

Easy Hook-Ups to Test Out

September 23

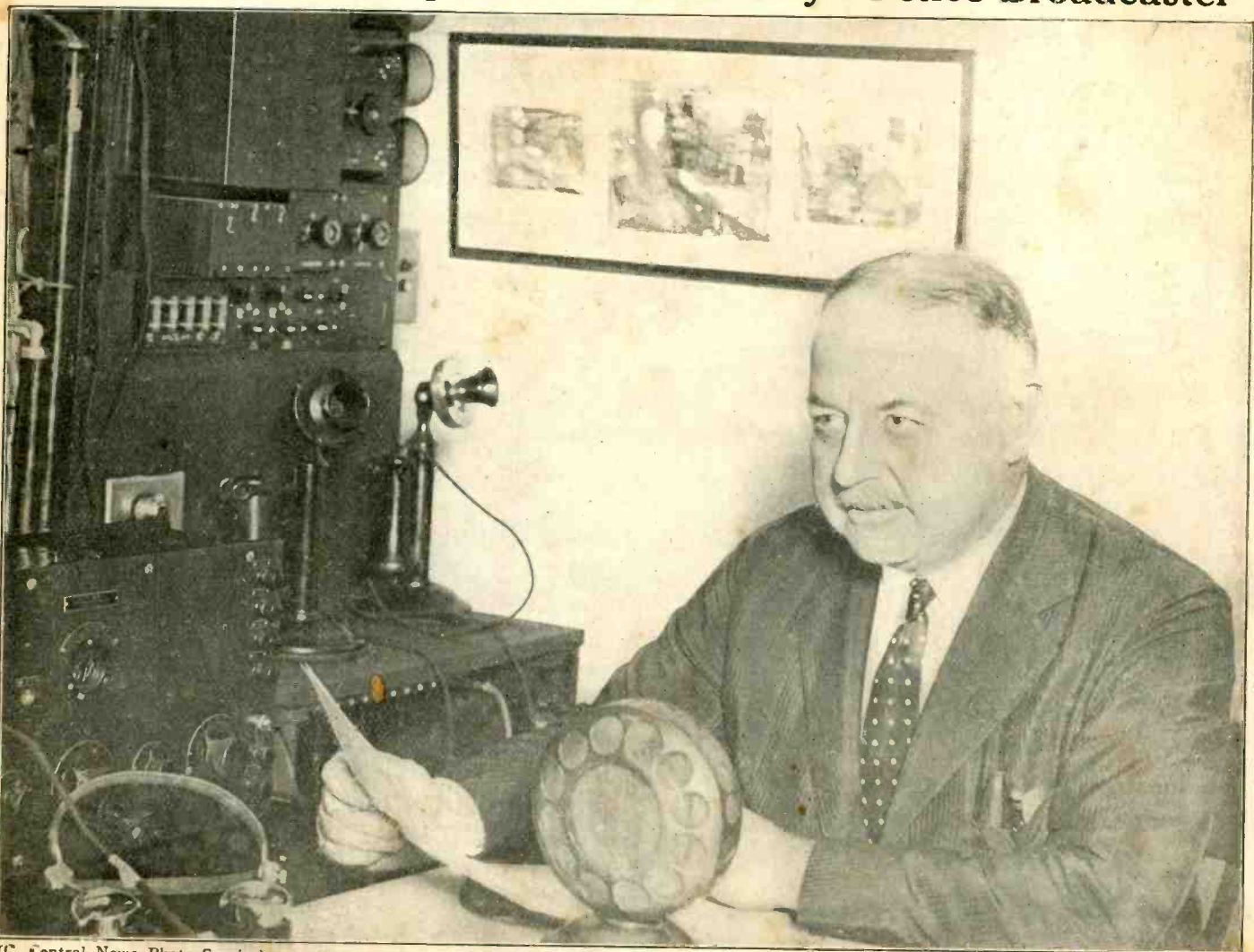
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52 Numbers

RADIO WORLD

I L L U S T R A T E D
P U B L I S H E D E V E R Y S E V E N D A Y S

Inspector Faurot Opens New York City's Police Broadcaster



(C. Central News Photo Service)

New York Police Department's First Radio Telephone Broadcasting Station, Inspector Faurot in Charge. (See Complete Story, Page 6)

COMPLETE TABLE OF RADIO SYMBOLS. See Page 5

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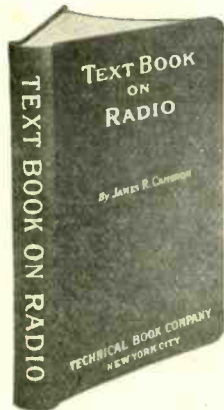
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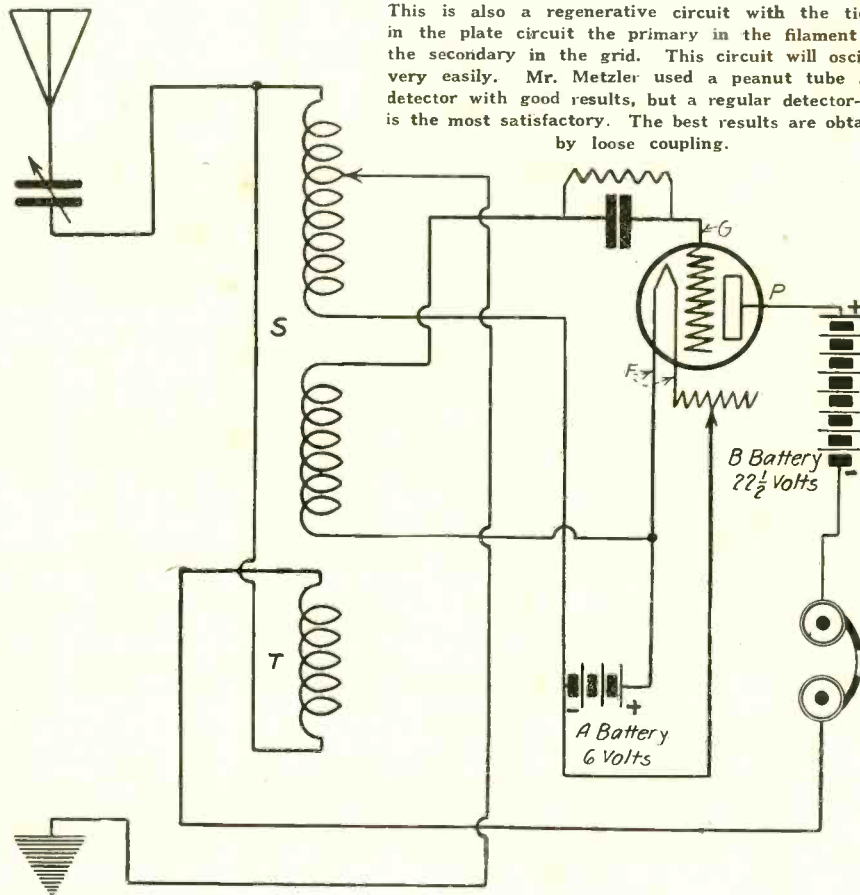
New V-T Hook-up Worth Testing Out

FELLOW amateurs! If you like to experiment with different circuits, try this one and feel a sense of satisfaction creep over you when you get to the point where you are ready to turn the rheostat knob to light the filament.

The accompanying sketch explains itself. There is but one thing I wish to say regarding it. Try the hook-up as the sketch shows, then, if you care to, go further.

Take the wire from the end of the tickler coil that connects with the aerial and connect it on the top switch of the primary coil. In this circuit, I use a loose coupler, and for the tickler, I use a coil which will fit snugly inside the secondary coil so it will slide in and out as does the secondary. Be sure that all coils are wound in the same direction. I have my primary wound with about 160 turns of No. 22 S-C-C wire tapped every 10 turns for the first 60 turns, then every 20 turns. The secondary has a like number of turns and the same size of wire, but is not tapped. The tickler has No. 24 wire and about 110 turns, and is not tapped. You will find the tickler coil in this circuit very sensitive and affording sharp tuning. I have never been bothered with a spark station when using this outfit.

By P. F. Metzler



This is also a regenerative circuit with the tickler in the plate circuit the primary in the filament and the secondary in the grid. This circuit will oscillate very easily. Mr. Metzler used a peanut tube as a detector with good results, but a regular detector-tube is the most satisfactory. The best results are obtained by loose coupling.

Latest Important Radio News of the Week

Two new radio stations will be erected in Manitoba, Canada, for the purpose of facilitating forest-fire control.

* * *

"The Valiant," a one-act play by Robert Middlemass, has been chosen by Joseph Santley for his experiment of broadcasting a drama by radio on Sunday evening, September 24, Mr. Santley will have the assistance of Ivy Sawyer. The event will be held under the auspices of the Equity Players, Inc.

* * *

Clerks in all offices of the Postal-Telegraph Cable Company are authorized to accept, for wireless transmission, all messages marked "via radio."

* * *

Arrangements are being made by the Crosley Manufacturing Company, Cincinnati, operators of the radio station WLW, to broadcast church services every Sunday morning.

* * *

The bid of the Western Electric Company to build the broadcasting station for New York City, will be considered at the next meeting of the Board of Estimate. The Western Electric bid was for \$24,500.

A vacuum tube capable of supplying 100,000 watts, or 200 times the power required for the ordinary radio broadcasting station of 100-mile range, has been developed in the Bell Telephone system laboratories of the Western Electric Company.

* * *

The efficacy of radio was demonstrated in the West Side Court, New York City, when a call was sent out from the broadcasting station at Police Headquarters by Fingerprint Expert William Beirns. The call was heard by his assistant, William McCue, who maintains a receiving set at his home at Neck Road, Sheepshead Bay. McCue rushed to the Fifty-fourth Street Station for important duty.

* * *

The "Manchuria," of the American Line, left New York equipped with a new radio device intended to guide vessels into and out of the harbor in time of dense fog. A test, made leaving New York harbor, was said to be satisfactory. The device consists of a cable containing seven conductor wires, submerged in the channel from Ambrose Light to the upper bay. Sensitive wires over the sides of the vessel trailed in the water, and were so "tuned" that when the ship was directly over the submerged cable buzzing sounds were registered in a box on the ship's bridge.

New Method for Lighting Filaments

By C. White, Associate A. I. E. E.

THE pleasure we derive from a certain scientific or mechanical device does not altogether depend on the initial cost of the affair, but, rather, on the cost of maintenance. Owners of automobiles attest the veracity of this statement. Therefore, an attempt to reduce the cost of upkeep is certainly a step in the right direction. Radio amateurs have long been waiting for some sort of a device that would remove the trouble and care attending the lighting of filaments of their tubes. Since most houses that are wired for electric lights have a supply of alternating current of sixty-cycles frequency, the main problem has been to adapt such current to the work. Of course, the use of toy transformers to step the voltage down to that recommended for the tubes has been often tried, but the whole method failed because a strong 60-cycle hum was heard in the phones. The problem then became one of getting rid of this hum to the best

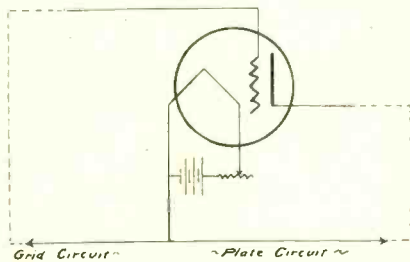


Fig. 1. Schematic diagram of the general hook-up of a vacuum-tube in a dissecting circuit. Drawn by C. White.

economical advantage. Filters are satisfactory scientifically, but, owing to their cost, are not economical in comparison with the old storage A-battery.

It was not until very recently that Dr. P. D. Lowell, of the United States Bureau of Standards, developed a thoroughly sound method. In this article, I shall endeavor to explain how his method may be adapted readily to any A battery circuit.

In Figure 1, the general hook-up of a vacuum tube in a detecting circuit is illustrated. For the sake of simplicity, the details of the tuning and plate circuits are represented by dotted lines. Now, the average amateur who uses bulbs has this type of wiring, and in order to change over to the new method, he must make connections similar to those shown in Figure 2.

From these two illustrations he can get the general idea of the alterations that must be made. First, the 110-volts A-C supply must be stepped down by a small toy-transformer with variable secondary voltage taps, such as 4 volts, 6 volts, 8 volts, and so on. These transformers may be purchased at any

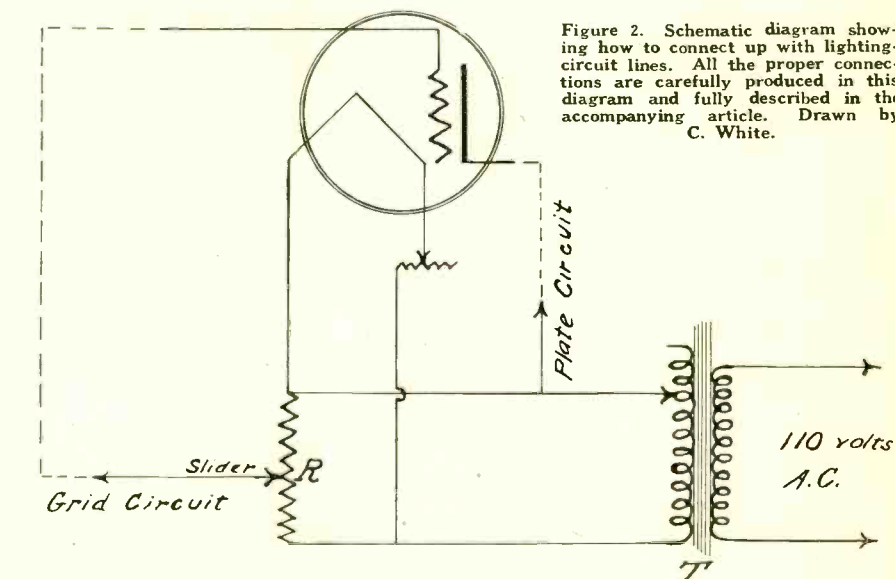


Figure 2. Schematic diagram showing how to connect up with lighting-circuit lines. All the proper connections are carefully produced in this diagram and fully described in the accompanying article. Drawn by C. White.

electrical or toy store. If the novice so desires he can buy a bell-ringing transformer having a 6-volt secondary tap only; but under such circumstances it is impossible to alter the voltage applied to the tube in case the supply voltage should rise or fall. The resistance, R, should have a value ranging from 200 to 220 ohms with a slider in the middle.

It is not an easy matter, however, to obtain such an unit complete, but the amateur can readily make up this unit separately. From any electrical supply-store, he can purchase two resistance units of 100 ohms each and a porcelain-base rheostat with a slider having a resistance of 10 ohms. The 100-ohms resistances may be purchased, mounted in standard Edison screw-bases and must be mounted in a standard incandescent-lamp socket. The three resistances are connected in series with the rheostat, in the middle and the two 100-ohm units on the outside. Therefore, by moving the slider a variation of 10 ohms may be made in the balancing point. If another tube is

to be employed, then it is necessary to use another unit, R. In fact, the number of tubes and the number of balancing resistances must be the same. All the tubes may be supplied from one transformer, T, so long as the transformer-current rating is not exceeded.

If this method is employed, it is recommended that a grid leak of two megohms and a condenser of 0.002 mfd., is used instead of the size at present on the receiver. The slider is to be adjusted until the minimum 60-cycle hum is heard in the phones. The brilliancy of the filament may be adjusted by the taps on the transformer and, finally, by the usual filament-control rheostat. Although there is always present a 60-cycle hum, it is possible to so adjust the set that this hum is almost inaudible. Small variations in the house-supply voltage will not materially alter the proper functioning of the apparatus.

In conclusion, I would like to call attention to the fact that this method of lighting filaments is not only easy to install but exceedingly efficient and economical in operation. There is no heavy, soiled storage battery to be carried and recharged; there is no charging set to be purchased; and, last but not least, your outfit is ready for operation at any time current supply is in your house, no waiting until the battery is charged or other such delays. Then again, the cost of the whole affair will not exceed the cost of one good storage A battery. Since the cost of operation is mainly dependent on the maintenance of the A battery, because the B battery needs practically no attention and lasts a long while, this method will be found to almost make the large vacuum-tube sets as easy from the upkeep point as a crystal detector.

Call Letters of Air-Mail Radio Stations

FOR the information of radio users the United States Postoffice Department has announced the call letters of all the radio stations used for air-mail postoffice business and broadcasting. The stations and their letters are as follows:

Washington, WWX Hazelhurst; WWU; Bellefonte, WWQ; Cleveland, NRH; Chicago, NAJ; Iowa City, KDTS; Bryan, Ohio, KDEL; Omaha, KDEF; North Platte, KDHM; Cheyenne, KDEG; Rock Springs, KDHN; Salt Lake, KDEH; Elko, KDEJ; Reno, KDEK; San Francisco, NPG.

The department states that amateurs can receive market and weather reports sent out from the Postoffice Department stations.

Complete Table of Symbols Used in Radio Reception and Transmission

AERIAL	VARIOMETER	GROUND	VACUUM TUBE	COIL OF INDUCTANCE
2-CIRCUIT JACK	VARIABLE COIL	FIXED CONDENSER	VARIABLE CONDENSER	CONDENSER WITH GRID LEAK
PHONES	CRYSTAL DETECTOR	RHEOSTAT	AUDIO AMPLIFYING TRANSFORMER	JOINED WIRES
CROSSED WIRES	AIR CORE TRANSF.	B BATTERY	A BATTERY	VARIOCOUPLER

Here is a table of radio symbols that every amateur will want to keep. As a ready reference it will be well to have this at your elbow. The experimenter will need it when he is wiring up any part of his set. The man who studies hook-ups will find it invaluable. These are all the symbols used in every phase of radiotelegraphy and radiotelephony. They have been compiled with great care by the Technical Editor of Radio World. The drawings are by S. Newman.

THE ordinary form of radio-frequency amplification by means of the cascade system is still in an experimental stage, so far as short waves are concerned. Experts have refused consistently to advise its installation, except for the purposes of experimentation. If the amateur desires to use it for experimental work only, it is perfectly all right, but if he wishes to use it in order to give steady performance with broadcast entertainment results will be as well as might be expected.

* * *

Whenever in reception over a considerable distance one observes a variation in the intensity of the signals it is most likely due to so-called "fading," caused by some obstruction to the traveling waves somewhere between the two stations, and

Hints for Fans

not to any fault of the transmitting station itself. These effects are much more frequent in the summer than in the winter season, presumably because of the greater influence of the sun on the earth and its atmosphere during that season. The transoceanic radio stations must be equipped with high-power apparatus in order to work through bad periods, although at certain times less power may be used, as is evidenced by the successful transatlantic transmission by low power stations during the winter months.

* * *

In all radio-frequency amplifying circuits it is absolutely necessary that a potentiometer be used across

the A battery which lights the filaments of the tubes. This stabilizes the entire circuit and enables the operator to put the proper amount of negative on the grids of the radio-frequency tubes. This function will be further assisted by placing a bypass condenser of at least .001 mfd. capacity across the grid lead and negative side of the potentiometer. One potentiometer and condenser may be used for all radio-frequency amplifying stages used in such a set. While it is possible to use a regenerative circuit in connection with radio-frequency amplification, this is not advised because it only adds to the difficulty of adjusting and balancing the receiver. It must not be forgotten that on short waves the phenomenon of regeneration is actually present in radio-frequency amplification.

First Police-Department Broadcaster for New York City

By Peter Gray

ON Saturday of last week, the Department of Greater New York began the operation of a radio-broadcasting station of the most modern type, to cover a radius of 30,000 square miles and to be used entirely in police routine. Within a few months, police boats and police-inspection headquarters will be equipped with receiving sets and New York City will be the most up-to-date radio-equipped city in the world so far as police-department work is concerned. Through Herbert R. Hoover, Secretary of Commerce, special permission has been granted to New York City to operate on a special wave-length of 400 meters—a band not allocated to any other municipality. This was done so there will be as little interference as possible in the police broadcasting.

The apparatus is of the same general type as that by which communication was carried on early this year between Deal Beach, N. J., and the steamer "America," when it was over 500 miles from land. The new New

York police broadcaster was used for the first time Tuesday, September 12, to broadcast the speeches given at the organization meeting of the National Police Conference at the Chamber of Commerce, and on Thursday night it "shot" into the ether the speeches of the annual National Police Conference dinner at the Waldorf-Astoria.

