De Luxe Reflex—Beginner's Aids—Flivver Super

# Radio Digest

EVERY WEEK Illustrated TEN CENTS

REG. U. S. PAT. OFF.

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# HYPNOTIZE BY AIRPHONE

Above is a movie strip taken of Blanche Sweet, movie star, when she was in the midst of a program broadcast from Station KHJ. At the top Miss Sweet is listening to where "the big bear leaped at Peter Rabbit." In the center she is saying, "Everyone keep quiet." At the bottom she has just tuned in some static. © Int.

## MENTAL SUGGESTION TRANSMITTED ON AIR

### Vishnu, Hypnotist, Predicts Even More Startling Discoveries for Coming Years

By May Teressa Holder

BIRMINGHAM, ALA.—Hypnotized by Radio! To do the "old stuff" in a new way is the quickest road to success, and one of the latest and most unique flings in that direction—Hypnotism by Radio—was given a most thrilling and successful test recently in Birmingham, Alabama. Then it was the second attempt in the history of hypnotism and the second time in the history of Radio. Miss Beatrice Kyle was not only put into hypnotic sleep but was also awakened by Radio when Vishnu the Famous Hypnotist, dozens of blocks away from his subject, transmitted mental suggestion through Radio instruments.

A receiving station was installed on a raised platform in front of the store of a local electric supply company by a former Radio expert of the United States Army, and Miss Kyle was seated in a chair on top of tables which had been placed on the sidewalk, while in another part of the city Vishnu was located in the studio of WSY, the Alabama Power Company's station.

Timidly looking out upon the vast audience which had gathered to witness the wonderful feat, Miss Kyle placed the headset over her ears. Soon the voice of

(Continued on page 2)

## STATION KPO GIVES FIRST COAST OPERA

### "EL RANCHO DEL REY" HAS CAST OF SIXTY

#### Broadcast Regarded as Success Despite Effect Lost in Lack of Colorful Settings

SAN FRANCISCO.—A new chapter in the history of Pacific Coast Radio was written recently when station KPO broadcast a complete opera from the studio on the sixth floor of the Hale Bros. department store. This was the first opera to be heard in its entirety from a coast city, and judging by the response from Radiophans all over the country, it was one of the most successful performances ever given to the air by a local station.

**Has Cast of Sixty**

The work was "El Rancho del Rey," libretto by Evelyn Nells of the San Francisco Call, music by George Bigler of Burlingame, Cal., and was conducted by Pearl Hossack Whitcomb, of San Francisco. The story treats of the early Spanish history of California, and was especially favored by the melodious music and excellent cast. Sixty men and women appeared in the production, and much favorable comment was elicited for the splendid way in which they were handled by Mme. Whitcomb.

**Production Considered a Success**

It is to be regretted that science has not yet found a means of broadcasting the colorful stage settings, the gorgeous costumes, and beautiful dances that called forth such thunders of applause when the opera appeared locally several weeks ago. However, the production was considered a success as given.

## NAME BABY BUFFALO ANTENNA AND AERIAL

PHILADELPHIA, PA. — The center of attraction of the hundreds of school children visiting the Philadelphia Zoological Gardens these days, are "Aerial" and "Antenna," new born baby bison. According to C. Emerson Brown, the animals were named with the first two names alphabetically of the Radio catalogue, and the Radio wave will include many more arrivals expected soon.

## *Monitor Control to Be Used Throughout Navy*

### New System Enables Navy to Handle 800,000 Words Monthly

SAN FRANCISCO.—After a nation-wide tour of inspection of Navy communications, Commander S. E. Hooper, U. S. N., announced recently that he had recommended that the Radio monitor control system, a new method of receiving and transmitting which was originated on the west coast, be installed throughout the Navy service.

In this district all messages under this plan are received at the South San Francisco Naval Radio station and are transmitted by it to the Naval Radio office, which will be operated from the U. S. Appraiser's Building. All outgoing messages will be transmitted to the Mare Island station for sending.

The Naval office will handle between 650,000 and 800,000 words monthly.

## *Landlord Can't Destroy Tenant's Radio, Ruling*

CHICAGO.—Judge Peter Schwaba ruled recently that a Radio aerial in an appurtenance to the home of the owner and therefore inviolable, so far as the landlord is concerned. The ruling arose out of a case between Fred B. Snell, 2836 Taylor street, and his landlord, John Vekias, 2838 Taylor street. Snell charged that Vekias chopped his aerial down with an ax when he told him he must wait until next day for his rent. Vekias was placed under a $1,000 peace bond.

The upper picture here shows Miss Sweet as she has just heard a good joke. In the center she is laughing at that whimsical bit of humorous song "Gallagher and Shean." Of course you can tell what has happened in the last picture,—"Jazz, the best yet," the little lady is saying here. Miss Sweet is quite a Radiophan. © Int.

# HYPNOTIZE BY AIRPHONE

(Continued from page 1)

Vishnu rang out clearly over the crowd, although he was many blocks distant:

**Gives Command to Sleep**

"It gives me great pleasure to attempt this strange new feat of hynotizing a woman by Radio," he said.

At this point the big audience strained every nerve to hear, for being in the open air on the main business street, there were many disturbing noises, and his voice seemed to die away. Suddenly his deep tones rang out again, and a serious expression overspread Miss Kyle's smiling face as he said:

"Fix your eyes, Miss Kyle, upon a definite object! Let your mind become concentrated upon the one thought—that of sleep. Put your knees together!"

Miss Kyle became deathly still. She seemed to be getting dazed.

"You will drift off peacefully to sleep—SLEEP!" was heard as the Radio buzzed on.

A little quiver ran through Miss Kyle's body. Her head drooped and her eyes closed slowly as she lurched forward, reminding one of a sleepy little child whom the "Sand Man" was about to get. One of Vishnu's attendants hurriedly took the receivers off her ears, which left her entirely dependent upon the Radio horn for a continuance of the experiment, and gently lifted her up.

From over the long distance Vishnu seemed to mysteriously sense the situation and feel her exigency for him. Quickly from out the Radio horn came his clear commanding tones:

"Let your body become rigid!"

**Rushes to Subject**

As if by magic, Miss Kyle's body straightened stiffly, every muscle taut. She seemed dead. In this state she was carried by ambulance to be placed on a little white bed which had been arranged in the show window of a large department store several blocks away.

Meanwhile the hypnotist got into a waiting automobile and was hurriedly driven to Miss Kyle's side in order to quickly relax her body before placing her on the bed. Upon his arrival at the show window, bending over Miss Kyle, he examined her condition and only smiled as she relaxed naturally. Then when she was lifted from the stretcher to the bed, where she was to remain in her comatose state until the next afternoon, he called on her again for rigidity, after which he again relaxed her for her twenty-four hours' sleep. After seeing that her breathing and heart were right, he gently drew a mosquito netting over the top of the bed, through which could be seen her flushed face upon the pillow.

"I find being hypnotized by Radio queer," said Miss Kyle the next day after she had been awakened from her long sleep. "However, I was not a bit afraid or nervous. Have you ever waked up from a real sound sleep and felt so drowsy that you would turn over and go right back to sleep? Well, it's just that twixt-and-between feeling I got at first. It seemed like I just must go to sleep. I never knew when I quit hearing Mr. Vishnu talking to me. I just went right off into dreamland. Then, when I was awakened, at first I seemed all confused, as though someone was making a big fuss over me, and then, 'Wake up!' was the first thing I got."

**Other Feats More Astonishing Will Come**

The hynotism of Miss Kyle was a striking demonstration of the progress science is making and how hynotism is keeping pace with it; yet withal, Vishnu declares that the coming years have in store for the ambitious youth discoveries even more numerous and much more astonishing.

"Hypnotism through the air is possible," says Vishnu. "When a subject is once controlled, only the sound of the human voice is needed. If the sound of the human voice can be transmitted by Radio, there is no reason in the world why a subject can not be controlled by Radio, and while hypnotizing a person by Radio is in itself a difficult feat, yet that of waking a subject by the same means is by far the more arduous task."

# *California Town Plans Loud-Speaker Curfew*

## Fans Show Fight, Say, "Curfew Shall Not Ring"

SIERRA MADRE, CALIF.—A Radio curfew ordinance is under consideration by the city board of trustees here. Citizens who are uninterested in the ether science have complained to city officials that the noise of neighborhood loud speakers is unbearable and become a nuisance when operated late at night.

The Radiophans of the city are planning to wage a hot fight to prevent any action being taken against their interests.

The law as suggested reads that it shall be an offence to operate any form of loud speaking apparatus after nine o'clock at night.

Radio telephones are to be placed on every fishing vessel of the Norwegian fleet, numbering more than 14,000 ships.

# AN EVENING AT HOME WITH THE LISTENER IN

## (SEE NOTE BELOW FOR INSTRUCTIONS)

| Station and City | Met. | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|---|
| CFCA, Toronto, Ont. | 400 | 7:00- 8:00 | 7:00-8:00 | 7:00- 8:00 | 7:00- 8:00 | 7:00- 8:00 | 7:00- 8:00 | 6:45- 7:45 |
| CFCN, Calgary, Alta. | 440 | ..... | ..... | 11:30-12:30 | ..... | ..... | 11:30-12:30 | ..... |
| CKAC, Montreal, Que. | 430 | ..... | 6:00-10:30 | ..... | 6:00-10:30 | ..... | 6:00-10:30 | 3:00- 5:00 |
| KDKA, E. Pittsburgh, Pa. | 360 | 5:00- 9:00 | 5:00- 9:00 | 5:00- 9:00 | 5:00- 9:00 | 5:00- 9:00 | 5:00- 9:00 | 1:45- 3:45 |
| KFAF, Denver, Colo. | 360 | 9:00-10:00 | 9:00-10:00 | ..... | 9:00-10:00 | 9:00-10:00 | 9:00-10:00 | ..... |
| KFDB, San Francisco, Calif. | 509 | 10:00-12:00 | ..... | 10:00-12:00 | ..... | 10:08-12:00 | ..... | 9:00- 9:30 |
| KFI, Los Angeles, Calif. | 469 | 7:00- 1:00 | 7:00- 1:00 | 7:00- 1:00 | 7:00- 1:00 | 7:00- 1:00 | 7:00- 1:00 | 10:00- 1:00 |
| KGW, Portland, Ore. | 492 | 10:00- 2:00 | ..... | 10:00-11:00 | ..... | 9:00- 2:00 | ..... | 9:00-10:00 |
| KHJ, Los Angeles, Calif. | 395 | 8:45-11:30 | 8:45-11:30 | 8:45-11:30 | 8:45-11:30 | 8:45-11:30 | 8:45-11:30 | 12:00- 1:00 |
| KPO, San Francisco, Calif. | 423 | ..... | 10:00-12:00 | ..... | 10:00-12:00 | ..... | 10:00-12:00 | ..... |
| KSD, St. Louis, Mo. | 546 | 8:00-12:30 | 8:00-10:00 | 8:00-10:00 | ..... | 8:00-11:30 | 8:00-10:00 | ..... |
| KYW, Chicago, Ill. | 448 | 8:00- 9:30 | 8:00- 9:30 | 8:00- 9:30 | 8:00- 9:30 | 11:30- 1:00 | 8:00- 9:30 | 7:00- 8:00 |
| NAA, Radio, Va. | 435 | 5:45- 7:30 | 6:05- 7:20 | 6:25- 8:40 | 5:45- 7:40 | 7:00- 8:40 | ..... | ..... |
| PWX, Havana, Cuba | 400 | ..... | ..... | 8:00-10:30 | ..... | ..... | 8:00- 10:30 | ..... |
| WBAP, Fort Worth, Texas | 476 | 7:15-10:30 | 7:15-10:30 | 7:15-10:30 | 7:15-10:30 | 7:15-10:30 | ..... | 6:30- 6:45 |
| WBZ, Springfield, Mass. | 337 | 6:30- 8:00 | 6:30- 8:00 | 6:30- 8:00 | 6:30- 8:00 | 6:30- 8:00 | 6:30- 8:00 | 7:00- 8:00 |
| WCX, Detroit, Mich. | 517 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | ..... | 4:00- 5:00 |
| WDAF, Kansas City, Mo. | 411 | 6:00- 1:00 | 6:00- 1:00 | 6:00- 1:00 | 6:00- 1:00 | 6:00- 1:00 | 6:00- 1:00 | 11:45- 1:00 |
| WDAJ, College Park, Ga. | 360 | 7:30-11:30 | 7:30-11:30 | 10:30-11:30 | 7:30-11:30 | 7:30-11:30 | 7:30-11:30 | 7:30-11:30 |
| WDAP, Chicago, Ill. | 390 | ..... | 10:00- 2:00 | ..... | 10:00- 2:00 | ..... | 10:00- 2:00 | 9:00-12:00 |
| WEAF, New York, N. Y. | 492 | 6:30- 9:00 | 6:30- 7:00 | 6:30- 9:00 | 6:30- 9:00 | 6:30- 7:00 | 6:30- 9:00 | ..... |
| WFAA, Dallas, Tex. | 476 | 8:30- 9:30 | 8:30-12:00 | 8:30- 9:30 | 8:30-12:00 | 8:30- 9:30 | 8:30-12:00 | 9:30-10:30 |
| WFI, Philadelphia, Pa. | 395 | 5:30- 6:00 | 5:30- 6:00 | 7:00- 9:30 | 5:30- 6:00 | 7:30- 9:30 | 8:00-11:00 | ..... |
| WGI, Medford, Mass. | 360 | ..... | 7:30- 9:00 | 5:45- 7:30 | 8:30-10:00 | 8:30-10:00 | 7:30- 9:00 | 8:30-10:00 |
| WGM, Atlanta, Ga. | 429 | 9:30-10:30 | 9:30-10:30 | 9:30-10:30 | 9:30-10:30 | 9:30-10:30 | 9:30-10:30 | 7:30- 8:00 |
| WGR, Buffalo, N. Y. | 319 | 7:00- 9:00 | ..... | 7:00- 9:00 | ..... | 7:00- 9:00 | ..... | ..... |
| WGY, Schenectady, N. Y. | 380 | 6:45- 9:00 | 6:45- 9:00 | ..... | 6:45- 9:00 | 6:45-11:00 | ..... | 6:30- 7:30 |
| WHA, Madison, Wis. | 360 | 7:00- 9:00 | 7:00- 8:00 | 7:00- 8:00 | 7:00- 9:00 | 7:00- 8:00 | 7:00- 8:00 | ..... |
| WHAS, Louisville, Ky. | 400 | ..... | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | ..... |
| WHAZ, Troy, N. Y. | 380 | 7:15- 8:30 | ..... | ..... | ..... | ..... | ..... | ..... |
| WHB, Kansas City, Mo. | 411 | ..... | 8:00-10:00 | ..... | 8:00-10:00 | ..... | ..... | 8:00-10:00 |
| WHK, Cleveland, O. | 390 | 5:00- 5:30 | 5:00- 5:30 | 7:00- 8:45 | 5:00- 5:30 | 5:00- 5:30 | 5:00- 5:30 | 7:00- 8:45 |
| WIP, Philadelphia, Pa. | 509 | 6:00- 6:30 | 6:00-11:00 | 6:00- 6:30 | 6:00- 6:30 | 6:00- 8:55 | 9:10-11:00 | ..... |
| WJAX, Cleveland, O. | 390 | ..... | 6:00- 7:30 | ..... | 7:15- 9:30 | ..... | ..... | ..... |
| WJZ, New York, N. Y. | 455 | 7:30- 9:30 | 6:00- 9:30 | 8:00- 9:30 | 7:30- 9:30 | 7:30- 9:30 | 7:30-10:00 | 7:30- 9:00 |
| WKAQ, San Juan, P. R. | 360 | ..... | 7:30- 9:30 | ..... | ..... | ..... | 7:30- 9:30 | ..... |
| WLAG, Minneapolis, Minn. | 417 | 10:10-11:30 | 6:00- 7:30 | 6:00- 7:30 | 9:15-10:30 | 6:00- 7:30 | 8:30-10:30 | ..... |
| WLW, Cincinnati, O. | 360 | 7:00- 9:00 | 9:00-11:00 | 7:00- 9:00 | 9:00-11:00 | ..... | ..... | ..... |
| WMAQ, Chicago, Ill. | 448 | ..... | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | ..... |
| WMC, Memphis, Tenn. | 500 | 8:00- 9:30 | 8:00-12:00 | ..... | 8:00- 9:30 | 8:00-12:00 | 8:00- 9:30 | ..... |
| WOAI, San Antonio, Texas | 400 | ..... | 9:30-10:30 | ..... | 7:30- 8:30 | ..... | ..... | 9:30-10:30 |
| WOC, Davenport, Ia. | 484 | 7:00- 8:30 | ..... | 10:00-11:00 | 7:00- 8:30 | 7:00- 8:30 | 9:30-10:30 | 7:00- 9:00 |
| WOO, Philadelphia, Pa. | 509 | 6:50-11:00 | ..... | ..... | 6:50- 9:10 | ..... | ..... | ..... |
| WOR, Newark, N. J. | 405 | 5:15- 6:30 | 7:00-10:00 | 5:15- 6:30 | 5:15- 6:30 | 7:00-10:00 | 5:15- 6:30 | ..... |
| WOS, Jefferson City, Mo. | 441 | 8:00- 9:30 | ..... | 8:00- 9:30 | ..... | 8:00- 9:30 | ..... | ..... |
| WSB, Atlanta, Ga. | 429 | 10:45-12:00 | 10:45-12:00 | 10:45-12:00 | 10:45-12:00 | 10:45-12:00 | 10:45-12:00 | 7:30- 9:00 |
| WSY, Birmingham, Ala. | 360 | 8:00- 8:45 | ..... | 8:00- 8:45 | ..... | 8:00- 8:45 | ..... | 7:30- 8:30 |
| WWJ, Detroit, Mich. | 517 | 7:30- 9:00 | 7:30- 9:00 | 7:30- 9:00 | 7:30-11:00 | 7:30- 9:00 | ..... | 6:30- 7:30 |

*Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.*

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# *Looking Ahead*

**Do You Want to Know All About Condensers and Inductances?** Next week Thomas W. Benson is going to tell about them. It makes no difference how well one may be versed in Radio, there is always some little point that may be hazy. Perhaps "Condensers and Inductances" is your weak point.

**A Diagram of the New Four-Circuit Tuner** will appear in next week's Digest. Want to do DX work this summer?—Then try this out on your antenna.

**Characteristic Curves of Recent Designs of Vacuum Tubes** will be shown in an article written by H. J. Marx in the June 2 issue of the Digest. This article is prepared particularly for those Radiophans who are critics of good apparatus.

**Mr. Flewelling Will Complete His Present Series of Articles** next week. If you have followed the series thus far you cannot afford to miss next week's article to complete your files. He will give operating kinks for the One Condenser Super Flivver.

**Are You Getting Your Share of Broadcasts** under the new wave length allocations? An article on "Loading Coils and How to Raise Your Set's Inductance Values" will be in an early issue.

**Your Vacation.** You died-in-the-wool Radiophans are going to take a set along, of course! What kind?—Let Radio Digest tell you in a coming issue.

# "RAILROAD NIGHT" IS BROADCAST BY KHJ

## FANS LISTEN IN ON REALISTIC DEPOT NOISES

### Traveler's Gossip, Cab Driver's Shouts, Newsboys' Cries, Children's Chatter —All Come In on Ether

LOS ANGELES, CALIF.—Presenting one of the most vivid, realistic and descriptive Radio broadcast programs so far heard on the Pacific Coast, the Radio concert from station KHJ, the Los Angeles Times, broadcast recently, proved to be one of stellar attraction.

"Railroad Night" was the subject and the atmosphere was alive with the associations of railroad life. The setting was the waiting room of the Arcade Station, of the Southern Pacific, in this city, but there was no waiting, everybody rushed headlong into the fun. Mayor Geo. E. Cryer was greeted by the South Pacific Shop Band as he stepped from a figurative train upon his return from vacation and as he passed into the waiting room was cheered by the crowd. The Mayor was there in person and was called upon for a short address.

**Have Railroad Band**

The Southern Pacific Band, under the baton of conductor L. B. Verweire, composed of accomplished musicians, presented a brilliant concert, including the following: March, from "Tannhauser," by Wagner, the overture "William Tell," by Rossini; "Fackeltaz" (Torch Dance), by Meyerbeer, and the "Star Spangled Banner," arranged by Lieut. John P. Sousa, U. S. N. R. F. Conductor Verweire and members of the band were congratulated for their brilliant performance.

A waiting room to be true to life should have the yowls of an infant, which was there in real life and it exercised its lungs in regular style. A police officer on the scene, to keep order and handle the crowd was enacted by Harry Anderson, who was recommended by Police Chief Louis D. Oaks, and Officer Anderson proved himself in the waiting room.

**Youngsters Play Parts Well**

Prattling youngsters are required in a waiting room, herein enter, Maxine and Virginia Loomis, the most charming twins in seventeen states; and yet, it is amazing what sensible questions the lassies of 5 years of age may ask. They presented an adorable part in the sketch. Richard Headrick, silver-sheet luminary, age 5 years, was the third party in the juvenile trio.

