

How to Build Five Tube Neutrodyne—This Issue

# Radio Digest

EVERY  
WEEK

# Illustrated

TEN  
CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VI Copyright, 1923 R. D. P. Co. Inc. SATURDAY, AUGUST 25, 1923 No. 7

## FINDS BURIED TREASURE

### SCORES VICTORY IN WESTINGHOUSE SUIT

#### CUTTING AND WASHINGTON GIVES BIG FIRM JOLT

Buyer of Armstrong Patent Starts New Suit Attempting to Entangle Klitzen Radio Corporation

(Special to RADIO DIGEST)  
NEW YORK.—Hardly had the ink dried on the decision of Judge Learned Hand of the United States District Court here in his decision favorable to the defendants, handed down in the suit of the Westinghouse Electric and Manufacturing Company versus the Cutting and Washington Radio Corporation, until the Westinghouse Company entered a suit in the Eastern District Federal Court of Wisconsin, asking for a preliminary injunction against the Klitzen Radio Corporation of Racine, Wisconsin, one of the Armstrong licensees, restraining them from selling their products through channels of distribution not named in the original Armstrong license agreement. The Westinghouse bill of complaint against the Klitzen Corporation follows closely that filed against the Cutting and Washington Company, for which only a temporary injunction was granted by Judge Hand on July 29, pending a six months' period in which the Cutting and Washington Company will have time to prepare itself to manufacture its sets under the Court's interpretation of the conditions of the Armstrong license.

#### Westinghouse Bill of Complaint

The complaint bill of the Westinghouse Company alleges that the Klitzen Radio Corporation sells through jobbers and dealers and has manufacturing agents to make the Klitzen sets. It also alleges a conspiracy with the Alladin Sales Corporation. The case comes up for hearing August 29 in Milwaukee. The Westinghouse Company is represented by Quarels, Spence & Quarels, attorneys of Milwaukee. The Klitzen Company by Thompson, Myers & Kearney, of Racine.

With the new Klitzen suit the Radio Corporation and Westinghouse Company now have suits pending against four of the independent Radio manufacturers making sets under the license granted them by Armstrong prior  
(Continued on page 5)



Above: Virginia Pearson, famous film beauty, flirts with the WJZ microphone and the great station's many listeners in. Below is Lillian Miller listening in to stations fifty miles and further away using only a barb wire fence as an aerial. Her simple-to-operate two-tube portable set makes such stunts easy, even in the midst of the summer's heat

### NEW DEVICE BARES WAY TO WEALTH

#### Louisiana Inventor Declares Machine Reveals Secreted Riches by Buzzing

#### Tests Bring \$59,700

#### Experiments Indicate Contrivance Locates Various Metals by Varying Sound Volume

By R. A. Sullivan

BATON ROUGE, LA.—All things in time may be known to Radio, even the secrets of the ages and the mysteries hidden deep in the earth and its waters—this is the prediction of most of those who saw recently the operation of the Radio treasure-finder invented, after many troublous years, by Emmett Green of this city. By means of his machine Green is reported to have found an urn, secreted by a Frenchman more than sixty years ago, containing bonds worth now more than \$58,000.

It is considered fitting that what is likely to rank soon among the wonders of the world should be tried and found not wanting in the mystic swamps and baffling bayous of the Father of Waters.

Romance and tragedy, the days of buccaneers and the Spanish Main, of proud Dons and languorous Creoles, of wash-bucklers and fair women, of cringing slaves, cruel men and wily, of the clash of blue and gray—all these may be recalled by a machine that looks like the wrecked half of a toy wagon.

When the treasure-finder is perfected and marketed, hidden treasures are likely to be as safe as a bootlegger at a camp  
(Continued on page 2)

### WBAP Quits Broadcasting Music Until September 17

FORT WORTH, TEX.—No more musical programs will be broadcast by WBAP, Star-Telegram station here, until September 17. Then it is planned to resume the concerts ordinarily given daily from 7:30 to 9:30 p. m., Central Standard time.

### Noted Writer's Songs Form Fine Program Sent by WOR

NEWARK, N. J.—L. Wolfe Gilbert, one of America's favorite song writers, was an unusually interesting feature on the program of Station WOR, L. Bamberger and company, here recently. He gave a program entirely of his own work.



# WRITES CHILD PLAY FOR BROADCASTING

## WLW TELLS OF RADARIO READY FOR SENDING

Station in Cincinnati Makes Known Method of Producing Air Theatricals

CINCINNATI, O.—T. C. O'Donnell, who has written several plays and stories for children and spoken from WLW, the Crosley Manufacturing Company here, has written the first original Radario especially for children. It is called "The Magic Journey" and will be given in September from the broadcasting station.

Some new Radiophans do not know that Radario plays were originated by Fred Smith, studio director of WLW. Mr. O'Donnell, editor of *Writer's Digest*, which is conducting a \$100 prize contest for the three best Radarios, says this about them:

### What Is a Radario?

"The word Radario can best be defined by giving a brief history of the broadcasting of one-act plays, as written for and produced on the stage. It was found that with the aid of occasional interpolations by the studio director, describing the entrance and exit of characters, and with each part given by a reader with a distinctive voice, it was possible to render the play so clearly that the listener could readily follow the play.

"But—directions by the studio director did interrupt the dialogue and the action of the play—to that degree the play failed of perfectly adaption to Radio broadcasting. Fred Smith hit upon a means of obviating this difficulty. His idea was to construct the play so that the dialogue would convey to the listener the entire action.

### How Entrance Is Shown

"For example, in a scene with two young women conversing about the young man whom they are expecting, on his appearance the studio director in the usual play would have said, 'At this point Reginald Fairfield enters and greets the young women.' The Radario version would go almost like this:

"Phyllis: Oh, here comes Reggie now! Hello, Reggie!"  
"Reginald: Why, here you are! Hello, Phyllis! Hello, Dorothy!" and the dialogue would go on smoothly and the entire action be as clear to the listener as though the studio director or 'descriptionist' as he is now called had described the action.

"To this new form Mr. Smith gave the name 'Radario,' a word which has quickly become fixed in the language.

"An essential of the Radario is that it tell a complete story, in other words, that it have a plot. It must be brief, not occupying more than twenty minutes on the program. And if variety is introduced in the form of a song by one of the performers or a bit of orchestra music or a novelty such as a whistling solo, so much the better."

# WSY, ONE YEAR OLD, SAYS AIM IS ETHICS

Birmingham's Station Moralizes on Its First Anniversary

BIRMINGHAM, ALA.—Radio broadcasting in Birmingham passed its milestone recently with the usual program by WSY, Alabama Power company station. A brief resume of the accomplishments of WSY during its first year of existence was given by Miss George Bryant, announcer.

She said, in part: "WSY has been dedicated to the service of Alabama, not to the service of the Alabama Power company. As it has been in the past, our policy in the future will be to keep service on the highest plane efficiency, permitting no one to use it in the furtherance of any individual's, firm's or corporation's interest. It stands for the highest ideals in music, religion and things educational."

# NOT GLANDS BUT NEW VOICE ENLIVENS WBZ

SPRINGFIELD, MASS.—WBZ, the Westinghouse station here, has been rejuvenated. It has inherited WJZ's old "voice"; installation has begun. The old WJZ transmitter is twice as powerful as the one in use now at WBZ. The inherited "voice" has an antenna input of 1,000 watts, twice as much as that of the New England plant.

# MISSIVE PROVES WOC IS HEARD 10,150 MILES

DAVENPORT, IA.—Station WOC, Palmer school of chiropractic, has been heard in Manila, Philippine islands. The signals were heard several times last winter by a Major Reickel of the Radio department of the army, it was reported. The report was verified recently when a cousin of the major visited the station and exhibited a letter in confirmation.

# WHY THE MOVING MEN WORK



Pearl Eaton (left) and Lois Wilde want everybody to know they have a Radio set, even the neighbors. With this in mind they have placed their loud speaker on the window sill so that the people next door will get an earful of the afternoon concerts © K. & H.

# Canada Grant for Telegraph Five Times That for Radio

CALGARY, ALTA.—A grant of \$55,000 has been made by the Dominion government for the establishment of Radio sta-

tions at McMurray in Northern Alberta, Fort Simpson, on the MacKenzie River, and Dawson in the Yukon, which will displace the telegraph in use at present from McMurray north and into Dawson. A sum ranging from \$275,000 to \$300,000 has been voted annually for the last twenty-three years for the telegraph service.

# ATLANTA JOURNAL'S NEW STUDIO BEAUTY

## WSB, REMODELED, RANKED AMONG LAND'S FINEST

Equipment of Studio in Southern Newspaper's Plant Not Only Costly but Exquisite

ATLANTA, GA.—Dixie's most beautiful broadcasting studio is now the home of Station WSB, "The Voice of the South." The Johns-Manville staff of acoustic experts has just completed the remodeling, beautifying and improving of the first sound-deadened concert chamber in the South.

The Atlanta Journal's Radio studio, although designed and constructed at a time when only two or three similar rooms were in existence, set a precedent in acoustic engineering that many of the finest stations in America have since followed.

WSB's newly remodeled, rejuvenated and redecorated studio, however, represents a further refinement and a marked advance in acoustic science. The new concert chamber will insure even better modulation and clarity.

### Beautifully Arranged

And as for appearances, no studio in the South could be any prettier. The color scheme and general design follow the idea of simplicity, as was the case with the original room.

The walls are four inches thick. Alternate layers of especially prepared felt, fibre and cotton fabric occupy the space, with air pockets intervening.

The surface is finished with sound-absorbent fabric, which literally permits the music to filter into the walls instead of rebounding. The principle is exactly the reverse of a sounding board, or shell, used for amplifying and magnifying any tone that strikes it. The only sound allowed to enter the microphone is the original tone as it is sung, played or spoken.

### Description of Studio

The ceiling and upper walls are snow-white. The lower walls are finished with a broad panel of cream-colored monk's cloth, a heavy, loosely-woven fabric. Snow-white paneling separates the upper and lower sections of the walls and divides the background in rectangles.

The windows are curtained with dark blue side draperies and cream-colored inner draperies. The lounge extending around two sides of the room is upholstered in blue. A heavy taupe rug covers the floor.

Decked in its new regalia, the place where WSB's army of artists play and sing for the invisible audience now stands as not only the largest, most modern and technically correct broadcasting chamber in Dixie, but likewise as a real beauty spot.

# Work Starts on Second Largest Army Station

Construction Begins on Towers Near Salt Lake City

SALT LAKE CITY, UTAH.—Actual construction has begun on the towers of the second largest army Radio station in America now being erected at Fort Douglas, near this city. The towers adjoin the present towers east of Mt. Olivet cemetery. The work is in charge of Robert Lohry, Radio engineer of the army. Mr. Lohry said the new station will operate solely on continuous waves and will be designed so that broadcast receivers will not know it is in operation except under unusual conditions.

The new station will be constructed at a reported cost of \$300,000. It will have a capacity of twenty-five kilowatts, with a ten-kilowatt input in the antenna.

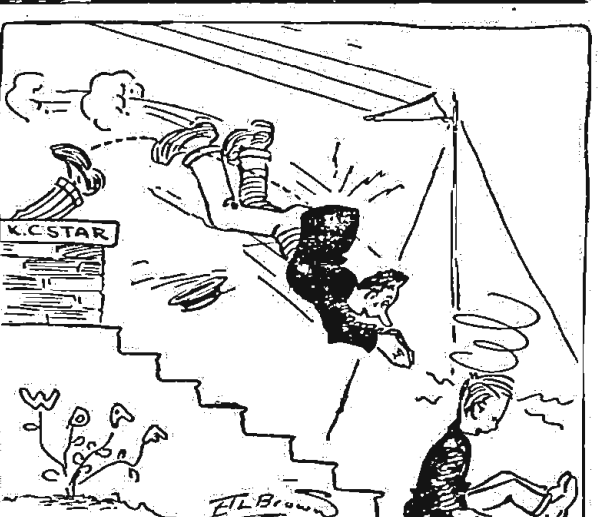
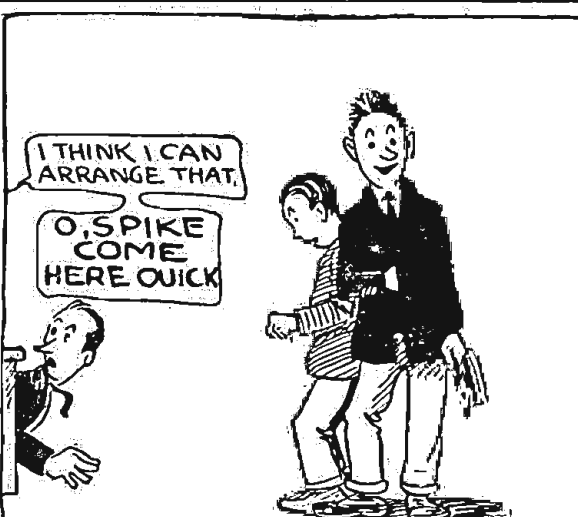
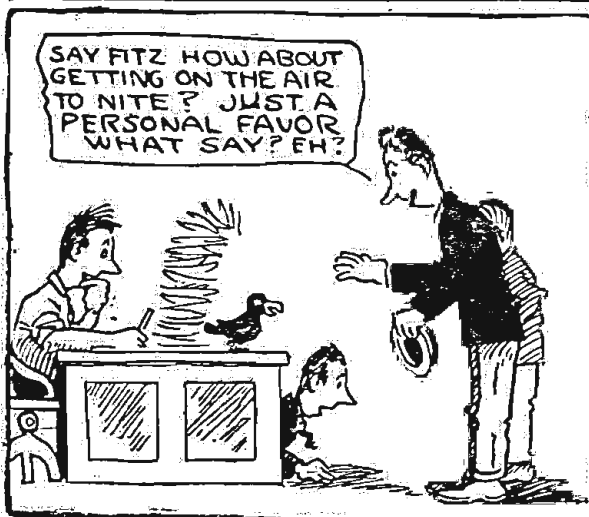
# Atlanta Gets Supervisor

ATLANTA, GA.—The Supervisor of Radio for the Fourth District, Walter Van Nostrand, Jr., has opened his office in the Federal Building.

# THE ANTENNA BROTHERS

# Spir L. and Lew P.

# A Bit of Atmosphere



# NEW DEVICE OUSTS STATIC, SAYS NAVY

## WASHINGTON HAILS TESTS OF NAVY'S CLARIPHONE

More Than 10,000 Pieces Used in Construction of Contrivance Declared Successful

By Carl H. Butman

WASHINGTON.—The Scott clariphone, an acoustic device for the elimination of static, will undoubtedly be acknowledged as one of the greatest advancements in Radio communication when perfected, naval Radio experts declare. Through its selective action, the clariphone subdues mechanical sounds of a discontinuous character, sustains the continuous notes and uniformly pitched sounds, thus enabling stations transmitting long distances through static interference to be read much more easily.

Although the inventor, Chief Electrician William J. Scott, U. S. N., began work on the static eliminator eleven years ago and filed an application in the patent office in January, 1921, little except the name of the filtering device has been made public. Radio Digest first announced the device several months ago. Since successful tests at the bureau of standards and at naval Radio central in Washington, naval officials have decided to release more information regarding the unique apparatus in the interest of those who are also fighting summer static in an effort to perfect Radio communication.

### Experiments Indicate Great Future

"While the clariphone is still in its experimental stage, the results obtained from the tests in Radio central seem to indicate that the entire elimination of static may be hoped for in the near future," a naval expert asserts.

