

# RADIO TO COMBAT CRIME

## MARCONI TO MARRY YOUNG ENGLISH GIRL

BECOMES ENGAGED DURING  
VISIT TO CORNWALL

Her Mother First Woman to Broad-  
cast to Australia During Test  
from Poldhu

LONDON, Eng. — Senatore Guglielmo Marconi, 49 years old, has become engaged to Elizabeth Narcissa Paynter, an 18-year-old Cornish girl. The romance of the engagement of the world-renowned inventor to this beautiful, dark-haired girl has seized the imagination of all Cornwall.

Miss Paynter became acquainted with Senatore Marconi while he was visiting her parents.

Miss Paynter's mother was the first woman to speak by Radiotelephony to Australia. Marconi was giving a private demonstration from the Cornish station—Poldhu—and she sent a greeting to the Cornish people in the commonwealth. Miss Paynter is to be one of the debutantes at their majesties' court at Buckingham palace this coming season.



## POLICE CHIEF CONFAB WILL SUPPORT USE

Will Flash Radio Photos

System Can Blanket World with  
Criminal's Identification in  
Half Hour

NEW YORK.—Crooks, beware! Radio is on the trail of criminals. No longer will these gentlemen of mystery be safe by simply fleeing from one country to another.

The latest safeguard of the law is Radio photography—the flashing of pictures and fingerprints from one station to another by means of Radio. Already transoceanic Radio photography has been proven successful.

Now the heads of police departments from forty-four nations will soon gather in convention to consider the advisability of establishing an international rogues' gallery. The proposal will be one of the main subjects for discussion at the impending International Conference of Police Chiefs, to be held May 12 to 16 in New York city.

### Sends complete Identification

The Radio photograph transmission system makes possible the sending of a criminal's identification card over distances of thousands of miles in less than half an hour. The card includes the criminal's front and side view photographs, his fingerprints and other details of identification.

In this country the new inventions by which photographs may be transmitted by Radio or over land lines are already being made use of by the police, and it is hoped to extend the service to all other countries.

(Continued on page 2)

Left, Helen Jones, who sings regularly for the Hoot Owls and on other programs from Station KGW. Above, Madeleine Collins, prima donna from Convent Gardens of London. She appeared as star in "Natja" in New York recently. She was heard from WMCA shortly afterward. Right, Sarah Zeigler, of the Zeigler Sisters, often heard from WQJ.



## GOLD CUP STANDING CHANGES SLIGHTLY

### CLOSE RACE EXPECTED AS BALLOTS COME IN

#### Fever of Contest Reaches High Pitch Early in Race—Four Groups Show Leaders

Excitement runs high in the Radio Digest second annual Gold Cup Award for the world's most popular announcer. From all parts of the country votes are coming in for the different announcers whose supporters are rallying to their cause.

Now is the time to show your appreciation for your favorite announcer who has entertained you consistently without thought of himself. Vote for him! Get your friends together and pool your votes. When they are in consecutive numbers, they are eligible for a bonus.

#### Groups Show Leaders

Leaders have been classified into four groups. Get together, fans, and help put your favorite announcer in the leading group. It takes team work to do it, so form a club and hoost your favorite announcer.

Here is just an idea of how they stand in the various groups. Quite a few changes have occurred since last week. Some candidates have advanced, while others have gone down the list. These groups are as follows:

First group: Geo. D. Hay, Graham McNamee, Henry Field, The Hired Hand.  
Second group: W. G. Hay, N. Dean Cole, H. W. Arlin, Gene Rouse.

Third group: Adams Colhoun, Chas. Erbstein, Lambdin Kay, Robert Emery.  
Fourth group: Robert Bonelli, J. H. Jay, E. W. Tyson, Jerry Sullivan.

If the announcer you admire is not in one of them, start right in and cast all your votes for him. Hold them until you have at least eight consecutive votes, and then send them in, thereby getting the advantage of the bonus votes.

The latest standing last week showed 121 contenders for the Cup. During the week, seventeen more candidates were nominated, bringing up the total to 138 announcers in the race.

The seventeen new possible winners—and every one has a good chance—are as follows:

CHIC. Rod West  
CFYC. N. S. Richards  
EPAE. George Hayes  
KFI. Harold Ishell  
KFMT. George W. Young  
KFRU. Frank Lane  
KFVB. Charles Westman  
WMAF. W. E. Branch  
WEDM. Leslie Athas  
WDAY. Kenneth M. Hance  
WGY. William Fry  
WBAS. Credo Harris  
WHAS. Harold A. Falser  
WIP. Karl Bonastia  
WOAW. Dr. Apollonius  
WRC. George F. Ross  
WRG. Ellsworth Tompkins  
WVMB. Clyde R. Randall

If your favorite announcer has not yet been listed, forward your nomination of him at once to the Gold Cup Award Editor, care of this magazine. No nomination blank is necessary.

#### How to Vote and Get Bonns

Don't miss a single ballot, for when these are turned in to 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 3 votes will be allowed for your favorite announcer.

For each 8 consecutively numbered ballots your candidate 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.

#### Most Powerful Set for Turkey

LONDON, England.—The Turkish government has decided to build at Angora the most powerful Radio telegraph station in the world. Captain Edward Walker, former British army officer, is responsible for the plans. He is acting for the Radio Corporation of America.

## RADIO COMBATS CRIME

(Continued from page 1)

The American system, which went into active use several weeks ago, includes only New York, Chicago and San Francisco at present; but it is planned to include many smaller cities in the near future. Photos and fingerprints of criminals are flashed across the country as soon as crimes are committed.

In this way police all over the nation are put on the lookout for criminals who have hitherto made their escape by rapid getaways before definite means of identification could be sent out.

But their flights cannot equal the speed of Radio.

## THOUSANDS OF FANS VOTE TO BETTER AIR

### VOTE YES ON CONSENSUS OF OPINION BLANKS

#### Broadcasters and Radio Clubs Endorse Radio Digest Campaign—Ask for Blanks

CHICAGO.—Spurred on by Radio Digest's national campaign to clarify the air, and once for all provide some means for satisfactorily regulating Radio, tens of thousands of listeners have responded with "Consensus of Opinion" votes.

Not alone have these enthusiastic Radio fans filled and returned the voting blanks, but nearly 50 per cent have requested more blanks, in lots of from ten to 500, for the purpose of enlisting the aid of fellow fans. Many of these requests come from Radio clubs. Others are from broadcasting stations. All will be supplied with blanks.

It is the earnest hope and aim of Radio Digest to secure a vote of several millions of listeners. Armed with such a petition it will not be difficult for Secretary of Commerce Herbert Hoover to give the invisible audience what the majority desires.

#### Broadcasting Stations Endorse Campaign

The movement for less air congestion has been officially endorsed by a great number of broadcasting stations. None of these have criticised the campaign. The stations all agree that the "Consensus of Opinion" vote is the most practical means yet suggested for correcting the present deficiencies of broadcasting.

The campaign is heralded by everyone as one of the best things that ever happened to Radio.

The response from Radio fans bears out the statement. While the tremendous mail cannot be acknowledged, all letters and blanks will be carefully classified and filed, and requests for more blanks will have immediate attention.

A study of the voting blanks received to date brings fourth some interesting information.

#### Affirmative Replies Overwhelming

Roughly speaking, 95 per cent of the votes are all in the affirmative, that is, every question asked is answered with "yes," regardless of whether the listener is all of 300 miles or but one mile from the nearest class B broadcasting station.

A few voters say no to question 1 (blank form above), but still are in favor of less congestion. The next six questions, from 2 to 7 inclusive, are almost always answered with yes. Sometimes, when the voter has not heard of the Kintner plan, question 5 is answered no, but the great majority of these "no's" vote yes to the next question, number 6.

Question 8 presents difficulties for many. Listeners often do not wish to list five disliked stations. Other voters answer as directed. The votes for and against various stations will bring many surprises when tabulated. It is interesting to note that the higher power class B stations with first rate programs, rank first in the minds of Radio listeners. Of course, these stations have a larger audience by reason of their power, so that must be allowed. Question 8 may seem unfair, but answers to it will amass much valuable information.

Do you want the campaign to continue? Do you want better reception conditions? Of course you do, so give all the spare time you can to the promotion of this movement. Get your neighbor to vote!

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## Looking Ahead

KNX, "In the Heart of Movieland," will be the next station to be featured with numerous photographs and descriptive story of the purpose and people behind the project. "Hollywood is the place," according to a prominent and somewhat dignified New Englander, "where a bank president can come to work bare-headed, in knicker trousers and a jazzy sweater, without starting a run on his bank." Coming soon: feature stories and photographs of Stations KY, KFAB, WGN, KFI, WAHG and WEMC. Watch for them.

Underground Antennas as Static Eliminators will be taken up next week by Edward T. Jones. This author has had articles on this subject in the Radio Digest before and the coming article shows the application of his system in limited areas. It differs greatly from that used by Dr. Rogers and was developed by Mr. Jones during the war.

Freed-Eisemann Neutrodyne is one of the most widely distributed receivers of this type, so we know the next Operating and Trouble Shooting article will be of interest to thousands of our readers. No matter what neutrodyne you are using, there will be much valuable data for you.

A.B.C. Radio Course by Professor Moreton has advanced to the stage where inductance and capacity are considered together in an alternating current circuit. The next chapter shows the reactions obtained by the use of both and how these results can be controlled.

### Newsstands Don't Always Have One Left

WHEN YOU WANT

# Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

### SEND IN THE BLANK TODAY

Publisher Radio Digest,  
510 N. Dearborn St.,  
Chicago, Illinois.

Please find enclosed check **M. O.** for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name.....

Address.....

City.....State.....

## STATION GLEANINGS AND NEWSY BRIEFS

### MOTHERS' DAY WILL BE OBSERVED BY MANY

Events of Illinois Legislature to Be Broadcast by WJJD—"Boys Friend" at KGO

Mothers' Day, Sunday, May 10, will be celebrated in a unique manner by WKRC (formerly WMH), Cincinnati, raised to 1,000 watts power with its change in call. Sons and daughters have been invited by the station to send in mothers' names, addresses, and songs desired. Both the names of the mothers and those sending these messages of love through the Radio entertainers will be read. Many old-fashioned melodies have been chosen to fill the ether this late Sunday hour from 10 to 12 p. m., Eastern time. The station is now owned by the Kodel Radio corporation.

Crosley Station WLW, Cincinnati, will also fittingly observe Mothers' Day, as will many other stations throughout the country.

"Baby Mine," a snappy farce comedy in three acts, is the dramatic production to be offered by KGO, Oakland, Calif., dramatic players Thursday evening, May 14. The piece will be presented in Radio form by Wilda Wilson church.

Believing that a broadcasting station is a semi-public institution, WJJD at Mooseheart, Ill., has arranged for a weekly report of the events of the legislature at Springfield, Ill., to be presented at 11:15 p. m., Eastern time, from its Chicago studio in the Palmer house.

Henry Furmont Eames, internationally famous lecturer and pianist, recently opened a series of educational lectures in musical appreciation over WLS, Chicago, Ill. Fridays at 10 a. m., Eastern time is the schedule of these. This is part of the educational program mapped out for the WLS high school audience.

Monday morning, April 20, saw the inauguration of the Central Y. M. C. A. "Devotion Period." At 7:30 a. m., Eastern time, this feature is given from Westinghouse Station KYW, Chicago, Ill. This is a daily fifteen-minute service sponsored by the Church Federation of Chicago, who arrange the program.

Baseball fans need no longer wait for the morning paper to find out the results of the game the day before. Station WHN, New York, is now broadcasting the results of the games each day.

Every Thursday evening from KGO, at 5:30, Pacific time, Geo. W. Ludlow, generally known as a "Friend to Boys," broadcasts what he calls "Sixty Minutes of Sense and Nonsense." He will not only talk about the sun, moon and stars, but other big things in the universe.

Lorado Taft, noted Chicago sculptor, whose masterpieces have made him nationally famous, recently gave fans one of his characteristic talks from WLS. His topic was "Appreciation of Beauty."

A tea dance program featuring the Dixie Boys' orchestra can be heard every Sunday afternoon from Station WBBM. This program is being broadcast from their studio in the Broadmoor hotel, Chicago.

Station KYW, Chicago, Ill., has added two fun makers to the staff in person of St Berg and Perc Congdon. They are heard on the Congress hotel program, broadcast at 12 o'clock midnight, Eastern time, every night.

Audiences of Stations WEAJ, WJAR, WEEI, WVIC, WCIS and WFF gave fans a rare treat when they broadcast Ruggero Leoncavallo's "I Pagliacci" in tabloid form recently. This is one of several grand operas being broadcast from these stations regularly.

Vincent Lopez, Pennsylvania hotel orchestra was heard playing recently under the auspices of the U. S. School of Music from WOR, Newark, N. J. The feature was well received by thousands of fans throughout the country.

For the first and only time in its history, the world-famous St. Olaf choir was heard recently from WCCO, Minneapolis-St. Paul. The concert was given to serve as an advertisement of the Norse Centennial to be held in the Twin Cities from June 8 to 9.

"The Chickering Artist Series," presented from Station WOR, Newark, N. J., has earned nationwide approval from members of the Radio audience, presenting as is does a higher type of artist than ordinarily found on Radio programs.

### FIND NEW DEPOSIT OF RADIO CRYSTALS

ESHOLT, Eng.—The newest place to look for crystals for your Radio set, according to reports from this city, is in the sewerage disposal works. While blasting operations were going on there, workmen discovered debris with a queer crystal-like appearance. One man took a piece home and tried it in his set. As soon as he reported that it improved reception, there was a rush to the works like the famous Klondike gold strike.

### DIRECT AIRSHIP VIA RADIO THROUGH FOG

LONDON, Eng.—During an 800-mile experimental flight over the British Isles, which it had just completed, the newly constructed airship, R-33, cruised over fog banks waiting for the mist to clear so that the ship could be moored again. During the fog the ship was navigated entirely by Radio bearings picked up from direction-finding stations for more than half the fifteen hours the vessel was in the air. Again Radio helps!