Others who completed the waiting room scene were: Newsboys who shouted the latest news, taxi drivers who announced their cars ready and peanut venders who cried out their wares, and as the program was deserving of a ringing tribute the Southern Pacific Company furnished a 200 pound locomotive bell for that purpose.

# STATION TO HELP SAVE LIVES ON GREAT LAKES

## WGR to Broadcast Weather Information to Seamen Daily

BUFFALO, N. Y.—For the first time an independent Radio broadcasting station will be a factor in saving the lives of those imperiled by violent storms on the Great Lakes and amateur Radiophans can now picture to themselves the scenes on shipboard described in their favorite sea stories when they receive the thrilling news of an approaching storm. This weather information will be broadcast partly in a code of letters and figures by the powerful Federal Telephone & Telegraph company's station WGR at Buffalo, N. Y., at 10:45 a. m. and 10:45 p. m., Eastern time, every day. Interested fans may obtain the key to this code by writing to the weather bureau, Telephone building, Buffalo, N. Y.

# GERMANS FIND WAVE TO DOWN AIRPLANES

PARIS.—French aviation investigators in Germany reported today that the Germans have discovered a Radio process which forces airships, however powerful, to land. Serious alarm is felt in French airplane circles at this news, which vitiates every effort in the development of France's chief weapon, aviation. Radio waves of extraordinary potency and of special quality are used to stop the airplane motors.

# NEW CUBAN STATION TUNES IN CLEVELAND

HAVANA, CUBA.—The new Cuban Station 6KW, operated by Frank Jones, is now working on a wave length of 315 meters. Mr. Jones recently entertained the whole town of Tuinicu with a Cleveland News Radio concert broadcast from the Union Trust Company's station. A loud speaker was placed in the window of the studio and connected to the receiving set. The entire populace listened to the "wave from Lake Erie" roll in.

# HOW ABOUT THIS CRYSTAL?

How would you like a crystal for your set as large as the one the young lady is holding? With the proper equipment one would stand a chance of bringing in some real DX records with it. The crystal is the same as used in Radio work but in the crude form. It is yet to be finished and chipped into smaller bits. ©K. &H.

## *Loud Speaker Directs Mob Scene of "The Hunchback"*

UNIVERSAL CITY, CALIF.—Whispers are directing the huge mobs used in some of the scenes for "The Hunchback of Notre Dame," being filmed here. Wallace Worsley, the director, has not needed to raise his voice above a monotone, yet it is carried to the farthermost portions of the seven-acre set.

This feat was made possible only through the great Radio amplifier, just installed by a Radio specialist of the Western Electric company. The installation cost $7,000, but it saves hundreds of dollars every day and affords complete mob control.

If reception is not as good as usual in damp weather, it is due to faulty aerial insulation.

# DO YOU KNOW HOW WGY BROADCASTS?

## SERMON PASSES THROUGH FIVE EXCHANGES

### Four Microphones Used—Two in Service; Two for Emergency—Use Twenty Mile Line

**By W. T. Meenam**

SCHENECTADY, N. Y.—Have you ever wondered how a Radio broadcasting station with its fixed equipment manages to send out religious services weekly from churches many miles away from the sending station?

The operating staff of WGY, the Schenectady, N. Y., station of the General Electric Company has so developed church service broadcasting that thousands of letters of appreciation are sent in from far and near. Furthermore, clergymen who were frankly skeptical at first of the value of broadcast religious services and who doubted that the dignity and beauty of these services could be conveyed through the air, now pronounce Radio an invaluable aid.

**Amsterdam Service Typical**

The installation necessary for broadcasting the service of the Second Presbyterian Church of Amsterdam, N. Y., recently is typical and will give the Radiophan an idea of how it is accomplished.

In the church were four microphones, two of them spares for emergency use. Two were placed at the reading desk to get the words of the clergyman in scripture reading, prayer, sermon and announcements. Two more were hung above and in front of the choir and organ. These microphones or pick-ups were the only evidence to the congregation that the service they were hearing was going out to countless thousands many miles away. There is nothing in the church installation to distract the attention of the congregation from the services.

**Operator Stationed in Church**

At one side of the church, hidden from view but in a position where he could follow the service was stationed one of the WGY staff who switched the microphones on and off as the service progressed. If the minister was speaking, his microphone was brought into the circuit and the choir microphone was switched off.

Two other operators were situated in an adjoining room where a portable control equipment had been installed. In this room one of the operators controlled the amplification of speech and music. The amplifying outfit consisted of two 5-watt tubes, one 50-watt tube and other necessary apparatus. Sufficient amplification was used to overcome line noise on the twenty miles of telephone wire necessary to carry the electrical oscillations set up in the microphones to the control room of WGY in Schenectady, N. Y. The second operator in the side room was in constant communication by special land wire with the control room at WGY.

**Passes Through Five Exchanges**

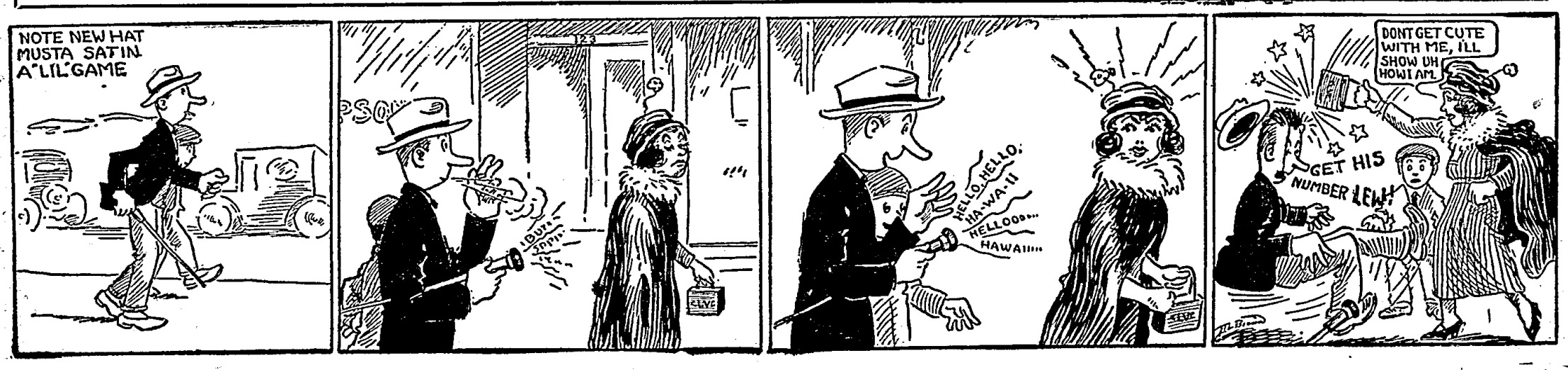
In the control room in Schenectady the church services were again amplified, this time on equipment which consisted of one 5-watt tube and two 50-watt tubes. From this point the electrical oscillations passed to the power apparatus and were impressed on modulator and oscillator tubes going to the antenna and the air.

Between the church in Amsterdam and control apparatus in Schenectady the service passed through three exchanges of the New York Telephone Company, the Amsterdam exchange, the Schenectady exchange and finally the exchange of the General Electric Company.

## Aurora Borealis Causes QRM

HARTFORD, CONN.—Presence of Northern lights, or the aurora borealis is believed to have been the cause of the failure of Canadian amateurs to relay a message across the continent during a recent three-day test of the American Amateur Radio Relay League. The aurora has been known before to interfere with transmission.

# THE ANTENNA BROTHERS Spir L. and Lew P. Ha-wa-ii, Then She Raised "Cane"



# RECEIVING RECORD CONTEST

By Contest Editor

THREE hundred and thirty-five records now appear in the complete list. Five new records were added this week. A number of the contestants have been able to hold their own since the last time the entire list was given. N. H. Hall, of Boston, Mass., is still in the lead with his 5,100 mile record from KYQ, Hawaii, while C. F. Rose, Jr., of Springfield, Mass., is running a close second. Four in the race hold records over 4,000 miles and 23 over 2,500 miles! Can you beat these? If you can, don't forget to enclose the mileages for the stations whose records you submit.

The complete list of records, revised to date, are printed below:

**Station—Miles Away—Who Heard It**

AS6—1250, John Kiener, Cleveland, O.
CFAC—1750, Ted Lehman, Ashland, Ky.
CFCA—1850, C. C. Beery, Spokane, Wash.
CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CFCN—2100, E. J. Cuddy, Dedham, Mass.
CHBC—2450, S. S. Florence B. Phillips.
CHCA—1625, T. S. Wildman, Nicholas, Iowa.
CHCB—2125, Arthur Chapelle, Woodburn, Ore.
CHCF—1250, B. U. Livingston, Morristown, N. J.
CHCQ—2100, G. F. Aiken, Providence, R. I.
CHXC—1500, M. B. Gilbert, Douglas, Wyo.
CHYC—2300, S. S. Atwood, Esperance, Wash.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
CJCB—1300, V. Dennis, Oskaloosa, Kans.
CJCE—2100, F. C. Woodford, Canton, O.
CJCN—1900, Nestor Barrett, Republic, Wash.
CKAC—2700, A. C. Carter, Juneau, Alaska.
CKCK—1650, L. C. Burwell, Jr., Charlotte, N. C.
CKCR—1225, Samuel Woodson, Jr., Liberty, Mo.
DD5—1550, C. V. Bell, Ottawa, Can.
DM4—1700, Arthur Chapelle, Woodburn, Ore.
DM7—1150, L. J. Martin, Minneapolis, Minn.
DN4—2100, W. E. Davison, Berwick, N. S., Can.
KDKA—2500, Robert Rowe, Santa Clara, Calif.
KDN—2175, F. C. Woodford, E. J. Poyser, Canton, O.
KDPT—2600, R. G. Williams, Springfield, Mass.
KDYL—2450, R. Doull, Halifax, N. S.
KDYM—2025, F. B. Steer, Cleveland, O.
KDYQ—2550, C. M. Rice, Jr., Worcester, Mass.
KDYS—1700, M. C. Ridenour, Kingwood, W. Va.
KDYX—5000, C. F. Rose, Jr., Springfield, Mass.
KDZA—2025, Breisch Motor Co., Ringtown, Pa.
KDZE—1725, Philip Delano, Bonne Terre, Mo.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KDZK—2050, C. E. Carber, Pittsburgh, Pa.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KDZR—1050, W. C. Wolverton, Linton, N. D.
KDZT—1250, E. M. Perkins, Jr., Sioux Falls, S. D.
KDZZ—1050, W. C. Wolverton, Linton, N. D.
KFAD—2125, Mrs. A. S. Mawhinney, New York, N. Y.
KFAE—1650, G. E. Wharton, Houston, Tex.
KFAF—1775, F. W. Foss, Boston, Mass.
KFAN—1250, Chas. N. Schwab, Grinnell, Iowa.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFAU—1325, Ross Hansch, Baraboo, Wis.
KFAW—1325, M. L. Johnson, Atchison, Kans.
KFAY—2200, L. A. Graf, Dunkirk, N. Y.
KFBB—1050, R. Henry, Butler, Mo.
KFBO—2125, J. D. Crosby, Stauffer, Pa.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFBH—1450, R. B. Reed, Eureka, Kans.
KFBJ—1775, Richard Reeder, Alliance, O.
KFBK—1950, H. S. Juday, Eldorado, O.
KFCB—1425, O. P. Klein, Leduc, Alta., Can.
KFCF—1775, R. A. Deger, Dayton, Ohio.
KFCL—1300, M. L. Johnson, Atchison, Kans.
KFCV—1600, Robert N. King, Needham Heights, Mass.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFDJ—2100, Ted Lehman, Ashland, Ky.
KFDL—1750, E. J. Cuddy, Dedham, Mass.
KFEB—1125, R. L. Hartman, Hoisington, Kans.
KFFY—1125, W. C. Wolverton, Linton, N. D.
KFHJ—1250, J. E. Bradley, Justin, Tex.
KFI—2900, W. E. Davison, Berwick, N. S. Can.
KFV—1750, A. L. Ober, North Manchester, Ind.
KFZ—2175, A. A. Acken, Jersey City, N. J.
KGB—1725, Louis Bruchiss, Chicago, Ill.
KGG—1650, Vernon Adams, Joplin, Mo.
KGN—1875, Fay Allarding, Lake Odessa, Mich.
KGU—1650, Eugene Evans, Tippecanoe City, Ohio.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KGY—1925, Paul French, Oxford, Mich.
KHJ—3000, H. S. Olding, New Glasgow, N. S., Can.
KHQ—2500, C. M. Rice, Jr., Worcester, Mass.
KJJ—2175, M. P. Jacot, Copley, O.
KJR—2800, H. S. Olding, New Glasgow, N. S., Can.
KJS—1150, W. F. Galloway, Vancouver, B. C., Can.
KLB—1900, Billy Withington, Jackson, Mich.
KLS—1400, J. E. Bradley, Justin, Tex.
KLX—2600, C. C. Dunbar, Greenville, N. H.
KLZ—2100, W. E. Davison, Berwick, N. S., Can.
KMJ—1550, H. E. Clark, Monmouth, Ill.
KMO—1600, Ross Hansch, Baraboo, Wis.
KNI—2150, John Kiener, Cleveland, O.
KNJ—1425, J. Wallace, Bridgeville, Pa.
KNT—2425, J. H. Wall, Rensselaer, N. Y.
KNV—1725, A. C. Flint, Chicago, Ill.
KNX—1175, J. E. Bradley, Justin, Tex.
KOB—1975, C. M. Rice, Jr., Worcester, Mass.
KOG—2450, H. F. Andrews, Albany, N. Y.
KOP—2075, T. W. Smith, Watsonville, Calif.
KPO—2550, C. M. Bussey, Hudson, N. Y.
KQI—1650, H. E. Clark, Monmouth, Ill.
KQP—2100, G. A. Walter, McDonald, Pa.
KQV—1325, M. B. Gilbert, Douglas, Wyo.
KQW—1900, C. Conrad, Logansport, Ind.
KSD—4000, Walter Lee, Lost Harbor, Alaska.
KTW—1600, H. E. Clark, Monmouth, Ill.
KUO—2675, C. M. Rice, Jr., Worcester, Mass.
KUY—2100, Roland Smith, Hilo, Hawaii.
KWG—2500, Mrs. A. S. Mawkinney, New York, N. Y.
KWH—2350, C. R. Richtmeyer, Allentown, Pa.
KXD—2075, Richard Reeder, Alliance, O.
KYI—1750, W. Schultze, Chicago, Ill.
KYQ—5100, M. H. Hall, Boston, Mass.
KYW—1850, J. J. Beales, Jr., San Anselmo, Calif.
KZM—2700, Sarkis Kachajian, Worcester, Mass.
KZN—1650, E. K. Kitts, Bluefield, W. Va.
KZV—1175, C. Bennett, Aurora, S. D.
NAA—2250, R. J. Gall, Blythe, Calif.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAAB—1325, C. H. Vale, Providence, R. I.
WAAC—1775, W. F. Macleod, Prince Albert, Sask., Can.
WAAD—1100, R. Doull, Halifax, N. S.
WAAF—1850, L. W. Beretta, San Mateo, Calif.
WAAJ—1725, M. B. Gilbert, Douglas, Wyo.
WAAM—2125, R. J. Gall, Blythe, Calif.
WAAN—1400, H. Baird, River de Chute, N. B., Can.
WAAP—1400, Arthur Chapelle, Woodburn, Ore.
WAAQ—1325, W. Douglas, Guthrie, Okla.
WAAS—1025, E. B. Miller, Plainview, Tex.
WAAW—1300, A. B. Butters, Los Angeles, Calif.
WAAZ—1700, W. E. Davidson, Berwick, N. S., Can.
WBAA—1575, C. C. Beery, Spokane, Wash.
WBAD—1125, N. Theobald, Attleboro, Mass.
WBAF—1250, M. Neuman, Guthrie, Okla.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAH—1050, F. T. Wycoff, Springfield, Mass.
WBAJ—1150, E. B. Miller, Plainview, Tex.
WBAP—2550, C. Blanch, Amherst, N. S., Can.
WBAU—1200, H. S. Olding, New Glasgow, N. S.
WBAX—1350, G. E. Wharton, Houston, Tex.
WBAY—2175, C. C. Beery, Spokane, Wash.
WBL—1900, H. S. Olding, New Glasgow, N. S., Can.
WBT—2250, Kenneth Curtis, Seattle, Wash.
WBU—1400, Wilson Woodside, Calgary, Alta., Can.
WBZ—2500, Arthur Chapelle, Woodburn, Ore.
WCAE—2250, R. Taylor, Livermore, Calif.
WCAF—1025, F. J. McKenney, New Prague, Minn.
WCAG—1325, K. McNeil, Ottawa, Ont., Can.
WCAH—1950, A. B. Butlers, Los Angeles, Calif.
WCAI—1100, A. C. Flint, Chicago, Ill.
WCAL—1400, S. S. Atwood, Esperance, Wash.
WCAR—1775, H. Madrich, Verdun, P. Q., Can.
WCAS—1450, Arthur Chapelle, Woodburn, Ore.
WCAT—1975, H. S. Olding, New Glasgow, N. S., Can.
WCAX—1325, Doyle Getter, Arkansas City, Kan.
WCAY—1050, D. J. Morris, Weir, Tex.
WCAZ—1450, H. S. Olding, New Glasgow, N. S.
WCK—1225, W. F. Macleod, Prince Albert, Sask., Can.
WCM—2174, H. S. Olding, New Glasgow, N. S., Can.
WCN—1750, E. B. Miller, Plainview, Tex.
WCX—2075, L. W. Beretta, San Mateo, Calif.
WDAE—1700, Wm. Hurst, Jr., Winnipeg, Can.
WDAF—1675, W. E. Davison, Berwick, N. S., Can.
WDAH—1925, Paul Glaister, Napanoch, N. Y.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAK—1200, R. Hastings, Atchison, Kan.
WDAL—2450, J. Beckman, Seattle, Wash.
WDAO—1500, M. J. Solumbe, Plattsburg, N. Y.
WDAP—1875, M. J. Bevilockway, Lomita Park, Calif.
WDAR—1175, C. B. Martin, Springfield, S. D.
WDAS—1250, C. M. Bennett, Aurora, S. D.
WDAU—1700, E. B. Miller, Plainview, Tex.
WDAX—1500, H. S. Olding, New Glasgow, N. S.
WDAY—1200, G. E. Wharton, Houston, Tex.
WDT—1400, G. E. Wharton, Houston, Tex.
WEAB—1550, H. S. Olding, New Glasgow, N. S., Can.
WEAD—1000, John Kiener, Cleveland, O.
WEAE—2000, R. J. Gall, Blythe, Calif.
WEAF—2450, N. E. Parr, Albany, Ore.
WEAH—1375, E. A. Howard, Watch Hill, R. I.
WEAI—2075, R. J. Gall, Blythe, Calif.
WEAJ—1300, Richard Siegel, Lawrence, Mass.
WEAK—1100, J. H. Wall, Rensselaer, N. Y.
WEAO—2100, Dobson & Tuckie, Oakland, Calif.
WEAP—1700, R. J. Gall, Blythe, Calif.
WEAT—1525, R. Doull, Halifax, N. S.
WEAV—1200, H. S. Rahiser, Pittsburgh, P
WEAY—1950, H. Gow, Seattle, Wash.
WEV—1400, H. Dammann, Bronx, N. Y.
WEY—1250, Mrs. A. S. Mawhinney, New York, N. Y.
WFAA—2000, H. S. Olding, New Glasgow, N. S.
WFAC—1375, H. S. Olding, New Glasgow, N. S., Can.
WFAF—2200, R. J. Gall, Blythe, Calif.
WFAG—1375, R. L. Hartman, Hoisington, Kan.
WFAH—1025, John Kiener, Cleveland, O.
WFAJ—1150, W. E. Davison, Berwick, N. S., Can.
WFAM—1025, J. H. Wall, Rensselaer, N. Y.
WFAN—1300, S. S. Atwood, Esperance, Wash.
WFAT—1275, P. Benneyan, Fresno, Calif.
WFAV—1350, S. S. Atwood, Esperance, Wash.
WFAZ—1150, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WFI—2350, A. B. Butler, Los Angeles, Calif.
WGAB—1750, J. A. Bernier, Quebec, Can.
WGAD—2575, L. Jang, Hanley Falls, Minn.
WGAF—1100, Kenneth Steele, Northumberland, Pa.
WGAK—1400, H. S. Olding, New Glasgow, N. S., Can.
WGAM—1275, H. B. Porter, Lynn, Mass.
WGAN—1700, H. S. Olding, New Glasgow, N. S., Can.
WGAQ—1025, W. J. Wolverton, Linton, N. D.
WGAR—1150, H. Dammann, Bronx, N. Y.
WGAT—1675, R. Doull, Halifax, N. S.
WGAY—1000, D. J. Morris, Weir, Tex.
WGF—1425, Perkins Benneyan, Fresno, Calif.
WGI—1750, E. L. Dye, Plainview, Tex.
WGM—2175, Allan Harvey, Snohomish, Wash.
WGR—2175, N. E. Parr, Albany, Ore.
WGV—1800, H. S. Olding, New Glasgow, N. S., Can.
WGY—2575, J. J. Beales, Jr., San Anselmo, Calif.
WHA—1650, Perkins Benneyan, Fresno, Calif.
WHAA—1450, H. S. Olding, New Glasgow, N. S., Can.
WHAB—1550, G. W. Perkins, Thompson, N. Y.
WHAE—1050, H. Rawls, Phoenix, Ariz.
WHAH—1100, Paul Glaister, Napanoch, N. Y.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WHAK—2175, Arthur Chapelle, Woodburn, Ore.
WHAL—1100, H. S. Olding, New Glasgow, N. S., Can.
WHAM—2225, Arthur Chapelle, Woodburn, Ore.
WHAR—1150, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAS—1950, Arthur Chapelle, Woodburn, Ore.
WHAW—1325, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAY—1700, R. J. Gall, Blythe, Calif.
WHAZ—2550, H. Wilbert, San Francisco, Calif.
WHB—1675, W. E. Davison, Berwick, N. S., Can.
WHK—1550, L. W. Gushwa, Firth, Ida.
WHX—1025, Mrs. A. S. Mawhinney, New York, N. Y.
WIAC—1206, H. Mutze, Manassas, Va.
WIAF—1325, C. V. Bell, Ottawa, Can.
WIAG—1250, Wm. Hurst, Jr., Winnipeg, Can.
WIAO—1700, S. S. Atwood, Esperance, Wash.
WIAZ—1525, E. M. Perkins, Jr., Sioux Falls, S. D.
WIK—1150, G. E. Wharton, Houston, Tex.
WIP—1325, De Witt McKinley, Ft. Worth, Tex.
WIZ—1175, H. S. Olding, New Glasgow, N. S., Can.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAJ—1000, D. J. Morris, Weir, Tex.
WJAN—1700, Arthur Chapelle, Woodburn, Ore.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAQ—1200, Paul Glaister, Napanoch, N. Y.
WJAS—1900, Louis Raymond, Pullman, Wash.
WJAX—2000, Allan Harvey, Snohomish, Wash.
WJAZ—1400, Wilson Woodside, Calgary, Alta., Can.
WJX—2550, Robert Rowe, Santa Clara, Calif.
WJZ—2575, J. J. Beales, Jr., San Anselmo, Calif.
WKAC—1175, H. Dammann, Bronx, N. Y.
WKAF—1500, C. M. Bennett, Aurora, S. D.
WKAL—1850, Arthur Chapelle, Woodburn, Ore.
WKAN—1100, C. M. North, Malden, Mass.
WKAQ—3850, Arthur Chapelle, Woodburn, Ore.
WKAS—1075, Paul Glaister, Napanoch, N. Y.
WKC—1200, J. E. Latt, Fairfield, Tex.
WKY—2400, R. Bartholomew, Garrochales, Porto Rico.
WLAC—1175, D. J. Morris, Weir, Tex.
WLAG—4150, H. A. Crowe, S. S. Ethan Allan, South of Hawaii.
WLAH—1500, D. J. Morris, Weir, Tex.
WLAJ—1450, J. H. Wall, Rensselaer, N. Y.
WLAK—1575, Vinson Crowder, Houston, Tex.
WLAL—1525, Arthur Chapelle, Woodburn, Ore.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WLAV—2000, G. A. Gallagher, Berkeley, Calif.
WLAW—1450, C. C. Sawyer, Liberal, Kans.
WLAY—4200, M. P. Jacot, Copley, O.
WLAZ—2075, A. B. Butters, Los Angeles.
WLB—1150, Wilson Woodside, Calgary, Alta., Can.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—2025, L. W. Beretta, San Mateo, Calif.
WMAB—1450, Arthur Chapelle, Woodburn, Ore.
WMAC—1300, R. T. Andrea, Cobalt, Ont., Can.
WMAD—1150, H. J. Latshaw, Clearfield, Pa.
WMAF—1250, R. Henry, Butler, Mo.
WMAG—1325, R. T. Andrae, Cobalt, Ont., Can.
WMAH—1350, S. S. Atwood, Esperance, Wash.
WMAK—1175, Wm. J. Wolverton, Linton, N. D.
WMAM—1350, H. Dammann, Bronx, N. Y.
WMAQ—1850, R. Rowe, Santa Clara, Calif.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WMAU—1400, W. W. Selden, Springfield, Mass.
WMAV—1500, H. S. Olding, New Glasgow, N. S.
WMAY—1400, R. J. Gall, Blythe, Calif.
WMC—1625, Perkins Benneyan, Fresno, Calif.
WNAB—1350, H. S. Olding, New Glasgow, N. S., Can.
WNAC—2500, S. S. Atwood, Esperance, Wash.
WNAD—1500, C. T. Mower, Malden, Mass.
WNAK—1200, J. H. Wall, Rensselaer, N. Y.
WNAM—1375, H. S. Olding, New Glasgow, N. S., Can.
WNAQ—1000, R. T. Andrea, Cobalt, Ont., Can.
WNAS—1200, B. S. Maynard, Detroit, Mich.
WNAT—1000, R. V. Hammer, Creston, Ia.
WNJ—2375, B. H. Seydel, Tacoma, Wash.
WOAA—1525, G. F. Cory, New Bedford, Mass.
WOAC—1600, O. P. Klein, Leduc, Alta.
WOAI—2250, H. S. Olding, New Glasgow, N. S., Can.
WOAJ—1550, S. S. Atwood, Esperance, Wash.
WOAN—1100, H. M. Clark, Auburn, Me.
WOAP—1950, L. W. Beretta, San Mateo, Calif.
WOAS—1275, L. Hull, Eureka, Kans.
WOAZ—1525, E. S. Macartney, Ottawa, Ont., Can.
WOC—1675, H. S. Trost, San Jose, Calif.
WOI—1550, L. W. Beretta, San Mateo, Calif.
WOK—1725, H. S. Olding, New Glasgow, N. S., Can.
WOO—1575, M. B. Gilbert, Douglas, Wyo.
WOQ—1475, Arthur Chappelle, Woodburn, Ore.
WOR—1800, Jack Costa, Haiku, Maui, T. H.
WOS—1625, G. L. Harms, Portland, Ore.
WOAW—1400, Robert Rowe, Santa Clara, Calif.
WPA—1950, W. E. Davison, Berwick, N. S., Can.
WPAB—1250, J. Skinner, Corsicana, Tex.
WPAC—1325, L. C. Hopkins, Enfield, Conn.
WPAH—1650, Arthur Chapelle, Woodburn, Ore.
WPAK—1250, Arthur Chapelle, Woodburn, Ore.
WPAS—1900, W. D. Newcomb, Socorro, N. M.
WPAT—1375, L. C. Kemp, Seattle, Wash.
WQAM—1400, C. V. Bell, Ottawa, Can.
WRL—1100, W. M. K. Young, Kansas City, Mo.
WRP—1375, Guy V. Carrolo, Houston, Tex.
WRR—2000, H. S. Olding, New Glasgow, N. S., Can.
WRW—2550, L. W. Beretta, San Mateo, Calif.
WSAS—1225, F. T. Wycoff, Springfield, Mass.
WSAV—1125, Billy Withington, Jackson, Mich.
WSB—2275, L. K. Poyntz, Victoria, B. C., Can.
WSL—1175, L. Hull, Eureka, Kans.
WSY—2050, Arthur Chapelle, Woodburn, Ore.
WTAC—2025, R. J. Gall, Blythe, Calif.
WTAW—1525, L. W. Beretta, San Mateo, Calif.
WTG—1375, Arthur Chapelle, Woodburn, Ore.
WWAC—1550, Donald Wood, Waco, Tex.
WWAD—1050, M. L. Johnson, Atchison, Kans.
WWAX—1700, Sydney Warner, Springfield, N. J.
WWB—2150, R. Taylor, Livermore, Calif.
WWI—1800, R. J. Gall, Blythe, Calif.
WWJ—2200, F. W. Hill, Cristobal, C. Z.
WWL—1275, G. W. Perkins, Thompson, N. Y.
2LO—3175, S. F. Richards, Janesville, Wis.

