voice from the Storage Battery!" It is a fitting slogan that the Willard Storage Battery company, of Cleveland, Ohio, has chosen and it has been heard across the Atlantic, from coast to coast in the United States and Canada, in Central America and far north amid the snow and ice of the arctic regions.

There are a bunch of live wires at WTAM, not alone in the battery room. Live wires are in evidence through the personnel of the station, for each individual seems particularly gifted for his specific duties. In Mr. L. W. Zimmerman, program director, the station has a man of many parts; an elocutionist par excellence whose selected readings call forth always a flood of applause; an actor of real merit, as proven by his part in a recent rendition of "The Mikado," and a manager of ability and discernment as indicated by the success of his programs. Mr. L. W. Zimmerman may look back upon his work at WTAM and call it good, and the station's audience may look forward with confidence in programs yet to come.

Mr. S. E. Leonard is chief engineer in charge of WTAM. It was Mr. Leonard who designed the station and its equipment, following plans that were largely his own and which, in no small degree, have contributed to the station's success. Better known as "Eddie," Mr. Leonard has a host of friends among the Radio enthusiasts of Cleveland and is never too busy to help in solving an experimenter's troublesome problems. Associated with Mr. Leonard is Mr. C. C. Russell, station operator, and Mr. J. J. Francis, late of Station KDPM in Cleveland.

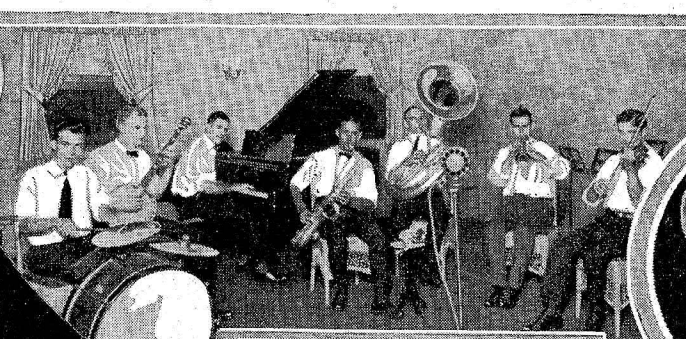
Mr. Arthur R. Herske, chief announcer, deserves a better acquaintance than can be given in these pages. It may be that "Art" has a dual personality; certain it is that Mr. Herske can adapt himself with utmost ease to the type of program that he may be announcing. When the program is of a serious nature, featuring the best of classical offerings, Mr. Herske is sedateness personified, dignity itself. But when the ragged strains of jazz are disentangling themselves from the aerial and the saxophones are wailing forth the rhythm of "Red Hot Mamma," then we have another "Art" Herske; "a fellow of infinite jest and excellent fancy." Mr. Herske is at his best in announcing the offerings of the "Coo Coo club," an aggregation holding forth on Saturday evenings.

This brings us in immediate touch and acquaintance with "Ev" Jones and his musicians,

artists all. As director of the Coo Coo club orchestra it behooves Mr. Jones that his ensemble and its offerings live up to a name that implies a total absence of sanity. That this is accomplished in effect but without a real loss of sanity or disregard for conventions is an achievement of no light order and is a tribute to "Ev's" real ability as a director.

Carl Rupp and his Hotel Hollenden orchestra provide dance music for the station as a weekly program feature and Mrs. Carl Rupp often delights the audience with vocal numbers. Mr. Rupp is the composer of many songs which have achieved national popularity, among them being "Lovely Lady," of which Mrs. Rupp was the inspiration. On other evenings an organ recital is offered, featuring the immense municipal organ in Cleveland's public auditorium. Mr. Edwin Arthur Kraft presides at the console most frequently, though Mr. Metcalf is called upon very often. Both gentlemen are organists of exceptional ability. Mr. Metcalf is blind, but his loss of vision seems compensated for by a marvelous sense of touch and appreciation of harmonies and he delights in exhibiting the capacities of the organ.

From six to seven o'clock, every evening except Sunday, WTAM offers a dinner concert of unusual excellence, alternating Maurice Spitalny's Hotel Statler orchestra with vocal and instrumental numbers from the home studio. (Continued on page 6)



Left, Carl Rupp, who directs the Hollenden hour of music, is a composer of nationally known popular songs. Center, the famous Coo Coo orchestra with "Ev" Jones, director, at the piano. Some jazz!

Below, S. E. Leonard, chief engineer and builder of WTAM.

COPPER-GLASS SEAL EARNS \$1,000 AWARD

W. G. HOUSKEEPER WINS
JOHN SCOTT MEDAL

Perfects Method of Adhering Copper
to Glass in Airtight Union for
Tube Use

PHILADELPHIA.—The city of Philadelphia has awarded to William G. Houskeeper of South Orange, N. J., the John Scott medal for his contribution of a copper-glass seal to technical progress. The award carries with it a premium of \$1,000 and is made by the city of Philadelphia from the proceeds of a fund left more than one hundred years ago by John Scott of Edinburgh, Scotland.

The achievement for which the medal was awarded to Mr. Houskeeper is the development in the Bell Telephone Laboratories in New York, of a practical method for making an airtight joint between copper and glass. Such a seal has been sought ever since the invention of the electric lamp more than a generation ago, requiring that an electric current be carried into the inside of an exhausted glass bulb. Recent developments in high power radio transmission have required the carrying of even larger currents into vacuum tubes, and in other ways indicated the necessity for a copper-to-glass seal.

Copper Replaces Costly Platinum

It has been known for a long time that these two substances when heated and pressed together will adhere as taffy will stick to a plate. The fact that on cooling the copper contracted more rapidly than the glass invariably caused the joint to break and allowed air to leak in and destroy the vacuum.

Since platinum contracts at practically the same rate as glass it has been extensively used. Its cost, however, is prohibitive in large amounts. Mr. Houskeeper's invention makes it entirely practicable to use copper instead of platinum, thus making the large sized vacuum tubes commercially possible. Many of these tubes are in use in the high powered broadcasting stations.

How Copper-to-Glass Seal Works

Mr. Houskeeper's invention briefly consists in the discovery that a copper-glass seal fails by the shrinkage of the copper away from the glass, and that this shrinkage can be prevented if either of the two substances is thin enough in comparison with the other that it can be stretched or compressed by its heavier team-mate. Due to its greater ductivity, the copper is usually selected as the element to give.

In joining a copper tube to one of glass the end of the copper is worked to a thin fin only a few thousandths of an inch thick. This is rubbed into contact with a heated glass ring, and later a larger piece of glass is sealed to the ring to complete the upper part of one of the high power vacuum tubes.

The wires are brought into this tube in an equally ingenious manner. To each wire is welded a thin copper disc which is then rubbed into contact with the flared end of a short glass tube. The other end of the tube is then welded by an ordinary glass-to-glass joint to the upper part of the vacuum tube.

BILL HAY IS GUEST AT WLS RECEPTION



"Bill" Hay

He was connected with KFKX. He put on a program of his own making at WLS on the reception night. He is noted for his Scotch songs which were included on this special program. They made a tremendous hit.

Mr. Hay was born in Dumfries, Scotland. He came to America and settled in Chicago about sixteen years ago, where he went into business, studying music in his spare time. For a while he was a vocal teacher. About six years ago he entered business in Hastings, Nebr.

HIGH POWER TUBES USE HIS INVENTION



William G. Houskeeper, South Orange, N. J., inventor, has perfected a method for making an airtight seal between copper and glass, for which he recently was awarded the John Scott medal and premium of \$1,000. Note the high power vacuum tube he is holding. All of the high power tubes make use of his invention which the wires or water cooling plate enter the evacuated glass container.

WTAM AT CLEVELAND

(Continued from page 5)

These popular dinner concerts are varied often by Guy Lombardo and his Royal Canadians, whose offerings are of lighter nature, but are thoroughly enjoyable.

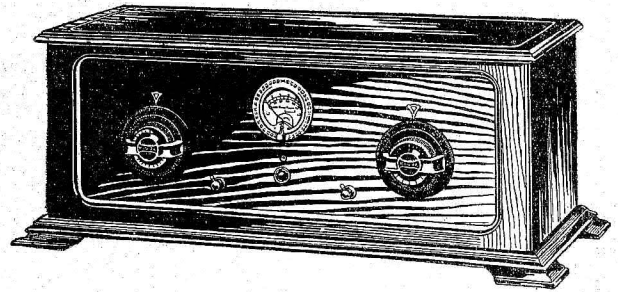
Another orchestra that plays a prominent part in the entertainment of WTAM's audience is that of Austin J. Wylie. Mr. Wylie is probably the most unassuming orchestra leader that can be found; modest almost to the point of diffidence. Wylie's orchestra was selected to entertain at one of Cleveland's most pretentious cafe dansants—it has been called upon for phonograph records time and time again. Mr. Wylie often announces his own programs, using a portable remote control equipment.

Since the opening of the summer season, Frank Wilson's Euclid Beach orchestra has been heard. Whether due to exceptionally favorable acoustic properties of the big dancing pavilion or to particular excellence of the orchestra itself, the offerings from this remote control station have attracted unusual attention from the station's audience.

A particularly pleasing feature of WTAM's daily schedule is the noonday program broadcast from the Euclid Music company studio, where Miss Ruth King is both announcer and program director. Miss King has been called "The Belasco of Radio;" certain it is that the young lady has remarkable ability in arranging and presenting an entertaining program. An accomplished musician and a composer of delightful little songs, Miss King has a most discriminating sense of values and her programs are noted for their "balance," that subtle something that preserves the proper relation between vocal and instrumental numbers, seriousness and syncopation.