## MISS AMERICA OPENS NEW WHAR



Miss Ruth Malcomson (Miss America), winner of the first prize for the most beautiful girl in America at the Atlantic City Pageant of 1924, recently delivered the opening address at the dedication of the enlarged transmitter at Station WHAR, Atlantic City, N. J. In the background is the Seaside House, home of WHAR.

### Broadcast Many Bands From Mineral Wells

Fifteen Hundred Musicians Participate in Mammoth Event

MINERAL WELLS, Texas.—Station WBAF, Fort Worth Star-Telegram, recently established a new mark in Radio broadcasting during the convention of the West Texas chamber of commerce when fifty massed bands, attending the convention, were broadcast by remote control each morning.

Fifteen hundred musicians gathered on the hillsides of this city and played en masse. This was the greatest aggregation of band musicians ever broadcast from any station.

One of the important features of the convention could not be broadcast. That was the biggest open air banquet ever held in Texas. Ten thousand people sat down and had dinner on a ten-acre lot. A pageant followed depicting the finding of the curative waters which have made this city famous.

WASHINGTON, D. C.—An application for licensing a broadcasting station on the yacht "Idalia" has been filed with the Radio section of the department of commerce by Ray Newby of San Jose, Calif.

### Station Changes

The following class B broadcasting stations have recently gone on the air: WHT, Wrigley building, Chicago, Ill., and WSMB, Saenger Amusement company, New Orleans, La. The latter station uses a wave length of 318.9 meters and is heard well in the North.

Class A licenses have been issued to WDDO, Chattanooga Radio company, Chattanooga, Tenn.; KQW, Charles D. Herrold, San Jose, Calif.; WIBE, Martinsburg Radio Broadcasting company, Martinsburg, West Va.; WIBO, Nelson Brothers, Chicago, Ill.; WQWL, Owl Battery company, New Orleans, La.; WIEP, S. E. Miller Dance activities, Wheatland, Wis.; WIBG, St. Paul's Protestant Episcopal church, Elkings Park, Pa.; WMBB, Trianon ballroom, Chicago, Ill., and WIBD, X-L Radio Service, Joliet, Ill.

Station KWG, Portable Wireless Telephone company, Stockton, Calif., has been transferred from class C to class A.

When Paderewski broadcast recently from 2LO, London, England, he refused to play on any piano but his own. He has a special motor truck built to carry the pianos.

## NEW ORLEANS NOW ON AIR WITH WSMB

### PICTURESQUE TOWN HEARD WELL IN NORTH

Studio Atop Maison Blanche Building Best That Money, Brains and Talent Could Produce

NEW ORLEANS.—Atop the Maison Blanche building in this city has been built a plant, dedicated to the ideals and service of the best that money, brains and talent can give to Radio—Station WSMB.

Artists, draughtsmen, engineers and technicians have transformed the upper floor of this building into a cozy home for the new station. It was built for the future as well as for the present. Those in charge anticipating the progressive march Radio will make in this territory, once the people take it to their hearts and homes, and adopt it as a necessity in their daily lives.

This station went on the air April 21 with a program dedicated to the city of New Orleans, and featured by a stellar program of entertainment, including brief addresses by leaders in the civic, professional and business life of the city and state.

The mighty fountain of entertainment, ready to be tapped at all times by the Saenger Amusement company, owners of the station, and a number of theaters in the South, gives one a brief idea of the scope and operating power necessary to man WSMB.

Actors, artists, musicians and the many allied units of entertainment will be brought into play for the pleasure of the unseen millions. Sports, science, market quotations, police bulletins and household aids, will intersperse the musical and vocal programs.

### WLW CHIEF TO GO ABROAD FOR DATA

Fred Smith Will Investigate International Broadcasting Problems and Foreign Stations

CINCINNATI.—International broadcasting has become a definite fact instead of a vague possibility since the advent of the super power broadcasting stations. The vast audience has been awakened to the necessity of a more complete understanding among broadcasters of the different nations.

Fred Smith, studio director of Crosley Station WLW here, is making the first concrete step in the direction of personal interchange of ideas. He is going to Europe in June to study broadcasting. He will visit England, Germany, Holland, Switzerland, France, Belgium, Italy and probably Russia.

Previous to joining the Crosley Radio corporation, Mr. Smith studied for eight years in the countries that he is going to visit. He will now take the advantage of his former experience, and will prepare a series of articles on broadcasting while in Europe. These articles will appear regularly in the Radio Digest.

### Plan Exploration of Receiving Conditions

Radio Equipped Special Train Will Tour Country

BROOKLYN, N. Y.—From one end of the United States to the other, in Canada, and across the border to Mexico, summer broadcast receiving conditions will be studied through the "Trade and Good Will Trip Through the Golden West" by the Brooklyn chamber of commerce.

Eric H. Palmer, noted newspaper man, is the "first Radio explorer," who will make this study. He will tune in on various stations en route, with a view to determine the strength of signals under all kinds of atmospheric conditions and under various environments.

A special train will be equipped for the journey. One of the cars will be used for a community room for meetings and the like. This car will be equipped with an elaborate Radio installation, and efforts will be made to tune in as many stations as possible.

### Interference at Tacoma Now Finally Eradicated

TACOMA, Wash.—For two years the Tacoma smelter here has been causing fans a tremendous loss of sleep and good temper. Now, the life of a fan in this city is sweet, for the trouble has been eradicated. Officials of the plant, together with O. R. Ferferm, are responsible.

## RADIO FADE-OUT IS NEW WJJD FEATURE

SONG TONED DOWN UNTIL IT FADES AWAY

Jack Nelson Humors Fans with New Method of Signing Off at Mooseheart

MOOSEHEART, Ill.—What movie fan doesn't know what a "fade-out" is? And now comes the Radio fade-out. When Jack Nelson was at old WDAP, he established the custom of singing his song, "May You Laugh in Your Dreams," as the finale to the late programs, after all signing off announcements had been made.

He does the same now on the late programs of WJJD, where he is director and announcer, but Ralph Shugart, the engineer, has added a new twist which is receiving many comments.

When Mr. Nelson is half way through the song, it begins to decrease in volume until the last notes of his singing and playing fade away into silence. The effect is such that the listeners feel they are drifting into space. One listener said that the only way he could describe it, was to say: "It makes me feel just as though I were dropping off to sleep in a clover field in the middle of a drowsy summer afternoon. Boy, he certainly gives me the spring fever!"

## NEW WJAZ VOICE SOON GOES ON AIR

Distinctive Lighting Effects, New Type Mike and Luxurious Furnishings Mark Station

CHICAGO, Ill.—Distinctive developments in lighting effects will play an important and unusual part in new Zenith Station WJAZ, when it broadcasts from the new location in the Strauss building.

The new studio will mark an epoch in the construction of Radio broadcasting apparatus. The entire twenty-third floor of the building will be utilized by the studio, reception room and executive offices of the Zenith Radio corporation. Acoustic experts have arranged interiors so that the delicate pitch of the violin and the deep resonant tones of the bass viol will all be harmoniously perfect in their transmission.

Dr. M. Luckless, well-known authority on lighting has been retained to develop something unusual in studio lighting. Lights—soft gradations of light and bold illuminative effects will make the atmosphere of this studio fit in with the mood of the selection being given by the artist.

By means of motion picture photography, an audience will be thrown on a screen in a new and distinct form of microphone, so that the artists will be able to visualize an audience when before the microphone. Station WJAZ will be on the air within the next few weeks.

## Expect Extension on Radio Monopoly Hearing in May

WASHINGTON, D. C.—Word received here is to the effect that it is possible that the companies against whom the Federal Trade Commission has issued a complaint alleging Radio monopoly, may ask to have the case postponed from May 18 until some future date. It is understood that a number of officials of the companies have made previous arrangements to leave the country. The case was originally set for March 18 but was postponed at the request of attorneys for the commission.

Edward H. Haas, an investigator of the trade commission during the early stages of its investigation into the Radio business made several years ago at the request of congress, has been delegated by the commission to assist Attorney E. L. Smith, who is in charge of the commission's complaint.

## New Television Invention Demonstration by British

LONDON, England.—For the first time in its history television has been publicly and successfully demonstrated here. The apparatus used was entirely different to that which has from time to time been used by newspapers for the rapid reception of photographs, and was absolutely "in the rough."

The device undoubtedly transmitted an instantaneous picture without the use of any code. The picture was flickering and defective, and at present only simple pictures can be sent successfully.

The British post office is endeavoring to eliminate code interference from the band now used for broadcasting purposes. It is proposed to put ship stations above the 400-meter band.

## WOAW ANNIVERSARY BRINGS TON OF MAIL

OMAHA, Nebr.—During the recent anniversary program from Station WOAW, located in this city, the inflow of mail was tremendous. It exceeded any other official or unofficial records made. In the brief period of nineteen hours more than 19,345 Western Union and 2,644 Postal telegrams had been received; 2,500 long distance and 2,100 local telephone calls were recorded, and in the course of the following week 158,458 post cards and letters were received.

## Carnegie Tech Announces Summer School in Radio

PITTSBURGH.—A six weeks' course in Radio communication will again be featured this year at the summer school of the Carnegie Institute of Technology here. The College of Industries will be in charge of the course.

## CHICAGO'S "SILENT" NIGHT NOW IS NOISY

CLOSEBY STATIONS WON'T AGREE WITH LOCALS

WHT Makes Proposition But WCEE, WTAS, WORD and WJJD Fail to Get Together

CHICAGO.—A lively debate over silent night in Chicago has again been settled—with the public losing.

With the recent opening of Station WHT, with studios in the Wrigley building, Chicago, and super-power station at Deerfield, Illinois, about thirty miles distant, officials of that station promised the mayor's Radio commission that WHT would observe the Chicago Monday silent night rule, providing other nearby stations with studios in Chicago did likewise.

The other stations with transmitters

within fifty miles of Chicago and pickup studios in Chicago are WCEE and WTAS at Elgin, WORD at Batavia and WJJD at Mooseheart, Ill.

All would not agree to remain silent on Monday night. The result is that WHT, in addition to the other closeby stations, is on the air Monday nights. So the public loses again!

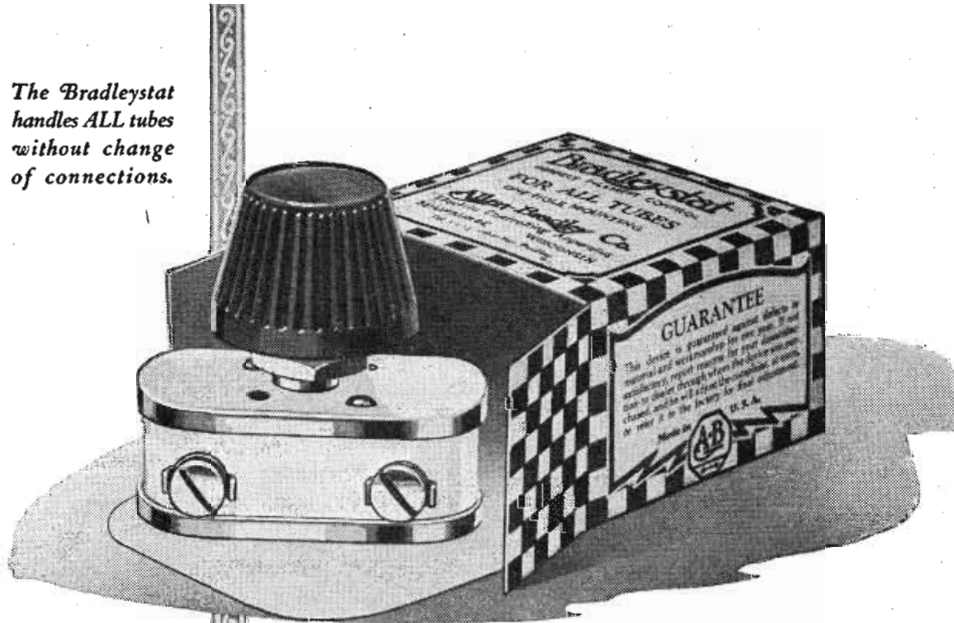
## KFOA CLOSING FOR DAY MOVING TRANSMITTER

Engineers Work Hard to Finish Job Maintaining Schedule

SEATTLE, Wash.—KFOA, the powerful broadcasting station owned and operated by the Rhodes Department store here, was stilled one Saturday evening recently when it moved to its new home. Engineers started to move the big transmitter after 3:15 p. m.

Work of moving the transmitting apparatus and installation of the elaborate remote control system was completed by 4 p. m. the next Monday.

The Bradleystat handles ALL tubes without change of connections.



**Bradleystat**  
PERFECT FILAMENT CONTROL

Two columns of graphite discs provide stepless, noiseless control.

Range of control is from 1/4 to 100 ohms, sufficient for all tubes without change of connections.

One-hole mounting for panels. Table mounting for baseboards.

Extremely compact. Easily substituted for wire rheostats.

**\$1.85**

In Canada, \$2.50

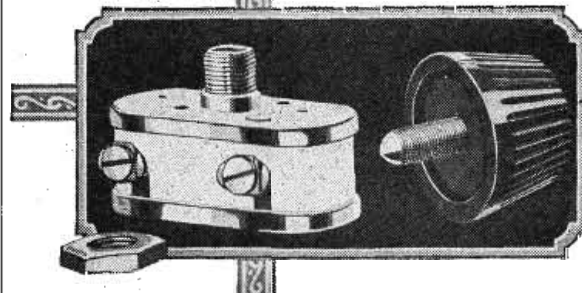
## There are many rheostats —but only one Bradleystat

The smooth, noiseless, stepless control of the Bradleystat is the outstanding characteristic that places this remarkable filament rheostat in the front rank of perfect radio devices. Many attempts have been made to duplicate Bradleystat performance by using substitutes for the scientifically-treated graphite discs, but without success.

