

# Radio Digest

EVERY WEEK

# Illustrated

TEN CENTS

TRADE-MARK

Vol. II Copyright, 1922, R. D. P. Co. Inc. CHICAGO, ILL., SATURDAY, JULY 22, 1922 No. 2

## CLAIMS RADIO TRUST

### EUROPEAN NATIONS FEAR PROPAGANDA

#### AIRPHONE MESSAGES MAY BE NEW WEAPON

Nothing Stops Ether Waves at Border—Statesmen See Source of Friction

(Special to RADIO DIGEST)

THE HAGUE.—Ability of Radio telephony to reach large audiences scattered wide without regard for geographical frontiers of nations, is said to be causing some uneasiness in countries of Europe, as it offers a means of carrying on propaganda which it is almost impossible to halt.

With a sending station located in its own country but capable of sending its messages across the border and into receivers in another land the only practical way of opposing propaganda would be by appealing to the loyalty of the persons hearing the messages, which would be at best an uncertain measure. Skillful propaganda, carried on by other means, is insidious and difficult to detect and Radio telephone com-

munication is thought by some European statesmen to offer a possible source of friction.



### INVESTIGATE MONOPLY IS SENATE PLEA

#### Senator Edge Starts Quizz

Foreign Triode Tube Imports Blocked—Patents Said to Defeat Anti-Trust Laws

(Special to RADIO DIGEST)

WASHINGTON.—Senator Edge of New Jersey has filed in the United States Senate a petition of the Plainfield Radio Association in behalf of itself and other New Jersey Radio clubs and associations, charging that there is a monopoly in the manufacture of Radio apparatus. The pe-

tion, which has been referred to the Finance Committee of the Senate, is as follows:

“Your petitioners, believing that there exists a monopoly in the manufacture, sale, use, and importation of Radio apparatus, submit that such monopoly should not be

(Continued on page 2)

### THIRTY YEARS DEAF, HEARS AGAIN, FAINTS

CLEVELAND, O.—When Mrs. Herman Koehle, of Lakewood, O., deaf for nearly thirty years, put a pair of Radio receivers to her ears recently and heard a fine broadcast concert, she fainted from the shock. Upon making the experiment again, she found that her deafness had not left her, but that she could hear perfectly by means of the set.

### Philadelphia Battery to Talk Direct to Members

PHILADELPHIA, PA.—Each member of the 180th Field Artillery of the Pennsylvania national guard in Philadelphia is to have a Radio receiving set, and will be in direct communication with his battery at the armory, where a powerful broadcasting station is being erected. It is declared that this will be the first military organization in the world to be so equipped that each member at his own home will be able to receive orders direct from his organization.

### New “Heinie” Station to Transmit Round the Globe

BERLIN.—The most powerful Radio station in the world will soon be built at Hersogensberg, Bavaria, it is learned. The station will be powerful enough to send messages around the world without relay. It will also handle the entire interior Radio traffic of Southern Germany. Recent improvements in methods of Radio communication have led to the decision to do away completely with telegraph and cable wires in Germany. Instead, Radio will be installed.

### ART LESSONS SENT BROADCAST BY WJZ

NEWARK, N. J.—Educators are much interested in the outcome of an experiment that was made at WJZ recently, which was in the nature of drawing lessons by Radio, given under the direction of Miss Ruth Hammond, a comedienne and caricaturist of recognized ability. Radio fans were asked to try their hand as instructed and send in their work.

### CLAIMS RADIO TRUST

(Continued from page 1)

encouraged by tariff protection and that Radio apparatus, particularly vacuum tubes, should be placed upon the free list.

#### Restricted to Inferior Tubes

"Reference is made to (1) the testimony before the Radio conference committee, appointed early this year by the Secretary of Commerce; (2) one of that committee's basic recommendations to the effect that Radio apparatus should be freed of existing restrictions; and (3) the fact that importation of Radio vacuum tubes—even for Government purposes—is virtually prohibited by the combine or its affiliated interests. Thus America is restricted to tubes of comparatively inferior quality and to a most limited selection as to power and type. For instance, four element tubes are not obtainable in this country, though freely made and used abroad.

#### Defeats Anti-Trust Laws

"We do not presume to express an opinion as to whether a legitimate patent monopoly can legitimately be combined with all other patents and patent rights of like nature. It is manifest, however, that such combination can be used to defeat the anti-trust laws, are contrary to public policy, and should not be fostered by tariff protection.

"We believe that the Army and Navy Departments have a large surplus quantity of Radio vacuum tubes, the disposal of which has been tied up by those interested in the monopoly. Inquiries made abroad meet with replies to the effect that importation of such tubes into this country is prohibited—not by reason of the tariff but by the control here of foreign patents and patent rights.

"Your petitioners pray that Radio vacuum tubes be placed upon the free list, at least for research and amateur experimental purposes."

## Driverless Tank Latest Attempt

### Successful Control of Battleship Iowa Leads to Effort by Army Engineers

(Special to RADIO DIGEST)

WASHINGTON.—Efforts to produce Radio controlled tanks appear to be the very latest step in Government Radio work for the Army and probably for the Marine Corps Material. To date no definite plan has been evolved by Radio engineering experts, but after the Navy successfully operated the Iowa by Radio control, the leading scientists of the Army believe Radio controlled tanks are a certainty.

Today one out of every eight or ten Army tanks has a Radio transmitting and receiving set, enabling this leading or controlling tank to keep in close touch with headquarters constantly, and communicate by signals with its fellows in battle. Such efficient liaison would be a tremendous step in military science, as the tanks could also serve as message centers for the infantry troops as well as spot artillery fire, and keep headquarters posted as to the position of the advance lines. Before the year is out, it is believed that all Army tanks will be equipped with Radio communicating outfits and that the Marine Corps will also have tanks equipped with Radio.

#### Radio Controlled Tanks a Certainty.

At the recent maneuvers at Gettysburg, the Marines used some Army tanks, one of which was a "master tank" equipped with Radio. While the method of the Radio control of the battleship Iowa by the Ohio last summer during the bombing maneuvers, has been carefully guarded, and the details of Radio controlled automobiles have never been revealed, it is understood that Army Radio experts have all the necessary principles well in hand and that the first Radio controlled tank will be christened before many months are passed. Then American forces, if they are forced to take the field against an armed enemy, will have a modern and heretofore untried military weapon using no personnel. During the World War the tanks used did not even have Radio communication, but signaled visually or reported by messengers or runners.

#### S. S. Alexander Has Airphone

NEW YORK.—In Radio equipment for the use and entertainment of passengers, the H. E. Alexander, formerly the Great Northern, flagship of the Admiral line fleet, is said to be the best equipped vessel in the world. Before she left New York, where she was reconditioned at a cost of \$500,000, for the coastwise service, there was installed a combination telephone and telegraph set which includes three distinct methods of communication—Radio telephone, continuous wave Radio telegraphy and interrupted wave Radio telegraphy. This is similar to the sets to be installed on all Admiral liners.

On the voyage to Honolulu which the vessel made with Shriners before entering the coastwise service, passengers were enabled to talk to Shriners on other vessels bound for Honolulu and also to shore stations up to 1,000 miles.

## Ten Government Departments Appoint Representatives on Broadcast Council

### S. W. Stratton, Director of Bureau of Standards, Heads New Group—Arranges System of "Primary" Stations to Transmit Official Government Bulletins to Local Broadcast Stations

WASHINGTON.—At the request of the Secretary of Commerce, each of the ten government departments have appointed representatives on an inter-department advisory committee on governmental Radio broadcasting. There are in addition representatives of the office of the Chief Coordinator (Bureau of the Budget), and the U. S. Shipping Board.

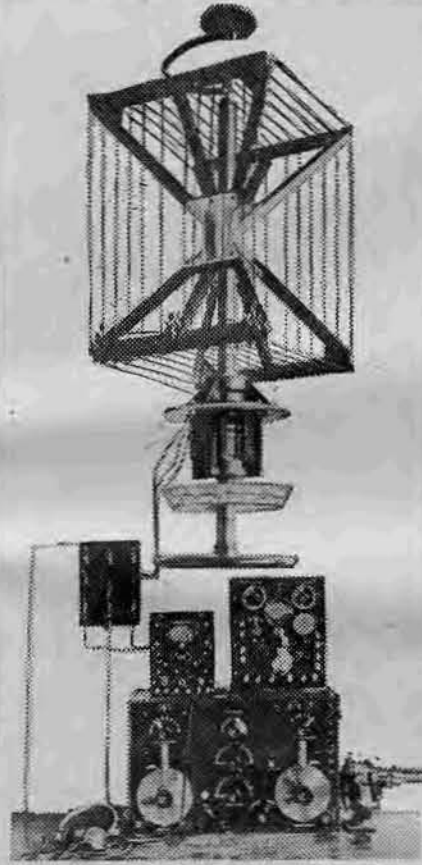
The Chairman of the Committee is Dr. S. W. Stratton and the Secretary is Dr. J. H. Dellinger, Chief of the Radio Laboratory, Bureau of Standards, Department of Commerce.

In accordance with recommendations of the committee, an experimental system of Government broadcasting by "primary" broadcast stations has been established, utilizing only previously existing Government stations and equipment. The "primary" stations are stations which broadcast official Government news by continuous wave (code) telegraphy for the purpose of furnishing this information to local broadcast stations for re-broadcasting by Radiophone. The eight stations thus far included send out daily bulletins of Government news mostly agricultural market data. They are: Arlington, Va. (Navy, 5,950 meters); Great Lakes, Ill. (Navy, 4,900 meters); Washington, D. C. (Post Office, 1,980 meters); Rock Springs, Wyo., (Post Office, 3,000 meters); Omaha, Nebr., (Post Office, 2,500 meters); North Platte, Nebr., (Post Office, 4,000 meters); Elko, Nev., (Post Office, 3,000 meters); Reno, Nev., (Post Office, 3,200 meters).

#### Will Schedule Classes of Broadcast

The committee has made a preliminary classification of the kinds of material which the several Departments may have to broadcast by the primary stations, viz., market prices and data, weather and hydrographic news, standard Radio signals, (such as wave length and time signals), executive announcements, statistics, and educational material. One of the functions of the Committee is to advise regarding priority of the types of Government material to be broadcast and regarding schedules of operation.

The Committee has recognized the principle that Radio must be used primarily for types of service that cannot be as satisfactorily given by other means of communication, and that therefore Radio broadcasting should not be used in general where wire telegraphy or telephony or printed publication would be as satisfactory. It is possible that the scope of the committee's activity may be extended beyond the subject of broadcasting, and that the committee will act in an advisory capacity to the Secretary of Commerce in matters of Government Radio regulation and will consider all Radio questions of inter-departmental interest.



At left is typical naval Radio compass. Below is compass station at Cape Hinchinbrook, Alaska. The range of such a station is over 200 miles. © K. & H.



### EXCURSION BOAT HAS SET

#### Passengers On Various Decks Hear Concerts and Jazz

PLYMOUTH, MASS.—Radiophone concerts are a part of the regular program of entertainment of the pleasure steamer South Shore, plying between Boston and Plymouth. This is the first large pleasure boat running out of Boston to adopt popular Radiophone entertainment for the passengers. Warren Scott, chief electrician for the Nantasket Beach Steamboat Company, constructed the powerful receiving set which is equipped with two steps of amplification and several loud speaking devices with extra steps of amplification. The concerts and dance music received are sent out to passengers on the various decks.

#### NOF Seeks Jobs for Veterans

ANACOSTIA, D. C.—By means of the Navy's Radio broadcasting station NOF, located here, the Veterans' Bureau Employment Service is broadcasting to veteran Radio fans opportunities for employment, and is also broadcasting the names, for the benefit of prospective employers, of "Vets" skilled in various trades and professions who are in search of employment. The first "Radio Want Ads" went out last week and several replies have been received; two men, at least, are now in direct touch with prospective employers,

### BUREAU HAS NEW PAPERS

#### Announces Three Publications of Much Interest to Enthusiasts

WASHINGTON.—A paper by R. T. Cox, entitled "Standard Radio Wavemeter, Bureau of Standards Type R70B," describes a standard wavemeter constructed at the Bureau of Standards and used in the standardization of Radio apparatus.

"An Electron Tube Amplifier for Amplifying Direct Current," a paper by H. A. Snow, describes an amplifier which has been developed at the Bureau for particular applications in electric signaling work and can be used in place of a polarized relay and also for various other purposes, including the recording of telegraphic and Radio signals.

E. L. Hall and J. L. Preston have prepared a report entitled "High-Voltage Storage Battery for Use with Electron Tube Generators of Radio-Frequency Currents," describing a special type of storage "B" battery developed at the Bureau.

#### West to Have First Exposition

LOS ANGELES, CALIF.—The first annual Radio Exposition ever presented in the West will be held here from August 12 to 20. President Harding will open the show by Radio. Contests are arranged for artistic displays, freak sets and amateur construction of most compact sets. Show headquarters are in the Mason Building.

# Radio Digest Illustrated

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## Looking Ahead

Everyday Analogies for Radio. A continuation of the series by Letson Ballet in answer to many requests from our readers.  
Crystal Detector Receiving Sets, Section II. Peter J. M. Clute will tell more about the crystal rectifier receivers.  
Radio Frequency Amplification. A continuation of Benjamin F. Miessner's series, and a timely article.  
Panel Units for Your Receiving Sets. Two additional panels of the standard type. The best way for an amateur to build up his set is by standard panels.  
Broadcasting Directory. Gets better and larger each week. The only convenient reference to aid you in finding a station heard.  
"How to Make Department." Many kinks every week are interchanged here.  
Radio Illustrated. The picture page is the best of its kind.

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# SHIPPING BOARD TO GET NEEDED TUBES

## R. C. OF A. FINALLY GIVES IN TO GOVERNMENT

Had Refused to Sell Its Goods—Humanitarian Appeal Wins Over Corporation

WASHINGTON.—Better radio service at sea is assured through the decision of the Radio Corporation of America to sell vacuum receiving tubes to ship stations, according to F. P. Guthrie, head of the Radio Division of the Shipping Board. Privately owned ships, as well as Government operated vessels may now be equipped with the latest types of Radio receiving tubes, even though the ships are in direct competition with the Radio Corporation of America, which controls the patents and production of the tubes.

Following an urgent request from the Shipping Board that all American vessels be permitted to purchase the very best and latest Radio equipment in the interests of the safety of life and property at sea, the representatives of the Corporation have agreed that a special receiving tube, for ships only, will be produced to sell for ten dollars each. The tubes, which can also be used for amplifying and transmitting, will be a big improvement over the crystal detectors and spark transmitting sets now in use.