A monthly feature of Station WTAM is "The Nite Caps on Lake Erie." Mr. James Frew may be fittingly called "The Daddy of the Nite Caps," for he has stood sponsor for the unique features that have made these programs distinctive since their inception. These programs are broadcast from the Euclid Music company studio and Miss Ruth King arranges and directs the offerings.

It would be a pleasure to introduce all of the artists who contribute to the programs offered by WTAM, but it is also a manifest impossibility when the list includes almost a hundred men and women who give so generously of their time and talent. Suffice to say that "The Voice from the Storage Battery" is a composite voice; it has borne the hisping notes of children, the pathetic quaver of the aged, the full rounded tones of virile manhood, the thrilling, heart-clutching cadences from the silver throats of women. "The Voice from the Storage Battery" has carried the barbaric strains of crude, primitive musical instruments and echoed exultingly in the soaring diapasons of a mighty organ; it has given to the ether the appealing tremolo of violin and cello and the provocative, lustful wailing of the saxophones. If it may happen that the radiations of Station WTAM should reach out into Infinity and be caught by dwellers of some other world it is almost safe to say that the verdict of inter-stellar space would be: "SOME VOICE!"



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JEWETT

SUGGESTS RADIO TO OVERCOME DEFICIT

OPERA LOSS LARGER WITH BROADCASTING OUT

Zenith Official Writes Chicago Opera Head: Explains How Radio Will Help Songsters

CHICAGO.—When the final financial statement of the Chicago Civic Opera company was issued for the season 1924-25 it was found that the always present deficit was greater this year than it was for 1923-24. Many reasons have been advanced as to the why of the added loss and many plans advanced for avoiding the same next season.

However, of all suggestions forwarded to Samuel Insull, the financial head of the organization, the one coming from S. I. Marks, business manager of the Zenith Radio corporation, is of greatest interest to the Radio public and perhaps to the lovers of opera.

Figures show that in 1923 when opera was broadcast from Chicago through Stations KYW and WMAQ, the deficit was much lower than it was in 1924 when the broadcasters were refused the privilege of opening their microphones in the Auditorium theater to pick up the operas.

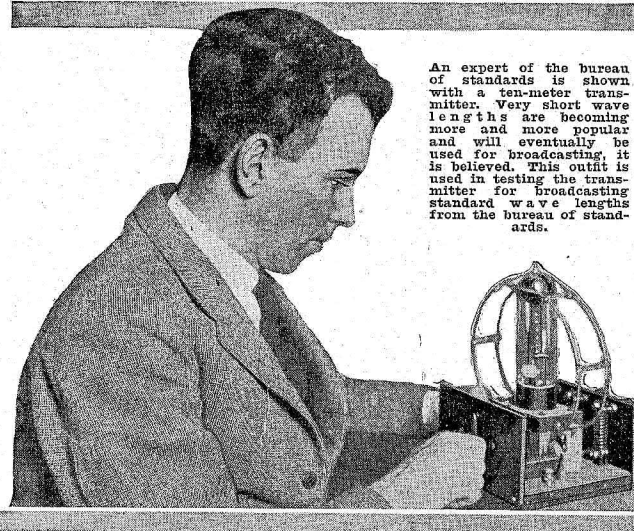
Radio Leader Points Reasons

Mr. Marks, in his letter to Mr. Insull, points out this fact and gives additional reasons why he believes that the logical solution of the deficit lowering problem is in the use of the Radio to increase a public appetite for classic music. The opera director's reply is awaited with great interest by those who love to sample opera in their homes before and after hearing it in full in the theater.

A part of Mr. Marks' letter follows: "What persons other than those musically inclined could truly say that they liked classical music? Those who attend the opera in the majority, acquired their taste for it by constantly hearing it, under so-called forced occasions.

"In order to attract a great attendance at operatic performances, the general pub-

TEN-METER TEST OUTFIT AT WORK



An expert of the bureau of standards is shown with a ten-meter transmitter. Very short wave lengths are becoming more and more popular and will eventually be used for broadcasting, it is believed. This outfit is used in testing the transmitter for broadcasting standard wave lengths from the bureau of standards.

lic must be educated to this class of music. There is no greater medium for serving this purpose than the broadcasting station. An operatic performance well broadcast, would have a listening audience of anywhere from one to five million people.

"If operatic performances were broadcast regularly, the jazz would soon be thrown into the discard. Instead of the musical comedy houses crowded and sold out nightly, the theaters producing grand opera would assume the leading position."

lic must be educated to this class of music. There is no greater medium for serving this purpose than the broadcasting station. An operatic performance well broadcast, would have a listening audience of anywhere from one to five million people.

The second gift mentioned was unique, a wonderful Nash Master coach with balloon tires and all accessories. It is remarkable that a gift of this nature was made without Radio solicitation. The story is unusual. The WOAW Radio pastor in the past two years had traveled some odd ten thousand miles in his rickety Ford sedan. While making one of these trips to an audience in Boone, Iowa, who wished to see and hear the famous Radio pastor, his car performed one of its mullah tricks. Brown arrived only in time to hear the closing amen.

The sympathetic and disappointed citizens of the Boone congregation voluntarily started a subscription for a new car, without informing the pastor. In a short time, Lowell O. Bodie and Charles Bosier, active in behalf of the fund, selected the Nash Master coach and presented it to Reverend Brown, much to the pastor's amazement and delight. And Reverend Brown is showing his appreciation by making more visits to rural audiences than ever.

The Bishop of London, in a recent prayer, called to God for a benediction of the modern inventions, among them particularly the motion picture and Radio.

"Preacher of Million Listeners" Is Title of World Radio Church Pastor

He Visualizes Invisible Congregation That Supplies Him with Auto, Radio, Candy, Eggs, Meat and Cakes—WOAW Pastor Has Direct Appeal to Listeners

By Eugene Konecky
THE announcer is speaking: "This is Radio Station WOAW, the Woodmen of the World, at Omaha, Neb. You are listening to the religious services of our World Radio congregation, of which Reverend R. R. Brown is pastor. Reverend Brown will now present his sermon." No jazz; no sensationalism—a spontaneous, sincere religious thought in modern understandable terms that carry conviction. He says: "You boys in the garage there, take off your hats; say, Bill throw away that smoke." Back comes a telegram, "How'd you know? We're with you."

Reverend Brown knows his audience, the youngsters and grown-ups, the tradesmen, mechanics, editors, doctors and shut-ins. He knows that his message must be simple, direct, emotionally sympathetic. He says: "I see 'em all, in the steel-framed, glass circles of my microphone." And the next question is, does Brown "get across" with his message. That question could be answered by reciting some statistics, for instance, that more than 50,000 listeners have certificates of membership in the World Radio congregation, and that this congregation has won him

the title, "the preacher with a million listeners."

But statistics are cold blooded affairs, after all. There is more eloquent testimony than documents, words or numbers.

Country eggs by the dozens, honey, bulging hams, turkeys, candy, cakes of the best homemade variety, pictures, brooms, and numerous other articles, are included in the list.

Recently two exceptional gifts were presented to Reverend Brown by his Radio admirers. The important fact, in this connection, is that these gifts, one and all, including the last two mentioned, have been made to Brown without any public solicitation whatever.

F. A. Holmes is a Radio manufacturer. But he has for more than two years been interested in Reverend Brown's splendid services. Mr. Holmes, who lives in Waterloo, Iowa, was deeply stirred to express his feeling of gratitude to Reverend Brown. One time, on a visit to Omaha, he called at the pastor's home and met his family. Here was the whole world listening to Brown except his own family. And now, Brown's Sunday morning services "hit home," in the literal sense of the

Village Store Now Air Fans Hangout

Old Stove No Longer Center of Attraction at Cross Roads—Radio Holds Attention

Supplanting the old stove in many a country store today is to be found the Radio loud speaker. Men gathered around the stove a generation ago and talked, now around the loud speaker they listen.

At the little town of Acton, on the edge of the Mojave desert, the storekeeper has provided a Radio receiver for his customers. Every evening they flock in to hear Radio programs, according to L. A. Barrett, of the Forestry service, in a recent interview with a member of the staff of KGO, the General Electric Pacific coast broadcaster.

Teaches English to Section Foreman

"One of the frequenters to this store is a Swede, a section foreman on the railroad. He is a man of middle age, who has been in this country a long time, but has not yet mastered the English language to his satisfaction. Every evening you will find him at the store in Acton, listening to English lessons from KGO, broadcast by Wilda Wilson Church.