It is not strange that the Bradleystat maintains its supremacy among radio rheostats! It was developed by engineers who have designed graphite disc rheostats for over twenty years. Have you improved your set with Bradleystats? Try one, tonight.

**Allen-Bradley Co.**

Electric Controlling Apparatus  
290 Greenfield Avenue  
MILWAUKEE, WISCONSIN



### MAIL THIS COUPON

Please send me descriptive literature on the Bradleystat and other Allen-Bradley radio devices.

Name.....

Address.....

# Operating and Trouble Shooting

For the Owner of a Marv-O-Dyne Model 612-C

THE Marv-O-Dyne is a five tube receiver manufactured by the Amher Manufacturing Corp. of New York city. The circuit employed is known as tuned radio frequency and, as will be noted in figure 1, there are 3 dials used for tuning, 2 smaller dials for making slight adjustments in the sensitivity and a voltmeter which shows the voltage applied either by the A battery or the B battery. This voltmeter is really quite a convenience, and will prolong the life of the tubes, as the operator can keep the filament voltage at 5 and this is the voltage which the manufacturers of tubes recommend.

**Accessories Necessary.**

The accessories required with this outfit consist of an antenna, a ground clamp, a six volt storage battery, a 90 volt B battery, a 4½ volt C battery and a loud speaker. A pair of head phones may be purchased also, if desired, but are not essential.

Figure 1 shows the front view of this set, figure 2 shows the rear view with the cabinet removed, while figure 3 is the schematic wiring diagram. These three diagrams have been numbered so that the various parts are the same in the three illustrations. On top of the first coil to the left, which we have designated with the number 9, will be found a three point switch designated as 14. This is to be so used that the first dial can be made to read approximately the same as the other two. If there were no such switch, and a very long antenna were used, the first dial would read considerably below the other two. The signals pass through this set from left to right, and behind dial 1 they come to an obstruction in the form of a tuned circuit, which they can only pass when this circuit has been adjusted, by means of dial 1, so that it responds to the wave length of the desired program.

Having passed this first circuit, consisting of condenser 1 and coil 9, the music and voice enter tube V in which they are strengthened and passed to part of coil 10. Coil 10 is divided into two parts, and the upper end of it, in conjunction with condenser 2, form another obstacle until dial 2 is set so the signals on the desired

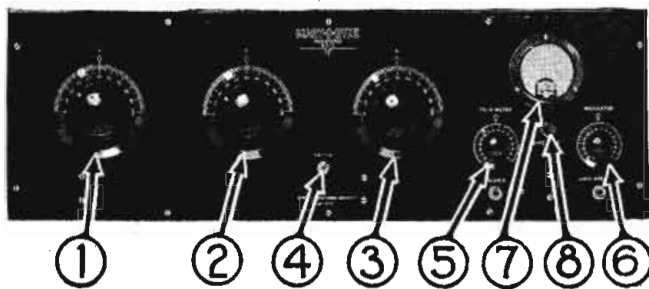


Figure 1

wave length can pass. They then go into tube W for a second strengthening, which is known to the Radio man as amplification. Tube W passes the desired program into the few turns at the bottom of coil 11. It is intended that these turns at the bottom of coil 11 shall pass the program into the upper part of coil 11, which forms a third tunable circuit with condenser 3. When this third circuit has been adjusted by means of dial 3 to the desired wave length, the signals can enter tube X. Up to this point, the incoming program has all been in a form such that it could not be heard if put into a pair of head receivers or a loud speaker, and it is the purpose of tube X, which is known as a detector, to change the form of the signals so that they will actuate a pair of head phones.

**Loud Speaker Amplification**

Radio programs are much more enjoyable when heard from a loud speaker, as one can sit back and enjoy them without the discomfort of a pair of head phones clamped to the ears. Therefore, two more tubes, Y and Z are used to strengthen the music and voice for use on the speaker. The energy passes from tube X into the unit 12, which is a transformer that needs no tuning, and from this transformer into tube Y. Tube Y passes them into transformer 13 from which they enter tube Z.

In the lower right corner of the panel there are two places known as jacks, provided for plugging in the loud speaker; the first enables the user to connect in the loud speaker after tube Y, while the second connects the loud speaker after tube Z. The small dial 5, which the manufacturers have seen fit to call a Fil-A-Meter, is used to adjust the brilliancy of the tubes. While one connects over 6 volts to the plus A and minus A terminals, part of it is to be consumed by the instrument behind dial 5. The voltmeter identified by the number 7 enables the user to see just how much is absorbed by 5 and how much goes on to the vacuum tubes. It will be found that as the Fil-A-Meter is advanced to the right, the volume of the signals will increase. When the needle has reached 5 or 5½ it

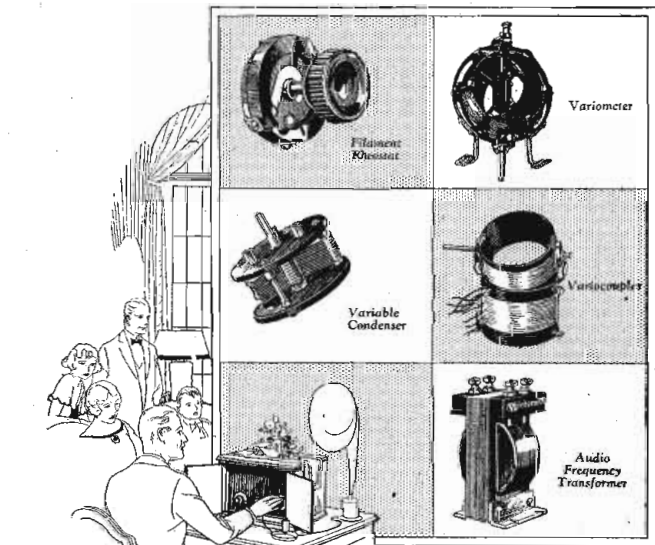
will be found that there is no further gain in volume even though the dial is turned further and the voltmeter needle advances to a higher figure.

**Sensitivity Control on First Two Tubes**

Item 6 is a control on the sensitivity of the first two tubes and it will soon be learned that this dial can be advanced further on higher wave lengths than it can on the lower ones, for maximum sensitivity. As this dial is turned to the right, the volume will increase until a point is reached at which a slight blurring occurs. This point will be reached sooner at lower wave lengths than at higher ones. However, for maximum efficiency this dial should be turned to greatest response, just before the blurring occurs, for each new station tuned in. If local signals are too loud when the loud speaker is plugged into the jack furthest to the right the plug should be withdrawn and inserted in the other jack. It might seem to one, at first thought, that this would be a waste of energy but provision has been made, in the jacks themselves, so that the last tube is not lighted unless the speaker is plugged into the last jack.

The voltmeter serves a double use in this set as, if one cares to learn the voltage being supplied by the B batteries at any time, it is only necessary to push in any knob 8 and the voltage of the B batteries will be indicated on the upper scale of the voltmeter. Releasing knob 8, a flicker of the needle will be noticed, and it is again indicating the voltage supplied the filaments of the tubes.

(Continued on page 20)



**Quality Parts Matched for Perfect Teamwork**

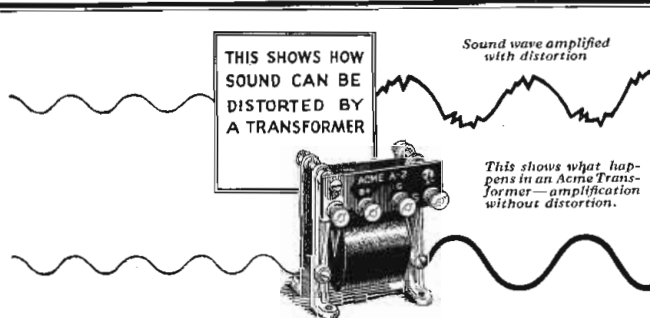
Your "pet" hook-up needs first quality parts—perfectly matched—to give you real radio.

Every Federal Standard Radio Part is designed, made, matched and guaranteed by Federal. That is why you find Federal parts in all the better hook-ups—that is why you should insist on Federal parts when purchasing.

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Standard RADIO Products



**With ACME transformers you get amplification without distortion**

WHEN you put a lot of time and money into a radio set you want to be sure that it will give the best results. You want to know that you can bring in the distant stations loud and clear, so that a roomful of your friends can enjoy it. You want amplification, but above all you want Amplification without Distortion. To do this, use amplifying transformers that increase the sound without spoiling the quality.

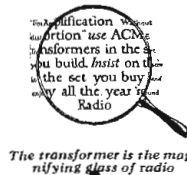
The Acme A-2 Audio Frequency Amplifying Transformer is the result of five years of research by Acme Engineers. Whether you have a neutrodyne, superheterodyne, regenerative or Reflex, the Acme A-2 Audio Transformer will make your set better.

If you are not getting loud, clear, undistorted radio change to Acme Transformers and note the difference.

Each Acme Transformer is tested in our factory and bears a guarantee tag; there are no Acme "seconds." Use Acme Transformers in the set you build. Insist on them in the set you buy. One of the big reasons why the AcmeReflex Kitset gives such excellent results is that it uses Acme Transformers.

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Street.....  
City..... State.....



SEND YOUR MOTHER A SONG VIA WKRC

Sunday, May 10

(Continued from page 8)

Bethany Temple; organ recital, Caroline Gutz; sermon, Rev. Gordon A. MacLennan; 2:30, services, Bethany Sunday school; 6:35, recital of sacred and old-time lyrics, Clarence K. Dawden, organist.



Kay Macrae, coloratura soprano, gives weekly concerts at WMCA, New York. Since she began her Friday appearances at this station she has received many thousands of applause cards.

Luke's Anglican church; 8:15, Dr. Price, Brangelist. KFAB, Lincoln, Neb. (240), 11 a. m., church services. KFOM, Beaumont, Texas, (315.6), 11 a. m., First Baptist church; 9 p. m., Mother's Day program.

Monday, May 11
Monday, allent night for: CHIC, CKAC, CKY, CNRT, KFDM, KMOB, KGW, KWV, WBAV, WBBM, WBCN, WCAU, WDAF, WEAD, WEBB, WEBJ, WFL, WGN, WGES, WJAX, WJL, WJY, WLJ, WLS, WMAZ, WML, WOC, WJY, WRC, WRD, WSAC, WTAM.

10-11, Packard Eight dance orchestra, Bill Hennessy, leader. KFWB, Hollywood, Calif. (252), 8-11 p. m., Warner Brothers' movie night with prominent stars of pictures and screen in person.

Monday, allent night for: CHIC, CKAC, CKY, CNRT, KFDM, KMOB, KGW, KWV, WBAV, WBBM, WBCN, WCAU, WDAF, WEAD, WEBB, WEBJ, WFL, WGN, WGES, WJAX, WJL, WJY, WLJ, WLS, WMAZ, WML, WOC, WJY, WRC, WRD, WSAC, WTAM.

Woolie and; 8:45, health talk from New York; 9, A. & P. Cousins; 10, Blue Ribbon quartet.

Monday, allent night for: CHIC, CKAC, CKY, CNRT, KFDM, KMOB, KGW, KWV, WBAV, WBBM, WBCN, WCAU, WDAF, WEAD, WEBB, WEBJ, WFL, WGN, WGES, WJAX, WJL, WJY, WLJ, WLS, WMAZ, WML, WOC, WJY, WRC, WRD, WSAC, WTAM.

WGN, Chicago, Ill. (370.1), 11 a. m., stories for the children. Uncle Walt; 11:45, Chicago theater; 2:30, Mothers' Day program; Erik's lullaby; 3:10, Henry Selinger; Drake concert; ensemble.

WAGC, Berrien Springs, Mich. (283.5), 11 a. m., studio concert. Cecelia Richards; Edna Eby, dulcimer; Catherine Berger, violinist; Prof. H. E. Edwards, bass; sermon, Pastor W. R. French; 3:15, Radio Lighthouse choir; Mrs. Margaret Wolf, pianist; Homer Kellow, tenor.

Marion Partridge gives The Crispin, an entertaining pianologue at WWJ, the Detroit News station.