### Had Refused to Sell Tubes

Heretofore the Radio Corporation has refused to sell its tubes except to amateurs and for experimental use. The sale of tubes to commercial companies competing with their transmitting and receiving stations was refused until the Shipping Board officials appealed in the interest of ship stations. At first the Corporation insisted on the payment of an excessive royalty running to about \$400 per ship, except for Government use, but finally acquiesced to the humanitarian plea of the Shipping Board, and drew up a special contract for sea Radio stations, forbidding the use of the tubes ashore.

The new sea tube is said to be better than the ordinary tubes sold for \$7.50, being similar to the commercial tube recently put on the market under the name of Radiotron.

# PLAN MAIL COURSE OF ETHERAL INSTRUCTION

## Massachusetts Experts Will Teach Interested Citizens

BOSTON, MASS.—Radio owners in Massachusetts and those interested in Radio will soon be able to receive expert instruction by mail, according to an announcement just made by James A. Mayer, director of the State Division of University extension, Massachusetts Department of Education. A correspondence course covering the same ground as that taught by mail by the Massachusetts Institute of Technology has been prepared, and is open to any resident of Massachusetts. The lessons will be non-technical and no previous knowledge of the subject will be required on the part of students applying for the course.

For convenience, the work of the course will be divided into two parts, the first dealing with the handling and construction of simple Radio apparatus and the second dealing with the principles of electricity involved in Radio operation. The first few lesson papers will discuss and define the fundamental principles in transmission. The conditions necessary to successful receiving will be outlined and directions will be given as to how a person may construct an inexpensive set for short range work. The second part of the course will take up in detail the characteristic waves and circuits upon which Radio transmission is based.

# BOW WOW HAS RIVAL IN ALPINE AIRPHONES

THE far famed St. Bernard dogs of the Alpine monasteries has a rival in Radio. At the Vallot observatory on the peak of Mount Blanc a Radio equipment has been developed which will resist the sudden atmospheric changes there that usually put ordinary equipment out of business. Climbing parties are cautioned before making the ascent to equip themselves with Radio apparatus.

# ETHER JABBER KEEPS TEUTON PLANTS BUSY

BERLIN, GERMANY.—The Drahtlose Uebersee-Verkehr, A. G., or Overseas Radio Company of Germany, has attained a new record for message service. On March 16th a total of 50,000 words were exchanged via Radio at the stations of this company at Nauen and Eilvese. Since the reconstruction of commercial relations, the traffic through these Radio stations has been steadily increasing.

# SHRINERS SHATTER RAILROAD RECORDS

## MOVING TRAIN GETS AIRPHONE 2,000 MILES

Code Bridges Gap from Santa Barbara to Annapolis—Aerials on Three Cars

CINCINNATI, O.—All transcontinental Radio records were shattered by the Radio equipped Shriner train of twelve cars carrying the Syrian Temple delegation from Cincinnati, Ohio, which was recently handled by the Southern Pacific. A long distance Radiophone receiving record of 2,000 miles was established as well as a 3,000 mile record for telegraph reception while in motion.

Aerials were constructed eight inches above the roof of one of the forward cars and were 160 feet in total length. A rail ground was used. The receiving equipment included honeycomb coils and a two step audio frequency amplifier.

The train left Cincinnati in constant contact with both coasts. At Denver, musical programs were enjoyed from the big Radio stations at Pittsburg and Chicago. At Colorado Springs the Cincinnati station was heard. The long distance record was made at Santa Barbara when the Radio while the train was in motion picked up the government station at Annapolis, 3,000 miles away. This is claimed to be a record for daylight reception under any conditions and an astonishing record on two steps of amplification from a moving train.

# AGE AND YOUTH BOTH RING IN



"Why, he's 15 years younger since he started to be a Radio fan," declares the daughter of E. B. Corcoran of Washington, 69 years old. Our photographer found Mr. Corcoran listening in with his little granddaughter, Louise May McBride. © U. & U.

# FAST SOUNDINGS MADE MINUS WIRE AND LEAD

## New Method Sends Sound Waves to Bottom

NEW YORK.—The Destroyer Stewart, equipped with the Sonic Range Finder, used for sounding at sea, has made a practical test trip from Newport to Gibraltar. The new method is closely related to Radio, depending on the transmission of sound waves through water, and is employed to measure depths of the ocean. Soundings are made by measuring the length of time required for sound oscillations sent out from the ship to travel to the bottom of the ocean and back again. Dr. Harvey C. Hayes of the Naval Engineering Technical Staff, who aided in the development of the new naval equipment, is making the trip on the Stewart.

Daily reports from the destroyer, during her trip across the Atlantic, indicate that the apparatus was a great success. Soundings were taken at regular intervals without stopping the ship, and indicated depths from 90 to 2,500 fathoms. These soundings correspond to those taken by the old laborious method with the wire and lead, which required the stopping of the ship for one or two hours during the operation.

# Turks Bar Sale of Apparatus Without Special Permits

CONSTANTINOPLE, INDIA.—The president of the allied police commission here has published a notice prohibiting the sale of Radio apparatus in Constantinople and in the zone of Allied military occupation. The notice permits the sale of apparatus outside of the zone occupied by the Allies, but requires firms wishing to make such a sale to obtain permission from headquarters, allied police commission, Constantinople, before making delivery of the goods, giving the name and full particulars concerning the buyer and of the destination.

# Signal Corps Now Has 51 Separate Stations in Net

WASHINGTON.—The signal corps Radio message department in the munitions building at Washington now controls 51 separate Radio stations throughout the country, connecting every corps area and numbers of small stations with the army headquarters in this city. During the past few days, stations at Camp Custer, Michigan; Miller Field, Staten Island; Scott Field, Illinois; Rockwell Field, California; Camp Lewis, Washington, and Arlington, Virginia, have been added to the net of the signal corps.

LONDON.—A test was made recently at Castleton, England, to find out if underground communication was a practical thing. A Radio receiving set was taken a quarter of a mile into the heart of a coal mine. Here a 50-foot aerial was strung across the tunnel. The usual connections were then made and when the set was tuned properly, the investigators were able to hear plainly signals sent out from Cornwall, Paris and Berlin.

LISBON, PORTUGAL.—An officer of the army of Portugal has developed a system which operates call bells by Radiophone. Army circles say it will do away with prolonged watching for calls at Radio receiving stations.

# THE ANTENNA BROTHERS

## Spir L. and Lew P.

## A Three-Ball Aerial "Hock-Up"



LEW WERE SO FLAT WE COULDN'T BUY THE PERFORATION OF A POSTAGE STAMP

IF NIAGARA FALLS WAS MONEY WE WOULDN'T HAVE A RAIN DROP

WAIT THERE LEW, I'LL RETURN RIGHT AWAY.

MONEY LOANS ON PERSONAL PROPERTY

PAY BRO

# Automobile Radio Simple to Make

## Ma and Pa Can Listen In Now While Driving

From the owners of the lowly flivver to those more fortunate in possessing the majestic imported car, the American public spends its vacation touring the country. Rich man, middleman, and poor man, all alike now are able to afford this recrea-

### WORKSHOP KINKS? EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT,  
RADIO DIGEST,  
123 West Madison St., Chicago, Ill.

tion. In the same manner, Radio has allured all classes. What then would seem more natural than the combination of a Radio set in the automobile for a dual source of pleasure during the summer vacation? There is no reason why father and mother should not enjoy Radiophone concerts while Johnnie is driving the car. Father sits in the front seat proudly operating the set, while mother is comfortably encushioned in the rear enjoying both the music and the rural landscapes that flash by, at the same time keeping a watchful eye to see that Sonny does not drive the car recklessly. Perhaps the watchful eye also includes father, to see that he does not let his eye stray toward pretty milkmaids.

#### Fastening the Antenna

On the open body touring car type, it is a simple matter to fasten a pole at the rear and front ends to carry spreaders for a four-wire aerial using the maximum spacing that the width of the car will permit.

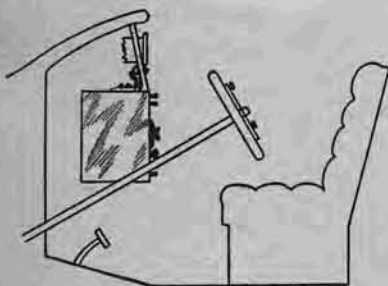


Figure 1

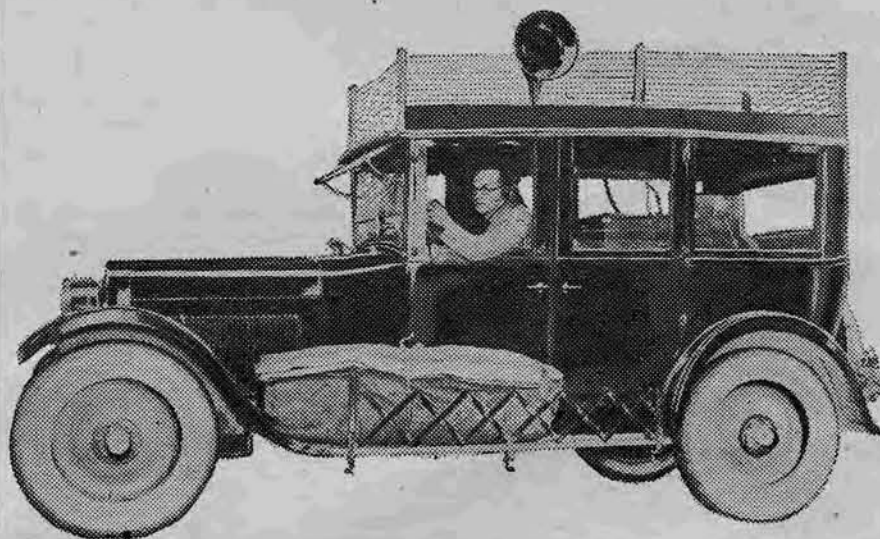
On the enclosed car, or what is usually called the all-year body, the flat loop aerial is simplest to construct, and combined with Radio frequency amplification will give very efficient results. Four pieces of 3/8-inch pipe about 18 inches long and four 3/8-inch pipe bases such as are used for fastening pipe railings to the floor, are necessary. These are fastened to the four corners of the roof. The pipe is wrapped with wax paper which can then be coated with asphaltum for insulation. Six turns of No. 14 wire (this can be covered wire) are wrapped around the four uprights and spaced two inches apart. Each turn should be fastened with wax cord on each upright to hold it securely in place. The two ends are then led down in the body for connection to the instruments.

#### Installation of Set

Figure 1 illustrates how the set can be mounted underneath the instrument or dashboard. Two angle plates are sufficient to hold the cabinet to the board. This method of mounting puts the set in a convenient place for operation by either the driver or passenger in the car. It is also accessible so that the storage batteries of the car can be utilized for filament current.

In the June 24th number of RADIO DIGEST, on page 4, and also in the July 8th number on page 13 are given three hook-ups using Radio frequency amplification with a loop type of aerial. Anyone of these will give very efficient results for an automobile set to be used while touring.

## AIRPHONE EQUIPPED SEDAN



For the benefit of the vacationist to whom distance is not important, the hook-up, Figure 2, is here given. This hook-up presents some unusual features that have been tested and given very favorable results. The loops are tapped as shown so that the loop is used not only as aerial but

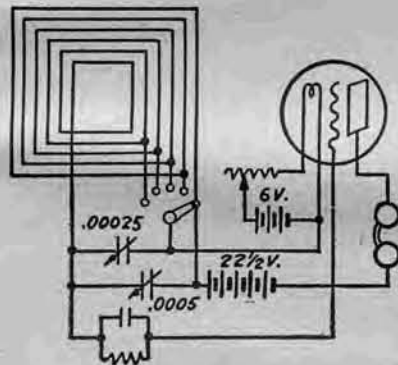


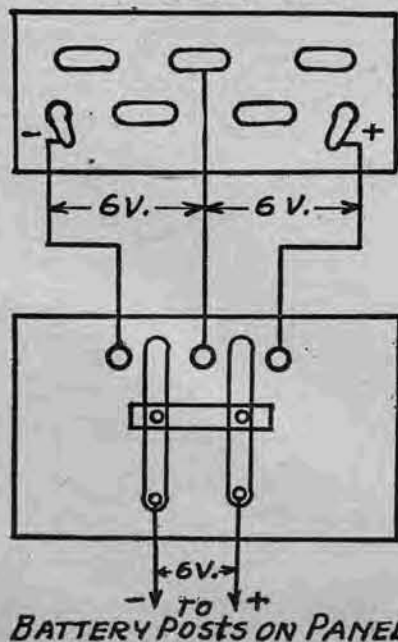
Figure 2

its inductive value permits very accurate tuning, although the range is rather limited. Since only four controls are necessary, tuning is a simple matter and requires very little skill. Any of these hook-ups utilizing the loop aerial will require no ground connection, therefore reception can be carried on while driving.

#### Six Volts from Auto Battery

A very satisfactory arrangement which I have completed for 6-volt tube filaments to be operated on a 12-volt battery is shown in the illustration. Of course, any person who has a car with a 6-volt battery can, by using a length of wire, use the automobile battery for their Radio tubes by connecting directly to the positive and negative terminals of the battery. With a 12-volt battery of this type the conditions are

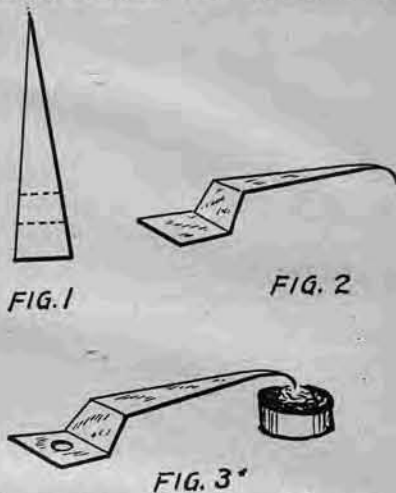
#### 12 VOLT BATTERY



different, but this difficulty is overcome by the arrangement herewith described. Procure a piece of well seasoned hardwood 6 inches long, 4 inches wide and 3/4 inch thick and give it a coat of shellac.

## Back Alley Junk Pile Yields Good Detector

The illustration shows a type of holder for a crystal detector arm that can be fastened to the top of an instrument box, plain base or table top. All that is required is a piece of metal cut from a tin can and a detector cup. The metal is cut



like a pennant, as shown in Figure 1. Then it is given two sharp bends on the dotted lines to produce the form shown in Figure 2. It is fastened to the base-board of the instrument or to a table top, as shown in Figure 3. The crystal cup is fastened under the point.—Beverly Converse, Joliet, Ill.

Procure two pieces of thin spring brass 3 inches long by 1/2 inch wide and drill an 1/8-inch hole 1 inch from one end of the brass strips and another 1/8-inch hole one-half inch from the opposite end. Cut a thin piece of fiber 2 inches long by 1/2 inch wide and drill two 1/8-inch holes 1/4 inch from each end.