Joseph A. Faurot, Deputy Commissioner in charge of the New York police executive departments says:

"If what Mr. Evans, the Western Electric engineer who is instructing our operators in the use of the equipment, states is true, the Police Department will be able, without any difficulty, to cover an area of at least thirty thousand square miles. This should prove a great advantage in running down stolen automobiles, locating missing persons, spreading alarms, and in all other work where secrecy is not an essential factor.

Every amateur receiving station in a radius of at least one hundred miles from the city will become a police outpost, enabling us to spread emergency information at a much quicker rate than is now possible. As our men gain more experience with the transmissions of radiotelephonic information, it is very likely that we may even use the ether to spread confidential reports. It would not be very difficult to prepare a special code for such purposes."

M. R. Brennan, Superintendent of the Police Telegraph Division, was mainly influential in clearing the way for the installation of the station.

Secretary Hoover, who recalled how the New York department was the first to make a success of radiotelegraphy in police work some years ago, was quick to realize New York City's position and authorized a 400-meter wave-length. Later, if it becomes necessary for the Department of Commerce to allow wider scope to any of the present users of the 360-meter wave-length, it has been agreed that the New York City Police Department may widen its range to 500 meters.

A vest-pocket telephone apparatus which can be quickly attached to the nearest telephone wire, putting the possessor in immediate communication with headquarters, is being demonstrated to Police Commissioner Enright by its inventor, William Wallace MacFarlane, of Elkins Park, Pa., president of the American Moving Train Telephone Company. He hopes to have every policeman equipped with one of his instruments, claiming this can be done at a cost of 75 cents each and will render unnecessary the present police telephone boxes.

When other large cities adopt radio for administrative purposes, it will be possible to establish a network of broadcasting and receiving stations through which a national alarm may be given instantaneously.



(C. Central News Photo Service)

This is a 500-watt radio broadcasting-set, consisting of two 250-watt tubes which operate on 1600-volts plate-circuit, has three-wire microphone transmitter and specially designed three-stage speech amplifier for converting speech into electric current for use in the radio transmitter. To furnish the necessary voltages, a three-unit motor-generator set and battery are placed in a separate power room. The equipment also includes a radio receiver consisting of two stages of radio-frequency amplification, a detector and one-stage of speech-frequency amplification. The antenna is of the T type, 92 feet long and 75 feet above the roof. A special panel is provided for controlling the voltages and currents used by the radio transmitter. Six meters are provided for indicating the antenna current oscillator and modulator plate-current, grid current, filament, and plate voltages. The radio transmitter is controlled by two dials, one marked "Frequency" for controlling the wave length and the other marked "Oscillator Adjustment" for controlling the oscillator plate-currents. Fifth Deputy Police Commissioner Joseph A. Faurot is shown in the photograph on our front cover broadcasting the first speech to be sent over the new set.

Four Soldering Points

THERE are four points to be remembered when making up a soldered joint. First, the surface of the parts that are being joined should be cleaned and polished; second, the surfaces should be treated with a soldering flux; third, the temperature of the soldering iron should be kept at the right heat; fourth, the metal parts should be heated with the iron and just enough solder applied to cover the parts neatly.

New Water-Cooled Vacuum Tube Develops 100 Kilowatts

WASHINGTON, D. C.—A supervacuum transmitting-tube, which brings this country again to the fore in radio development, has just been perfected by the Bell System Research Laboratories. It is a 100-kilowatt water-cooled tube and takes precedence over all the vacuum tubes perfected during the past few years which depended on thermal radiation and were limited, therefore, in output to from 1 to 5 kilowatts, when used as an oscillator. Engineers of the American Telephone and Telegraph Company have even surpassed the tube recently brought out by Professor Irving Langmuir of the General Electric Company, capable of delivering 20 kilowatts of high-frequency current and also water-cooled.

Although the A. T. & T. officials will make no predictions as to the future uses or practical applications of the new tube—the largest in the world—they should now be able to transmit code messages around the world from WBAT with two such tubes in parallel, and it is probable that with two or four tubes the human voice could be sent across the Atlantic Ocean. Ten of the Langmuir tubes in parallel, it has been estimated, would be required for transoceanic communication.

Besides the high power of the tube, great economies in eliminating equipment, saving both space and cost, are promised when the hundred-kilowatt tubes become commercialized. Uninterrupted long-distance communication is assured, in the near future, due chiefly to the method of cooling this high-powered tube.

Development of Transmitters

The art of radio transmission has developed from spark sets to arc sets, thence to alternators recently perfected, finally to tubes which are daily in process of development and perfection. Some of the larger broadcasting stations employ two or more tubes of the 250-watt type and it is a common occurrence for their broadcasts of music and voice to be heard a thousand miles. The voice does not carry as well as telegraph signals and, therefore, for telegraph work two of the new 100-kilowatt tubes, 200 times the strength of the 250-watt tubes, and five times the size of the Langmuir tubes, should carry half way round the world which, it is believed, is the ultimate need for transmission.

"The development of wireless telephone and the use of continuous-wave transmission in wireless telegraphy have led to the general adoption of the

By Carl H. Butman

vacuum tube as the generator of high frequency currents in low-power installations," says Dr. W. Wilson in describing the recently made tubes. The ordinary vacuum tube is unsuited for handling large amounts of power, he points out, and, to-day, at large radio stations where the plants are rated in hundreds of kilowatts, either the arc or the high-frequency alternator is used. The development of radiotelephony called for more powerful tubes in proportion to the power of the big stations, and for years the research men of the Bell System have been working on the problem. When Arlington Radio Station, NAA, first bridged the Atlantic and Pacific Oceans with a spoken message, some time ago, 300 tubes of 25 watts each were used in parallel—which was difficult of operation.

Need for Kilowatt Tubes

Kilowatt tubes were needed in place of tubes measured in watts. The multiple of 1,000 was a stumbling block as were other phases of the problem. The elimination of the heat developed was the big problem; but the idea of cooling the anode by the passage of water—somewhat as the barrel of a machine gun is cooled by a water jacket—was finally hit upon. Dr. E. R. Stoekle and Dr. O. E. Buckley, with assistants, finally developed an experimental tube cooled by water which developed 10 kilowatts. They were later aided by W. G. Housekeeper and Dr. M. J. Kelly, the former working on the

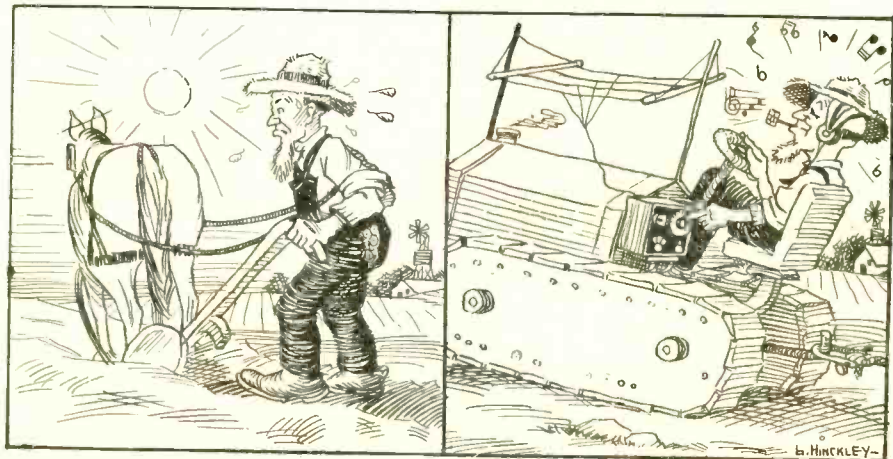
mechanical structure and the latter determining the electrical design and process of tube exhaust. It was Mr. Housekeeper who developed the vacuum seal for closing the metallic and glass portions of the tube, so that it would withstand repeated heating and cooling varying from the cold of liquid air to a temperature of 350 degrees, without cracking or breaking the vacuum. This he did, perfecting the ribbon, disc, and tube seals for joining copper and glass by a sort of welding process.

The Big Tube Weighs Ten Pounds

The big tube is a little less than 2 feet in length and weighs only 10 pounds, yet it is capable of developing 100 kilowatts high-frequency energy, applicable to both radiotelegraphy and radiotelephony. "These 100-kilowatt tubes," an official of the telephone company states, "by no means represent the largest tube made possible by the present development. There is no doubt that if the demand should occur for tubes capable of handling much larger amounts of power, they could be constructed along the same lines."

The anode, which is made of a piece of seamless copper tubing closed by a copper disc welded into the end, is 14 inches long and 3.5 inches in diameter. The filament is of tungsten and is .06 inch in diameter and 63.5 inches long. The current required to heat it is 91 amperes and the power consumed in it 6 kilowatts. The filament leads are of copper rod 1/8 inch in diameter and are sealed through 1-inch copper-disc seals. The grid is of molybdenum and is wound around three molybdenum supports.

Farm Life Isn't What It Used To Be



AS IT WAS: "Gaddap, Dynamite! Cuss your measly hide."

AS IT IS: KYZ is sending some fox-trot to-day, by heck!"

(Cartoon by L. B. Hinckley)

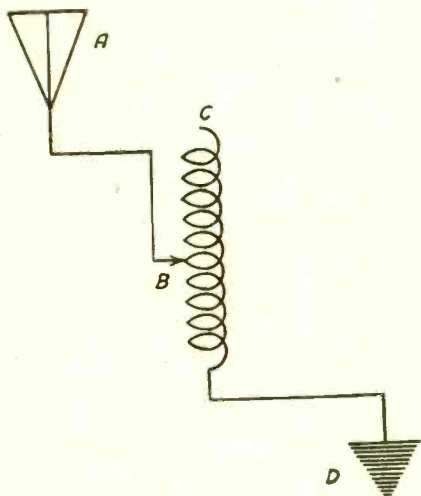
The Radio Primer

A Weekly A. B. C. of Radio for the Beginner, in which Elementary Facts and Principles Are Fully and Tersely Explained and all Words and Terms Used by Amateurs and Experts Defined

By Edward Linwood

HOW can the primary of a vario-coupler be determined in a diagram. Should this be drawn the same way in all diagrams?

The primary of a vario-coupler, loose coupler, or tuning coil is always determined and drawn in all circuits according to the accompanying sche-



Schematic design of aerial, primary coil and connection.

matic design. A represents the aerial, and B the variable connection from aerial to one side of the primary coil. C is the primary coil and D the connection from the other side of primary coil to the ground.

How are the secondary windings of power transformers connected?

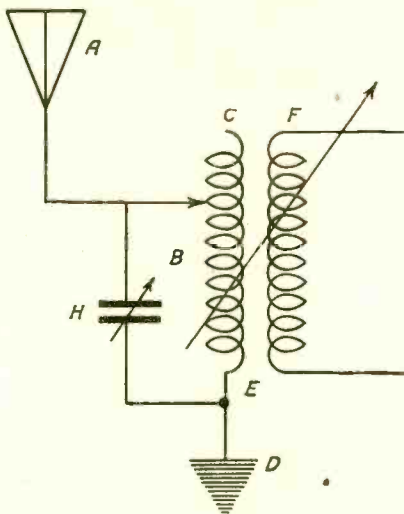
The secondary windings are connected in series with a terminal at the junction so that the two rectifying tubes may be used simultaneously thereby utilizing both halves of the alternating current and voltage waves.

What are the use of tertiary windings?

Tertiary windings are supplied for lighting the filaments, thereby eliminating batteries.

What is the symbol of a vario-coupler, or loose coupler, and how does it look in a circuit or diagram?

The symbol of a vario-coupler, or loose coupler, is the sketch shown above. A vario-coupler and a loose coupler have two coils, known as primary and secondary. One coil of the vario-coupler, the secondary, is mounted on a shaft and placed inside



Schematic diagram of vario-coupler, or loose coupler, in a circuit.

of the primary at an inductive relation to the primary. Means are provided so the secondary may be rotated in order to increase or decrease the mutual induction between the two coils. The loose coupler is of the same principle and is made so the secondary may slide in and out of the primary. The letter F in this diagram represents the secondary of the coupler. E indicates the coupling between the two coils. The arrow proves that the coupler is variable. Whenever this symbol is given in a diagram, it means that it represents the primary and secondary of a vario-coupler or loose coupler.

Can continuous-wave power transformers be used for operation on alternating current and how are they made?

The development of the vacuum tube as an amplifier and rectifier made it possible for anyone having an antennae to transmit signals and the human voice by means of continuous waves of radio frequency. Formerly the old source of energy was a high-voltage direct-current generator, or battery; but by employing rectifying vacuum tubes, chokes, condensers, and a properly designed transformer, it is now possible to use the ordinary lighting-circuit alternating-current supply thus affecting a considerable saving in the cost of high voltage direct-current supply. These transformers are designed to operate on 110 volts AC, 60 cycle-source on the primary, and have two

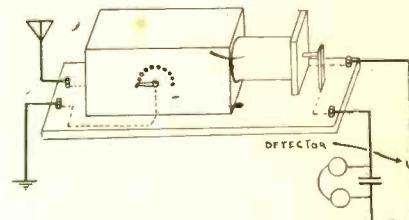
secondary windings of 550 volts each for the 200-watt size, 325 volts for the 50-watt size, and two tertiary windings of 12 volts each, one for rectifying tube-filament heating, the other for power-tube filament heating.

Does the single-slide tuning coil differ in any way from the loose coupler or vario-coupler?

There is a great difference between a single-slide tuning coil and the coupler. This is the difference: With the vario-coupler, or loose coupler, we have a primary and secondary winding whereas, with the single-slide tuning coil we merely have one coil known as the primary. It is called, frequently, a single circuit. With the single-circuit, or single-slide tuning coil, we cannot produce good tuning-qualities, as we have no means for eliminating, or decreasing, the mutual induction. We also have no coupling. With the vario-coupler, or loose coupler, we are able to have the advantage of both controlling mutual induction and eliminating interference. This is accomplished by coupling.

What side of a loose coupler is the primary wiring? What is the secondary? Can this be identified easily?

The primary winding of a loose coupler comprises the larger coil of the two. The smaller coil which can be pulled out of the larger is the sec-



Schematic diagram of complete crystal set employing a loose coupler.

ondary. A schematic diagram is published herewith of a complete crystal set employing a loose coupler. It will be seen that the larger coil is the primary and the smaller the secondary. This is one method of identifying a loose coupler.

If you did not get a copy of Radio World No. 1, send us \$6.00 and we will send you this paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

Navy Planes Rely Solely on Radiotelegraphy for Communication

By Washington R. Service

THE United States Navy's development of radio apparatus and equipment for use in service aircraft, has been one of the greatest contributions to the progress of radio communication in the air, even advancing the art of flying itself. Both of these facts, experts in radio and aviation believe, are gradually placing the Naval aircraft of this country in the very fore of flight and aerial telegraphy.

Today the Navy's planes rely solely on radiotelegraphy for communicating with other planes, land stations, or ships, the radiotelephone having been practically discarded by Naval pilots, although still used in the Army Air Service. The marine pilots found that telephone sets were impractical. They were too heavy and had inferior ranges, besides being inaccurate and causing much interference. Formerly, they admit, radiophone communication was very convenient for pilots who were not telegraph operators; but, today, as all Naval aviators are code operators, this advantage is lost. The continuous wave-system, known to require skilled operators, was recently requested by the operating units of the Pacific Fleet Air Squadrons to the exclusion of all other methods.

All Naval scouting planes are equipped with radio transmitters capable of sending messages 400 miles, either while in the air or on the sea. While the Navy is not saying much about them, it is known that better and more powerful radio sets are available, held in reserve, while, for economy, the older stock is being used. Spotting planes, however, are equipped with the latest designed continuous wave sets, which have given satisfactory communication when large numbers of planes in the air were transmitting simultaneously.

May Transmit 300 Miles

Recently developed radio apparatus permits a disabled seaplane on the water to transmit up to 300 miles. Compass bearings sent from a distance of 400 miles have been picked up by planes resting on the surface of the sea.

Pioneer experiments in radio for Naval aircraft began as early as 1911. By 1916, the Naval experts succeeded in interesting commercial wireless manufacturers to the extent that four out of seven bidders built sample airplane sets which would transmit about 100 miles while in flight and weighed

less than 100 pounds. The first step in the development of long-distance radio for aircraft resulted in the ordering of seventy-five sets divided among the four pioneer bidders.

This same year saw the successful development of sound-proof head receivers, enabling the pilot to hear code signals despite the roar of the engine, propeller, and wind. Tests were also made with the radio compass mounted in an airplane and a number of aerial radio-compasses were ordered. When more funds for research were made available during the World War, some of the larger naval planes were radio-equipped and, due to improvements made by the Naval experimenters, planes now communicate with ships 400 miles distant and with other planes up to 150 miles away.

The Navy's Radio Laboratory

Most of the radio development work in the Navy has been done in a small but highly efficient radio laboratory at the Anacostia Naval Air Station, near Washington and close to NOF. There, advanced designs for transmitters and receivers are available when new apparatus is required for service uses. Among the problems now receiving attention is the design and test of radio-

compass equipment for aircraft, capable of receiving bearings up to 1,000 miles. A special low-lying antenna for the big airship field at Lakehurst was recently designed and is now being installed at the future home of the big ZR ships. Some of the work under way is confidential and is reserved for military use only.

Almost all the development work is also of benefit to commercial builders and operators of aircraft. The kite antenna and radio equipment for seaplanes forced down, for example, has great commercial life-saving values. The landing field indicator and piloting cable for aircraft is applicable to inter-city air lines and trans-continental air routes. It gives out an audible signal making it possible for the pilot to keep on a route in darkness or fog, and will have practical application as soon as long-distance aerial routes are established. A short while ago, the aircraft teletype was successfully demonstrated between a seaplane and the Anacostia Laboratory. This scheme has been offered to the world for commercial application.

Such are a few of the radio developments, which, it is believed, are establishing the Naval aircraft of the United States as the best in the world.

Receiving Set for Electric-Light Indoor Aerial

By John Kent

IF you intend to utilize the electric-light power-lines in your home as an aerial—particularly if an outdoor aerial is out of the question—it should not be overlooked that conditions governing the use of a special plug in the socket, for this purpose, are so varied that a description of a receiving set should be of interest.

It is essential that such plugs should be the output of reputable concerns. Care should be taken that the condensers in the plugs will withstand any voltages that might exist on the line. See that its dielectric is not made of paper.

There are some receivers that will not even operate on an outdoor antenna, and no results may be expected by using such a set on electric-light lines. Tuning is much more critical with such a system and, therefore, must be made

more carefully than if an outdoor aerial is used. If one has a little patience, however, its use will bring success in the face of apparent failure.

Sometimes there are local conditions which make it impossible to obtain results with the plugs just as they may make reception with aerials extremely difficult. Such conditions will be found when operating in buildings which are heavily shielded or in places that are close to power plants and electric lines carrying heavy loads of current. Another important factor is the distance of the user from the transformer in a system using alternating current.

It is stated that the Board of Fire Underwriters is now making rules governing electric-light plugs. When effective, these rules will be a safeguard for the purchase of such plugs.

Complete Method for Building an Electron-Tube Detector Unit

By the Experts of the United States Bureau of Standards

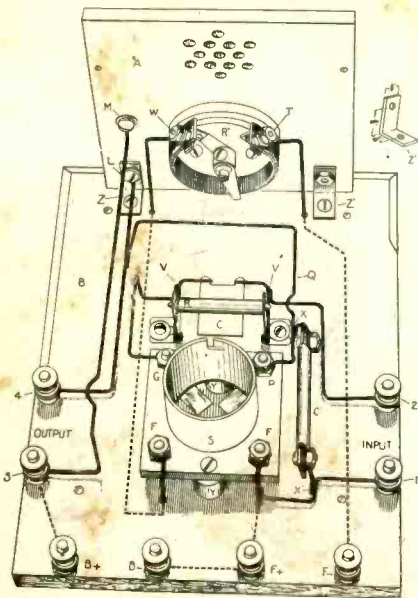


Figure 1—Schematic design showing baseboard upright panel, socket, and other accessories fully described in this article.

THE electron tube-detector unit described in this article may be substituted for the crystal detector, that is its function is the same as the crystal detector, which is to make the signals from the radio transmitting-station audible in the telephone receivers when the radio receiving-set is tuned to the proper wave-frequency (wave length). The use of an electron tube-detector will increase the receiving radius of the receiving set so that it will be possible to hear high-power transmitting stations at a distance of about seventy-five miles, provided the transmitting station uses wave frequencies between 500 and 1,500 kilocycles per second (wave lengths between 600 and 200 meters). Under good atmospheric conditions, signals from greater distances may be heard, especially at night.