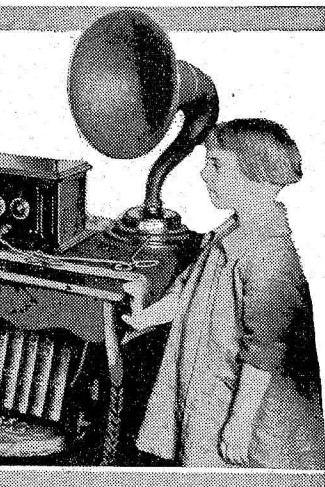
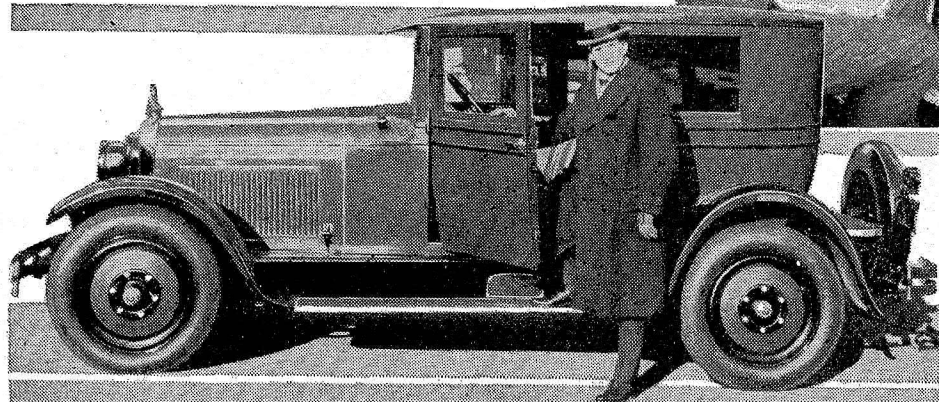
"Besides being a medium of education and entertainment for the dweller in mountains and deserts of the West, Radio is also helping in other ways. During summer months constant forest fire menace is uppermost in minds of stock raisers and lumbermen. Radio, by spreading widely important information on fire prevention is of enormous benefit," according to Barrett. "One of our most difficult problems is to educate tourists. Not that the tourist is more careless where fire is concerned, but because he is many times not used to living in a country where grass under his feet is tinder, and where a single cigarette stub or piece of glass is enough to start a million dollar blaze.

Entertains Forest Rangers

"In the course of my rounds visiting fire wardens and rangers in the forest reserves, I am constantly seeing the value of Radio in keeping these men on lonely outposts in touch with the world. Not only do rangers and fire scouts enjoy Radio programs, but lumber-jacks and workers at the saw mills are equally enthusiastic. No modern lumber camp is without its Radio receiver. Up in Trinity river country of northern California, I have seen groups of men listening in night after night.

Radio also often brings valuable information to fire outposts. One night, up in Lassen county, I got news of fires and progress made against them from all up and down the coast. Nothing before Radio has ever been able to bring in such comprehensive reports."

Many persons so deaf that they cannot hear conversation or enjoy a concert can hear over the Radio without difficulty.



Just because Rev. R. E. Brown was so much delayed in visiting in neighborhood community to deliver a sermon, his Radio listeners of the WOAW audience "passed the hat" on the quiet and purchased this splendid new automobile to substitute for his battered flivver. The best part of it all was that he didn't know a thing about the project and was completely surprised when the presentation was made. While preaching isn't often the most profitable of professions, Reverend Brown is well taken care of by his good friends who listen to him over WOAW. Above he is shown with his three youngsters while tuning the five-tube set given to him by a receiving set maker who is a regular member of Reverend Brown's other church.

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Speaking of Mail

ALTHOUGH the postman has so far failed to bring letters from broadcasting stations, our recent editorial entitled "Now to Scold Stations" seemed to be a go-getter for fan comment. Readers will recall that the editorial advised dilatory stations that it was their duty to acknowledge in some fashion every applause card mailed to them by admiring fans. Opinions seem to differ, but still the majority of letters from readers support the contentions of the criticism. All of which goes to show that you can't please everybody.

One disagreeing listener proclaims the editorial the "bunk" and thinks that stations do enough when they send out the programs free of charge. He advises stations to save the postage and put the savings to good use in improving programs. However, it seems that the worst offending stations neither have good programs or acknowledge fan applause. What are they doing with their "savings"?

Members of the listening audience who liked the thought expressed were very enthusiastic and several listed stations to whom they thought marked copies should be sent. Probably enough marked copies will find their way to the dilatory stations to convince them that something should be done.

One large hotel never acknowledges fan mail. Of all concerns broadcasting, a hotel, catering to the tourist trade as this one does, should take great care to leave a good taste in the mouths of its listeners, especially those so loyal as to put their admiration on record.

We wonder how fan-guests wishing to see this hotel broadcasting station are treated. Does someone lead them about on a tour of inspection and tell them all about the workings of the plant, where the artists stand, the announcer at his microphone, the transmitting set in action, the antenna system? We happen to know that no one does. After expending a large sum of money to broadcast, this famous hotel fails to cash in on the good will created.

Besides hotels, many other business establishments will find it worth many future dollars to keep the good will of their listening audiences. The unappreciative station should know that listeners soon become tired of such treatment and say, as one reader has expressed it, "to h— with such stations."

Censorship in Manitoba

WHILE rigid censorship of broadcast speeches is being exercised in the United States and Great Britain, it is interesting to note how the problem of censorship is being tackled in the Province of Manitoba, Canada, where the one broadcasting station is owned by the people of the Province and is operated by the provincial government telephone system.

Weekly church services are broadcast free of charge, except in special cases where two or more churches demand the same date. Then the matter is regarded as an ordinary business proposition and a small charge is made to whichever church secures the date. In undertaking to broadcast church services, CKY stipulates that they shall be of a strictly religious and non-political nature. If this regulation is broken by the introduction of politics into the sermon, then the full rate for a political meeting is applied.

CKY broadcasts speeches on political and other controversial subjects at a regular and non-prohibitive fee and without the exercise of any censorship whatever, drawing the line only at sedition, blasphemy or indecency. It has never yet been necessary to terminate a broadcast on account of an attempt to broadcast anything of such a serious nature, nor is it thought likely that this will ever have to be done, as it is found generally that people who are willing to pay a fee for broadcasting are anxious to gain the good will of the greatest possible number of listeners.

The British Broadcasting company recently refused to broadcast prohibition speeches. CKY has broadcast both prohibition and anti-prohibition speeches without suffering criticism. It is interesting to hear a provincial government station broadcasting anti-government propaganda, but CKY frequently does so (at so much per minute, of course).

RADIO INDI-GEST

Tin Cup Race Neck 'n Neck



The sixteen involuntary contestants in the infamous Indi-Gest Scold Tin Cup Worst Announcer's contest are now coming down the stretch on each other's neck. In fact it looks like a necking contest. Inasmuch as all the contestants are well known we will list them by characteristics rather than by name.

To the left is pictured the repeated Tin Cup which will be shipped by freight to the winner.

1. He tells the world how good he is.....16,000
2. He cracks wise ones and laughs himself.....15,000
3. He talks through his nose.....14,000
4. He clears his throat with the mike open.....13,000
5. He "dead-eyes" numbers.....12,000
6. He reads telegrams complimenting himself.....11,000
7. He tries to pronounce Russian names.....10,000
8. He mispronounces his city's name.....9,000
9. He calls sopranos contraltos.....8,000
10. He rattles papers in front of the mike.....7,000
11. He says "or-KESS-tra".....6,000
12. He courts his girl via Radio.....5,000
13. He thinks jazz is lowbrow.....4,000
14. He thinks Grand Opera highbrow.....3,000
15. He asks for fan letters.....2,000
16. He says "well, well, folks, the next, etc.".....1,000

A Sitch in Time, Etc.

Says a contemporary weekly:

"One of the most valuable accessories to a tube set is a sitch by means of which the batteries may be readily connected and disconnected."

Then, too, we have heard that some of the most useful parts of receivers are gadgets, dofunnies, thingamags and whatchemaycalls.

The Radio Bug

The Radio Bug is a very strange sight.
The best time to see one is quite late at night.
It sits in a corner and makes not a sound,
But humps up its back like a mole in the ground.

Its ear is developed as large as a plate,
Its sitting down part is as wide as a gate;
It says very little but hears quite a lot,
But for things that are local it cares not a jot.

Its language is simple—it has but one word.
If you make the least sound it is then to be heard:
"Hush," it says and repeats it again and again,
Then sinks into silence as dense as a Dane.

A statue of patience—the Radio Bug,
As still as an old sleeping dog on a rug;
It twiddles the knobs on the Radio set,
Still trying another new station to get. GEORGE.

But even at that the Radio Bug does not have to cultivate a vocabulary as does the Golf Nut.

Music Trust Originality, or Inspired for a Copyright (Play in One Short Act)

Scene: Studio of KNX.
Time: 6:45 p. m.
Characters: Town Crier, announcer of KNX and Paul Finstein, leader of Atwater Kent dinner hour orchestra.
Town Crier: "What's your next number, Paul?"
Finstein: "Well, we have about two hundred requests for Moonlight and Roses."
Town Crier: "That's out! You know our contract provides no jazz or dance music on this hour."
Finstein: "All right. We'll play Andantino in D flat." (Selection is then played.)
Town Crier: "You said you were going to play Andantino in D flat and you played Moonlight and Roses. How come?"
Finstein: "We did play the Andantino. Don't you know the Andantino is an old English number written years and years ago for the organ and that it has been lifted bodily and arranged in fox trot time as a dance number?"
And another announcer passed out. K. N. EXXER.

There are about 200 more acts to this drama but inasmuch as they are all about the same, we say as many announcers have had to say, "Sorry, but we can't use that number here."

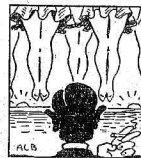
We Love Us Says Delmer

By Delmer Englass

BEING only the paid critic of NWG, I can scarcely refrain from patting our station on the back. It is wonderful. Always wonderful! All the other broadcasters in Chicago and elsewhere are somewhat or very puny. Only shades of punkeness differentiate them one from the other.