I. W. McLean, baritone, is popular with Buffalo fans. He will sing Wednesday, May 13, at WGR.













# An Evening at Home with the Listener n

(FOR CENTRAL TIME)

(FOR EASTERN TIME Or Cities Using Central Daylight Saving Time)

Call	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Call	Location	Met.	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Call			
AT9	Silent	5:00-6:00	Silent	Silent	Silent	7:00-8:55	Silent	AT9	Fort Bragg, N. C.	435	Silent	6:00-7:00	Silent	Silent	Silent	8:00-9:55	Silent	AT9			
CFCA	Silent	6:00-7:00	Silent	7:15-8:15	7:15-8:15	7:15-8:15	Silent	CFCA	Toronto, Ont.	356.9	Silent	7:00-8:00	Silent	8:15-9:15	8:15-9:15	Silent	Silent	CFCA			
CFCN	11:00-1:00	Silent	Silent	Silent	Silent	9:00-10:00	Silent	CFCN	Calgary, Alta.	434.5	12:00-2:00	Silent	Silent	Silent	Silent	10:00-11:00	Silent	CFCN			
CHNC	Silent	Silent	7:30-8:30	Silent	Silent	Silent	Silent	CHNC	Toronto, Ont.	356.9	Silent	Silent	8:30-9:30	Silent	Silent	Silent	Silent	CHNC			
CKAC	6:30-11:30	3:30-4:30	Silent	6:30-11:30	Silent	6:30-11:30	Silent	CKAC	Montreal, Que.	410.7	7:30-12:30	4:30-5:30	Silent	7:30-12:30	Silent	7:30-12:30	Silent	Silent	CKAC		
CKY	Silent	7:00-8:45	Silent	7:30-10:30	Silent	8:00-9:00	Silent	CKY	Winnipeg, Man.	384.4	Silent	8:00-9:45	Silent	8:30-11:30	Silent	9:00-10:00	Silent	Silent	CKY		
CNRO	6:30-11:30	Silent	Silent	6:30-11:30	Silent	6:30-11:30	Silent	CNRO	Ottawa, Ont.	434.5	7:30-12:30	Silent	Silent	Silent	Silent	7:30-12:30	Silent	CNRO			
CYB	8:30-9:00	Silent	Silent	8:30-9:00	Silent	9:00-11:00	Silent	CYB	Mexico City, Mex.	470	9:30-10:00	Silent	Silent	Silent	Silent	10:00-12:00	Silent	Silent	CYB		
CYL	Silent	Silent	Silent	10:00-11:00	Silent	10:00-11:00	Silent	CYL	Mexico City, Mex.	480	Silent	Silent	Silent	11:00-12:30	Silent	Silent	Silent	Silent	CYL		
CYX	Silent	Silent	9:00-12:00	Silent	Silent	8:00-10:00	Silent	CYX	Mexico City, Mex.	330	Silent	Silent	10:00-1:00	Silent	Silent	Silent	Silent	Silent	CYX		
KDKA	7:00-8:30	5:45-7:45	7:00-8:30	7:00-11:00	7:00-8:30	7:00-8:30	7:00-8:30	KDKA	Pittsburgh, Pa.	309.1	8:00-9:30	6:45-8:45	8:00-9:30	8:00-12:00	8:00-9:30	8:00-9:30	8:00-9:30	8:00-9:30	KDKA		
KFAB	11:00-12:30	4:00-5:00	9:30-11:00	Silent	9:30-11:00	Silent	Silent	KFAB	Lincoln, Nebr.	240	12:00-1:30	5:00-6:00	8:50-11:00	Silent	8:50-11:00	Silent	Silent	Silent	KFAB		
KFAE	Silent	Silent	9:30-11:00	Silent	9:30-11:00	Silent	Silent	KFAE	Pullman, Wash.	348.6	Silent	Silent	10:30-12:00	Silent	10:30-12:00	Silent	Silent	Silent	KFAE		
KFAU	Silent	Silent	9:00-10:00	Silent	Silent	9:00-10:00	Silent	KFAU	Boise, Idaho.	275	Silent	Silent	10:00-11:00	Silent	Silent	Silent	Silent	Silent	KFAU		
KFDM	Silent	Silent	Silent	Silent	Silent	8:00-9:00	Silent	KFDM	Bouquet, Texas.	315.6	Silent	Silent	Silent	9:00-10:00	Silent	Silent	Silent	Silent	KFDM		
KFI	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	KFI	Los Angeles, Calif.	468.5	9:45-2:00	7:00-8:00	9:45-2:00	9:45-2:00	9:45-2:00	9:45-2:00	9:45-2:00	9:45-2:00	KFI		
KFKU	Silent	Silent	9:50-8:45	Silent	Silent	9:50-8:45	Silent	KFKU	Lawrence, Kan.	275	Silent	Silent	9:50-8:45	Silent	Silent	Silent	Silent	Silent	KFKU		
KFKX	Silent	Silent	9:30-11:00	Silent	Silent	9:30-11:00	Silent	KFKX	Hastings, Nebr.	288.3	Silent	Silent	10:30-12:00	Silent	Silent	10:30-12:00	Silent	Silent	KFKX		
KFMQ	Silent	Silent	9:00-10:00	Silent	Silent	9:00-10:00	Silent	KFMQ	Fayetteville, Ark.	298.8	Silent	Silent	Silent	10:00-11:00	Silent	Silent	Silent	Silent	KFMQ		
KFMX	Silent	7:00-8:00	Silent	9:00-10:00	Silent	9:00-10:00	Silent	KFMX	Northfield, Minn.	356.9	Silent	8:00-9:30	Silent	11:00-12:00	Silent	10:00-11:00	Silent	Silent	KFMX		
KFNH	6:30-9:00	6:30-9:00	6:30-9:00	Silent	6:30-9:00	6:30-9:00	6:30-9:00	KFNH	Shenandoah, Ia.	255	7:30-10:00	7:30-9:00	7:30-10:00	Silent	7:30-10:00	Silent	7:30-10:00	Silent	KFNH		
KFRU	8:00-1:00	8:00-1:00	8:00-12:00	8:00-1:00	8:00-1:00	8:00-1:00	8:00-1:00	KFRU	Seattle, Wash.	454.3	9:00-2:30	9:00-2:30	9:00-2:30	Silent	9:00-2:30	Silent	Silent	Silent	KFRU		
KFRU	7:30-12:00	5:00-7:00	7:00-10:00	10:30-12:00	8:10-10:30	10:30-11:00	11:00-1:00	KFRU	Bristow, Okla.	394.5	8:30-1:00	6:00-8:00	8:00-11:30	11:30-1:00	11:30-1:00	11:30-1:00	11:30-1:00	Silent	KFRU		
KFUO	Silent	9:15-10:15	Silent	Silent	9:15-10:15	Silent	Silent	KFUO	St. Louis, Mo.	545.1	Silent	10:15-11:15	Silent	Silent	Silent	Silent	Silent	Silent	KFUO		
KFWB	9:45-2:00	11:00-1:00	Silent	Silent	Silent	9:45-2:00	Silent	KFWB	Hollywood, Calif.	252	10:45-3:00	12:00-2:00	10:45-3:00	10:45-3:00	10:45-3:00	10:45-3:00	10:45-3:00	10:45-3:00	KFWB		
KGO	10:00-1:00	8:00-11:00	10:00-1:00	10:00-1:00	10:00-1:00	10:00-1:00	10:00-1:00	KGO	San Francisco, Calif.	328.2	12:00-3:00	5:30-12:30	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	Silent	KGO	
KHJ	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	KHJ	Portland, Ore.	491.5	9:00-11:00	9:00-11:00	9:00-11:00	9:00-11:00	9:00-11:00	9:00-11:00	9:00-11:00	9:00-11:00	Silent	KHJ	
KHJ	8:00-4:00	8:20-12:00	10:00-12:00	8:00-1:00	8:00-1:00	8:00-1:00	8:00-1:00	KHJ	Los Angeles, Calif.	405.2	9:00-5:00	9:00-1:00	11:00-1:00	9:00-2:00	9:00-2:00	9:00-2:00	9:00-2:00	9:00-2:00	Silent	KHJ	
KIAF	Silent	4:00-5:00	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00	KIAF	St. Louis, Mo.	421	Silent	3:00-4:00	8:00-9:00	Silent	Silent	Silent	Silent	Silent	Silent	KIAF	
KJIR	Silent	9:00-10:00	Silent	10:00-11:00	Silent	10:00-11:00	Silent	KJIR	Seattle, Wash.	384.4	Silent	10:00-11:00	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KJIR	
KJIS	Silent	9:15-11:00	Silent	Silent	Silent	9:00-1:00	Silent	KJIS	Los Angeles, Calif.	294.9	Silent	10:15-12:30	Silent	11:00-12:00	Silent	11:00-12:00	Silent	11:00-12:00	Silent	KJIS	
KKX	Silent	7:00-1:00	8:30-2:00	8:30-2:00	9:00-2:00	8:30-2:00	8:30-2:00	KKX	San Francisco, Calif.	454.3	Silent	9:00-2:00	Silent	9:00-2:00	Silent	9:00-2:00	Silent	Silent	Silent	KKX	
KKX	8:30-4:00	7:00-1:00	8:30-2:00	8:30-2:00	9:00-2:00	8:30-2:00	8:30-2:00	KKX	Hollywood, Calif.	336.9	9:30-5:00	8:00-2:00	9:30-5:00	9:30-5:00	9:30-5:00	9:30-5:00	9:30-5:00	9:30-5:00	Silent	KKX	
KOA	10:00-1:00	8:00-9:00	9:00-10:00	Silent	9:00-1:00	Silent	Silent	KOA	Owen, Conn.	322.4	11:00-2:00	6:30-10:30	10:00-11:00	Silent	10:00-2:00	Silent	Silent	Silent	Silent	KOA	
KOB	Silent	Silent	8:30-9:30	Silent	Silent	Silent	Silent	KOB	State College, N. M.	348.6	Silent	Silent	9:30-10:30	Silent	Silent	Silent	Silent	Silent	Silent	KOB	
KPD	8:25-2:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	KPD	San Francisco, Calif.	328.2	10:00-1:00	9:30-1:00	9:30-1:00	9:30-1:00	9:30-1:00	9:30-1:00	9:30-1:00	9:30-1:00	Silent	KPD	
KSD	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	KSD	St. Louis, Mo.	545.1	8:00-10:30	Silent	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KSD	
KSL	9:00-11:00	10:00-11:00	9:00-10:00	10:00-11:00	9:00-10:00	9:00-10:00	9:00-10:00	KSL	Salt Lake City, Utah.	261	10:00-12:00	11:00-12:00	10:00-11:00	11:00-12:00	10:00-11:00	10:00-11:00	10:00-11:00	10:00-11:00	Silent	KSL	
KTHB	8:30-8:45	8:30-11:30	8:30-11:30	8:30-11:30	8:30-11:30	8:30-11:30	8:30-11:30	KTHB	Hot Springs, Ark.	374.8	9:30-10:45	9:30-12:30	9:30-12:30	9:30-12:30	9:30-12:30	9:30-12:30	9:30-12:30	9:30-12:30	Silent	KTHB	
KTW	Silent	9:00-11:30	Silent	Silent	Silent	Silent	Silent	KTW	Seattle, Wash.	455	Silent	10:00-12:30	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KTW	
KYW	10:00-12:30	9:00-7:00	Silent	6:00-10:00	6:00-10:00	6:00-10:00	6:00-10:00	KYW	Chicago, Ill.	353.4	7:00-1:30	8:00-8:00	Silent	7:00-1:30	7:00-1:30	7:00-1:30	7:00-1:30	7:00-1:30	Silent	KYW	
NAA	Silent	8:45-7:00	8:45-7:00	8:45-7:00	8:45-7:00	8:45-7:00	8:45-7:00	NAA	Radio City, N. Y.	434.5	Silent	7:45-9:00	7:45-9:00	7:45-9:00	7:45-9:00	7:45-9:00	7:45-9:00	7:45-9:00	Silent	NAA	
PWX	7:30-10:00	Silent	Silent	7:30-10:00	Silent	Silent	Silent	PWX	Havana, Cuba.	400	8:30-11:00	Silent	Silent	Silent	Silent	Silent	Silent	Silent	Silent	PWX	
WABL	Silent	Silent	6:00-8:00	Silent	Silent	8:00-8:00	Silent	WABL	Sters, Conn.	275	Silent	Silent	7:00-9:00	Silent	Silent	Silent	Silent	Silent	Silent	WABL	
WABN	Silent	Silent	9:00-12:00	Silent	Silent	9:00-12:00	Silent	WABN	La Crosse, Wis.	244	Silent	10:00-1:00	Silent	Silent	Silent	Silent	Silent	Silent	Silent	WABN	
WAHG	11:00-1:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00	WAHG	Richmond, Va.	315.6	12:00-2:00	9:00-1:00	9:00-1:00	9:00-1:00	9:00-1:00	9:00-1:00	9:00-1:00	9:00-1:00	Silent	WAHG	
WBAF	7:00-8:30	7:00-8:30	7:00-8:30	7:00-8:30	7:00-8:30	7:00-8:30	7:00-8:30	WBAF	Fort Worth, Tex.	487.5	8:00-9:00	12:00-1:00	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	Silent	WBAF	
WBAY	Silent	Silent	7:00-9:00	Silent	Silent	7:00-9:00	Silent	WBAY	Sioux Falls, S. D.	406	Silent	11:00-12:00	10:00-11:00	Silent	Silent	Silent	Silent	Silent	Silent	WBAY	
WBAY	Silent	Silent	7:00-9:00	Silent	Silent	7:00-9:00	Silent	WBAY	Columbus, O.	283.9	Silent	Silent	8:00-10:00	Silent	Silent	Silent	Silent	Silent	Silent	WBAY	
WBBB	Silent	Silent	7:00-9:00	Silent	7:00-9:00	7:00-9:00	7:00-9:00	WBBB	Nattapatt, Mass.	248	Silent	Silent	8:00-10:00	Silent	Silent	Silent	Silent	Silent	Silent	WBBB	
WBBM	7:00-12:00	3:00-9:00	Silent	7:00-11:00	7:00-9:00	7:00-9:00	7:00-9:00	WBBM	Chicago, Ill.	226	8:00-1:00	4:00-10:00	Silent	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	Silent	WBBM
WBBR	6:00-4:45	5:00-8:05	6:00-5:55	Silent	Silent	6:00-5:55	Silent	WBBR	Cruten Island, N. Y.	272	7:00-7:45	8:00-8:00	7:00-7:50	Silent	Silent	Silent	Silent	Silent	Silent	Silent	WBBR
WBCN	6:00-12:00	4:00-11:00	6:00-12:00	6:00-12:00	6:00-12:00	6:00-12:00	6:00-12:00	WBCN													

# Radio Digest

PROGRAMS  
Illustrated

Published by the Radio Digest Publishing Company, Inc.  
510 North Dearborn Street  
Chicago, Illinois  
Telephones: State 4372, 4373, 4374, 4375

E. C. RAYNER, Publisher

Eastern Office, Park-Lexington Building, 247 Park Ave.,  
New York. Telephones: Ashland 8144, 8145, 8146

Member of the Audit Bureau of Circulations

241  
PUBLISHED WEEKLY

SUBSCRIPTION RATES  
Yearly in U. S. and Possessions and Canada, \$5.00  
Foreign postage, \$1.00 additional. Single copies, 10 cents.

Vol. XIII Saturday, May 9, 1925 No. 5

## Congestion Campaign Continues

LESS congestion in the air is in sight, if the great response from listeners is indicative of a solution. And it is indicative, for when the desires of the public are consolidated and presented to congress in a concrete form, congress will act.