Turn into the board three No. 10 round head brass screws in line with each other 1 inch apart, then rivet the fiber on the brass strips so as to form the letter H, then by mounting these on the board, as shown, it will be seen that by moving one brass strip to one side it will carry the other brass strip with it, making contact with two of the screws in the board. This will make connection for 6 volts across the brass switch. After using the switch in one position for two or three hours throw it to the other position so as to discharge your battery equally on both ends. This arrangement may be elaborated upon and permanently mounted on your car.—Walter L. Homadieu.

#### Panel Connection Kinks

Make all connections back of the panel as short and direct as possible. Never coil or kink the wires. Try to avoid running them parallel. Square tinned bus bar or No. 16 copper wire is best for panel connections. Insulating them with spaghetti tubing greatly improves appearances and lessens the danger of shortening or leakage.—Edwin Young, Seattle, Wash.

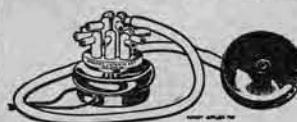
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To the tune of Yankee Doodle



Price \$10

Gregg's Listen In set, is a marvel, you bet. Through which the waves come abuzzin'. Attach to the phone You now use alone, And the program is heard by a dozen. Yes, a dozen hear the news, A dozen hear it dandy. Everyone should have Gregg's Set, Because it is so handy.

The family should get Gregg's Listen In set. Does for all, even uncle and cousin. No more all alone. Does one use the phone, The set sends it out to a dozen.

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Write for Complete Price List Special Discounts to Dealers



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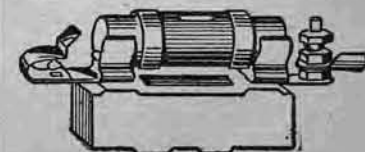
## BRACH

### VACUUM LIGHTNING ARRESTER

Every lightning flash fills the air with static, which has in it potential dangers to every radio and home, unless they are protected by the BRACH Vacuum Lightning Arrestor.

This unflinching sentinel is on guard day and night—it works automatically, does not have to be switched and cannot become grounded.

Railroads, fire alarm systems and the U. S. Army depend upon the BRACH Arrestor—successfully used for 16 years.



Sold by Dealers Everywhere

**L. S. BRACH MFG. CO.**  
NEWARK, N. J.

# HOOSIER TOWN KNOWN BY WEAW

## JAZZ MUSIC OF ANDERSON STIRS STATE

Small Town Gets Publicity From Broadcasts of Home Station

Plant Sends 300 Miles

Peppy Programs Relieve Jaded Ears of Indiana Listeners—Heard in Toronto

(Courtesy the Indianapolis News)

ANDERSON, IND.—Whenever a well-informed Hoosier meets a person from Oakland City he looks at him in an envious sort of way and exclaims, "Oh, that's where Eddie Roush lives." When he meets someone from Greensburg he smiles knowingly and says, "Yes, that's where the tree grows on the courthouse tower." But when he chances to run across a resident of Anderson, he throws up his hands in a fit of jealousy and whispers in an awe-stricken voice, "That's where WEAW is."

Whereupon the proud Andersonite will swell out his chest and say, "Yep, that's right. Some broadcasting station, ain't it?"

Everyone in Indiana who owns a Radio receiving set, in fact everyone within 300 miles of Anderson, or even farther, will agree that WEAW is some broadcasting station. For if there are three nights in a week when static is absolutely disgusting to concert listeners within this radius, they are Monday, Wednesday and Friday, the broadcasting nights of WEAW. Although WEAW is one of the newest combinations in the Radio broadcasting alphabet, the station has already achieved a reputation for popular entertainment that older and more powerful stations have failed to gain.

### Broadcast Music and Talks

WEAW is owned and operated by the Arrow Radio Laboratories. Originally it was one of the first receiving stations in Anderson, and in this capacity was known as 9IT. When it began broadcasting on a regular schedule about May 1 it was changed to WMA, still later becoming WEAW. Musical programs and special talks constitute the major part of the program of the station, which has a consistent range of about 300 miles. Three hundred miles is rather a conservative statement, however, for it has been copied at much farther distances, including Toronto, Canada, on several occasions.

### Plant Well Equipped

The power station of the Arrow Radio Laboratories contains a large power panel with transformers, meters, switches and other apparatus. In the same room are high-voltage generators. The aerial of WEAW is of the umbrella type with a buried counterpoise. The broadcasting room includes a transmitting panel, holding the various meters, coils and tubes. All the instruments are mounted on the back of the panel. Five tubes are used for transmission, two as oscillators, two as Modulators, and one as a voice amplifier. Hand microphones are used for announcements and speeches. The music room, in addition to the sensitive pick-up microphones, contains a baby grand piano and a talking machine. The latter is used only occasionally.



The Faulkner Radio Six Syncopates every Friday night over a 300-mile radius from Station WEAW, Anderson, Indiana.

### H. D. Norviel Is Operator

Herbert D. Norviel is the operator at WEAW. C. A. Stahl is second operator, and Harry E. Norviel, as manager, arranges all the programs.

On Friday nights the Faulkner Radio Six, of Anderson, provides the syncopation and this is the feature evening of the week. The rhythmic strains which this combination broadcasts weekly from WEAW are looked forward to by every Radio amateur in Indiana whose feet are the least bit restless, and these melody makers have gone far to make WEAW near to the hearts of all those possessing receiving sets.

The Faulkner Radio Six, "tuning" up at the WEAW studio, is shown in the accompanying picture.

### POST OFFICE PLANT TO USE PHONE EXCLUSIVE

### WWX Makes Change to Aid Those Not Knowing Code

WASHINGTON.—Commencing July 1st, Station WWX of the Post Office at the Capital began to broadcast all its varied information by Radiophone on 1,160 meter wave length, so that all may get the latest weather, crop and market news without knowing code. The daily schedule, except for the Saturday closing at 1 p. m., is as follows:

10:00 a. m., Weather (Eastern-Central only); 10:30, Washington wholesale fruits and vegetables; 12:30 p. m., Live stock, openings St. Louis and Chicago (form 41); 2:15, Chicago and St. Louis live stock closing (form 20); 3:00, Crop report and special market news; 3:30, General fruits and vegetables; 5:00, Wholesale dairy produce, New York and Chicago (form 59); 5:30, Grain report; 7:30, Live stock and grain (form 43); 8:00, Fruits and vegetables; 9:30, Weather.

### Another State Heard from; Idaho Follows Band Wagon

WASHINGTON.—Among twelve broadcasting stations licensed by the Department of Commerce during the past week, are two in Idaho, one of the five states which had no broadcasting station. They are operated by an electric shop in Moscow and a firm in Lewiston. Wyoming will soon be in the broadcasting field it is reported, and then there will be but three states with no Radio distributing stations: Mississippi, Kentucky, and Delaware.

Three daily papers took up broadcasting this week, one school of music, and the city of San Jose, California.

### STATION IN BOSTON OPENS AS SURPRISE

### WFAU GETS LICENSE BEFORE PLANS LEAK

Mayor Curley Microphones First Official Message—Power Tubes Total 100 Watts

(Special to RADIO DIGEST)

BOSTON, MASS.—This city's newest Radio station for the broadcasting of concerts and entertainments was opened Thursday, July 6, when Mayor Curley broadcast the first official message from WFAU, the new Radio station of the Edwin C. Lewis, Inc., electrical concern, at 121 Federal street.

For several weeks rumors have been circulated in Radio circles that several new powerful broadcasting stations were about to open in the business district of the city during the summer, but the announcement of the Lewis station came as a surprise to fans. The new Shepard station will be ready for an official opening within the next few weeks. It is natural that the Lewis concern should establish a station, as it was one of the first firms in the city to take up the popular art as a serious and sound business proposition.

Equipment of the Lewis station is the latest apparatus obtainable from the Radio Corporation of America, and includes a transmitter of 100 watts using Radiotron tubes. Its range will cover all parts of New England, except that small strip around Springfield and Hartford, which, due to the mineral deposits in the hills near Worcester, makes Radiophone broadcast reception impossible from any distant New England cities.

Unlike the Amrad station at Medford Hillside and the new Shepard station, the Lewis station will not broadcast nightly, but will start on a one-night a week program, which they thus hope to maintain to the highest standard possible in concert and general entertainment.

### Great Lakes On 30 KW Arc

GREAT LAKES, ILL.—The Naval Radio station at Great Lakes began broadcasting news and weather and crop bulletins for the Department of Agriculture recently, and now handles about 3,200 words daily with a 30-kilowatt arc on a wave length of 4,900 meters. A new 750-watt telephone transmitting set is being installed at the Great Lakes station, which it is expected will be completed soon.

### Jack Canuck Learns Fast To Adjust his Detector

MONTREAL, CANADA.—Radio communication is making great strides in Canada, as it is doing in the United States. Broadcasting stations are now operating in most of the important cities. Radio sets are becoming a universal household utility. The Detroit News programs are being picked up in both Eastern and Western Canada, and enjoy a degree of popularity second to none of the local broadcasting stations.

A review of developments just published here predicts that Radio is due to revolutionize many phases of Canadian life. Railways, newspapers, pleasure resorts, theaters, business houses and private individuals by the thousand are installing Radio outfits.

### Cubans On Variometer Hunt

(Special to RADIO DIGEST)

SANTIAGO, CUBA.—There is an increasing interest in Santiago in Radio telegraphy and telephony, and it is intended to install a broadcasting station powerful enough to be heard in every town in Oriente Province. The majority of receiving stations now in use have been constructed by amateurs or assembled from parts obtained from the United States, but as American firms are oversold, much difficulty has been experienced in getting deliveries on orders placed in this country. The proximity of Cuba to the broadcasting facilities of the United States adds to the possibilities for developing a market there for Radio sets.

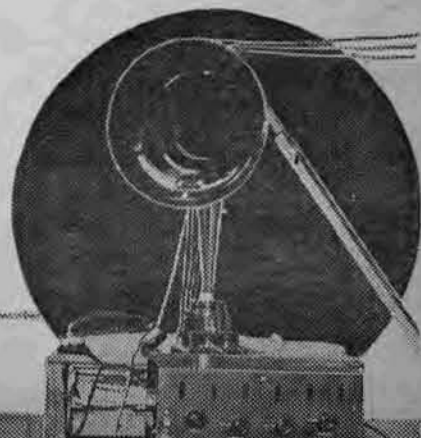
### Senator Employs "Speak Easy"

SIOUX CITY, IA.—"Monahan Post" of the American Legion, staged a very large and successful Fourth of July celebration here, at which the Honorable Royal C. Johnson spoke to a crowd of over 10,000 people through a Radio transmitting station and was heard distinctly through three magnavoxs placed in front of a 400-foot grand stand.



The former discordant quartet had to be replaced by something more refined since the flapper has begun to frequent the barber shop, hence the photo, made in one of Washington's most up-to-the-minute shops which cater to flappers.

© U. & U.



# NEW DETECTOR TUBE USES NO BATTERIES

## JOSEPH D. R. FREED, NEW YORKER, IS INVENTOR

### Synthetic Chemical Fills Evacuated Bulb Having Two Electrodes— Claimed Very Sensitive

(Special to RADIO DIGEST)  
 NEW YORK.—A new detector consisting of an absolutely new synthetic chemical, together with suitable electrodes sealed in an evacuated glass tube and requiring no batteries, has been invented by Joseph D. R. Freed of this city. It is claimed that the new detector, for which no adjustments are necessary, is as sensitive as a good three electrode vacuum tube detector. Another feature claimed for the invention is that a regular audio frequency amplifier can be connected with it and that the resultant set will work as well as any two stage audio frequency amplifier.

It is also said that the new detector tube is free from rectifier distortions commonly



New Tube and its Inventor

found in the customary triode tube due to the operating characteristics of the latter. Mr. Freed, youthful Radio engineer and manufacturer, is now making application for patents covering the device, a picture of which is given on this page. A more detailed description of the tube and the circuit in which it is used cannot be given until the patent application has been filed.

## May Install Receivers At All National Parks

### Plan to Keep Tourists in Touch with World

(Special to RADIO DIGEST)  
 WASHINGTON.—No matter how far one travels in search of a vacation, he will soon be unable to avoid Radio telephony. Plans are now being completed at Washington for the installation of a gigantic system of Radiophone receiving stations in all of the country's big national parks. The plans will furnish news, market reports and concerts to tourists.

Radio transmission stations now in the parks will co-operate in the work, according to Stephen T. Mather, director of the national parks.

Mr. Mather explains that tourists have heretofore been cut off from the world when they enter the parks. The Radiophone will be able to keep the tourists in touch with current events. He said cases have been known where tourists knew nothing of happenings of national importance for several weeks.

He believes this can be remedied by installation of Radio receivers at strategic points throughout the park system. They can be cared for by a mobile force, and the expense involved will be small in comparison to the return. Experiments will be tried in several parks immediately.

WASHINGTON.—Regulations to govern the erection and operation of Radio apparatus in the District of Columbia are being prepared by the electrical department of the local government.

# Book Reviews

**The Complete Radio Book.** By Raymond Francis Yates and L. G. Pacent. The book on Radio for which the vast public interested in the subject has been eagerly waiting. Covers the subject authoritatively and completely. Forty diagrams and twenty-five illustrations. Price, \$2.00.

**Radio Experimenter's Hand Book.** By M. B. Sleeper. Throughout the preparation of this book one purpose was kept in mind, "Answer the practical questions for the novice or the "beginner" and the more "advanced student." This book will help the selection or construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, \$1.00.

**Radio Engineering Principles.** By Henri Lauer and Harry L. Brown. The book covers thoroughly the operation and characteristics of two and three electrode vacuum tubes, the practical application of the tubes, the generation and control of electric flow, and the conditions which must be obtained to cause a tube to operate in any of its functions. Price, \$3.50.

**Radio for Everybody.** By A. C. Lescarboura. A popular guide to Radiophone reception and transmission and to the dot-and-dash reception and transmission of the telegraph for the layman who wants to apply Radio for his pleasure and profit without going into the special theories and the intricacies of the art. Price, \$1.50.

**Elements of Radio Telephony.** By William C. Ballard, Jr., M. E. A reliable authoritative discussion, in simple form, of the principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, \$1.50.

**Home Radio—How to Make It.** By A. Hyatt Verrill. This book is particularly adapted for the amateur that desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

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. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

## FRENCH NOW LISTEN TO EIFFEL TOWER MUSIC

### Famous High Point Has 1500-Mile Broadcasting Plant

(Special to RADIO DIGEST)  
 PARIS FRANCE.—Stirred by the tremendous success of Radio broadcasting in the United States, Gen. Ferris, head of the French Army Signal Corps, has organized a service for the benefit of the public within a radius of 1,500 miles of Paris.