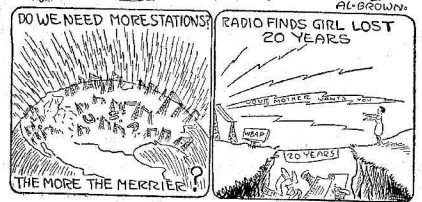
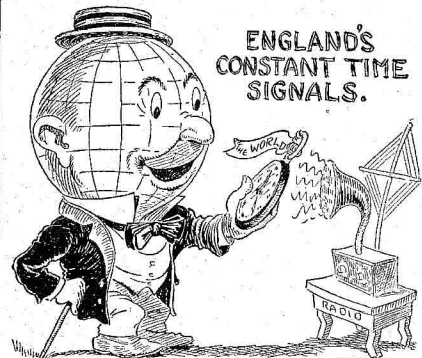
While wandering about the dials yesterday I suddenly hesitated at the numbers which usually bring me the GOOD things from NWG. Why, I do not know. Why should I stoop to dial in NWG? I believe it was because I am always assured of the best on the air at that dial setting. (And, of course, my boss would get sore and fire me if I didn't say swell things about our station.)

What little kiddies, do you suppose I found? No-sir-ee, ugh, ugh. I heard the jungles of Tennessee on the air, and a lot of monkeys were discoursing on their improbable (they hoped) relationship with man. And the big black monkey said to the fierce ape, "Have you ever met Bill Jones?", and the ape said to the big black monkey, "No, what's his name?", and the big black monkey said to the fierce ape, "Who?"
So, good night, kiddies! Come around tomorrow morning and read what cute things I have to say about NWG. And maybe I'll take a nasty crack at WTAS or, perhaps, WBBM. Won't that be fun?



Delmer Criticizes

News of the Week



Condensed BY DIELECTRIC

When you have no other means of visiting a coast resort it is well to try a Radio trip—the cost is little and imagination does a heap. I traveled to Atlantic City the other night via WFG. Just after my dials came to a stop at that broadcasting station the Ambassador hotel orchestra began a program which held one's attention during the entire feature. Tschalkowski wrote but one piece of chamber music that endures to this day, the andante of which is a beautiful selection. You must admire the violinist, not alone for his ability, but for the responsiveness of the instrument he owns. His work was splendid.

We are back again with the concerts broadcast through several stations and rendered by the New York Philharmonic orchestra, one of the foremost in the country. It is a misfortune, however, to have such music delegated to WJZ in New York for transmission to music lovers in that territory. Other stations could more efficiently do this. And to think how some feared for the success of sending out classical music on this order. Fortunately those days of skepticism have passed from us.

WEAR, Cleveland, may have received several commendatory references in these columns for the style of organ recitals broadcast. They are likely to receive more—unless the organist becomes careless. Few compositions are so well suited to varied instrumentation as the famous New World symphony of Dvorak, the andante movement of which is exquisite however often it is heard. That andante was sufficient for the entire evening's enjoyment as played in Cleveland and carried through the ether.

Not in some time has Dielectric tuned to the dinner hour concert given by Station WTAM, Cleveland. This has not been due to lack of enjoyment of the feature, as assurance is hastily given. I don't imagine Radio listeners, once hearing this feature, miss an opportunity for repetition. How many dinner hour concerts are regularly tuned in? This would be interesting, if known. Presumably we are to be entertained while enjoying our simple repasts by orchestras entertaining diners spending many pieces of eight for the same musical relish. Do we? Try WTAM.

Station WLIT, Philadelphia, has one regular feature of rather general interest—the Stanley theater concerts. These differ not at all from other theatrical programs, except, perhaps, in a degree of excellence (this one not being at the top). On my last listen in to this feature, soloists were heard whose excellence many would question. The instrumental trio is another story altogether. They were happy in choice of selections and mindful of each other's presence. When a trio becomes a soloist with two accompanying, it is no longer a trio—properly. We thank WLIT for giving us Stanley T-R-I-O, with no "line busy."

Col. Green has done much for Radiophony with no other motive in mind than to please himself and provide pleasure for the rest of us. Experimentation is not yet at an end at WMAF, South Dartmouth, Mass., and, it is to be hoped, will not be for many a year. If you have not attempted to reach this station, by all means do so. The programs are mainly retransmissions—but such transmission! Anyone appreciating piano music will find here cause for rejoicing for the modulation is almost perfection. Let's see how many of you agree with me.

Radio Inductive Interference and Its Cure

Part I—Sources of Trouble and Identifying Clues

By Radio Branch, Dept. Marine and Fisheries, Canada

FOR the past year the research council of Canada, on behalf of the department of marine and fisheries, has been conducting an investigation into the causes of and means of locating and suppressing Radio inductive interference, and the Radio branch of the department is now in a position to put into practical use some of the results of this investigation, and solicits the cooperation of all those interested in Radio in the work of clearing up such interference and continuing the study.

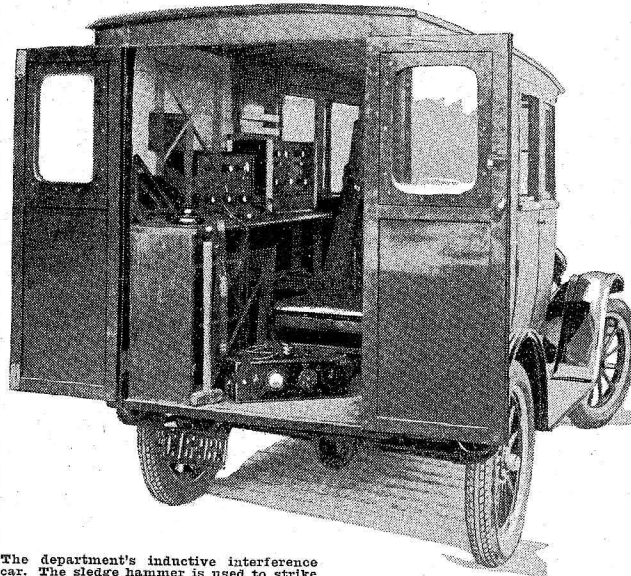
All electrical conductors carrying current are surrounded by an electromagnetic field. When the current in a conductor changes, the electromagnetic field also changes in a similar way and will induce a voltage in any Radio receiving aerial close to it.

There is also another field, called the electrostatic field, surrounding all electric conductors at high voltage. A change in this electrostatic field also induces a voltage in the aerial of any Radio receiver which is close to the power wires.

Range of Interference

Under normal operating conditions on electric power lines, this electromagnetic and electrostatic field, which surrounds the conductors does not extend more than a few yards from the power line. In some cases, however, where the change of current of the change of voltage is of a very sudden nature, called an electrical surge, a receiving aerial situated at a considerable distance from the power line may be affected. An electrical surge may travel many miles along a power line, and produce a radiation which may be picked up on Radio receivers.

The Radio receiver aerial system, which includes both the aerial and ground wire, should therefore be placed at as great a distance as possible from all electric power lines. In cases where it is not practical to get far enough away from the power lines, the aerial should be run as nearly as possible in a direction at right angles to the power line, as the induction



The department's inductive interference car. The sledge hammer is used to strike electric light poles in vicinity of the interference which will make and break a faulty circuit, and this is checked by another operator at the super-heterodyne on the bench.

from power lines is very much greater on aerials which run parallel to them.

In no case should an aerial be erected above a power wire in such a way that it would be possible for the aerial to come in contact with the power wire in case the aerial should accidentally fall. Many accidents have been caused in the past

by aerials accidentally coming in contact with power wires.

The following characteristics of the Radio inductive interference from some sources may provide useful clues in the investigation.

Battery chargers of the vibrator type cause an electrical surge which may

travel along the supply wires of the secondary distribution system and cause Radio interference to all receivers near these wires. This interference is very staccato in character and consists of a regular series of clicks corresponding to the frequency of the alternating current supplying the charger.

Commutator motors which in some cases cause Radio interference due to sparking of the brushes may often be recognized by the sound in the Radio receiver. The interference noise will rise in pitch as the motor speeds up. It is sometimes possible to identify the speed of the motor due to irregularities in the commutator. In cases of motors running at less than 200 R. P. M. it is sometimes possible to count the speed of the motor by listening to the Radio receiver and observing the second hand of a watch.

Faults of High Voltage Lines

A faulty insulator on a transmission line of 20,000 volts or more may sometimes cause an electrical surge which travels along the transmission line for many miles and causes Radio interference to receivers situated within a few hundred yards of this line. This Radio interference may be induced on to other lines which run parallel to it and thus be distributed over a wide area, possibly throughout the entire city. This interference is usually continuous but may under some conditions, be intermittent and very erratic. The number of cases of such interference, however, is very small, as faulty insulators usually cause the shut down of the transmission line and thus will not continue.