Without going into the technical details (and the operation is complicated) the writer can vouch for the fact that the instrument works. While in one of the receiving stations on the third floor of the Navy building a few days ago, naval operators tuned in NPG, San Francisco, faintly through bad static. By changing from the telephone headset on the regular receiving apparatus to a pair of head phones connected with the clariphone, a remarkable improvement was at once noted; the static was reduced materially and the distant signals from San Francisco came in more clearly and sharply. Dispatches from the Naval Stations NBA, Balboa, and NPL, San Diego, were read with ease when the clariphone was connected, whereas the dots and dashes were difficult to distinguish through the phones directly on the receiving set.

### How Device Looks and Operates

The apparatus consists of a large metallic chamber or tube about four feet long and eighteen inches in diameter, with adjustable ends. From the chamber eight smaller tubes or "telescopes" project radially in pairs. Each telescope contains a watch-case telephone receiver used for introducing the Radio signals into the receiving chamber. The incoming sound is then passed through the chamber acoustically, where it is broken up several hundred times, the inventor explains, by the internal arrangement.

# FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

### Condenser to Eliminate Capacity

(Submitted by M. E. S., Chicago, Ill.)

Question. Quoting from your answer to G. H. D. in the July 28 issue of Radio Digest, you say: "It is a great puzzle to the writer why so many of these condensers are in use when it is so easy to purchase a type that will practically spell the elimination of hand capacity effects." Please do me the favor of telling me what condenser you are referring to and where I can get it.

Answer. Because the number of questions that we answer in this department is of necessity limited we must pick those

most frequently asked in order that we may help the greatest number in the space allowed.

Flewelling evidently "started something" when he referred to the condenser. Queries similar to yours are pouring in but as we are accommodating, here is your answer: the condenser referred to cannot be named in deference to the usual policy but I am sure that you can find such a type if you will look hard enough for it, if not now then in the near future, because some manufacturer or other is going to see the value of it and make such a condenser. You have my word for it that once you find it you will use no other. The matter of body capacity effects comes within the scope of this answer because of the numerous queries concerning it. I can but emphasize previous statements that with properly designed apparatus you will have no body capacity worth bothering about.

All of the static is absorbed by more than 10,000 separate pieces used in its construction; exactly how, is not divulged. To a lesser degree, the signal sounds themselves are also absorbed in the filtering process. A weaker, but a clear, note is picked up by four microphones, two on the top of the cylinder and one on each end. The microphones are connected in parallel to the primary of a transformer, the secondary being connected to a headset where the operator receives the outgoing signals after the static is eliminated. The sound of the signals may also be heard through two acoustic phones also attached to the top of the apparatus. When the emitted sounds are found too weak, they may be amplified in the usual manner.

Whatever the internal acoustical mechanism may be the patent office recognizes it as a pioneer invention. Scott has patents pending in the United States and several foreign countries. The clariphone will operate for the elimination of static in Radio telegraphic and even in telephonic communication, it is said. Scott also hopes to be able to eliminate all interference from nearby stations using wave lengths which are close to the wave length to which the instrument is tuned.

### Only Airphone Trade Link Is Routed by Subsea Cable

SAN FRANCISCO.—The only commercial Radiophone link in the world, which for the last three years has been handling telephone business between Catalina Island, 30 miles off the coast of California, and the wire lines of the Bell system, has been replaced by a submarine cable. The license of the Radio "talk" bridge" expired on August 1. The department of commerce has requested that its operation be discontinued, making its wave lengths available for broadcasting.

## A NEW Western Electric LOUD SPEAKER

\$21<sup>00</sup> SEND MONEY ORDER

DEALERS WRITE!

C. W. THOMPSON COMPANY MATTOON, ILLINOIS

# CANADA FIGHTS RACE TIPS BY AIRPHONE

## DOMINION POLICE ASK AID AGAINST GAMBLING

Efforts of Authorities to Suppress "Sporting" Publications Described as Futile

TORONTO, ONT.—Provincial police authorities of Ontario, engaged in a campaign to suppress the circulation of racing "tip" publications, are seeking the co-operation of the Radio license branch of the dominion department of agriculture.

The provincial police say they have information that several racing tip publishers have already made arrangements to supply subscribers by means of Radio, and will ask that licenses of broadcasting stations sending such data be revoked.

### Authorities Question Remedy

It is understood that the attitude taken by the inspectors of the dominion Radio license branch is that the revocation of Canadian broadcasting licenses would put out of business only a half dozen racing tip publishers in Toronto and Hamilton, while subscribers to Buffalo racing tip services could receive their tips with little danger of interference. Radio receiving sets are so numerous and common in Ontario, and change hands so frequently, that the Radio inspectors would be put to unreasonable work and trouble to gather all unlicensed sets owned by persons interested in betting on the races or suspected of peddling racing information received by Radio.

## Two More Stations for England's String of Six

### British Program Directors Hit Snag in Finding Talent

LONDON.—Six broadcasting stations are operating in the British Isles. The original plan contemplated eight, and this will probably be carried out by establishing the seventh station at Bournemouth and another at Aberdeen to cover the North of Scotland.

It was expected that sufficient power could be radiated from station 5SC at Glasgow to serve Scotland, but the Grampian Mountains act as a shield for the Glasgow signals, preventing them from reaching the northeast coast with the proper strength.

The British Radio impresarios are having the same trouble as the program directors in the United States in securing talent to entertain through the air. The Society of Authors, Composers and Playwrights at a recent meeting unanimously agreed that no member of the society should permit his works to be broadcast without a fee. The theatrical interests have broken off negotiations with the broadcasting company, and concert companies have stipulated in contracts with singers that they shall not sing into the microphones.

**ELECTRIC SOLDERING IRON**



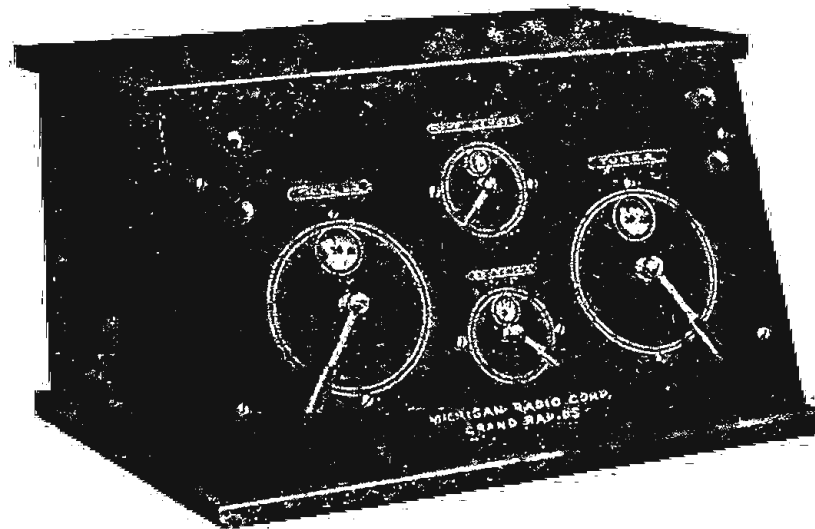
**EVERY RADIO FAN** has been looking for this iron for both radio and home use. Operates on A. C. or D. C. current.

**GUARANTEED** one year. Sent anywhere in U.S. or Canada Parcel Post prepaid on receipt of money order for \$2.28.

**FANS** Send 2c stamp for our list of **RADIO BARGAINS**

**17 N. LA SALLE ST. CHICAGO**

## CHEAPER THAN BUILDING YOUR OWN—AND BETTER



The Michigan Midget Receiver \$27.00

### A Long-Distance Wonder Worker

We get stations from coast to coast, including all the new wave-lengths up to 600 meters, with the "Midget," and they come in clear and strong.

Use standard 6-volt tube or any of the new low-voltage dry cell tubes.

Tho the handsome mahogany-finish cabinet is only 14½ in. long, it holds three No. 6 dry cells and one 22½ volt B battery.

Sloping front panel, with lever-tuning, is a great improvement on straight panel and knob-and-dial tuning. Easier, more accurate.

Receives through one or more head phones.

Add our two-stage amplifier for loud speaker reception.

Send for the Midget circular. Give name and address of your favorite radio dealer.

**DEALERS.** The Midget is a quick-turnover seller and every sale creates others—a wonderful endless-chain of satisfaction.

## MICHIGAN RADIO CORPORATION

GRAND RAPIDS, MICHIGAN

**PATENTS ON RADIO**

Can you secure a patent on your Radio invention? Does your apparatus or circuit infringe existing patents? These questions and others can be answered promptly by consulting my special library of Radio patents compiled to assist Radio inventors and manufacturers. Send for booklet on Radio patents.

**JOHN B. BRADY**  
Ouray Building WASHINGTON, D. C.

For the Picnic—



The New **GREBE Broadcast Receiver** Licensed under Armstrong U.S. Pat. No. 1,113,149

How pleasant to rest on the cool grass beneath green shade trees and listen to music from far over the horizon! A Grebe Receiver will give you these joys—and its 20-foot wire may be set up anywhere, in a moment.

Ask Your Dealer

**A. H. GREBE & CO., Inc.** Richmond Hill, N. Y.





# UNCLE SAM TO TAP BOWELS OF EARTH

## SURVEYORS TO TEST RADIO IN CANYON MILE DEEP

Party of Ten Geologists Begins Long Journey from Arizona Only with Receiver

PHOENIX.—Equipped with a special Radio receiving set, a party of ten explorers from the geological survey left Lees Ferry in northern Arizona early in August, for a 300-mile trip down the Colorado to the mouth of the Virgin River, at Rioville, Nev.

Unfortunately these modern surveyors, who are following the route first explored by Major Powell fifty-four years ago, were unable to carry a transmitting set, due to weight and space. But they are carrying a modern receiving set and will be able to hear what is going on in the world during the three months, although they will be unable to relate daily their adventures.

Arrangements have been made, however with the Radio stations of the Deseret News, KZN, Salt Lake City, and the Los Angeles Times, KHJ, to broadcast bulletins sent from trail crossings.

### To Tell World of Rapids Trip

The dispatches will be relayed by runners and telephone or telegraph when the party gets far enough down the Colorado to reach the regular lines of communication. In this manner the world will be advised of the progress of the exploration in the canyon and passage of the four boats through some of the wildest rapids in the country.

The special Radio set was reconstructed by R. L. Atkinson of the survey, from a manufactured regenerative set, adapted to two stages of amplification with new tubes. The whole outfit, including the batteries, is packed in a waterproof, wooden box with sponge rubber to keep it from jarring during the long boat trip. An especially constructed antenna on a reel, capable of being erected at camp sites on the banks of the river, can be strung from short poles or from projecting rocks to a length of 150 feet.

### Expect to Find "Dead" Spots

A preliminary Radio test at Lees Ferry has already been made. It is reported that the explorers received broadcasts from Los Angeles, 430 miles away, without difficulty at night. The real reception test, Col. C. H. Birdseye, in charge of the party believes, will come when they are in the lowest part of the canyon, estimated as a mile deep, near El Tovar, where dead spots and static may be encountered.

Besides the geological and topographical results achieved, the trip will also prove of material interest in the development of Radio communication, in relation to experiments undertaken by the bureau of mines and other governmental bureaus to see how far Radio will carry into the "bowels of the earth."

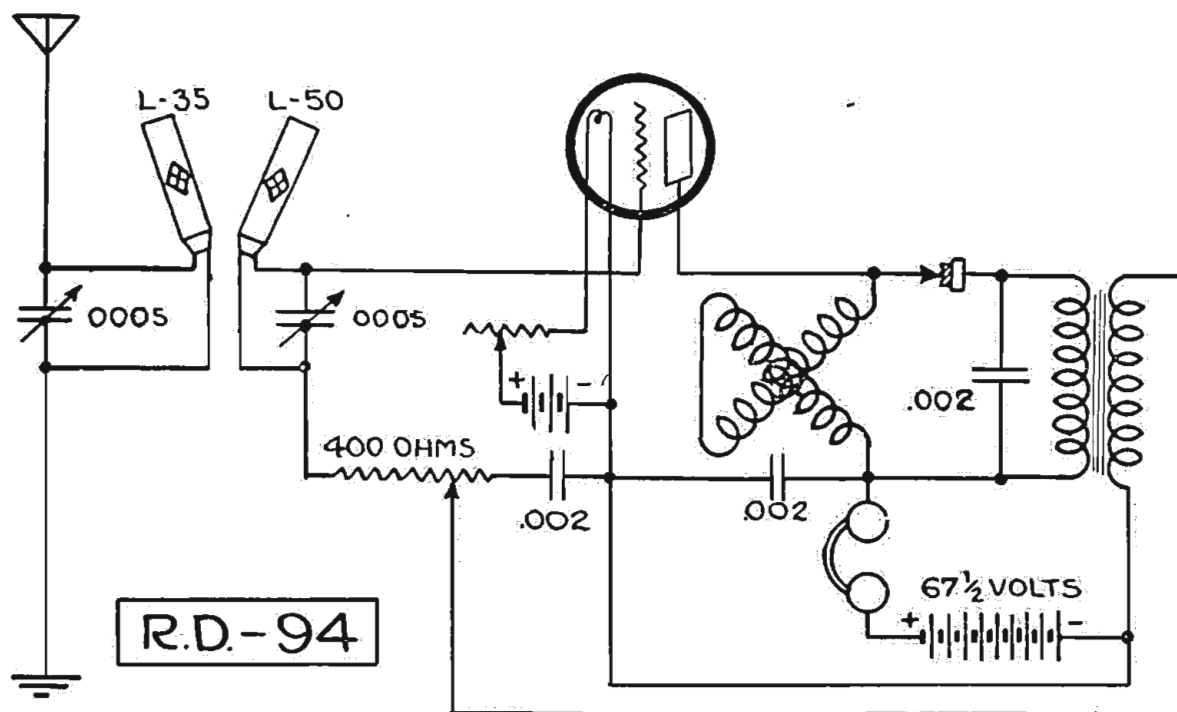
### Out to Improve Air

BUFFALO, N. Y.—The Buffalo Chamber of Commerce has named a special committee to study methods of improving all forms of Radio communication in the Buffalo district. The committee consists of John F. Condon, W. T. Huber, John B. McKillen and August C. Smith.

### Radio Equipment

EDISON Elements for making "B" Batteries, 6c per pair; tubes, 2c each. Nickel Wire, Insulators and Cabinets at reasonable prices. TODD ELECTRIC CO., 178 Lafayette St., New York City.

## SINGLE TUBE REFLEX CIRCUIT



A SINGLE tube reflex differing considerably from the type usually seen is presented in the diagram R.D. 94. This circuit is used with a good outdoor antenna and ground.

The tuning element consists of two inductively coupled honey-comb coils, each shunted with a .0005 mfd variable condenser, preferably with vernier control. If the antenna is high and long it may be advisable to use a .001 condenser in the primary, and to connect it in series on the antenna or ground side.

The coupling from the first tube to the crystal detector is accomplished through the use of a variometer, which should be of the type with low internal capacity. The cheaper types are by no means recommended.

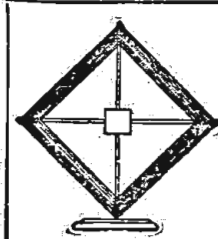
The crystal detector can be of the fixed or adjustable type. Naturally care should be taken that an efficient detector is selected. Any of the average standard audio frequency transformers will serve. Three by-pass condensers of .002 mfd capacity are used. The 400 ohm potentiometer controls the reflexing of the audio frequency currents and helps stabilize the tube.