## *Rival Hand Saw Musicians Entertain WEAY Listeners*

HOUSTON, TEX.—Adam Carter, hand saw musician, recently appeared as entertainer for The Evening Post in a program from WEAY, the Iris theater station. The next day, John Weber, rival hand saw musician, offered to show that he also can play entertaining Radio music on the one-time carpenter tool.

Subsequent developments brought scores of requests for special selections and repeat numbers on the hand saw. Weber used a special-made phonograph record for accompaniment.

# MOVIES IN THE HOME BY RADIO

## "SOON WILL BE PROVEN FACT," SAYS INVENTOR

### Inventor of "Pictures by Radio" Machine Working Out Problem

### *Only One Kink Unsolved*

### Will Enable Persons in Far Away States to See Inaugural Ceremonies

By L. M. Lamm

"Movies by Radio in the home will soon be an accomplished fact, startling as this may seem, for the only unsolved problem is the speed factor," says C. Francis Jenkins of Washington, D. C., inventor of a machine by which photographs are sent by Radio. Actual demonstrations have been made between Washington and Philadelphia of the practicability of sending these pictures and Mr. Jenkins is now working on perfections of his new idea. Answering the writer's questions, Mr. Jenkins continued:

"When, then, this remaining problem of speed is solved, and it is now being worked out gratifyingly, persons in California or Nebraska or Maine or Florida will be able to see the inaugural ceremonies of their President in the National Capitol on the day of inauguration, or both see and hear grand opera broadcast from any point.

**Will Allow Fast Picture Distribution**

"Meantime, while this problem is being worked out photographs by Radio will be perfected for useful and speedy service in the distribution of picture news for the daily paper, the news bulletin, the theater and all other subscribers to such service."

The process of broadcasting photographs, Mr. Jenkins explained, consists chiefly in "slicing" the picture to be broadcast into hundreds of perpendicular sections, each about 100th of an inch thick, and in moving the projected image of each section across a so-called photo-electric cell, made of selenium or a similar mineral, whose ability to carry an electric current varies with the intensity of light falling upon it. As each section of the illuminated image is thus drawn across the cell, the dark portions, halftones and light spots formed along the "slice" by the shadows, lights and color variations by the photograph serve to correspondingly decrease, increase or maintain the flow of electric current through the cell.

**Substitute for Microphone**

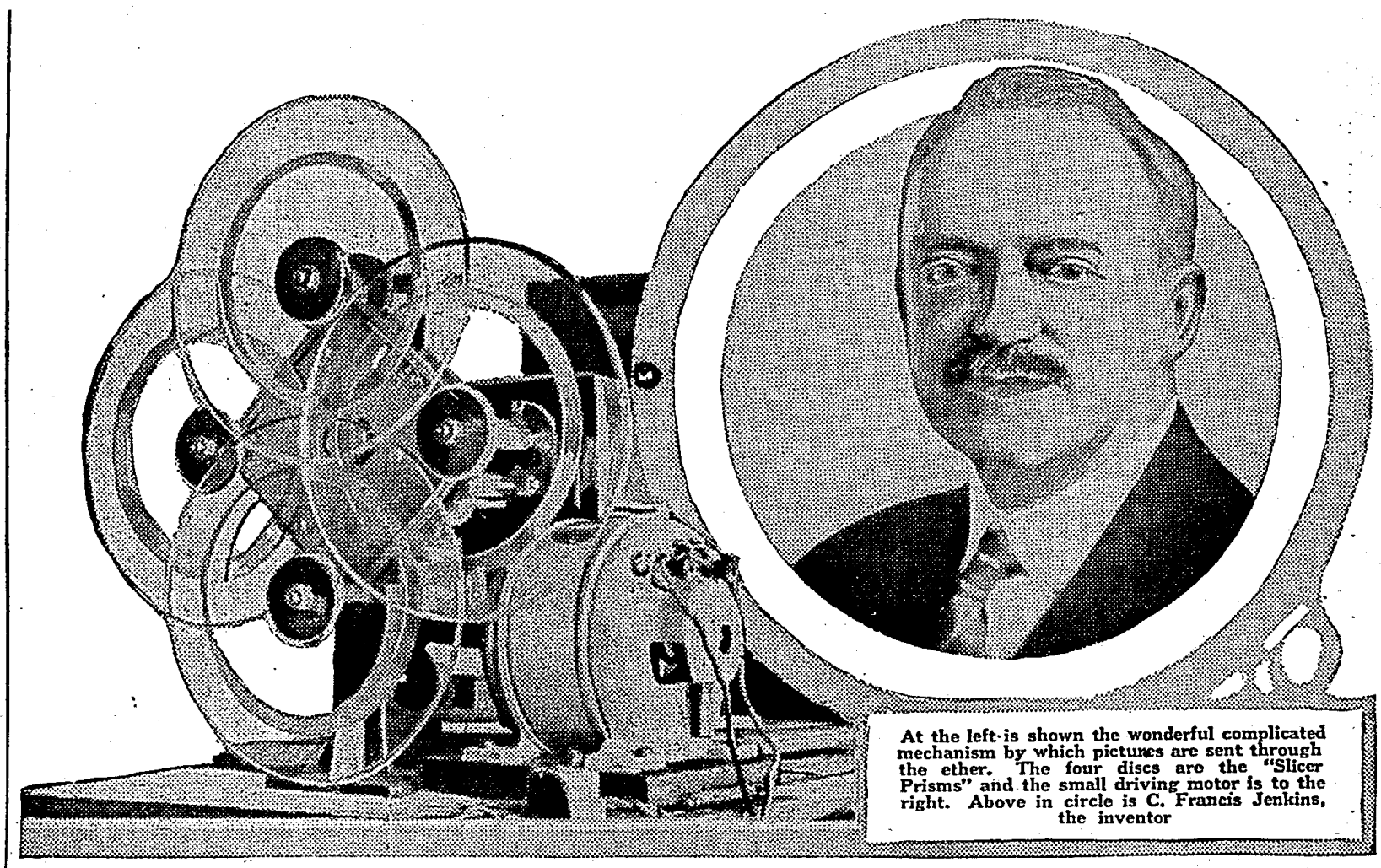
Having transformed light variations into electric current, Mr. Jenkins explained, it was a simple matter to substitute this instrument for the microphone mouthpiece of the Radiophone, for the function of the microphone is similar to transform sound variations into current variations.

To reproduce the picture at the receiving station a virtual reversal of the sending process occurs. Two methods have been successfully employed. By the first method, the Radio waves are received over a regular Radio receiving set, the receiver of which, however, is equipped as follows:

On the metal diaphragm of the receiver is mounted a tiny mirror which vibrates with the diaphragm as the Radio oscillations are registered. Focused on the mirror is a strong ray of light, which is reflected through a shutter when the mirror is stationary. As the impulses originating from the sending station start, the mirror oscillates with the diaphragm and the reflected ray also oscillates across the shutter hole. Thus, when the diaphragm is vibrating slowly more light from the ray filters through the aperture than when the vibrations are rapid. The current variations received by Radio are accordingly transformed back to light variations which are registered on a sensitized photographic plate.

**Receiver Has "Slicing" Machine Also**

It will be seen, however, that these variations as they are received must be reproduced in perpendicular "slices" across the face of the plate in order to build up again the completed picture. Here Mr. Jenkins devised a new type of disc prism, which he has patented, constituting in appearance a circular glass plate, about ten inches in diameter, with a rim beveled to form a prism of spiral shape and of gradually increasing thickness at the edge. As the beam of light from the mirror strikes this revolving prism it is bent along a perpendicular path downward across the plate, repeating this movement until each section of the original picture, sliced up in a similar way by circular prisms, has been neatly laid down beside its neighbor to form the completed reproduction. The correct horizontal spacing is maintained by a system of like discs, revolving in the sending and receiving stations at the same speed.



At the left is shown the wonderful complicated mechanism by which pictures are sent through the ether. The four discs are the "Slicer Prisms" and the small driving motor is to the right. Above in circle is C. Francis Jenkins, the inventor

**Second System Simpler**

The second method, just recently developed and the one which, because of its simplicity, probably will be permanently substituted for the former system, consists in sending the Radio current as amplified by the Radio receiving outfit through a specially constructed incandescent electric light bulb, the tiny filament of which is surrounded with hydrogen. About two volts of a storage battery current are conveyed constantly through this filament, so as to produce a red glow in the bulb.

As the varying Radio currents course through, the filament lights up, dies down to produce half tones, and shades. Thus it reflects directly on the plate the varying intensities of light. This method does away with the uncertainty of reflecting mirrors, which are always subject to vibrations likely to distort the reproduction.

**Needs Little New Apparatus**

It is evident, therefore, that little apparatus is required, in addition to standard Radio equipment, to make the usual receiving set a picture-receiving outfit. The entire adjunct takes up but a small amount of room and can easily be placed on the library table for operation. A person of constructive inclinations could readily manufacture his own set, providing, of course, he could obtain possession of the disc prisms.

Heretofore, inventors have succeeded in sending etchings by Radio by curving the etchings over a revolving cylinder and passing slowly across the cylinder an electrical contact, which sent out current impulses as it touched the high points of the etching. Never before, Mr. Jenkins says, have photographs themselves been transmitted because of the inability in times past to reproduce halftones.

The first distant transmission of photographs by Radio was made by Mr. Jenkins on March 3 when they were sent from the naval Radio station in this city to the receiving station of the Philadelphia Evening Bulletin.

The test was made under the auspices of the North American Newspaper Alliance in the presence of newspaper publishers and scientists. At that time pictures of President Harding, Vice President Colidge, and Governor Pinchot of Pennsylvania were sent and received very successfully.

# The Week's Advance Broadcast Programs

## Tuesday, May 22

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Frederick Stanger, tenor; Mannie Roth, violinist.
KFDB (Pacific, 400), 2:00-2:30 P. M., Y. W. C. A. talk, Margaret LeSeur, Sec'y San Francisco Y. W. C. A.
KPO (Pacific, 400), 8:00-10:00 P. M., Chorus, 20 male voices.
KSD (Central, 546), 8:00 P. M., Musical program, Marguerite Wessels, soprano; Adelaide Blase, Genevieve Seibert, violinist; Ruth Haynie, O. R. McHughes, Brittie L. McGee, pianists; Address, "Veterans of the Allies," Capt. Francis L. Tottenham, O. B. E., Royal Navy, Naval Attaché to British Embassy in Washington; Address, "Municipal Opera," Nelson Cunliff, Chairman Executive Committee, Municipal Opera Association of St. Louis.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Bergey Chicago Opera School, Theodore S. Bergey, director; Elsie C. Mellus, Pansy G. Bird, sopranos; Ruth Freeman, pianist; A. E. Bredemeir, tenor; Theodore S. Bergey, baritone.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Band from Gorman, Tex.
WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program by Chicago Fine Arts Conservatory of Music; Jack Chapman's Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray, editor of The Semi-Weekly Farm News; 8:30-9:30 P. M., Musical program, Mrs. LaRue Nelson and assisting musicians; 11:00-12:00 P. M., Musical program under auspices of Lester Gunst Company.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Song and quartet recital; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; Children's stories, Cousin Sue; 8:00-9:55 P. M., Musical program; 10:10-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales," Uncle David; 8:30 P. M., Evening program; Business report, Roger W. Babson; Selections, Winchester Laundries' Orchestra; Lecture, Tufts College; Winchester Laundries' Orchestra.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest; Scientific American Article.
WGY (Eastern, 380), 7:45 P. M., Musical program, Georgia Minstrel Boys; Old Southland Melodies, WGY Orchestra; Darktown humor, Minstrel Boys; "I Wish I Was in Dixie," Male Quartet; Dialogue, William Jackson, Washington Lee; "Georgia Cabin Door," Washington J. Lee, baritone; "Swanee Smiles," "The Heart of Virginia," "Lonesome Mamma Blues," Orchestra; "My Southern Home," Orchestra; "Black Trash," Minstrel Boys; "Mah Mandy Lee," Tambo Jones, tenor: "Kentucky Babe," "Massa's in de Cold, Cold Ground," Radio Four; "Hot Time in the Old Town Tonight, Minstrel and Orchestra.
WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, C. Conrad, Alamo Theater; Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Charles Myer Orchestra; Grace Deppe, soprano.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Recital and dinner music; 3:00-4:30 P. M., Short talks; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Concert, Charlie Kerr's Orchestra in L'Aiglon Cafe.
WLW (Eastern, 360), 10:00 P. M., Musical program, "Burlesque," "Cradle Song," Francis Wolff, cellist; "Le Nil," "Elegie," Mrs. R. Sayler Wright, soprano; Physical culture talk, Dr. C. A. Wulzbach, of Central Y. M. C. A.; "Eklog," "Spring Song," Francis Wolff; "Mother, My Dear," "Dreams," "Darkness," "My Love Is Come to Me," Mrs. Wright; Radio farce, "Fearfully Fat for Forty," A. R. Plough, Louis Koetter; "Scherzo," "Venetian Love Song," Francis Wolff; "Songs My Mother Taught Me," "Homeward," Mrs. Wright.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Bush Conservatory of Music; Report, Babson; Talk on "Farm and Garden Society;" "The Way of Business," Henry Walter Graham, humorous reading; Axel Christensen, pianist; 9:15 P. M., Compositions, Mrs. Floy Little Bartlett.
WMC (Central, 500), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gasper Papalardo, director; 11:00 P. M., Midnight Frolic.
WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Organ recital, Mary E. Vogt.
WWJ (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Walter Bates, tenor; Edith Pickles, soprano; Harrison Burch, pianist.