A transmission line which sparks to some insulated conductor, such as an insulated guy wire or an ungrounded conduit, may cause Radio interference of a similar nature to that described as originating on a faulty insulator. In this case, however, the interference may continue for weeks or months without causing any power shut down, as the amount of cur-

(Continued on page 20)

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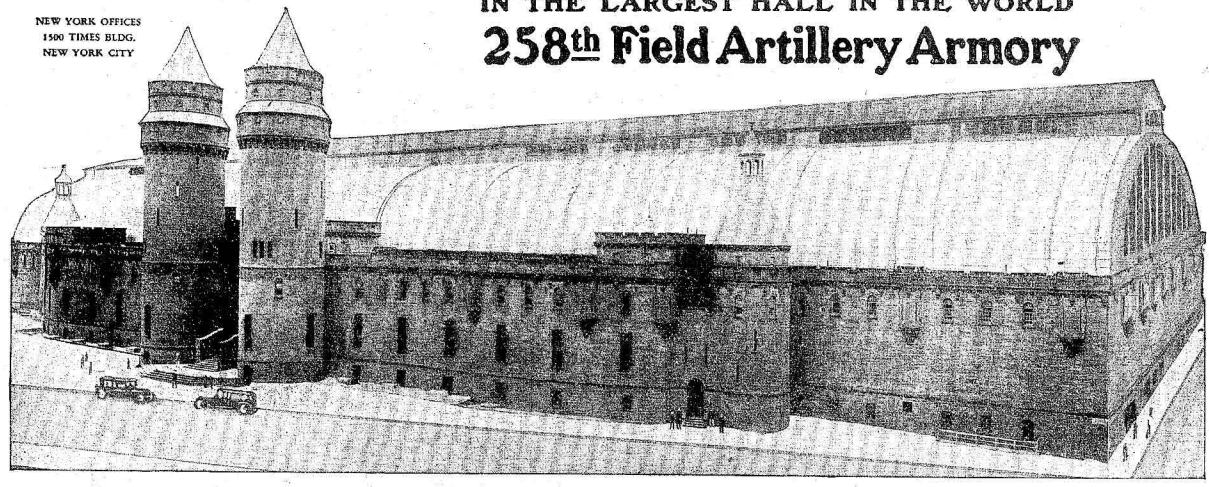
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A. B. C. Course in Radio Fundamentals

Chapter XIX—Operation of the Electron Tube

By David Penn Moreton

THE electron or vacuum tube, to most Radio set owners, is nothing more than a small glass bulb, very much like a small electric lamp in appearance, and having four electrical connections instead of two as in the ordinary lamp. This simple device, however, constitutes the very heart of practically all modern Radio receiving sets and its development during the past twenty years represents one of the most important advances in the realm of electrical science. In addition to its importance to the Radio engineer there are many applications for this tube which add to its practical importance in many lines of scientific development.

The electron tube derives its name from the fact that the action of the tube is due to very small particles of matter called "electrons." According to the electron theory, the atoms of all substances consist of negative and positive electricity. Each atom is supposed to consist of a nucleus of positive electricity around which the negative charges or electrons are grouped, and the electrical effect of the positive electricity just neutralizes the electrical effect of the electrons, and in the normal condition the whole atom is electrically neutral. The atom cannot have any of the positive electricity removed, but in conductors the negative charges or electrons are continually getting loose from the atoms and becoming attached to other atoms. If the electrons are driven off from the conductor, it is left with an excess of positive electricity and the conductor is said to be charged positively. If, on the other hand, there is an excess of electrons on the conductor, that is the negative electrons more than neutralize the positive charges on the atoms, the conductor is said to be negatively charged. The smallest electrical charge that can exist is that of a single electron.

Guided Electrons Are Current

A current of electricity, according to the electron theory, is a stream of electrons guided by a conductor. The stream of electrons is in the opposite direction to that in which the current of electricity

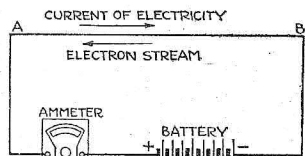


Figure 30

is assumed to be flowing. This apparent discrepancy is due to the fact that the convention, with reference to the current flow, was established before the validity of the electron theory was established. In a metallic conductor, a great many of the electrons are so loosely bound that they are very easily set in motion by electric forces. There is also evidence that the electrons are moving in miscellaneous directions with high velocities when there is no electrical pressure impressed upon the conductor. The velocity of these electrons can be increased in a number of ways, especially by the application of heat, to such an extent that the electrons

can be thrown through the surface of the metal and into the surrounding space.

When an electrical pressure is applied to a conductor, the direction of motion of the electrons is changed from a random motion into a directed motion or drift, and this drift constitutes the electric current.

We ordinarily think of a current of electricity passing from A to B, figure 80, that is from the positive to the negative terminal of the battery through the outside circuit. The electron stream is in the opposite direction or from B to A, that is from the negative to the positive terminal of the battery through the outside circuit.

The electron is a very, very small amount of electricity when compared with the amounts we deal with in everyday life. For example, to light a five-watt tube it would require a stream of electrons of about 300,000,000,000,000 elec-

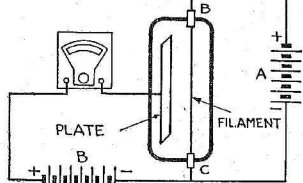


Figure 31

trons per second. When the molecular structure of a material is such that it prevents the passage of electrons more or less completely the material is called an insulator, and if the electrons can move through the material without meeting much opposition, the material is called a conductor.

Let us consider the action taking place around a wire BC, figure 31, which has been sealed in a glass bulb from which the gas has been exhausted, and let the terminals of this wire be connected to a battery A. Such an arrangement is analogous to an ordinary incandescent lamp bulb. A stream of electrons passing through the wire from C to B will constitute the heating current. All of the electrons in the wire, however, are not used in heating the wire, and as the temperature of the wire is increased, the remaining electrons are free to move about with increased velocities. The movement of these electrons may become violent enough to cause some of them to break through the surface tension of the metal and permit them to escape into the space surrounding the wire. The electrons in the space surrounding the wire will tend to repel others coming out and, at the same time, an excess positive charge on the filament will tend to draw the electrons to the wire, and a condition of equilibrium will be reached when no more electrons are given off.

Two Electrode Tubes

If a metal plate P be sealed into the bulb, as shown in figure 31, and a battery B connected as shown in the figure, the following action will take place. A milliammeter in this second or plate circuit, will show that there is a small current of electrons flowing toward the plate inside the tube when the wire or filament is hot. This current is due to the free electrons surrounding the filament being

attracted by the positive plate. This movement of electrons from the filament to the plate constitutes a current in the opposite direction, or from the plate to the filament inside the bulb. The circuit in which this current flows is commonly called the B circuit and the battery connected in this circuit is called the B battery.

If the connections of the B battery be reversed, and the plate made negative instead of positive with respect to the filament, no current will flow as the plate repels the electrons given off by the filament and tends to drive them back into the filament. If an alternating electrical pressure be connected to the plate circuit instead of the B battery, there will be a stream of electrons flowing toward the plate only when the plate is positive.

It is evident that such a bulb may be used as a rectifier for alternating currents and, therefore, can be substituted for a crystal detector in a Radio receiving set. The connection of a bulb of this kind in a simple receiving set is shown in figure 82. This device is called the Fleming valve, after the investigator who showed the application of the tube to Radio reception.

The Edison Effect

In the early days of the carbon filament incandescent lamp, Edison noted a phenomenon which could not be explained at that time. A metal plate was sealed inside the lamp bulb between the two sides of the filament, the plate being completely insulated from the filament itself. When the outside terminal of the plate was connected to the positive terminal of the filament through a galvanometer, a current was found to exist in the circuit, while if the outside terminal of the plate was connected to the negative terminal of the filament no current could be detected. This phenomenon is generally called the "Edison Effect," but Edison made no use of his discovery.

The above description of the flow of electrons between the filament and plate in an electron tube applies to a tube hav-

ing a very perfect vacuum. When there is more than the merest trace of gas remaining in the tube, the operation is more complicated and a larger current will usually flow in the plate circuit, all other conditions remaining unchanged. The explanation for this is as follows:

In a rarefied gas, some of the electrons present are constituent parts of atoms and some are free. The free electrons move about at high velocities and, if one of them strikes an atom, it may dislodge another electron from the atom. The newly freed electron will, under the action of the electrical pressure acting between the plate and filament, acquire a velocity in one direction, that is the direction in which the colliding electron is moving, and the positively charged remainder of the atom, which is called the "ion" will move in the opposite direction.

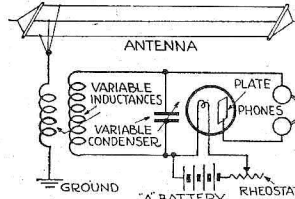


Figure 82

Thus both of the parts of the disrupted atom become carriers of electricity and contribute to the flow of current through the gas. This action of a colliding electron upon an atom is called "ionization by collision," and on account of it, relatively large plate currents are obtained in electron tubes having a poor vacuum.

High Vacuum Desirable

The earlier tubes were of this kind, but at the present time most tubes are made with a better vacuum so that ionization by collision is responsible for but a

(Continued on page 20)

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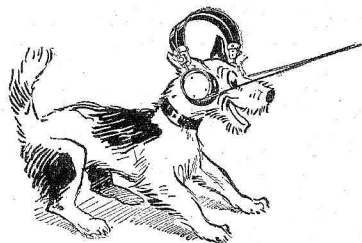
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Heteroflex: The Reflexed Super-Heterodyne

Uses Four Tubes and Crystal

By P. E. Edelman

Now comes the heteroflex receiver, a real improvement. With this outfit you don't need six or eight tubes, and the four tubes used do not drain down the B batteries. Unlike several forms of superheterodyne circuits, the heteroflex is non-radiating. It has very sharp frequency selectivity supplemented by the directional selectivity of a loop so that much interference affecting other receivers does not annoy the user of the heteroflex outfit. Four tubes are not too expensive nor difficult to keep going. The heteroflex is very sensitive but controlled by two dials plus only one rheostat. Potentiometers, etc., are omitted.