This electron-tube detector unit is one step forward in the understanding of more sensitive and complex apparatus. The simple electron-tube detector circuit will not make "continuous-wave" signals audible.

The cost of an electron-tube detector unit, complete with the necessary batteries will be between \$23 and \$37. Additional electron-tube amplifiers will greatly increase the sensitivity, hence the receiving radius of the receiving set will not require additional storage batteries. This will make the added cost of the amplifiers small.

The complete radio-receiving equipment may be divided as follows:

Antenna, Lightning Switch, Ground Connections, and Telephone Receivers.

The Tuning Device. This may be the tuning coil described in Bureau of Standards Circular No. 120 or it may be the two-circuit coupler and variable air condenser described in Bureau of Standards Circular No. 121. While the two-circuit tuner will be somewhat more selective than the single-circuit tuner, as stated in Circular No. 121, its use is not absolutely essential. The two-circuit tuner is also more difficult to operate than the single-circuit tuner.

Electron Tube Detector Unit. (Figures 1, 2, and 7). The electron tube detector unit is composed of a baseboard B and an upright panel A. On the baseboard B is mounted an electron tube E (shown only in Fig. 7), an electron tube socket 6, a resistor (grid leak) B, a grid condenser C, a by-pass condenser C', and eight binding posts. On the upright panel A is mounted a filament rheostat R', (the adjusting knob J is shown in Figure 7), and two telephone receiver binding posts L and M. The parts S, R, C and C' are also shown in Figure 3. This Circular tells how the various parts are assembled on the baseboard and the panel. No description is given of how the parts E, S and R' are made because these are all commercial articles. It is, of course, possible for one to make parts such as the electron tube socket S and the filament rheostat R'.

Accessories. Under this heading may be listed a six-volt battery, used for lighting the filament, often called the A battery, having an ampere-hour capacity of about 60, a 22½ to 45-volt dry battery (B battery), binding posts, stiff copper wire, wood boards for the baseboard and upright panel, and two brass angle-braces for supporting the panel. The A and B batteries are shown in Figure 7. The A battery will usually be placed on the floor beneath the table upon which the other parts of the equipment are mounted. Its comparative size is much reduced in the drawing. An insulating material panel may be substituted for the wood if desired. The electron tube detector may also be entirely enclosed in a wood cabinet with a hinged cover, if desired.

Baseboard. (B Figures 1 and 3). The base B is any kind of dry wood about 6¼ inches by 8¼ inches by ¾ inch thick. Eight holes are drilled through the base in which the binding posts are fastened. Spacing of

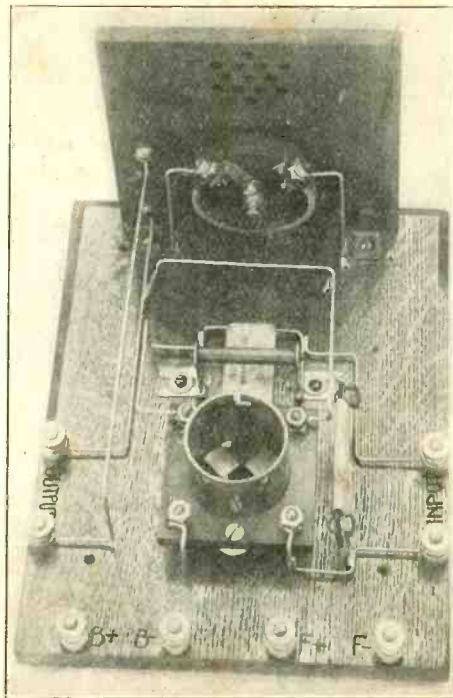


Figure 2—Baseboard, upright panel, socket and other connections when completed, as shown by a photograph.

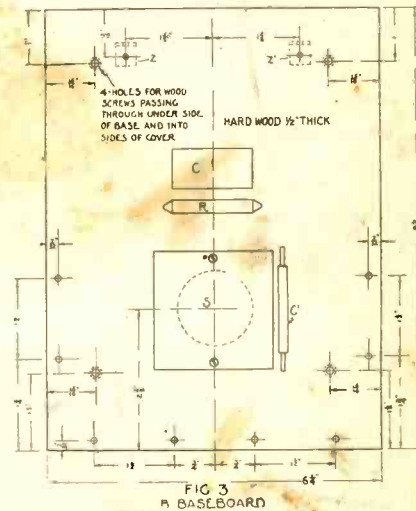


Figure 3—Showing correct borings for holes.

these holes is shown in Figure 3. By the addition of two more binding posts properly connected, this detector may be used in a "regenerative" circuit when the binding posts are externally connected to a "tickler" coil coupled to the tuner. These binding posts are added to the detector baseboard B in line with the "input" binding posts Nos. 1 and 2 (see Figure 1). They are 7/32 of an inch from the edge of the baseboard, and the four binding posts are arranged in such a manner that they are equally spaced, 1½ inches between centers. Referring to Figure 1, the wire which leads from the terminal P of the electron-tube socket is cut at some convenient place Q and the two ends thus formed connected to the extra binding posts. The method followed in making these connections does, of course, correspond with the style of wiring used in the complete electron tube detector unit. The connection X, from one terminal of the condenser C', is also removed and a longer wire connected from this terminal to the other side of the point Q where the wire was cut. The base is arranged so that the three remaining sides and a hinged cover may be added without changing the relative positions of the binding posts. Under each of the four corners of the base B, rubber or wood feet (risers) are fastened in order that the binding post heads and wiring will be protected on the under side of the base.

Upright Panel. (A Figures 1 and 4.) The panel A is any kind of wood about 4½ inches by 5 inches by ¾ inch thick. In Figure 4 a back view of the panel is shown which brings the two holes for the telephone-receiver binding posts in the lower left-hand corner. If the panel is viewed from the front these two holes will be at the lower right-hand corner. It seems quite desirable that this board present a good appearance, it being the front panel. Four holes are drilled in the panel A, one for the bolt which fastens the panel to the base (see L, Figure 1), two for the telephone receiver binding posts L and M (Figures 1 and 7) and one for the shaft of the filament rheostat R' (see Figure 1). The exact location of the hole for the rheostat shaft is determined from the rheostat itself. It is drilled so that the rheostat will

(Continued from preceding page)
occupy as low a position as possible, allowing room enough to do the necessary wiring.

Electron Tube. (E Figure 7.) The electron detector tube is a commercially available type.

Electron Tube Socket. (S Figures 1, 2, and 7.) The electron-tube socket is of commercial design. No suggestions are offered as to the particular kind of socket to use. There are many types available and the majority of them will be found satisfactory for this purpose.

Grid Leak and Grid Condenser. (R and C Figures 1, 2, and 7.) The grid leak and grid condenser may be purchased together

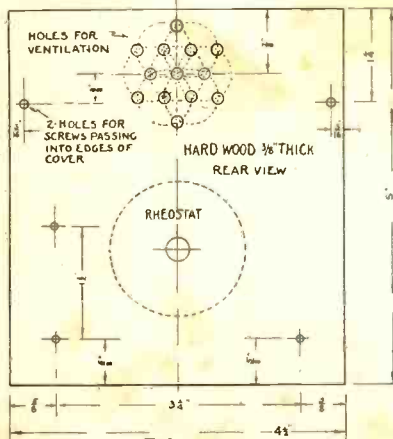


FIG 4
UPRIGHT PANEL

- 2 BOARDS FOR SIDES 7/8 x 5 x 1/2
- 1 BOARD FOR BACK 5 x 3 3/4 x 1/2
- 1 BOARD FOR TOP 7 1/4 x 5 1/4 x 1/2
- 2 HINGES BUTT 3/4"

Figure 4—Schematic design of the upright panel.

or separately, or they may be constructed. If one expects to use a detector type of electron tube (sometimes called "soft" or "gas" tube), it is recommended that these two parts be purchased with the tube, care being taken to select the proper values of resistance and capacity for the grid leak and the grid condenser, as specified by the manufacturer of the tube purchased. The resistance of the grid leak will usually be between 1 and 5 megohms (1,000,000 and 5,000,000 ohms) and the capacity of the grid condenser will be about .0003 of a microfarad (30 micromicrofarads). If an amplifier type of electron tube (sometimes called a "hard" tube) is used, the resistance of the grid leak may generally be anywhere within the resistance limits specified above and the same size of grid condenser used as

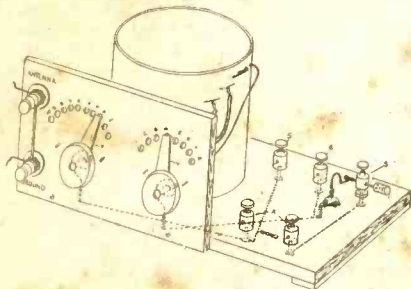


Figure 5—Schematic diagram showing the tuner and panel with knobs, switches, and connections with aerial and ground.

mentioned above. Experimental grid leaks may be made for such electron tube detectors. This is only suggested for its educational feature. If the two-stage audio-frequency amplifier is used also, it will be quite difficult to make a grid leak that will work satisfactorily. Such an experimental grid leak may be made from a piece of fiber

about 3/8 inch wide, 1 1/2 inches long and from 1/32 to 1/8 inch thick. Two 1/8-inch holes are drilled along the center line of the piece, about 1 inch apart. A line is drawn between the two holes, using India or drawing ink. Contact with the ink line may be made by the use of two brass (6-32 or 8-32) machine screws about 1/2 inch long and each equipped with one nut and two washers. The machine screws are put through the holes in the ends of the fiber strip with one washer on each side of the fiber strip. A small piece of tinfoil may be rolled up and wound around each machine screw between the fiber and the washer so that the tin-foil pad will make contact with the ink line. When the nuts are tightened down, the tin-foil pads will flatten out and form a contact between the brass washers and the ends of the ink line. Since the ink line makes a partial electrical conductor of high resistance, the thickness and width of the ink line will determine the resistance of the grid leak to a great extent. The value of resistance may be decreased by inking the line over several times, until the electron tube detector works best.

By-Pass Condenser. (C' Figures 1, 2, and 7.) This is any small-sized fixed condenser having a capacity of from .0003 to .0015 of a microfarad (300 to 1,500 micromicrofarads), which may be purchased or made. This condenser is not absolutely necessary, its use is advisable.

Binding Posts. (Figures 1 and 2.) The binding posts used on the base may be 6-32 or 8-32 brass machine screws each equipped with two nuts and two washers, if regular binding posts are not available. The telephone receiver binding posts, L and M (Figures 1 and 7), should be of the set-screw type to admit the tips of the telephone receiver cords.

Filament Rheostat. (R' Figure 1.) As has been previously stated, the filament rheostat may be constructed but no details are furnished. If the rheostat is purchased, it is desirable to select one designed for panel mounting as well as one having a neat appearing knob and pointer. The rheostat should have a resistance of about seven ohms and a current-carrying capacity of about 1 1/2 amperes.

Accessories. The accessory batteries are commercial articles. The purchaser of a storage battery for lighting the filaments should get full instructions from the dealer for testing and recharging the battery. The dry battery ("B" battery) usually used for the plate circuit cannot be recharged. The normal life of a battery of reliable manufacture is about six months. Storage batteries for use as "B" batteries are available. Their first cost is greater than that of dry batteries, but they may be recharged.

Wood Finish. It is essential in electron-tube sets that the wood be protected from moisture. While the wood base and panel may be treated with paraffin, it was found more satisfactory to first dry the wood and then stain and varnish it, using a good varnish, preferably insulating varnish. Shellac is not recommended. It is rather difficult to give definite suggestions concerning drying and staining of wood. Wood may be put in a warm oven for an hour or so to insure more or less complete drying. A lamp-black or carbon pigment stain is not used ordinarily on such radio parts and it would be well to avoid the use of such. The stain and varnish are thoroughly dried before the apparatus is mounted on the wood baseboard and panel.

Baseboard. (B Figures 1 and 7.) The eight brass machine-screws or binding posts are put in the holes already drilled in the baseboard. If machine screws were to be used the heads would be put on the under side of the baseboard with a brass washer between the head and the baseboard. A brass washer and two nuts are then fastened to

each screw, on the upper side of the baseboard, with the washer next to the baseboard. The tube socket S, the grid condenser C, the grid leak R and the by-pass condenser C' are next screwed to the baseboard. (Certain types of condensers will be held in position by the wiring only.) The exact location of these parts cannot be stated because the several types of parts commercially available will vary somewhat in dimensions. One can get a very good idea of the relative positions of the several parts from Figures 1, 2, and 7. The tube socket S is mounted so that the two terminals marked G and P (Figure 1), are nearest the upright panel. Blocks Y and Y' are put

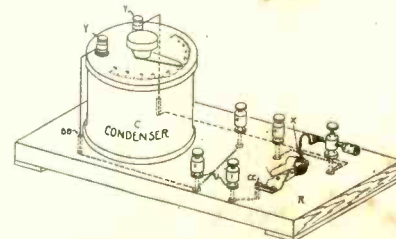


Figure 6—Schematic diagram of condenser mounted on panel with connections and necessary binding-posts.

under the socket S so that the four terminals of the socket do not touch the wood baseboard.

This is done by cutting off two round wood blocks just long enough to raise the socket terminals clear of the base, and mounting them so that the screws which hold the socket to the baseboard will pass through holes in the centers of the blocks. After the socket S, grid condenser C, grid leak R, and by-pass condenser C' are mounted the parts are wired up. No. 14 bare tinned copper wire is used in wiring. This makes the connections stiff and self-supporting. This wire is ordinarily furnished in rolls. The wire should be straightened before it is used. It can be straightened by clamping or otherwise fastening one end solidly and pulling on the other end just hard enough to stretch the wire slightly. It is also a good plan in wiring such sets to have all wires run as directly as possible, neatly, and all bends made at right angles. When a wire is attached to a binding post, a loop or eye is formed on the end of the wire and the wire at the eye flattened with a hammer. This gives more contact surface. Special lugs may also be soldered to the ends of the wire before the connection is made.

A small hole is drilled through the baseboard just back of each of the tube socket terminals marked F. (See Figure 1.) A short piece of wire is fastened to the right-hand socket terminal marked F and is then led through the small hole in the baseboard to the under side of the baseboard. The same wire is led to the binding post F+ and fastened between the machine screw head and washer underneath the baseboard. The same wire is further led to the binding post marked B and fastened between the machine screw head and washer underneath the baseboard. All wires which are run on the under-side of the baseboard are shown by dotted lines. A short piece of wire is soldered to the wire leading from the right-hand socket terminal marked F, just above the baseboard and led to the "input" binding post No. 1, and fastened between the washer and the first nut. This wire is shown as a solid line which means it is on the upper side of the baseboard. The wires do not touch the wood boards except at the terminals and where the wires pass through holes in the baseboard. The wires may be raised more or less to accomplish this. The two terminals of the grid condenser C are connected to the two terminals of the grid

(Continued on following page)

(Continued from preceding page)
 leak R as shown in Figure 1, A wire is soldered at V and led to the input binding post No. 2.

This wire is kept quite close to the baseboard. Another wire is soldered at V' and led to the tube socket terminal marked G. The remainder of the wiring is left until the upright panel is assembled and fastened to the baseboard.

Upright Panel. (A Figures 1, 2, and 7.) The filament rheostat R' is mounted on the

hand hole in the baseboard at the rear of the electron tube socket S and connected to the left-hand binding post marked F. This completes the assembling and wiring of the electron tube detector unit.

Connections. It has already been stated that better results are obtained if the two-circuit tuner is used with the electron-tube detector. However, the single-circuit tuner may be used or the electron-tube detector may be connected to any tuner not already supplied with an electron tube detector.

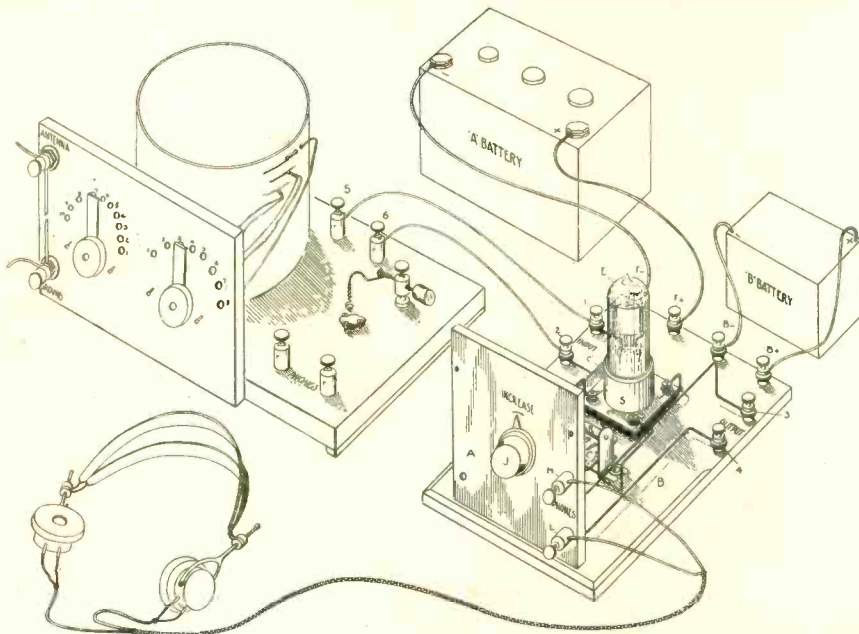


Figure 7—Schematic diagram showing the complete set with tuner, vacuum-tube unit, and storage batteries. One the right-hand side is shown a crystal detector which may be used in case the tube is omitted from the circuit. In this case, the telephones must be changed over to the tuner connections marked "Phones."

upright panel A so that the two terminals will be in a convenient position for wiring. Two binding posts of set-screw type, L and M, (Figures 1 and 7), are inserted in their proper holes, and the upright panel mounted in position by bolting it to the two brass angle pieces (Z and Z') shown in Figures 1, 2 and 3. One of the telephone-receiver binding posts L serves as a bolt. Two small holes are drilled through the baseboard near the two terminals of the filament rheostat R'. A wire is run from the "output" binding post marked 4 (Figure 1) along the upper side of the baseboard to the back of the telephone receiver binding post marked L. A wire is fastened to the tube socket binding post marked P and from thence led to the back of the telephone receiver binding post marked L, or else soldered to a convenient place on the wire leading from binding post L. These wires are shown in Figure 1. A wire is run from the binding post marked 3 to the back of the telephone-receiver binding post marked M and also a wire from B+ to binding post No. 3 underneath the baseboard. One of the terminals of the by-pass condenser C' is connected at the point X and the other terminal of the condenser is connected at this point X'. The method of making these connections depends to some extent on the particular type of fixed condenser which is used. If the condenser be provided with flexible leads one of them is soldered at the point X and the other is likewise connected at the point X'. If the condenser is provided with lugs, connections are made by bending the wires into the proper shape and soldering thereto. A wire is run from the filament rheostat binding post marked T through the hole in the baseboard and thence along the underside of the baseboard to the binding post marked F-. This wire is shown in Figure 1 by a dotted line. Likewise a wire is run from the rheostat binding post W underneath the baseboard and up through the left-

If the single-circuit tuner is used with this electron tube detector the several parts are arranged somewhat as shown in Figure 7. Two more binding posts are added in the back right-hand corner and wired as shown in Figure 5. The greater portion of the wiring is beneath the baseboard. The wires shown as ---- are those already described. The wires shown as are the new wires added. Such wiring will not disturb the set for use as a crystal detector receiving set. The second unit to the right is the electron tube detector described in this circular. Accessory parts such as telephone receivers, B battery and A storage battery are also shown in Figure 7. As previously mentioned, the A battery is shown here reduced in size, and it is usually placed under the table upon which the rest of the apparatus is mounted.

If the two-circuit tuner is used with this electron tube detector the arrangement of the parts is similar to that shown in Figure 7, except that the two units consisting of the coupler, and the variable condenser with crystal detector, replace the single-circuit receiving set shown at the left. Two more binding posts are added at the rear edge of the baseboard supporting the variable condenser and crystal detector (see Figure 6). The dotted lines clearly indicate the new wiring connections as described for the single-circuit receiving set.