## Wednesday, May 23

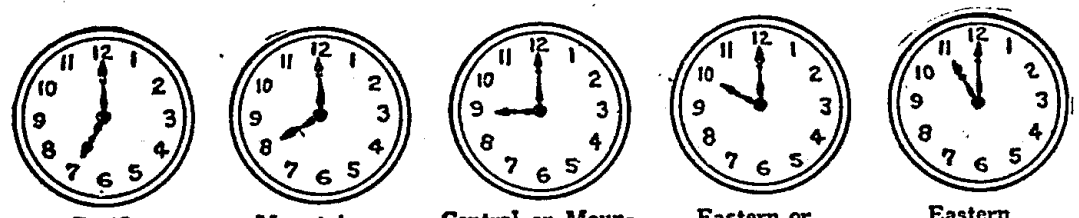
CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Albert Downing, tenor; H. Saunders, cellist.
KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Banking," Officers Mercantile Trust Co.; 2:30-3:00 P. M., Music, lecture; 8:00-10:00 P. M., French music; One-act play in French, professional actors of San Francisco French colony.
KSD (Central, 546), 8:00-9:45 P. M., Musical program, Overture, "Egmont," "The Sawmill River Road," Missouri Concert Orchestra; Organ recital, Stuart Barrie; Vocal specialty, Cliff Nazarro; Band specialty, George Hall and orchestra.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Jessie R. Edwards, soprano; Sallie Menkes, accompanist; Katharine Gorin, pianist; Theodora Beidlung, violinist; Alma Broberg, reader.
WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:45 P. M., Evening program; Girls' Hour, Eunice L. Randall; Concert, Boston Masonic Club; "Summer," Henry Copley Greene, American Red Cross.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest; 9:00-11:00 P. M., Musical program, Morris E. Bennet, Buffalo, N. Y.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Mildred Schirmer, pianist; 7:30-9:00 P. M., Concert; Alyce Everin, pianist; Mrs. William Corrigan, soprano; Esther Brown, violinist; Bernice Lake, soprano; Oakley H. Kellogg, flute; solos; Maurice Mennen, George A. Resta, clarinetists.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Short talks and piano recital; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.
WLW (Eastern, 360), 8:00 P. M., Musical program, "Awakening," Mrs. E. B. Hausfeld; Roger Hill Dance Orchestra; Mrs. Henry Risch, soprano; Henry Risch, violinist; Mabel Moore, accompanist; "Lorely," "In Einem Kuhlen Grunde," "Haidenroslein," Bavarian Male Chorus; Radio drama, "Magda;" "Der Lindenbaum," "Es Steht Einer Lind," "Spinn-Spinn," Bavarian Chorus.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Cosmopolitan School of Music and Dramatic Art; 7:00 P. M., Stories, Georgene Faulkner; 9:15 P. M., Musical program; Hilda Butler Farr, pianist; Helen Hedges, soprano; Cooper Lawley, tenor.
WOC (Central, 484), 3:30 P. M., Talk, D. K. Kirk; 6:30 P. M., Sandman's visit; 7:00 P. M., Musical program, Erwin Swindell, director; Grace Harper, Gertrude McKinsey, Elsie Dack and Roscoe Williams; 8:00 P. M., Lecture, "Electricity on the Farm," Jos. Kimmel of Delco Light Co.; 10:00 P. M., Musical program, J. Dwight Clark, John McGreevy, Mrs. John McGreevy, Blanch Whitcomb.
KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, Nielsen Laurik, San Francisco Palace of Fine Arts; 2:30-3:00 P. M., Lecture, "The Making of Fine Pottery," Wm. V. Bragdon, Tile Shop of Berkeley; Recital, Mrs. Emily Kauffeld, pianist.
KPO (Pacific, 400), 8:00-10:00 P. M., Organ recital, Gladys Salisbury.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Violet Tait, soprano; Howard Nielson, tenor; Sallie Menkes, accompanist; Harriet G. Allen, contralto; Mildred Kilmer, whistler; Maybell Wells, accompanist; 9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. J., head of Dept. of English, Loyola University.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Knights Ku Klux Klan, Realm 101, Fort Worth.
WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program, Paramount Orchestra; Songs, C. W. Stewart; Jack Chapman's Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and piano selections; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Stories for the little tots by Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Dealing With Public Utilities," J. W. Everman, Supervisor of Public Utilities of Dallas; 8:30-9:30 P. M., Program by Honey Grove representatives, arranged by J. H. Lowry, editor of Honey Grove Signal; 11:00-12:00 P. M., Musical program under auspices of Will A. Watkin Company.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:00 P. M., Musical program; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; Children's stories, Cousin Sue; 8:00-12:00 P. M., Song recital; Dance music, Meyer Davis, Bellevue-Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "General Conditions in the Shoe and Leather Industry," Weekly Review New England Shoe and Leather Assn.; Evening program; "Romance of the Shoe," Harry M. Wood; Concert, Amrad Banjo-Mandolin Club.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest, Boy Scout Radiograms, Industrial Employment Bulletin.
WGY (Eastern, 380), 1:00 P. M., Music and address, "Foods for Growth—Milk," Mary G. McCormick, Supervisor of Nutrition, N. Y. State Dept. of Health; 7:45 P. M., Radio drama, "What Happened to Jones;" Selection from "You're in Love." WGY Instrumental Quartet.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ recital, Roy C. Parks, Rialto Theater; 7:30-9:00 P. M., Concert, Beta Chapter Beta Pi Omega Sorority; Betty Maoris, soprano; Mary Emily Chenault, pianist; Thelma Duffin, soprano; Sara Hill Richardson, violinist; Sallie Pennington, soprano; Ruth Blakey, pianist; Reading, Mrs. G. L. Gibson; Mary Gibson Craig, soprano; Sunday School lesson, Dr. Harris Malinckrodt; Talk, S. W. McGill, Child Welfare; Charlie Bynum, pianist.
(Continued on page 9)

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Hotel Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks and musical program; 4:30-6:00 P. M., Fashion talk; Dream Daddy with little tots; 7:30-8:00 P. M., Dream daddy with the boys and girls; 8:00-9:55 P. M., Song recital and short talks; 10:10-12:00 P. M., Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Practical Education for Young Men," Nathan Powell, principal Powell Training School.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music; Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Song recital; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; Children's stories, Cousin Sue.
WOO (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Organ recital, Mary E. Vogt; 8:00-12:00 P. M., Musical program.
WWJ (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Constance Mattes, soprano; Victor LeBlanc, baritone; Talk, William H. Wetherbee, grand commander Knights Templar.

## Thursday, May 24

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Norma Hermiston, soprano; Harry Adaskin, violinist; 10:00-11:00 P. M., Dance program, Star Orchestra.

## What Time Is It?




THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

# How to Make One Condenser Flivver Super Set

## Part IV—Panel Layout and Wiring

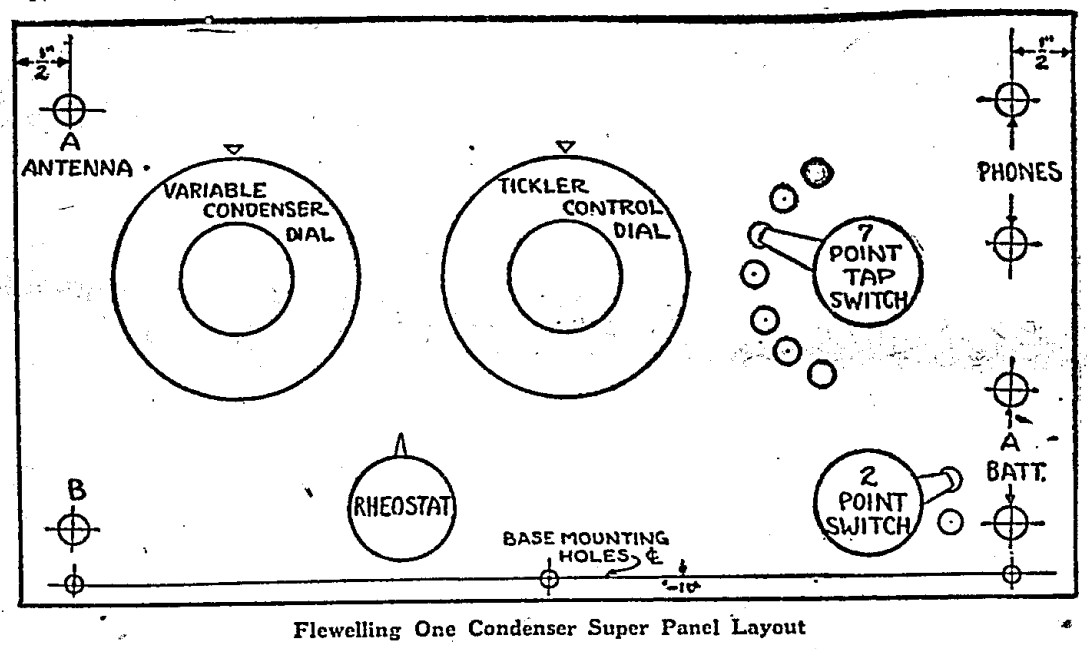
*By E. T. Flewelling*

A DISCUSSION of panel arrangement for any Radio set will often bring up some more or less interesting points. For instance, it can be readily seen that an absolutely improper layout might easily result in the failure of the entire set. For a general rule to follow when considering panel layouts, perhaps the idea of progression is the best and certainly is the one that is most generally accepted. Progress with your layout in direct line with the signals that are received. That is, if the signal comes first to the extreme left of the panel, use every care that the layout of your panel does not make this signal repeat its course back and forth until it finally reaches the output point. Start it at the extreme left for the input side and see that the layout is such that it goes to the right or output side in progressive steps as it goes through each individual piece of apparatus, and make each connection as short as possible.

**Suitable Layout for Flewelling Set**

A panel layout that will comply with these requirements, is given in Figure 1. The output posts are at the extreme left of the panel and the signal will travel through the set progressively until it reaches the extreme right of the panel where the output posts are located.

Because of different types of dials, condensers, inductances, etc., will be used by different builders, no dimensions can be given. It is suggested that you assemble the various parts together, and place them on a flat surface, such as a table top, following the arrangement pictured.




Flewelling One Condenser Super Panel Layout

This will enable you to determine the spacing required for the parts and from this you can decide upon the size of the panel needed to accommodate the parts that you are using. Secure the proper sized panel and a piece of copper shielding of the same size, mark the panel for the various holes, then have the copper shielding held firmly under it so both shield and panel are drilled at one operation. When the drilling is finished there will be several holes in the shield that it will be necessary to enlarge so that no short circuits will occur between the instrument shafts and the shielding. Note the three holes on the bottom line of the panel, and the holes for the 2-point switch.

The holes for the switch should be spaced far enough apart so that when the switch is thrown from one point to the other that the two points are not connected together by the switch blade and thus short circuit the B battery. The holes in the bottom line of the panel are to be used for screws to mount the panel in an upright position on the edge of a suitable board referred to in a previous article.

The panel and shielding should now be lined up with each other and fastened to the base board. It is then in good solid and convenient position for mounting the various parts.

**Mounting the Parts**

Mount the parts on the panel and watch carefully that the shafts and parts do not touch the shield as you mount each separate piece. If this is cared for at this time you will not have to tear your set down later to remove a troublesome ground or short circuit.

Our next work is to make the various connections and it is quite important to put the best efforts on this part of the construction. Let me say a word about soldering. All parts to be soldered must be very clean, always use copper soldering clips at the points of connection. Do not attempt to solder direct to a binding post or other heavy metallic point unless you are an adept at the art. The heavier points must, for correct soldering, be brought to a high heat and the time required to do this may result in injury to the fiber or other parts. A small copper clip reaches this high point of heat so quickly that the work is done before harm can come to the other parts. Use a very small amount of soldering paste or flux, also of solder, and heat the joint just to the point where the solder flows quickly through the joint then remove the iron immediately. Because you have arranged for your panel to be in an upright self-supporting position you will find this work very interesting due to the fact that both hands may be used exclusively for soldering.

**Systematic Wiring**

Like everything else the wiring of a Radio set is best done if a system of some kind is followed. Without a systematic method of wiring one is apt to become confused as they carry out the diagram. Lots of folks start out bravely with even such a simple diagram as ours, and find out later that their set does not work because they have forgotten one little connection.

The more experienced worker always divides his diagram into separate parts, is thus able to wire one simple section correctly, and having done this goes on from one section to the other until he finds his work completed, and completed correctly.

**Doing Work in Sections**

In line with the above let me suggest a suitable division of the sections of a Radio set. If it is followed, I believe that you will be much pleased with your results. When you start to wire your set forget for the moment, every other part of it but the filament lighting circuit with its socket, rheostat, etc. Complete this circuit first and having done so, insert the tube in the socket, connect the battery and you can immediately see whether or not this circuit is correct. If it is, proceed to the next part of the diagram.

The grid circuit or the part of the diagram to the left of the tube is usually the best part to work on second. Start this section by connecting the antenna post A to one side of the variable condenser C-1, and connect the other side of the condenser C-1 to the top point or beginning of the tuning inductance L-1.

Stop now and connect the taps of the inductance to their respective points on the panel switch. This is best done by mounting the coil on the board first. The switch points are all ready in place on the panel so that if a wire is soldered to each switch point and left long enough, all that we have to do is to pull the wire over to its correct tap on the inductance and solder it there. This results in short, clean-cut taps on the inductance. We can now go on with the rest of the circuit.

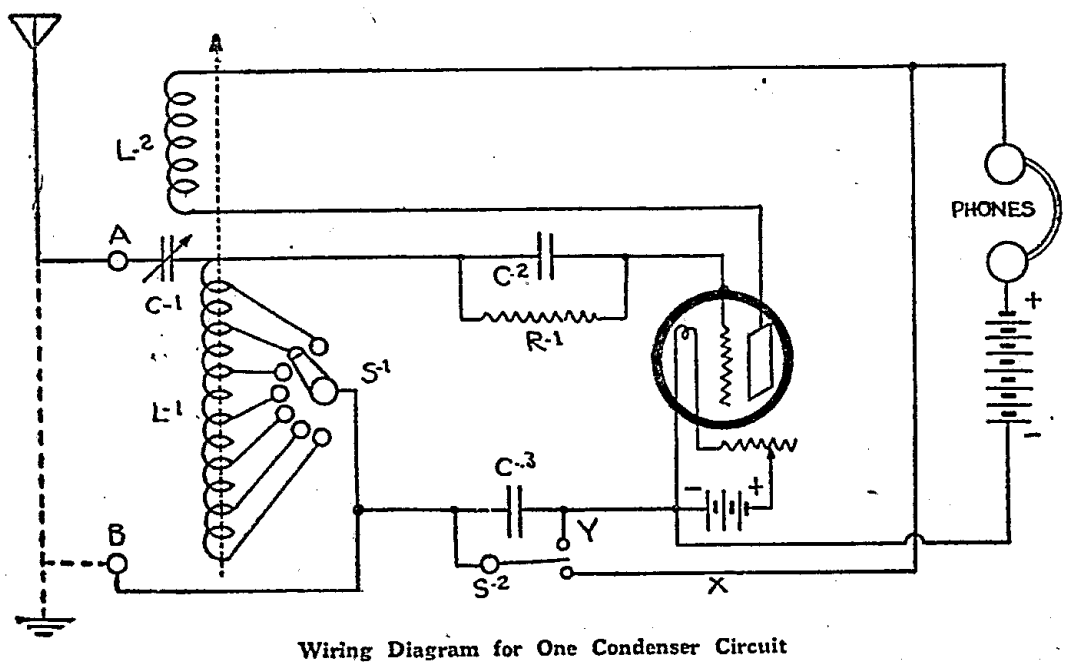
**Finishing the Circuit**

Carrying along the signal's path, connect the top point of the inductance to the grid leak and condenser and then from the other side of the leak and condenser go to the grid post of the tube. Be sure that these connections are as short as possible.

The next thing the program calls for is to complete the grid circuit wiring by connecting the inductance tap switch arm to the .006 mfd. condenser and the arm of the 2-point switch S-1, and finish the grid circuit by connecting the .006 mfd. condenser to both the switch contact of S-2 and to the positive filament post of the socket.

**Plate Circuit**

If this scheme is followed you may go on to the wiring of the plate circuit with the feeling that you have nothing to do




Wiring Diagram for One Condenser Circuit

but get that one remaining circuit right, and that your receiver is correct so far. Detailed directions for the plate circuit wiring are not considered necessary and I would only suggest that you leave the connection marked X until the last and run this connection from the remaining point of the 2-point switch to the most convenient point between the phones and the tickler coil, using great care that you make the connection exactly as shown on the diagram. This is the most critical point about the set, hence the caution.

This completes the panel layout and wiring instructions for the set and if directions have been carefully followed out should result in a good clean cut piece of Radio receiving apparatus of an up to the minute type.

**Suitable Cabinet**

The matter of a suitable cabinet for such a set must of course be left to the individual. Most cabinets are recessed to receive the panel flush with the front of the cabinet. That is the reason for mounting the panel on a base board that was slightly shorter than the panel. The board cannot interfere then with the sides of any cabinet that is used, when the panel and set are mounted.

Note also that on the right or output side of the panel are binding posts for the phones and also for the filament battery. This enables us to carry on to an amplifier if we wish. For this reason connections to the B battery have been left to be made from the back of the set at a point that is most convenient for the individual builder.

If a panel mounting type grid leak is used the builder can place it on the panel according to the particular make of leak used. No two makes are identical so that this point must be left to the maker.

For the convenience of those who wish to follow the diagram with this article, last week's wiring diagram is again shown in this issue with some changes the writer deemed advisable.

(TO BE CONTINUED.)

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The night range of sending and receiving stations is much greater than the daylight range. Do not expect to hear stations a great distance away in the daytime.