A powerful broadcasting outfit has been installed in the Eiffel Tower, and now not only citizens sitting in their homes, but airplane travelers between Paris and London, enjoy the daily concerts. A party of thirty-five in North Africa, 1,450 miles away, recently enjoyed one of these Paris concerts, which they heard perfectly.

It is now planned to permit direct Radio communication between a telephone subscriber in Paris and one in London or in an airplane or on a ship at sea, so that it will be possible soon to keep in touch with any person traveling between Paris and other European cities.

**RADIO MANUAL.** Everything the beginner should know. How to build and operate an inexpensive receiving set. Sixty-four pages, thirty illustrations. Twenty cents. Post paid. RAYDIO PUBLISHING COMPANY, CAXTON BUILDING, CLEVELAND, OHIO.—Adv.

**Carter Radio Co.**  
 209 S. STATE STREET  
 CHICAGO

**CARTER TU-WAY PLUG takes TWO head sets at same time; takes ALL types of cord tip terminals. Price \$1.50 each.**  
 If Your Jobber Is Unable to Supply, Write Us

Headquarters for  
**Radio Supplies and Equipment**  
 Radio Department  
**COMMONWEALTH EDISON ELECTRIC SHOPS**  
 72 West Adams Street  
 Chicago, Ill.

## S. S. GOLD STAR SAILS FROM HAMPTON ROADS

### Navy's First Radio Repair Ship to Visit Stations

FORT MUNRO, VA.—The S. S. Gold Star, the navy's first Radio repair ship, has sailed from Hampton Roads for the Pacific Coast and Alaska to deliver spare parts and repair the two Radio compass stations in the Arctic which are maintained by the navy. These two stations, which are located at Cape Hinchinbrook and Sandstone Point, are frozen up for seven months of the year.

## "ALL-AMERICAN" Audio Frequency Transformers

Two Types—Fully Mounted  
 R 3 Ratio 10 to 1.....\$4.50  
 R 2 Ratio 3 to 1.....4.25  
 Send For Illustrated Folder  
**RAULAND MANUFACTURING CO.**  
 35 SOUTH DEARBORN STREET, CHICAGO

## RADIO MAILING LIST

6,840 Retail Radio Dealers, Price per M.....\$7.50  
 590 Radio Manufacturers, per List.....7.50  
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**Trade Circular Addressing Co.**  
 166 W. Adams Street — Chicago, Ill.  
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## "To Build Right, Consult First"

**MANUFACTURERS** who want the best obtainable consulting advice on their Radio engineering problems must go to the man who knows for their information.

TO BUILD right—consult first. No obligations are incurred in sending in your problem. An estimate on its solution cost will be tendered first.

ADDRESS your correspondence to Box 109, Radio Digest Illustrated, Chicago. THE MAN WHO KNOWS

# MICRODENSERS

FOR FINE TUNING

## MARVELOUSLY EFFICIENT VERNIER CONDENSER

Infinite Adjustment

Wider Range

Absolute Stability

Greater Selectivity

For All Capacities

Manufacturers—Jobbers—Dealers.

Write for Discounts.

## The RADIO SHOP

242 West Adams Street

Sole Distributors

Detroit, Michigan

# CROSLLEY RADIO APPARATUS

## BETTER—COSTS LESS

Crosley Harko Senior



The HARKO SENIOR was developed to supply the demand for a low-priced, efficient receiving outfit, having a range of from 150 to over 600 meters, thus bringing in on the average amateur antenna—amateur stations, radio telephones and commercial stations, operating up to and including 600 meters. Ships and stations on the Atlantic Coast are easily copied in Cincinnati. Radio telephone concerts and voice, from Newark, New Jersey and other New Jersey phones in addition to Pittsburgh, Detroit, Chicago and other phones, are regularly copied in Cincinnati, except under adverse conditions. It is just the thing for receiving radio telephone concerts. This instrument is a combination tuner and audio detector. It consists of a tapped inductance, a CROSLLEY VARIABLE CONDENSER, CROSLLEY Model "A" Rheostat, CROSLLEY V. T. SOCKET, CROSLLEY GRID CONDENSER and Leak. The hook-up is special—of our own design. The HARKO SENIOR is sold complete as described without tube, "B" Battery, "A" Battery or phone, as is usual with such apparatus.

PRICE .....\$20.00

The HARKO SENIOR can be used in connection with the two-step amplifier described elsewhere.

Crosley Two Step Amplifier

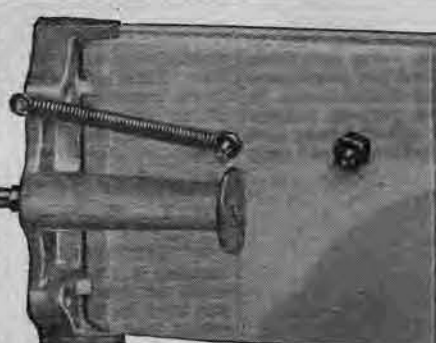


To meet the demand for a moderately priced, efficient Two-Step Amplifier we have developed the one illustrated above. This consists of CROSLLEY Rheostat, Sockets and Transformers, mounted on panel of formica or other similar dielectric composition, complete with binding posts which are marked.

The CROSLLEY TWO-STEP AMPLIFIER is designed to work well with practically any audio detector hook-up, the phone posts on the detector being connected to in-put binding posts on the amplifier panel. The phones are then attached to the phone posts connected with the "A" battery. Two leads with clips come out of the rear of the cabinet to be connected with the "B" Battery. The CROSLLEY TWO-STEP AMPLIFIER cabinet is designed to match up uniformly with either the CROSLLEY Detector Unit, the Crosley Crystal Receiver No. 1 or the HARKO SENIOR. The size of the cabinet of the Two-Step Amplifier is 11 1/2 inches wide, 6 inches high, 4 1/2 inches deep.

Price of the CROSLLEY TWO-STEP AMPLIFIER without tubes, "A" or "B" Batteries, or phones, complete as shown in the illustration, is \$25.00

The CROSLLEY VARIABLE CONDENSER is unquestionably one of the most radical improvements in Radio apparatus introduced during the past few years. It has a great many advantages over the old type of interlocking plate air condensers. Hence, its popularity in marketing these condensers we make no apologies on account of the low price. Instead we state emphatically that they are better than other types of variable condensers that have been heretofore offered for use in Radio work, notwithstanding their low price. The CROSLLEY VARIABLE CONDENSER depends upon a thin sheet of mica as insulation between the plates. As there is no friction from the opening and closing of the plates, the mica will last as long as the condenser. Moreover, the



mica will stand up under much higher voltage than the average air condenser, without puncturing, breaking or showering. Therefore, the CROSLLEY VARIABLE CONDENSER can be used safely for C. W. Work or modulated C. W. work. Anyone who has experimented with Radio telephony will readily recognize the advantage of this feature. Each CROSLLEY VARIABLE CONDENSER is carefully tested to withstand one thousand volts before shipment. Try this on an air condenser if you never want to use it again. Another decided advantage of the CROSLLEY VARIABLE CONDENSER is the fact that there is no danger of short circuiting. The slightest bending of one of the plates will make other condensers absolutely worthless.

PRICES: Model A, \$1.25; Model B, \$1.75; Model C, \$2.25  
 For Knob and Dial, 40c extra

In addition to the above, we now are producing, in large numbers, the Crosley Crystal Receiver No. 1 and the Crosley Detector Unit, the two combined forming the Harko Senior. Our Radio Frequency Tuned Amplifier, costing \$15.00, is producing wonderful results. We also are producing transformers, variometers, vario-couplers, loud-speaking devices, sockets, cabinets, rheostats, tap switches, taps, binding posts, and many other articles used in radio outfits.

SEND FOR OUR CATALOG

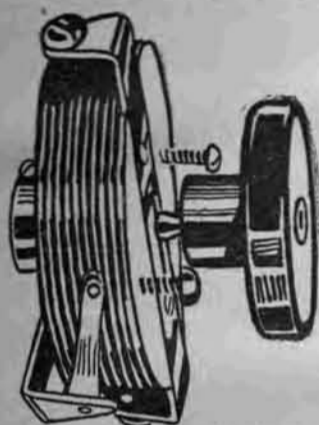
**CROSLLEY MANUFACTURING COMPANY**  
 CINCINNATI, OHIO

# The Radiophonist's Mart

**T**HE NECESSITY for a rheostat that would give finer adjustment than heretofore attained was soon realized after Radio got well under way. The advent of Radio frequency feed back circuits emphasizes this need still further. J. E. Jenkins, of Chicago, after giving considerable time to this very important necessity in Radio worked out a vernier rheostat and an immediate improvement was noticed in the selectivity of the receiving sets.

The principle of the rheostat is a wire wound around a solid horn fiber drum in which a screw thread has been cut. The wire lies in the bottom of the cut. Contact is made by a pointer attached to the shaft of the rheostat; and, by turning to right or left, the resistance can be lessened or increased as desired, with infinitely small resistance variations.

One of the most attractive features of the rheostat is the fact that instant contact can be made by means of a switch connection which is part of the rheostat. By simply pushing the knob the circuit can be broken, and when the filament current is again required, a pull on the knob connects the circuit and the filament is heated at the same resistance as when the circuit was disconnected. This is a big advantage



Vernier Rheostat Has Fine Graduation

and saves considerable trouble by not having to continually readjust the rheostat every time it is desired to use the set.

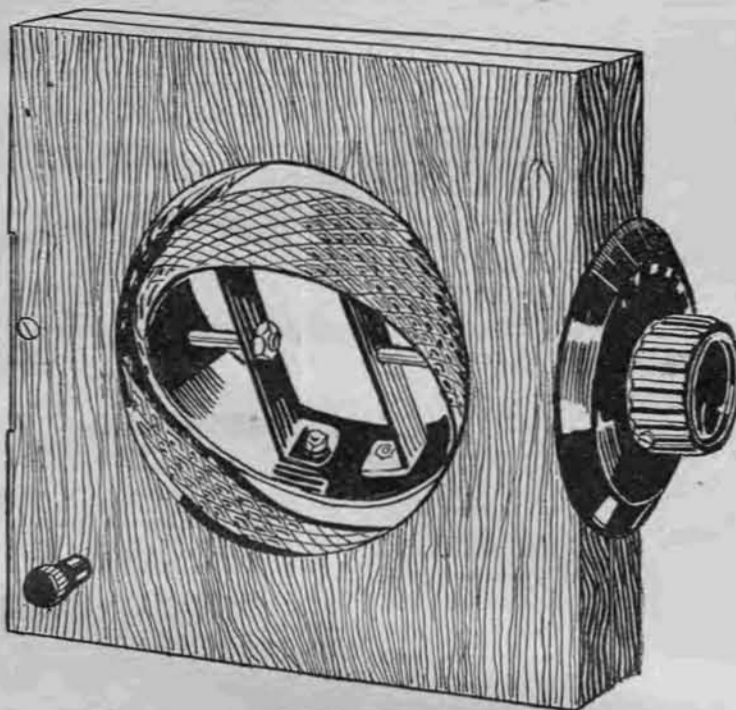
**I**N THE earlier days of Radiophone, the most familiar type of the "B" or plate battery was the one put out in the box form with the red or black sealed top and periscope two or three taps. Due to the fact that a variation in the plate voltage had a decided advantage in controlling the reception especially with two or more stages of amplification, the actual number of taps in the battery unit was increased, usually ranging in steps of three volts each. The next development that took place was a small 4½-volt unit. A complete battery in itself, a number of which were added together to make up the necessary voltage. Even this, however, has been improved on.

In the battery shown in the illustration, manufactured by the Hipwell Manufacturing Company, any cell in the battery can be removed and replaced as desired. In this manner, the trouble of one or two cells going dead and spoiling the battery for further use can be remedied by the simple expedient of inserting a new unit. To some of the individual units are attached lugs. This permits tapping of the battery at any voltage desired. The individual units are not sealed in the container. The wire connection from the zinc of one unit is soldered to the carbon cap of the next unit. When the cover of the battery is slipped on the lugs project through slots in the cover. These slots are marked with the proper voltage for each lug. Each lug is drilled with a 1/8-inch hole so that a typical battery binding post can be fastened to it, avoiding the usual necessity of a soldered connection to the battery terminals. The claim of the manufacturer is that these batteries have a long life and are perfectly noiseless. This is a material advantage in reception where battery noises are often misunderstood, and the set condemned. The construction is such that at any rate, a noisy or bad cell can be removed and replaced by a good one.

The batteries are produced in the familiar 22½ and 45 volt form; in addition, they are also made in various sizes for different amperage values. Instructions are also furnished for inserting a unit without the necessity of soldering, as many fans are not equipped for this work.

**D**IAMOND variometers and variocouplers are a special type of lattice wound instruments. These instruments furnish a receiving set with minimum inter-turn capacity, a high inductance ratio and sharp tuning. The variometers are extremely sensitive and it is possible to keep the detector bulb at the point of oscillation through entire scale of both grid and plate variometer. The inductance ratio is considerably higher than usual. The form of winding is the latest development in "lattice"

## Variometer with Lattice Winding



winding, and will accommodate the new broadcast wave lengths with negligible losses.

Those who have used other variometers will find it necessary to follow a different procedure with the Diamond variometer due to the fact that it tunes so sharply. The plate must follow the grid at all times, as none but very near stations is heard over more than a few points on the grid variometer scale. A variable condenser of from 11 to 15 plates shunted across phones, or across primary of first transformer in a multi-stage set, will make a very efficient vernier control.

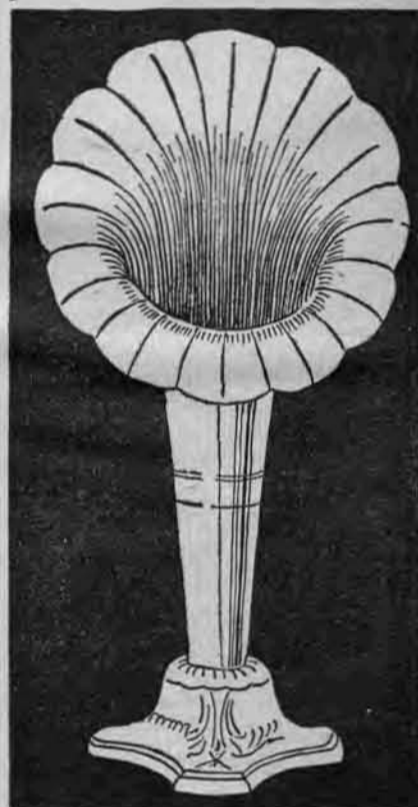
The case of the Diamond variometer is strongly built of well-seasoned birch, mahogany finish, and all metal parts are brass with buffed nickel finish. Double bearing springs insure positive contact, thus producing noiseless circuits. The variocouplers are identical in size, shape and construction with the variometers, having "lattice" windings which are wound to a wave length of 200-1,500 meters.