The antenna and ground wires are connected as shown in Figure 7. Binding post No. 5 (Figure 7), is connected to binding post No. 1 and binding post No. 6, is connected to binding post No. 2. The telephone receivers are connected to the binding posts L and M as shown in Figure 7. The red (positive, +) wire of the B battery is attached to the electron-tube detector binding post marked B+ and the black (negative, -) wire to the binding post marked B-. An insulated flexible copper wire is run from the red (positive, +) terminal of

the 6-volt A storage battery to binding post marked F+ (Figure 7) and a similar wire from the black (negative, -) terminal of the A battery to the binding post, F-.

Operation. The filament rheostat knob J (Figure 7), is turned to the extreme left and the electron tube E inserted in the electron tube socket S. The filament rheostat knob is then turned to the right until the electron tube filament becomes lighted, the brilliancy depending upon the type of electron tube used. When one of the telephone receiver terminals is removed from its binding post and again touched to the post, a sharp "click" in the telephone receivers will be an approximate indication that the circuit is in working condition. If the test buzzer is available, it may be attached to the tuner binding post marked "ground" and then the rheostat adjusted until the sound in the telephone receivers is the loudest. The reader should bear in mind that the electron tube detector unit is merely substituted for the crystal detector. When signals from a desired transmitting station are heard as loud as possible by tuning, the intensity may sometimes be improved by adjusting the knob on the filament rheostat so as to increase or decrease the filament current (current from A battery). The knob is kept in the position of minimum filament current without reducing the strength of the incoming signals.

If a detector type of electron tube be used, the voltage of the B battery is changed until the greatest signal intensity is obtained. This necessitates a tapped B battery.

The operator must not expect too much of the apparatus at the first trial, and even assuming that he has had experience with crystal detectors, some difficulty may be experienced in getting the electron tube to operate.

It has been stated above that certain connections were soldered. In fact, one could well advise that all connections about a radio circuit be soldered, but soldered correctly. There are some general hints that may be given, but judgment is essential.

(1) The soldering copper must be clean and the tip well coated with solder. If the tip of the soldering copper is not bright, it should be filed clean. It is then heated, care being taken that the tip is not directly in the flame. After the copper is hot—not red hot—it is dipped in the soldering flux or paste and the copper tip coated with solder.

(2) The wires are cleaned where the soldering is to be done, using fine sandpaper, then a small amount of soldering flux or paste is applied at the joint, and the wires to be soldered are tinned or coated with solder before the wires are joined. After the wires are tinned they are soldered together, using just enough solder to make the joint solid. The joint should not be jarred while the solder is still soft; to do so weakens the joint and gives the solder a dull appearance. A good soldered joint will be smooth and bright.

The following list includes the cost of parts of the electron tube detector unit and the A and B batteries:

Electron Tube Detector Unit

Electron tube	\$5.00 to \$6.50
Electron tube socket75 to 2.00
Filament rheostat	1.00 to 2.50
Grid leak and grid condenser ..	.50 to 1.50
By-pass condenser about35
Ten (10) feet No. 14 bare tinned copper wire about...	.10
Miscellaneous binding posts and screws, about75

Batteries

A storage battery, 6-volt, 60 ampere-hour capacity	\$15.00 to \$20.00
B battery, 22½ to 45 volts...	1.00 to 3.00

Total

\$23.25 to \$36.70

Radiograms

Latest Important News of Radio Garnered from the World Over, and Reduced to Short Wave-Lengths for the Busy Reader.

THE strongest evidence of the growth of radio communication is contained in an announcement by Edward J. Nally, president of the Radio Corporation of America, that an agreement has been signed by his company and the Postal Telegraph-Cable Company whereby every postal office in the United States becomes an agency for acceptance of radiograms for transmission across the Atlantic and for the delivery of radiograms received from abroad. The Radio Corporation's stations transmit and receive messages directly to and from England, France, Norway and Germany, and through connecting stations abroad, to and from all countries in Europe, Asia and Africa. The company now maintains the only direct line of radio communication with Germany and Scandinavia and additional direct service is planned for the near future with Belgium, Holland, Italy, Poland and Sweden. Prior to the new arrangement, practically all of the radiograms transmitted to trans-Atlantic countries originated in New York and in Washington. The contract just signed gives to inland communities equal facilities with the Atlantic seaboard.

Radio concerts for airship passengers have now become an assured fact, as proved by the trip of a commercial passenger airplane from Geneva to Paris. The experiment, which had been tried on the Paris-London route with only passable results, was, on this trip, wholly successful and satisfactory.

The steamer "Pan-America" is equipped with the latest type of arc transmitter, having a range up to 5,000 miles, and, in addition, a one-kilowatt Navy standard spark-transmitter with a transmitting range up to 1,500 miles. This is the steamer that carried Secretary of State Hughes to the Brazilian Exposition. The chief wireless operator, L. K. Meriweather, and his assistants have the distinction of being the first in the history of radio to hear messages through the most powerful receiving apparatus ever installed on a merchant vessel.

To show the world-wide interest in the anti-prohibition poll now being conducted by "The Literary Digest," it may be mentioned that the "Wireless Press News," printed on a steamer en route between America and Japan, contained a radio dispatch, bulletined over an area of forty-six million square miles of Pacific Ocean, which carried returns then available.

Because certain Canadian amateurs have call letters similar to those of amateurs in this country, the Canadian department of the naval service has under consideration a plan to change call letters in the Dominion. Canadian amateurs have calls consisting of a number followed by two or three letters like amateur stations here. The Canadian stations with calls beginning with Nos. 1, 2 and 3 are in the southeastern part of that country somewhat near to the United States stations having calls beginning with the same numerals. Therefore it is possible for a Canadian station having a call, say 1AB, to work with a United States station having the same call.

The first organization for the blind to make systematic use of radio was the New York Guild for the Jewish Blind, which secured a modest crystal-set and a single-tube set, and conducted code classes for blind boys, who learned to copy commercial messages, including the various wireless press services.

Baseball fans who are also radio fans will be able to follow the World Series at home this year. WGY, the radio broadcasting station of the General Electric Company, will give a play-by-play report of the World Series. Direct wires from the ball park will carry every play practically the second it happens and these will be relayed by wireless the instant received.

The Canadian public is looking to radio for much of its entertainment. This is proved by the fact that several theatres in Toronto and throughout the province of Ontario have installed radio-receiving sets in their buildings for the purpose of giving radio concerts each evening. They have secured the services of a number of artists who will perform in the Marconi Company's large new broadcasting station on the roof of the Canada Central Building.

Swedish electrical dealers have been trying to obtain modification of the regulation which forbids the use of radio apparatus by amateurs, but so far without results. Should its use by individuals be permitted there would be a good market for

wireless goods in Sweden, owing to their interest in all things electrical, and the short distances between cities in Sweden and cities in neighboring countries.

The radio set at Clifden has been saved. A patrol of four National Army men proceeding toward Ballinaboy Bridge, near Clifden Wireless Station, County Galway, was ambushed by forty irregulars, whose intention it apparently was to cut off the Marconi station garrison from its base. The patrol, however, took cover and held its position until reinforcements arrived, when the irregulars were put to flight.

Two new stations have been opened by the United States Signal Corps. One is located at Fort Totten, New York, and the other at Fort Benning, Georgia. This brings the total number of Signal Corps Stations to 53. Another station is planned for Fort Sill, Oklahoma. When completed it will bring the eighth area into the Army radio net. The Signal Corps will then cover the entire country with its radio service.

Italy is demanding more radio apparatus. There is a growing interest on the part of the Italians for American production of radio apparatus. Inquiries are being received both for transmitting apparatus to be used in broadcasting and for the radio telephone receiving sets. If American manufacturers interested in the possibilities of the Italian market for their product will send catalogues and other descriptive literature to the office of the American Commercial Attache, care of the American Embassy, Rome, such material will be made available to all persons inquiring.

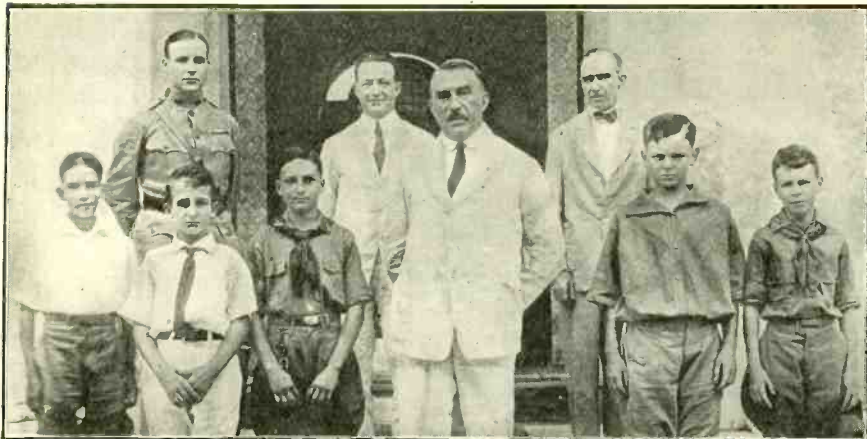
Japanese capitalists, headed by Baron Shibusawa, have asked permission to establish a radio station in Japan so communication may be held with America and Europe. The new station will cost about \$97,000,000. The present system of radio communication between Japan and the United States is carried on schedules arranged between the Japanese Department of Communications and the Radio Corporation of America. The international service is generally commended, as previously all radio stations were under strict military rulings.

The Tight-Wave Walker



Cartoon by O. Messmer, in "The Globe"

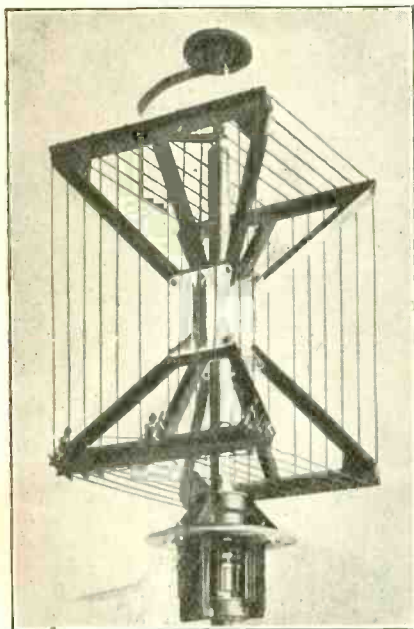
Leonard Wood and His Philippine Island Radio Fans



(C. Kadel & Herbert News Service)

Major-General Leonard Wood, Governor-General of the Philippine Islands, recently greeted the pioneer boys' radio class at the Governor's office at the Malacang Palace, P. I. These are the first boys in the Philippines to make and operate their own radio sets. General Wood is an enthusiastic sponsor of radio and is encouraging radio amateurs who reside on Uncle Sam's protectorate in the Orient. The boys in the photograph above all made successful radio tests, and General Wood was so pleased with what he heard of their work that he requested the young radioists to call at his offices with their sets. The young men proved that they understand radiocraft as well as their brothers at home.

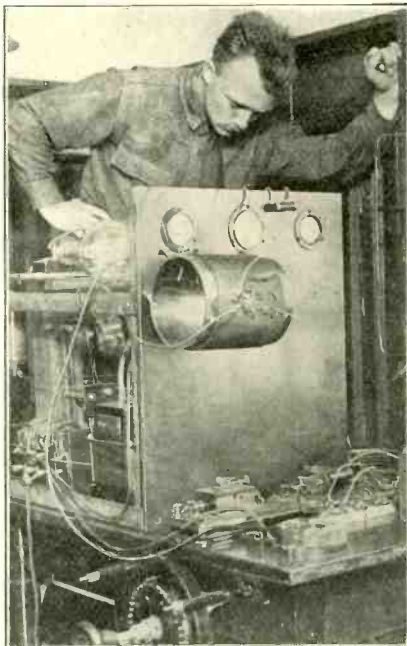
This Is the Aerial Used by U. S. Navy



(C. Kadel & Herbert News Service.)

Loop aeriels are being brought into such general use, to-day, by advanced amateurs that Radio World feels justified in printing a photograph of the loop used by the compass stations of the United States Navy. It is somewhat different to other loops and gives excellent results from 600 to 1,000 meters. At some stations, operators could get as low as 300 meters. These loop aeriels are the actual instruments that guide the ocean liners to port in bad weather. During the World War they were used exclusively by the United States.

This Is a Short-Wave C-W Transmitter



(C. Underwood & Underwood)

The above photograph is that of a short-wave C-W transmitter, in the station at WVP, Fort Wood, Bedloe's Island, New York. This set was installed by the radiomen of the station so that amateur work may be advanced. Fort Wood is one of the stations ordered by the government to carry on radio instruction and operation in connection with the Amateur Radio Reserve. The transmitter shown has for its power the vacuum tube, an important element for the transmission of continuous waves and radiotelephony. The inductance coil, in front of the panel, is one of the instruments used to regulate the various wave-lengths. The instrument on the table at the right is a wave meter. With the aid of this wave meter, any wave-length desired may be calculated and marked. A wave meter is a handy instrument in a radio station, but due to its high cost, it is seldom used. The meters on top of the panel indicate what the tubes are really doing—if they are operating and forwarding the proper currents. An operator is informed by these meters if power is being transmitted to the breeze, without taking dangerous chances with other older methods that the operator knew, from practical experience, to be hazardous.

Why Resonance Is Essential in Tuning

HIGH-FREQUENCY currents are seriously affected by resistance, moreso than low-frequency alternating currents such as are used in house-lighting systems. If an inductance is placed in the circuit by itself, the opposition of the coil to the radio-frequency currents is so great that the current flow through the receivers and detector would be too small for detection. This objection or opposition of the inductance coil is called reactance. Fortunately, the reactance of inductances and condensers are of different kinds. They can be called positive and negative in explanation. It follows that if the inductance applies too great an opposition in the form of reactance, we may add some condenser capacity and gradually overcome it. By increasing the reactance of the condenser, we come to a point where the capacity and inductance are exactly opposite and equal. The high-frequency currents may then flow through the circuit with practically no opposition. When this point is reached, the circuit is in a state known as resonance. In tuning we must have resonance if we wish to hear what is broadcast.

High-Frequency Sets

IN laying out the necessary work and diagrams for radio frequency and the more complicated sets of radio, it is strongly recommended to amateurs that they build an experimental set first rather than attempt to put the apparatus in panel form. An excellent basis for this work would consist of some pine drawing-board and No. 14 bare copper wire. All radio-frequency transformers should be carefully shielded. Too much emphasis cannot be placed on the necessity for making good connections. Use the soldering iron whenever possible. Where flux other than resin is used, all traces should be removed before the circuit is put in use. Bear in mind that the receiving type of tube operates on six volts. In using a six-volt storage battery, especially where several tubes are employed, the voltage drop in the connecting leads may be sufficient to spoil the operation of the tubes. If No. 14 wire is used for the purpose, this source of trouble will be practically eliminated. For shielding the radio-frequency transformers, the best metals are copper or aluminum.

Rules Governing Amateur Radio Operators

THE owner of an amateur radio-transmitting station must obtain a license before he can operate. Provided his station is of sufficient power to cause interference with neighborhood licensed-stations in the receipt of signals from transmitting stations outside his State.

Station licenses are issued only to citizens of the United States, its territories, and dependencies. Transmitting stations must be operated under the supervision of a person holding an operator's license. The owner of a license is held responsible for its activities.

Amateur licenses issued by the United States are granted in three classes. They are special amateur stations known as the Z class, and are permitted to transmit on wave lengths up to about 350 meters. General amateur stations are permitted to transmit on wave lengths up to 200 meters and have an input of 1 kilowatt. Restricted amateur stations are those located within five nautical miles of Naval radio stations. They are not allowed to exceed one-half kilowatt input, but are permitted up to 200 meters. Experimental stations are those of universities and schools, and are known as the Y and X class. They are allowed, usually, the use of longer waves at the discretion of the Department of Commerce.

All stations are required to use the minimum amount of power necessary to carry out communication. Malicious or willful interference on the part of any radio station, or the transmission of false or fraudulent signals, is prohibited. Severe penalties are provided for violation of these governmental provisions.

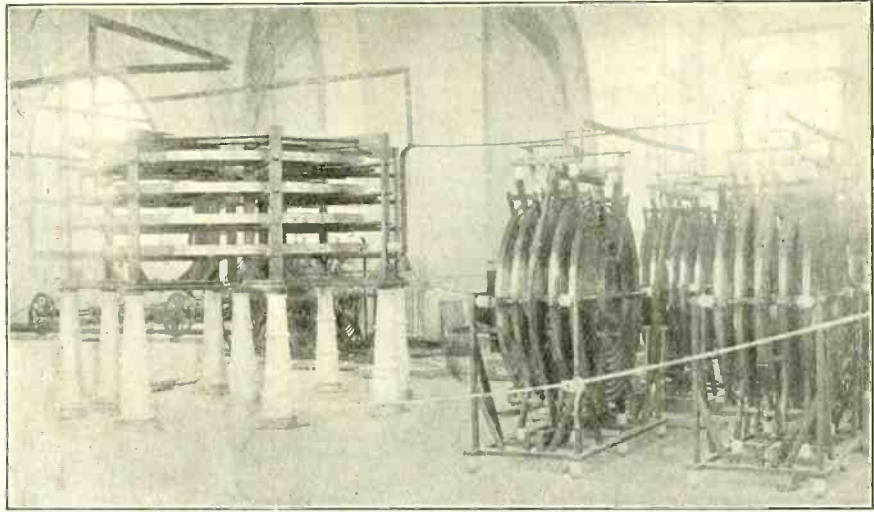
There is no license required whatsoever for the operation of a receiving set, but all amateurs are required by law to maintain secrecy in regard to any messages which may be overhead. There is no fee for either an operator's license or a station license.

Applications for licenses should be addressed to the Radio Inspector of the district in which the applicant, or station, is located.

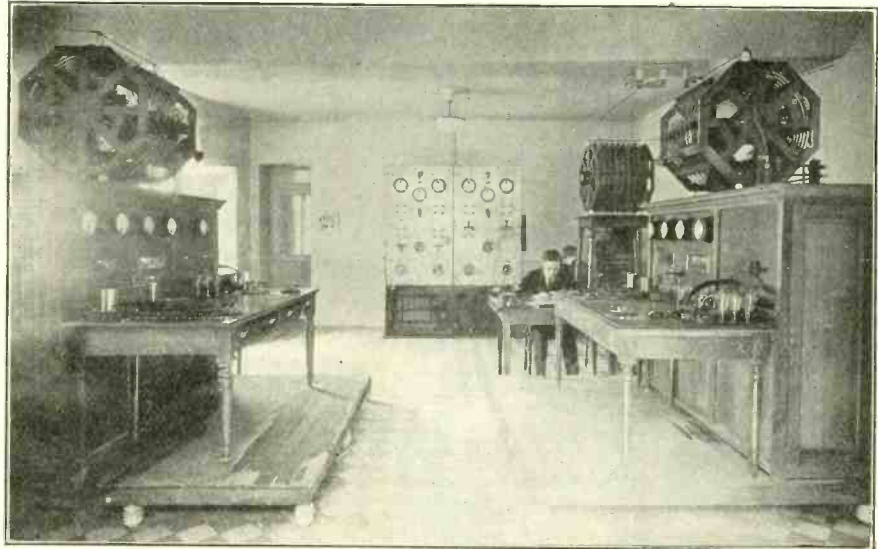
The Hot-Wire Ammeter

A hot-wire ammeter is used to measure the current in the antenna system of a transmitter. The value of the current flowing in this system is usually indicative of the performance of the apparatus. This meter is employed in tuning a transmitter to resonance, so that the maximum value of current may be induced into the antenna circuit.