# Radiophone Broadcasting Stations

## *Corrected Every Week—Part III*

**State, City, Call**

**Alabama:**
Auburn, WMAV
Birmingham, WSY
Mobile, WEAP
Montgomery, WKAN

**Arizona:**
Phoenix, KDYW, KFAD, KFCB
Tucson, KFDH

**Arkansas:**
Fayetteville, KFDV
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

**California:**
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KMJ
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KFCL, KFI, KHJ, KJS, KNN, KNV, KNX, KUS, KWH
Modesto, KXD
Oakland, KLS, KLX, KZM
Reedley, KFAZ
Richmond, KFCM
Sacramento, KFBK
San Diego, KDPT, KDYM, KFBC, KFFA
San Francisco, KDN, KDZG, KDZX, KFDB, KPO, KSL, KUO
San Jose, KFAQ, KQW
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

**Colorado:**
Boulder, KFAJ
Colorado Springs, KFFQ, KFCR
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KFIC, KLZ
Gunnison, KFHA
Pueblo, KFGB
Trinidad, KFBS

**Connecticut:**
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

**Delaware:**
Wilmington, WHAV, WOAT, WPAW

**District of Columbia:**
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WQAW

**Florida:**
Jacksonville, WDAL
Miami, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH
Winter Park, WRAF

**Georgia:**
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WMAZ
Savannah, WHAO, WRAB

**Idaho:**
Boise, KFAU, KFDD, KFFB
Kellogg, KFEY
Moscow, KFAN

**Illinois:**
Belvidere, WOAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WHAP
Elgin, WTAS
Galesburg, WRAM
Lake Forest, WABA
Mattoon, WQAL
McLeansboro, WRAS
Peoria, WJAN, WQAX
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

**Indiana:**
Brookville, WSAL
Evansville, WAOU
Greencastle, WLAX
Huntington, WHAY
La Porte, WRAF
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WGAZ
West Lafayette, WBAA

**Iowa:**
Ames, WOI
Boone, KFGQ
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Lamoni, KFFV
Le Mars, KFCY, WIAU
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

**Kansas:**
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Cheney, KFGP
Emporia, WAAZ
Hutchinson, WLAS
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WTG
Marion, WRAD
Parsons, WOAJ
Topeka, WJAQ, WPAM
Wichita, KFHI, WAAP, WEAH, WEY

**Kentucky:**
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS, WLAP
Paducah, WIAR

**Louisiana:**
Alexandria, KFFY
Baton Rouge, KFGC
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, KFHF, WGAQ

**Maine:**
Bangor, WPAY
Houlton, WLAN

**Maryland:**
Baltimore, WCAO, WEAR, WKC, WNAV
Frostburg, WPAQ

**Massachusetts:**
Boston, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

**Michigan:**
Ann Arbor, WMAX, WQAJ
Berrien Springs, KFGZ
Dearborn, WWJ
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Rodgers, WCAF
Saginaw, WIAW

**Minnesota:**
Baudette, KFGY
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, WBAD, WBAH, WCAS, WLAG, WRAH
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AVT, WAAH

**Missouri:**
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, KFHD, WEAK
St. Louis, KFEZ, KFGJ, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

**Montana:**
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

**Nebraska:**
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, KFDU, WFAV, WJAB, WKAC, WMAH, WQAP
Norfolk, WJAG
Oak, KFEQ
Omaha, KFCZ, KFFX, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
Utica, KFGV
York, KFDR

**Nevada:**
Reno, KDZK
Sparks, KFFR

**New Hampshire:**
Laconia, WKAV

**New Jersey:**
Atlantic City, WHAR
Camden, WIP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

**New Mexico:**
Roswell, KNJ
State College, KOB

**New York:**
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WEAF, WJX, WLAW, WSAP
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Stapleton, WDT
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

**North Carolina:**
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

**North Dakota:**
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

**Ohio:**
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH, WSAI
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL, WWAJ
Dayton, WAI, WABD, WJAJ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

**Oklahoma:**
Ardmore, WOAA
Chickasha, KFGD
Norman, KFHC, WNAD
Okemah, WKAK
Oklahoma City, WKY
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

**Oregon:**
Arlington, KFGL
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW
Salem, KFCD

**Pennsylvania:**
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Harrisburg, WABB
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

**Rhode Island:**
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH

**South Carolina:**
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

**South Dakota:**
Brookings, KFDY
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

**Tennessee:**
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

**Texas:**
Abilene, KFGM, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, KFFZ, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WRAA, WSAY
Laredo, WWAX
Orange, KFGX, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, WCAR, WAOI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

**Utah:**
Ogden, KFCP
Salt Lake City, KDYL, KZN

**Vermont:**
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

**Virginia:**
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

**Washington:**
Aberdeen, KNT
Bellingham, KDZR
Everett, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

**West Virginia:**
Clarksburg, WHAK
Morgantown, WHD

**Wisconsin:**
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

**Wyoming:**
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

**Alaska:**
Fairbanks, WLAY

**Hawaii:**
Honolulu, KDYX, KGU, KYQ

**Porto Rico:**
Ensenada, WGAD
San Juan, WKAQ

**Canada:**
Calgary, CHBC, CFAC, CFCN, CJCY
Edmonton, CFCK, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS, CJGGC, CKOC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHNC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKY, CKZC, CJNC

**Cuba:**
Havana, PWX

(NOTE—The third and last part of the schedule list appears below. Next week the first part will appear.)

**WLAW**, New York, N. Y. 360 meters. New York Police Dept.

**WLAX**, Greencastle, Ind. 360 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

**WLAY**, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

**WLAZ**, Warren, O. 100 mi. 360 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

**WLW**, Cincinnati, O. 2,000 mi. 360 meters. Crosley Mfg. Co. Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat, 2 pm, special. Sun, 11 am, church services. Eastern.

**WMAC**, Cazenovia, N. Y. 360 meters. 500 mi. C. B. Meredith. No definite schedule.

**WMAD**, Rock Port, Mo. 360 meters. Atchinson County Mail.

**WMAF**, Dartmouth, Mass. 360 meters. Round Hills Radio Corp.

**WMAG**, Liberal, Kan. 360 meters. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

**WMAH**, Lincoln, Neb. 254 meters. 500 mi. General Supply Co. Temporarily discontinued.

**WMAJ**, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

**WMAK**, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

**WMAL**, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

**WMAM**, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

**WMAN**, Columbus, O. 360 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

**WMAP**, Easton, Pa. 360 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

**WMAQ**, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Mon, 4:35-5 pm, 9:15-10. Wed, Fri, 7-7:30 pm. Tues, Thurs, Sat, 7-8 pm. Central, Daylight Saving.

**WMAR**, Waterloo, Iowa. 360 meters. Waterloo Electrical Supply Co. Schedule not established.

**WMAT**, Duluth, Minn. 360 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

**WMAV**, Auburn, Ala. 250 meters. Ala. Polytechnic Institute.

**WMAW**, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

**WMAX**, Ann Arbor, Mich. 360 meters. K. & K. Radio Supply Co.

**WMAY**, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

**WMAZ**, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

**WMC**, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

**WMH**, Cincinnati, O. 360 meters. Precision Equipment Co. Temporarily discontinued.

**WMU**, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

**WNAB**, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

**WNAC**, Boston, Mass. 360 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

**WNAD**, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

**WNAL**, Omaha, Neb. 360 meters. R. J. Rockwell.

**WNAM**, Evansville, Ind. 200 mi. 360 meters. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

**WNAN**, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

**WNAQ**, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

**WNAP**, Springfield, O. 360 meters. 200 mi. Wittenberg College.

**WNAR**, Butler, Mo. 360 meters. C. C. Rhodes.

**WNAS**, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

**WNAT**, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

**WNAV**, Knoxville, Tenn. 360 meters. People's Tel & Telg. Co.

**WNAW**, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

**WNAX**, Yanktown, S. D. 360 meters. Dakota Radio Apparatus Co.

**WNAY**, Baltimore, Md. 360 meters. Shipowners Radio Service.

**WNJ**, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

**WNO**, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.

**WOAA**, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

**WOAB**, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

**WOAC**, Lima, O. 266 meters. Maus Radio Co.

**WOAD**, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

**WOAE**, Fremont, Nebr. 360 meters. Medland College.

**WOAF**, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

**WOAG**, Belvidere, Ill. 360 meters. Apollo Theatre.

**WOAH**, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

**WOAI**, San Antonio, Tex. 400 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.). Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

**WOAJ**, Parsons, Kans. 360 meters. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

**WOAK**, Frankfort, Ky. 360 meters. Collins Hardware Co.

**WOAL**, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

**WOAN**, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

**WOAO**, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

**WOAP**, Kalamazoo, Mich. 360 meters. Kalamazoo College.

**WOAQ**, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

**WOAR**, Kenosha, Wis. 360 meters. H. P. Lundskow.

**WOAS**, Middletown, Conn. 360 meters. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

**WOAT**, Wilmington, Del. 360 meters. Boyd Martell Hamp.

**WOAU**, Evansville, Ind. 360 meters. Sowder Bowling Piano Co.

**WOAV**, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

**WOAW**, Omaha, Nebr. 527 meters. Woodmen of the World.

**WOAX**, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

**WOAZ**, Stanford, Tex. 360 meters. Penick Hughes Co.

**WOC**, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

**WOI**, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

**WOK**, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church service. Central.

**WOO**, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12 m, time; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Thurs, 7:50 pm, concert. Eastern.

**WOQ**, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

**WOR**, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment, lectures. Eastern.

**WOS**, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

**WOU**, Omaha, Neb. 360 meters. Metropolitan Utilities Dist.

**WOV**, Omaha, Neb. 360 meters. R. B. Howell.

**WPA**, Ft. Worth, Tex. 360 meters. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, 11:30-12 m, 1:30-2 pm, 2:30-3, 6-6:30. Daily ex Sun, Mon, Wed, 8:30-9:30 pm, 10-10:05. Mon, 11-12 mid. Sun, 3-3:30 pm, 9-9:30. Central.

**WPAA**, Waco, Neb. 360 meters. Anderson & Webster Elec. Co.

**WPAB**, State College, Pa. 360 meters. Pa. State College.

**WPAC**, Okmulgee, Okla. Donaldson Radio Co.

**WPAD**, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7 pm, music. Wed, Fri, 10-11 pm. Sun, 2:30-3:30 pm. Central, Daylight Saving.

**WPAF**, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

**WPAG**, Independence, Mo. 360 meters. Central Radio Co., Inc.

**WPAH**, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

**WPAJ**, New Haven, Conn. 360 meters. Doolittle Radio Corp.

**WPAK**, Fargo, N. D. 360 meters. North Dakota Agricultural College.

**WPAL**, Columbus, O. 360 meters. Superior Radio & Tel. Equip. Co.

**WPAM**, Topeka, Kans. 360 meters. Awerbach & Guettel.

**WPAP**, Winchester, Ky. 360 meters. Theodore Phillips.

**WPAQ**, Frostburg, Md. 360 meters. General Sales & Engineering Co.

**WPAR**, Beloit, Kans. 360 meters. 50 mi. R. A. Ward. No definite schedule.

**WPAS**, Amsterdam, N. Y. 360 meters. J. & M. Electric Co.

**WPAT**, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

**WPAU**, Moorhead, Minn. 360 meters. Concordia College.

**WPAW**, Wilmington, Del. 360 meters. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.

**WPAY**, Bangor, Me. 360 meters. Bangor Radio Lab.

**WPAZ**, Charleston, W. Va. 360 meters. Dr. John R. Koch.

**WPG**, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

**WPI**, Clearfield, Pa. 360 meters. Elec. Supply Co.

**WPM**, Washington, D. C., 360 meters. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

**WQAA**, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

**WQAB**, Springfield, Mo. 360 meters. Southwest Missouri State Teachers College.

**WQAC**, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

**WQAD**, Waterburg, Conn. 360 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 6:30-7:45 pm, music, Boy Scout news. Eastern.

**WQAF**, Sandusky, O. 240 meters. Sandusky Register.

**WQAH**, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

**WQAJ**, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.

**WQAK**, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.

**WQAL**, Mattoon, Ill. 360 meters. 100 mi. Coles County Tel. & Telg. Co. Tues, Thurs, 9-11 pm, music, lectures. Central.

**WQAM**, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

**WQAO**, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern.

**WQAP**, Lincoln, Nebr. 360 meters. Am. Radio Co.

**WQAR**, Muncie, Ind. 360 meters. Press Pub. Co.

**WQAS**, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

**WQAT**, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5. Eastern.

**WQAV**, Greenville, S. C. 360 meters. 75 mi. Huntington & Guerry, Inc. Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.

**WQAW**, Washington, D. C. 360 meters. Catholic University of America.

**WQAZ**, Greensboro, N. C. 360 meters. Greensboro Daily News.

**WQAX**, Peoria, Ill. Radio Equipment Co.

**WRAA**, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

**WRAB**, Savannah, Ga. 360 meters. Savannah Board of Public Education.

**WRAC**, Mayville, N. D. 360 meters. State Normal School.

**WRAD**, Marion, Kans. 360 meters. Taylor Radio Shop.

**WRAF**, La Porte, Ind. 224 meters. Radio Club, Inc.

(Continued on page 9)

# STATION SCHEDULES

(Continued from page 8)

**WRAH**, Providence, R. I. 360 meters. Stanley N. Read.
**WRAK**, Escanaba, Mich. 360 meters. Economy Light Co.
**WRAL**, St. Croix Falls, Wis. 248 meters. Northern States Power Co.
**WRAM**, Galesburg, Ill. 360 meters. 200 mi. Lombard College. Wed, 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
**WRAN**, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
**WRAR**, David City, Nebr. 360 meters. 100 mi. Jacob C. Thomas. Tues, Fri, 7-9 pm. Central.
**WRAS**, McLeansboro, Ill. 360 meters. Radio Supply Co.
**WRAU**, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.
**WRAV**, Yellow Spring, O. 360 meters. Antioch College.
**WRAY**, Scranton, Pa. 360 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m. reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15, 10:30 pm, music. Sun, 4 pm, chapel. Eastern.
**WRK**, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
**WRL**, Schenectady, N. Y. 360 meters. Union College Radio Club.
**WRM**, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30. Univ. news, talks, music. Central.
**WRP**, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.
**WRR**, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
**WRW**, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Mon, Wed, Fri, 7:30-11:30 pm. Sun, 7:30-9:30 pm. Eastern.
**WSAA**, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
**WSAB**, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.
**WSAC**, Clemson College, S. C. 360 meters. Clemson Agri. College.
**WSAH**, Chicago, Ill. 360 meters. A. G. Leonard, Jr.
**WSAI**, Cincinnati, O. 309 meters. United States Playing Card Co.
**WSAJ**, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.
**WSAL**, Brookville, Ind. 246 meters. Franklin Elec. Co.
**WSAP**, New York, N. Y. 360 meters. Seventh Day Adventist Church.
**WSAV**, Houston, Tex. 360 meters. Clifford W. Vick. Temporarily discontinued.
**WSB**, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10.54 am, 5-6 pm, 7:30-9, church services. Central.
**WSL**, Utica, N. Y. 360 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
**WSY**, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.
**WTAC**, Johnston, Pa. 360 meters. Penn Traffic Co.
**WTAS**, Elgin, Ill. 275 meters. Chas. E. Erbstein.
**WTAU**, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.
**WTAW**, College Station, Tex. 360 meters. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
**WTG**, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
**WWAC**, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
**WWAD**, Philadelphia, Pa. 360 meters. Wright & Wright, Inc.
**WWAJ**, Columbus, O. 360 meters. Columbus Radio Club.
**WWAX**, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
**WWAY**, Chicago, Ill. 360 meters. Marigold Gardens.
**WWB**, Canton, O. 360 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
**WWI**, Dearborn, Mich. 360 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.
**WWJ**, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, 3-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special," Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.
**WWL**, New Orleans, La. 360 meters. Loyola Univ.

(Note.—This completes the station schedule list. The first part will appear again next week.)

# ADVANCE PROGRAMS

(Continued from page 4)

**WIP** (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Song recital; 5:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Song and piano recital; Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.
**WIW** (Eastern, 360), 10:00 P. M., Musical program, "Welcome, Sweet Springtime," Women's Chorus; "Spring's Awakening," Mrs. E. B. Hausfeld, whistler; "The Kiss," Jeanette Tibbs, soprano; "Scherzando," Mrs. C. E. Haddock; "May Morning," Mrs. Eugene Zimmerman; "The Land of the Sky Blue Water," Mrs. E. B. Hausfeld, whistler; "Blue Bells," Mrs. Howard Case; "Concerto No. 4," McMorris Houston, cellist; "My Song of You," Mrs. R. E. Hine; "Down in the Woodland," Chorus; "Polonaise," piano solo; "Rackety Coo," Cora Abernathy; "Sunlight Waltz," Jeanette Tibbs, Mrs. E. B. Hausfeld; "March Triumphant," Mrs. C. E. Haddock.
**WMAQ** (Central, Daylight Saving, 447), 4:35 P. M., Program, Pupils Lyceum Arts Conservatory; Talk, Edw. Price Bell; 7:00 P. M., Talk, "Auto Trails," Rockwell Stephens; Helen Ethel Levine, David Charles Levine, pianists; 9:15 P. M., Hamilton Club Male Chorus.
**WMC** (Central, 500), 8:00 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.
**WOC** (Central, 484), 3:30 P. M., Talk, Karl G. Stephan; 7:00 P. M., Musical program, Washington Band, Washington, Ia.; 8:00 P. M., Lecture, "Chemistry and Its By-Products," Prof. J. P. Magnusson, Augustana College, Rock Island, Ill.
**WOO** (Eastern, Daylight Saving, 509), 11:00-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Short talks; 4:30-6:00 P. M., Organ recital, Mary E. Vogt.
**WWJ** (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Mattie B. Lamphere, soprano; Belle Mangold, contralto; 11:00 P. M., News Orchestra; Mattie B. Lamphere, soprano; Belle Mangold, contralto.

## Friday, May 25

**CFCA** (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Orchestra; Meza Deeton, soprano; W. Woods, cornetist.
**KFDB** (Pacific, 400), 2:00-2:30 P. M., Talk, "Growth of Bones," Dr. A. D. Fisher; 2:30-3:00 P. M., Lecture, "Health," San Francisco Tuberculosis Assn.; 8:00-10:00 P. M., Concert, Lyric Trio of Berkeley.
**KSD** (Central, 546), 8:00-9:45 P. M., Musical program, Michel Guslkoff, violinist; Larry Conley, trombonist; Arthur L. Utt, organist; Gene Rodemich's Orchestra.
**KYW** (Central, Daylight Saving, 447), 8:00-858 P. M., Musical program, Lulu McNelley, soprano; Alfred Newman, baritone; Elizabeth Dollison, pianist; Madeline Pendelton, reader; 9:05-9:25 P. M., Book reviews, Llewellyn Jones; 10:00 P. M.-1:00 A. M., Midnight Revue.
**WBAA** (Central, 360), 7:15 P. M., Lecture, "Care of Milk and Cream on the Farm," B. C. Manhart.
**WBAP** (Central, 476), 9:30-10:30 P. M., Concert, Texas Christian University, Ft. Worth.
**WDAR** (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and short talks; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Stories for the little tots by Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-12:00 P. M., Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.
**WFAA** (Central, 476), 12:30-1:00 P. M., Talk on Sunday School Lesson, Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Musical program, Vera Marzian, supervisor of music in O. M. Roberts Public School.
**WFI** (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:00 P. M., Musical program and song recital; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Dance Orchestra; Children's stories, Cousin Sue.
**WGI** (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., Girls' Story Hour, Irene H. Veno; 9:30 P. M., Evening program; "Silversmith Series," David M. Cheney; Concert, Franklin Field, baritone; Marjorie Leadbetter, soprano.
**WGR** (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Amplico recital; 7:30 P. M., News Digest; 9:00-11:00 P. M., Musical program, Ralf Dietrich, director; Lecture, "Missing Motors," F. B. Thompson, engineer of Vacuum Oil Co.
**WGY** (Eastern, 380), 7:45 P. M., Musical program, "Estudiantino," Red and White Trio; "Little Azure Rings," Marjory Barnes, soprano; "Valse Chromatique," Raymond Heindorf, pianist; Address, "The Citizens' Military Training Camp," Major Edgar C. Leonard; "Barcarolle," Red and White Trio; "Cohen on the Radiophone," Lillian Fisher, reader; "Kamenoi Ostrow," Raymond Heindorf; "Such a Lil' Fellow," "The Call of Love," Marjory Barnes; "Waves of the Danube," Trio; "Goblins," Lillian Fisher, reader; "Adagio" from "Moonlight Sonata," Raymond Heindorf; "Where the Sad Waters Flow," Marjory Barnes; "Three Winners," Lillian Fisher; "Liebestraum," Raymond Heindorf; 10:30 P. M., Concert, "Intermezzo," WGY Orchestra; "Marching," "Until the Dawn," Male Quartet; "To a Wild Rose," "Anno Domino 1620," Joseph Walsh, pianist; "Scherzetto," Quartet; "Kentucky Babe," "Honey, I Want Yer Now," Quartet; "Sea Pieces," "Twilight," Joseph Walsh; "Serenade," Instrumental Quartet; "Story of a Tack," "Fishing," Male Quartet; "Polonaise in A," Joseph Walsh; "Entr'acte Valse," Instrumental Quartet.
**WHAS** (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ, Clifford Gorman, Rialto Theater; 7:30-9:00 P. M., Concert, Blue Grass Orchestra; Helen C. Honaker, soprano; Mrs. Emery Nold, contralto.
**WIP** (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Musical program; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.
**WMAQ** (Central, Daylight Saving, 447), 4:35 P. M., Program, Pupils Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Marx E. Oberndorfer; 9:15 P. M., Mrs. Justine Durchanek-Siroky, soprano; Ireno Pitlik, violinist.
**WMC** (Central, 500), 8:00 P. M., Concert, arranged by Goldsmith's Department Store; 11:00 P. M., Midnight Frolic.
**WOC** (Central, 484), 3:30 P. M., Talk, C. E. Wilent; 7:00 P. M., Musical program, The P. S. C. Orchestra.
**WOO** (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song and piano recital; short talks; 4:30-6:00 P. M., Organ recital, Mary E. Vogt; 8:00-12:00 P. M., J. W. C. I. Band concert and dance music.
**WWJ** (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Mabel Osborne, soprano; Herbert Lamb, baritone; Mrs. Gus Sorge, soprano.