The principle or amplifying process used in the new heteroflex receiver is shown in the illustration. Figure 2 shows a diagram of the connections. The incoming Radio frequency is amplified by the first tube and passes through the second tube. This second tube comprises a local oscillator to form beats or heterodyne with the incoming frequency and the output of this tube is fixed to absorb the intermediate or beat frequency energy. This heterodyned output then passes through the third amplifying tube and is cascaded through the fourth amplifying tube at the same intermediate frequency. A fixed rectifier detector is then used to convert the intermediate frequency output to unipulsating audio current. This audio current is amplified by the third tube and cascaded to the first tube, from which the amplified audio output is obtained.

The four tubes thus afforded—one original Radio frequency amplifier, an oscillator and amplifier, two stages of inter-

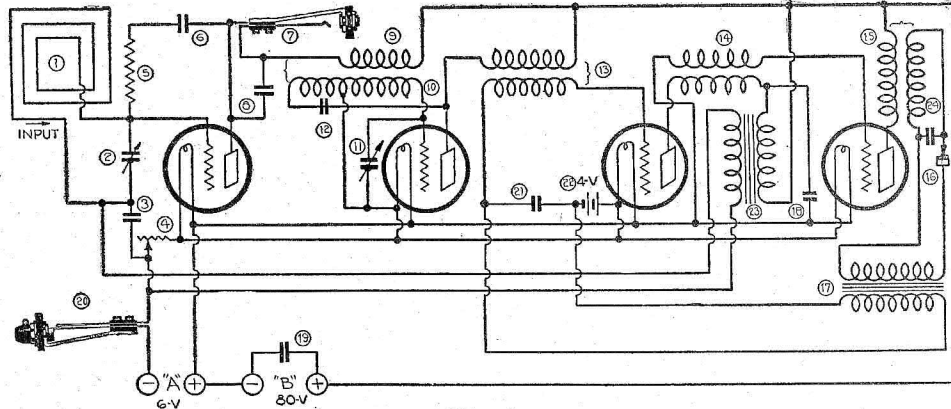


Figure 2

The Radio output of tube 1 goes through plate coil 9 which is coupled to coil 10. Coils 9 and 10 form an air core tuned secondary Radio frequency transformer, and the secondary coil 10 is also used for the oscillator inductance of the second tube. Coil 9 may have 15 turns of number 22 dcc wire wound in a layer at one end of a 3-inch fibre tube, with coil 10 insulated therefrom and continued on the same tube with 60 turns of the same

efficiently and may have a powdered iron core. Suitable transformers are on the market.

The intermediate frequency output from the third tube goes through a similar intermediate frequency transformer 14 of small dimensions and repeats into the fourth. Mica by-pass condensers are used in the grid circuits of the first and third tubes. Condenser 3 is .003 mfd. and condenser 21 is .002 mfd. A 4-volt C battery is used in the grid circuit of the third tube to prevent undesired grid current flow.

The Radio output of the fourth tube is also at the intermediate heterodyned frequency, but is put through a transformer 15 with a tuned secondary. The transformer 15 has a fixed condenser across its secondary so that the secondary is tuned closely to the intermediate frequency, in this case 50,000 cycles. If

this is not done accurately, the tuning of the heteroflex set will be much broadened because the fixed intermediate transformers pass a band of frequencies. The transformer 15 has the high side of its secondary winding connected to a fixed rectifier crystal detector 16.

It is important that the rectifier be inserted in the high potential output side, and that a good rectifier able to handle the input from the fourth tube be used. The rectified current is fed into a one to three audio transformer 17, with the secondary fed into by-pass condenser 21 in the grid circuit of the third tube. The audio output of this third tube is fed into the transformer 23. The primary of this transformer 23 is shunted around the by-pass condenser 18 of .003 mfd. capacity. Transformer 23 has a ratio of one to three and its output feeds across the

(Continued on page 20)

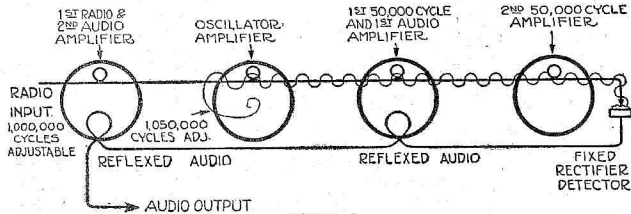


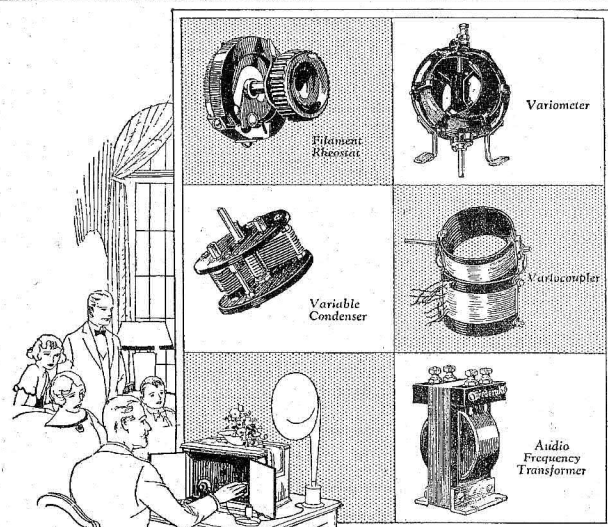
Figure 1

mediate Radio frequency amplification, detection, and two stages of audio amplification. Loud speaker output on distant broadcast programs is obtainable therefrom with small loop input, and local stations are easily tuned through, and cut out thereby. It is also possible to use the heteroflex with three tubes, omitting the last stage of intermediate amplification and the first reflexed audio stage, but this will reduce the performance very considerably, so that an aerial input will be required for good results.

Uses a Loop
The four tube heteroflex set shown uses a loop input. The loop can have 24 turns of wire spaced 1/4 inch apart, wound spiral pancake fashion, starting on a diameter of 6 inches and continuing until a total of 100 feet of number 18 copper wire is so wound. The tuning condenser 2 and the oscillator condenser 11 are .0005 mfd. variable plate types and must have a vernier dial, because the tuning is very sharp and will be lost by rapid manipulation of condenser knob controls.

wire. The tenth turn is tapped as shown so that 50 turns are in the grid circuit of the second tube and ten turns are coupled to the plate by mica condenser 12 of .001 mfd. size. Condenser 11 adjusts the oscillator frequency and also approximately resonates the grid circuit for the first tube's Radio frequency output. The resistance 5 is 5000 ohms and the mica condenser 6 is .00001 mfd., and these elements are connected between the first tube's grid and plate as shown for tube control purposes. The first tube is made an efficient incoming Radio frequency amplifier, and the set does not re-radiate annoying disturbances to other receivers nearby.

Intermediate Frequency Transformer
The second vacuum tube has an intermediate frequency transformer 13 in its plate output circuit. The primary of this transformer draws off the heterodyned frequency output from the second tube and repeats it to the grid circuit of the third tube. This transformer 13 may be of a fixed type able to repeat 50,000 cycles



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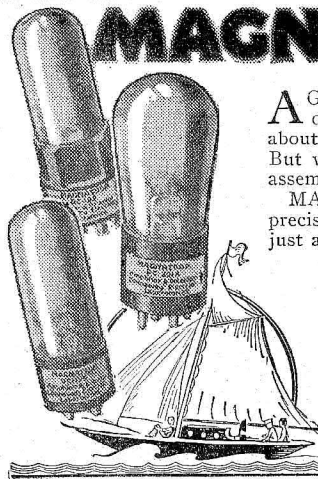
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HETEROFLEX RECEIVER

(Continued from page 19)

condenser 3 in the grid circuit of the first tube. Rheostat 4 is 15 ohms size and it controls all tubes. Tubes used are UV-801A. It is possible to use UV-19 tubes in the sockets shown for the second, third and fourth if suitable provisions are made in the circuit therefor, with an additional rheostat.

Four A tubes only require 1 ampere operating current, or one A tube with three 199s requires less than 1/2 ampere filament current. The by-pass condenser 19 is a mica one having 1 mfd. capacity, the switch 20, turns on and off to operate the set. A B battery supplying 80 volts is required. Volume control is had by turning down rheostat 4 or turning loop 1 partly out of line with the nearby broadcasting stations, thus reducing all the Radio and intermediate amplification. The audio amplification can still function when the rheostat is turned down. This turning down is necessary on account of the tremendous amplification.

Not a Complicated Circuit

The heteroflex is thus not so very complicated after all. The construction requires experienced Radio frequency assembling ability with careful testing and checking up of circuits. Good parts are essential, and there must be no short circuited windings, or by-pass condensers. It is possible to use a third stage of audio with the heteroflex but this will not be found necessary if the heteroflex is well built. It is not policy to use the heteroflex output on a headset without turning the filament rheostat down, as the output will shake the parts of a headset loose or rattle the diaphragm.

The heteroflex should not be confused with ordinary reflex or superheterodyne sets, though it does the work of both. The method is novel and obtains good output from each tube. squeals are noticeably absent so that true reproduction may be had. The input circuit to the first tube should be calibrated with a wavemeter or against logging of well known stations. The oscillator condenser will operate below or above each setting, so slow turning of the condensers is recommended. A station found can be repeated at will with the same setting. To check up, if the Radio stages are operating O. K., a headset in series with a fixed rectifier can be connected successively across the secondaries of each Radio transformer while the set is operating on some broadcast program. If you find no progressive gain in this manner, then one or more of the transformers is not operating properly or is robbed of its Radio input by some by-pass wiring or short circuit.

Panel size can be to suit, but 7 by 18 inches is sufficient with a back base of 7 by 18 inches. A beginner should not attempt the assembly without experienced assistance.