**W**ITH THE present abundance of amplifying horns which are being placed on the market, it is gratifying to find one that has been designed and

constructed under definite consideration of acoustic experience. There is no question about the fact that the metal horn in phonograph days was found to have a tinny sound, and the ultimate development was the seasoned wood resonance chambers which are found in use today. The popularity of the phonograph dates from the time the wooden type was developed. In Radio, this past experience in metal horns has been completely ignored. For this reason there are found plenty of metal horn amplifiers, but very few of the type that takes into consideration the knowledge taught us by experience with phonographs.

Maderaware, manufactured by the American Art & Shade Company, is a very dense artificial wood made by compressing wood fiber in steel dies under about twelve tons pressure and at a temperature of approximately eight hundred degrees Fahrenheit. The material is much denser than even the hardest seasoned violin wood. This density coupled with the fact that it is uniform in its physical characteristics gives these horns very fine acoustic properties.

The word "Clearspeaker" has been coined for the new type of horn. It will operate equally well for loud sound reproduction necessary for filling a large arena, or toned



Horn Made of Compressed Wood

down to the requirements of a small living room. The form shown makes a beautiful piece of apparatus designed to help to adorn the Radio set rather than disfigure it as most loud speaking devices do.

## How Radio Compass Works

There are two distinct methods of using the Radio direction finder as an aid to navigation to enable a ship to locate its position, according to the Bureau of Standards. In one system Radio signals are transmitted from stations located on the shore and are received with Radio direction finders located on the ship. In the other system the ship which desires to know its position transmits Radio signals which are received at a number of Radio compass stations located on shore, and the bearings observed at these shore Radio compass stations are plotted and the ship notified as to its position by Radio.

## Grid Action Similar to Gate

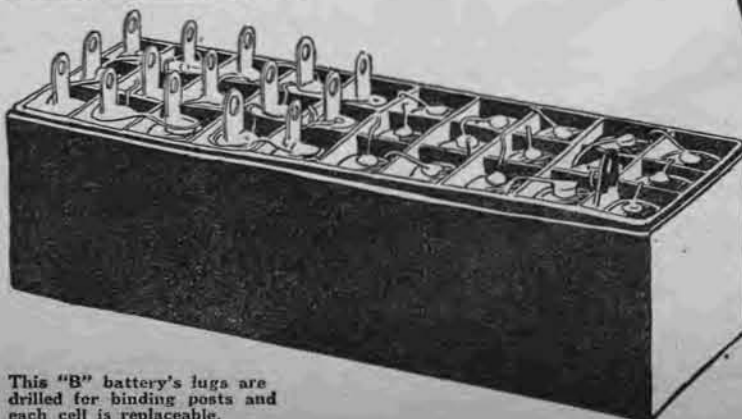
The part played by the grid of the three electrode vacuum tube is to form a variable gate through which the electrons pass to the plate, and the amount the gate is opened or closed depends on the variations of the Radio waves coming in, thereby causing the power of the local plate battery to be utilized to give a much louder signal than would be possible with the energy of the signal alone.

In other words, the grid action is like that of a very small man working the handle of an elevator. The man himself cannot exert even a small fraction of the effort to lift the weights that he can easily control from the elevator handle by turning on and off the electric power at the proper times.



Lugs for tapping battery as desired

Individual unit for replacement as necessary



This "B" battery's lugs are drilled for binding posts and each cell is replaceable.







# Radio Digest Illustrated

TRADE-MARK

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In a new scientific field where many writers are contributing articles there will arise some controversy over the expressions of opinions and statements made from time to time. Some of these controversies may be taken into the courts for settlement. The priority of inventions may be claimed as well as the merits of some part entering into the construction of the radio apparatus. The Radio Digest is an outlet for these expressions and the publisher disclaims any responsibility for opinions or statements made in connection with radio apparatus. The news will be printed as it comes to us.

Vol. II Chicago, Saturday, July 22, 1922 No. 2

## Radio Breaks Down Farm Isolation

No Distance Exists Between the Farmer and Town Now

LITTLE by little the man on the farm comes closer to city life. Radio will destroy the remaining isolation of the farm. It was not so very long ago when the farmer did not even have his mail delivered. Once a week found him on his way to the small town or city in the farm carry-all to procure the necessary groceries and to get the mail. Free rural delivery has brought both of these to him each day. Automobiles and good roads have aided him still more, for he can get away quickly in the evening and enjoy a ride that could not be had with the old horse and buggy.

Now the Radiophone brings to him the entertainment that was impossible for him to see and hear in a small town. The small town does not have such entertainments. He is now just as good as his town fellowmen. He hears the same music and lectures as they do. He also has the many advantages of Radio weather forecasts and market reports. The Radiophone surely has brought good things to the door of the isolated man.

## The Sea Loses Some of Its Terrors

Flashes Through the Ether Bring Ship Out of the Fog

RADIO has certainly robbed the sea of some of its terrors. Recently the steamship Oropesa arrived in New York after a three-day siege with fog. The data provided by the naval stations was so accurate that the ship came within sixty yards of the Fire Island lighthouse for which its course was set and then it was able to proceed to Sandy Hook and its pier.

The captain said it was superior to anything he had experienced in his many years at sea. The ship was found to be in exactly the location on its charts after obtaining the flashes from the navy stations. The navy should be proud of its work and Radio is the instrument at hand that has brought about these new conditions. This may be a forerunner of the time when Radio compass flashes will entirely span the ocean and be of help at all locations.

## Do Not Hesitate Buying Sets

Radio Has Its Joys Even in Warm Weather

THERE seems to be a sentiment among buyers that Radio broadcasting will close during the summer. So much talk about static has also had its effect and the buyer is now holding off for a later purchase. Reports from the big stations which are furnishing the nightly concerts prove that the broadcasting will continue throughout the summer. In one instance the power of the station has been doubled and the aerial raised over one hundred feet.

Let these few items set your mind at rest. Radio is here for all time and it is just as entertaining in summer as in winter. A concert may be enjoyed without the necessity of dressing in evening clothes and spending an entirely too hot evening in a hall or theater listening to an uninteresting and abstruse lecture.

## Telephone Sales Not Changed

The Radiophone Has a Field All Its Own

THE TELEPHONE industry betrays no symptoms of anxiety as to its future. It keeps on supplying its instruments and apparatus. The Westinghouse Electric Company, for instance, though interested in Radio, finds its dealings in the standard telephone to be utterly unaffected. The sales manager of this corporation argues that not in our time will the Radio replace the telephone.

He expects the telegraph and the telephone to be brought to greater effectiveness, but alleges that proper conduct of business by Radio broadcasting depends on direct and individual connection. Radio appears to him to have value for private business only when conducted by means of secret codes.

## Ye Ed Asks 'imself

Question.—What is the loop or coil aerial?

Answer.—The loop antenna is generally wired with several turns of wire from five to ten feet square, mounted on wooden pedestals supported so that such a loop or square may be rotated. Indoor antennas of this type require from two to three stages of amplification. While a set of this kind is more expensive the money invested is well worth while due to the compactness of the set and ease with which such a set may be installed. In using such a set interference from other sources is very small and by means of direction, that is, rotating the loop antenna in the direction of sending station, considerable improvement in transmission is noted and additional elimination of outside stations takes place.

In using such an indoor antenna in a building largely composed of steel construction the value of such an aerial is materially decreased.

Question.—Explain in a simple manner the theory and operation of a vacuum tube and the action it performs.

Answer.—The operation of a vacuum tube in general can be said to be similar to the flow of water in a pipe. The water in a pipe flowing in either direction may be controlled by a valve suitably located. This flow of current by means of a valve can be regulated, a heavy or small amount of water being entirely controlled. When it is understood that the vacuum tube acts as a valve controlled by means of the energy received on the Radio antenna, it will be clear that the controlling of a vacuum tube is relatively as simple as the control of a valve in a water pipe.

In speaking of the flow of current in a vacuum tube as a matter of comparison it must, of course, be understood that this flow of energy from the plate to the filament is in the form of a continuous or uninterrupted stream of electrons flowing in the valve.

Question.—What are the principal advantages of a vacuum tube receiving set as compared to an ordinary crystal set?

Answer.—The principal advantage of a vacuum tube set lies in its greater sensitiveness and, of course, of its greater range. The ordinary vacuum tube without amplification has, at least fifteen times more sensitivity than the most efficient type of crystal that may be obtained.

One of the principal disadvantages of a crystal detector set is that slight jars or imperceptible jolts immediately throw it out of adjustment, and since this is liable to take place almost at any time in the ordinary operation of the set it will be clear that its use as a detector is troublesome. As a general rule all of these difficulties are entirely overcome when a vacuum tube is used. It also has the additional advantage that when a detector vacuum tube is used and is put in operation for a particular wave length of a specified broadcasting station, little, if any, further adjustment is required, as jars and vibrations have no effect on its operation.

It is, of course, true that tube sets are more expensive but many reasons can be given for the difference in cost and the advantages derived from the difference in price. The upkeep of a tube set is greater because of the constant changing of the storage battery and the occasional replacement of the dry batteries. The lamps in the tube sets, of course, are destroyed due to careless operation and the application of more current than is ordinarily required in their use.

Question.—Is it a difficult problem to design and construct transformers for audio or Radio frequencies?

Answer.—The principal difficulty in this problem is in the design and manufacture of a core for the transformer having the smallest amount of core losses. While excellent results can be obtained by the use of silicon plates of small thickness, excellent results have been obtained by the use of a core composed of iron filings imbedded in a high melting point compound. The method of winding these transformers and also the means provided for insulating the windings and the core are similar to those specifications followed in the manufacture of any good transformer.

Question.—It is claimed that a low voltage dry cell in the "B" battery circuit may cause disturbances in the set similar to those brought about by so-called static conditions. Please advise us of your opinion in this respect.

Answer.—Considerable study has been made of the charging and discharging of different types of so-called battery dry cells and it has been found that one cell in such battery which is low in voltage will cause serious disturbances in the battery circuit. These tests have shown that by removing a cell of the low voltage and substituting a new cell in the circuit disturbances are overcome which could not be located in any other way.

Question.—What is the maximum wattage required in the transmission bulb for transmitting wired Radio broadcasting?

Answer.—Two 5-watt transmitting tubes will give a satisfactory service over a range of at least 200 miles. While this wattage may seem low for this range of service as compared to the large amount used in so-called aerial broadcasting, there can, of course, not be any relative comparison between the two systems.

Question.—In using wired Radio either over telephone or electric light circuits should the receiving set be fused with the circuit connected to the aerial?

Answer.—Ordinary precautions require that such a circuit be fused, if for no other reason than to prevent 110 volts from destroying the receiving set. A one-half ampere fuse is entirely satisfactory for this purpose.  
W. N. Furthman.

## RADIO INDI-GEST

Only 360 Meters from the Stage, Sir!

The box-office of a theatre in New York is now equipped with a Radio receiving set to take care of reservations from passengers on incoming steamers. S'pose nefarious Radio ticket scalpers will now butt in and try to grab off all the orders.

Sell 'Em at the County Fair!

A young Radio sharp at Ogdensburg, N. Y., recently heard through his set "Come home with the car,



Howard; I have to go to the store." Who can say that a set in the pasture will not soon call the cows at milking time, "Come, Bossie!"—Chicago Daily News.

Put 'Em on the Broadcast Program

"Please switch off the Radiophone, won't you, dear?"  
"But that's the famous Mme. Serceeholini singing."  
"I know, but I think the people in the next apartment are having a family quarrel."—New York Sun.

It All Depends on How You Look at It

A writer says: "Ladies are attaching Radio garters to their facilities of transportation." A low-down application of a great principle.—Chicago Daily News.

Listen In

All the world's broadcasting now,

Listen in.

Hear your neighbors in a row,

Listen in.

Hear a concert down the line,

List while politicians whine,

Might broadcast this lay of mine,

Listen in.

—Louisville Courier-Journal.

Barbers Are Also Saving Their Breath

And now it is the dentists who are profiting by Radio. It is a great advantage to keep the mind of the patient off his troubles. When telephone receivers are clamped on, what registers on the ears of the sufferer makes him more or less indifferent to what is going on in his mouth. Great possibilities for the soothing talker. Some of us will remember when a good talker made us feel it was a pleasure to be fired.

Did a Vacuum or Inner Tube Blow?



Claude: "I see Jones has Radioized his motor car."  
Clarence: "Yeh! he calls the garage service wagon that way now."

Broadcast but Not Heard

A definition of a crystal receiving set—Fishing for music with Galena bait!

Birds of a Feather Radio Together

Scientists claim that birds are born with ability to transmit and receive Radio messages in their own way. Man must be a backward ignoramus.

Aunt Enna Has a Mental Capacity

When in doubt as to just what an aerial is, ask your Aunt Enna.



# Radio Telephony for Amateurs and Beginners

## Part IX—Crystal Detector Receiving Sets, Section I

By Peter J. M. Clute

### To Explain—

The following article by Peter J. M. Clute is a continuation of his series. Articles to come are:

- IX. Crystal Detector Receiving Sets, Section II.
- X. Vacuum Tube Receiving Sets.
- XI. Amplifiers.
- XII. Useful Information.

**B**EFORE taking up the specific subject of crystal detector receiving sets, it may be advisable to consider briefly the basic elements of Radio communication. To utilize electromagnetic waves for

is often a measure sure of the efficiency of its ground system.

(3.) A means of tuning the receiving system to the frequency of the incoming waves. Tuning consists in adjusting the receiving equipment so as to have it in electrical resonance with the transmitting station it is desired to hear. Tuning is accomplished through variations in inductance and capacity in the receiving circuit.

(4.) A device which performs the function of converting or rectifying the Radio frequency oscillations received in the antenna circuit into uni-directional pulsating currents. This contrivance is called a detector, and may be either of the crystal or of the vacuum tube type.

(5.) A form of telephone receiver to render audible to the ear the audio frequency currents produced from the Radio frequency currents through the agency of the detector. These may be the regular high-resistance Radiophone receivers or head-set or in the form of a loud-speaking

Some crystals, such as carborundum, operate more sensitively to the incoming oscillations if one or two dry cells are connected across them. Carborundum requires a firm pressure of the contact point to secure audible signals in the 'phones. It makes a very stable detector, although it is not very sensitive, unless a battery is placed across it. The small current supplied by this battery must flow in a definite direction through the crystal, to obtain satisfactory results, the value of current flowing being adjusted by means of a potentiometer or rheostat. The connection for this circuit is shown in Figure 3.