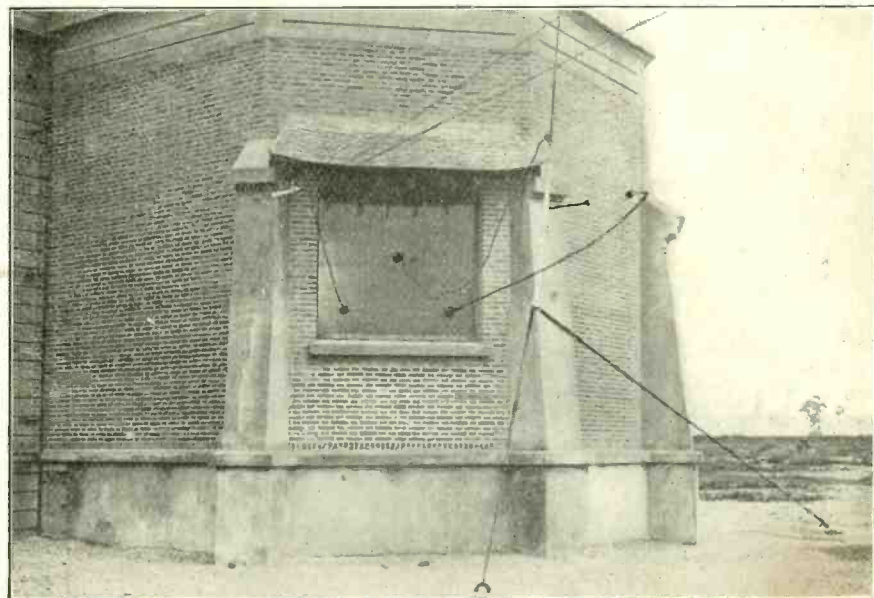
Here France Shoots Her Radios to America



Section of the interior of the great radio station at Sainte Assise, France. To carry on communication with America these large inductance coils are necessary.



The sending apparatus is operated by remote control. The instruments shown make it possible for the operator to have complete control while the set is working.



(3 photos. C. Keystone View Co.)

Lead-in wires from the lofty aerials connect with the apparatus in the building.

Radio and the Woman

By
Crystal D. Tector

I MET, on Broadway, the other day, a woman friend I hadn't seen in a blue moon. Of course, we greeted each other with all the fervor that should be expected when two good friends collide after a long separation. I could only tell her that I am still here in New York, living my same happy, never-idle hours; but she nearly took me off my feet when she informed me that she had been in the South and West for the past five months selling radio apparatus! When I asked her if she had done well, she replied, "Well enough to buy one of the swellest fur coats, for the coming winter, you ever set your eyes on, Crystal! Besides that, I am sending mother to California for the winter—and I have paid off a debt that has been keeping me busy rubbing out wrinkles for the past year—and—"

* * *

Well, she rattled on until I began to wonder if the money she had made wouldn't pay off the national debt. I wasn't so much interested in what she made so much, however, as how she made it. When I told her that I was a radio "bug," her eyes fairly popped out of her head. So we hiked to the nearest tea shop and gassed away; and, finally, I could only invite her up to dinner. Poor Friend Husband! Next morning, as he toddled off to business, he mentioned something about "Never hearing two women talk so in all his life," and he "couldn't get a word in with an axe!"

* * *

But Estelle opened my eyes. She told me that she just had to do something; and while her relations balked furiously when she announced that she was "going on the road," she went just the same. Radio appealed to her because it was new—spick-and-span new—and she realized that she would be entering a field of salesmanship that was not overrun with competitors. She found that several big firms were willing she should represent them; and with a number of smaller products as side lines, she sallied forth.

* * *

Estelle told me that she visited only small town and farming districts. In the towns, she "sold" a number of electrical firms. Among the farmers, she found many who were, first, most anxious to learn all about radio and, secondly, to buy sets as soon as they were sufficiently educated to operate them. She always had, she says, the most interesting audiences, particularly with farmers who were eager for market and weather reports.

* * *

She found that radio is the most talked-of thing in the districts she traversed. "It even supplants prohibition," she quaintly remarked; at which Friend Husband managed to blink his eyes and ask "Izzat so?" She also told me that she received a wire from one of her firms stating that they could not promise to fill orders as fast as she was sending them in. Now, she is trying to arrange with her people to let her go over the same territory to see if all her orders were promptly filled and if all the sets are working satisfactorily.

* * *

And while this may prove costly from the firm's point of view, I think it would be a wise thing to do. No doubt, many of her customers will give her new orders. And as radio is the newest thing on earth, and changing for the better all the time, it would be wise to keep in touch with those who are none too close to the big set centers.

Radio to Be Generally Installed by American Hotels

THAT wireless apparatus in the not distant future will be installed in many hotels and play an important part in the entertainment of the hotel keepers' guests, is the prognostication of the New York State Hotel Association Messenger, says "The Globe," New York. Improvements in radio communication are coming so fast and exciting such widespread

interest that its possibilities as an accessory to the hotel interests may be said to be almost without limit.

It was pointed out that numerous hotels throughout the United States have already instituted radio service for their patrons and others are preparing to do so. A recent striking indication of the drift is seen in the statement that a New York company manufacturing radio apparatus announces that it has contracts for 25,000 receiving sets which operate only on deposit of a quarter—the orders coming chiefly from hotels and hospitals.

I see that there are radio songs and radio stunts on the stage—and even a show that is called "Radio Girls." Then there is radio cloth, and the permanent radio-wave in one's hair has come to stay. In a candy store, the other day, I was asked if I would like a "radio sundae." Now, it isn't me to pass up anything that relates to my pet hobby, so I promptly tuned in. The concoction was cooling and delicious. The white-garbed youth behind the counter filled a silver dish with every shade of ice cream he had in the place. Over this he poured some marshmallow cream, sprinkled it with grated nuts, stuck a few cherries here and there—and then covered the whole thing with frapped orange juice. I am still smacking my lips!

* * *

I have a letter from a mother in Ohio asking my aid in appealing to the broadcasters to alternate the bedtime stories with an occasional lullaby. This correspondent says that children still love to be sung to sleep—and I believe her. Her set, so she informs me, works so perfectly that a lullaby would be most welcome, and she has three little ones that are tucked away early. Not a bad idea. Some station may take this tip seriously.

* * *

Another correspondent wants to know if I can give her any advice about New York as a safe place for her son who is coming here to engage in the radio business. Her question is a bit out of the ordinary. But all that I can say is that her son will be as safe here as he is at home, if he will take care of himself. New York City was built up by boys who migrated from the country. But they were boys who knew how to master opportunities. It is all up to the boy.

* * *

And—I have received a letter from a man! He resides in Sandusky, Ohio, and has a peculiar grievance—one of those complexities that only a woman can grapple with. At least, so he thinks. My Sandusky friend tells me that he is a "night owl"—one of those radio birds that sit up all night listening for distant signals. Well, the other night,—and this is his story,—he became so interested in trying to pick up the faint call of some distant radioists that he failed to keep an appointment with his sweetheart! Of course, the little lady is deeply peeved and will not speak as they pass by. "What would you do if you were me?" asks my Sandusky hero.

* * *

Well, Sandy, what would I do if I were you? Just go up to her like a man and tell her you're sorry and apologize. Then ask her to come over, some night, with a friend or two and join you in your nightly pastime. Interest her in all the mysteries of radio—let her know the fascination of hearing someone talk to you who is, perhaps, a thousand miles away—let her realize the great fascination of listening for some call and experiencing the thrill only the radioist knows, when it comes in.

* * *

Along toward midnight brew some coffee and bring some nice sandwiches—if you didn't know how to make them you ought to be ashamed of yourself—from your cupboard. Then all sit around the set and sup—and tell them what wonderful nights you have had, what wonderful experiences you have known, what comes to the "night owl" from the far, far distances that comes to no other man on earth.

And I think, Sandy, that before the night is over she will just want to put her arms around your neck and kiss you.

If a guest in a hotel room or a patient in a hospital so equipped desires a little entertainment he has merely to drop in his coin exactly as if the set were a chewing gum or penny arcade machine, and he gets everything that comes over for the next twelve hours—jazz, weather reports, baseball scores, etc.

The cost of installation under this system will be borne equally by the company and the hotel or institution, and the profits or loss will be divided equally between them. The machines are expected to be in operation within a very short time.

Radio Patents

William F. Hendry's New Method for Manufacturing Audions

No. 1,427,734, Patented August 22, 1922,
Patentee, William F. Hendry,
New York, N. Y.

The object of Mr. Hendry's invention is to produce a unitary multiple-surface electrode from stock material. To accomplish this a plurality of dies are used which successively treat the electrode material to shape it into its final form. The electrode in its final form comprises two parallel-spaced surfaces of a corrugated form joined at their lower ends by a collar of the same material,

which collar is adapted to surround and grip the stem of the tube and support the electrode structure. At their upper ends, the surfaces are joined by a boxlike structure made of sheet metal and in which is supported a block of insulating material which serves as a base for supporting the wires from which the other electrodes are supported.

The method of producing these electrodes is in general as follows:

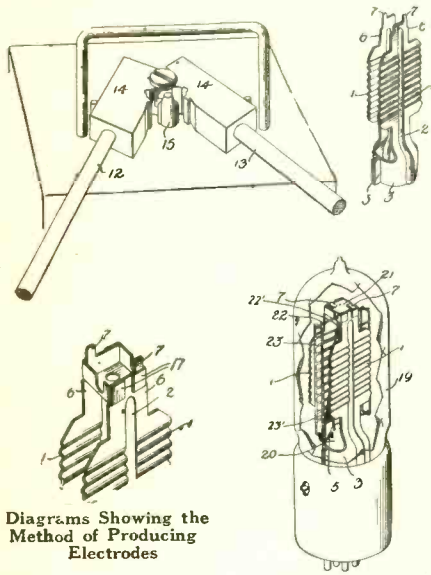
1. The metal for the electrode surface is supplied in the form of ribbon of the required dimensions and is preferably of substantially pure nickel.

2. This material is first passed through a punch press in which is a die so shaped as to stamp out in a flat piece the multiple electrode structure with the connecting collar.

3. This rough blank is then passed through another press in which it is subjected to a forming operation by a die, the result being that the electrode surfaces are corrugated in the manner described in the above mentioned co-pending application. The structure is still in the form of a flat blank however.

4. The structure is then placed in a simple bending machine which bends the collar into a cylindrical form and arranges the electrode surfaces in planes parallel with each other. The structure is then ready for assembly with the other electrodes.

5. The metal box at the top of the electrode structure is formed into shape in three operations in punch presses by dies comprising one blanking and two forming operations.



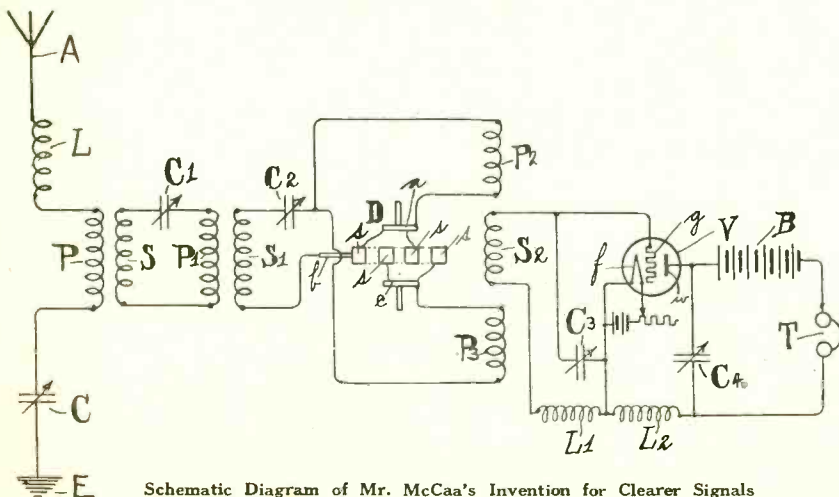
Diagrams Showing the Method of Producing Electrodes

For Clearer Signals

No. 1,423,345. Patented July 18, 1922.
Patentee: David G. McCaa,
Palo Alto, California

THE invention on which Mr. McCaa has been awarded papers patent, is intended to create clearer signals in radio. The preferably sustained or undamped high-frequency energy representing the signals operates in conjunction with locally produced high frequency oscillations of the same frequency to produce great changes in ampli-

tude and therefore more easily readable or recognizable signals, the changes in amplitude being effected by periodically, and at preferably suitable audible note-producing frequency, reversing the coaction of the received and locally produced energies. Without the production of beats, an audible signal-representing note is produced, the frequency or pitch of the note being independent of the frequencies of the received and locally produced energies and is dependent upon the frequency of reversal of the coaction between the produced energies.



Schematic Diagram of Mr. McCaa's Invention for Clearer Signals

No Wireless Receiving Set is complete without



MAGNAVOX products are designed in our own laboratories and manufactured in our own factory—greatly extended in size during the past few months.

The Magnavox Power Amplifier has been designed for use especially in connection with the Magnavox Radio, and its use greatly increases your range and signal strength.

Every owner of a Magnavox Radio should also add the Power Amplifier Model C if he has not already done so.

R-2 Magnavox Radio with 18-inch Horn

FOR those who wish the utmost in amplifying power; for large audiences, dance halls, etc. Requires only .6 of an ampere for the field.

Price, \$85.00

Type R-3 Magnavox Radio with 14-inch Horn

THE same in principle and construction throughout as Type R-2, and is ideal for use in homes, offices, amateur stations, etc.

Price, \$45.00

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INSURES getting the largest possible power input for the Magnavox Radio. Can be used with any "B" battery voltage which the power tube may require for best amplification.

AC-2-C, 2-Stage..... \$80.00
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Radio brings it
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Answers to Readers

I HAVE a set with a French detector-tube which I am using as a detector. What would be the proper plate and filament currents to be used in conjunction with this tube?—Marshall Craig, Rome N. Y.

The French tube is practically the same as the American tube with the exception that the plate is cylindrical, lying in a horizontal position similar to the grid. When using this tube as a detector, the plate voltage should be about 22 volts, but if the tube should happen to be extra soft, the voltage will have to be reduced accordingly. The filament may be supplied by a 6-volt storage battery.

What would be, approximately, the correct number of turns on the primary of the vario-coupler and the rotor in conjunction with the super-regenerative receiver.—Samuel Levens, San Antonio, Texas.

The primary of the vario-coupler should have, approximately, about 50 turns wound on it, while the rotor should have about twice the amount, or a hundred turns. This is needed for the feed-back of the system.

I have a honeycomb-coil set, hook-up enclosed, with which I get satisfactory results from WHN, WOR, and WIZ; but I cannot hear WVP. Could I use the same 6-volt battery for all three tubes of a two-stage amplifier? Does the rheostat control the plate voltage?—Sidney H. Bohack, Binghamton, N. Y.

For WVP, I would suggest you to use L-300 coils. The 6-volt A battery may be used to light all your filaments. The rheostat does not control the plate voltage, but the plate voltage may be controlled by a potentiometer across the filament, to which one tuner lead is connected; or by tape on B battery.

My aerial is 95 feet long and 15 feet above the roof. It is near iron posts and a tin roof. Would this affect my distance any? Would you advise me to change the position of my antenna?—Ray Whitman, Cypress Hills, L. I.

I would advise that your aerial be changed from its present position to a position that would leave the aerial so it would be clear of all metallic structures.

I have a pair of watchcase receivers, single pole, 75 ohms. Can they be rewound so as to give satisfactory results in connection with crystal detector? If this can be accomplished, please inform me what size wire should be used.—Milton C. Prince, Brooklyn, N. Y.

It is inadvisable for you to attempt to consider rewinding these receivers. A receiver of this type would not respond to weak signals. It would not have sufficient resistance. We advise a pair of 2000-ohm receivers which would work far better than the ordinary 75-ohm house telephone-receivers, particularly in your case.

Does copper wire in a solid form work better than Litzendraht wire?—Michael Maloney, Pittsburgh.

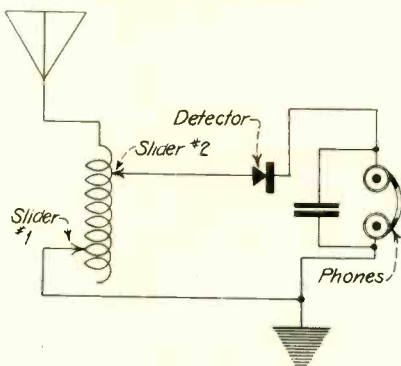
It is a fact that electrical energy travels on the edge of a wire. It is known as skin effect. Therefore, Litzendraht, which contains many strands of wire, would have more surfaces for this electrical energy to travel over than just the one strand of the solid copper wire. Litzendraht wire is expensive. It is used in all high-class receivers where exceptionally good results are expected.

In using the hook-up in RADIO WORLD No.

20, dated August 12, what capacity is the variable condenser, grid condenser and phone condensers? Will this hook-up pick up signals 400 miles from a 500-watt sending station?—M. F. Prine, Hugoton, Ill.

The capacity of the variable condenser is .001 microfarads capacity; grid condenser is .00025 microfarad; phone condenser is simply a fixed by-pass condenser, sometimes called stopping condenser. As this circuit only employs one tube, it is most likely that you will not be able to receive at this distance. We suggest that you add a two-stage amplifier to your set.

Is it possible for me to secure a diagram showing the hook-up of a two-slide tuning coil with crystal detector and all connections?—William Schaefer, Pawtucket, R. I.



Schematic diagram requested by Mr. William Schaefer, Pawtucket, R. I.

The accompanying diagram shows the complete wiring diagram of a two-slide tuning coil with crystal detector and all connections.

In the schematic diagram of the complete regenerative set which you published for Mr. Harold Trowbridge, Canastota, N. Y., in RADIO WORLD, No. 21, dated August 19, what are the capacities of C 1, C 2, and the fixed

or by-pass condensers?—Karl Hector, Auburn, Nebraska.

The capacity of the condenser in series with antenna C 1 was of .001 mfd. capacity, while the capacity of C 2 was of .005 mfd. capacity. The phone by-pass of fixed condenser was of .00025 mfd.

Who is WVP, and what is the wave length he operates on?—John Gleason, Omaha, Nebraska.

WVP is the United States Army reserve broadcasting station located on Bedloe's Island, Fort Wood, New York. It operates on a wave length of 1450 meters.

Suggest a way of taking taps from the primary of a vario-coupler. Is No. 22 single cotton-covered wire suitable for a vario-coupler?—Ben Schlutz, Pensacola, Fla.

Taps should be taken from each of the first 10 turns and then from each tenth turn. The single taps are brought to a fine switch and the others to a coarse switch. No. 22 single cotton covered wire is suitable.

In working with a superregenerative set, I am rewinding my vario-coupler which is to be of the 90-degree type. The primary now has 60 turns of No. 22 single cotton-covered wire, and is tapped and each of the first ten turns and then at the 20th, 30th, 40th, 50th, and then the 60th turn. Would you advise me to have a smaller number of turns and a larger wire?—Kenneth Lothringer, Pasadena, California.

The present number of turns you are using on your vario-coupler are sufficient. Don't make any change.

May I remagnetize my phones if I use them on an alternating current with large electromagnetic?—Joseph Woodson, Topeka, Kansas.

You will ruin your phones if you try to use them with an alternating current. The electromagnet is absolutely useless for this purpose. It is preferable to return your phones to the manufacturer.

Will placing more than 22 volts on the plate of a UV-200 vacuum tube keep it from working, or does it aid the signal strength?—Paul Wentworth, Kansas City, Mo.

Radiotrons work best with an 18-volt plate; but there are experimenting times when the operator must choose his own plate-voltage.

Marconi Company Wins Radio Rights in Austria

AFTER a hard fight, in which the diplomatic representatives of Great Britain and Germany are said to have played active parts, says "The Times," New York, the Marconi Wireless Telegraph Company of London has defeated the German Telefunken Company and won from the Austrian Government the exclusive right to build radio stations in Austria and to handle all the wireless business between the republic and other countries for the next thirty years, according to reports found in Vienna newspapers. The Main Committee of the Austrian National Assembly, against the votes of the Socialist members, has approved the concession, and it is expected to be ratified by the National Assembly itself when it reassembles after the Summer holidays.

In reporting the conclusion of the negotiations, the Vienna "Arbeiter-Zeitung" sharply attacks the government of Dr. Seipel for giving what may within a few years prove to be an absolute monopoly of Austria's foreign telegraphic traffic to a private company. The Socialist organ also wants to know how a Cabinet containing three Pan-German Ministers could have been induced to turn down a German company in favor of an Entente concern, especially as the Telefunken agents offered to meet every point of the Marconi offer, and it says the public would like to know more about the nature

of the "arguments" brought into play. These questions have also been raised in the Federal Council, so there may be further political battles ahead before the concession becomes effective.