Radio Digest has taken a large task in hand. Remember, that the most conservative estimates allow two millions of Radio fans in this country. If a showing is to be made before congress, almost two millions of names must appear on the petition tendered.

The "Consensus of Opinion" voting blank will appear every week in this magazine. If you have filled and returned a blank, get your friends to fill the blanks as they appear. If you belong to a Radio club which you feel should consider this important question, get in touch with your president or secretary and suggest that he write to this magazine for a supply of blanks with which to take the votes of the club's membership. No stone must be left unturned in this gigantic effort to secure a representative referendum for better Radio.

The voting blanks so far received are encouraging. Everyone agrees that something must be done to relieve the air of its present congestion. Everyone agrees that some plan for limiting the number of stations is advisable. Everyone is in favor of an unbiased, non-partisan broadcasting control board for the purpose of regulating broadcasting.

It looks as though some real constructive work is under way. But, let us not rest on our oars, for there is much work to be done before the "Consensus of Opinion" vote can be called representative of the entire invisible audience.

## Dressing Our Telegrams

TELEGRAM reading is an evil—sometimes. Sometimes, because telegram reading can be done interestingly without being made boring. The usual style of telegram reading, however, is in the evil class. "Program coming in fine" begins the hackneyed telegram. The audience of certain stations always expect this. "Play blank," continues the highly interesting piece of literature. The form has been so repeated as to mean nothing to the average listener.

Why not—! telegram reading is necessary—dress the announcement of telegrams in some interesting fashion? It can be done. It is not necessary to name specific stations that are succeeding in reading telegrams successfully, but needless to say, these stations really don't "read" the telegrams—they take the telegrams as foundation material and weave interesting stories or comment from them.

Down with the telegram readers. Let us have our telegraphed testimonials and requests in some better form. It certainly shouldn't be difficult for a versatile announcer to weave something better than "Program coming in fine" from the incoming applause.

## Musical Taste Developed

EVIDENTLY broadcasts of musical programs have enhanced the sale of musical instruments. Dealers in musical goods see a marked increase in the demand and they cannot place the cause unless it is Radio. There are more than thirty million people in this country who play some musical instrument. When such a large population of players have their natural human interest in music stimulated by the Radio programs an increased demand for musical instruments is not at all surprising. The past year has developed more home orchestras than ever before.

It is the belief of manufacturers of musical instruments that Radio will develop the musical taste of the people of this country much more rapidly than if Radio had not existed.

## WKRC Assembles Artist Applause

WKRC, Kodel Radio corporation station in Cincinnati, has originated a splendid idea. The applause each day is assembled, copied and furnished to each performer appearing at the station on the night for which the applause was sent. More power to WKRC.

## RADIO INDI-GEST

### Grand Opening of Station BLAH



WALLA WALLA—Station BLAH, was formally opened last night. Chief Kokomo made the presentation address and his speech was warmly welcomed by the natives. (A little boisterous, but nice, nevertheless).

Forked Tongue was announcer. He has two tongues, so that he is able to talk in both English and Walla Wallaian, at the same time. When the switch was thrown, opening the microphone, Forked Tongue started shouting: Help! Fire! Murder! Police! This was followed by a deafening crash and heated arguments from the natives. They claimed that Forked Tongue didn't make half as much noise as some of the announcers in the States.

If you hear these frantic cries for succor do not become dismayed or alarmed for it is merely Indi-Gest's method of letting you tune in before the station really begins operation. This is something novel in the way of broadcasting, and no doubt, it will be adopted by several stations before long.

The new plant is the most modern to be erected in a radius, as the erow flies in circles, of 7,000 miles, and as there are no stations within a radius of 9,000 miles, there will be no interference. The powerful transmitting apparatus has a range of 3,000 cubic miles. The closest habitation to Walla Walla is 10,000 miles, so it should be easily tuned by those who go to the proper wave length. It is located on that tropical island of Walla Walla, in the midst of the great damp Pacific Ocean.

### To Karl Stefan, Announcer, WJAG

We have listened to announcers  
From the East and from the West,  
But Stefan, who lives at Norfolk,  
Is just about the best.

He tells us all about the markets,  
And the game of ball at Wimmer,  
The price of hogs at Bloomfield,  
And what he had for dinner.

We hear praises for the Printer's Devil;  
We don't say that it's a sin  
To praise the Norfolk Daily News,  
But where does "Steve" come in?

We hope you won't lose your job,  
Because you are the best  
Announcer in the North or South,  
In the East or in the West.

May you live long and prosper,  
Is our daily prayer and hope,  
And we'll all smoke your stogies,  
If they are made of rope.

GEO. E. DOWNS.

\*Mr. Stefan owns a smoke shop.

### How Many Stations Did You Catch?

(Clipping from Casper, Wyo. Herald)

### Watson Radio Shop Has Complete Line of Fishing Tackle

#### Broadcasting

Over the waves on the ether  
Love Messages I send,  
They are answered and received,  
Our thoughts together blend.  
Over the infinite ether waves  
I'm sending thoughts aglow;  
And they are broadcast back to me  
Eternally I know.

Together always, one in heart  
United soul to soul,  
It matters not a part or near  
The wireless we control;

For when two souls are mated, they  
Receive and are in tune;  
In waves of understanding  
As ancient as the moon.

RHEA SHELDON.

#### The Test of a Tube

Dear Indi: Bill, up from the country, listened patiently while the salesman in a big London Radio store expounded the virtues of various tubes which he spread out on the counter. Solemnly the customer picked up each in turn and shook it close to his ear.

"Naw, naw," was his final verdict, "I ain't goin' to be had that way. I'll stick to my old one at home. It beats any of yours, 'cause it's got one of them electrons in it!"

LONDON MAN.

## Vox Pop



## Condensed

By DIELECTRIC

One of the features booked by Station WCAE, Pittsburgh, is not unusual, though very pleasing: Blackstone theater orchestra music. It differs not at all from other like musical bodies but equals the best of them. Except for a few weird sounds, no one would suspect the flight of the "mythical dirigible," which appears late in the program. You have the telegram reading (abomination) and usual jazz.

Another "sitting" on the wave of WOS, Jefferson City, Mo., produced a sedative effect with Jones and Oliver brothers filling the air. Their rendition of "Home Sweet Home" made the subject of the song sweeter, for it is there that one may touch a dial—all unscen! Here again was another outburst of telegraphic entertainment. How some folks like to share with the world their mastery of rhetoric, while announcers seem to fall for it. Ostensibly programs are for us all.

Station WTIC, Hartford, Conn., may not reach to all corners of the globe, yet it deserves mention here for certain reasons. When call letters are announced they usually are intelligible enough, but proper names and special announcements often are heard as a jumble. This station exercises care in whatever is said by the announcer so that guessing is unnecessary. What is presented meets with approval by most.

Possibly some of you listeners in failed to tune to Station WLW when the Cincinnati Orpheus club gave a concert with Miss Jeannette Vreeland, soloist. If you missed this, you missed a rare treat. Miss Vreeland is one of the most accomplished American concert artists appearing today, and on this occasion showed no signs of the suffering which must attend a sprained ankle. Her visible audience accorded a merited ovation to the beautiful singing of a generous program.

We can check up another station broadcasting organ recitals for those who enjoy hearing this type of musical production. WMC, in Memphis, Tenn., is responsible for broadcasting organ music during the evening hours. It is possible to choose now as between several stations. Let your appreciation be known to the artists.

Presumably no one was disappointed who tuned to Station WNAC, Boston, and heard the program from Symphony Hall arranged by those in charge of the annual ladies' night of the bank officials' association. Paul Shirley's symphonic group was one of many splendid features.

Out where the chiropractors learn their gentle art you will find Station WOC, one of the originals, with diversity in program arrangement; having at the same time its dance programs designed to feed the fancy of terpsichorean enthusiasts. One evening we heard dance numbers conveyed to us through this station in Davenport, Iowa, from Moline, Ill. Distance had no enchantment to loan, however.

We were all set for an attractive program from KFKX, to be given by the Kiwanis club, but had to be content with a change at the last minute. Instead, there was presented one of those ordinary jazz band outbreaks, which is becoming less and less appealing. The time is coming when any old jazz stuff will be curiously tuned out and some station with a better class of music tuned in and held.

# Low Loss Tuned Radio Frequency Receiver

## Part III—Complete Wiring Instructions

By George Walters

THE instructions in Part II carried the home constructor through the assembly of the front panel and sub base while the wiring diagram was presented for those able to continue work from a schematic. In this article we will therefore present figures 11 and 12, with more detailed wiring instructions for the beginner. Before the wiring is begun the coils should be set at the neutrodyne angle of 54.7 degrees. The following suggestion will help many readers to adjust their coils to this angle. On a piece of light cardboard, lay off a triangle so that one side will be three inches long and another side 4 1/4 inches long. Between these two sides of the triangle there should be a right angle of exactly 90 degrees. If this triangle is now placed before you with the 3-inch side at the bottom and the 4 1/4-inch side vertical, the angle between the slanting side and the base line will be 54.7 degrees. This piece of cardboard can now be placed on the sub base just to the right of each coil and moved up so that the long slanting edge touches one side of the coil. The machine screw which fastens the coil to the brass mounting bracket should now be tightened to hold the coil at the correct angle.

### Leads From the Coil

In figure 11, the four leads from the coils have been numbered 1, 2, 3, and 4 to correspond to the numbers used on figure 5, which was part of the first article. It will now be necessary to drill 25 holes through the sub base, through which connecting wires can pass from the upper side to the lower. These holes have been numbered practically in the same order in which they will have to be drilled for a logical method of wiring. The negative A leads should be put in first, which makes necessary holes 1, 2 and 3 for the wire connecting the negative A binding post with the two rheostats and the wire which connects the right hand rheostat with the detector and audio tube sockets.

The next series of holes will begin with number 10 for the positive A leads and, when these have been put in, the grid and plate wires will be found to fit

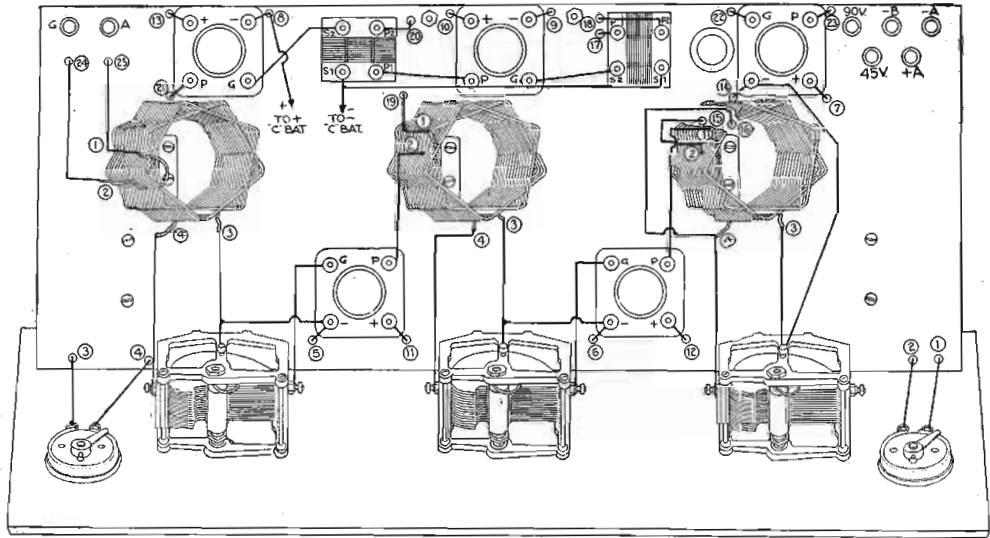


Figure 12

in very easily. The wiring above the panel which connects the variable condensers, the coils and the sockets should be left to the last, as some of these wires must connect to the filament leads already put in. The C battery is not shown in figure 11 and its position is left to the builder's own personal preference. The points to which it connects are clearly indicated however. The connections to the variable condensers as shown in figure 11 might confuse some builders so it should be explained that these condens-

(Continued on page 18)

## This Amazing New-Type Coil is Revolutionizing Radio Set Building

MODERN electrical science has discovered a new principle in radio frequency amplification—a new improved transformer that gives the most amazing results. It is known as the Erla Circloid. Simply clip the coupon below—and let us send you the complete technical story.

### 4 vital improvements

The story of Circloid advantages is a fascinating study—even for those who are not interested in the technical side of radio.

As practically everybody knows, in the ordinary radio set, not only the antenna but the radio frequency coils themselves act as pick-up devices of broadcasting signal. This is one of the chief causes of what most radio fans call "broad tuning."

With Erla Circloids, independent pick-up of signals by the coils is completely done away with. Selectivity of the receiver is always at maximum. Sharp tuning and less interference are the direct result.

Static disturbance has been reduced to the very minimum. For everybody knows that static has no particular wave length. It invades them all. And because the Circloids have no pick-up qualities, only such static as happens to be present on the exact wave length to which the receiver is tuned can come through. Thus here at last is a radio set that offers new delights in summer-time radio. No other receiver can provide such perfect freedom from annoying interference.

Another Circloid improvement is greater stability—smoothness of operation and less of control.

The tendency of conventional receivers to get out of control and howl uncontrol-

### Three Great Advantages

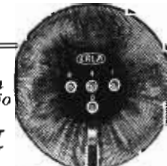
1. The absence of an external field eliminates the effect of the coil upon nearby coils or adjacent wiring circuits.
2. The Circloid has no pick-up quality and is rendered immune from outside electrical influence.
3. Its efficiency is higher than any other type of coil and losses are unbelievably low.

ably is due to excessive feed back between coils and wiring circuits.

With Circloids feed back of energy is eliminated between coils and confined solely to the wiring circuits where it is subject to complete control. Thus perfect stability is obtained. Oscillation that is sudden and violent in the average receiver, making it necessary to start tuning all over again, is now controlled. Just the slight turn of one control and it is completely controlled.

But the most important of all Circloid improvements is its effect upon tone quality. Any radio engineer will tell you that excessive "feed back" is the greatest cause of distortion or blurring.