The voltage of the plate battery should be at least 67 1/2 or even more if the tube and transformer will permit it. Many of the dry cell tubes are found to operate unsatisfactorily in reflex work so the tubes to be used should be carefully selected and tested.

This circuit is a simple one in tuning and will give very satisfactory results in relation to local and long distance receiving.

## Government Cuts Funds but New Norway Radio Succeeds

WASHINGTON, D. C.—The Norwegian government telegraph administration has received Radiophone apparatus for the plant at Bergen, Norway. Preliminary tests have been very successful but the installation has not aroused the interest that was expected, mainly because the appropriation for duplex apparatus to enable the simultaneous transmission of messages both ways was stricken from the estimates. The proposal for a new telephone line between Bergen and the Rundmanden Radio station has met the same fate.



James Curtis of Michigan writes, "I used to get 3 stations at one time until I bought a Ritter Loop; now I can tune out any station I choose."

**RITTER PORTABLE LOOPS** are directional. Price \$1. By mail 10c extra.

**RITTER RADIO CORP.** 230 Canal Street, New York City

## LAWS HALT GERMAN ADVANCE IN RADIO

### Prohibition of Private Sets Stifles Ambition, United States Consul Reports

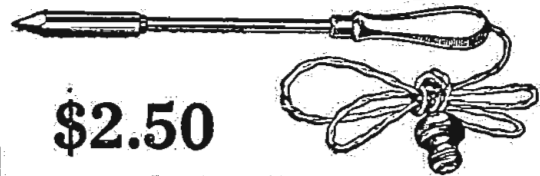
BERLIN.—The German Radio club of this city has attracted a considerable membership and is at present endeavoring to bring pressure to bear on the government to relax prohibition of private installations. All Radio is under the monopolistic control of the posts administration.

The American consul reported recently:

"It is in a sense surprising that in respect to private Radio enterprise Germany is so far behind other countries. Commenting upon this circumstance at a meeting of the Radio Club recently, a well-informed speaker interested a large gathering of members with an outline of recent Radio progress and cited the experimental work of Slaby, Braun, Graf Arco Goldschmidt, and the Meissner brothers, as deserving special appreciation. It is, he said, to the Meissner brothers that the world is indebted for the present method of amplification which makes possible the manufacture of small pocket sets now so popular in the United States.

By means of a small closed circuit (loop) antenna demonstrated by the speaker, London was easily heard. He concluded his lecture by saying, "Whereas in former times Germany was well in the front in Radio matters, it is now far behind, as a result of official opposition."

## Electric Soldering Iron



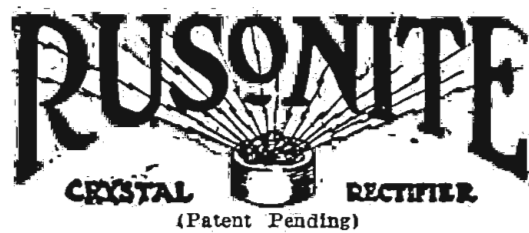
\$2.50

A. C. OR D. C. CURRENT

DEALERS—Attractive Discounts

NOTE: We are the Largest Exclusive Radio Jobbers in the Middle West

**HUDSON-ROSS**  
123 W. Madison St. Chicago



**THE PERFECT SYNTHETIC CRYSTAL DETECTOR, SENSITIVE OVER ENTIRE SURFACE.** No Hunting for "Spots." Loud and Clear. Endorsed by thousands of satisfied users. Sensitiveness Guaranteed. Price, Mounted, 50c

**14 K. GOLD SUPERSENSITIVE RUSONITE CATWHISKER.** Permanent. Will Not Oxidize. Price, Mounted, 25c

**RUSONITE REFLEX CRYSTAL.** Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage. Guaranteed. Price, Mounted, \$1.00

Order from your dealer or direct from **RUSONITE PRODUCTS CORP.** 15 Park Row New York, N. Y.

## Federal Audio Frequency Transformer No. 226

### Amplification Without Distortion

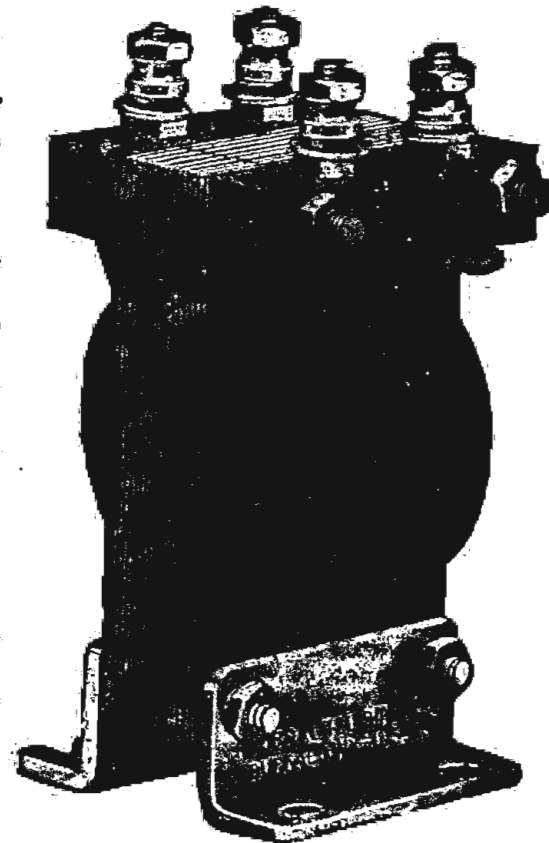
This transformer pronounced by leading radio engineers, after exhaustive tests, to excel in all essentials.

*Federal A. F. Transformer No. 226 can be used with any vacuum tubes in common use.*

It furnishes greater amplification and faithfulness of reproduction of both voice and orchestral music.

Install a No. 226 on your present set. It will prove a revelation to you.

Send today for illustrated catalog describing them fully



Your Dealer Sells Federal No. 226

**Federal Telephone & Telegraph Co.**  
BUFFALO, N. Y.

Western District Office: 417 South Dearborn St., Chicago, Illinois

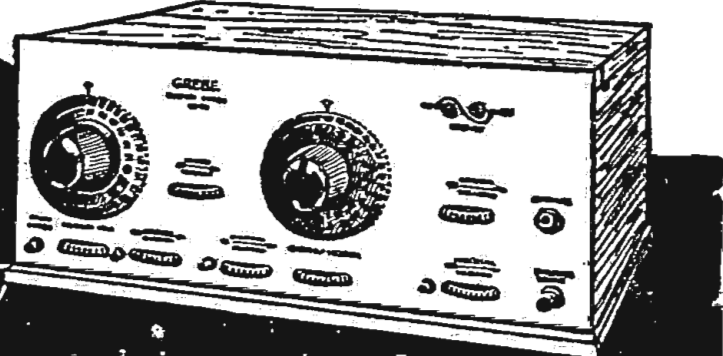
130 GUARANTEED RADIO PRODUCTS

## New GREBE Broadcast Receiver has Seven Points of Satisfaction

THESE points will be appreciated by those who have long awaited the coming of the perfect receiver.

ASK YOUR DEALER TODAY!

Mcintosh-Armstrong U.S. Pat. No. 1,113,149









ADVANCE PROGRAMS

(Continued from page 7)

WFAA (Central, 476), 8:30-9:30 P. M., Tell Me This Orchestra, Dramatic Club program.

Friday, August 24

CFCM (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Overture, "The Magic Flute," Star Concert Orchestra.

soprano: "Melody," Master Adelbert Purga, violinist: "Macushla," Inquest, "For You Alone," H. Herbert Massey, tenor.

Saturday, August 25

CFCM (Eastern Daylight Saving, 400), 8:00-9:00 P. M., Overture, "Phedra," Star Concert Orchestra.

Sunday, August 26

KHJ (Pacific, 395), 10:00 A. M., Sacred service; 10:30, Organ recital, First Methodist Episcopal Church.

The latest and most essential part of an efficient tube set



Variable Resistance Leaks FOR PANEL MOUNTING

Mounted on any panel in a few seconds—2 screws serving as connections behind panel.

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

Arthur Blakeley, organist; 7:00-7:30 P. M., Organ recital, First Methodist Episcopal Church, Arthur Blakeley, organist.

Monday, August 27

KPO (Pacific, 423), 8:00-10:00 P. M., Organ recital, Gladys Salisbury, Music, Stanislaus Bem's Orchestra.

RADIO VIA PARCEL POST AT N. Y. PRICES Standard Parts Only, in Original Packing NO SALVAGED GOODS SOLD

MARGO \$1.00 Vacuum Tube 1 1/2 Volt 1 Socket 25c

Table with columns: PHONES, VARIABLE CONDENSERS, TRANSFORMERS (Audio Frequency), TRANSFORMERS (Radio Frequency), MISCELLANEOUS

Table with columns: RHEOSTATS, SOCKETS, DIALS

Model's ESTABLISHED 1929 191 Fulton St., Dept. F-27 New York City 9 New York Stores America's Greatest Radio Mail Order House

chestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports; 7:45, Dinner music.

Amplifiers Liven WMAF Dead Spots

But Millionaire's Loud Speakers Are Silenced by Neighbor's Protest as to Noise

NEW BEDFORD, MASS.—Colonel Edward H. R. Green is to establish soon on his estate at Round Hills the Radio school with free tuition, announced some time ago in an article in Radio Digest.

Colonel Green's new 500-watt broadcasting station, WMAF, is now working; it is broadcasting simultaneously to New England fans the full program of WFAF, New York, nightly by telephone line relay.

In analyzing the use of the five special telephone lines to convey the program to WMAF it was found that at various intervals between New York and South Dartmouth, Mass., where the station is, there were "dead spots" across which the current refused to flow unaided.

Temporarily the huge loud speakers in the tower at Round Hills are silent, owing to the complaint of a summer resident at Nonquitt that they disturbed him.

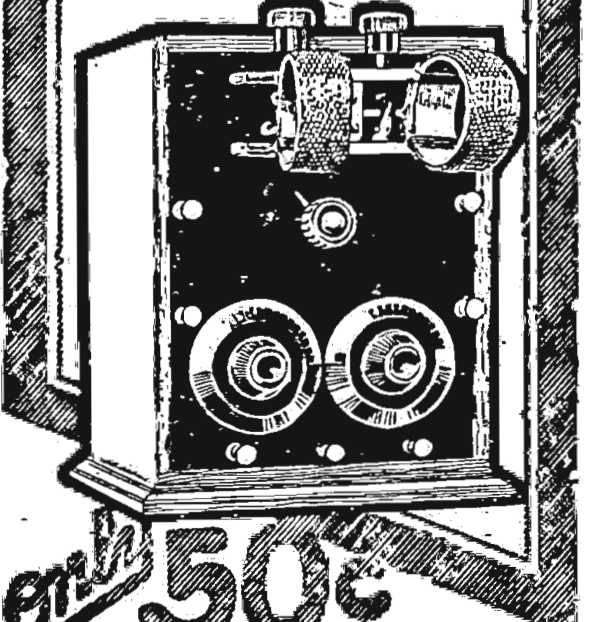
ELECTRIC SOLDERING IRON \$2.24 A. C. or D. C. Guaranteed One Year \$6.50 Dry Cell Tubes: UV-199, WD-12, UV-201A.....\$5.85 1.50 Gold Grain Detector..... .35

How to Make a Flewelling Receiver

BLUE PRINTS for the construction of a Flewelling Receiving Unit and two step amplifier.

ALL DETAILS FOR ASSEMBLY Description of apparatus and accessories and details of tuning. CABINET DIMENSIONS PANEL LAYOUTS LIST OF PARTS

Send only money orders—no checks or stamps. Coins at your own risk. Book Department Radio Digest 123 W. Madison St., Chicago, Ill.



# Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DDM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.  
123 West Madison Street  
Telephone: State 4843, 4844, 4845  
Chicago, Illinois

E. C. RAYNER, Publisher  
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor  
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square,  
New York; Telephone Bryant 4909

Pacific Coast Representatives  
E. J. Wood, 251 Kearney St., San Francisco

Telephone Kearney 1472

H. M. Morris, 417 Western Mutual Life Building, Los Angeles  
Telephone 12911

Member of the Audit Bureau of Circulations



PUBLISHED WEEKLY

SUBSCRIPTION RATES

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

Vol. VI Chicago, Saturday, August 25, 1923 No. 7

## Lectures Alone Not Satisfying

It Takes Real Music to Hold the Attention of the Fan  
THE navy department, which has been broadcasting concerts from NAA, has declared its intention of discontinuing them and using the government equipment only for lectures, "because more persons will listen to the lectures than to the concerts."

Perhaps their assertion is correct but if it is it certainly does not apply to all localities. Lectures are right when sandwiched with good musical programs but a steady diet of lectures soon pall the appetite of the ordinary Radiophan.

## New Field for Radio

Arctic Explorers Find Air Communication of Benefit

THE use of Radio for arctic work is new and untried; the results of the plan of communication, designed jointly by Captain MacMillan and officers of the American Radio Relay League, are expected to pave the way for future expeditions under vastly improved circumstances as to the morale of the explorers and the advancement of science.

Should some sudden emergency overtake the exploring party and their rescue brought about, then the weeks spent in preparation, the painstaking care in which Radio equipment was assembled, will not have been in vain and Radio will have proved its value in the new field.

## Freak Effects in Reception

Localities Seem to Suffer from Jumps in Waves

IT is a widely known fact that some places are very unsatisfactory for Radio transmission and reception. The range of a broadcasting station may be many hundreds of miles, yet within fifty miles are localities over which the radiated electro-magnetic waves seem literally to hop, coming down at points farther along. At the same spot, however, over which waves from one station skip, waves from more distant stations may readily be picked up.

These conditions give rise to much speculation as to the cause. The characteristics of the land, whether hilly or flat, wooded or cleared, moist or dry, over which these waves have passed are thought by many Radiophans to be conditions which contribute to freak effects.

## Let the Knocker Be Knocked

Nothing Gained by Kicking About Something Free

SOME of the Radio broadcasters are complaining about unappreciative audiences and about the number of "knocks." Few persons realize the pains to which the broadcasters go to furnish amusement free of cost.

It is impossible to satisfy such a vast audience as that of Radio. The impulsive or enthusiastic listener is always ready either to register a "kick" or a "boost" as he is touched by this or that part of a program. While you may not like a certain portion sent from a certain station that is no sign others have the same dislike. A little patience will carry you further and help the broadcasting station to arrange a program that will suit the greater part of a Radio audience.

Managers of broadcasting stations should not take "knocks" from impulsive individuals seriously, nor take them as a standard by means of which to judge others of the audience. There are many satisfied listeners who never think of sending in a "boost"; these are the persons who really benefit by the entertainment.

"Knockers" must remember that it is an expensive matter to maintain these stations. One of the great broadcasting stations employs fifty-six persons. Vacuum tubes used in these stations cost even at wholesale almost one hundred dollars and they have a habit of burning out even faster than the smaller tubes do.

## RADIO INDI-GEST

Which Goes for Many Other "Records"

MY FRIEND	SPANISH SOLO
BILKINS	I HEARD
WAS BRAGGING	WAS THE
ABOUT THE	TOREADOR SONG
WONDERFUL	FROM CARMEN."
LONG DISTANCE	"HAH HAH,
RECEPTION	HEH HEH,"
HE HAD HAD	I CHUCKLED
LAST NIGHT.	PUNCTURING
SAID HE,	HIS HOPES.
WHY, I EVEN	"THAT SONG
HEARD CUBA.	WAS FROM
I KNOW	STATION PDQ
IT WAS CUBA	RIGHT HERE
BECAUSE THE	IN THE CITY."