Under the tentative agreement, as summarized in the Austrian press, the Marconi Company is to form an Austrian radio telegraph operating company within six months from the date of the concession. The Marconi Company is to subscribe for more than half of this company's capital stock, the Austrian Government is to take 30 per cent. and a group of Austrian bankers is to participate in the organization. The Board of Directors of the Austrian Marconi Company must be more than 50 per cent. Austrian. The operating personnel must be exclusively Austrian and be selected from among employees of the Austrian State telegraph system. Operations are expected to begin in the Summer of 1923.

In case the net profits of the company exceed 8 per cent., after covering possible deficit in the preceding business year and setting aside the prescribed amount to the reserve fund, the management is to keep half of such excess. When the concession expires, the management has the right to buy the company's equipment within six months at price to be fixed by experts or the Austrian courts.

Radio-Frequency Tuned Amplifier Works Satisfactorily

CONSIDERABLE interest has been aroused throughout the country by the recent development of a radio frequency tuned amplifier. Most efforts along the lines of radio frequency amplification have been confined to the use of the untuned radio frequency transformer, working efficiently over a very narrow band of wave lengths, says "The World," New York. But the unit, being tuned, works efficiently over a band of wave lengths ranging from 200 to almost 600 meters.

This is accomplished by the use of a variable condenser, operating in conjunction with a fixed inductance, both having extremely low resistance, and consequently the interaction between the capacity effect of the condenser and the inductance as well as external body capacity effects are reduced to a minimum, permitting easy tuning, impossible with any other type of variable control of a tuned radio-frequency amplifying unit. When the new unit is used in connection with an audion detector an amplifier tube is placed in the detector unit, with the grid leak and condenser bridged or short-circuited.

The detector tube then is placed in the radio frequency unit, which then contains the radio frequency tuner, detector tube and its control. Engineers have found that this radio frequency tuned amplifier increases the range and volume of the average detector unit at least ten times, making it far more efficient, easier to tune and giving to it power to produce satisfactory results in working over a wide band of wave lengths.

One of the features of the new unit is the variable condenser. The most common form of condensers, called interlocking air-plate condensers, depend upon air for the dielectric. Their construction necessitates a comparatively wide gap between the plates, which means low capacity for the given unit of plate area. But the variable condenser under consideration 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 down or showering. Therefore, the condenser can be used safely for C. W. work or modulated C. W. work. Any one who has experimented with radio telephone will readily recognize the advantage of this feature.

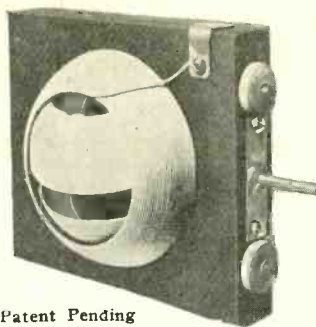
The contacts to the two plates are positive, thus eliminating to a great degree the internal resistance that develops in a short time in the air condenser from corroded spring contacts, etc. Variation is accomplished by the book action of the two plates operated by the cam. This cam is especially designed to as uniform a variation of capacity as possible over the entire range of 180 degree scale. Both plates are almost completely covered with copper, and one copper plate completely covered with a thin sheet of mica. The copper and mica are attached by means of a special grade of cement having high electric properties, to eliminate possibility of leakage.

Hence the calibration curve of the condenser is most satisfactory. Tests in the laboratories of one of the leading universities of the United States have shown the maximum capacity never to be less than .0008 Mf. This frequently runs much better than .001 Mf.

A Radio Necessity!

Latest broadcasting map 15c. That is, a complete broadcasting map appeared in Radio World, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C.

RADIOMART VARIOMETERS ARE SELLING FAST!



Patent Pending

The Design Is As Efficient As It Is Exclusive

Such is the VERDICT of all radio men. There is a minimum clearance between stator and rotor; our process makes the coils as strong as metal; with no dielectric losses; nickel plated brass bearings. A three-inch dial will cover the two mounting screws.

RADIOMART variometers are best for 3 circuit and single circuit receivers. Wave length, 150-600 meters. They are the neatest and best shaped variometers made anywhere. Satisfaction guaranteed.

Price, \$5.00 prepaid. Cash or C. O. D.

Our Literature is Free!

More Dealers Wanted!

RADIOMART CO.

1230 American Ave.
Long Beach, Calif.



Hard Rubber Composition PANELS

Conform to Navy Specifications

A High Resistance Panel, Guaranteed Not to Warp, and Drilled Cleanly Without a Burr. Highly Polished—Edges Ground to Size.

Standard sizes, 7x10x3/16, 7x18x3/16, 7x24x3/16, 10x12x3/16, and 12x14x3/16, in stock for immediate delivery. Orders for special sizes received in the morning, shipped the afternoon of the same day. Binding posts, dials, and knobs to match. We have a complete line of Coils, Variometers, Variocouplers, Sockets and Rheostats.

Largest Discounts.

Jobbers and Dealers! Write for proposition and Free Sample!

CAREFUL ATTENTION GIVEN

TO ALL RADIO ENTHUSIASTS

ALLIED RADIO COMPANY, INC.

Dept. D, 445 SEVENTH AVENUE, NEW YORK CITY, Fitzroy 3731

WANTED—A Reliable New England Representative.

For CORRECT RADIO MAILING LISTS Use THE POCKET LIST

of Radio Manufacturers, Jobbers and Dealers in the United States and Canada. Issued Quarterly—January, April, July and October. October, 1922, issue corrected to September 15th, 1922. Classified under three different headings—Manufacturers, Jobbers and Dealers—and alphabetically arranged by states, cities and towns and names of firms. Containing approximately 15,000 names and addresses.

We have been exceptionally careful to see to it that every Manufacturer, Jobber and Dealer is listed and under the PROPER CLASSIFICATION. Most mailing list concerns charge more than \$100 for a list of this kind and, as a rule, those supplied are far from being correct. Compare this list with any other, and you will find it to be the very best obtainable anywhere at any price.

October issue ready for distribution September 25th. Price \$5.00 per copy, or \$10.00 per year (four issues, including monthly supplements which keep the list absolutely correct and up to date at all times). October edition limited. Send your order with remittance today.

F. D. PICKENS, 1021 CARRINGTON STREET
JANESVILLE, WISCONSIN

"TUNING IN"

TO THE RIGHT TUNE IS VERY SIMPLE WHEN YOUR CONNECTIONS ARE SOLDERED WITH THE NEW

"POST SOLDERING IRON"

(The Iron with the Platinum Heating Unit). Removable Soldering Tip



1/2 Actual Size

LIST \$6.00

Designed especially to cover every requirement for delicate work. The smallest practical, efficient instrument on the market. Attaches to any socket. Universal current. Fully guaranteed. From your jobber or write

POST ELECTRIC COMPANY

30 EAST 42ND STREET

NEW YORK

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

1493 Broadway, New York City.

Please send me RADIO WORLD for months, for which please find enclosed \$

SUBSCRIPTION RATES:

Single Copy\$.15

Three Months1.50

Six Months3.00

One Year (52 Issues)..... 6.00

Add \$1.00 a Year for Foreign and Canadian Postage.

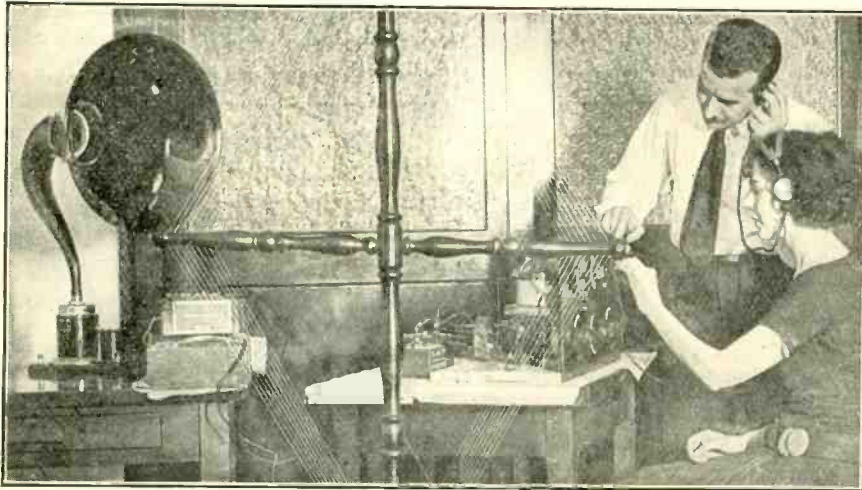
Advertising Rates, Display, \$5.00 per inch, \$150.00 per page

Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word

Telephone Bryant 4796

Armstrong Superregenerator in Operation



This illustration shows an Armstrong superregenerative set in operation. Durham & Co., of Philadelphia, who are specializing in this set, are the manufacturers of the 5-M.H. and 100-M.H. choke coils, also the 12,000-ohm resistances and .005-mfd. condensers used exclusively with this set for satisfactory reception.

Sell Only Tested Radio Merchandise, Says Myron M. Studner

"Many people have been greatly discouraged with the working of their radio apparatus and this was only natural, due entirely to the type of individual that has been trying to ex-



MYRON M. STUDNER

plot this great field for personal gain rather than for the development and improvement of radio merchandise," said Myron M. Studner, designer and manufacturer of radio apparatus,

to a representative of RADIO WORLD. "The law of compensation is surely manifesting itself in this instance as in all others, and the old adage, 'Shoemaker stick to your last,' is true. An unscrupulous person or firm cannot truly make a success or produce an instrument of a standard, unless their past experiences and performances have been such that they know what they are about.

"I am glad to note that the dealers throughout the country have come to a realization that only tested and merited merchandise can be sold and that the firms and distributors are behind each and every piece of apparatus that they make. Radio reception this winter will surely be an artistic treat and delight to all people, as is quite evident by the preparations made by reputable concerns to meet the demand and give service. Success in radio reception, as well as in anything else, is a matter of intelligent selection of the proper instruments, to receive proper results. In the long run the best is usually the cheapest."

Radio Business Booming Radio Wholesaler Announces 100 per cent Increase in Business

The manager of a wholesale radio distributing company of Newark, N. J., announces that from September 1 to September 12, his firm did a larger volume of business, by 100 per cent, than during the entire month of August.

This shows the trend of the radio business.

New Firms and Corporations

Notices in this department are considered as purely interesting trade news and published without compensation to us. We welcome trade news of this nature. All notices having an advertising angle are referred to our Advertising Department, and are placed under Classified Advertising at 5 cents a word, or as Display Advertising at \$5 an inch.

(The firms and corporations mentioned in these columns can be reached by communicating with the attorneys, whose addresses are given whenever possible.)

Cofth & Dean, Wilmington, Del., electrical goods, \$500,000. (Corporation Trust Co. of America.)

La Flint Battery Corp., Binghamton, N. Y., \$250,000 to \$100,000.

Pacific Electric Co., Inc., Hoquiam, Wash.

Federal Telegraph Co. of Delaware, install and operate system, New York, \$2,000. (United States Corporation Co.)

Standard Radio & Electric Supply Co., Harry E. Jackson, 2208 Broadway, Oakland, Cal.

New Era Electric Shop, Inc., 5218 West 25th Street, Cicero, Ill.

Packard Electric Corp., 307 Cass St., Joliet, Ill.

Auto Electric & Radio Service Co., 28th and Harney streets, Omaha, Neb.

Broadway Electric Supply Co., 1300 Broadway Street, Detroit, Mich.

Radio Electric Co., 513 South Ervay Street, Dallas, Texas.

Southern Radio Laboratory, Harwood and Bryan streets, Dallas, Tex.

Big Radio Growth

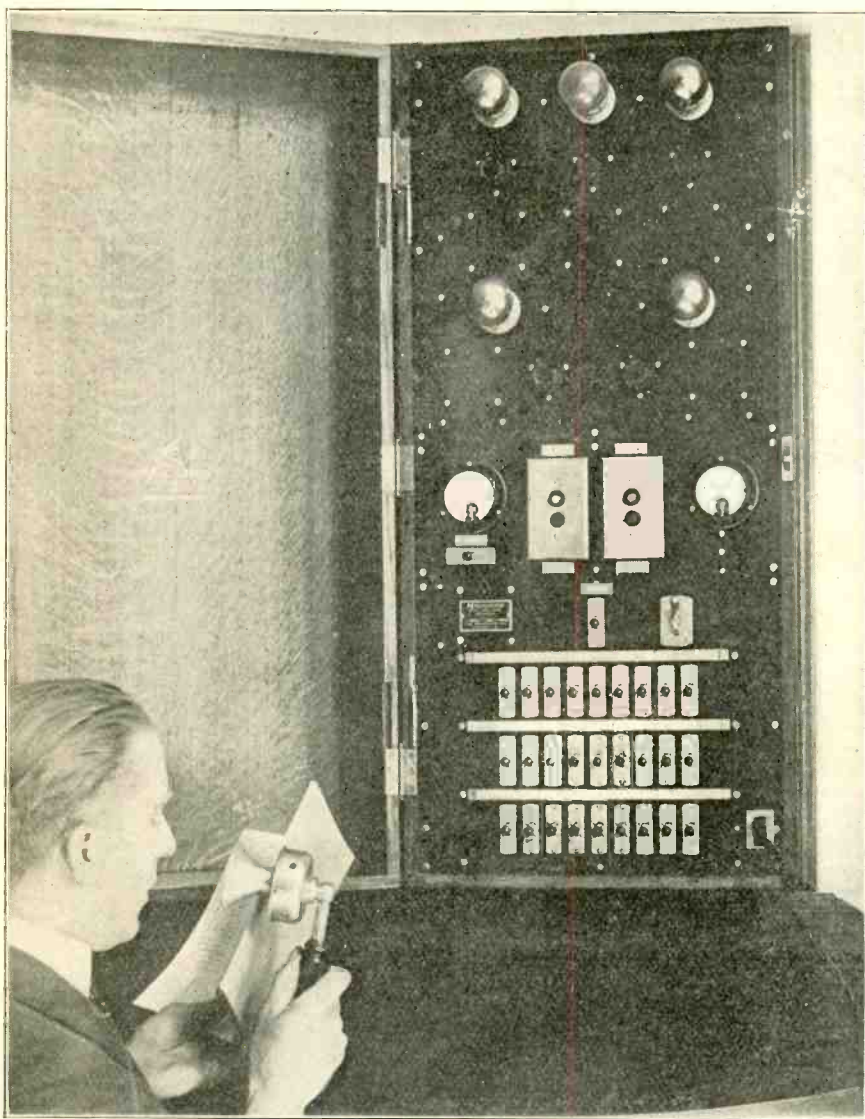
IN New York city the recent growth of the radio has been so rapid that it is estimated there are now from 75,000 to 100,000 apartments in the city equipped with receiving sets. Wireless equipment has in fact come to be considered so indispensable that plans now being made for many new apartment houses to be built in the next year or so provide radio equipment for each apartment. There will be a central receiving station connected with the apartment and in charge of an experienced radio operator, similar to the switchboard operators in apartment buildings. Radio broadcast concerts and news will be received by the central station and radiated to each apartment, which will be furnished only with a loud speaker, since all the radio instruments will be in the central radio room, where the complete tuning will be done by the expert in charge.

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, N. Y. C.

REPRESENTATIVES WANTED!

RADIO WORLD wants young hustling subscription representatives in every college, school, factory and big business concern throught the country. Send us your name and address for full particulars. RADIO WORLD, 1493 Broadway, New York City.

Novel Radio Installation in Piedmont, California, High School



Principal of the Piedmont, California, High School, talking to the students in twenty-five class rooms simultaneously, through a Magnavox Telemegaphone installation. This also has a radio hook-up.

AN interesting radio installation has been completed for the Piedmont High School, Piedmont, Cal., involving a distinct improvement over present methods of inter-classroom communication. Developed by the Magnavox Company, the installation consists of a central or master station, and twenty-five receiving stations, each equipped with a No. LS-2 Magnavox Telemegaphone, the motor generator and battery being installed in a steel cabinet in the basement.

The master station is operated like an ordi-

nary telephone, as shown in the accompanying photograph. Talking into the Magnavox in ordinary tones, the speech is amplified in any or all of the twenty-five classrooms as desired in sufficient volume to be distinctly audible to all the students. This is its first application to school service. A distinctly novel feature is the fact that, by means of a special switch, broadcast lectures and concerts may be connected so as to be reproduced in any or all the classrooms by the same Magnavox Telemegaphones.

Coming Events

The editors of RADIO WORLD will gladly publish news items of all contemplated radio shows and expositions. Keep us posted by mailing full information.

ANNUAL SHOW OF THE ST. LOUIS RADIO ASSOCIATION, St. Louis, Mo., October 4 to 7, inclusive.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 4 to 22. U. J. Hermann, managing director, 549 McCormick Building.

RADIO CLUB OF AMERICA. First autumn meeting will be held the last Friday in September. Renville H. McCann, secretary, Columbia University, New York.

CINCINNATI RADIO AND ELECTRICAL EXPOSITION, Music Hall, Cincinnati, O., October 2 to 7, inclusive.

TRI-STATE TOBACCO GROWERS' RADIO SHOW, Covington, Ohio, October 21 to 28, inclusive.

NEW YORK ELECTRICAL AND INDUSTRIAL EXPOSITION, Grand Central Palace, New York City, October 7 to 14, inclusive.

NEWARK'S SECOND ANNUAL RADIO SHOW, Robert Treat Hotel, Newark, N. J., October 4, 5, 6 and 7.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inclusive, 1923, George A. King, director of publicity, 417 South Dearborn Street, Chicago, Ill.

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31, inclusive. Direction American Radio Exposition Company, 120 Broadway.

BOSTON RADIO EXPOSITION, AND NEW ENGLAND AMATEUR CONVENTION, Mechanics Building, Boston, October 30 to November 4, inclusive.

SPRINGFIELD RADIO EXPOSITION, Springfield Auditorium, Springfield, Mass., October 3 to 7, inclusive.

Pioneer of Radio Industry Honored



Colonel John Firth, John Firth & Company, Inc., twenty-one years in the wireless industry.

TWENTY-ONE years ago, on August 30, 1901, Colonel John Firth of the firm of John Firth & Company, Inc., engaged in the wireless industry. The event was fittingly celebrated on August 30, last, by a dinner tendered Colonel Firth by his business associates. When Colonel Firth started his business, radio was very much in its infancy. But Colonel Firth, one of the real pioneers to see its great possibilities, stuck to belief in the new science, and, guided by his vision, built up a successful business. To-day he is proud to be called a pioneer of the radio industry.

A handsome loving-cup was presented to Colonel Firth by his associates in John Firth & Company, Inc. Another remembrance came from the Democratic party of the Borough of Richmond. A number of speeches congratulating Colonel Firth were made and to which he replied.

"To-day I celebrate my twenty-first year in the wireless industry," said Colonel Firth. "It has been a most fascinating and interesting career. I am proud of the development and accomplishments my firm has made. As you gentlemen know, the industry, to-day, has become a world-wide method of communication that is speeding human endeavor ahead by years. To-day we find the world of matter a great nerve vibrating thousands of miles through a breathless point of time. Because I am a factor in the development of this huge industry makes my twenty-one years in the radio industry a period of deep appreciation and satisfaction."

Among those present were: John A. Lynch, president, Borough of Richmond; Harry Tierney, County Judge and Surrogate; C. J. Druhan, assistant corporation council of New York; T. J. Oxholm, general engineer of the Borough of Richmond; Dr. Royal Copeland, Health Commissioner of New York City, and many other prominent officials of the New York City administration.

Subscribe direct or through your news dealer. \$6.00 a year, \$3.00 six months, \$1.50 three months. Radio World, 1493 Broadway, N. Y. C.

AGENTS

Wanted in every city and town to sell radio apparatus. Good commissions. A few stocking agencies open to reliable parties.

DELANCEY, FELCH & COMPANY
13 Meeting St. Pawtucket, Rhode Island

Recommended by Dealers for Reliability

RADIO STORES CORP.

VARIABLE CONDENSERS—
PLUGS—RESISTANCE UNITS, ETC.
If your dealer doesn't carry, address Dept. D,
222 West 34th Street, New York

BUILD YOUR OWN



Complete 50c. instruction book for 20c. only on radio reception and how to make eight classes of crystal and vacuum tube receiving sets. Wonderful information makes you understand radio. With every order we send free our price list of parts prepared especially for the several sets described. Buy direct from factory and save many dollars. Both instruction book and price list sent on receipt of 20c. only. Money back if not pleased.
RADIO PARTS MFG. CO.
Dept. 15, Park Pl. W., Detroit, Mich.