And Circloids, because they have no external field, eliminate stray feed back effects and do away completely with this principal source of tonal distortion.



The New Erla Balloon Circloid Radio Frequency Transformer and Coupler

\$4.00 Each Patent Pending

can supreme musical clarity and fidelity of reproduction be obtained. No other radio set can offer you these exclusive advantages. No other set can offer these supreme achievements.

### 4 ways to buy the Circloid

Erla Circloid Transformers are offered for sale, \$4.00 each—in kits of three, \$12.00—in kits of three with Erla Condensers, \$21.50—and in Factory-Bilt Kits, \$49.50. They may be obtained direct from your nearest dealer. Or write direct for detailed information.

"Last night we heard the sweetest voice!"



FEW boast of having heard a powerful voice. Radio has grown up. It is now something to listen to, not to marvel at. We are now in the cycle of TONE!

The other day a man said he was just realizing that he had a hundred dollars worth of set and a dollar's worth of horn! His next move is to balance up his set with a good speaker.

The BRISTOL has all the volume you will ever want, but its fine point is TONE. It is good to listen to. The notes come in in tune. You receive a wealth of music from which the cream of tone has not been skimmed.

For \$20, \$25 or \$30 you can get a Bristol Speaker, and there are others for less. Ask your dealer to send one out to the house. And let us send you folder No. AY-3022; it tells why the Bristol is the horn of tone.

**BRISTOL** AUDIOPHONE Loud Speaker  
THE BRISTOL COMPANY, WATERBURY, CONN.



**ERLA CIRCLOID**  
Radio Frequency Transformer

\*Trade Mark Registered

Electrical Research Laboratories, Inc.  
2501 Cottage Grove Ave.,  
Chicago, Ill.

Gentlemen: Please send me detailed information about the new Erla Balloon Circloid Transformer.

Name .....

Address .....

**SUB BASE WIRING OF WALTERS TUNED R. F. RECEIVER**

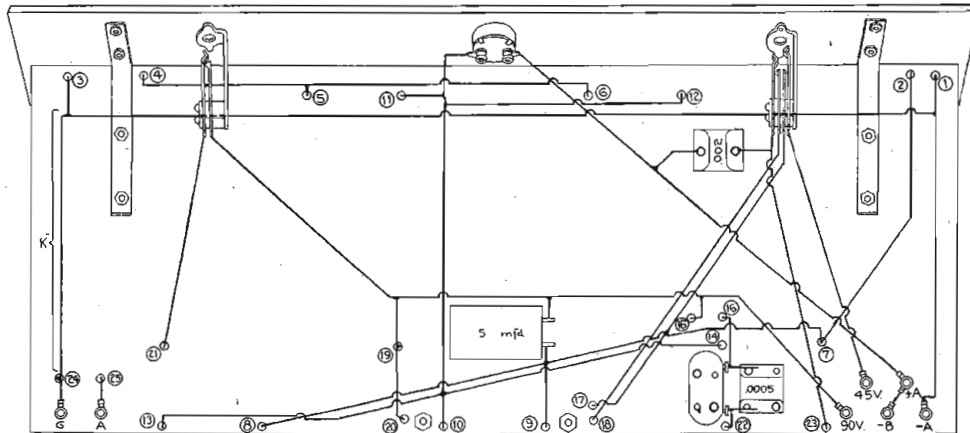


Figure 12

**LOW LOSS TUNED R. F.**

(Continued from page 17)

ers have binding posts on each side connected to the stator plates. If you find that your condensers have only one binding post on these plates, connect each of the number 4 terminals on the coils to the grid binding post on the following socket and then connect the grid binding post to the stator plates. This applies to the first two R.F. transformers only, and to the two radio frequency tube sockets. The third transformer has been cut away so that the connections which pass through holes 15 and 16 might be clearly shown. The builder may prefer to place his fixed condensers in other positions than those shown but the positions of the .5 mfd. and .002 mfd. condensers have been so chosen that they will give very short connecting leads.

In figure 12 it will be noted that the letter K has been inserted at the left edge of the drawing to designate the wire which connects the ground binding

post with the negative filament bus wire. This is the wire, also labeled K, in figure 9. This wire was put in dotted lines because it is preferable not to use it unless the set develops unpleasant noises and reactions which make the use of this wire necessary.

**Tuning Set**

Having completed the wiring we are now ready to connect the set and tune it. First connect the A battery of 6 volts to the minus A and plus A binding post and insert all five tubes. The filament switch should be turned to the "On" position and the rheostat turned up to see whether all tubes light. If they do not, the springs in the bottom of the tube sockets should all be examined and pulled up with a button hook or piece of wood to be sure that they make contact with the prongs in the bottom of the tubes. Having done this, see whether the tubes light and, if they still do not, recheck the wiring to locate the break. Now disconnect the minus A from its binding post and touch it to the 45 volt binding post and also the 90 volt.

The tubes should not light if the wiring has been done correctly. If they do light when either of these binding posts is touched it indicates a connection between the high voltage side and the filament circuit which would blow the tubes if the batteries were connected, and the circuit should be checked over to find the undesirable contact.

Assuming that the tubes do not light when the minus A is touched to the 45 or 90 volt binding post, connect the minus A to its proper binding post and remove 4 of the tubes from their sockets. Now connect the three B battery leads to their proper binding posts and, if no difference is noticed in the brilliancy of the single tube left in its socket, the other tubes can be inserted and we are ready to try out the set. Turn the filament switch to the "On" position and connect the aerial and ground wires to their binding posts at the left edge of the sub base. The B battery should now be connected in place and a loud speaker plugged into the jack

at the left end of the front panel. The variable grid leak should be screwed down so that the resistance is low and the rheostats should both be turned through about three-quarters of their possible rotation. Turn the filament switch to the "On" position and a hissing sound should be heard in the speaker.

Set the dials 2 and 3 at 50 and swing the dial one slowly back and forth over an arc from 30 to 70. If signals are not heard, set the dials 2 and 3 at 60 and swing the dial one between 40 and 80. This procedure should be continued up the scale and then at the lower end of the scale until a station is heard. Readjust all dials until maximum volume is secured and then adjust the rheostats for best results. After 2 or 3 comparatively strong stations have been tuned in so that the approximate positions of the dials for various wave lengths have been learned, look for a more distant station and get one in as loud as possible. Now turn the grid leak so that the pressure is loosened, and there is more resistance, and a point will be found where signals suddenly come in with nearly double the strength. This loosening of the grid leak should not be carried too far, however, as there will be a tendency for instability and harsh signals. The point of loudest reception should be found and the grid leak turned down just a little below this point, at which it can be left.

**Eliminating High Pitched Hum**

If there is a steady, unvarying high-pitched hum or whistle which is not affected by turning the dials it is probable that it is caused in the audio frequency part of the circuit. Ground the frames and shields of the audio frequency transformers by connecting them, on the underside of the sub base, to the negative filament wiring. If this hum increases to a high-pitched squeal when the right hand rheostat is turned up for good volume put in the wire K which should reduce or eliminate this noise.

If it is rather hard to find stations at first, this is not a fault of the receiver but a point in its favor, because the sharpness of tuning is remarkable and is not found on any other receiver of the tuned radio frequency type which the writer has seen. It is very probable that dials 1, 2 and 3 will be found to run alike throughout the scale. If, for example, dial 1 reads 18, dial 2 reads 23 and dial 3 reads 22 for a low wave length station, it will be found that dial 1 will read 88, dial

(Continued on page 20)

**Finer Selectivity**  
Equip your receiving set with Apex Vernier Dials. They will greatly increase the efficiency of any set. Make tuning positive—bring in distant stations. Your dealer has them. If not, send \$2.00 for Royal Brass Finish—\$2.50 for Satin Silver Finish, or \$3.50 for DeLuxe Gold Plated (24k).

**APEX SUPER 5**  
This highly efficient tuned radio frequency receiver is most advanced in design and construction. An instrument that meets every critical expectation of the radio enthusiast.

Housed in a highly finished walnut cabinet, complete with Jones Multi-Plug Battery Cable. All settings highly gold plated. Sells for \$95 complete excepting accessories.

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Full of valuable information for every set owner. Antennas of various types have been described, the care of batteries is gone into thoroughly, there are pages and pages of tuning hints. Hook-ups that give the experimenter many hours of pleasure and experience, complete how-to-make articles on various types of sets. A score of illustrated articles on the country's most popular stations and the artists they secure.

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# A. B. C. Course in Radio Fundamentals

## Chapter VII—Calculating the Capacity of Condensers

By David Penn Moreton

THE capacity of a condenser may be calculated quite accurately if the dimensions of its plates, distance between these plates, and the kind of material separating the plates are all known. The expression giving the value of the capacity of a condenser composed of two metal plates of the same size and shape, separated by a dielectric of uniform thickness is as follows:

$$C = \frac{0.0885 \times K \times S}{t}$$

in which C is the capacity in micromicrofarads, t is the thickness of the dielectric between the plates in centimeters, S is the area of one side of one plate in square centimeters, and K is the dielectric constant of the dielectric.

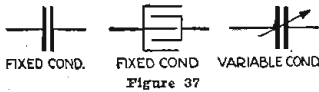


Figure 37

The capacity of a condenser increases with an increase in the area of the plates that are exposed to each other, decreases with an increase in the distance between the plates, and increases and decreases with an increase and decrease in the value of the dielectric constant of the dielectric. The dielectric constant of all materials is expressed in terms of the dielectric constant of air which is considered a standard or reference material and has a dielectric constant of one.

For example, the capacity of a condenser composed of two brass plates each having an area of 100 square centimeters and separated a distance of 1/10 centimeter with air as the dielectric will have a capacity of

$$C = \frac{0.0885 \times 1 \times 100}{0.1}$$

$$= 88.5 \text{ Micromicrofarads}$$

If these plates be separated by a sheet of mica having a dielectric constant of 6 the capacity of the condenser will be just six times as great as it is with air as the dielectric.

### Dielectric of a Condenser

The dielectric constant of a material

may be defined as being equal to the capacity of a condenser, having this particular material as a dielectric, divided by the capacity of the same condenser having air as the dielectric, the area of the plates and the distance between the plates being the same in both cases. The difference in the value of the capacity in the above condensers is due entirely to the dielectric. The dielectric constant of a number of different materials is given in the accompanying table.

Material	Dielectric Constant
Air	1.0
Hard rubber	4.0 to 4.0
Glass	4.0 to 10.0
Mica	4.0 to 8.0
Dry paper	1.5 to 3.0
Celluloid	7.0 to 10.0
Unglazed porcelain	5.0 to 7.0
Wood, dry maple	3.0 to 4.5
Shellac	3.0 to 4.0
Bakelite	6.0 to 7.5
Distilled water	81.0

Several methods of representing a condenser in a diagram are shown in figure 37.

The majority of condensers are composed of more than two plates and in such cases the capacity is determined as follows. The expression for the capacity of two plates as given is multiplied by the number of plates less one to get the total capacity of the condenser. Let N represent the number of plates, then

$$C = \frac{0.0885 \times K \times S \times (N-1)}{t} \text{ micromicrofarads}$$

For example, a condenser composed of 11 brass plates, 2 centimeters by 5 centimeters and separated by mica 0.01 of a centimeter in thickness and having a dielectric constant of 6 will have a capacity of

$$C = \frac{0.0885 \times 6 \times (2 \times 5) \times (11-1)}{0.01}$$

$$= 5810 \text{ micromicrofarads, or } 0.00581 \text{ microfarad.}$$

It is seen that some materials have quite a wide variation in the value of the dielectric constant. There is also a wide variation in the physical properties, and also the electrical properties, of the differ-

ent grades and kinds of material. For example, there are a large number of different kinds of glass made for different purposes and having very different properties. Some materials will absorb a small amount of water and this generally causes a marked change in the value of the dielectric constant.

### Finding Dielectric Constant

The value of the dielectric constant of a material is determined by dividing the capacity of a condenser with the material as the dielectric by the capacity of the same condenser with air as the dielectric. The dielectric constant will depend upon the kind of voltage applied and the manner in which it is applied. For instance, if the condenser is charged from a direct-current source, such as a battery, the values of the dielectric constant found when the condenser is charged slowly will differ quite a bit from the values found when the condenser is charged rapidly. If an alternating current source of electrical pressure is used in charging the condenser the dielectric constant may differ considerably from the values determined by direct current. This difference becomes more pronounced as the frequency is increased and is quite appreciable for frequencies such as those used in Radio communication. For the best results the conditions under which the material is to be used should be known and its dielectric constant determined if possible, under these conditions.

The materials used for dielectrics are not perfect insulators and they do allow a certain amount of electricity to pass through them. This condition in the electrical condenser corresponds to a diaphragm in the hydraulic condenser having small holes in it which will allow a certain amount of liquid to actually pass through the diaphragm. For example, in figure 36, previous chapter, if the diaphragm be caused to move to the position shown by the right dotted line, by moving the piston toward the left end of the cylinder, the hydraulic condenser will be discharged. Now, if the valves be closed, the diaphragm will remain in a strained

condition for an indefinite period provided there is no leakage, from one side of the diaphragm to the other. If, however, there is a leakage through the diaphragm, the diaphragm will gradually return to its zero position after it has been displaced and the valves closed. This same condition exists in the electrical condenser. If the dielectric of the condenser has a very high resistance the condenser will remain charged for a long time after it is disconnected from the charging source. On the other hand there will be a more

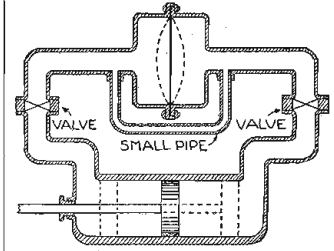


Figure 38

or less rapid discharge of a condenser having a dielectric of low resistance after it is disconnected from the charging source. This property of a condenser which results in the condenser slowly discharging itself if allowed to stand after being charged is called the "leakage" of the condenser. Materials used in the construction of condensers differ greatly in their leakage values. For example, a condenser composed of plates separated by dry air as the dielectric will retain its charge almost indefinitely after it has been disconnected from the charging source, while a condenser having a leaky paper dielectric will discharge in a comparatively short time after it is disconnected from the charging source.