Since the crystal detector, and also the vacuum tube detector, are voltage operated contrivances, the greatest potential is obtained on the detector if the crystal is connected directly to the turns at the antenna end of the tuning coil, inasmuch as at the lowest potential with respect to the earth. This will not make as much difference on the shorter wave lengths as on

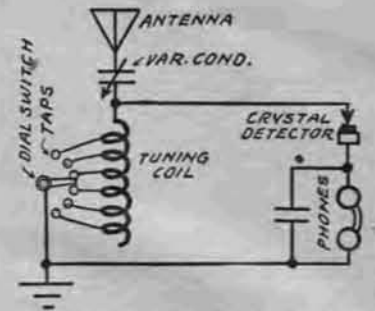


FIG. 8: RECEIVING UNIT WITH TAPPED TUNING COIL & VARIABLE CONDENSER.

aerial to include additional capacity, enables the aerial circuit to be tuned in to the short wave lengths.

Additional series antenna loading inductance is required only when it is desired to receive waves greater than the fundamental wave length of the antenna. Increasing the number of turns of series inductance prepares the open circuit for reception at longer wave lengths.

Tuning is accomplished easily, by using a condenser and a tuning coil to obtain capacity and inductance in convenient, adjustable form. One, or the other, or both of these tuning devices must be adjustable. The series loading inductance may be omitted for reception at 360 meter wave length. Satisfactory tuning may be effected by the use of a variable condenser in the antenna circuit and by adjustment of the tuner.

There have been considered, thus far only simple crystal detector receiving units in which variation in inductance for tuning purposes is produced by fixed steps. Oftentimes in tuning, signals will come in louder when the operator's hand is on the slider of the tuning coil. This condition occurs when the station is not correctly tuned or when there is a poor ground connection. The capacity of the body tunes the set nearer the wave length of the transmitting station and, therefore, a stronger signal is received.

Sliding contacts do not always insure good contact and where exceedingly sharp tuning is desired, some other tuning device must be used. Since the continuous wave transmitters used in Radio are tuned very sharply, even the slightest change in tuning inductance will materially affect the reception. Continuous variation in inductance is generally accomplished by using two coils, one stationary and the other movable, so constructed that their mutual inductance may be varied by changes in the relative position of the coils. The relative motion of the two coils may be effected in a number of ways, of which the loose coupler, the variocoupler and the variometer are representative types.

*Editor's Note.*—The second installment for Part IX of Mr. Clute's series will appear in the next issue and will deal with crystal detector receiving units employing loose couplers, variocouplers, and variometers for tuning purposes.

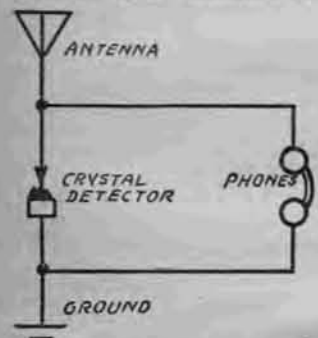


FIG. 1: SIMPLEST RADIO-PHONE RECEIVER.

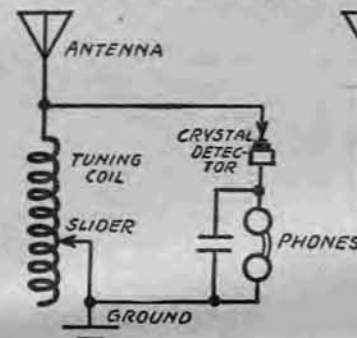


FIG. 2(a): CRYSTAL RECEIVER, WITH SINGLE-SLIDE TUNER.

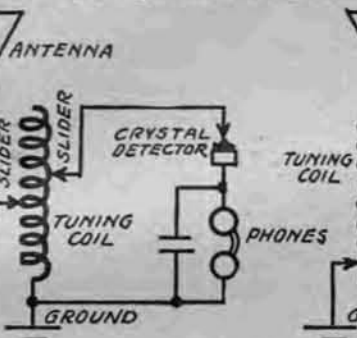


FIG. 2(b): CRYSTAL RECEIVER WITH DOUBLE-SLIDE TUNER.

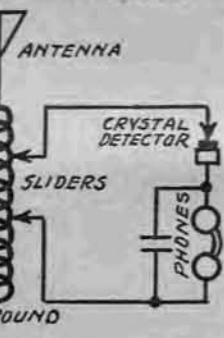


FIG. 2(c): CRYSTAL RECEIVER WITH THREE SLIDE TUNER.

the practical purpose of sending and receiving signals at distant points, several conditions must be met:

- (1.) There should be a circuit in which electrical disturbances, called Radio-frequency oscillations, can be produced.
- (2.) There should be provided a transmitting antenna or aerial to radiate these

device, depending both on the type of circuit and on the whims of the operator.

### Simplest Form of Receiving Set

The simplest form of receiving set is found in the crystal detector type. It combines ease of construction with simplicity of operation and may, therefore, be easily made and operated by the amateur or beginner. Such sets have only one or two controls for varying the wave-length and a simple crystal detector for rectifying the incoming signals.

Figure 1 shows what is probably the simplest Radiophone receiver imaginable. With this sort of receiver signals can be heard only at very short distances from a sending or transmitting station. Inasmuch as there is no tuning device in this circuit, selection of stations is impossible, and it will pick up or "listen in" on any signal that may come along.

The addition of a single slide or a double slide tuning coil will greatly improve signal reception. The tuner serves the purpose of bringing the receiving antenna in electrical resonance with the transmitting station. With a tuning coil, any station within the range of the receiving set, both of distance and of wave length, can be selected to a certain degree. The sliding contact, moving over the bared section of the wire, varies the number of turns of the in-

the larger ones, but it is advisable to bear it in mind when making connections.

### The Multipoint Switch

If, instead of a slider, a multipoint switch is used, with contact points so connected as to include every five or ten turns of wire on the tuning coil, the circuit shown in Figure 2 (a) will be represented as in Figure 4. With this method, only rough tuning can be obtained, inasmuch as the inductance in the circuit is varied in

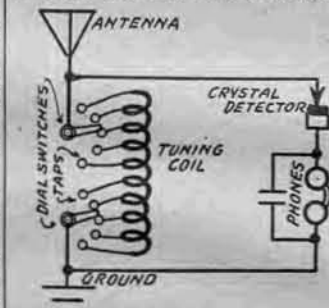


FIG. 6: CRYSTAL RECEIVER WITH TWO SWITCHES FOR TUNING COIL TAPS.

comparatively large steps. Figure 5 is a commercial receiving unit of this type.

When two switches are used instead of one, as shown in Figure 6, relatively fine adjustment can be obtained. One switch cuts in groups of five to ten turns, while the other switch takes in only one turn at a time. For instance, if 53 turns arbitrarily represent the correct tuning adjustment, the first switch is turned so as to include 50 turns, and the second switch is turned to connect in the three additional turns needed for fine adjustment to the incoming wave length.

### Variable Condenser

The circuit shown in Figure 4 can be much improved by the addition of a variable condenser in the antenna circuit for sharp tuning. Figure 7 illustrates a com-

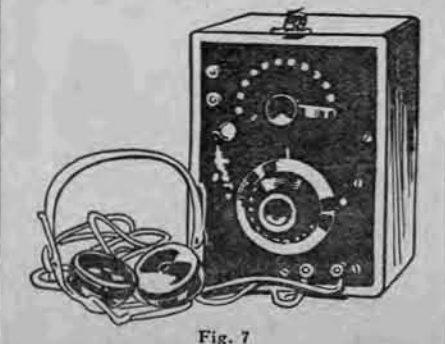


Fig. 7

mercial set of this type, the diagram of connections being shown in Figure 8.

oscillations into space in the form of electromagnetic waves.

(3.) In order to set up electric currents in the receiving circuit, a receiving antenna must be provided to intercept these electromagnetic waves and to convey the energy to the receiving apparatus.

(4.) A receiving apparatus must be installed, so that with the aid of telephone receivers, or their equivalent, the incoming signals may be detected, rectified and rendered audible.

### Essentials for Proper Reception

Certain essentials are found necessary for the proper reception of Radio signals, no matter how simple the receiving outfit may be. These essentials have been discussed in more or less detail in the preceding articles of this series and it will undoubtedly suffice to merely mention them here to recall them to mind. They are as follows:

(1.) The receiving antenna or aerial, the purpose of which is to intercept the electromagnetic waves sent out by the transmitting station and conduct the energy to the receiving apparatus.

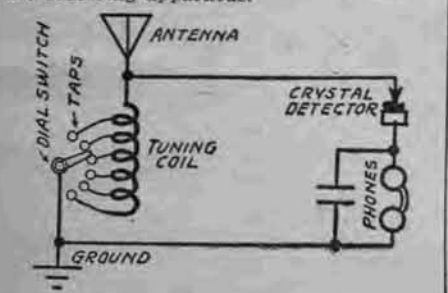


FIG. 4: CRYSTAL RECEIVING SET WITH TAPPED TUNING COIL.

(2.) The ground, which may be made, preferably, to either water or steam pipes, the ground lead being as short as possible. The distance a station may receive from

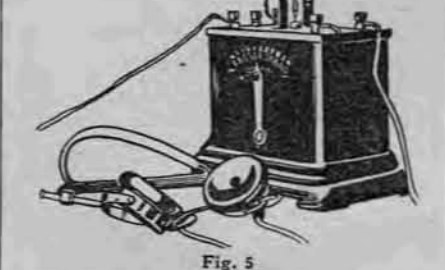


Fig. 5

ductance or tuning coil. Adding turns on the coil, by means of the slider permits the reception of signals of longer wave lengths than the natural wave length of the receiving aerial. Increasing the length of the tuning coil will allow reception on higher wave lengths, but it may decrease the efficiency. Figures 2 (a) and 2 (b) show crystal detector receiving connections, with single slide tuner and double slide tuner, respectively. It will be noticed that a small fixed condenser is connected across the telephone receivers. This condenser offers a path of low impedance to the high frequency current which is to be detected, and, in this way, it is found to increase the strength of the incoming signals.

### Three Slide Tuner Connections

Figure 2 (c) shows the connections for a three slide tuner. With this device it is possible to tune more closely than with the two slide type, and it will, hence, aid in long-distance reception. Various other methods of connection may be used with this type of tuner, making for very selective operation.

### Typewriter Parts Make Dials

The material in a typewriter ribbon spool can be used to make a dial. The spool is 2 inches in diameter and those solid, not spoked, are the best to use.

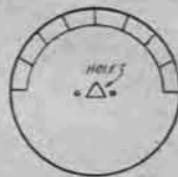


FIG. 1

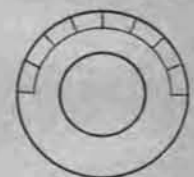


FIG. 2

Remove the disk, using care not to bend it. Mark the graduated scale on the edge of the dial with a sharp tool or scriber. Drill two holes close to the center to take small screws for fastening the knob, as shown in Figure 1. Remove the knob from the paper roller or platen and fasten it to the disk or dial with screws. The finished dial, Figure 2, will present a very neat appearance on any panel.—Frank M. McKinney, San Francisco, Cal.

### Strange Sounds Not Static

Ebbbling or grating sounds which may be noticed when the antenna and ground wires are disconnected from the receiving set are not caused by atmospheric or "static," but may usually be remedied by tightening the binding posts at various parts of the circuit, cleaning the vacuum tube contacts, or by replacing old "B" batteries. Sometimes a triode tube is found which has a bad connection between the filament itself and the lead wire which connects the filament with the base. Such a tube should be replaced by a new one.

# Simple Instructions for the Beginner

By Harry J. Marx

## Types of Amplifying Circuits

SOUND WAVES and alternating current waves, as has been explained before, are very similar in form. Both sound and electrical waves have amplitude and it is this amplitude that indicates the power in back of the waves. In Figure 1, "A" indicates an alternating current or a sound wave without variation in amplitude.

Amplification means increasing this amplitude of either sound or electrical waves without alteration of the characteristic of the wave. The curve "B" in Figure 1 shows an amplification of the curve "A," while "C" illustrates still another step of ampli-

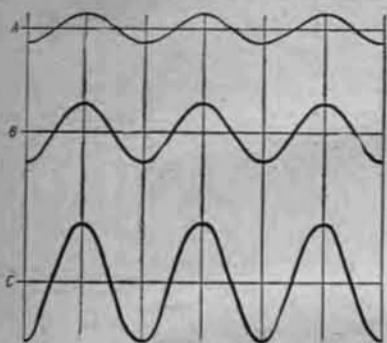


Figure 1

fication. These curves illustrate quite clearly just what happens in the steps of amplification used in Radio telephony.

The question may be raised that both sound and Radio waves do not possess a uniform amplitude but are irregular in form. In Figure 2 the amplification of an irregular wave form is illustrated. The point that should be clear in the mind of the amateur is the fact that the frequency of the wave has not been altered but in increasing the amplitude the power behind it has been increased. This increase of power is obtained through the amplifying qualities of vacuum tubes. Heretofore the vacuum tube has only been discussed as a detector. It has, however, the additional

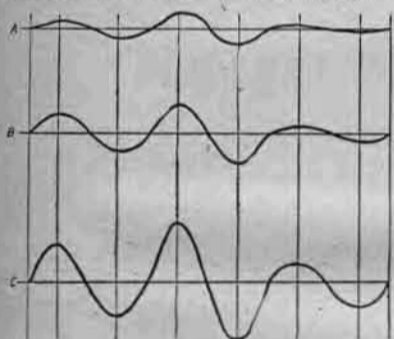


Figure 2

feature of increasing the potential of an electric current. In this respect it acts similar to a transformer, but the increased current is drawn from the "B" batteries. This amplification can be utilized for Radio frequency alternating currents as well as for the rectified audio frequency currents.

It may seem queer to the amateur that the vacuum tube which has heretofore been considered only as a detector or rectifier of alternating current, should now be used for amplification of Radio frequency currents without rectification. If the energy or potential of the grid becomes great enough and the plate circuit has sufficient

for practical and commercial use, but the amplifier has served to increase the range of both receiving and transmitting stations to an unbelievable extent. The Radio wave may be so weak that the detector tube cannot rectify it and supply sufficient energy to operate the receivers. Yet when one stage of Radio frequency is added, the weak impulses are magnified to the extent that detection is possible, giving audible sounds in the receiver. Adding another stage of amplification after the detector tube, the sounds become loud enough to be heard considerable distance from the phones. Perhaps another stage and a loud speaking device can be connected and the reception will be heard throughout the room.