20c

CRYSTAL SET \$4

"THE LITTLE WONDER"
\$2.50 UNMOUNTED

Wonder in name and a wonder in performance. Cannot be equalled for the price. Catches distinctly everything within 25 miles.

Send for FREE catalog, describing our "Little Wonder" set and listing radio supplies.

Radi-O-Plate Panels. All sizes cut to order.

HOLLOWAY

ELECTRIC SUPPLY CO.

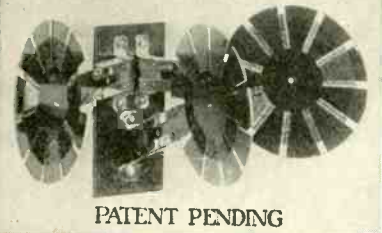
238 Third Avenue New York City

Tune 20 times faster—and louder with the ideal combination for vacuum tube control

The **AMPLITROL** and the **KLOSNER RHEOSTAT** model 200—see them at your dealer's

KLOSNER IMPROVED APPARATUS COMPANY
2024 Boston Road—New York City

THE GOODMAN



The Niftiest Short Wave Tuner on the Market
Only \$6.00 & PP on 1 lb.
Send for pamphlet. Order through your dealer.

L. W. GOODMAN
DREXEL HILL, PA.

Dr. Miller, of Chicago, writes: "My perfectly good variometers and vario-coupler now go into the discard."

Latest broadcasting map 15c. That is, a complete broadcasting map appeared in Radio World, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C.

RADIO WORLD

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1493 Broadway, New York

ASSOCIATE EDITORS:

Robert Mackay Fred. Chas. Ehlert

SUBSCRIPTION RATES:

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months.

Add \$1.00 a year extra for postage to Canada and foreign countries.

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

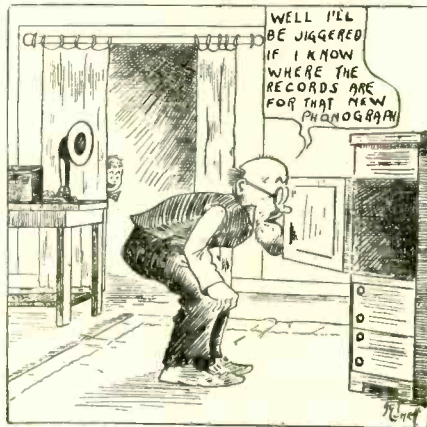
Advertising rates on request.

Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

IMPORTANT NOTICE:

While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

Grandpa Can't Find the Radio Records



From "The Globe," New York

Radioman "K.O.'s" Cyclone

SAILOR JOE-JOE, otherwise Radioman Joseph H. Boyer, attached to the U. S. S. "Patuxent," now at Coco Solo, Canal Zone, has stepped into the limelight as a contender for the welter-weight championship of the Isthmus. A few days ago this radio fighter knocked out "Cyclone" Clifford, a local favorite, in the sixth round at the Coco Solo Naval Air Station. This is the first victory of a radioman over a cyclone. Nautical witnesses state that Cyclone Clifford didn't know his "code," but admit that static may have interfered. It does with most everything in the tropics.

Phenomenal!

The most remarkable thing about the rapid spread of radiophones is that it has occurred without a law forbidding it.—"The Star," Kansas City, Mo.

Subscribe for Radio World, \$6.00 a year, \$3.00 six months, \$1.50 three months.

V-A-C-U-U-M-T-U-B-E-R-E-P-A-I-R-I-N-G
A C C U U M T U B E R E P A I R I N G
Save on 1.50 Detectors | Save on 3.00 Amplifiers
Repairing all detectors and amplifiers using a single tungsten filament such as the following listed tubes, Marconi, Moorehead, DeForest, A. P. Electron Relay, Radiotron UV-200, UV-201, Cunningham C-300, C-301.
Detectors and Amplifiers repaired for \$3.50.
The repaired tubes, we warrant, will give you the same absolute satisfaction that you would expect to receive from new tubes.
We are now in a position to give guarantee for prompt deliveries with satisfactory results. A reasonable trial will confirm our reliability.
George H. Porell Co., Inc.
WEST SOMERVILLE, MASS.
V-A-C-U-U-M-T-U-B-E-R-E-P-A-I-R-I-N-G

GOING—and Going Fast

We have only a few left and they are going fast, but while they last we will continue to sell them at the reduced price.

VT 1 Detector and Amplifier.....\$7.50
VT 2 Detector and Amplifier.....\$8.00

The above tubes are the genuine army J's and E's, respectively.

"RADIO BUILDER" PLANS FREE!
By Mail, 5c.

LIBERTY RADIO CO.

106 Liberty Street New York City

KNOCKED-DOWN VARIABLE CONDENSER

MONEY-SAVING PRICES

An accurately made, fully efficient instrument that cannot get out of order or adjustment. Fully guaranteed. Extra heavy aluminum plates. Condensate end pieces. All other parts heavily nickel-plated. Knob and pointer included. Furnished assembled or knocked-down at the following low prices. Ready assembled by anyone following instructions furnished. Save money—order from us. Folder upon request.



No. of Plates	M.F.D. Capacity	Assembled Price	Knocked-down Price
3	.00007	\$1.75	\$1.50
11	.00025	\$2.50	\$2.00
21	.0005	\$3.25	\$2.50
43	.001	\$3.90	\$2.90

Lott's Better Radio Condenser Co.
475 ORANGE STREET NEWARK, N. J.

Radio Supplies

Variocouplers, Variometers, Headsets, Transformers, Sockets, Rheostats, Etc.

Guaranteed Crystal Set \$4
25-Mile Or Money Refunded PRICE,

Send fifty cents for 20 efficient blue-print hook-ups.

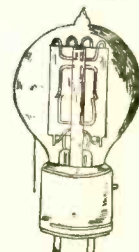
Any Radio Set Made to Order or Repaired

Sunbeam Electric Co.

71 THIRD AVE. NEW YORK



V-T 1 at \$7.54 "J" Tube



V-T 2 at \$8.45 "E" Tube

These are the Tubes for which so many are inquiring and that are still difficult to find anywhere. There being very few of these tubes on the market, and after present supply is exhausted, more will not be available at any price, as they are to be made exclusively for the U. S. government, sure long life.

FULL LINE OF SUPPLIES. LOWEST PRICES ON STANDARD MERCHANDISE. GET OUR PRICES BEFORE PLACING YOUR ORDERS.

Amalgamated Radio Supply Co.
EXPORT AND IMPORT
193-A William Street New York City
DEALERS SUPPLIED

**IMPORTED
DETECTOR TUBE, \$2.75**

Manufacturers' Guarantee 1000 Burning Hours
This is a real \$5.00 value

43 Plate Condensers .001 Mfd.....	\$1.95
23 Plate Condensers .0005 Mfd.....	\$1.65
Jefferson Transformers.....	\$2.95
4,000 Ohms French Phones.....	\$8.00
\$5.00 Vario-Coupler.....	\$2.75
Two-Slide Tuning Coils.....	\$1.75

Mail Orders Filled Promptly
Send for Complete List of Specials

J. J. KELLEHER
14 UNION SQ. EAST
Phone Stuy. 9636



**NA-ALD
V. T. SOCKET**

35c each, 3 for \$1.00.
Moulded genuine Condensite.
Requires but small space
for mounting. Readily ac-
cessible binding posts. No
excess metal to interfere
with efficiency. Unaffected
by heat of bulbs or soldering iron. Phosphor
bronze contacts. Nickel plated brass binding
screws. Slash cut slot. Price possible because
of large production.

Special proposition for
dealers and jobbers.

ALDEN-NAPIER CO.

52 Willow St. Dept. L. Springfield, Mass.

**NOW THAT YOU ARE BACK
FROM YOUR VACATION—**

Be sure to see that your file of **RADIO WORLD** is complete. There will soon be so great a demand for back numbers that the supply will not be sufficient to cover it. **RADIO WORLD** has been issued every week from April 1 to date (22 numbers up to August 26th issue). Mail, postpaid, for 15c a copy; any seven copies for \$1.00. The first 22 copies sent on receipt of \$3.00. Or send \$6.00 for one year (52 issues) and have your sub start with No. 1.—**RADIO WORLD**, 1493 Broadway, New York City.

**Installing a Receiver in the
Bathroom**

WE never felt so popular in our life as last Saturday, when a large and expectant family stood on the steps of a country house in Long Island to greet us as the week-end guest who "knew all about installing a radio set," says a writer in "The Globe," New York.

We were thoroughly confident that the anticipation would not be disappointing. The set was a good standard make, with two stages of amplification, and the house situated not more than fifty miles from Newark. So we took off our coat and went to work.

But we had reckoned without our host, who had neglected to inform us of his inadequate equipment. In common with his wide-eyed and hopeful offspring, he thought that all you did to a radio set was to set it on a table and the music would come.

We secured a battery finally from the automobile. The wire we stole, heaven knows where, removing the insulation with a ferocious looking butcher knife. Wire for an aerial was not available, unfortunately, but we had foreseen this and brought along a condenser plug.

Finally everything hooked up, set, both batteries, the plug (via two lamps connected together), we looked for a ground. None to be found. No water pipes on this floor, heat supplied by furnace or fireplace, not even a copper rod to be had. I decided to give up.

Then, looking up, we saw tears of disappointment in the eyes of the two smallest children, who had pleaded to be allowed to stay up "just to hear the bedtime story." So we carried set and batteries to the bathroom on the next floor. plugged into the light socket, again with the intervention of a lamp and cord, grounded on the water pipe, and in ten minutes were rewarded by the sight of a row of happy infants sitting on the edge of the bathtub as the voice of the "Man in the Moon" rolled in clear.

**SUPER SENSITIVE
SELENIUM CELLS**

Guaranteed More Sensitive Than Any Other Cell.
Manufacturers' Selenium Laboratories
Live Wire Radio Co., Sole Agents
36 THIRD AVE. NEW YORK



Corporal

THE BEST LITTLE
THING IN RADIO

**EBY
BINDING POSTS**

Place your fall orders now
Latest reductions enable us to quote attractive prices.



Ensign "H"

H. H. EBY MFG. CO., PHILA., PA.

BUY "RITE"

Set of three rheostats, one Klossner Vernier, and two none vernier knobs to match.....	\$2.40
Teagle Sockets — for base or panel mounting.....	.55
Switch Lever, 50c value.....	.30
Vernier Condenser—46 Plate.....	5.90
Vernier Condenser—23 Plate.....	4.90
D. C. or S. C. Jacks.....	.48
75c. Dubilier Condenser.....	.62
35c. Dubilier Condenser.....	.28
65c. Grid Leaks.....	.52
\$4.00 Varicoupler.....	2.90
All range coupler.....	7.00
Crystal Set complete, with double ear phones, antenna, etc., ready to install.....	20.00

All Armstrong Parts in Stock.
Postage Paid.

Dealers write for catalogue.

RITE RADIO SHOP

Cor. 4th Ave. and Pacific St.
BROOKLYN, N. Y.
1 block from L. I. R. R. Station
Tel. Sterling 8513

Subscribe for **RADIO WORLD**. \$6.00 a year, \$3.00 six months, \$1.50 three months.

**CASTINGS
BRASS, BRONZE, ALUMINUM**

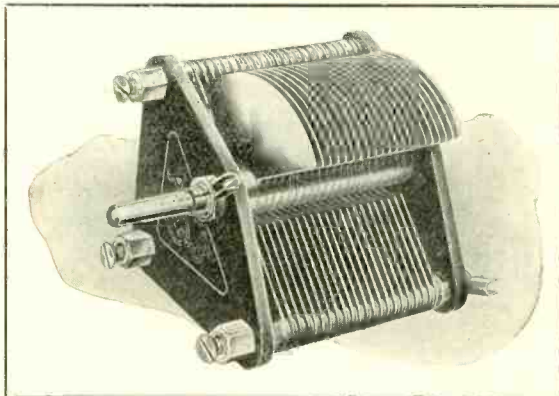
**Our Motto
"SERVICE"**

THE ANCHOR BRASS & ALUMINUM CO.

Ninth and Freeman Sts.

CINCINNATI, OHIO

A LABORATORY QUALITY CONDENSER



MADE OF THE BEST MATERIALS
BY
MEN WHO KNOW HOW

BULLETIN
ON
REQUEST

A. B. COLE, INC.
88 East Kinney Street, Newark, N. J.

Spirola Concert Complete With Unit

TRADE MARK PATENT PENDING

The only way to really enjoy radio music is to use V. I. amplification and a LOUD SPEAKER.

Listening in with head phones is all right as a novelty, but no one who has ever used a real loud speaker outfit would ever go back to the phones. It would be like going back to one of those ancient phonographs where you had to listen with rubber tubes to your ears.

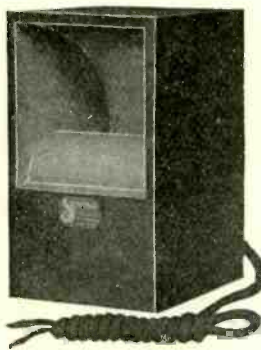
BUT—many people have gotten the idea from the radio "music" they have heard on the street that loud speaking means distortion—a blaring, raucous sound, lots of NOISE but not much music. This idea is entirely wrong. SPIROLA CONCERT reproduces radio music with absolutely NO distortion or tinny, blaring quality and with a minimum number of stages. Two stages of amplification are sufficient under almost all conditions to bring in the music clear and strong and as natural as life—one stage is enough within twenty miles or so of a large broadcasting station.

These are not mere advertising claims. We back them up with an absolute guarantee. If you wish to return your SPIROLA for any reason whatsoever, do so within ten days and your money will be immediately refunded.

Beautiful cabinet type, choice of either mahogany or dark oak finish, with bronzed throat, complete with cord, ready to hook up—no "units" or other extras to buy—at your dealers or prepaid anywhere in the U. S., Canada or England—\$12.50.

MADE AND SOLD BY

L. H. DONNELL MFG. CO.
Dept. B, Box 70, Ann Arbor, Mich.



"Spirola Speaks"

YOUR PHOTO IN THIS PAPER ATTENTION AMATEURS!

Have you built your own receiver?

Are you experimenting with any particular hook-up?

Are you improving your set?

Are you doing any interesting constructive work in radio?

Why not share this knowledge with your thousands of brother fans who read RADIO WORLD every week?

We want pictures of receiving sets with descriptions of how you overcame some difficulty or any additional part or unit that you have added to obtain better results. These are the things that, probably, the other fellow is looking for. Send in your information; pictures or whatever you have done to improve the art.

Address Technical Editor

RADIO WORLD, 1493 Broadway, New York City, N. Y.

Remember the beginner is looking for them.

We intend to print on this page, each week, pictured information and description of value to radio amateurs. If you have found a newer or better way of doing anything, don't keep the secret but tell it to your thousands of brother fans.

Send in a photograph of your set with or without accompanying diagrams and measurement. State whether you figure in the picture yourself, or not, and without any expense whatsoever to you we will make an engraving and publish it. Be sure to write your name and address plainly on photograph.

Send in your picture at once, or if you have not made a set or done anything else in making radio material, tell the boy next door all about this offer.

Radiogleanings

WIRELESS signals are most easily perceptible and loudest at that point on the earth farthest from the station sending the message.

Use the same kind of wire for stringing up your insulators that you use for the antenna itself. Rope will stretch and shrink with the changes of weather and will cause the antenna to sag and tighten up. This strain may cause the wires or the rope to give way.

Although Radio Central, Riverhead, L. I., can talk to Wales, France, Germany, or Norway with ease, Riverhead can listen simultaneously to messages from all those countries. At the same time it can close its "ears" to the powerful impulses sent out only a few miles away by the giant Radio Central, and is able to eliminate 90 per cent of atmospheric disturbances.

U. S. Signal Corps officers estimate that radio has saved hundreds of hours in time, as well as thousands of dollars, since its installation.

The B battery, if left in a damp place, will be found to be useless for radio purposes. Actual use takes less from a B battery than half the time spent in damp inactivity.

B battery is extremely fragile. It is true that it appears solid and bricklike, but it must nevertheless be handled almost as carefully as a watch.

When building a loop, make it as large as conveniently possible, as a large loop with a small number of turns will give better results than a small one with a greater number of turns. The average size ranges from three to four feet square. For short wave use a four-foot loop should have from four to six turns.

A crystal detector will give excellent results on your antenna and a range of about twenty-five miles.

When a radio set is not operating correctly it is analogous to the human body when ill. It has symptoms which tell a story to the doctor, who understands their meaning and knows how to remedy the condition. So it is in radio. Each objectionable sound is a symptom telling a story which can best be interpreted by practical experience, enabling the radioman to understand the meaning and rectify the trouble by adjustment of the instruments.

Cross wires as seldom as possible; keep them well separated where they cross; keep them as short as possible; have them well insulated and make good connections.

When connecting a new, complicated and unfamiliar hook-up it is a wise radio fan who leaves one B battery terminal open until the last connection has been made. Then by placing most of the filament rheostat in the circuit and cautiously completing the B battery connection any high voltage in the delicate filament will be detected before the tubes are burned out.

It is a mistake to rate phones entirely by their ohmage, as the sensitivity is only indirectly dependent upon this factor. A high ohmage could be obtained by winding the receiver magnets with resistance wire, but if this were done the phones would be very insensitive indeed. This system of valuation is about as good as a system that determined the worth of a man by his weight in pounds.

Standard the World Over



The Phone with the adjustable pole pieces that can be used on any stage of amplification or will receive the most sensitive signals. Guaranteed to be equal of any phone on the market listing at \$8.00.

PRICE \$5.75

If your dealer cannot supply you write direct. One dollar at least must accompany each order. Balance C. O. D.

Dealers and jobbers write.

Standard Electric Sales Co.
843 Broad Street Newark, N. J.

**The FAMOUS GREWOL
FIXED DETECTOR**



PRICE \$2.00

OPERATES WITHOUT BATTERIES.

In using the

GREWOL

you don't have to find the spot.

**THIS DETECTOR IS
ALWAYS SET AND READY**

completely protected from dust.

Gives the best results.

If your dealer does not handle the Grewol send us \$2.00 and we will mail one to you.

WRITE FOR OUR TRADE
PROPOSITION

RANDEL WIRELESS CO.
9 Central Ave. Newark, N. J.

**Practical Instructions for
Erecting Aerials**

THE most common cause for the non-reception of signals, or even weak signals, is due to the improper erection and construction of the aerial with a proper lead-in. It must be remembered that lead-in wires bring the signals from the aerial to receiving set. If a few simple rules are carried out when the aerial is being put up, it will guarantee proper reception of the wave energy and conduct it cleanly to the receiving set.

A No. 14 wire, either solid or stranded, 100 to 150 feet long, may be used. It will be sufficient to receive wave lengths from 150 to 800 meters. Copper wire or phosphor bronze gives the best results. I would not recommend that any other wire be used. This wire may be made into one aerial with a horizontal length of 100 feet, or into a two-wire aerial 40 to 50 feet long with the rat-tail, or lead-in, brought down from one end. In all cases, if any means can be employed to erect the aerial in one length, far greater results may be had than with a two-wire aerial. The aerial should be supported between two masts, or poles, preferably 20 to 30 feet above the roof. It is always a good plan to have your aerials as high and as long as possible.

Another important factor: when connecting or making joints at lead-in wires, be sure to solder all connections

Handy Tool Kit for Radio

- 1 pair 5-inch long-nose pliers.
- 1 pair 5-inch side-cutting pliers.
- 1 pair 8-inch diagonal pliers.
- 1 12-inch medium screwdriver.
- 1 4-inch small screw driver.
- 1 jeweler's screwdriver.
- 1 hand drill.
- 1 set of twist drills.
- 1 small hammer.
- 1 pair small gas-pliers.
- 1 reamer.
- 1 roll of rubber tape.
- 1 electric soldering-iron.
- 1 rosin solder.
- Half pint of killed muriatic acid. (Never use soldering paste).
- 1 hack saw.
- 1 small vise.
- 1 small file.
- Sandpaper of various sizes.