One Control Method

A further improvement on the heteroflex has been worked out with automatic mechanical coupling of the tuning condensers of the input and oscillator circuits, so that one control handles both circuits in correct ratio. The two dials shown are, however, within the operating ability of a novice.

The heteroflex thus affords also necessary Radio, intermediate, and audio frequency amplification in a practical four tube set contained unit.

The heteroflex is thus a considerable improvement on the old heterodyne amplifier of Fessenden and the several so-called superheterodyne circuits using six to ten tubes as worked out by others. As compared to other reflex sets, the heteroflex utilizes more efficient amplification for a similar number of tubes. The advantage is from the heterodyne amplification, and permits the use of a rugged fixed rectifier detector. You do not need to use more than four tubes. When the heteroflex method is employed, that is enough.

The heteroflex can be used with aerial input, but very loose coupling is desirable if this is done, a disadvantage results from the interference picked up by an aerial. A practical point to keep in mind regarding sensitive sets such as the heteroflex is that in reaching out for great distances, you also reach out for interferences which have not any noticeable effect on a less sensitive receiver. The loop input thus becomes almost an essential, as it receives interferences only from the same general directions that the signals are coming from, not from all directions, as in the case of an aerial.

(Some juggling of fixed capacities and grid bias will be found desirable. Filter may be at input or output of the intermediate stages and individual rheostats are a help. The technical staff successfully built one of these sets, so the reader can proceed with the knowledge that Heteroflex is a practical reality.—Editor's Note.)

A. B. C. RADIO COURSE

(Continued from page 18)

small part of the current flow. Ionization by collision might appear to be an ad-

vantage, because a large plate current can be obtained, but there are two outstanding difficulties which have proved so great that tubes are now made to have only the pure electron flow. The first of the difficulties is the rapid deterioration of the filament when there is a large plate current flowing caused by ionization by collision. The positively charged parts of the atoms are driven violently against the negatively charged filament, and since they are much more massive than electrons, this bombardment actually seems to tear away the surface of the filament. The second disadvantage is that too large a battery may cause a "blue glow" discharge. The tube becomes very erratic in behavior. The characteristic curves will not repeat themselves and the electrodes may be changed due to excessive heat.

Tubes having a low vacuum very seldom contain the same amount of gas, and their electrical characteristics may be quite different. Tubes having a high vacuum can, on the other hand, be constructed so that their characteristics are very similar. Tubes containing a little gas, that is having a poor vacuum, are called "gas tubes" or "soft tubes," while tubes with a high vacuum are called "hard tubes."

(The characteristics of the two electrode tube and the operation and characteristics, of the three electrode tube, will be discussed by Professor Moreton in the next chapter.—Editor's Note.)

INDUCTIVE TROUBLES

(Continued from page 17)

rent flowing is only sufficient to charge the ungrounded metal and not sufficient to indicate at the power house. In case such a fault is caused by a line swinging into contact with a guy wire, it is usually noticed to be intermittent during windy weather.

Faults on Transformers

Interference which is caused by defective insulation in conduit or in electrical apparatus, is sometimes intermittent and comes on when the apparatus is vibrated or subjected to strain by expansion due to a change of temperature. For example: A faulty bushing on the primary of the transformer may cause Radio interference by sparking to the ungrounded frame of the transformer when the transformer is subjected to vibration by the passing of a truck along the road.

Charging of lightning arresters is heard in the Radio receiver as a very loud roar, but only lasts for a few seconds. Sometimes this is repeated a number of times as a series of lightning arresters are charged at one station. Most power companies charge their arresters at times outside the broadcasting period, such as noon or 2 or 3 o'clock in the morning. The interference from lightning arresters may be heard for many miles from the source.

Cottrell precipitators sometimes cause interference which may be heard at a distance of 15 miles, but when proper means are taken to reduce this interference at its source they cannot be heard at a distance of more than one mile.

Preliminary Tests to Make

First Test: To determine if the noise in the receiver is due to a fault in your receiver or is actually interference coming in on the air.

Disconnect your aerial and ground wires. If there is no reduction in the intensity of the noise while the broadcast music is stopped by the disconnection, the probability is that the source of the noise is in your own receiving set, in the form of a loose connection, faulty batteries, or defective tube.

Shake your ground wire near the ground connection to make sure that the noise you hear is not caused by a bad connection at this point.

Second Test: To determine whether the interference originates in your own house-lighting circuit.

From cases of interference investigated it has been found that a great number of these are of a purely local nature, originating in such sources as a lamp loose in its socket, or a loose plug of a heater, or from faulty household apparatus. While the interference is continuous, open your main house-lighting switch for a few seconds at the same time listening in on the receiver. If the interference stops when the switch is open, the source of the interference is probably in your own circuit. This test should be repeated several times, however, as there may have been a misleading coincidence with something occurring outside at the instant the switch was opened. Many sources of interference do not start again immediately as the switch is closed, so that observations taken at the instant of opening the switch are more reliable than those taken at the instant of closing it.

Third Test: To determine the extent of the area affected by this interference.

When you are assured that the interference comes in on the air and does not originate in your own set or in your own house-lighting circuit, you should communicate with others in your district who have Radio receivers. Great care should

(Continued on page 21)

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Antennas, for whose erection there are seemingly no rules, are covered fully; the reason for a long wire in some locations and a short one in others, is readily grasped by anyone. Crystal sets, one tube, two tube reflexes, three tube regenerative and reflex outfits, four tube R. F. and neutrodyne, five tube assemblies—all types are presented up to the nine tube "super," king of the air.

For the Man That Bought His Set

For the non-technically inclined there is a two-color broadcast map of the country, operating schedules of all the leading stations, call letters and power rating of every station on the air, suggestions for the care of batteries and tubes.

No matter what type of receiver you own, there are dozens of valuable suggestions on tuning, trouble shooting and operating. Your head receivers, loud speaker, antenna and certain parts within the set, require frequent cleaning, adjusting and care. Interference and its remedies are factors you should understand even though you care nothing about "what makes it go."

Compiled by the technical staff of Radio Digest, it represents the high lights of the past twelve months in the Radio field. All this data is indexed for ready reference and logically arranged. Only a few thousand have been printed and this offer will stand for a limited time. The only book of its kind and is FREE with one year's subscription to Radio Digest. This offer good only on subscriptions sent directly to this office, not through agents or agencies.

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How to Construct Low Loss Tuner

Regenerative Coupler Proves Very Efficient

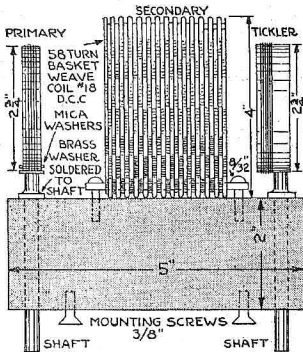
With the coming of low loss sets I built the tuner described below. It has been in use about seven months and I think it is better than any ready built tuner. It is made of a piece of hard rubber or bakelite

WORKSHOP KINKS EARN A DOLLAR—

There are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.
RADIO KINKS DEPARTMENT
Radio Digest,
510 North Dearborn St., Chicago

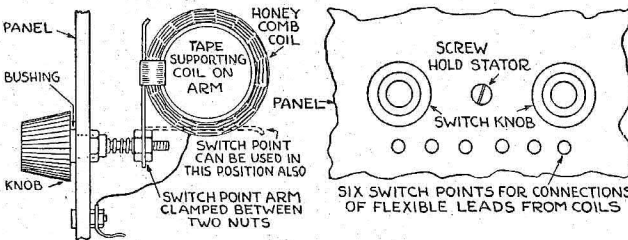
2" x 5" x 1". In this, 3/8" from each end, you drill two 3/4" holes for the shafts and 3/8" from these you drill two holes using a number 29 drill; then tap these with an 8/32 tap. On the opposite edge you drill two more holes using a number 29 drill; one is 3/4" from shaft hole and the other is 1 1/4" from the other shaft hole.

Next make the shafts. These are two pieces of 1/4" brass or rubber rod. Rubber is best, 3 1/2" in length. Drill and tap one



end of these for an 8/32" screw. Then, if brass was used, solder a brass washer 5/8" of an inch from the tapped end. This is to take out end play. Now make a primary of five turns of number 18 dec. by just winding a coil in hand about 2 3/4" in diameter and tying with thread to hold together. This makes a self supporting coil. Then construct a basket weave coil of one of the many designs described in Radio Digest. The tickler is a 3/4" length of bakelite tube 2 3/4" in diameter. Wind, on one side of this, 15 turns of number 26 dec. wire and then drill a hole that will pass an 8/32 screw on opposite edge from

BACK PANEL HONEYCOMB MOUNTING



Here are sketches of a Radio Kink for panel mounting three honeycomb coils which require only three switch point dials, which any fan always has lying around and does not require any extras to mount.

These dials can be spaced according to

wire and fasten to one shaft with a machine screw.

Fasten the primary to the other shaft by spreading the wire and insulating with 2 mica washers and then insert both shafts in piece of rubber. Now fasten secondary to rubber by machine screws (tightening to support by a rubber strip running through coil. Now it is ready to mount on panel; mount in any desired position and then cut two felt washers and slip on shafts that project through panel and put on dials. In making connections to this unit use pigtail wire with spaghetti or rubber covering.—Forrest Bryant, Minneapolis, Minn.

the kind of coils. Any type may be used where a variable coupling is desired, and with a little care a very neat and desirable mounting can be made. The center knob is removed using only the screw giving ample room in handling the two variable dials.—W. A. Moyer, Springfield, Ill.

suitable. Great accuracy is required in these tests for it has been found that many misleading reports have been received from observers who were not sufficiently accurate in their observations. For instance, interference has been reported to be associated with the switching on of the street lights in cases where the interference actually was produced by another circuit which was switched on every evening about dusk. If the observers in this case had noted the time very accurately, the source of the interference could have been located much more readily.