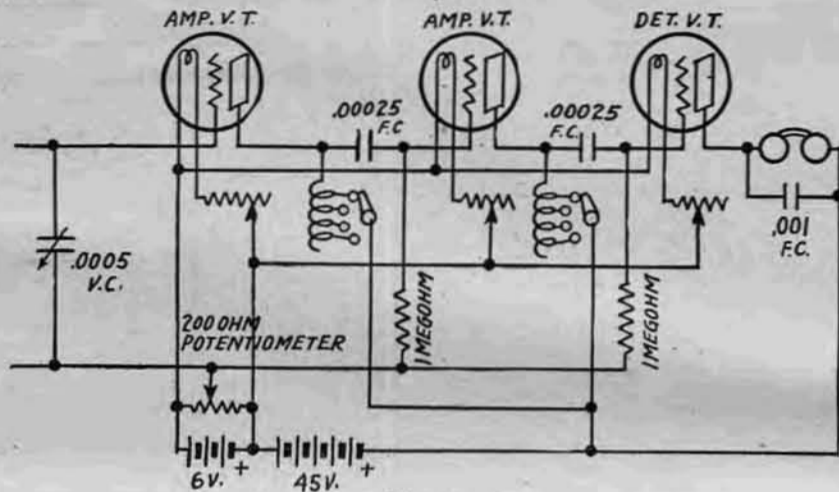


Figure 3

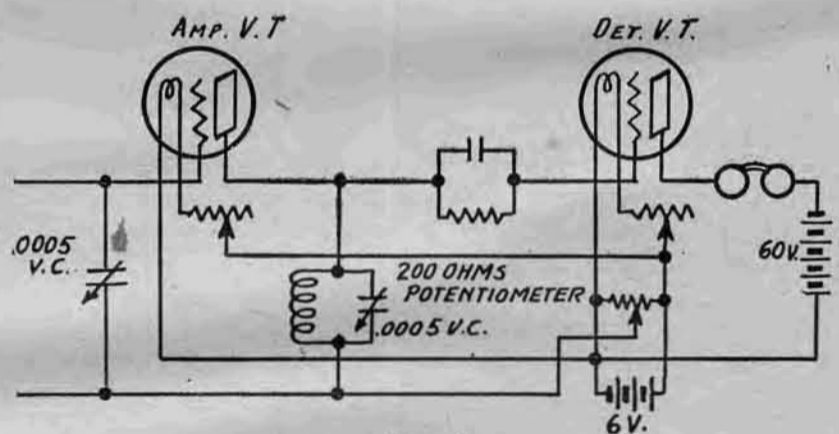


Figure 4

Audio frequency amplification has been considerably developed and is in considerable use for both commercial and pleasure purposes. The development of Radio frequency amplification marks the greatest advance in Radio taken place since the invention of the three electrode vacuum tube. Reception that has heretofore been too weak to be detected by ordinary means is readily heard with Radio frequency amplification, the addition of but a single stage resulting in an astonishing improvement. Not only is there a tremendous increase in the distance over which signals are heard, but the reception is uncommonly clear from distortion when proper trans-

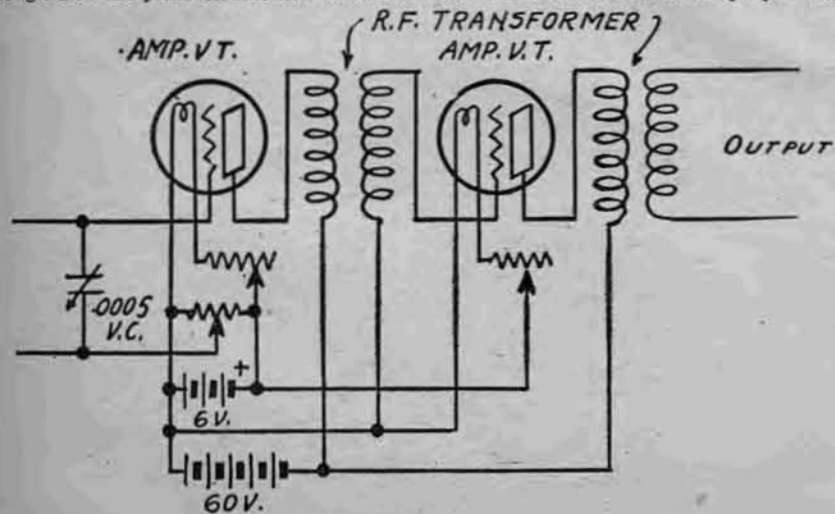


Figure 5

battery voltage, the tube simply amplifies the Radio frequency current without rectification.

The enormous strides in the progress of Radiophony is mainly due to the development of amplification. The range of a vacuum tube detector set is too limited

formers are used. Selectivity is greatly increased, thus permitting very efficient tuning for stations with but slight variation in wave length.

Another highly important advantage of Radio frequency amplification is the advantage of the use of a compact loop aerial

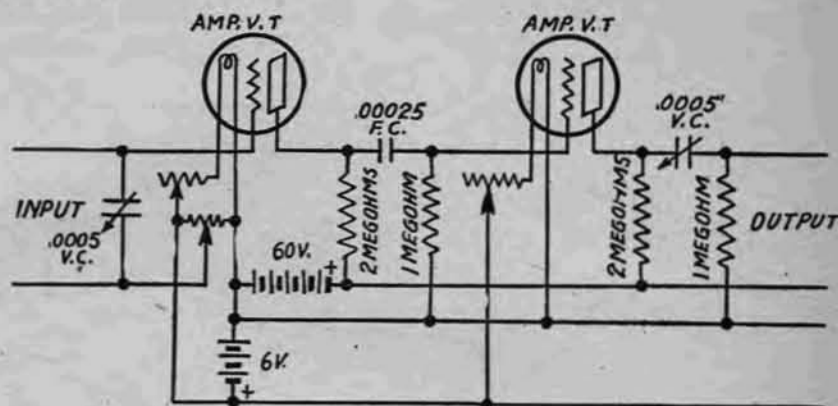


Figure 6

which has heretofore been impractical with audio frequency. The loop because of its directional properties offers greater advantages of selectivity.

Figure 3 is the typical two stage Radio frequency amplifier using transformers. The potentiometer is connected across the "A" battery in order to permit accurate control of grid potential—one of the important features in Radio frequency amplification. It must be stated, however, that the range of Radio frequency transformers is very limited and requires more than one to cover any considerable wave length range.

Figure 4 is a typical resistance coupled two stage amplifier. This type, although it has a greater natural operating range, does not have the high efficiency of the transformer coupled type. Unfortunately its inefficiency is more marked in wave lengths under one thousand meters.

In Figure 5 the coupling is accomplished through tapped inductances. This permits an increased operating range, and at the same time the two switches can be so designed that more than one stage is adjusted simultaneously.

A new development is the combination coupling by means of an inductance and capacity connected in parallel. This is illustrated in Figure 6. Considerable efficiency for low wave lengths has been claimed for this type of hook-up.

The stages of audio frequency amplification have been illustrated and explained considerably in the past. Figure 7 shows the popular transformer coupled type, while Figure 8 is an impedance coupled circuit. This type of hook-up is called cascade coupling.

### Use of Multiple Cat Whiskers

Some amateurs cannot keep their homemade crystal detector "cat whisker" in place without frequent adjustment. Try using two or three "cat whiskers" instead of one. If each "whisker" is slightly separated from the other a sensitive spot is sure to be touched.

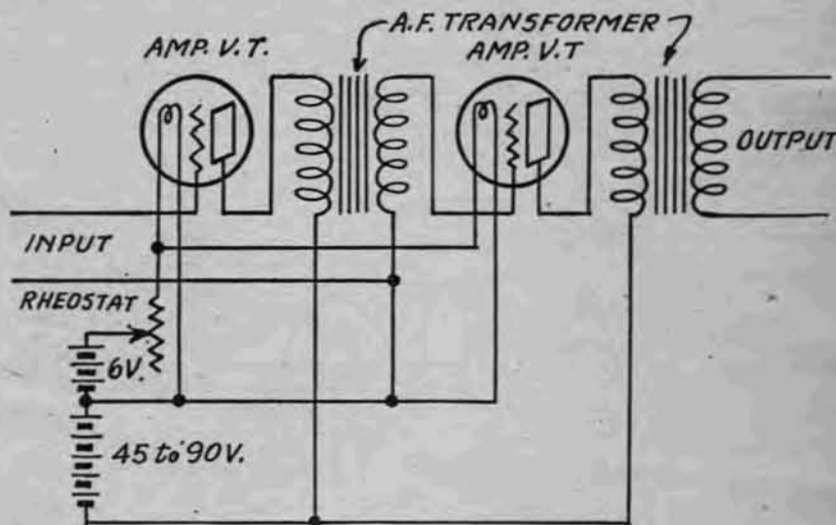


Figure 7

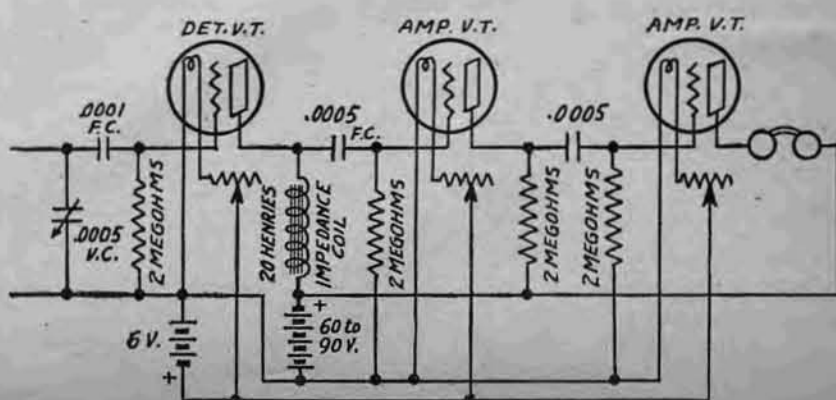
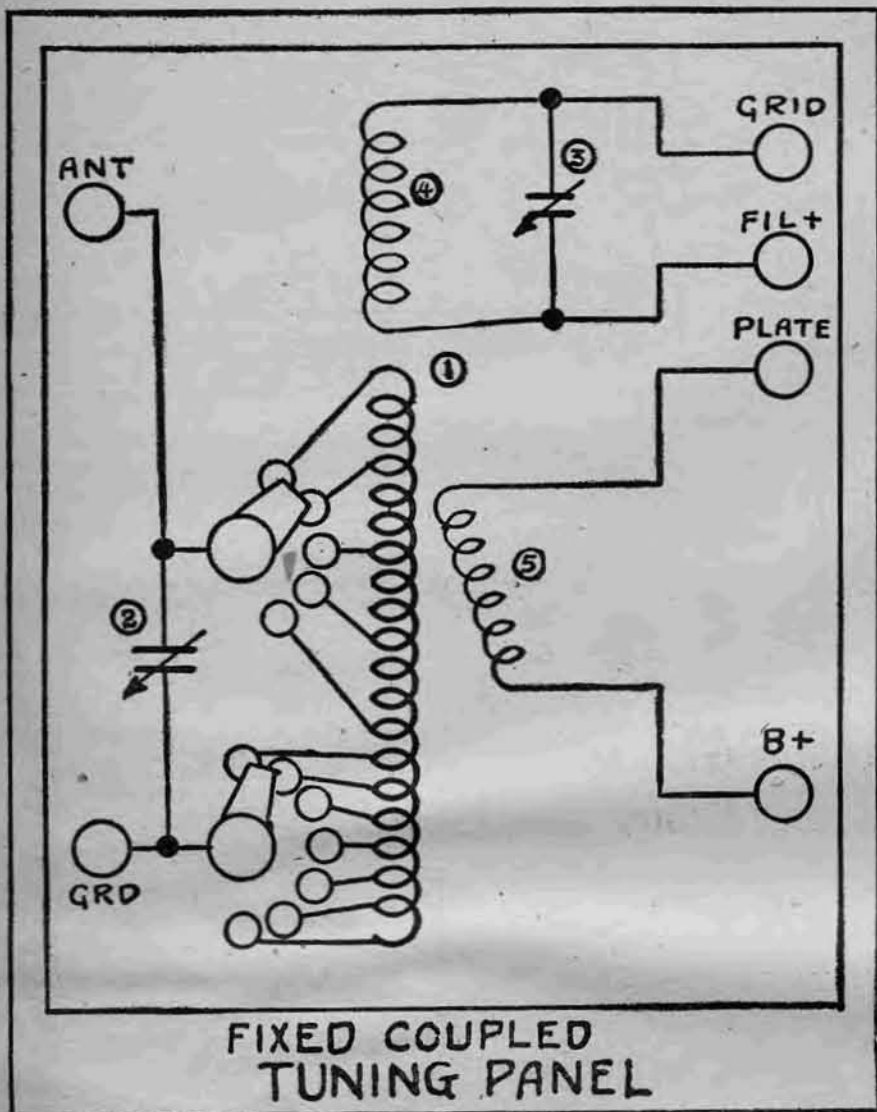


Figure 8

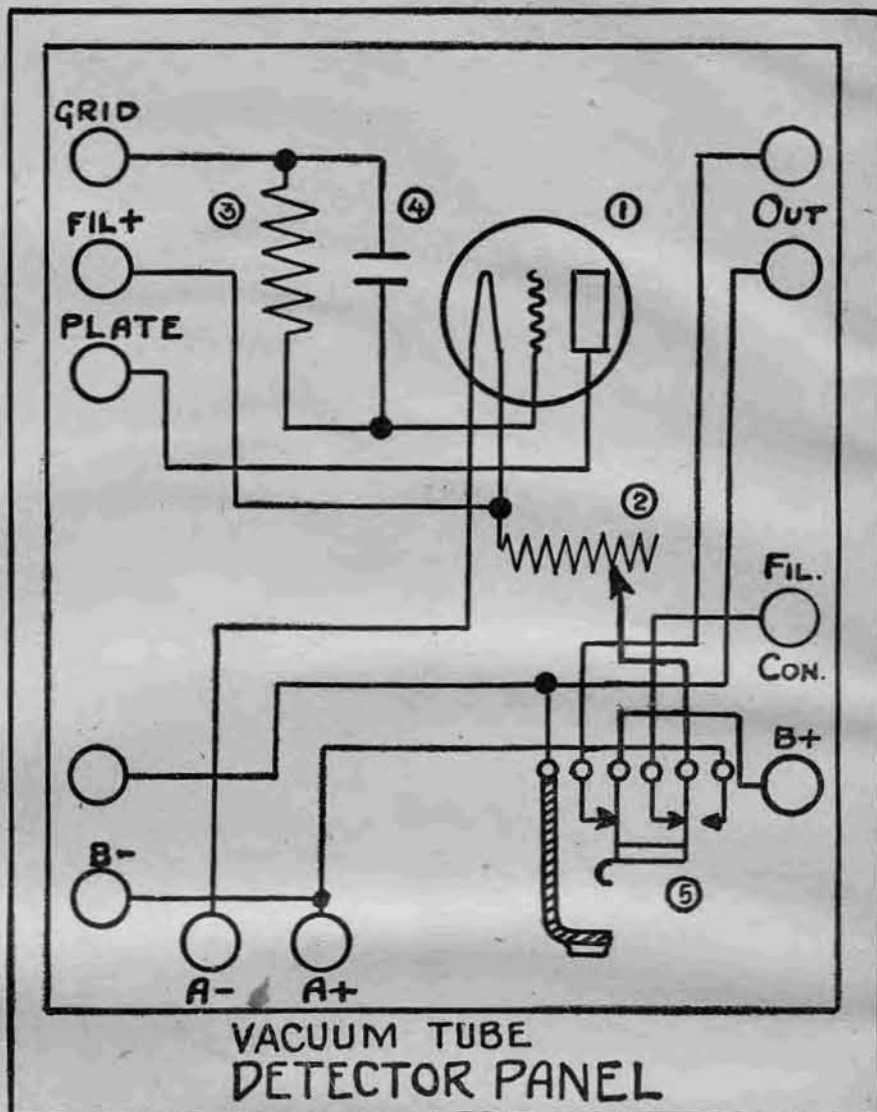
# Panel Units for Your Receiving Sets

By Harry J. Marx



**FIXED COUPLED TUNING PANEL**

S-8



**VACUUM TUBE DETECTOR PANEL**

S-11

**PARTS REQUIRED FOR FIXED COUPLING TUNING PANEL**

- 1 Panel 8"x10"x1/4"
- 6 Binding Posts
- 2 Tapped Switches as Required for Primary Winding
- No. 1—Primary Winding of Fixed Coupled Tuner
- No. 2—Primary Variable Condenser .001 Mfd.
- No. 3—Secondary Variable Condenser .0005 Mfd.
- No. 4—Secondary Coil of Fixed Coupled Tuner
- No. 5—Tickler Coil