GOO GOO.

## An Electromagnetic Cerebellum, as 'Twere

Dear Indi: 'Sno use, they've all got it—Radio on the brain. Witness the following between Ma and me:

"Wire you in-su-late?"  
"Been out with my Gal-ena."  
"Did you have a quarrel with Maggie Ohms?"  
"No. She had a date with Reggie Eeneration."  
And so the moon turned pale. MIKE ROFARADS.

## A-B-C Lessons for Indigest Beginners

Chapter X—J Also Stands for Jay Walker

BY GOSH

**J** IS for the Jumble  
That you hear on busy nights,  
When you're tunin' broad as Broadway,  
And static blinks the lights.

## And So the Limerick Contest Starts

Dear O. M. Indi: Three weeks ago you introduced Mike and Izzy and assured us that they would play a minor part in the game of Radio confusion. Then to make good your word you never mentioned them since. I can't forget their happy dissatisfied look as they seem to fail to get the drift of what wasn't going on, so I want to suggest something.

You know limericks, don't you? (No; who Izzy?—Indi.) Then why not exact a prize of anything from a microfarad to a milhenry from the Radio squab who writes the worst limerick about Mike and Izzy. Disposition of the prizes is to be left to your indiscretion, but would suggest that they be exchanged for a last year's bird's nest, which may be used for a housing on a leaky variometer.

To start the ball on the downward curve, here's my limerick; who can do worse?

Two monks, one Mike and one Izzy,  
With wire and sundries got bizzy.  
They built up a loop,  
Put spaghetti in the soup—  
Er somethin' which made 'em both dizzy.

Or you might reject this one for the benefit of those who don't want to read hefty stuff:

Friend Izzy he built up a circuit,  
And Mike tried his durndest to workit.  
He tuned in for "BLAH"  
With never a flaw.  
Now there isn't a job but he'll shirkit.

Have some misguided individual write a limerick every week for several years. Besides being filling for the column it may inspire some Radioninny to discover a new ultra extraordinary superfluity which will revolutionize the shape of the modern binding post. Nobody reads the dope, so I believe you will be doing yourself a favor by accepting a prize from the worst limerick offered. One peck of marks sent herewith as pay for my suggestion. Please announce through BLAH, the Walla Walla broadcasting station, that you got my letter and tell the kinfolks that we will hold an ice cream social for the benefit of our Limerick Club Friday of next year. Yours on 360 meters. GESS HOO.

Lying below is  
Alloicious DeMarving,  
Who listened so long  
He died by starving.

## My Radio

The hours I spent with thee, dear heart,  
Are fraught with joy & bliss, altho'  
At times I'd like to kick apart  
My Radio, My Radio.

Each word a shriek, each song a blare .  
But still I tune and tune in vain  
I listen in unto the end, and there  
You screech again.

"B" batteries and ampliphone  
Oh, tuning coil that makes me cross  
I wish that I could cure your static groan  
But you're a loss, sweetheart, a total loss.  
H. C. GUMP.

"Blame those new cuff buttons you bought for me," muttered Paw. "I can't get 'em to work at all," he grunted. And then he wondered why the family laughed when he rolled back his coat sleeves to show two beautiful nickel-plated binding posts.



## Condensed

By DIELECTRIC

When the telephone and telegraph wires were overloaded with news of President Harding's sudden death, Radio again served in its unique capacity. News of this character spreads rapidly by whatever medium it be carried, but isolated farms, lumber camps, ships at sea, for example, knew the sad tidings far in advance of such time as pre-Radio days would have enabled. It is said that Dr. Harding was apprised of his son's demise by a neighbor who received word from a broadcasting station. Events of almost immediate occurrence may be known by many thousands in this day of Radio transmissiou.

The widely known broadcasting station in Atlanta, Ga., WGM, has found a new feature to present to its many listeners in that state. Sessions of the local legislature are being sent out as a regular part of the programs, so that all debates on all subjects may be followed and campaign speeches may be checked with what the voter has learned first-hand of the candidate's stand on measures passed or defeated. A better informed citizenry should result.

When those six convicts escaped from their enforced lodging in the city of Philadelphia they might not have considered the unseen agency which carried news of their leaving to cities, towns and even farm houses all along the way. Station WOO broadcast information respecting suspects who had "borrowed" a boat in Maryland to go cruising. Chances of escape from capture are very slim indeed with so many folks informed quickly over a large territory.

It is pretty generally admitted that daytime reception of broadcasting does not compare favorably with night reception. Yet a recent test made by Station WDAP showed very little difference between them. Instead of the three hundred mile range, the station was found to have a daytime transmission range of twice that. The test proved a power amplifier transmitter to be the most efficient. It is the pursuance of these practical tests which greatly aid progress.

Except for a violin in the hands of a youthful student, I know of no sound produced on a musical instrument so distracting as the harsh piano tones carried by so many broadcasting transmitters. We have WGY to thank for making it possible to hear piano music in our headsets and loudspeakers "true to life." Engineers at that station have succeeded in producing a device to catch overtones and the natural singing quality of the instrument, and to give to the lower notes of a piano their true value when heard through a loud speaker.

The proposed action of the marine bureau of Japan to equip fishing ships with Radio apparatus for use in case of accident to the ships or to report a catch has been tried by other nations and found valuable. This "plaything" is coming near to being a necessity in many business transactions; that fact is borne out almost daily. There is already a sizable list of practical uses.

Now our friend Howard Thurston is broadcasting again on the subject of interplanetary gossiping. He is duly recorded as predicting that "unearthly" forces will soon hobnob with us without the expensive aid of professional mediums. Well, I for one, prefer to see all efforts directed toward improving the sending and receiving of Radiophony, economizing in code usages, application of Radio to ship movements and the like before we wander so far afield for new thrills.

# First Steps for Beginners in Radio

## Chapter XIV, Part I—Headsets and Loud Speakers

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

**B**EGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles, yet to appear are:

- Chapter XIV, Part II—Headsets and Loud Speakers.
- Chapter XV—Filament Batteries.
- Chapter XVI—Plate Batteries.
- Chapter XVII—Using Alternating Current on Tubes.
- Chapter XVIII—Testing Radio Instruments.
- Chapter XIX—Locating Trouble in the Set.
- Chapter XX—Useful Information and Formulas.

**F**EW Radiophans realize the importance of the headset in the operation of a Radio set. The headset is one of the most important links in the chain between the original sounds striking the microphone at the broadcasting station and the reproduction of those sounds miles away. When one considers that their function is to convert the changing electric currents, picked up with difficulty and nurtured through stages of amplification, into audible sounds, their importance may be more easily recognized. Furthermore a poor headset will cut down the range of set hundreds of miles; many DX records are made or marred in the headset.

Perhaps the common use of wire telephones has led many to neglect the headset, thinking it but a compact telephone receiver that will keep on working perfectly indefinitely and will stand careless handling without harm. True, a Radio receiver is just a telephone receiver but a good headset is a refined scientific instrument and should be treated as such. A well designed Radio receiver will give an audible sound on a current of .00000000016 amperes. To convert such a minute current into sound demands the best of materials and workmanship in the instrument in the first place and the instrument demands consideration and care to retain its efficiency.

When one unscrews the cap from a Radio receiver and sees but two tiny coils of wire and a few pieces of steel they may well wonder where all the scientific instrument idea comes from, for it all seems so simple. But behind that simplicity lies a long story of research and experiment.

### The Theory of the Receiver

Briefly the theory of the telephone or Radio receiver is as follows: a thin metal diaphragm is rigidly mounted a fraction of an inch away from a pair of pole pieces. These pole pieces are made of soft iron but are magnetized by one or more permanent magnets mounted in the shell. Around the pole pieces are wound many turns of fine copper wire. The diaphragm is normally under tension from magnetism in the pole pieces. When a current flowing around the windings changes in value the magnetic pull on the diaphragm will be varied and the diaphragm will vibrate, giving rise to sounds.

Simple in theory but the details demand attention. The iron in the pole pieces must be of the softest grade so that the magnetism will change rapidly

with the least change in the current in the coils. The diaphragm must be of a certain exact thickness for it must vibrate to the high notes of the violin and respond as well to the cello. A tiny dent or the least bend in the diaphragm will give rise to distortion or make the telephone more sensitive to one frequency than another. The distance between the pole pieces themselves and between the pole pieces and diaphragm are of great importance. All these factors must be taken care of to assure proper operation.

### Resistance of the Receiver

Now we come to the important part, namely, the resistance. There is a mistaken idea that the resistance determines the sensitiveness of a receiver. A 3000 ohm phone is not more sensitive than a 200 ohm phone because it has a higher resistance but solely because it has more turns of wire on the pole pieces.

In designing electromagnets the practice is to make the thickness of the winding twice the width of the pole piece. The size of coil in the receiver then is fixed by the size of the pole pieces used. The pull of an electromagnet depends on the ampere turns, that is, the number of turns multiplied by the amperes flowing in the coil. Therefore the more turns we can get into a given space the greater the magnetic flux. In order to get sufficient turns on the pole of a receiver the manufacturers use very fine wire, for that reason the resistance of a Radio receiver is high.

However, another factor enters the use of receivers with tubes. It is a well known law in electrical practice that the impedance of the output circuit of any device should equal the impedance of the device itself. Therefore the impedance of the receivers should equal the plate impedance of the tube. Impedance as we have learned is the resistance offered to the flow of alternating currents by an inductance as well as the direct current resistance. Therefore the impedance of a 2200 ohm phone for instance is 22,000 ohms on an alternating current of 800 cycles. For higher frequencies the impedance is still greater; it varies with the frequency. In order to meet the above conditions it is common practice to design receivers and transformers with an impedance equal to the plate impedance of the tubes with which they are to be used.

### Resistance Does Not Affect Sensitiveness

Realizing then that resistance has little to do with sensitiveness we will consider the important factors in the purchase and care of Radio receivers. The best guide is the reputation of the manufacturer. A cheap 'phone is seldom worth all its costs; so don't hesitate to pay a little more for the best. See that the cases are carefully made, all threads well machined and the caps fit snug and tight, that the diaphragms are perfectly flat and rest on smooth edges of the shell, that the coils

have been protected by a covering and the permanent magnets will support the diaphragm on edge. If they fail to hold the diaphragm they are weak and should not be accepted. The simple test for a Radio receiver is to place a piece of paper moistened with the tongue between a nickel and a penny and to touch the 'phone tips to the coins. The current generated by this simple battery should give a click in the phones. If no sound is heard they are useless for Radio work.

### Care of Receivers

Having purchased 'phones let us take good care of them so they may give long and satisfactory service. Handle them carefully and do not knock or jar them excessively. Vibration will weaken the magnetism in the permanent magnets and reduce the sensitiveness of the receivers. Do not test the 'phones by connecting the cord tips with a B battery, for strong currents in the wrong direction tend to demagnetize the magnets. Since the pole pieces are kept magnetized, a current in one direction in the windings will assist the permanent magnets but a strong current in the opposite direction tends to reduce the magnetic effect and demagnetize the magnets. For this reason the receivers are fitted with marked cords, the cord with the red thread being connected to the positive 'phone terminal. The current in the plate circuit will then tend to help the permanent magnets and the 'phones will retain their sensitiveness. With crystal detectors this is not important, the 'phones may be connected either way.

Should it be necessary to remove the diaphragm at any time do so by sliding it off carefully. Do not attempt to lift it with the finger nails for it will be bent and the efficiency of the instrument reduced. In replacing the diaphragm slide it into place to prevent bending it.

The 'phones should not be pulled around by the cords. The conductors are made from tinsel; excessive pulling or twisting

causes the tinsel to break. In time loose contacts will develop that cause annoying sounds by reason of the current being made and broken with each movement of the cord.

### Single 'Phones for Loud Speakers

Many fans make a practice of using a headset as a loud speaker by mounting it in a horn. The heavy currents they are called upon to handle will often render them unfit for DX work despite the ruggedness of the receiver under ordinary conditions. It is better practice to reserve the headset for long distance reception; for loud local reception, make use of a single receiver similar to the Baldwin mounted in a horn. To reduce the amount of current in the headset use is made of jacks but one should be careful in wiring in the jacks to see that the same spring in all the jacks is positive and that the cord with the red thread is so connected into the plug that it will make contact with the positive spring when the plug is inserted in the jack.

When putting the receivers away do not throw them into a box or drawer with other objects that may strike the diaphragm and dent it and then expect the 'phone to do good work.

(TO BE CONTINUED)

The French steamship line plans to equip all its passenger ships sailing out of New York with Radio receivers and amplifiers for the reception of broadcast programs.



## WE REPAIR RADIO TUBES

WD-11 ...\$3.50	UV-199 ...\$3.75
WD-12 ... 3.50	UV-299 ... 3.75
UV-200 ... 2.50	UV-201-A ... 3.75
UV-201 ... 3.00	C-301-A ... 3.75
C-300 ... 2.50	UV-202 ... 4.00
C-301 ... 3.00	C-302 ... 4.00

MAIL ORDERS SOLICITED AND PROMPTLY ATTENDED TO.

**H. & H. RADIO COMPANY**  
Clinton Hill Station  
P. O. Box 22A NEWARK, N. J.

## RADIO SETS AND PARTS MADE TO ORDER

### CONTRACT MANUFACTURING

Send us blue prints and specifications for price quotations.

**LINCOLN RADIO CORP.**  
224 North Wells Street, CHICAGO, ILL.

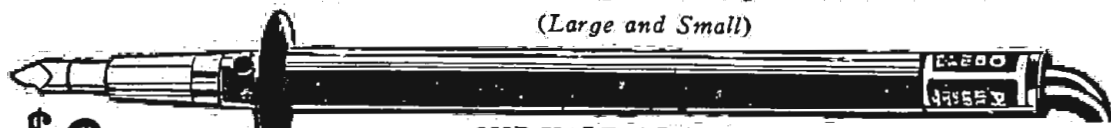
## Delicate Soldering

Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.

### THE POST SOLDERING IRON

Platinum Heating Unit—Interchangeable Tips—Universal Current

(Large and Small)



\$6

ONE-HALF ACTUAL SIZE  
Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute  
From your Dealer, or write

POST ELECTRIC COMPANY (Dept. 509), 30 E. 42nd St., New York

## "MAKE PERFECTION YOUR SELECTION"

<b>BRANDES</b> Superior Phones. \$8.00 list—Special.....	<b>\$5.45</b>	<b>NEUTRODYNE</b> Complete parts for 4 tube Fada Neutrodyne Set. Mostly Fada parts used.....	<b>\$27.95</b>
<b>ACME PHONES</b> Has no peer for receiving clear.....	<b>\$3.95</b>	<b>ATLAS</b> Loud Speaker. Supreme Quality. Clear and Loud. List \$25. Special.	<b>\$17.50</b>
<b>COCKADAY</b> Complete parts for this wonderful circuit; only best material used. Guaranteed to work properly. Special complete..	<b>\$13.95</b>	<b>FLEWELLING CIRCUIT</b> Complete parts. Including two mounted Coil Mountings. Only standard adver- tised parts used. Complete.....	<b>\$11.45</b>
<b>REINARTZ</b> We specialize in the Reinartz circuit. Complete standard parts. We guarantee results.....	<b>\$10.45</b>	<b>2 STEP AMPLIFIER</b> Completely assembled, ready to use. None better made.....	<b>\$11.95</b>
<b>VARIABLE CONDENSERS (Moulded Ends)</b>		<b>SETS</b>	
3 Plate .....	List Price 2.00 Our Price 1.25	Aeriola Jr. (Westinghouse).....	List Price \$18.00 Our Price \$5.95
11 Plate .....	3.50 1.75	Cutting & Washington 3-Tube Type II.....	125.00 55.00
17 Plate .....	4.00 1.95	Tuska Regenerative .....	35.00 22.50
23 Plate .....	4.00 1.95	Crosley Regenerative .....	19.00
43 Plate .....	5.00 2.25	Crosley 2-Step Amplifier.....	17.00
11 Plate Vernier .....	6.00 3.25	2-Step Amplifier, Assembled.....	11.95
17 Plate Vernier .....	6.00 3.25	General Radio 1-Step Amplifier.....	8.00 6.95
23 Plate Vernier .....	6.60 3.50		
43 Plate Vernier .....	7.50 3.95		

**PERFECTION RADIO CORPORATION,**  
Six New York Retail Stores  
208 page complete Radio catalogue free with orders of \$5.00 on request.  
Otherwise prepaid for 25 cents.