(Continued on page 20)

# Send for it!

Before you build your set



EVERY RADIO FAN should have a copy of the "Shamrock Radio Builder's Guide Book." It contains carefully planned diagrams and complete instructions for building ten different circuits—at prices ranging from \$15.00 to \$50.00. Page 21 of this popular booklet describes a powerful little receiver—

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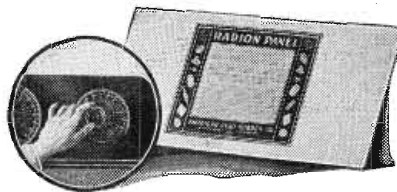
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### HOW TO OPERATE SET

(Continued from page 7)

Should the receiver fail to operate when first connected, there are a number of points which should be checked over in an effort to locate the difficulty. First of all, observe whether the insulation was

C battery to one terminal of the lightning arrester. The second terminal of the loud speaker should now be attached to the remaining terminal on the lightning arrester. There should not be a click. Touch this second terminal to the side of the lightning arrester already connected to the C battery and a loud grind-

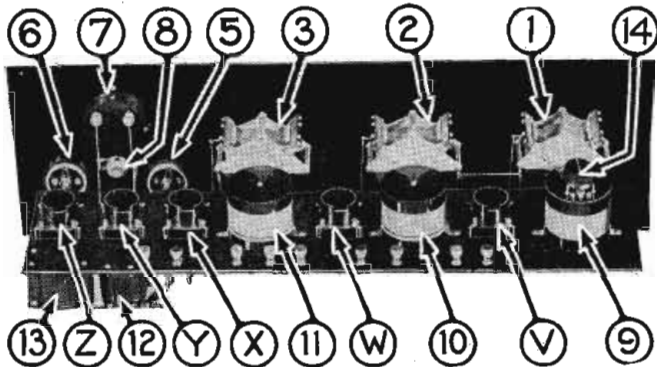


Figure 2

removed from the ends of the wires where they are connected to the binding posts on the set, the A battery and the B battery. While doing this, look also at the wire connecting the two 45 volt B battery units, as the writer forgot to do this recently when asked to locate the trouble in a set and only discovered it after almost taking the set apart.

If all of the connections seem to be electrically perfect and all binding posts are screwed down tightly, test the 6-volt storage A battery with a hydrometer and the hydrometer should give a reading of 1250

ing click will be heard in the loud speaker. If this same kind of a click is heard when the free end of the lightning arrester is touched it indicates a short circuit in the lightning arrester. In which case a new one should be provided. If signals from local stations do not come in with considerable power the ground connection should be examined.

The best way to get a good ground connection is through the use of a ground clamp attached to the cold water pipe, after a short length of water pipe has been scraped with a knife or file until

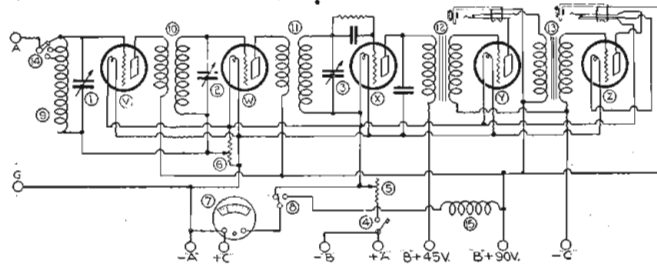


Figure 3

to 1300 if the battery is supposed to be fully charged. The set will function on any reading down to 1150; if the hydrometer shows 1150 or less connect the battery to a charger and give it a charge of 8 to 10 hours, after which, test it again with the hydrometer. The reading will be higher but if it is not 1225 or better give it another 2 to 4 hour charge. The hydrometer should then show 1250 to 1300. If dry cell B batteries are being used (2 of the 45-volt type), each unit should show 44 to 45 if the batteries are new, and these units are useful so long as they each read 34 or better. If 4 of the smaller 22½ volt units are being used they are useful until the voltage of each drops below 17.

If examination of the batteries does not bring the difficulty to light, attention should be directed to the lightning arrester. If one is connected to the antenna lead-in. Disconnect the lightning arrester and then disconnect the C battery from the receiver. Connect one terminal of the loud speaker to one end of the C battery and connect the other end of the

bright and shiny. Wrapping a wire around a cold water pipe does not give a good ground; the set may work for a short while on such a ground but corrosion quickly sets in and the efficiency drops at once.

### LOW LOSS TUNED R. F.

(Continued from page 18)

2 will read 95 and dial 3 will read about 93 for a higher wave length station.

Due to the layout of the sub base and the ease with which you can get at the three air core radio frequency transformers, it will not be difficult to experiment with various types of oscillation preventers should the builder care to do so. If the builder cares to try neutrons, tap at the 15th turn from filament end.

Experiments have recently been made by the station at Stuttgart, Germany, in relaying programs of distant stations for the benefit of German listeners. KDKA was the American station picked for these tests.

### A. B. C. RADIO COURSE

(Continued from page 19)

The leakage in a condenser might be thought of as being due to a resistance connected in parallel with a dielectric of infinite resistance or no leakage. Thus in figure 38 there is a hydraulic condenser with a small pipe connecting the opposite sides of the diaphragm. When this condenser is being charged there will be a small amount of liquid pass through the small pipe which will combine with the liquid displaced in the condenser and give the total quantity of liquid passing around the circuit.

The displacement of the liquid in the condenser chamber will cease when the strain produced in the diaphragm is equal and opposite to the pressure produced by the piston. There will, however, be a flow of liquid through the small pipe so long as there is a difference in pressure between the ends of this pipe, and the liquid passing through this small pipe passes around the main circuit so long as the condenser is connected to the pump. It is quite evident that the total quantity of electricity passing by any point in the circuit, shown in figure 38, such as through the valves, will depend upon how long the circuit is closed. Hence in charging a leaky condenser there will be a greater movement of electricity in the circuit than that represented by the displacement of the diaphragm. Likewise a leaky condenser will not cause the same movement of electricity in a circuit on discharge that took place when the condenser was being charged, and this difference will increase as there is an increase in the interval of time between the charge and discharge.

Some dielectric possesses a property called "absorption" which results in the condenser behaving on charge and discharge in the following manner. Suppose the hydraulic condenser shown in figure 38 be charged and the diaphragm displaced in position, which will result in the movement of a certain quantity of liquid

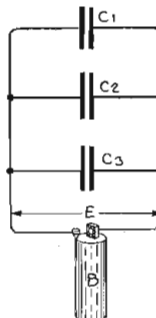


Figure 39

in the circuit, and the condenser remains connected to the piston and as time goes on the diaphragm moves farther and farther to the right then there will be an additional movement of liquid in the circuit. This condition is said to be due to absorption. If this same condenser be discharged the diaphragm will not return in its zero position immediately, although there is apparently no strain in the diaphragm. If, however, the condenser be allowed to stand on open circuit for a time a second discharge can be obtained from it and this process may be repeated until the entire charge is removed from the condenser. The absorption of a dielectric results in a condenser taking a longer time to fully charge and also a longer time to fully discharge. The first discharge from a condenser when its terminals are connected is called the "free charge." In condensers made with such materials as air, oil and good mica as the dielectric the absorption is small, but it is quite large with such materials as glass and bakelite as the dielectric.

Leakage and absorption in the dielectric of a condenser are accompanied by the production of heat in the dielectric which represents a loss of energy. As a result of this loss in the dielectric, the output

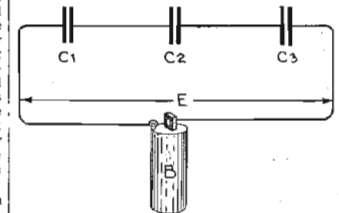


Figure 40

of a condenser is never as great as the input.

#### Series or Parallel Combinations

Condensers are frequently combined in series or parallel or a combination of series and parallel, just as resistances are combined. The capacity of a combination of condensers, however, is not calculated in the same way as the resistance of a combination of resistances is calculated.

In figure 39, there are three condensers connected in parallel to the terminals of a battery B. All three of the condensers

(Continued on page 22)

**pep up your set with good tubes**

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Two (2) Lincoln 4-Point Tapped Loop Aerials.  
Ship the above C. C. D. in view of the fact that I am not known to you.  
It may interest you to know that I have official Radio Official and licensed radio frequency sets, where an outside Aerial is impractical. For the requirements of my set where it is desired to vary the inductance of the loop.

Very truly yours,  
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**Lincoln 4-Point Tapped Loop \$8.00**  
The only moderate priced Loop of this type on the market. Fine for all types of "Super-hets"—and neutrons and tuned radio frequency sets, where an outside Aerial is impractical. For the requirements of any set where it is desired to vary the inductance of the loop.

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For sale by good dealers everywhere. Other models priced from the two tube 51, at \$18.50, to the Tridyn Special with sloping panel, at \$65. All Crosley Radios are licensed under Armstrong Regenerative U. S. Patent 1,133,149. Prices quoted are without accessories.

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Crosley owns and operates Broadcasting Station WLW

# Circuit with Double Tuning Coil

## Dry Cell Tubes Give Good Dancing Volume

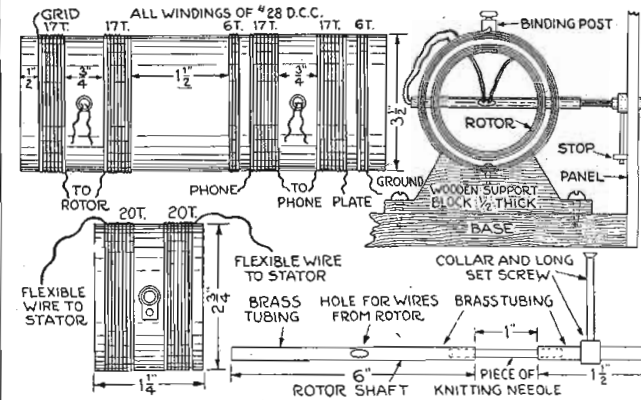
The illustration shows a circuit for a double tuning coil and three stages of audio amplification. The general cry is, we cannot get enough volume for dancing.

### WORKSHOP KINKS EARN A DOLLAR—

**T**HERE 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

by using dry cell tubes. With this hook-up shown we get enough volume for dancing upstairs and the set is on the first floor. The music comes in quite clear. It will be seen that the set is tuned in on the detector and the first stage. These two tubes are run in parallel and they

## DETAILS FOR MAKING THE COIL



stop for the rotor, which save the flexible wires from breaking off in bending. Binding posts are put on the coil for the four connections to the set.  
Here is the peculiarity of this set. We all know these sets make noise and interference if they are not properly oper-

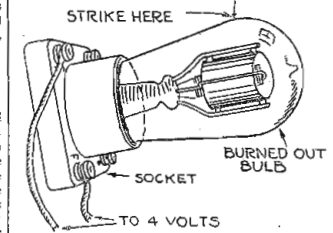
I have tried a good many hook-ups from your magazine during the last eighteen months, but I have gone back to the old reliable. Even under the worst conditions you can get something and on a good night there is no limit.—W. G. Higgins, Lachine, P. Q., Canada.

## Welding Tube Filament With Regular Current

No doubt all Radlophans have experienced the bad luck of burning out a tube, usually just when an extra is not at hand. If you have patience and carefully follow these directions you can repair your burned-out tubes.

The method of doing this is quite simple as can be seen in the illustration. The burned-out tube is placed in a socket and wires led to the filament binding posts, and these connected to the battery. About four volts is all that is required, and is often better than the usual six. The bulb is held in one hand, the other being used to strike the bulb as shown by the arrow in the illustration. The bulb should be held so that the plate is in the position shown. The bulb may require quite a lot of hitting before the broken filament will touch and weld. After the filaments touch the current will weld them together, but the tube will have to be handled with care so as not to jar them apart.

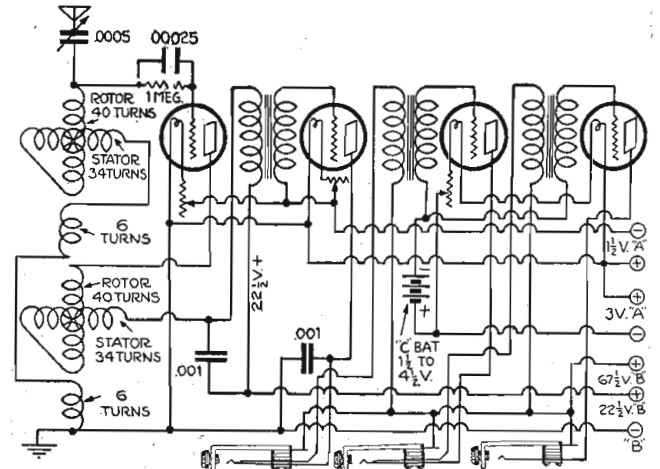
Bulbs repaired in this manner will give nearly as good results as new ones. They also make excellent detectors, sometimes being better than the ordinary detector tube, as they can use more current on the plate (if the tube is an amplifier). These



bulbs require much less current than the ordinary tube with almost as good results. The bulbs described are those of the older make (UV-200 and 201), however the newer ones (UV-201A), may be repaired in this way in many cases.—Evermont Fisel, Lebanon Junction, Ky.

### Importance of Perfect Contact

When soldering connecting wires to the terminals of jacks for making connections to the telephones, it is important to keep soldering flux from running down to the insulating segments which separate the different spring contacts. If the flux runs down into the insulating segments, it causes leakage, and it is to this fact that many experimenters owe the trouble they have with their homemade sets. Use only enough flux for the solder to take hold. A thin film is enough. Another point to remember is to be sure that the contacts make and break properly when the wiring of the set is completed. Sometimes they get bent out of position slightly and do not touch properly; it may never be discovered, and in the new set may never work right.



use current from two 1 1/2-volt dry cells, with a rheostat for each tube.