Fifth Test: To determine where the interference radiates from, by means of a portable Radio receiver.

In cases where a portable receiver is available the source of interference may be very often traced by this means. In cases where the noise is of such a weak nature that it only interferes with the reception of distant broadcast signals, a very sensitive loop receiver is required to pick this up. A portable super-heterodyne receiver complete with batteries and thoroughly shielded is best for this pur-

INDUCTIVE TROUBLES

(Continued from page 20)

be taken in making this test to avoid the danger of confusing the interference which originates from different sources, which may appear similar in the receiver. The most satisfactory way of making this test is for one observer to listen to the interference received on two Radio receivers at different points at the same time by means of a telephone system. To carry out this test an assistant at the distant Radio receiver should place his head phone (or preferably his loud speaker) near the transmitter of the telephone in order that the observer at the other receiver may listen at the same time to the interference heard on his own receiver at his right ear, while listening to the interference heard at the distant Radio receiver by means of the telephone to his left ear. This test should be continued for a sufficient length of time to observe a number of variations in the nature of the interference.

In cases where it is not convenient to use the telephone system for this test, the two observers at distant Radio receivers may keep an accurate log of the interference, but in this case they should first synchronize their watches and record any characteristic change in the interference heard, noting the time accurately to within a few seconds.

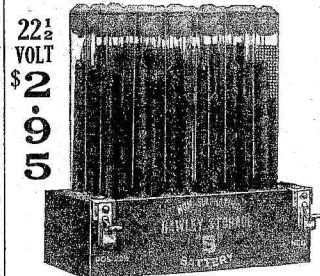
Fourth Test: To determine if any suspected source actually causes Radio interference.

In carrying out this test either of the two systems referred to in test No. 3 is

pose. A much less sensitive receiver may, however, be used in connection with the loop which will be suitable for determining the conductors from which the interference radiates. In cases where the interference is coming in along the conductors of the electric light or power system, a single circuit regenerative receiver having two stages of audio frequency amplification is sufficiently sensitive to give indication when the loop of the receiver is placed within a few yards of the conductor radiating the interference. The construction of a satisfactory trouble shooting set will be presented in a future article.

(In the next article, various methods of correcting interference are explained by the department of marine and fisheries, and photos are shown of their transmission line leakage finding receiver.—Editor's note).

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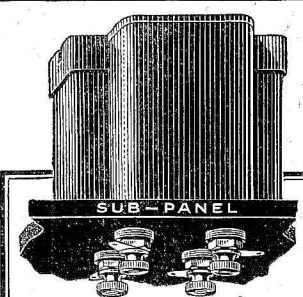
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Questions and Answers

Transmitting Information

(14026) AML, Wilmore, Ky.
 If possible for you to do so, would like for you to give me some information on the following: Average cost of 10-watt transmitting station? Average cost of 50-watt transmitting station? Also the distance these stations could be heard. Where could I get the above equipment complete or knockdown? Would also like to know just what proceedings to go through with to get amateur license from the government.

A.—In your letter you ask how far the two stations mentioned could be heard. A 10-watt station might be heard occasionally at 1,000 miles, but its dependable range over which it could be heard about 95 per cent of the time would be 10 miles. A 50-watt station might be heard frequently at 2,500 miles, but its dependable range over which communication could be dependably accomplished would not be more than 500 miles. The dependable transmission runs just about one mile per watt as you will note from the above figures.

The only concerns who can legally sell you a complete transmitter are the Radio Corporation of America and the Western Electric Company. With the exception of broadcasting stations of the 500-watt and 1,500-watt classes all of the transmitters in this country in amateur use or broadcasting use are made by the users from individual parts which can be purchased from various concerns. If you are interested in transmitting, we refer you to the publication known as QST, which is published by the American Radio Relay League of Hartford, Conn. That magazine and that organization are devoted exclusively to amateur transmission both in code and in voice.

To Tune Above 360 Meters

(13976) NS, Hutchinson, Kan.
 A neighbor has a new five-tube set which refuses to "perc" above 360 to 375 meters. It works nicely below 360 about 40 to 45 on dials and the detector action (the hiss heard upon turning up the detector rheostat) seems to be just the same on the higher dial settings, as it is on the lower wave lengths. For some reason nothing will come through, not even static. This set has two pieces of apparatus which are apparently neutrons such as are used in the Hazeltine circuits. These are sealed with some sort of wax (dropped on while hot) so of course cannot be moved. Could the trouble be in these? The set does not howl on any setting. The aerial is about 115 feet long and ground O. K. Was wondering if a few more turns of wire put on the primary of the first transformer (and perhaps on the other too) would help the higher wave lengths.

A.—The problem of all tuned radio frequency outfits is to secure maximum amplification with a little regeneration at all wave lengths. Most of them will do

this on the lower wave lengths, but the regeneration is less above 360 meters. The — Five is evidently subject to this same difficulty and your suggestion of adding a few more turns to the primaries of the R. F. transformers is a good one. This will have to be done very carefully however and there will have to be a switch by means of which these added turns can be cut out when reception is desired on the lower wave lengths as the presence of these extra turns will cause howling if they are not eliminated when tuning below 360 meters. The little condensers which you believe are neutrons have a lot to do with this and it is on their settings that the regeneration is determined. We are not aware of the fact that the — company was licensed to use this device by Prof. Hazeltine and we are inclined to believe that they are infringing on some patents.

Test Your Batteries Again

(14050) PM, Codell, Kan.
 I have a five-tube neutrodyne set, and up to recently it has worked, but upon tuning in some time ago I found I was unable to get anything. Have tested the batteries, antenna, ground and lead in wire but cannot find anything wrong. Have one Cunningham C-300 detector tube and four Cunningham C-301A amplifier tubes and they all light up and are apparently all right. Have also tried another head set which I know to be all right but can't get a sound, only the sound of battery current. Can you tell me what is wrong with the set? Is it probable that the transformers or the microphone and condenser are ruined? Have done a lightning arrester and thought it had probably received an overcharge somehow though I always mean to disconnect it from the antenna.

A.—It is more likely that this is a five-tube tuned R. F. set and not a neutrodyne and it seems to us that you must be mistaken on this point. If you have taken all of the accessories and find that your batteries give full voltage someone must have tinkered with your receiver or in some way damaged the tubes. The only correct test for dry cell B batteries is to let the set run for half hour or so and then test them with a voltmeter.

PATENT ATTORNEYS

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for if they are tested immediately after a long rest of 15 hours to several days they will show full voltage because they have had a chance to recuperate. A tube may still light and yet be damaged internally because the grid may have been jarred over against either the filament or the plate. If your set is equipped with a variable grid leak it may also be that someone has changed the setting of this leak which would render the set inoperative. Since there are no howls or squeals it is not likely that there is a broken connection. We would suggest that you disconnect the batteries and pull up the springs in your sockets so that you may be sure of contact with all of the pins in your tubes. We have no other suggestions which we can make at this time.

Underground Antenna Cable

(13999) JB, Cle Elum, Wash.
 I would appreciate it very much if you would tell me where I could get some "Packard high tension cable" of which Edward Thos. Jones spoke in his article, "Underground Antennas for Summer Reception." Also the price, if you could get it for me. Would you also please tell me where I could get a stamp book in which to place the stamps that Radio stations send you to prove that you heard them.

A.—We have your letter requesting information as to where you can purchase high tension cable. While we cannot advise where to purchase Packard cable we wish to suggest the Parantec cable which can be had from the Schneiter Radio Co., 420 Felix Street, St. Joseph, Mo. We would suggest the use of 200 feet of this cable with a four foot cross

Salesmen calling on radio dealers wanted to handle Radio Tubes as a side line. Thoria Tube Company, Dept. "D", Middletown, Ohio.

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and this cable sells for \$1.50 per hundred feet.

As to a book in which you can paste station stamps we wish to advise that the originators of this idea are the Ekko Company, 111 W. Monroe Street, Chicago. Their album sells for \$1.75.

Aerial Noise Maker

(13977) RAJ, Fairfield, Ill.
 I have just had a Radio installed and the electrician who put up the aerial soldered a screen door spring to the end of the aerial and then hooked it to the insulator. Please tell me if this would affect the set? We notice much crackling and noises in it.

A.—We wish to advise that the presence of the door spring in your antenna between the insulators would certainly cause a crackling noise in the receiver. The spring should be shifted to the other side of the insulator so that it is between the post and the insulator. In that position it will still give resiliency to the installation but not affect the tuning or the radio frequency currents.



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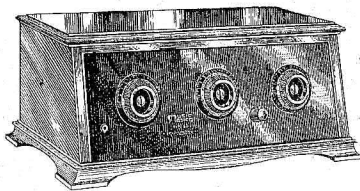
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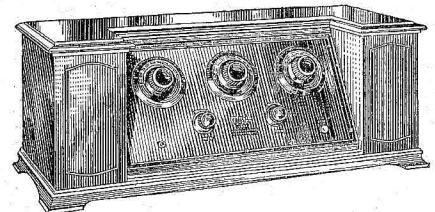
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