59 Corland St., NEW YORK CITY  
Do Not Send Stamps

**Rametra CORPORATION**  
**PRICE LIST**  
for the FALL SEASON  
now ready for mailing **FREE**  
Write for it  
**RADIO & MECHANICAL TRADING CORP.**  
23 Warren Street NEW YORK CITY

**TWO SUPERSENSITIVE CIRCUITS**  
(Both Copyrighted)  
My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, \$3.00. Photo of set with every order.  
This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.  
My W. D. II Circuit is especially designed for use with the "Pickler" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, \$3.00. Photo of set with every order.  
Either set is easy to build, easy to operate. Everything clearly shown.  
Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.  
**S. A. TWITCHELL**  
1925 Western Ave. Minneapolis, Minn.

**Crystal Tube Detector**  
Replaces crystal and cat whisker. Always set and alive, loud and clear. No more fishing for live spots. Guaranteed to detect perfectly. Simple to connect—full instructions. Needs no batteries and never burns out. Made of the famous B-Metal. Sold by all live dealers or can be ordered from  
**The B-Metal Refining Co.**  
3134 Trumbull Avenue  
Detroit, Mich.  
Price \$1.50

**FORMICA**  
A Laminated Phenolic Condensation Product  
**SHEETS TUBES RODS**  
**RADIO PANELS**  
POLISHED BLACK FINISH  
CUT PERFECTLY SQUARE TO ANY SIZE  
1/32" THICK 1/2¢ PER SQ. INCH  
1/16" THICK 3/4¢ PER SQ. INCH  
3/32" THICK 1¢ PER SQ. INCH  
1/8" THICK 1 1/2¢ PER SQ. INCH  
3/16" THICK 2¢ PER SQ. INCH  
1/4" THICK 2 1/2¢ PER SQ. INCH  
3/8" THICK 4¢ PER SQ. INCH  
1/2" THICK 5 1/4¢ PER SQ. INCH  
SEND FOR COMPLETE PRICE LIST  
PROMPT ATTENTION TO MAIL ORDERS  
DEALERS' PRICES ON APPLICATION  
**STARRETT MFG. CO.**  
519 SOUTH GREEN ST. CHICAGO

# Some Ideas for the Amateur Workman

## Homemade Devices for Use in Receiving Sets

Many amateurs who construct their own sets readily appreciate, no doubt, the kinks constantly appearing in publication. The author presents here a group of his own ideas which he hopes will prove beneficial to the Radio fraternity.

### WORKSHOP KINKS? EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT,  
Radio Digest,  
123 W. Madison St., Chicago

"Economy" is the watchword of the amateur with the small purse; for the reader who may be under such circumstances Figure 1 shows a kink which at some time may prove valuable. If you have a dial that is stripped or that is broken so that it is useless you can easily make a neat scale from it by cutting it with a jig saw, and drilling as shown by the dotted lines in the illustration.

Vernier variable condensers have become quite popular because of the fine adjustment which they make possible. In many instances, good condenser adjustments are worth remembering. We have a dial to indicate the position of the condenser itself, but what about the vernier, which is quite important. A simple remedy for the situation is to mount a pointer on the vernier knob, using the dial as a scale. It is true that the dial is not always in the same position but this will not prevent your keeping a record of good adjustments. For example, the illustration (Figure 2) shows the condenser adjustment as 50 degrees, and the vernier as 80 degrees.

To solder taps on switch points in some cases is quite difficult, although it insures a good connection. A small Fahnstock binding post will be found quite useful in such cases, for connections. By mounting one in back of each tap (as shown in Figure 3), the work in wiring is much simplified, and secure connections can be made, eliminating the solder.

Figure 4 shows a compact, back-mounted inductance switch. The knob of the switch projects through a slot cut in the panel, and the top of the switch is numbered, in conjunction with the taps. The switch and the switch points are mounted on a piece of hard rubber, supported by a bracket. This saves panel space, and presents a neat appearance.

Honeycomb and other inductance coils are quite awkward when mounted on the front of the panel. Though there are many ways of back mounting these coils very few are

## SIX SHORT CUTS ON HOME SETS

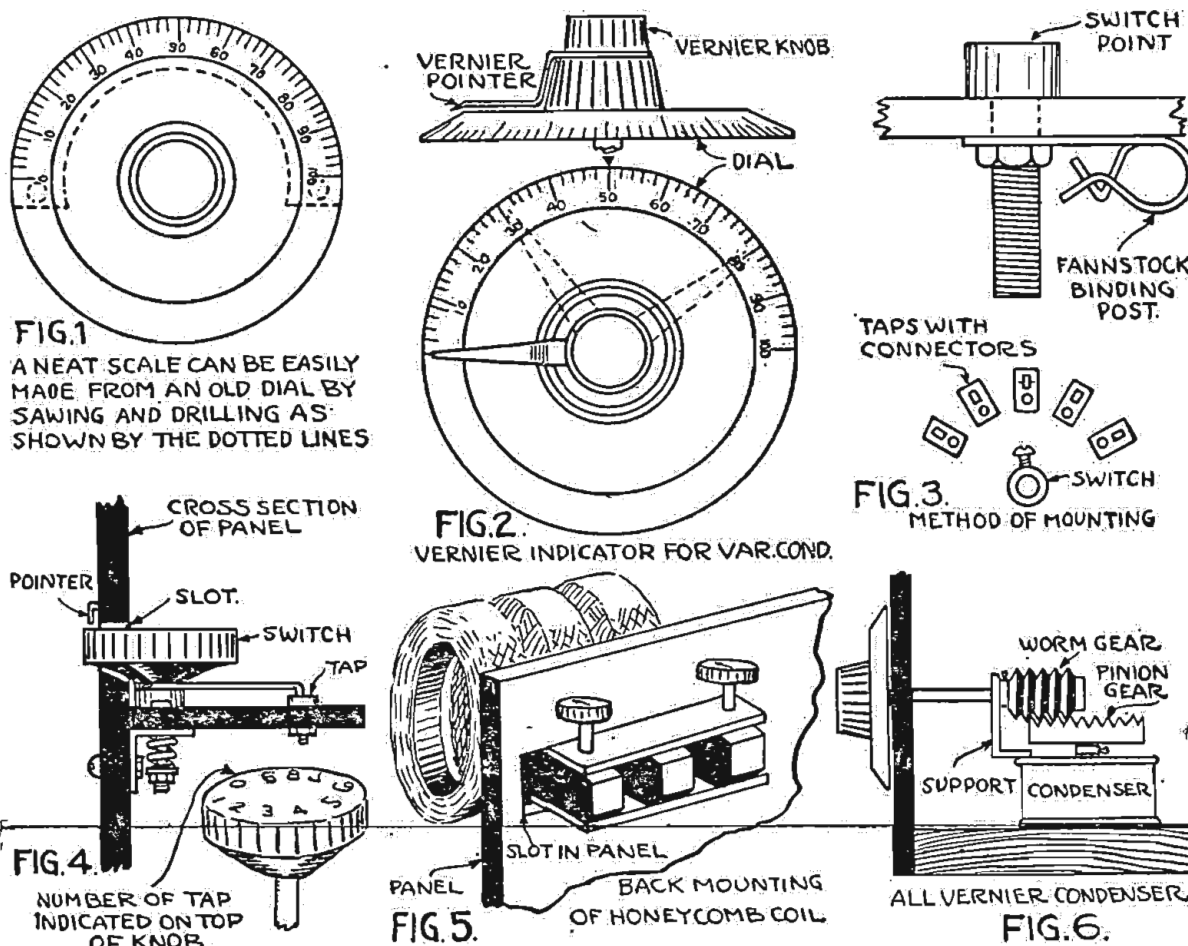


FIG. 1  
A NEAT SCALE CAN BE EASILY MADE FROM AN OLD DIAL BY SAWING AND DRILLING AS SHOWN BY THE DOTTED LINES

FIG. 2  
VERNIER INDICATOR FOR VAR. COND.

FIG. 3  
METHOD OF MOUNTING TAPS WITH CONNECTORS

FIG. 4  
CROSS SECTION OF PANEL  
NUMBER OF TAP INDICATED ON TOP OF KNOB.

FIG. 5  
SLOT IN PANEL  
BACK MOUNTING OF HONEYCOMB COIL

FIG. 6  
WORM GEAR  
PINION GEAR  
SUPPORT CONDENSER  
ALL VERNIER CONDENSER

satisfactory. The standard mounting can be easily changed to back mounting, as shown in Figure 5. A slot is cut in the panel, and the mounting is reversed, allowing the coils to be inserted through the slot. Small arrows engraved on the knobs, indicate the position of the coils.

There is no need of discarding the old condenser if you want a vernier condenser, for it can be changed quite easily at small cost. Figure 6 shows the simple arrangement. A pinion gear is mounted on the condenser shaft, and a worm gear on a shaft which is controlled by a dial. The ratio of the gears makes accurate vernier adjustment possible. This method can also be applied to variometers or variocouplers.—Carl Mason, Jamaica Plain, Mass.

### Soldering Brass and Copper

For all Radio work, when copper and brass are to be soldered, only rosin should be used. Any paste or liquid will inevitably corrode the metals; it is difficult to remove all the paste after the joint is made. For this reason, use only rosin-core solder wire. This is a tube of solder filled with rosin; and no cleaning is necessary afterward.

### Concerning Rebuilt Phones

Rebuilt headphones lose magnetism in the permanent magnets if no attention is paid to the direction in which the currents employed in them flow.

From time to time the aerial should be lowered, and the insulators should be cleaned off to avoid leakage.

### YOU DON'T NEED

**Tubes** to get out of town. Even in the summer I hear Omaha, Kansas City, Fort Worth and Davenport on my crystal set without amplification. Works over 1,000 miles in winter. Send self-addressed envelope for further information or \$1.00 for complete copyrighted drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED. Leo Lambert, 501 South Volutsis, Wichita, Kan.

**\$10 to \$12 VALUE FOR \$5 BECAUSE**

Because of the Scientific and Simple construction of Repeater Receivers the manufacturing cost is so low that the purchaser actually gets \$10 to \$12 value for \$5.00. Repeater Receivers represent a great forward step in Radio Head Set designing. Repeaters are a quality product. 2400 OHMS. We guarantee results equal to the highest priced Head Sets.

**YOU BE THE JUDGE**

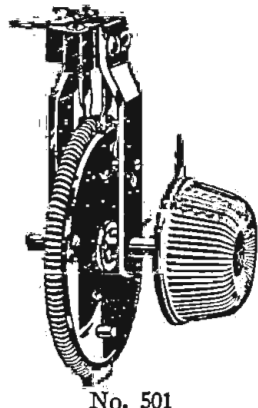
If your dealer hasn't Repeaters, on receipt of \$5.00 and your dealer's name we will send postpaid a complete set subject to refund within ten days if you are not perfectly satisfied.

**DEALERS**  
Write for our proposition. You will like it.

**MOSS-SCHURY MFG. CO., Inc.**  
Radio Division  
2011-13 Franklin St., DETROIT, MICH.  
Repeater Receivers are manufactured in large volume by this firm and high quality is assured by our long experience in the manufacture of electrical precision devices.

**Repeater Receivers**

## Kellogg Radio Equipment for Better Results



### Rheostats

The Kellogg rheostats are simple in design, having but one movable part. The resistance wire is carried on a rotor of high grade insulating material and the contact arms are so placed that a slight movement brings in the one-half turn of the wire, giving a vernier effect.

The knob is shaped and corrugated to fit the fingers, making possible the slightest movement.

- No. 501 Rheostat, 6 ohms.....\$1.50
- No. 502 Rheostat, 25 ohms..... 1.50
- No. 46045 Rheostat Rotor, 25 ohms ..... .90

**KELLOGG SWITCHBOARD & SUPPLY COMPANY**  
1066 W. Adams Street  
Chicago, Illinois

## How to Plan and Make Your Fixed Condensers

Radiophans are divided into many classes. Some are familiar with all of the various electrical stunts while others are not versed in the solution of mathematical formulae. This article is to give some information to the latter class.

For example: It is desired to make a fixed condenser of a capacity of .00025 mfd. using tinfoil for plates and mica as a dielectric. What should the area of each tinfoil plate be and how many will be required?

The capacity of this "problem" condenser is small and only two plates will be required, separated by one piece of mica. In this case C equals the capacity desired which is .00025 mfd. T equals the thickness of the dielectric in decimal parts of an inch, which is .01 and K equals the dielectric constant for mica which without further explanation may be taken as 6.

$$C = \frac{KT}{4\pi} \times 10^{10}$$

The Area =  $\frac{2248 K}{.00025 \times .01 \times 10,000,000,000}$  or, substituting,

$$\text{Area} = \frac{2248 \times 6}{2} = 2 \text{ sq. in.}$$

Taking the square root of 2 square inches gives 1.41421 inches. Therefore, two plates will be required, each plate measuring 1 1/2 inches (approximately) on each side. Remember this the lapping area.

The plates are placed between two pieces of formica 1/8 in. thick with the mica between them.

## REFLEX

Erla Reflex Transformers

DEALERS: SEND FOR LITERATURE

NOTE: We are the Largest Exclusive Radio Jobbers in the Middle West

**HUDSON-ROSS**  
123 W. Madison St. Chicago

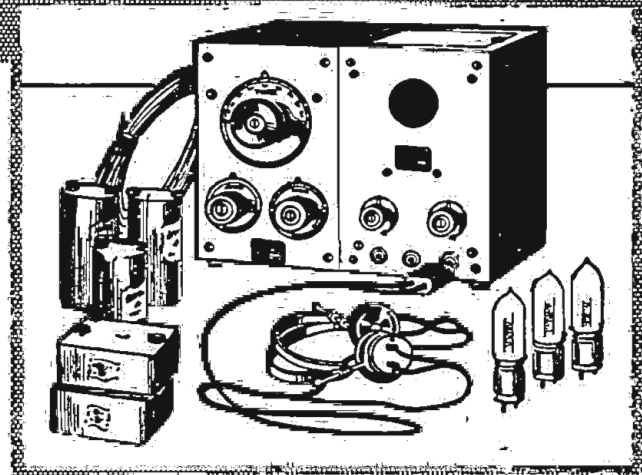
## The Largest Radio Store in America OFFERS

# FOR 30 DAYS ONLY!

FOR THIS SALE

# 6750

EVERY SET IS GUARANTEED BRAND NEW



## \$142.50 Model RC Radiola

Made by WESTINGHOUSE for the Radio Corp. of America

Every one of you Radio Fans know that the RC Radiola Set is one of the best on the market—that it sells all over the country for \$142.50. Here's your opportunity to get that set at a REAL SAVING—IF YOU ACT AT ONCE. We have a very limited number of brand new sets that we are offering at \$67.50. Think of that! \$75.00 less than the regular selling price! No C. O. D.'s can be shipped.