The two binding posts on the left-hand side are for aerial and ground connections. The primary coil has two individual tapped switches. For rough adjustment there are five or more turns for each contact and for fine adjustment one turn for every contact. This in conjunction with the primary variable condenser will permit very accurate tuning efficiency. The secondary coil is wound on the same tube as the primary and is in fixed position. The secondary variable condenser by means of the adjustment of capacity, permits variation for tuning the wave length of the secondary circuit. The two binding posts in the upper right-hand corner are for connection to the vacuum tube detector unit, directly to the grid and also to the positive side of the filament battery. The two binding posts below, marked "PLATE" and "B+" are for regeneration and connect the tickler coil in the series between the plate and the "B" battery.

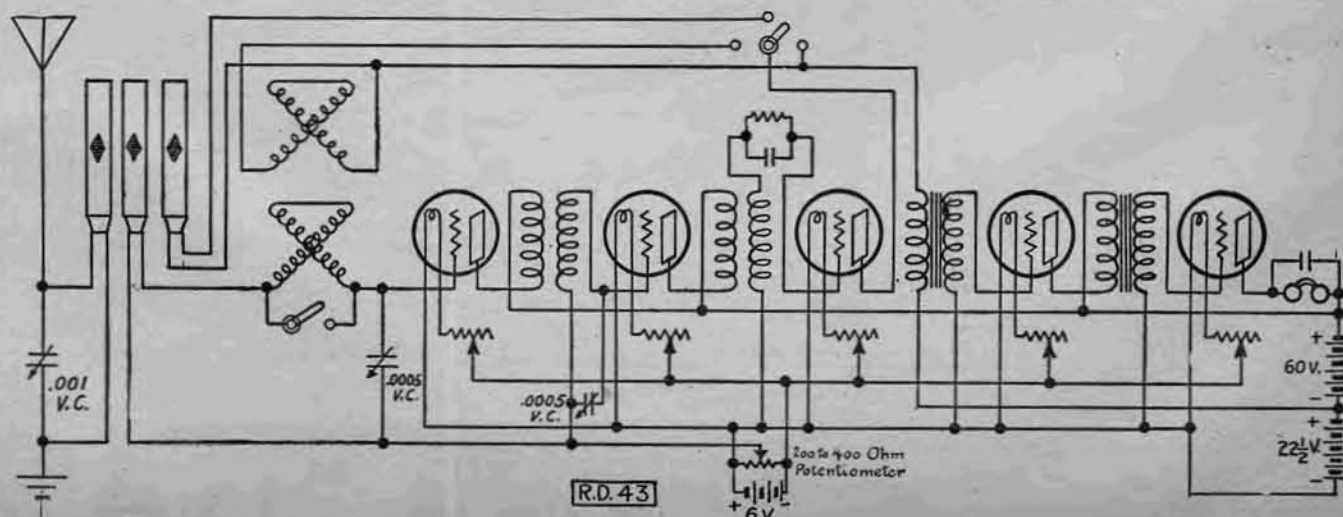
**PARTS REQUIRED FOR VACUUM TUBE DETECTOR PANEL**

- 1 Panel 8"x10"x1/4"
- 11 Binding Posts
- 1 Tube Socket
- No. 1—Detector Vacuum Tube
- No. 2—Filament Rheostat
- No. 3—Grid Leak .5 Megohm
- No. 4—Grid Condenser .00025 Mfd.
- No. 5—Filament Control Jack

The binding post on the left-hand side marked "GRID" is for connection to the grid binding post on any of the tuning panels. Likewise, the one marked "FIL.+" for connection to the filament binding posts on any of the tuning panels. The one marked "PLATE" connects to the plate of the vacuum tube. If the tuning panel is of the regenerative type, a corresponding plate binding post is connected to the detector binding post. If the tuning panel is not regenerative, this binding post is connected to the one directly below it. The binding post marked "B—" is for the negative side of the plate battery, which for the detector panel alone should not be more than 22 1/2 volts. The lower binding post marked "B+" on the right-hand side of the panel is for the positive terminal of the plate battery. The two binding posts at the bottom marked "A—" and "A+" are for respective terminals of the six volt "A" battery. The three binding posts marked "OUT" and "FIL. CON." are for connection to amplifier panels.

**HOOK-UP RD-43**

The hook-up shown is intended as a combination set that will offer to a certain extent the advantages of both the vario-couplers and variometers and honeycomb coils as tuning units. The primary and secondary are two honeycomb coils. A grid variometer is added but can be omitted by closing the switch across its terminals. The set can be non-regenerative by turning the top switch to the right contact point, thus cutting out both plate variometer and the tickler coil. If the switch is on the center contact the honeycomb tickler coil is in series in the plate circuit. If the switch is on the left contact, the plate variometer is connected in series. In this way advantage is taken of both the types although the total effect is not entirely like the coupler tuner as commonly used. The potentiometer is connected across the "A" battery for regulation of the grid potential in the Radio frequency amplifiers. The variable condenser is con-



ected across the secondary of the first secondary circuit. Likewise a variable honeycomb coil permitting more accurate transformer for critical adjustment of the condenser is shunted across the secondary tuning adjustment.

# Questions and Answers

## List of Broadcast Stations

(636) GEL  
I heard station KLZ very clearly last Thursday evening. I find that it is listed as Fitzsimmons Hospital in Denver, Colo. The same station was also heard by another fellow here also. Can you tell me where I can get a list of broadcasting stations?

A.—KLZ is Reynolds Radio Company, Denver, Colo. DD5 is Fitzsimmons Hospital. Get RADIO DIGEST every week for the most complete list of broadcast stations. You will find it up to the minute and accurate.

## One Step Amplifier

(304) RDV  
I wish you would send me a "hook-up" for the following: I have a Variocoupler and want to use the inside coil as a tickler with a one step Amplifier and Detector tube.

A.—Diagram 2 and A 304 is shown.

## Variocoupler and Two Variometer Set

(335) CHC  
I intend to have a receiving set consisting of one variocoupler, two variometers, a 43-plate variable condenser, a detector tube with vernier rheostat, and two steps of audio frequency amplification. My aerial consists of one wire, seventy-five feet long, with a twenty-five foot lead in, running northeast and southwest. The dead end is fifty-five feet high and lead-in end is forty feet. My ground wire runs seventy-five feet to a water pipe.

1. What is the best way to connect up my set? I want my detector tube in the tuner cabinet and my two-step amplifier in a separate cabinet, receivers to be connected in with jacks and plugs.

2. Is it more efficient to shunt my variable condenser across the primary of the variocoupler, or place it in series with the antenna?

3. Could I use variable condensers of rotating plate type as grid condensers, and would my set be more selective by doing so?

4. If the answer to above question is affirmative, what capacity condensers would be the better? How many ohms should the leak be in conjunction with variable grid condensers?

5. What capacity phone condenser would recommend? I am planning to use Baldwin Type C unit in a loud speaker.

6. How many taps are there on the Baldwin variocoupler? Would I need two control switches to vary inductance?

7. With the above set, using your connections, with my antenna and ground, what would be my maximum and minimum variations of wave length?

8. What broadcasting stations should I hear and what would be my range?

9. Can I better my receiving set in any way by any other instruments?

10. If I am unable to receive NAA what means should I use to load my set to the required wave length and how and where should such inductance be inserted?

A.—1. Series of that type started with the 13th issue.

2. If you have a low natural wave length in your antenna shunt the condenser across the coil, otherwise in series.

3. Yes, but not more than 11 plates are necessary (0025 mfd.).

4. 0.25 to 1.5 megohms.

5. .001 mfd.

6. Don't know. Not necessarily.

7. See page 13, issues 9 and 10.

8. 200-mile range.

9. Yes, with Radio frequency amplification. See issue 12, page 13.

10. See page 13, issues 9 and 10. Answer to Question 7 in series.

## Soldering

(714) HK  
1. Is it necessary to solder the wires to the lugs which are on a ground switch or can you just twist the wire around the bolt and tighten the nut? I have tried five times to solder in the lug but found it unsatisfactory. A little pull or twist and the wire will come right out. I have an outdoor aerial.

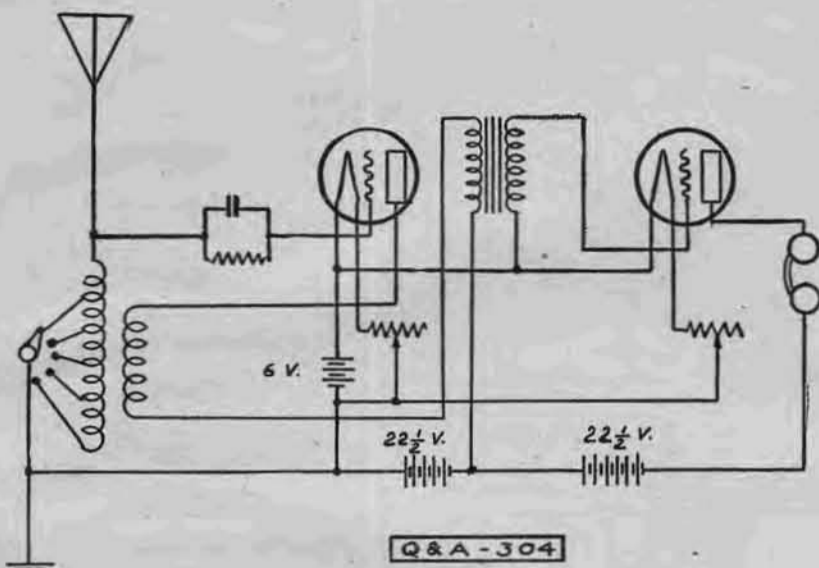
2. Some say you should use No. 4 stranded rubber covered wire from your lightning switch to the ground. I have No. 4 rubber covered wire not stranded. Is it satisfactory or not? I have my Radio set rigged up and all connections made except the ones to the lightning switch.

A.—1. The wires should be soldered to the ground switch lugs. I believe your trouble is due to the fact that you are not making a good job of the soldering. Be sure that both wire and lug are properly scraped, cleaned and tinned before attempting to solder the wire on the lug. The soldering iron should be hot enough to allow sufficient solder to flow and thus make a satisfactory joint.

2. The lightning switch ground wire need not be stranded. The wire you have is satisfactory and according to the Fire Underwriter regulations.

## Making Loud Speaker

(344) KA  
Will you kindly answer my questions? Can a Magnavox be made at home? If it can be made at home, will you please send me instructions for making one? Will you please send me the diagram sketch of the inside of a Magnavox?



A.—Not very easily. Plans and sketches are not available.

## Can't Hear KDKA

(329) ACB  
I am a reader of RADIO DIGEST ILLUSTRATED and would like to have your Radio Department tell me what my trouble is. Am enclosing a diagram of my hook up. I would like to hear the music sent out by station KDKA at East Pittsburgh about 90 miles away but can't hear anything.

A.—Try shunting your variable condenser across your tuning coil. You ought to get KDKA. Of course, due to lack of information about your tuning coil, it is hard to state anything definite.

## Standard Sets

(341) AJA  
Would you please be so kind as to give me the inside hook-up of the Telmaco Type T.R.-5? I haven't seen any such sets around this vicinity as yet, but as I am doing a lot of fixing would like to know the different hook-ups. Would you please tell me how far such a set is able to receive, and oblige?

A.—We cannot give details of hook-ups of the internal circuits of any of the standard type receiving sets shown on the diagram pages. Range is about 200 miles for phone.

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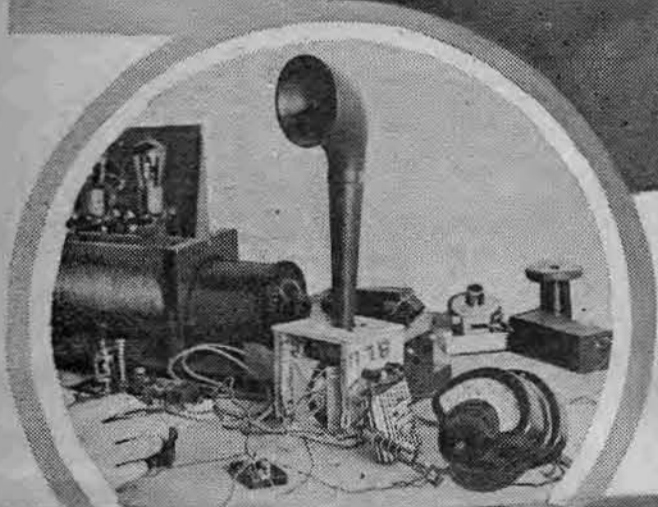
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# Radio

## Illustrated

Young Jackie Coogan, movie star, obtained this Radio receiving set by selling subscriptions to a local newspaper. All of the studio help in sight contributed to the purchase price of this set through the buying of subscriptions. No movie actor should be without a receiving set, so Jackie says.

© INT.



It is considered a crystal receiving set is not good for a loud speaker, but here is one that works.

© K. & H.

The very youngest of the Radio fraternity. The youngster, Le Roy Allain, Jr., takes great interest in the Radiophone.



Monsieur Kanony, baritone, broadcasts as if his hearers could see him.

© KEYSTONE