## Saturday, May 26

**CFCA** (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Orchestra; Violin solos, Mannie Roth, Harry Adaskin; Rupert Lucas, baritone.
**KFDB** (Pacific, 400), 2:00-2:30 P. M., Lecture, Dr. Jau Dou Ball, "Juvenile Delinquency;" 2:30-3:00 P. M., Music.
**KPO** (Pacific, 400), 8:00-10:00 P. M., Entertainment, Elks' Lodge 522, Santa Cruz.
**KSD** (Central, 546), 8:00-9:45 P. M., Musical program, Stuart Barrie, organist; Isadore Cohen's Concert Orchestra and vocal selections.
**KYW** (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy Concert Dept.; 9:25 P. M., "Under the Evening Lamp," Youth's Companion.
**WBAP** (Central, 476), 7:00-7:30 P. M., Radio Bible Class, W. F. Barnum, First Methodist Church.
**WDAP** (Central, Daylight Saving, 390), 10:00 P. M., Musical program; Marion McDonough, soprano; Jack Chapman's Orchestra.
**WDAR** (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.
**WFAA** (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Musical program, J. I. Wright's Male Quartet; 11:00-12:00 P. M., Popular music, Grace Methodist Church Orchestra, Earle D. Behrends, director.
**WFI** (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Song recital and short talks; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; Stories, Cousin Sue; 8:00-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra.
**WGI** (Eastern, Daylight Saving, 360), 8:00 P. M., Evening program; Talk, "New England Problems," New England Business Magazine; Farce, "Box and Cox," Amrad Players; Music; Comedy, "Blood Will Tell," Amrad Players.
**WGY** (Eastern, 380), 8:00 P. M., Dance program, Cain's Castle Orchestra.
**WHAS** (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ, Roy C. Parks, Rialto Theater; 7:30-9:00 P. M., Concert, Joe Schnur Kentucky Melody Boys.
**WIP** (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Talk by a professor of the Philadelphia College of Pharmacy; 6:00-7:50 P. M., Dinner dance music; Uncle Wip's bedtime stories; 8:00-12:00 P. M., Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.
**WMAQ** (Central, Daylight Saving, 447), 7:00 P. M., Musical program; S. J. Cassell, tenor; 9:15 P. M., Maywood Temple Band.
**WOC** (Central, 484), 3:30 P. M., Talk, C. C. Hall; 7:00 P. M., Musical program, Apollo Mandolin Club; Henry Dismer, Louis Crowder; 9:30 P. M., Dance program, P. S. C. Orchestra.
**WOO** (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Organ recital and band concert.

## Sunday, May 27

**KPO** (Pacific, 400), 11:00-12:15 P. M., Organ recital, Gladys Salisbury.
**WBAP** (Central, 476), 11:00 A. M.-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor; Will Foster, organist.
**WDAP** (Central, Daylight Saving, 390), 9:15 P. M., Henry Selinger and Drake Concert Ensemble: two soloists from University of Chicago Band.
**WFAA** (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, Dallas; 9:30-10:00 P. M., Singers from Christ Church, Episcopal, Mrs. J. W. Ohl, director; 10:00-11:00 P. M., Concert, Harris Bros. Orchestra.
**WFI** (Eastern, Daylight Saving, 395), 4:00 P. M., Chapel services; 7:30 P. M., Church services, Arch Street Presbyterian Church; Sermon, Rev. Clarence Edward Macartney; Organ recital, Alton K. Dougherty, organist; 9:30 P. M., Organ recital.
**WGI** (Eastern, Daylight Saving, 360), 4:00 P. M., Twilight program; "Adventure Hour," Youth's Companion; Concert, Amrad Juvenile Orchestra; 8:30 P. M., Federation Church Service, Mass. Fed. of Churches; 9:00 P. M., Musicale.
**WGR** (Eastern, Daylight Saving, 319), 3:00 P. M., Vesper services, Rev. Walter Lord.
**WGY** (Eastern, 380), 9:30 A. M., Church services, First English Lutheran Church; Sermon, "The New Age, the Young Man, the Old Gospel," Rev. Herbert D. Shimer; 3:00 P. M., Symphony concert, "The Merry Wives of Windsor," WGY Orchestra; "I Will Extol Thee," Corabel MacCrossen, soprano; "Espagnole," Orchestra; Excerpts from "La Traviata," Orchestra; "Hear Ye, Israel," Corabel MacCrossen; "Largo," Orchestra; 6:30 P. M., Church services, First English Lutheran Church; Sermon, "God's Call to the Unselfish Life," Rev. Herbert D. Shimer.
**WHAS** (Central, 400), 9:57 A. M., Organ; 10:00 A. M., Church service, Trinity Methodist Church, Rev. Dr. John Lowe Fort; 4:00-5:00 P. M., Concert, Trinity Methodist Church choir.
**WIP** (Eastern, Daylight Saving, 509), 11:00 A. M., Church service, Holy Trinity Memorial Chapel, B. Janney Rudderow, minister; Ernest Felix Potter, organist and choir leader, choir of male voices; 2:00-3:30 P. M., Orchestra concert.
**WLW** (Eastern, 360), 11:00 A. M., Church services, Church of the Covenant.
**WWJ** (Eastern, 580), 11:00 A. M., Church services, St. Paul's Cathedral; 4:00 P. M., Detroit News Orchestra.

## Monday, May 28

**KFDB** (Pacific, 400), 2:00-2:30 P. M., Mrs. Lucile Strawn, "Detective and Mystery Stories" and "Sleuthing for Odd Books," Paul Elder Book Store.
**WBAA** (Central, 360), 7:15 P. M., Lecture, "Care of Furniture and Cabinet Woods," Prof. R. B. Trueblood.
**WBAP**—(Central, 476), 9:30-10:30 P. M., Concert, First Presbyterian Church Orchestra.
**WDAR** (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Short talks; musical selections; Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-12:00 P. M., Musical program, Arcadia Cafe Orchestra; Songs by Harry Glyn.
**WFI** (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; Stories, Cousin Sue.
**WGR** (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Amplico recital; 7:30 P. M., News Digest; 9:00-11:00 P. M., Musical program; Elm Vocational School, Buffalo, N. Y.
**WGY** (Eastern, 380), 7:45 P. M., Musical program, Excerpts from "The Mikado," WGY Instrumental Quartet; "Love's Own Kiss," from "High Jinks," Isabelle Franklin, soprano; "O Belle Nuit," from "Tales of Hoffman," WGY Quartet; "When a Maid Comes Knocking," "The Bubble," Isabelle Franklin; "Waltz" from "Faust," Quartet; "Topics of the Day;" Ballet from "Rosamunde," Edward A. Rice, violinist; "Sweethearts," Isabelle Franklin; "Toreador March," Quartet; "Giannina Mia" from "The Firefly," Isabelle Franklin; Excerpts from "The Bohemian Girl," Instrumental Quartet.
**WHAS** (Central, 400), Concert, Mary Anderson Theater Orchestra; Organ, Clifford Gorman, Rialto Theater; Address, "The Power of Music," Rev. A. Mack Parish.
**WIP** (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:30 P. M., Song and piano recital; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.

# Radio Digest Illustrated

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## Better Outlook for Summer

### Distribution of Stations Helps Reception

SUMMER is approaching, and likewise as a result a general decrease in broadcasting reception range. However, the outlook for the coming summer to the Radiophans is a great deal better than it was at this time last year.

## Jazz for Vacationists

### Hosts of Tourists Will Carry Sets on Trips

SOME few people seem to think that because they can go to shore or mountain the stay-at-home has no form of amusement, forgetting entirely Radio, probably the most popular of all forms of amusement yet devised.

Likewise, these same shore or mountain vacationists are missing a lot of good things that are broadcast from every part of this country. As a matter of fact, there are any number of thousands of vacationists who carry their sets with them, erecting an aerial at the vacation point.

Campers, automobilists on tour, canoe tourists and others will take along sets and trade in Radio equipment should not fall off so appreciably as it is fallaciously predicted that it will every year. Most vacationers, and especially those who go to places other than the big resorts, are literally snatched away from a jazz point, and something must be provided to fill the aching void. The Radio receiving set does the trick.

## Just a Little Thoughtlessness

### Spark Stations Should Use Discretion

IN A CERTAIN section of a city in the northwest owners of Radio receiving sets have a great deal of trouble with interference from a spark set in the neighborhood that paralyzes all reception. Is this the case with you in your city? It stands to reason we all have the same trouble. Just about the time you get the set working on a very fine selection, then all of a sudden the sender of a spark station near you fills the air with a carrier wave that drowns out any reception coming in.

It is not believed that anyone is mean enough to purposely do this when aware of the results. The ones doing this are not versed in Radio, but are usually some beginner that does not know of the offense.

Everyone interested in Radio should get together for the benefit of the game. The amateur has his rights and they shoud be, and are, respected. The beginner should respect the rights and privileges of his brother amateurs and broadcast receivers and not give all the amateurs a "black eye" because of his thoughtlessness.

## About the Copyright Situation

### The Independent Station May Be Driven Out

THE long fight for the amendment of our copyright laws may be hastened considerably by the present difficulty encountered in the broadcasting of Radio music.

Action on the part of the Society of Authors, Composers and publishers, in stopping broadcasting stations from transmitting music within their control, has brought on such severe criticism and objections by broadcasters generally, that this may result in a demand for a change in our copyright laws for the benefit of broadcasters and Radio listeners.

So far as the great Radio audience and public opinion is concerned this action will react very unfavorably. It is said the copyright group controls about 95 per cent of copyrighted music and musical productions in the United States.

It is needless to say that if action taken holds good it will drive out many independent stations that should be encouraged as a bulwark against a possible monopoly of Radio broadcasting in the future.

No one wants to deprive an author, composer or publisher of the fruits of his labor. He has a right to ask returns on his copyrights, but Congress, in establishing a copyright law, had in mind protection, not extortion. The moment such a right, conferred by the American people, is used as a weapon of monopoly and aggression against them, then the American people have it in their power to take away this right, and they certainly will, through their Congress, take such action.

# RADIO INDI-GEST

## CASH COPPER CONTEST AWAKES KEEN INTEREST OF RADIOKNUTS

The big $000,000,000,000.19 Cash Copper Contest has brought in such a flood of mail that it has been impossible to open and read it all to date. Every day brings in new papers on the Stebbin's Sooper Degenerative. The papers are coming in thick and fast so if you intend to enter the contest MAIL YOUR PAPER OR DRAWING AT ONCE! —There is still time to get in.

Parts of the vast number of letters and telegrams are:

"Inclosed find my drawing and paper. Where is the first prize?" —Imp.

"If I win the first prize I shall use the money to buy a new set of switch points." —Nutz.

"It is so sweet of you, Indi, to enable me to have the chance to assume such wealth. Paper under separate cover." —Lotta Static.

"Have never built a Stebbin's set (thankgod) but am sending in my paper on how I did it." —Lillian G.

"Can I bribe judges with A. R. R. L. hootch to award me first prize." Spider Webb.

"Am sending drawings by wire." —Polly W.

"It is such a jolly contest, old thing. Am sending my bally drawings by the silly letter vender." —Alagonquin Tonsils III.

"Am holding my paper until I find out if you have enough to pay prizes. Looking you up in Bradstreet." —LaVerne C.

"Inclosed please find my paper. Mail check for first prize to me at once." —Q. R. M.

"My husband wishes me to inform you that he is too occupied with compiling his data and transcribing statistics for his contest paper to write himself. It is his sincere wish that you be so exceedingly kind as to hold the contest open until he has the requisite time in which to complete his work. I am, Most cordially," Mrs. Ezra Hecht.

### *A RADIO NIGHT*

*I was seated alone by my tube set,*
*Weary from loss of sleep,*
*My fingers o'er the dials wandered,*
*The stations were hard to keep.*
*The constant whistle and howling,*
*Shrieked through my throbbing head,*
*I tried to tune in till disgusted,*
*I thought of my cozy bed.*
*But the lure of the game was upon me,*
*I'm an ardent Radiophan,*
*When you once get the bug you can't shake it,*
*Try as hard as ever you can.*
*So I staid with my set and I coaxed it,*
*I'm a Radioknut, you guessed right,*
*At last it worked fine and I listened,*
*While the Night Hawk Club signed off "Goodnight."*
*—MAC.*

### Another Satisfied Customer

Deer Endy: I houked-up the lem' stebbin's souper circut & busted the detectur fust thing. After getting the blamed thing all set the fust thing i recei'ed wuz h—l frum my wife acct. spilling contents uv detectur over carput. It rely wurked betur than i xpectud.
—eZra hechT.

### Thanx!

Dear Indi: I am inclosing a Radioknut kink which has proved a hum-dinger, hope it works as well by those that try it. Am inclosing a dollar ($) for same. Thanx,
—Spark Coil.

P. S.—I find that I have lost the kink and can not think what it was. Am closing the dollar ($) anyhow. Thanx,
—S. C.

### We Don't Know—Yes—You Are In, Go Ahead!

Indigest, Sir: Who are they and how do they do it?—Polly W. and Lillian G. . . . I have written somewhere about sixty contribs to your column and I never can get in—I ask you, is it fair? Yet these above two are always making the column. If I do not get in pretty soon I am just going to get mad and stop sending 'em in.
—Jackie.

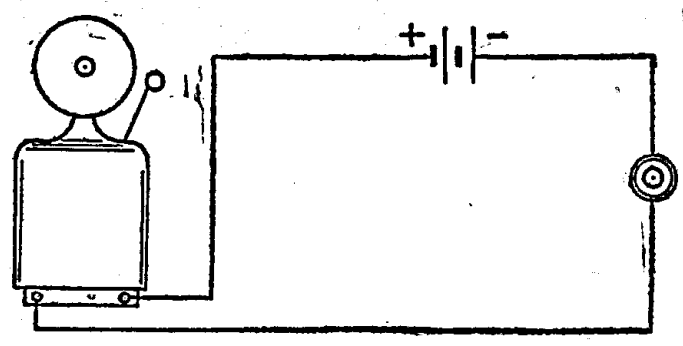
### There Ain't No Sech Critter

Dear Indigest: Local dime store is offering new aerial wire that "takes all the static out of the air." Any fans not receiving their full share of static should get the new type aerial. —Clinton, Iowa.

## *QUESTIONS AND ANSWERS*

Dear Indi: Last week I tuned in a station that opened their broadcast with the ringing of a bell. I have been unable to get them any more, though I have tried hard. I think the trouble is in my set so will you give me a hook-up of a circuit that will enable me to hear the bell?
—Spider Webb.

A.—Sure. A very good circuit for this purpose is shown below.




Dear Indi: I am very seriously annoyed by the spark amateur in the next block. I can not hear any broadcast programs for his constant sending. How can I stop him?
—R. E. Ostat.

A—Get sawed off shotgun (commonly known as riot, or scatter-gun), load with washers, screws, ten penny nails and heavy charge of black powder. Point gun at amateur and pull trigger with quick motion of index finger. If this does not bring desired results, tell him we shall write him a letter and severely reprimand him for his ungentlemanly conduct.

## *Looking Ahead*

**The Great $000,000,000,000.19 Cash Copper Contest** is rapidly drawing to a close. There is a lot of work yet to be done by the judges, opening and sorting the papers. So there is still time for you to sneak in your drawing or paper. If you have not entefed the contest—Do So At Once! Watch INDIGEST for awards of prices. Get INDIGEST from your most handsome newsdealer—10c.


## Condensed

By DIELECTRIC

The owners of Station WJZ, well known all over the world, are about ready to move into their new studios in the Aeolian building in New York city. It is understood that here the artists who appear in Aeolian Hall may have their concerts broadcast through this station, and some of the greatest musicians appear there. Two wavelengths will be used so that varied types of programs may be broadcast at one time.

To many who have had the joy of working out problems in algebra the talks from Station WOR may prove of little interest. On the other hand, they may be the very ones who wish to refresh their minds on the subject. But to any desiring some knowledge of the subject, they have only to tune in the station and listen to a very simple explanation of the rules and application of this branch of mathematics.

The Irish, that is those in Dublin, will have a modern Radio station erected in their midst to be patterned after the Eiffel tower in Paris. It is to be a government operated station and will broadcast market reports, weather forecasts and news for the benefit of towns in the provinces. Providing the station is sufficiently powerful, we may yet hear the innumerable disputes between Irishmen in place of reading about them.

For a while at least we shall find it rather hard to think in kilocycles instead of meters; however, if the improved broadcasting service becomes all that is expected of it, then the matter will be quite easy. When QRM is rampant the meter of a station is seldom referred to. It's generally a more profane part of the transmitter to which attention is given. In order to secure the greatest good from the new ruling it will be very necessary for the stations to stick to their assigned kilocycles.

In Ohio the state Federation of Women's Clubs devoted a week to increasing the interest in gardening, including landscaping. Of course, they made use of the time-honored custom of broadcasting through the columns of the press, also the newer medium—the movies, and then wisely chose to avail themselves of Radio. Many a person will linger long enough at the dials to be told of a thing that he never would take time to read.

It may be recalled that prior to removal one column nearer to passing off the last page of Radio Digest, I mentioned the good one could do in supply Radio receiving sets to leper colonies. Whether the gentleman in New York got his inspiration from my suggestion or not is immaterial; at any rate, he contributed one hundred dollars toward a set to be installed in the leper colony in Porto Rico. Now, you healthy fans, who will be the next?

The Army Radio experts are working all the time to increase the efficiency of mechanical code reception. They have so far succeeded in sending one hundred words a minute by use of certain mechanism and a reception speed of sixty-five words a minute. That seems like saving considerable time at both ends, yet they expect to be able to mechanically copy the messages as received visually as well as by ear. Thus saving even more time.

While the season of Grand Opera in this country is over, Cuba is just beginning hers. On the opening night of the San Carlo company in Havana the opera of "The Barber of Seville" was broadcast and many in the United States were able to listen to the entire performance produced by several of the world's noted artists. Station PWX had the honor of sending out the first opera ever broadcast from Cuba. Future opera broadcasts will be anticipated with pleasure by those capable of tuning in this station.

# First Steps for Beginners in Radio

## Chapter III, Part II—Pointers About Aerials and Grounds

*By Thomas W. Benson, A. M. I. R. E.*

AS STATED in the first part about aerials either the capacity or the inductance in the tuned primary circuit of a receiving set may be made large enough to serve as an efficient collector for Radio waves. Having dealt with the form of aerial in which the capacity is large we may now consider cases where the inductance acts as the energy collector.

Briefly then, a loop aerial, disguise it as you will, is simply an oversize tuning inductance but since it is usually limited to a comparatively few feet on a side it does not pick up as much energy as the outdoor aerial. It might be said to be loosely coupled to the wave and therein lies its greater selectivity aside from its directional properties. As a matter of fact when a loop is used it is not necessary to employ any coupling device for tuning, the usual practice being to simply connect a condenser across the loop for tuning.

**BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:**

**Chapter IV—About Condensers and Inductances.**
**Chapter V—Tuners and How to Tune Your Set.**
**Chapter VI—About Crystal Detectors.**
**Chapter VII—Tube Detector Theory and Operation.**
**Chapter VIII—The Regenerative Detector.**
**Chapter IX—Radio Frequency Amplification.**
**Chapter X—Audio Frequency Amplification.**
**Chapter XI—How Super Regeneration Is Accomplished.**
**Chapter XII—Reflex Circuit Operation.**
**Chapter XIII—About Headsets and Loud Speakers.**
**Chapter XIV—Batteries Used in Radiophony.**

### Selectivity of Loop

The selectivity of a loop aerial might be better understood from Figure 10. Here is shown the usual type of outdoor aerial connected to the stator of a variometer or similar tuning device. Placed in inductive relation to the stator is the rotor connected to the detecting and amplifying apparatus. Now it will be clear that only part of the energy flowing in the aerial circuit is transferred to the secondary circuit.

We can control the degree of coupling between the two circuits and thus select the particular wave energy we wish. The circuits are said to be loosely coupled.

Now consider the loop aerial where, instead of bringing in a comparatively large amount of energy and selecting what we want, we pick up from the wave but a small amount of energy and thus get selectivity. To all intents and purposes the loop aerial acts as the secondary of a variocoupler or the older form known as the loose coupler.

The analogy can be carried further in that both the secondary of a variocoupler and the loop circuits can be made with a low resistance and having both lumped capacity and inductance which makes for sharp tuning.

### Little Energy Picked Up

It should be borne in mind, however, that except with a very large loop the total energy picked up is much less than

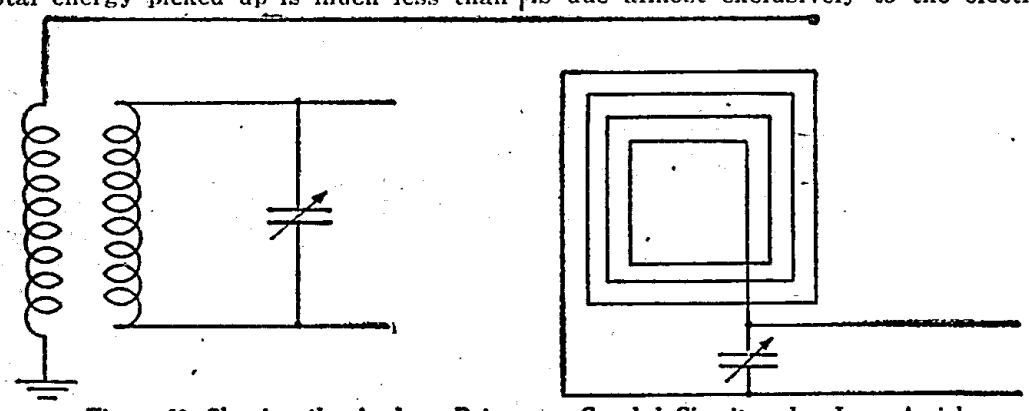


Figure 10—Showing the Analogy Between a Coupled Circuit and a Loop Aerial

that transferred from the primary to the secondary of a coupling device connected to an outdoor antennae or aerial. We then only obtain selectivity at the sacrifice of wave energy which can be compensated for by using Radio frequency amplification to amplify the received energy sufficiently to give good signals when rectified by the detector tube.