This Price Is Actually Less Than the Cost of the Parts!

The RC Radiola has been sold everywhere for \$150 with the aerial equipment included. During this sale you get everything complete at the remarkable price of \$67.50. Get your order in at once!

COMPLETE, WITH BATTERIES AND ALL EQUIPMENT

- |                     |                             |                              |
|---------------------|-----------------------------|------------------------------|
| 3 WD-12 Tubes       | 1 Ground Clamp              | 3 Red Seal Radiola Batteries |
| 2 Insulators        | 1 Phone Plug                | 1 45-Volt Radio "B" Battery  |
| 50 ft. Lead-in Wire | 1 Pr. Sensitive Head Phones | 100 ft. Antenna Wire         |

**ACT NOW! While they last—Save \$75.00 SEND YOUR ORDER IN TODAY!**

ALL MOSS-SCHURY GUARANTEED BY US TO BE OF FIRST QUALITY

**CHICAGO SALVAGE STOCK STORE**

MAIL ORDERS

ADDRESS DEPT. R. D.

509 So. State St.

CHICAGO, ILL.

# Five Tube Neutrodyne Receiving Circuit

## Part I—The Circuit and List of Parts

By H. J. Marx

SINCE the announcement of the development of the Hazeltine Neutrodyne Circuit, patented March 27, 1923, under United States Patent No. 1450080,

tenna and ground to the first neutrodyne when the lever is on the one side; when on the other side the loop is connected direct to the grid and negative

out entirely, leaving no dead end connections as is sometimes the case.

Jacks are used in the first and second audio stages only. No connections are

condensers. The illustrations, to be shown later, will reveal the appearance and assembly of these parts.

A potentiometer, added for grid control of the detector tube, was found to be of considerable advantage, especially when using different tubes for the detector. In using 201-A tubes neither a straight positive, nor negative grid return connection gave best results, but the potentiometer was the means of adjusting to the best operating point.

The two jacks are of the filament control type; when the rheostat adjustments have been made they need not be altered except to account for variations in battery discharge.

The audio frequency transformers were of a small compact type, taking up a minimum amount of space. In spite of the apparently large panel there was but little surplus room and the panel layout required considerable study to avoid interference.

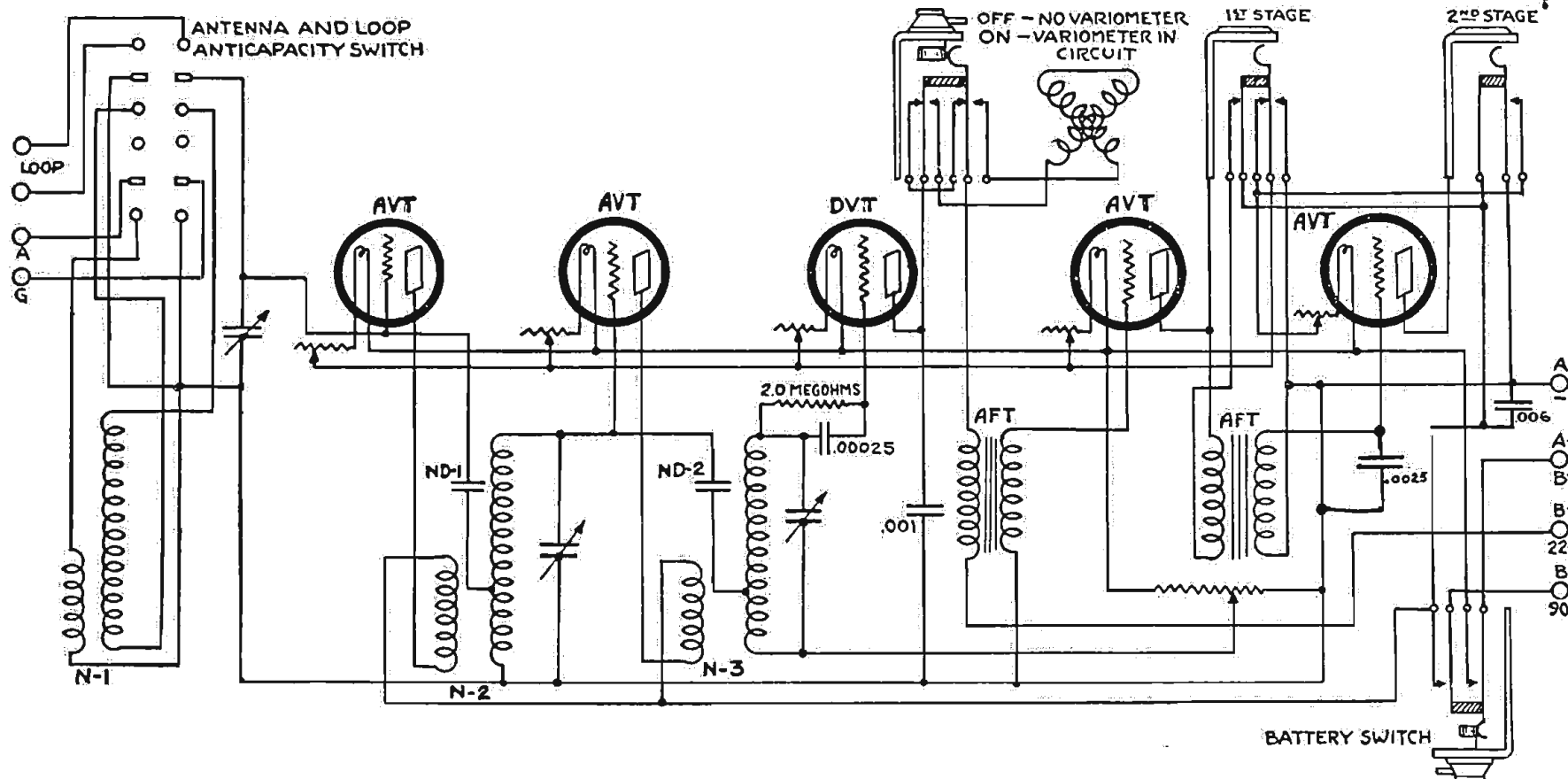
### List of Parts

The list of parts gives completely the various pieces required for the assembly of the set which as constructed used 20-ohm rheostats. Either UV-201A or C-301A tubes were contemplated for use in the circuit. All tubes to be used should be carefully selected and tested. The resistance of the rheostats may be changed to suit the use of any other tubes under contemplation.

(TO BE CONTINUED)

### Care of the Filament

Although the normal life of the average filament is considerably more than 1000 hours, it requires but an instant to destroy this delicate filament when excessive voltages are applied to its terminals.



every Radiophan has been itching to try it. It was possible to give circuit diagrams, but real constructional data of a tested circuit and set were not available. Rather than furnish details blindly in an effort to supply the demand, time was taken to construct and assemble carefully a set of this type. The final tests having been completed, and the operation of the circuit giving thorough satisfaction, it is now presented to the fans with the knowledge that if instructions and details are carefully followed there will be no difficulty in operation.

It would be well to say here that the efficiency of operation depends much on the quality of apparatus, carefulness and accuracy of construction, and the experience of the operator. Until the approximate dial settings for various wavelengths are determined, tuning is difficult. Each stage of Radio frequency must be tuned to the proper wavelength; as these adjustments are rather critical, no reception will be had until each step is tuned in. There is no long whistle to inform you of a carrier wave; reception has a habit of slamming in on you so suddenly that it makes the ears ring for a while. The volume is more than sufficient; the clarity of tone is exceptionally good and, once the tuning knack is acquired, distance appears to be unlimited. But let it be said again—all these points are only the reward of great care in construction and the selection of apparatus.

### Special Circuit Features

From the flood of requests for neutrodyne circuit details, a number of special features in popular demand were selected and incorporated in the circuit. Such features may be omitted by the constructor if they are not desired.

Some wanted a loop antenna circuit; others wanted to use their outdoor antennae; many wanted to use both. For this reason the circuit calls for four binding posts, two for antenna and ground and two for loop aerial connections. An anti-capacity switch connects the an-

filament with the condenser of the neutrodyne shunted across it. If the lever is in the center or neutral position all aerial and ground connections are open.

A battery switch has been added. This

### LIST OF PARTS

- 1—Main Panel 7 1/8" x 23 3/4" x 3/16"
- 1—Sub Panel 8" x 9" x 3/16"
- 3—Neutroformers
- 2—Neutrodons
- 5—Rheostats 20 Ohms
- 2—Panel Mount Sockets
- 3—Base Mount Sockets
- 1—Anti-Capacity Switch, 12 terminals
- 1—Jack Type Battery Switch, double circuit
- 1—Jack Type Switch, 6 spring
- 1—Filament Control Jack, 5 spring
- 1—Filament Control Jack, 3 spring
- 2—Audio Frequency Transformers
- 1—Variometer
- 8—Binding Posts
- 1—Grid Leak, 2 megohms
- 1—Grid Condenser, .00025 mfd.
- 1—Fixed Condenser, .001 mfd.
- 1—Fixed Condenser, .0025 mfd.
- 1—Fixed Condenser, .006 mfd.
- 1—Potentiometer, 200 ohms
- 4—Dials 3/4", Hole 3" Diameter
- 50 ft. Square Bus Bar Wire

switch opens and closes both the A and B battery circuits.

A variometer has been added in the plate circuit of the detector tube. This may be cut out by means of the variometer switch. It will be noticed that this switch cuts it

made for the detector stage, as all tuning may be done by plugging in on the first stage of audio frequency amplification.

All binding posts are mounted in the back of the panel, so no unsightly wires need be run to the front of the set.

### The Circuit

The circuit covers two stages of Radio frequency detector and two stages of audio frequency amplification. Transformer coupling is used in all stages. The regular Radio frequency transformers cannot be used since the ratio and neutrotron tap are of special importance in the proper operation of this type of circuit. In addition these transformers, called neutroformers, are of the air core type. They consist of the transformer windings on tubes, mounted on the proper variable

**CARTER**  
New Inductance Switch



No sliding contacts; panel numbering eliminated; 15 good contacts; adjustable stop pin. Price \$2 including knob-dial. Ask your Dealer. Write for new free catalog.

CARTER RADID CO., 205 S. State St., CHICAGO

### —Of special interest to Radio Dealers!

One of Chicago's oldest and largest exclusive radio stores sold more Mu-Rad Receiving Sets in 1922-23 than all other types of Receivers combined!

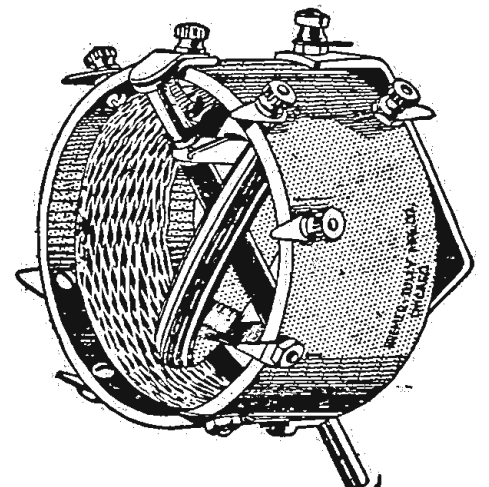
### Mu-Rad sells—and sells!

That fact has been repeatedly verified by our many other Mu-Rad dealers in the middle-west. Why not join them? Why not enjoy as they do the ASSURED PROFITS of good radio merchandise well advertised?

### Write for a Mu-Rad Franchise

To get complete details of our special Mu-Rad proposition will not obligate you. Write also for a copy of our handbook catalog of other profitable Radio merchandise. Write today before someone else in your neighborhood gets exclusive Mu-Rad privileges.

**Chicago Radio Apparatus Company**  
Jobbers of Good Radio Merchandise  
General Offices: 407 South Dearborn  
CHICAGO



### "B-T" UNIVERSAL VERNIER TUNER

does away with tapped coils and switches on REINARTZ CIRCUITS

and improves range clearness and selectivity wonderfully. Covers new broadcasting wave lengths. Also a wonder-worker in practically all the modern circuits, including reflex. Price, from your dealer or postpaid, \$5.00. Hookup diagrams free.

**BREMER-TULLY MFG. CO.**  
532 South Canal Street CHICAGO

**"VERILOUD" SYNTHETIC RADIO CRYSTAL**



ON APPROVAL FOR 30¢  
**ZOBEL-STEIN LABORATORIES**  
322 9th ST. BROOKLYN, N.Y. SOUTH 2650

**WE REPAIR YOUR VACUUM TUBES**

WD-11, WD-12, UV-199, UV-201-A, C-301-A .....\$3.50 each  
UV-200, C-300, AP Detectors..... 2.75 each  
UV-201, C-301, AP Amplifiers..... 3.00 each  
DV-6, DV-6-A ..... 3.50 each  
UV-202 ..... 4.00 each

And Guarantee Them Equal to New

**QUICK SERVICE** Include with your order remittance to cover repair plus parcel postage for one pound per tube. If preferred, tubes will be returned C.O.D. repair charges.

**Abalene Radio** 14 Vesey Street New York, N.Y.

**Federal DISTRIBUTORS DEALERS—ATTRACTIVE DISCOUNTS.**

NOTE: We are the Largest Exclusive Radio Jobbers in the Middle West

**HUDSON-ROSS**  
123 W. Madison St. Chicago

**Money Earning Opportunity**


HERE is your chance to cash in on your spare time. A special offer is being made to you for the summer.

YOU can easily earn some real money, or your choice of Radio parts needed for your receiving set.

WORK is pleasant and profitable. Just call on your friends, enrolling their names on our large family roll of readers.