RADIO INSULATION

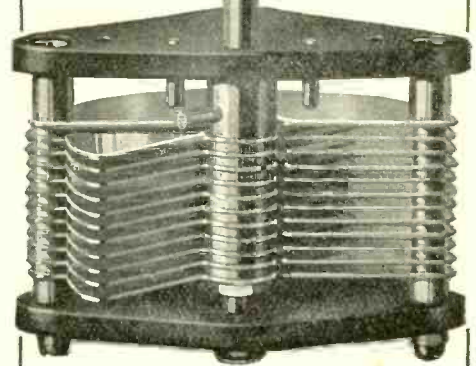
"SPAGHETTI"—VARNISHES—WAXES
COMPOUNDS—PAPERS—ETC.

ESTABLISHED 1889

Write for Price Bulletin and Samples.
MITCHELL-RAND MFG. CO., 24 Vesey St., N.Y.

"RADIO"

Variable Condensers



These condensers are the
Standard of Quality.

- 3 Plate Vernier \$1.50
- 23 Plate \$4.00
- 43 Plate \$5.00

Sent prepaid on receipt of price.
Special discounts to Radio Clubs.

Jobbers and Dealers write.

Frederick H. Pruden, Incorporated

LERNER BUILDING
993 BERGEN AVENUE
JERSEY CITY, N. J.

If you did not get a copy of Radio World No. 1, send us \$6.00 and we will send you this paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

Teleradio



The Teleradio Tube Socket
Whose handsome design is adapted for table or panel mounting. Of shell-drawn aluminum. All parts perfectly insulated—legs are not current-carrying. Terminals plainly marked.

List Price, 60c



2,000 Ohms, \$6.50

2,200 Ohms, \$7.50; 3,000 Ohms, \$9.00
Each

Teleradio Supersensitive Headsets equal the performance of phones selling at \$12.00 and \$15.00.

If your dealer has not stocked Teleradio Products write us direct
DEALERS and JOBBERS write for our PROPOSITION

OTHER TELERADIO PRODUCTS

Variable Condensers, 3, 11, 23 and 43 Plates, list prices are \$1.50, \$2.50, \$3.00 and \$4.00, respectively. Filament Protectors, 60c. Fixed Phone and Grid Condensers, 35c each.

TELERADIO ENGINEERING CORPORATION

484-490 BROOME STREET

NEW YORK

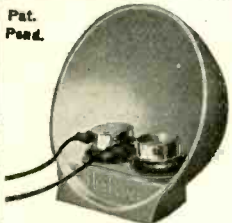
Rocky Mountain Crystals

BETTER THAN GALENA
The most sensitive mineral rectifier known. Can also be used with one or more stages of amplification.
Mounted, 35c.; Unmounted, 20c.; Postpaid
Manufacturers, Jobbers, Dealers, Clubs,
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These are neatly typewritten and ready to send on receipt of remittance covering the amount. Guaranteed 98% correct.
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No tubing or horn to distort delicate notes. Swells every sound into full richness!
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Newark, N. J.

\$5.00 AT ALL GOOD DEALERS OR DIRECT BY MAIL

"MIRAD"

"Quality Radio Priced Right"

3 Plate Variable Condensers..... \$1.50
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3000 Ohm Double Head Phones..... 6.00
1500 Ohm Single Head Phone..... 3.00
(Money back guarantee.)
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Mirad 43 Plate Variable Condenser.... 4.95
Mirad Detector Unit..... 30.00
Mirad Two-Step Amplifier..... 25.00
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Dealers' Sample of Above 25% Off

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GENUINE MYERS' AUDION HI-MUTUBES

\$4 each

1 or 100 at this price so long as my stock lasts.

All original tubes in original packages direct from the Myers Laboratory

GEORGE A. SIMMS

18 WEST 34th ST., NEW YORK
Room 71

Mail Orders Filled on Receipt of Cash

Over 500 Broadcasters Licensed

TOTAL broadcasters licensed up to September 9 numbered 502, of which ten were licensed during the past week. Since the licensing of the first broadcaster in September, 1921, only 16 have withdrawn or dropped out, and altogether the number of licenses granted per week has been decreasing recently, there is no indication that many of the stations are contemplating a cessation of their activities.

It is natural that the licensing should decrease slowly, for the saturation point is being approached. There are stations in all but one State and in practically every city of importance; too many, unfortunately, in some cities, so that they frequently interfere with one another. With the new regulations, depending upon legislation, granting broader bands for broadcasting, however, it is hoped that better and far more efficient service may be rendered. The establishment of class B stations on a 400-meter wave, for the stations which can qualify, will also improve the situation.

The new stations are as follows:

WNAD—Atkinson County Mail, Rockport, Mo.

WKAY—Benau College, Janesville, Ga.

WKAX—Wm. A. Facfarlane, Bridgeport, Conn.

WLAC—North Carolina State College, Raleigh, N. C.

WLAH—Samuel Woodworth, Syracuse, N. Y.

WLAO—Anthracite Radio Shop, Scranton, Pa.

WLAM—Morrow Radio Co., Springfield, Ohio.

WMAB—Radio Supply Co., Oklahoma City, Okla.

KFCC—Auto Supply Co., Wallace, Idaho.

WMAJ—Drovers Telegram Co., Kansas City, Mo.

KFBQ—Savage Electro Co., Prescott, Ariz.

WLAL—Tulsa Radio Co., Tulsa, Okla.

KFCB—Nielsen Radio Supply Co., Phoenix, Ariz.

WLAG—Cutting & Washington Radio Corporation, Minneapolis, Minn.

WKAZ—Landaus Music and Jewelry Co., Wilkes-Barre, Pa.

Typewritten Letters Radioed from the Sky

NO reason at all why an aviator, in a modern stable plane, should not carry a typewriter and write a story of his journey while in the sky, writes Henry Smith Williams in "The American," New York. But now comes the remarkable part of the story. For it appears that our present aviator, as he manipulates the typewriter there in the airplane, is writing a message that is typed out, letter by letter, as he clicks the keys, on a strip of paper that is miles away from him at a radio-receiving station on the ground. Word by word and sentence by sentence the record of his observations is being made in ordinary typed characters and read by the person who is operating the receiving apparatus. There is no mysterious code involved. The message is as easy to read as any other typewritten letter. The apparatus involved is called a "radio teletype."

The principle on which it works is not very mysterious—except as all electrical phenomena are mysterious—although its application is highly ingenious. Each bar of the typewriter, as the key is touched, makes an electrical circuit which releases a modicum of energy and sends out a radio wave of particular type. At the receiving station on the ground, as arranged, the typing apparatus receives the radio energy and interprets it selectively, letter by letter, to correspond with the transmitted message.

The navy officials declare that the new achievement furnishes a means of communication far in advance of any radio telegraph and telephone systems hitherto in use. Its advantages are obvious enough, even to the layman. The next step, presumably, will be to combine the teletype apparatus with a telephoto apparatus, so that the aviator may send an illustration—for example, a picture of a fortification or line of battle—along with his written description.

To many anxious inquirers: **RADIO WORLD** has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.

RADIO BOXES

All radio carpentry work our specialty. Write for

SPECIAL PRICES

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Superior Radio Products

All Parts, Receiving Sets Complete and in Units. Send for Description and Prices. Prompt Shipment on Mail Orders.

Dealers Write for Proposition

RADIO OUTFITTING CORP.

Mfg. High Grade Radio Apparatus
410 East 34th St. New York, N. Y.

LOWEST PRICES

FORMICA RADIO PANELS

3/16 in. thick, cut to size, per sq. in.2c.

MAGNET WIRE, per 1/2 lb. Spool

B. & S. Gauge	Enam.	D.C.C.	D.S.C.
22	\$.40	\$.68	\$1.23
24	.48	.79	1.41
26	.54	.96	1.73
28	.58	1.12	2.03

HUGHES ENGINEERING CO.

P. O. Box 57 Terrace Park, Ohio

DRIVE 100 TACKS AND SAVE \$25.00

Ford Roadster Top Recovering \$5.20. Touring \$6.95, and \$9.95. Chevrolet, Dodge or Maxwell \$13.95. All other 5 passenger cars \$18.50 with plate glass lights. Regular Side Curtains \$5.95 up. Special Winter Side Curtains that open with doors \$11.40 up. Ford Seat Covers \$3.15 up. Ford Cushions \$5.75. All goods same as car mfr. use. Quality the best and guaranteed to fit. Printed instructions given how to apply. Send for samples. Prices above include delivery at your door.
AUTO EQUIPMENT CO., 37 Canal Street, Cincinnati, O.



Pictures and Facts About Armstrong Amplifier

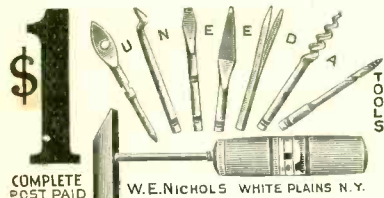
Radio World has published a number of pictures, diagrams and descriptive articles regarding the New Armstrong Super-Regenerative Amplifier. The numbers containing this material are dated June 24, July 8, July 15, and August 5. They will be sent postpaid on receipt of 15 cents each, the four copies complete for 60 cents. Or you can subscribe, \$6.00 year; \$3.00, six months; and have your subscription start with the number dated June 24. **RADIO WORLD CO., 1493 Broadway, New York.**

A Fitting Birthday Present for Those Interested in Radio

Are you cudgeling your brain in an effort to think of an appropriate present for a relative or friend? If that relative or friend is interested in radio, **WHY NOT SEND HIM OR HER RADIO WORLD FOR THE COMING twelve months?** Send us \$6.00 for each subscription you want, and we will place the names on our subscription list for one year, postpaid, and we will also send special cards to the addresses you send us announcing that the subscriptions were sent with your compliments.

Address Subscription Department, Radio World, 1493 Broadway, New York City, N. Y.

Latest broadcasting map 15c. That is, a complete broadcasting map appeared in Radio World, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C. (Adv*)



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Law Storage Battery

Constant voltage, large amperage. Will run two months without recharging. Attractive Dealers' Discounts. Write for Details

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Aborn and Sabin Streets, Providence, R. I.

Welcome! Come in and hear the

Coraco

Radio Concert

Daily, 9 A. M. to 5 P. M.

18th Floor, 220 W. 42nd St., next to Amsterdam Theatre

The Coraco Super-Radiophone is the latest and greatest improvement in radio. It has no outside connections—no installations expense—is as simple to operate as a phonograph. If you cannot call, write for full information.

The Coraco Company, Inc.

220 West 42nd Street New York

GITHENS TRUTONE RADIO HORN—LOUD SPEAKER

First one to sell on ten day trial Money back Guarantee



Retail Price \$21.00 Includes Loud Speaker

Trutone has been pronounced the best on the market by experts. It has a clear true tone. Every radio fan should try Trutone and compare it with others. If YOU don't find Trutone the best, your money will be refunded. It is sold on a ten-day trial money-back guarantee. If not carried by your dealer write us.

Distributors and Dealers, write!

AUTO PARTS MFG. CO.

1815 Trombly Ave., Detroit, Mich.

NOVO "B" BATTERIES FOR RADIO

22½-45 & 105 VOLTS

NOISELESS DEPENDABLE GUARANTEED

ASK YOUR DEALER

NOVO MANUFACTURING CO.

424-438 W. 33rd ST. NEW YORK

531 SO. DEARBORN ST., CHICAGO.

High-Frequency Amplification and the Crystal

HOW successfully can a crystal detector be used for receiving broadcast music and entertainment after the incoming wave has been subjected to high frequency amplification? asks a writer in "The Tribune," New York. To solve this question a series of extensive experiments were conducted during the week in our new laboratory.

The results of these tests emphasize that it can be done successfully within limitations. So far we have not been able to obtain success with more than one stage of radio frequency amplification ahead of the crystal. All attempts to go beyond one stage have resulted in material reduction of signal strength.

In order to approximate the most adverse conditions the test was made with a single wire indoor aerial, consisting of fifty feet of No. 18 cotton covered annunciator wire. This wire was stretched in a room on the fifteenth floor of a steel-construction building, where the worst shielding effect is met. During the experiments first one stage of radio frequency amplification was employed, then two, and finally three stages.

In order to reduce the circuit to its simplest form the tuning element in the aerial consisted of an ordinary standard short-wave variometer directly connected to the aerial and ground. The amplifying tubes were of the UV 201 type, and the high frequency transformers of the R. T. 1 type.

In operation it was found that the circuit was particularly steady so long as no more than one stage was employed, and moreover it was very selective, far more so than in the case of the ordinary crystal set using a double tuning circuit. In fact, it was so selective that the slightest turn of the variometer rotor threw out the broadcasting station, and as a consequence it was found advisable to use a vernier attachment on the dial of the variometer in order to make minute adjustment of it. Interference from wireless telegraph stations was at a minimum.

Who Is This Broadcaster?

HERE is a real radio mystery. What station could possibly be sending out a bedtime story at 1 o'clock in the morning, and then announce that the regular program for the evening would be continued? It has puzzled two of our readers, says "The Tribune," New York: Harry S. Colins, of 2AJW, and Dunbar B. Adams, of 2ASH. Can any one help them identify the station? Here are the facts:

"On the night, or rather the morning of August 16, at 1 o'clock, E. S. T., while tuning about for any possible radiophone stations, picked up one on the usual broadcast wave.

"'Little Red Riding Hood' was being given for the kiddies. in a woman's voice, after which followed the announcement, in a man's voice, to the effect that the regular evening program would be continued.

"We then listened to several selections and then foolishly shut down without being able to identify the broadcasting station.

"By a process of elimination we decided it must be KYDX, at Honolulu, Hawaii, and accordingly cabled them. The answer was in the negative.

"This reception was done on a Paragon R. A. 10 detector, one stage of audio frequency, and the Western Electric No. 10A loud speaker—an additional two steps of audio but no frequency—owned by Mr. Dunbar B. Adams, of Bayshore, L. I., Radio 2ASH.

"We are very desirous of learning the identity of this station, and will greatly appreciate your help in the matter."

52 Weeks for \$6.00

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Copies of Radio World No. 1

PATENT
Your Radio Ideas.
Call or Write
FREE ADVICE



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Tel. Market 4066

ALADDIN ELECTRIC COMPANY, INC.

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MEYER TUBES AND CHOKE COILS

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Buy Your Radio Receiving Set at Manufacturers' Cost

Buy your Radio Supplies at a large discount below the list or retail price. If a saving of \$15.00 to \$140.00 on a Radio Receiving Set or if a saving of 25% to 40% on Radio Supplies interests you, write or telegraph us today.

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521 Penn Ave. Wilkesburg, Pa.

COMPLETE RADIO SET

READY TO LISTEN IN

\$14.50

C. O. D. FOR THE COMPLETE SET.

(INCLUDING AERIAL (Regular price: \$35))

This outfit is intended for the fan that appreciates a good thing. It includes a high grade tuner with a 40 to 60 mile radius, 1200 ohm phone, insulators, and complete aerial set.

SEND NO MONEY unless you wish. Simply send us your name and address, and we will mail immediately. You pay Postman on arrival, our price, plus postage. Satisfaction guaranteed, or money refunded.

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HOMCHARGE YOUR RADIO BATTERY for a Nickel

ENJOYABLE Radio Concerts and Maximum Receiving Range are obtained only when your battery is fully charged.



charges your "A" or "B" battery over night. Silent and clean in operation—requires no watching—may be used right in your living room.

Connects to any lamp socket. Self-polarizing—fully automatic—cannot overcharge or injure the battery.

Entirely enclosed—approved by Underwriters. Unconditionally GUARANTEED. Lasts a lifetime.

Beautifully finished in Mahogany and Gold—the most efficient and handsome rectifier ever produced. Sold by all dealers, \$18.50 complete. Send for Bulletin 637. IT'S FREE.

THE AUTOMATIC ELECTRICAL DEVICES CO.

135 West Third Street Cincinnati, Ohio



Over 50,000 HOMCHARGERS in Use

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS
DEPARTMENT AT 5c A WORD

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a ten-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands ten days after copy reaches us.

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads., if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4794.)

RADIO CRYSTALS. 10 Varieties, tested, \$1.00. Harlem Radio, 2124-7th Ave., N. Y.

HOKUPS: Over 100 blueprints to select from at 10c. each. Send dollar for trial order. Radio Supply Co., Box 192, Pueblo, Colo.

PATENTS—Electrical cases a specialty. Pre-war charges. B. P. Fishburne, Registered Patent Lawyer, 386 McGill Bldg., Washington, D. C.

DON'T BUY A BICYCLE MOTOR ATTACHMENT until you get our catalog and prices. Shaw Mfg. Co., Dept. 71, Galesburg, Kan.

Manufacturers of Rogers Radio Receivers and Rogers Receiving Radiometers. Rogers Radio Company, 5133 Woodworth Street, Pittsburgh, Pa.

TO THE TRADE—Fixed Phone and Grid Condensers. Write for price list and sample. SALKEY RADIO CO., 2378 Eighth Ave., New York City.

Exchange jolly interesting letters through our Club! Stamp appreciated. Betty Lee, 4254 Broadway, New York City.

PATENTS—Send for form "Evidence of Conception" to be signed and witnessed. Form, fee schedule, information, free. Lancaster & Allwine, 259 Ouray Bldg., Washington, D. C.

Triple mounted SHAMROCK CRYSTALS—50 cents—galena, silicon and iron pyrites mounted in one. Will fit any standard detector cup. Tested and sold under replacement guarantee. Mailed to any address on receipt of price in coin. Bathgate, 120 Autumn St., Passaic, N. J.

RADIO ENGRAVINGS FOR SALE—We have a large stock of radio half-tone and pen-and-ink reproductions which are suitable for magazines, illustrations, booklets, circulars, advertisements, etc. Tell us what you want and we will quote rates. R. W., Room 326, 1493 Broadway, New York City.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

CABINET mounted, honeycomb regenerative set, complete, \$48.00. Fred Reichert, Hudson St., Hawley, Pa.

RADIO Easily Learned
Be a Radio Expert. Make big money. Win success in this new, uncrowded field. Trained men needed.
\$1,800 to \$6,000
a year easily earned. I will train you quickly, at home, in your spare time, to construct, install, operate, repair, maintain and sell radio outfits. Short course, low cost, easy terms, money back guarantee. Write for "Radio Facts" FREE.
Engineer Mohaut, American Electrical Association
Dept. D-2, 4513 Ravenswood Av., Chicago, Ill.



Entirely does away with outside antenna and lightning arrester—all for \$2.00. Simply plug into any electric light socket—no current necessary—"ANTENNELLA"

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And It Will**

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PATENTS

Protect your invention today. Write for 1922 Illustrated Book Free. Radio, Electrical, Chemical and Mechanical experts. Over 30 years' experience. A. M. Wilson, Inc. (Radio 3 ARH), 310-18 Victor Building, Washington, D. C. (Successors to business established 1891 by A. M. Wilson.)

Dealers and Salesmen wanted to handle Shamrock Crystals. See other ad. Good proposition to dealers. Send 50 cents for sample. Bathgate, 120 Autumn St., Passaic, N. J.

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EDISON "B" Battery Elements, 10c. pair. 1KM 181 Pleasant St., Malden, Mass.

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WANTED: COPIES OF RADIO WORLD, April 22 and May 20, 1922. Mail us copies of these issues, or either one, with an accompany postal and we will send you a copy of the latest issue for each copy so mailed. RADIO WORLD, 1493 Broadway, New York.

25 WATT C. W. and phone set including motor generator, 5 tubes, new, used less than 20 hours. Cost over \$250; sell \$175,000 cash. Box 152, Mahwah, N. J.

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TUNING COILS, single slide, \$1.00; double slide, \$1.25. Bases finished in Blackrite, 6x6, 25c.; 6x14, 45c. Include postage. J. Zied, 530 Callowhill St., Philadelphia, Pa.

Axioms for Radio Inventors

THE following axioms regarding inventions and patents proved to be useful to inventors and prospective inventors:

1. An invention belongs to anyone until patented.
2. Unpatented ideas are not profitable.
3. The simplest ideas have often resulted in the greatest good and most profit.
4. The fruit of one's mind shall be protected as well as his personal property.
5. A patent secured through reliable patent attorneys is a guarantee and protection against infringement.

If an inventor of a commercial article does not succeed in the radio field it is due to one of the following three reasons:

1. Failure to patent his invention.
2. Failure to receive adequate protection.
3. Failure to place his invention before the public.

It Will Not!

Wonder if the radio craze will develop wireless wire-tappers.—"Gazette-Times," Pittsburgh.

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, N. Y. C.

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