Apparently then there would be little

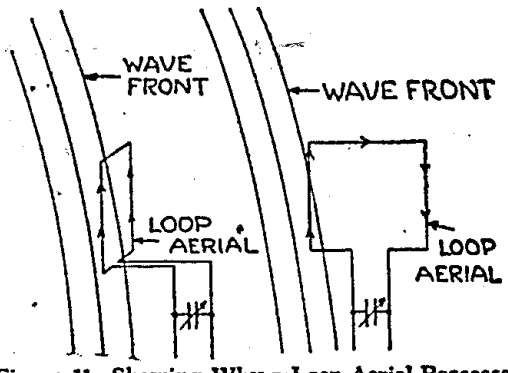



Figure 11—Showing Why a Loop Aerial Possesses Directive Effects

advantage in using a loop aerial simply on the ground of greater selectivity because the saving in cost of installation is offset by the additional tube and transformers required to bring the signal up to standard. However, the loop possesses other characteristics that will continue to make it more popular especially as the summer months approach.

### Less Atmospherics with Loop

The outdoor aerial not only picks up Radio waves but is also effective in picking up static, strays, etc., because these are due to electrostatic stresses between the clouds and the earth. The loop on the other hand is freer from such disturbances and, when static is heavy in summer, it will bring in the broadcast programs with a minimum amount of static interference.

In addition we have the well known directional effect that increases its selectivity by enabling one to "spot," as it were, a particular station and eliminate others to a great extent. The reason for this directive effect will be clear after a little consideration.

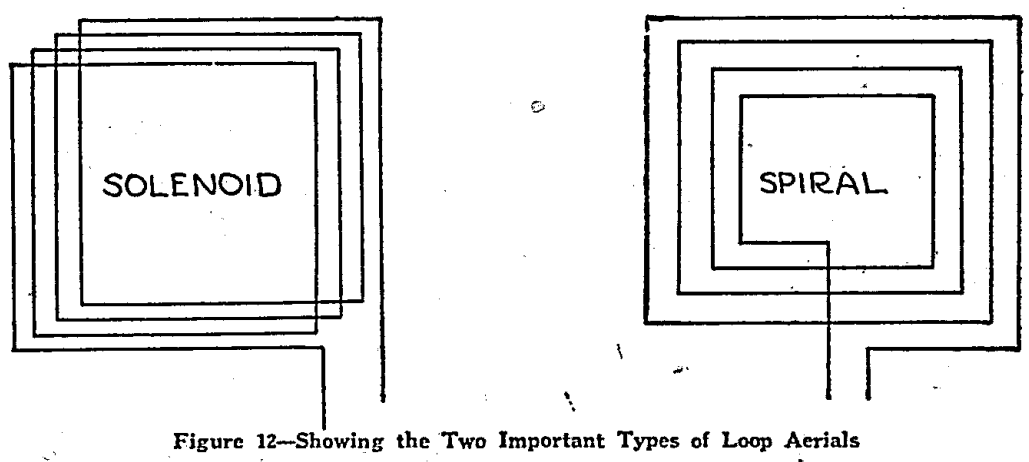



Figure 12—Showing the Two Important Types of Loop Aerials

### Explains Directional Effect.

The energy picked up by a loop aerial is due almost exclusively to the electromagnetic field of the Radio wave. When a wave strikes a loop aerial on the side, that is, when the loop lies at right angles to the direction from which the wave is coming, equal currents are induced in both sides of the loop which neutralize each other and do not affect the amplifiers or detector. However, as the loop is gradually turned it will be clear that the wave strikes one side before the other with the result that a slight current flows, sufficient to affect the amplifier and a response is heard in the phone. When the loop is placed so that it lies in line with the transmitting station the effect is at a maximum and the loudest signals are heard.

It will be noticed at times that grounding one side of the loop increases the signal strength. This is due to the fact that the loop is acting as a capacity aerial and currents induced by the electrostatic effect are added to those picked up by the loop itself.

### Constructional Details

A loop should, of course, have a low high frequency resistance and for that reason stranded wire should be used, the sixteen strand wire, being softer, is preferable. Obviously the loop should be as large as conditions will permit but one larger than 3 feet on a side is usually out of the question. This gives us a basis to work from.

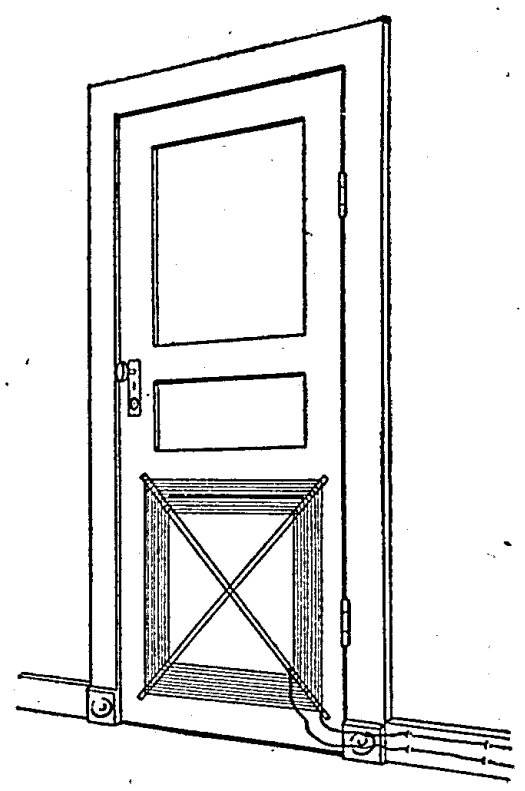


Figure 13—A Novel Effective Method of Mounting a Loop Aerial Back of a Door which Is Convenient

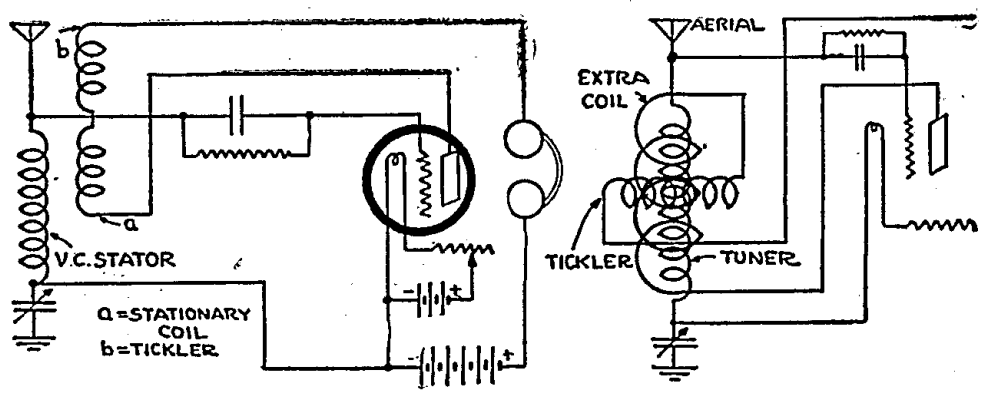
Loops are of two types; namely, the solenoid, and the spiral, both shown in Figure 12. There is little preference between them on the score of efficiency but the spiral is easier to build and makes a neat job.

An efficient spiral loop can be made

(Continued on page 12)

# Second Coil on Variocoupler Stator

## INCREASES CAPACITY OF STATOR




## Extra Winding Produces More Selective Tuning

In building a single tube circuit regenerative set I made my own variocoupler to use with it. After I tried it out I found that the tickler coil was too small in inductive capacity, and I was stumped for a few minutes as to what to do, for I did not care to use any smaller wire on the rotor in order to get more turns on it. Finally I hit upon the following kink:

Over the coils of the tuner (stator) part of the variocoupler I placed a coil equal in turns to the tickler. This coil I connected in series with the tickler and was very gratified to find the results were very good, and besides the added feed-back inductance gained, I found that the tickler now operated over a range of 180 degrees, instead of 90 as it did before. So the set I built later I deliberately used this idea to get more critical adjustment on the tickler.—Phil Rulon, San Jose, Cal.

## WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only 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 securing 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
123 West Madison St., Chicago, Ill.

## FIRST STEPS IN RADIO

(Continued from page 11)

from a simple wooden cross using glass push pins to wind the wire around and thus insulate the separate turns. Fiber tubes can be used by joining in the center by a block of wood and cutting slots in the arms to hold the wires. With a 3-foot loop, 12 turns spaced ¼-inch apart will be found suitable for broadcast reception. The loop should be mounted so it can be rotated to obtain the full advantage of its directive effect.

**Loop on a Door**

A rather novel and unobtrusive method of mounting a loop is to attach it to the back of a convenient door, running flexible leads to a pair of wires fastened to the baseboard and connected to the set. There is always some door that can be used for this purpose. The loop is then out of the way and it can be swung by simply opening or closing the door.

If a door is selected that is usually left open against a wall the loop will hardly be noticed except when actually in use and the direction of the transmitter demands it.

**Proper Grounding**

It would not be out of place to cover the subject of grounding while discussing aerials. When using an outdoor aerial the ground connection is of greater importance than most Radiophans believe. In fact consistent long distance reception depends to a great extent on having a perfect ground. Simply wrapping a wire around any handy pipe, whether it is gas, heating or water will give results to be sure, but watch the improvement when a good ground is connected.

Briefly, a ground connection should be just as good as it can possibly be made. Use No. 8 or 10 wire and run it in as direct a line as possible to the street side of the water cock in the basement. Use a heavy ground clamp, solder the wire securely to the clamp, clean the pipe thoroughly by scraping with a knife or filing and clamp the ground tightly and securely. When this job has been carefully done then one can say his set is properly grounded.

**Heavy Wire Required**

One might question the need of heavy wire for grounding but there is a very good reason for it. In an oscillating circuit such as the primary circuit of a receiving set, which includes the aerial and ground, it will be found that the voltage is greatest at the free end of the aerial while the current is greatest at the ground

(Continued on Page 14)

## Longer Life for Tubes

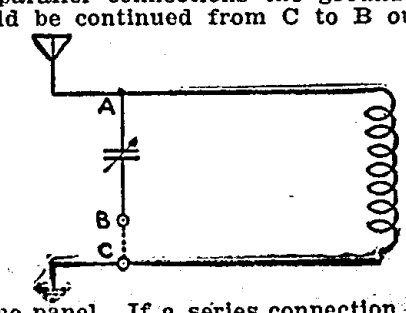
Just like electric lights if the voltage is too high and the burden of the load is too great, the life of a vacuum tube is greatly shortened by burning it above its rating. It is cheaper in the end to add a stage of amplification than to overwork your tube. One of the manufacturers of tubes says that an increase of 3 per cent over the rating of the filament of a vacuum tube will halve the life of the tube. Naturally, using your audion at 3 per cent lower than its rating will double its life.

## Remedy for Noisy Storage Cells

If you have trouble with noisy storage batteries take a cloth dipped in ammonia and wipe off the top carefully. This neutralizes the acid. This may be done on either A or B batteries.—P. R. Gould, Minneapolis, Minn.

## One More Binding Post Used Instead of Switch

Why use a series parallel switch when one additional binding post on the front of the panel will be sufficient? Ordinarily for parallel connections the ground wire would be continued from C to B outside




of the panel. If a series connection is desired this connection is broken and the aerial fastened to B instead of A. This saves the cost of a series parallel switch and simplifies the wiring.—Gordon G. Logan, Portage la Prairie, Manitoba.

Loud speakers can be made of sea shells, by cutting off the stem and attaching a receiver to the small opening.

# Making a Three Tube Reflex De Luxe Receiver

## Part IV—Cabinet Mounting, Operation and Conclusion

*By H. J. Marx*

IN ORDER to give all the details necessary for the complete assembly of the Reflex De Luxe, the plans of the cabinet construction are shown. The original is made of walnut and has natural wood finish. A wax polish keeps it neat in appearance and there is no need of worrying about scratching, as would be the case with a piano finish.

**Stock Used in Cabinet**

The top, bottom and sides are cut from ¾-inch stock, while the back is only ¼-inch in thickness. The front edges have a ¼-inch flange on all four sides. This flange projects $\frac{3}{16}$-inch and permits the panel to set in with the face flush with the flange. Twelve nickle plated, round head wood screws, ¾-inch long, hold the panel in place in the cabinet.

A word of caution—in wiring be sure that all wires are kept inside of the cabinet dimensions or it will be crushed and probably shorted when the panel is fastened in the cabinet.

Eight holes are drilled in the back of the cabinet—in alignment with the binding posts on the sub panel. Small hard rubber bushings, called grommets, can be purchased in most any five and ten cent store. They will help improve the appearance of the finished set.

The binding posts are identified in the sub panel layout (Figure 2, May 12 issue). The antenna and ground binding posts are used when a permanent outside aerial is used. A loop aerial can be plugged in through the loop jack in the upper left corner on the main panel. The positive A and negative B batteries have one binding post in common.

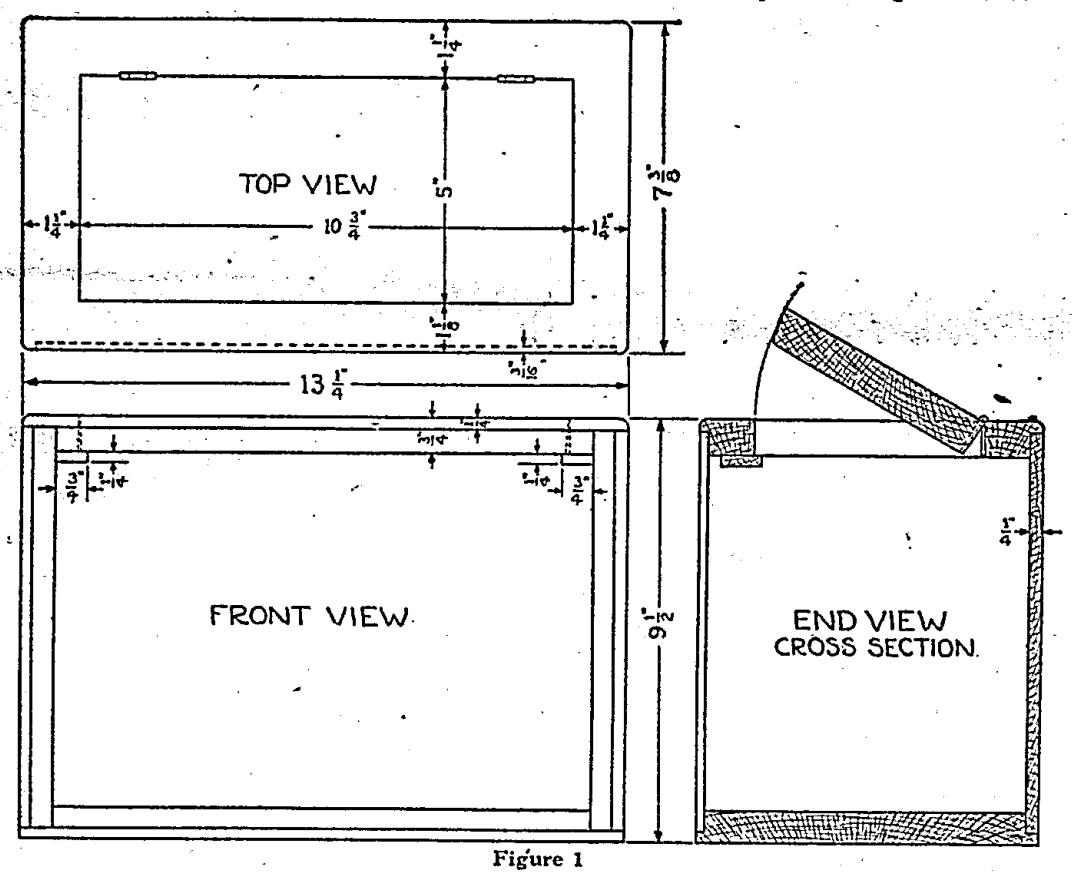



Figure 1

The fourth binding post from the right hand side of the sub panel layout is one positive plate battery terminal. The voltage there should run from 45 to 90 volts. The third from the right is the second positive plate battery post and the value here can vary from 67 to 150 volts, depending on the tubes used.

The last two binding posts on the right side are for a permanent loud speaker connection if desired. This is optional as the two jacks on the right side (front panel) can be used.

**Flexible Wire Leads**

Since these binding posts are rather inaccessible unless the panel is taken out, some form of making convenient connections is desirable. Flexible wire is easily obtainable. Cut seven pieces each 2 feet in length. On two of the pieces solder a heavy A battery clip at one end. On the remainder, solder the small type of wire clips at one end. These will snap on the plate battery terminals and will permit simple readjustments of voltages. They can also be used for snapping to the antenna and ground leads.

The terminals to be soldered to the other ends of these flexible leads depend upon the type of binding posts that are used. Either the eyelet type or phone cord tips are advisable. It might be well to make sure that the eyelet terminals will pass through the grommet holes in the back of the cabinet before they are soldered on the wires.

**Circuit Changes**

Since the first part of this article was published in the Digest, a few unimportant circuit changes have developed. It was found that a one megohm grid leak connected between the grid and plate terminals of the second tube helped clear up some noises without detracting from the volume. It may be found worthwhile to add a series-parallel switch for the primary condenser. The capacity of the by-pass condenser across the primary of the first audio frequency transformer was changed from .002 to .006 mfd. A 200 ohm potentiometer can be substituted for P-1 but the control will not be as good as with the higher resistance type.

**Directions for Tuning Operation**

For simplicity, the use of a loop aerial will first be assumed. The phones or loud speaker should be plugged in on the top jack. Turn on the Reflex rheostat knob. Depending on the type of tube and the plate voltage, also the condenser and potentiometer position, it may start howling after a certain point on the rheostat is reached. Occasionally, if the rheostat is turned further it may stop again. Either turn back or to the point where the purring is heard. If the howling cannot be overcome it may be due to the following causes:

1. Crystal detector not adjusted.
2. Inductive interference in leads.
3. Wrong by-pass condenser values.
4. Defective transformers.
5. Poor tubes.
6. Too much plate voltage for tubes.

**Rheostats and Secondary Condenser**

The filament rheostat adjustment is not necessarily very critical but it will be found that readjustment after a station has been tuned in will improve reception. Using only a loop aerial the entire wave length tuning is confined more or less to the secondary condenser. This should give the finer wave length adjustments. For any wide range of wave bands it is advisable to tap the number of turns on the loop, giving an inductance variation. The potentiometer is then adjusted for clearest reception and volume.

When the loud speaker is plugged in on the last stage, the amplifier filament is adjusted, as are the reflex tubes. It may also be necessary to advance the reflex rheostat slightly to compensate for the extra drain on the battery. Volume can usually be controlled by rheostat and plate voltage adjustments. Blurred reception indicates too much B battery.

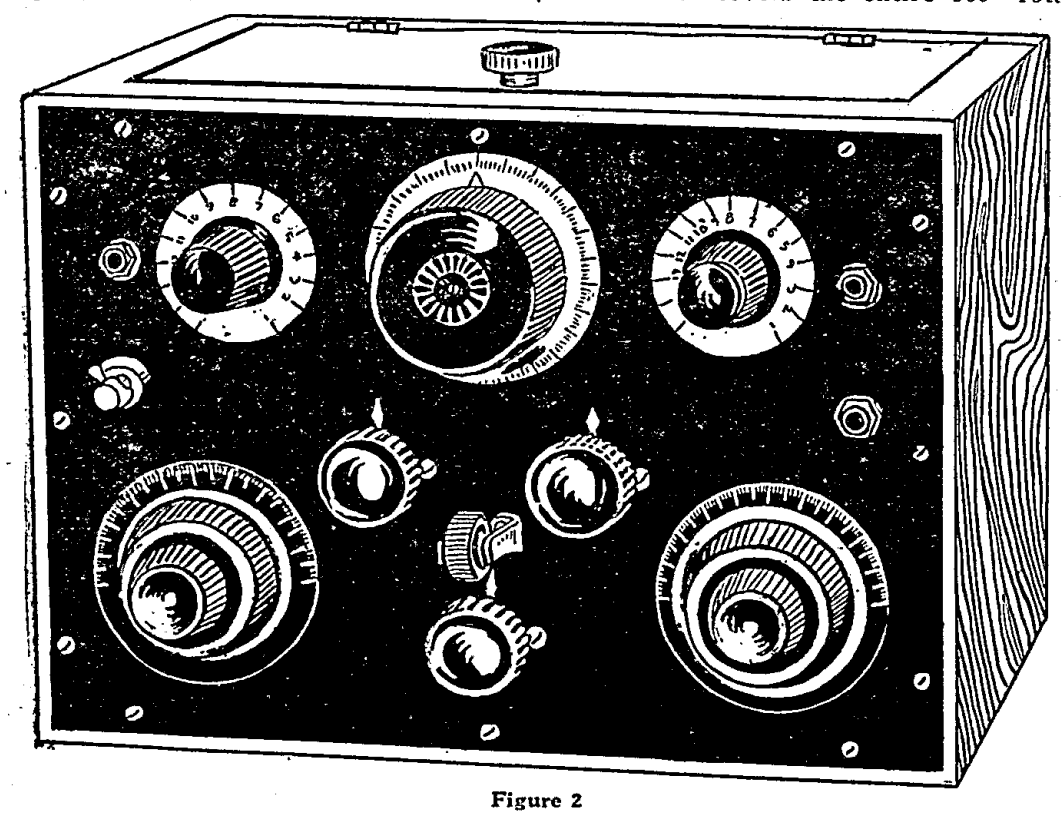


Figure 2

**Tuning with Variocoupler**

When an antenna and ground connections are used, four additional controls must be adjusted. The rough and fine inductance switches present no serious difficulties in tuning. The two variable condensers give accurate control of the wave length adjustment, but the key to station selection lies in the adjustment of the coupling. Some form of vernier dial control is recommended, since two stations on the same condenser setting can be separated by the coupling adjustment. The peculiar part noticeable is the fact that this control covers the entire 360° rotation of the secondary. It is because of this unusual coupling control that the circuit has such a high rating as a long distance receiver. Code station interference can in this way be kept at a minimum.