WRITE at once for our proposition which is yours for the asking. Address

Circulation Manager, Radio Digest  
123 W. Madison St., Chicago



## REAL TWO-COIL LOOP AERIAL CIRCUIT

## Reviews of Books

**Elements of Radiotelegraphy.** By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, \$2.50.

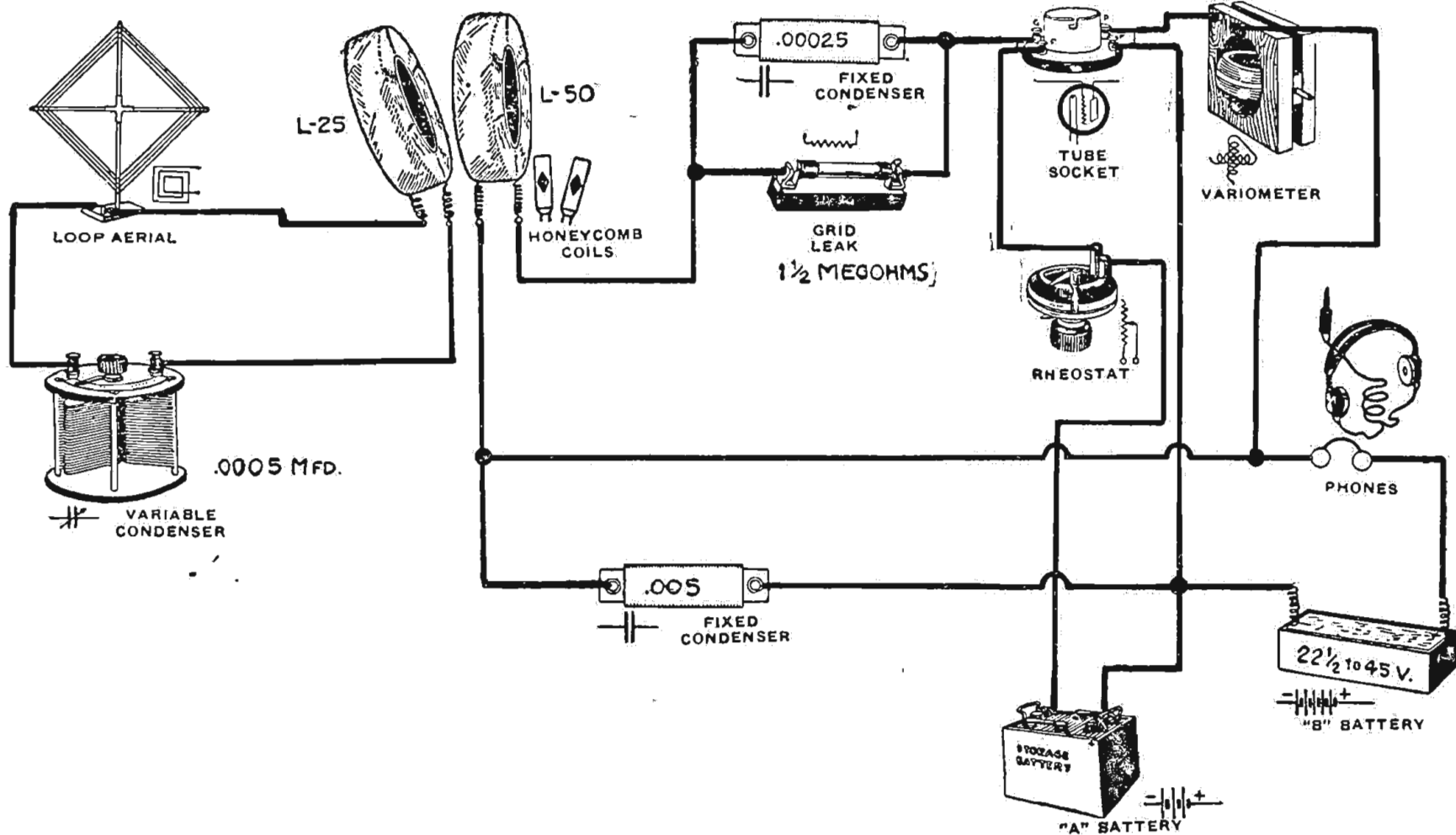
**Radio for the Amateur.** By A. H. Packard and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

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.

One reason for the problem of a condenser of .006 mfd. capacity is that this condenser has been in great demand in the Flewelling set. Using the foregoing formula you can work out any size condenser you desire to make.

The illustration shows a condenser actually constructed by the foregoing formula. The formica is 1/8 by 3 by 3 3/4 inches. Two small holes are drilled through both pieces of formica with the idea of fitting the mica sheets between the two bolts inserted therein. The dotted lines indicate the limits of the mica. Switch posts may be used for the bolts as the formica is not thick enough for countersinking the holes for the heads of the posts, it is recommended that a small wooden washer or fiber piece be countersunk through which the head of the posts will pass. This is to be placed on the outside of each end of the formica and serves to keep the metal free from surrounding objects.

No glue should be used on the mica. The tinfoil is arranged so that each end is somewhat longer than the active condenser area, thus affording a contact with the posts. A piece of old inner tube from an automobile tire is laid on the completed condenser affording a means of uniform compression.



HERE is a simplex circuit somewhat similar to the Flewelling. It is well adapted either to loop or the outdoor aerial. Tuning is taken care of by means of the honeycomb coils and the variable condenser. The variometer in the plate circuit controls regeneration. For variations in wave length other coil values may be substituted.

The circuit is simple to operate and cheap as to construction expense. It will give very efficient results.

The plate battery voltage is dependent on the type of tubes used, and is best ascertained by test under operation. Any of the dry cell tubes can be used if desired, substituting the proper rheostats and dry cells as necessary. An improvement on

this circuit would consist of the addition of another .0005 mfd. variable condenser connected across the secondary honeycomb coil for closer tuning.

When an outdoor antenna is used the aerial is connected to the coil and the ground to the rotating plate terminal of the variable condenser.

## CONDENSER MAKING

(Continued from page 12)

tween makes a very accurate grid condenser: It makes no difference if the mica is a little larger in area than the tinfoil. Copper foil can be substituted for the tinfoil. German silver may be used if it is 3/8 inch thick, but the dielectric must be .01 thick.

### Second Example

Another example: What capacity would a condenser have using 7 sheets of mica 2 3/4 inches square and .01 inch thick and having 8 tinfoil plates 2 1/2 inches square? Wherein 6 = K = dielectric constant, 2 1/2 x 2 1/2 = A = area of one plate, and N = number of tinfoil plates = 8.

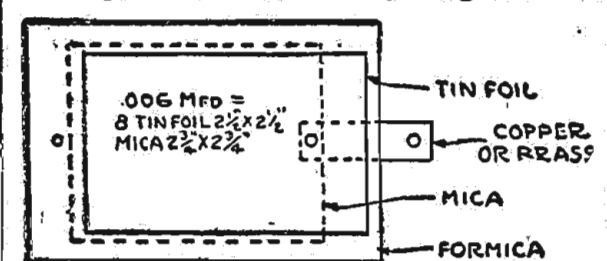
$$\text{Capacity} = \frac{2248 \text{ K A } (N-1)}{T 10^{10}}$$

$$\text{or substituting; } \frac{2248 \times 6 \times 2.5 \times 2.5 \times (8-1)}{.01 \times 10,000,000,000}$$

= .0059 mfd. or approximately .006 mfd. This means that such a condenser has an approximate capacity of .006 mfd. The formulae, the use of which has just been explained, may also be transposed to find the number of plates required for a given condenser. The formulae then reads:

$$N = \frac{C T 10^{10}}{2248 \text{ K A}} + 1$$

In the example previously considered, capacity = .006 mfd. Thickness of the mica = .01 inch. Dielectric constant = 6. Area of tinfoil plates = 2 1/2 by 2 1/2, or 6.25 square inches. Everything but the



number of plates is known. Then with N = the number of tinfoil plates we get by substituting:

$$N = \frac{.006 \times .01 \times 10,000,000,000}{2248 \times 6 \times 6.25} + 1 = 8 \text{ tinfoil plates.}$$

This means 7 separating mica plates, and with one on top and bottom the total number reaches 9. The exact value of a condenser can be only determined by measuring the value of the completed condenser, but this is out of the question with the ordinary fan.

The formula for figuring the .006 mfd.

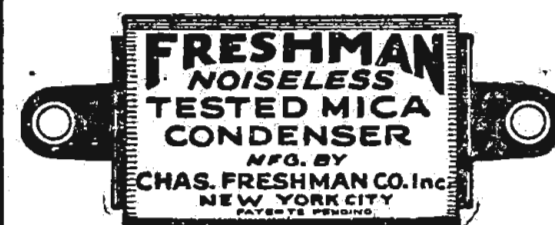
condenser is used when the condenser consists of more than two plates.

### Third Example

Example Three: Using same size tinfoil, 2 1/2 by 2 1/2 inches, and mica .01 inch thick measuring 2 3/4 by 2 3/4 inch. Problem: To make a condenser of .004 mfd. capacity, how many plates are needed?

$$\text{Substituting: } N = \frac{.004 \times .01 \times 10,000,000,000}{2248 \times 6 \times 6.25} + 1 = 6 \text{ tinfoil plates approximately.}$$

## The Condenser Sensation of Modern Radio



Through the accuracy and dependability of Freshman Condensers, hook-ups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

*These little Storers of energy and rectifiers of Radio Current are the very heart of a well-built radio set.*

The proper fixed condenser will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	\$.35	.002	\$.40
.00015	.35	.0025	.50
.0002	.35	.003	.60
.00025	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	2.00
.0015	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

At your dealers, otherwise send purchase price and you will be supplied postpaid.

**Chas. Freshman Co. Inc.**  
Radio Condenser Products  
106 Seventh Avenue NEW YORK

# How to Make a Reinartz Receiver

Complete

## BLUE PRINTS

for the construction of a Reinartz Receiving Unit and two step amplifier.

## INSTRUCTIONS FOR ASSEMBLY

Description of apparatus and accessories and details of tuning.

## WINDING A REINARTZ COIL

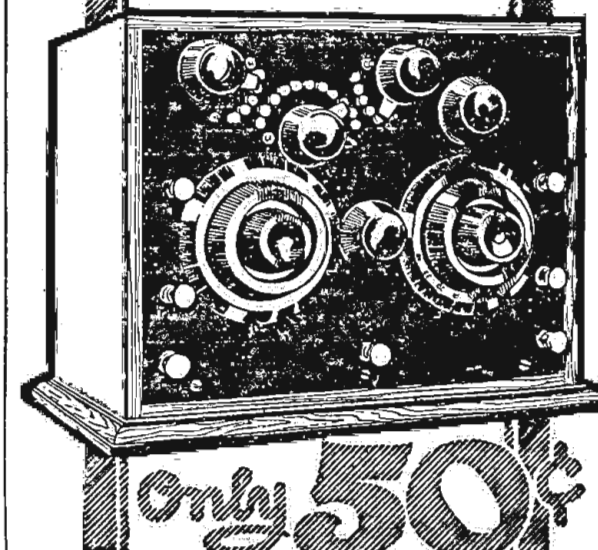
Cabinet Dimensions  
Panel Layouts  
List of Parts

Send only money orders—no checks or stamps. Coins at your own risk.

Book Department

## Radio Digest

123 West Madison Street  
CHICAGO, ILL.



Only 50¢

# WILLARD RADIO COMPANY

291 BROADWAY

NEW YORK CITY

### FLEWELLING CIRCUIT Complete Parts

Baseboard, two honeycomb coils, mountings and coil plugs, 3 .006 condensers, .002 phone condenser, variable grid leak and condenser, grid leak 1/2 meg, 23 plate variable condenser, vernier rheostat, tube socket, 3" dial, 8 binding posts, 16 ft. bus bar, PANEL ALREADY DRILLED, TOGETHER WITH DIAGRAM AND INSTRUCTIONS..... **\$11.95**

Parts for TWO-STAGE AUDIO FREQUENCY AMPLIFIER, for either of above circuits, with drilled panel and book of instructions..... **\$11.00**

### REINARTZ CIRCUIT Complete Parts

Baseboard, Reinartz coil increased wave length, tube socket, vernier rheostat, 23 plate and 13 plate variable condensers, 3 inductance switches, 2 3" dials, variable grid leak and condenser, .002 phone condenser, 16 ft. bus bar, 23 switch points, 29 nuts, 6 stops, 8 binding posts, PANEL ALREADY DRILLED, TOGETHER WITH DIAGRAM AND INSTRUCTIONS..... **\$10.95**

ALUMINUM LOUD SPEAKING HORN, nickel plated, high polish, list \$8.00.....	\$3.75
3000 OHM TELEPHONE HEADSET, list \$8.00.....	3.50
AUDIO-FREQUENCY TRANSFORMER, designed for use with W. D. II tube, also excellent for all other tubes, list \$4.50.....	2.75
VARIOCOILER, Litz wire wound secondary, 150-600 meters, list \$4.50.....	2.25
Triple Coil Mounting.....	\$3.35
Multiple Point Inductance Switch with knob and dial (15 points).....	1.45
Reinartz coil, increased wave length.....	1.55

Honeycomb coil, mounted 50 turns.....	\$.95
Honeycomb coil, mounted 75 turns.....	1.00
Freshman var. grid leak and cond.....	.75
Freshman variable grid leak.....	.60
V. T. Socket.....	.40

### CONDENSERS

3 Plate Variable, value \$1.75.....	\$1.05
13 Plate Variable, value 2.50.....	1.20
23 Plate Variable, value 3.50.....	1.35
43 Plate Variable, value 4.50.....	1.95
13 Plate Vernier, value \$5.50.....	3.75
23 Plate Vernier, value 6.00.....	4.00
43 Plate Vernier, value 6.50.....	4.25

Ball bearing inductance switch.....	.25
Single circuit Jack, list 65c.....	.30
Double circuit Jack, list 90c.....	.45
Lightning arrester, approved by underwriters.....	.30
3" dials, high finish, heat resisting.....	.25
2" dials, high finish, at.....	.25
Filament rheostat, 6 ohms.....	.65
Filament rheostat, 20 ohms.....	.80
Filament rheostat, 50 ohms.....	.90
Rheostats with 2" dial, 15c extra	

Every article we sell is guaranteed by the manufacturer and us—Mail orders filled immediately—Postage prepaid on all orders of \$5.00 or more, east of the Mississippi River only. All others include postage.

# Questions and Answers

### Reinartz Wave Length (4175) OEW, Lonoke, Arkansas.

Will you please advise how to raise the wave length of a standard Reinartz hook-up from about 500 meters to 600? The set has the usual coil with two condensers, one 23 and one 13 plate. I tried a coil with 75 turns but it would not oscillate at all. I took this coil out and tried another with about 45 turns but it still does not oscillate.

A.—The circuit may be loaded to accomplish a new allocation of wave lengths by inserting a 75-turn honeycomb coil in the antenna and secondary circuits respectively. This will not affect the oscillation of the circuit and will tune to about 600 meters wave length.

### Wave Length on Flewelling (4158) AIA, Austin, Minn.

In the circuit detailed in your pamphlet on the Flewelling circuit I take it that the honeycomb coils of 50 and 75 turns are approximately correct for the reception of the wave lengths used in Radiophone broadcasting up to this time.

What other coils and combinations should I have available in order to receive on the new wave lengths allotted these same stations?

What coils should be used to receive the 200 meter waves of the amateur telegraph senders?

What coils should be used to receive the code sent by ships?

What coils to receive Arlington time?

What coils to receive transatlantic code? A.—Honeycomb coils of 75 and 100 turns should be used for primary and tickler, respectively, on wave lengths up to 650 meters.

For reception of amateur transmission, coils of 25 and 50 turns are indicated. For transmission from ships the 75 and 100 turn coils will serve.

It is advised that a super-regenerative circuit loses its effectiveness entirely on any wave length more than 800 meters, so that Arlington time signals could not be received. By elimination of the super feature and the use of the circuit as a straight regenerative it may be possible to receive this station by employing coils of 600 and 200 turns.

It is doubtful if the transatlantic code could be accomplished with the circuit under discussion.

### Super Heterodyne (4217) GW, Berwyn, Ill.

Can I use the UV-199 tube, with the super heterodyne receiver for the Radio frequency, and UV-201-A for the audio frequency, with good results? Please give me the most effective combination of tubes for this set. I now have one storage A battery, and would not care to purchase another one. Therefore, I wish to use the same storage battery to light all tubes. Could I use dry cells to light the UV-199 tubes, and use the large battery to light the others, in the same set?

Please send me the super-heterodyne circuit using three Radio and two audio frequency, transformer coupled amplifiers, one describing all the necessary parts. Also I would like your opinion as to the best make of variocoupler, Radio and audio frequency transformers, etc., that would be most effective in this circuit.