The second and third stage are run in series with one rheostat on three volts from two 1 1/2-volt cells in series. The panel is shielded with sheet copper and the rotor shafts are broken by a piece of bone knitting needle.

There is no body capacity whatever. The set can be run without a ground, the shield taking its place, which also cuts out a lot of interference from other sets, especially on a bad night. The long set screw in the shaft collar is to act as a

ated. If the detector tube and the first stage tube are wired in series, as are the third and fourth tubes, on one rheostat it will change the set altogether. For instance, all whistling and squealing is gone no matter how much you turn your feedback dial. Local stations come in with more volume, but distant stations come in a little weaker than before. On a good night, using the set this way, you can tune in on the loud speaker one station after another without any noise or bother to anyone. The transformers are 4 to 1 and the jacks of the non-solder type.

### Winding Low Loss Coils

In making low loss coils as described by Mr. Fournier I found that the dowel rod he mentions is something unknown to the small town lumber yard. Large nails or spikes of various sizes can be obtained anywhere, and the size of the spike determines the diameter so it is possible to secure any size needed. By using a piece of 3/4-inch hardwood or 1-inch soft wood for the base, the spikes will stand the strain of considerable tension in weaving the coil. Holes should be drilled a snug fit and when the coil is finished, the spikes can be pulled out of the coil and the board with a pair of pliers. This is easier than trying to work the coil off and by taking only one spike out at a time the coil retains its shape perfectly although it should be tied in one or two places before drawing out the spikes to keep it together.

Another kink which helps a good deal when more than one coil is to be built is to make hollow paper tubes which fit loosely around the protruding end of the spikes. These tubes are easily made by taking mangled paper strip and rolling to the right size as one would a cigarette. When the coil is built on the spikes which are covered by these paper tubes, the spikes may be pulled without fear of rubbing the insulation on the winding, and after the spikes have been pulled the coil is still snugly held together by the paper tubes although it is loose from the base-board and is easy to sew together. After sewing the coil the tubes are easily pushed out and can be used over again.—C. M. Tucker, Edgemont, South Dakota.

## Good Summer Reception At Last With The Kane Antennae

What ruined your Reception last summer? "Static," the bugaboo of summer reception. Static cannot be entirely eliminated, because your set itself will pick up some. But the Kane Antennae will eliminate at least fifty per cent of your static. Were you disgusted with your Radio Set last summer? With the Kane Antennae you will use it all summer long. All your power losses will be eliminated, and at least fifty per cent of your static.

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  2. Weak signals can be heard which would never be received on any single-wire aerial.
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  5. The worst possible locality is changed into the finest kind of locality for broadcast reception.
  6. Last, but not least, any radio receiving set, no matter what the make and no matter what your location may be, becomes a better receiving set when hooked up to a Kane Antennae.

Gentlemen: We have tried out your Kane Antennae, and found it does all you claim for it. (Signed) Yours truly, Butte Ignition Works, R. J. Bedson, Manager

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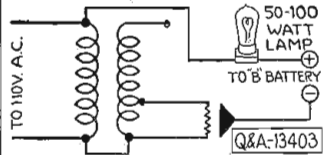
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# Questions and Answers

**Static With Powerful Stations**  
(13410) VGM, Oklahoma City, Okla.  
Summer is approaching and heretofore it has been almost impossible to have any reception in this locality during the summer due to the excessive static, however, almost all salesmen that come here now talk of the great results of 5000 watt stations that are going to be on the air this summer.  
It is understood here that the powerful stations will eliminate static. If this is so it will be of great benefit to the Radio dealers of this country to have something from an authentic source in regard to these stations.  
If you have such information at hand I shall greatly appreciate it if you will advise me of the locations of such stations and if it is known what effect they will have on overcoming the static?  
A.—There is no reason why the use of high power stations should eliminate static. However, in receiving signals from high power stations the receiver will not need much amplification. In this way, while the station will come in loud, the static will not be amplified. The following is a list of super power stations: WEAF, WLW, KFI, WOC, WCBW, WSAI, WCCO, KDKA, WBB, WGY, KOA, KGO, WHT and KFKX. The following stations will also be super power stations soon: WLS and WSB.

kind of a set will eliminate your trouble. You cannot, however, use a loop with a neutrodyne unless you shield the whole set and keep the loop at a distance from the receiver.

**Battery Charger Windings**  
(13403) RCM, Portland, Oregon.  
Will you please tell me how to wind the transformer for the battery charger as constructed by Jacques Pournier so that I can charge my 90-volt B battery as well as my 6-volt A battery?



A.—We herewith show a book-up for charging B batteries. If a rate greater than 1/2 ampere is desired you must use a larger lamp in place of the 50 watt lamp as shown.

## A. B. C. RADIO COURSE

(Continued from page 20)  
C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> will be charged to the same potential E and the total quantity of electricity passing through the battery

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B. D. SMITH

31 Washington Ave. Danbury, Conn.

on charge will be equal to the sum of the quantities passing through the three condensers. Representing the total quantity by Q and the quantities passing through the three condensers C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> by Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub>, respectively, we may write the following expression  
Q = Q<sub>1</sub> + Q<sub>2</sub> + Q<sub>3</sub>  
now  
Q<sub>1</sub> = C<sub>1</sub> × E  
Q<sub>2</sub> = C<sub>2</sub> × E  
Q<sub>3</sub> = C<sub>3</sub> × E  
The equivalent capacity of the three condensers may be represented by C, then  
Q = C × E

Substituting these values for the various quantities in the first equation we may write the following expression  
C × E = C<sub>1</sub> × E + C<sub>2</sub> × E + C<sub>3</sub> × E  
dividing this expression by E gives  
C = C<sub>1</sub> + C<sub>2</sub> + C<sub>3</sub>  
The total capacity of the three condensers in parallel is equal to the sum of their respective capacities. The capacity of any number of condensers in parallel is

equal to the sum of their respective capacities. This expression for capacities in parallel corresponds to the expression for resistances in series.

When the condensers are connected in series as shown in figure 40 the combined capacity C is calculated by means of the following equation, which corresponds to the one used for calculating the total resistance of a number of resistances in parallel

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

(The action of capacity and inductance in the alternating current circuit will be given in the next chapter.—Editor's Note.)

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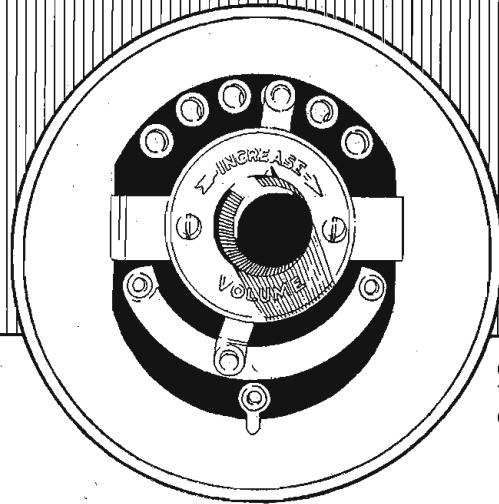
# Radio-Phone Broadcasting Stations

## Corrected Every Week—Part V

State, City, Call	State, City, Call	State, City, Call	State, City, Call	State, City, Call	State, City, Call
<b>Alabama:</b> Auburn, WSY Mobile, WEAP, WEBM	<b>Illinois (Continued)</b> Oak Park, WGES Rockford, KFVJ Beck Island, WERP Spring Valley, WBOW Sycamore, WDX Tuscola, WJW Urbana, WRM Zion, WCBD	<b>Michigan (Continued)</b> Port Huron, WAFD, WBBH Saginaw, WARM	<b>North Dakota (Continued)</b> Grand Forks, KFJL, KFRL	<b>Texas (Continued)</b> College Station, WTAW Dallas, WPA, WBR Denison, KFVJ Dallas, KFPL El Paso, WDBL Fort Worth, KFJZ, KFQB, WBAP Galveston, KFLX, KFLL Greenhill, KFPM Houston, KFVI, WFV, WRAA Orange, KFQX San Antonio, WCAR, WQAI San Benito, WFCU Tyler, WQ Waco, WJAD	<b>Canada (Continued)</b> London, CFCW, CFLC, CIGG Montreal, CFCW, CFCY, CIGL New Westminster, CFXO Ottawa, CHNC, CNCR, CNRO Quebec, CFCF Regina, CKCK, CNCR Saskatoon, CFCQ, CFCU, CNRS Saskatoon, CFCQ Victoria, CFCB, CFCZ Toronto, CFCO, CHIC, CHNC CFCG, CFCF, CFCN, CFCO Vancouver, CFCQ, CFCF, CFCO CRCD, CFCF Winnipeg, CFI, CNRW

### STATION SCHEDULES (Continued from last week)

Station	Time	Station	Time	Station	Time	Station	Time	Station	Time	Station	Time	Station	Time
<b>Chile</b> ARC, Vina del Mar, Chile, 400 meters. Radio Cor. of Chile in Chile.		<b>Cuba</b> 66T, Ciudad Vieja, Cuba, 200 meters. 10 watts. 68S, Sagua la Grande, Cuba, 200 meters. 10 watts. 69K, Tulcan, Cuba, 275 meters. 100 watts. Frank B. 67W, Toluca, Cuba, 252 meters. 100 watts. Frank H. 70J, Havana, Cuba, 275 meters. 100 watts. Julio P. 71P, Havana, Cuba, 185 meters. 10 watts. George A. 72Z, Cansaque, Cuba, 225 meters. 10 watts. Pedro 73Y, Ciego de Avila, Cuba, 225 meters. 20 watts. 74R, Sagua la Grande, Cuba, 245 meters. 500 watts. Salvador 75R, Sagua la Grande, Cuba, 275 meters. 500 watts. Salvador 76W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 77W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 78W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 79W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 80W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 81W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 82W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 83W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 84W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 85W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 86W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 87W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 88W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 89W, Havana, Cuba, 275 meters. 100 watts. Pedro C. 90W, Havana, Cuba, 275 meters. 100 watts. Pedro C.	<b>France</b> FPTT, Paris, France, 458 meters. 500 watts. Superior School P. T. T. Annoumer, M. Chanton. Lyon, France, 500 meters. 500 watts. French Govern- ment. Agen, France, 318 meters. 250 watts. French Govern- ment. Paris, France, Le Petit Parisien, 340 meters. 500 watts. Berlin, Germany, 505 meters. 700 watts. Vox Haus. Berlin, Germany, 290 meters. 100 watts. Telefunken Co. Bremen, Germany, 415 meters. 1,500 watts. Telefunken Co. Frankfurt, Germany, 420 meters. 1,500 watts. Hamburg, Germany, 830 meters. 1,200 watts. Nord- deutscher Rundfunk. Hornsea, England, 500 meters. 500 watts. Hornsea Beyer.	<b>Germany</b> Kriegsberg, Germany, 450 meters. 1,500 watts. Ost- marken Rundfunk, A. G. Leipzig, Germany, 454 meters. 1,500 watts. Mittel- deutscher Rundfunk, A. G. Munich, Germany, 485 meters. 1,500 watts. Deutsche Stunde in Bayern. Munster, Germany, 440 meters. 1,500 watts. Stuttgart, Germany, 443 meters. 1,500 watts.	<b>Great Britain</b> 29D, Aberdeen, Scot. 485 meters. 1,500 watts. British Broadcasting Co. Annoumer, H. M. Fitch. 29E, Belfast, Ireland, 429 meters. British Broadcast- ing Co. Ltd. Annoumer, W. T. Guthrie. 29F, Dundee, Scot. 331 meters. British Broadcasting Co. 29G, Edinburgh, Scot. 328 meters. British Broadcast- ing Co. 29H, London, Eng. 305 meters. 1,500 watts. British Broadcasting Co. 29I, Bradford, Eng. 310 meters. British Broadcast- ing Co. 29J, Leeds, Eng. 348 meters. British Broadcasting Co. 29K, Manchester, Eng. 375 meters. British Broadcast- ing Co. 29L, Birmingham, Eng. 475 meters. British Broadcast- ing Co. 29M, Nottingham, Eng. 326 meters. British Broadcast- ing Co. 29N, Newcastle, Eng. 400 meters. British Broadcast- ing Co. 29O, Plymouth, Eng. 335 meters. 200 watts. British Broad- casting Co. Annoumer, Clarence Goode. 29P, Glasgow, Scot. 420 meters. British Broadcasting Co. 29Q, Cardiff, Wales. 351 meters. British Broadcasting Co. 29R, Bournemouth, Eng. 383 meters. British Broad- casting Co. 29S, Bristol, Eng. 301 meters. British Broadcasting Co. 29T, Hull, Eng. 335 meters. British Broadcasting Co. 29U, Liverpool, Eng. 315 meters. British Broadcast- ing Co. 29V, Stoke-on-Trent, Eng. 308 meters. British Broad- casting Co.	<b>Italy</b> 190, Rome, Italy. 422 meters. 1,500 watts.	<b>Mexico</b> CVA, Mexico City, Mex. 185 meters. Partido Liberal Atencio. CVB, Mexico City, Mex. 380 meters. 500 watts. Es-	<b>New Zealand</b> 19A, Auckland, New Zealand. 200 meters. 200 watts. 19B, Auckland, New Zealand. 500 meters. 500 watts. 19C, Wellington, New Zealand. 275 meters. 15 watts. 19D, Dunedin, New Zealand. 150 meters. Otago Uni- versity. 19E, Dunedin, New Zealand. 510 meters. 500 watts. 19F, Auckland, New Zealand. 150 meters. 500 watts.	<b>Spain</b> EAJL, Barcelona, Spain. 325 meters. 100 watts. EAB, Seville, Spain. 250 meters. 1,500 watts. Radio Espanola, 325 meters. 500 watts. EAS, Seville, Spain. 500 meters. Es-				



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