The directional effect of a loop is not as marked as might be anticipated, but the fan will be surprised at the volume that can be expected from a loop.

(THE END.)

The natural wave length of an antenna is that which will pick up signals without any tuning whatsoever.

# For the Loud Speaker Fans

## More About Talker Described April 21

*By Thos. W. Benson*

IT IS regrettable, in view of the great interest shown in the description in the April 21 issue of the loud speaker constructed by this writer that certain mistakes crept into the article that resulted in a flood of letters and inquiries. Not that any real mistakes were made, but most fans desired more information.

What seemed to trouble the greatest number was the winding of the field coil. This coil is wound in the usual manner with No. 20 D.C.C. wire, 75 turns in a layer and 18 layers. Nearly two pounds of this wire are required. This coil serves to create a dense magnetic field between the center pole and the circular pole piece.

**Moving Coil Location**

Through an error the illustration of the cross sectional view of the talker shows the moving coil above the pole piece. Checking dimensions will show that this coil lies in the space between the center pole piece and the circular ring, that is, in the magnetic field created by the field coil.

As to the transformer winding. The secondary consists of 115 feet of No. 38 enameled or S.C.C. wire wound smoothly into place. The primary was wound with No. 38 enameled and takes about 1¼ ounces of wire. This will give very close to 1000 ohms resistance. One ounce of No. 40 enameled will give a little over 2000 ohms. The latter winding was not tried but slightly better results might be expected from its use.

**Winding on Moving Coil**

The winding of the moving coil should present no difficulties. Starting as close to the edge of the form as possible, make a few turns and fasten them with a drop of collodion. Then wind the wire in smooth layers back and forth till 360 turns of No. 40 enameled wire are in place. The ends of the winding are then tied to legs of the supporting spider and the whole coil given a coat of collodion to make it rigid.

The above data with that furnished in the article on the loud speaker in the April 21 issue should be complete enough for anyone to build this instrument. Any further inquiries will receive immediate attention if addressed to the writer, care of Radio Digest.

## FIRST STEPS IN RADIO

(Continued from page 12)

connection. Hence any resistance in the ground wire has what is termed a damping effect upon the oscillations and chokes them out. That is, when the aerial circuit is put into oscillation by the wave instead of the current being allowed to flow freely to and fro it is choked off by the resistance. This has two ill effects.

The first thing it does is to reduce the amplitude of the current in the circuit, naturally cutting the signal strength to some extent. In addition the damping effect broadens the tuning and it will be found more difficult to cut out unwanted stations. These effects will be more noticeable with the smaller crystal sets but the condition applies as well to the larger tube sets.

Conditions are often such that quite a long lead will be required to reach the water pipes in the basement. This should cause no worry as it is an advantage in a certain sense. Knowing that the voltage is greater near the free end of the aerial and remembering that the tube detector is a device depending on voltage for its operation it should be apparent that a set connected in the aerial-ground circuit nearer the free end will have a higher voltage impressed upon the grid of the tube. For this reason the signals may be slightly louder with the long ground than if a wire were run to a nearby gas pipe or radiator.

**Need for Lightning Arrester**

The protection of buildings from lightning is too often overlooked when installing a Radio set but it is poor policy to take chances with the elements. It is universally known that such protection is demanded by the Fire Underwriters yet it is safe to say that the majority of crystal sets have no protection. Too much emphasis cannot be laid upon this part of a Radio installation. By all means put in a lightning arrester the day the aerial is installed.

There are a number of such devices on the market selling at a reasonable price that perform their work well. Any type approved by the Underwriters may be used. Install it outside of the building if at all possible and run a ground wire to a water pipe. Number 14 wire may be used for a lightning ground, but heavier wire is advised. The Underwriters do not require switches or fuses, except in the case of transmitters which will not operate with the arrester connected to the aerial while sending.

**Fastening Wires in Building**

Wires inside the building should be firmly fastened to prevent mechanical injury and to prevent them coming in contact with lighting or power wires. In no case should gas pipes be used for a ground.

Summing up the chief points to be remembered in constructing an aerial; use stranded wire, insulate it perfectly, let it touch no woodwork or other surface, run it as direct as possible to the set, protect it from lightning and run it as straight to ground as possible and make a good ground connection. For with good connections, low resistance, you are sure to have consistent results when the rest of the set is functioning properly.

(TO BE CONTINUED.)

## Reviews of Books

**The Armstrong Super-Regenerative Circuit.** By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

**Radio Experimenter's Handbook.** By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

**The Radio Amateur's Handbook.** By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

**Ideas for the Radio Experimenter's Laboratory.** By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data is given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, vacuum tube characteristic measuring set and detailed advice given on the winding of various kinds of standard inductance coils. Price, 75 cents.

**The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.**

It is estimated that the energy absorbed from Radio waves by a receiving antenna is about one-millionth of an ampere.

# Questions and Answers

### Honeycomb Coil Set

(2573) R.T., Talmadge, Ohio.

I am building a three circuit regenerative receiver, making use of honeycomb coils. I expect to wind my own coils and I am asking for advice upon winding these coils.

Does the inside lead connect to the plug or the socket of the coil mounting (not panel mounting)?

When these coils are mounted and placed in a panel mounting, are the coils wound in a clockwise or counter-clockwise direction?

Do hand wound honeycomb coils compare favorably with machine wound coils? I wish to connect them so I can use either machine wound or hand wound coils without changing the wiring.

A.—Answering your inquiry with reference to winding of honeycomb coils will advise that the outside lead connects to the socket, and that coils are wound counter clockwise.

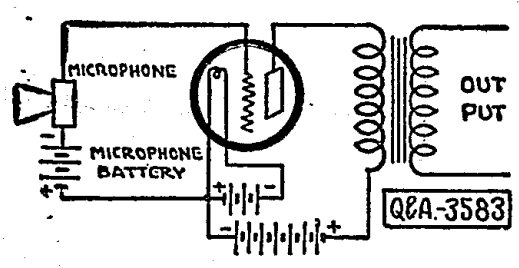
Effectiveness of any homemade apparatus depends upon the skill and care with which it is constructed. Unless you are able to exercise these qualities by special adaptation along mechanical lines you will doubtless find greater satisfaction in the manufactured coil. They are inexpensive.

### Speech Amplifier

(3583) 9E.A.H., Moline, Ill.

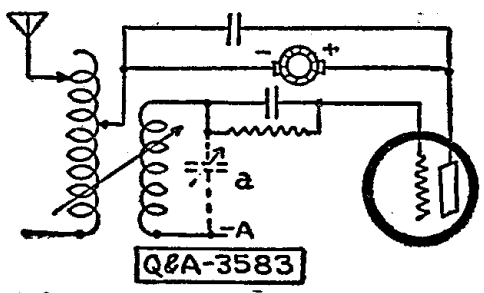
How should a speech amplifier to be used with a 10-watt phone set be constructed? I use the Colpitts circuit. For some reason or other, on phone I am very weak. I think by adding a speech amplifier I may be able to overcome this difficulty.

Can you furnish me with the circuit used




in the Paragon 2-5-U-Radiophone set? I have been trying for several months to get a copy of this circuit but so far have been unsuccessful.

What, in your opinion it the best set of today? My equipment consists of this 12 tube super-hetrodyne, 3 tube Reinharts, 1 tube Flewelling, and a 3 tube honeycomb set. Is there any other set, regardless of price, that would give better results? A few of the results I have had already on the super-hetrodyne are as follows: 500 amateurs logged, some in every district, in three weeks. Eng. 2 LO copied in the recent tests. French 8 A.B. copies once. Station such as 4 GL, 6 AWP, 7 LU, 8 ZZ, 5 LA, etc., copied almost any time they are on. Commercial stations too numerous to mention, among them, POZ (Nauen) I have heard, though, that there are sets




that have this beat. If possible would like to get circuit, data, etc.

A.—Answering your inquiry we are advising that a speech amplifier is merely audio frequency amplification. A simple one tube speech amplifier may be constructed in accordance with first diagram shown. An ordinary amplifying tube, B battery and audio frequency transformer are used as indicated.

Your phone signals come in fairly well here, but of course, should not be compared with straight C. W.

The circuit used in the Paragon 2-5-U Radiophone set is merely the grid tickler circuit. The second diagram shown explains this.

The super-hetrodyne circuit is the best of those cited and probably has no rival at this time.

We take pleasure in congratulating you upon your log.

### Super Hetrodyne

(2830) J.H., Hackensack, N. J.

Referring to the Super-Hetrodyne on page 14, February 24th issue of your paper, R-D-73, will you kindly give me the information desired?

Are the tubes critical, that is, do they have to be matched as you do in R.F. Circuits?

Will WD11 tubes work satisfactorily? If so, what results will they give as compared with Radiotron UV 201 or UV 201-A? What are the very best tubes to use?

Not considering the detector, can good results be obtained with less than five tubes? If so, how many?

What do you consider the proper number of tubes to use to get the very best results, everything considered?

A.—Answering your inquiries with reference to super-hetrodyne circuit appearing in Radio Digest of February 14th issue, will advise that tubes are not very critical. Would not compare the WD11 tube as affording results to be obtained by employment of Radiotron UV 201 or UV 201-A. Exceptional results have been secured in use of these tubes. VT1 is also used effectively.

At least five tubes, exclusive of detector, are required. Seven tubes in circuit make a very efficient set.

### Aerial and Ground

(2824) W. M. G., Sea Bright, N. J.

The lead in from my aerial to my set is about 20 feet from the window and I have run the wire under my rugs. My ground is about 25 feet from my set and this also is under the rugs. Both wires are not insulated. As I have no way of placing a lightning arrester on the outside, I would like to know if there will be any danger if I connect the arrester inside and how would I do it?

A.—Noting your specifications with reference to antenna construction will advise that there is no danger whatever in the method employed. Merely connect lightning arrester in the same manner as you would if both were outside.

### VT-2

(2388) FTS, Le Mars, Ia.

In the issue of January 20, page 14, you give an illustration of Flewelling circuit shown as R.D.-70, making mention of VT-2 or E tube. I cannot make this out. Please make mention of what this tube is, and who makes it, for which I thank you in advance.

A.—Answering your inquiry with reference to Flewelling circuit, would advise that the VT2 or E tube mentioned is one of the best obtainable today and is manufactured by the Western Electric Company of Chicago. However, any other make of hard tube may be used satisfactorily.

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Holes in bakelite hard rubber or fiber must be made with a drill. In making up panels for a set using such materials do not use nails or tacks.

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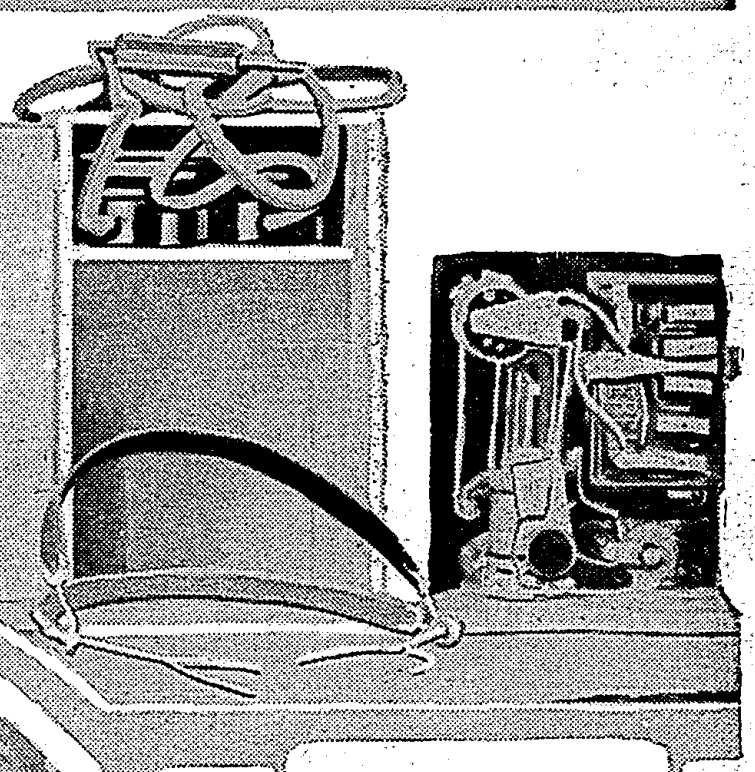
It is possible to light the filament of your tube with alternating current, but it is accompanied by hum.

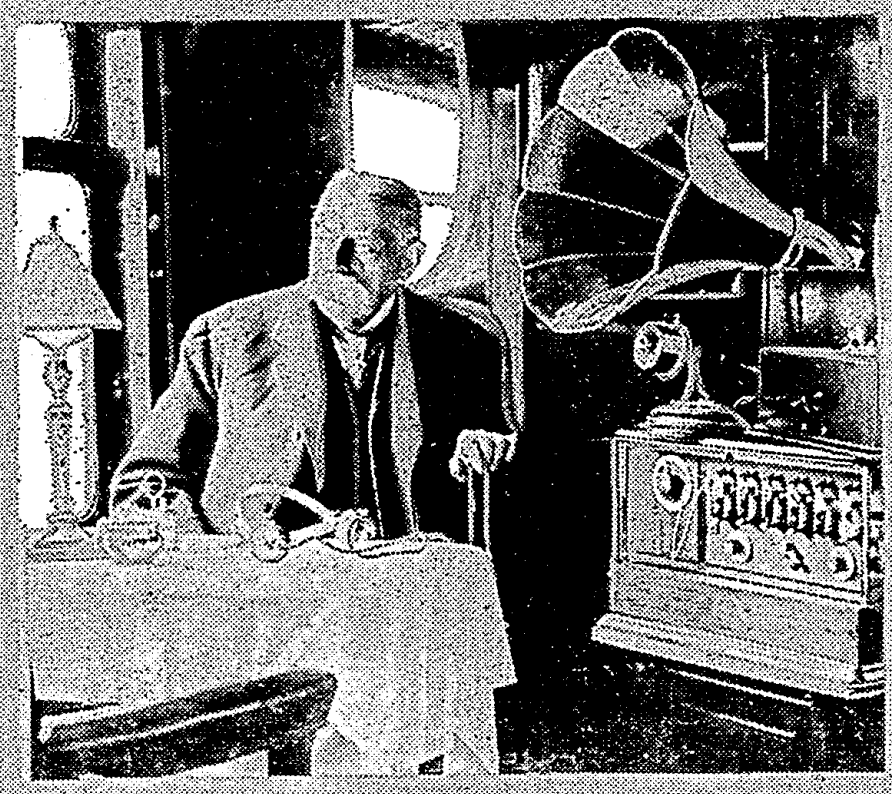
# Radio Illustrated

Marjorie Rambeau in "As You Like It," which was broadcasted from the stage in New York City Wednesday night, April 25th, by WJZ. Miss Rambeau was acclaimed as the most beautiful Rosalind seen for many, many years on the old white way

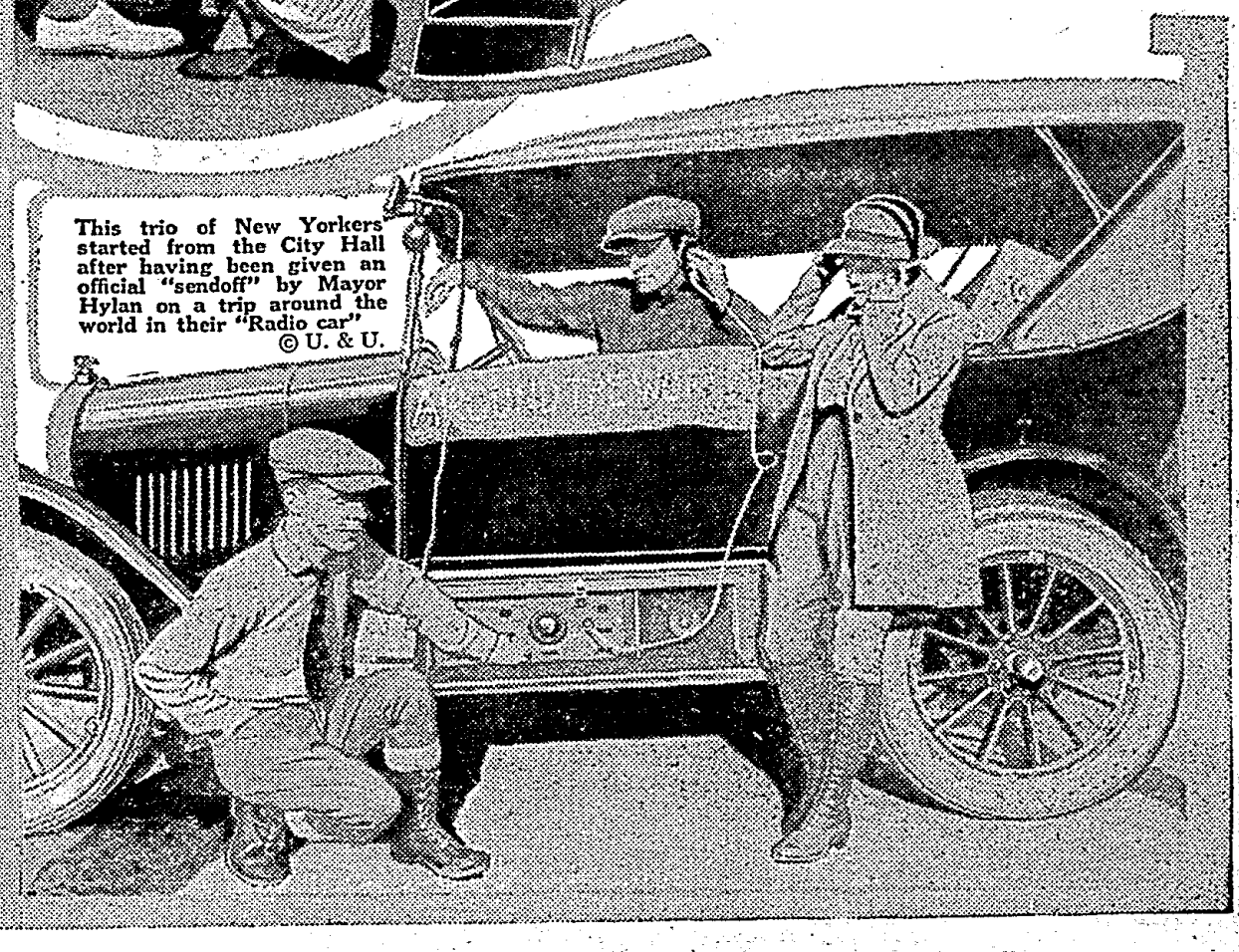


The latest thing in a tube set as to smallness was made by Eber Byam of Rogers Park, Chicago. It is said to be the smallest Radio tube set constructed of standard parts
© Swastika

It's great to be able to take a honeymoon just when you feel like it. Here are Mr. and Mrs. Cornelius Vanderbilt, Jr., who are revelling in the sunshine and balmy weather on the outskirts of Los Angeles, Calif. Just to keep in touch with daily events, Mr. Vanderbilt uses his Radio set daily, taking in everything from Bedtime Stories to Market Reports © Keystone



For the entertainment of the passengers on the Pullman cars traveling between London and Dover, a Radio telephone loud speaker has been installed on the boat train. In spite of the noise of the moving train, the result is more than satisfactory. Photo shows Sir Davison Dalziel listening in enroute to Dover © Keystone



This trio of New Yorkers started from the City Hall after having been given an official "sendoff" by Mayor Hylan on a trip around the world in their "Radio car"
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