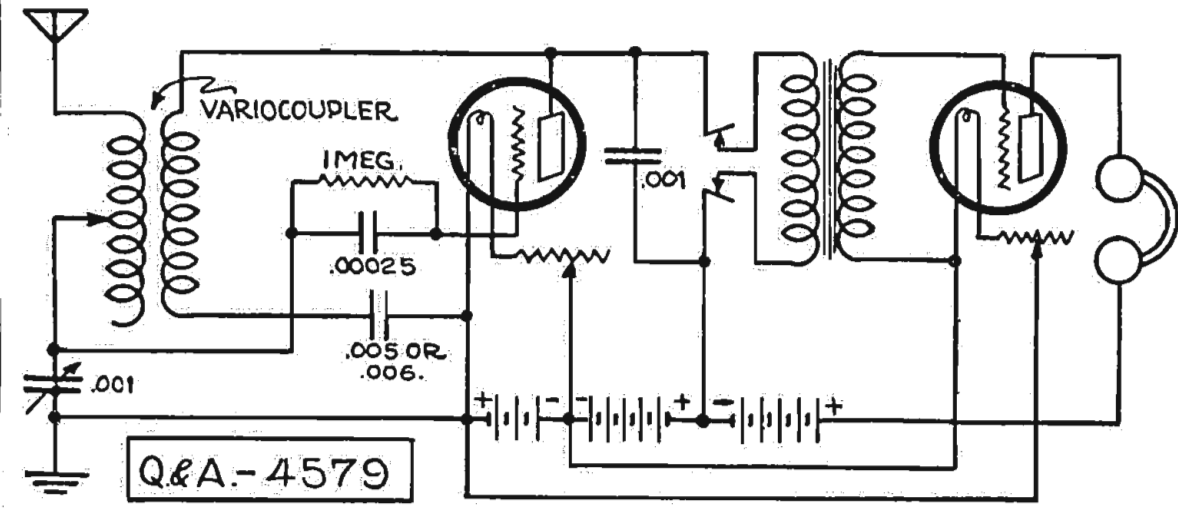
A.—The UV-199 and UV-201A tubes can be used, as suggested, but we are recommending a better combination in that of UV-201 for Radio frequency amplifier and detector and UV-201A for oscillator and audio frequency amplifiers. The same battery can be used on all tubes.

We are unable to comply with your request for a diagram of this circuit other than as it appears in February 24th issue of Radio Digest, which can be secured for ten cents, should you fail to have it at hand.

We are advising further that any standard impedance coupling of the Radio frequency will prove more effective than transformer coupling. For audio fre-

quency any standard transformer of rugged construction will serve.

RD-86 (4579) EGB, Mount Vernon, O. I have made a RD-86 as given in Radio Digest of June 23, 1923. I would like to put on a 1-step audio frequency amplifier.



Will you give me a hookup for this amplification?

A.—Complying with your request, we are presenting a diagram of RD-86 with one stage of audio frequency.

### Transformer Core (3678) AJG, Wichita, Kans.

Seeing your diagram of a rectifier for charging storage batteries in your issue of April 21, I would like to know the exact dimensions of the iron core, and other details. This is taken from Q&A 2956.

A.—Answering your inquiry with reference to a rectifier for a battery charger as described in the April 21 issue of the Radio Digest, we suggest that the core be made of silicon steel .018 thick, which may be obtained in any sheet metal shop. About ten pounds will be needed. To make the core, cut 170 pieces 5 3/4 by 1 1/4 inches and 170 pieces 2 3/4 by 1 1/4 inches. This will make a core 1 1/4 inches square, inside dimensions 4 1/2 by 1 1/2 inches. The A battery in the diagram shows the polarity reversed. The negative side should be connected with the plate of tube.

### High Antenna Capacity (4229) PEH, Dunsmore, Fla.

Why is it my Flewelling circuit will not work when the aerial is connected? Is it due to the location of the 23-plate condenser? I find that when the aerial wire is brought close to the antenna terminal so as to give a coupling effect, or if a fixed condenser is in series I can get some re-

sults but to have the wire attached kills the set.

This set is noisy and after I pick up the carrier wave and begin to get the voice loud enough to hear the tearing noise also gets so loud it drowns the voice. Would changing the number of turns on the 75

turn tickler coil help or will the change I am making, that is, putting on a Pudlin leak and condenser and a mica .006 instead of a paper condenser help?

In my other set with the tapped coupler I get results on the regenerative side but get nothing on the super. I had to bank wind the rotor to get 100 turns, is this correct? I can think of nothing to change except the paper .006 condenser for a mica as above.

In the first set (see diagram) how should a ground be connected if I want to insert a two point switch in the tickler circuit to make a straight regenerative circuit?

A.—Referring to the Flewelling circuit, we are of the opinion that the difficulty encountered is due to too high an antenna capacity, which may be overcome by the employment of an eleven-plate antenna series condenser.

It will probably not be necessary after attention is given to the above detail to change the size of the honeycomb coil, however, the use of a good variable grid leak and a .006 mica condenser will be of great help.

Bankwinding on the rotor to accomplish the required number of turns will be all right.

### Storage Battery Charging (4195) EC, Ozawkie, Kas.

I have a 32 volt farm lighting plant. Please tell me whether if I connect my storage battery with it, will it charge too fast? The dynamo is rated at 40 volts and 15 ampere hours. My storage battery is a 90 ampere hour battery and charges at the rate of 8 amperes. If the charge is too fast please tell me how I can charge it with my plant.

A.—A storage battery can be charged from a thirty-two volt lighting plant merely by connecting the positive side of the 32 volts to the positive side of the storage battery and the negative side of the storage battery to a resistance, such as an electric iron, a heater or bank of lights, the other side of the resistance to the negative side of the 32 volts system. The resistance prevents the storage battery from charging too rapidly. Resistance may be varied so that the desired charging rate may be used.

### Directional Effects

Changing the direction of the antenna may increase the signal strength. If it is built like a T, the ends should point toward the station that the operator desires most to hear. If it is like an inverted L, the elbow where the flat top and the lead-in wire join should point toward the sending station for the loudest results.

## POSITIVE RESULTS

are being obtained by thousands of satisfied users of the

## EASTERN COIL SETS

### for the COCKADAY CIRCUIT

The remarkable features which are making this circuit (4 circuit tuner) more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound. COMPLETE ASSEMBLED SET OF B, C AND D COILS—PRICE.. \$2.75

Hook-up, directions and material list furnished free with each set of coils.

Mail Orders Filled. Dealers Communicate. EASTERN RADIO MFG. CO. 22 Warren Street, Dept. R. D., NEW YORK, N. Y.

## CUNNINGHAM TUBES REPAIRED

C-300 or UV-200	\$2.75
C-301 or UV201	3.00
C-302 or UV-202	3.50
C-301A or UV201A	3.50
WD-11 or WD-12	3.50
Moorehead Detectors	2.75
Moorehead Amplifiers	3.00
DV-6 or DV-6A	3.00
Also the new UV-199	3.50
NEW OX 1/2 VOLT TUBES	4.00

All tubes guaranteed to work like new. Mail Orders Given Prompt Attention "24 Hour Service"

RADIO TUBE CORP. 55 Halsey Street Newark, N. J. TUBES SENT PARCEL POST, C. O. O.

## DON'T PASS THIS-BUY

World Radio Batteries SAVE YOU 50% WRITTEN 2YR GUAR

SPECIAL 2-Volt Storage Battery for WD-11 and WD-12 Tubes. Will give 5 200 HOURS on single charge... \$5

## World-Radio-Batteries

Are unconditionally guaranteed Because you deal direct with a manufacturer who is responsible for the performance and quality of the Battery.

6 Volts—60 Amps., \$10.00	6 Volts—100 Amps., \$14.50
6 Volts—80 Amps., \$12.50	6 Volts—120 Amps., \$16.00

Full Rating Guaranteed MAIL YOUR ORDER TODAY. WE SHIP EXPRESS C. O. D., SUBJECT TO INSPECTION, OR WILL ALLOW 5% FDR CASH WITH ORDER. ALL ORDERS SHIPPED SAME DAY AS RECEIVED.

WORLD BATTERY COMPANY, 60 E. Roosevelt Rd., Dept. L, Chicago, Ill.

# FREE Your Choice

Of one Bound Volume, with each Annual Subscription when mailed direct to us. You have Vol. 2, 3, 4 or 5 from which to make your selection.

Supply Limited

Greatest Collection of Radio Information Ever Published

- Reinartz Long Distance Circuit
- Ultra-Reinartz Circuit
- Flewelling "Flivver" Circuit
- Grimes "Inverse Ouplex" Circuit
- Single Tube Reflex Circuit
- Armstrong "Super-Heterodyne" Circuit
- Two, Three and Four Tube Reflex Circuits
- A. B. C. Lessons for Radio Beginners

In addition to these features, these volumes contain many instructive articles, receiving set diagrams, how to make articles, new apparatus, pictures and illustrations, hook-up diagrams, broadcasting stations, technical articles and hook reviews.

Volumes 2, 3, 4, and 5 Now Ready

13 Numbers in the Bound Volume 52 Numbers in Year's Subscription

Your choice of one Bound Volume is free and postpaid with your one year's subscription or renewal. This offer good only in the U. S. and possessions. One dollar additional for Canadian or foreign countries. Additional volumes are \$2.00 each, but are only available to annual subscribers. This on account of our limited supply.

Orders for these Bound Volumes must be mailed us direct with full remittance, as they can not be supplied on orders through subscription agencies or news dealers.

Remittance must be by check, money order or draft. (Stamps not accepted.)

COUPON 8-25

PUBLISHER, RADIO DIGEST 123 W. Madison Street, Chicago, Illinois CHECK OFFER DESIRED

One year's subscription and choice of one volume. Send Vol. \_\_\_\_\_ Check or M. O. enclosed..... \$5.00

One year's subscription and choice of two volumes. Send Vols. \_\_\_\_\_ Check or M. O. enclosed..... \$7.00

One year's subscription and additional Volumes Nos. ....

Name .....

Address .....

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

## COMPENSATING CONDENSER

is a special three-electrode condenser for balancing the grid charge on the amplifying tubes. Stops all local oscillations without detuning the amplifier. Shielded against hand capacity disturbance.

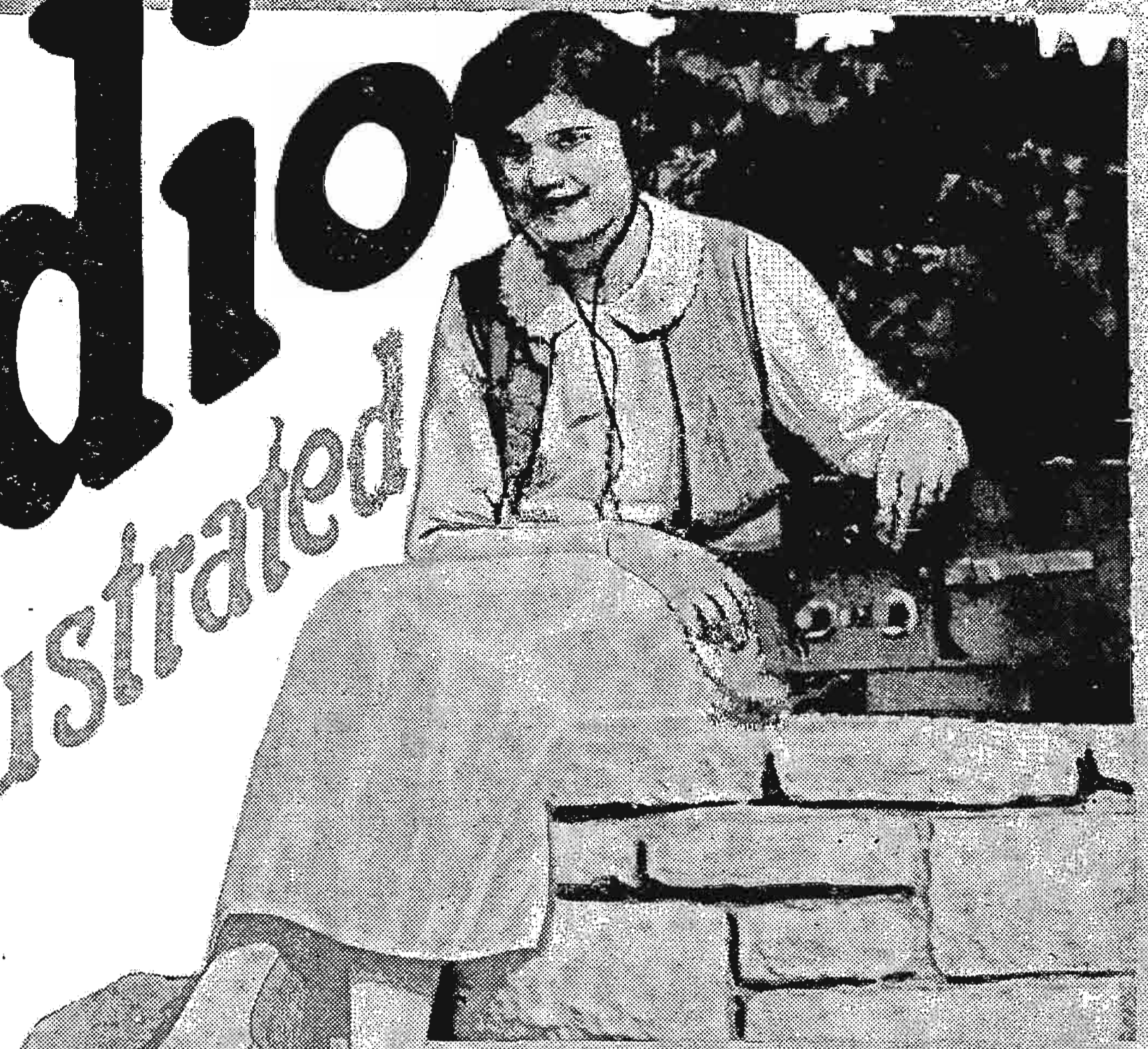
\$3.00 Complete

For Use with Tuned Radio Frequency Receivers

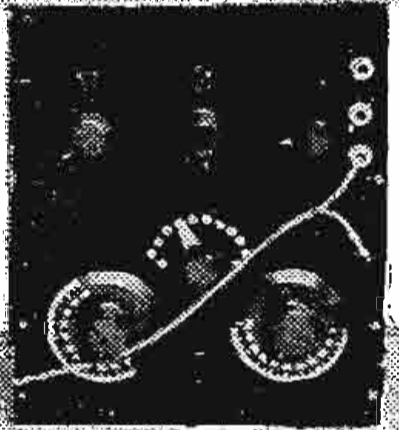
At All Good Dealers

AMSCO PRODUCTS, INC. Broome & Lafayette Sts., New York City

# Radio Illustrated



Gladys Smith, pretty St. Louis miss, takes her portable set to Forest Park, in the "show me" city, and finds that she can hear Station KSD with neither aerial nor ground



After a day's tramping through the woods, a cooling plunge in the stream and the lesson in woodcraft, these Boy Scouts at Camp Spence, Bear Mountain, N. Y., listen in to Radio concerts and receive instructions in making sets from Harry Schwartz (right) © U. & U.



Rita Kaplan, age fourteen months, certainly does like her afternoon Radio concert! But one of the phone terminals came loose and the concert stopped. You'd cry, too, in a similar predicament. She kept up the wail, too, until the kind-hearted photographer connected the phones again © Fotograms

This is one time when "Gypsy" Smith hears the "call" in a hospital. The well-known evangelist is Radio convalescing in an Edinburgh, Scotland, nursing home, where he underwent an operation © P. & A.

