VOLUME I NO. 5

PACIFIC RADIO NEWS

MAY 1917 TEN CENTS

WAR EDITION

First and only Pacific Coast Publication devoted to Radio Communication

NO. A2 PANEL SET

Specifications:
Polished BAKELITE Panel.
Multiple Point B battery switch.
Back mounted circular rheostat.
Three point filament switch.
Special 45 volt 7 amp. sealed B battery.
One tested supersensitive Electron Relay.
All metal parts nickel plated.

This instrument is our commercial type panel set and is finished and mounted in the best possible manner. The switches are laminated, insuring ease of adjustment. The rheostat operates without noise and is capable of giving very delicate adjustment.

This Set is Complete with B Battery and Tube
PRICE.....$15.50

Below we show an unsolicited letter from a well known local experimenter: we have several hundred letters of this kind regarding the Electron Relay in our files. We take this one because both stations mentioned were working on 200 meters wave length and using less than one kilowatt of power. Denver is approximately 900 miles from Burlingame.

Burlingame, Calif.
March 28, 1917.

Moorhead Laboratories,
San Francisco, Calif.

Gentlemen:—Some time ago I purchased one of your Electron Relays. I want to let you know that I am very pleased at the results I have obtained with it.

I am located at Burlingame, Calif., 20 miles south of San Francisco, about 15 miles from the ocean. My call is 6WZ. I have been in the wireless game for the last six years and have always owned a station. In this time I have used all kinds of audions and mineral detectors.

On Sunday morning, March 25, 1917, at 2:00 a. m., I worked and received a message from 9AMT of Denver, Colorado. This station came in very loud and there was no repeating. I consider this very wonderful work and I am sure you will agree with me. I congratulate you on your wonderful work.

Yours very truly,
(Signed) HALL BERRINGER.

THE MOORHEAD LABORATORIES

165 Jessie Street **San Francisco, Cal.**

QST AMATEURS! QST

No. 20
Switch Complete
.75
Knob only
.40

No. 20

No. 21

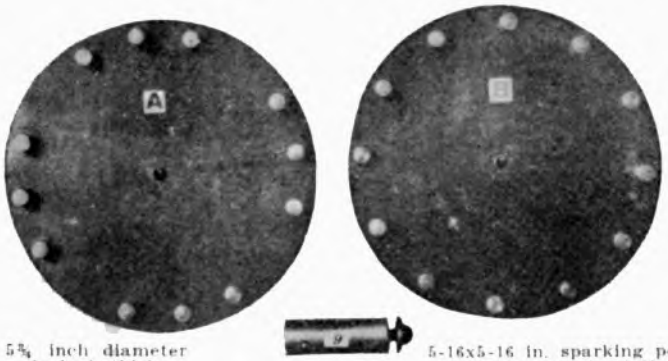
No. 21
Switch Complete
.45
Knob only
.20

Build your own receiving sets and save money. Handsome knobs 1 inch and 1¼ inch and 2¼ inches in diameter. Brass collar 5-16 inch high. Self-cleaning switch lever 1-18 inch and 1-14 inch long. These switches will make any set look 100 per cent better.

Club together and buy them in 100 lots at the following prices:

No. 20	Switch complete	per 100	$52.00
No. 21	" "	" "	36.00
No. 1	Knob only	" "	30.00
No. 2	" "	" "	15.00
No. 15	brass contacts 1-4 in. x 1-4 tapped 6-32	" "	1.75
No. 14	" " 5-16 in. x 5-16 in. tapped 6-32	" "	2.50

ROTARY GAP DISCS



5¾ inch diameter
⅛ inch thick

5-16x5-16 in. sparking points
Carrying capacity 2 K. W.

Made of highly polished Formica and turned absolutely true. Guaranteed not to warp or crack. "A" disc represents our famous chord note rotary. Type "A" disc furnished with either 8 or 12 points—type "B" disc in 6-8 or 12 points at no additional charge. Chuck drilled for 1-4 inch shaft.

Disc complete with chuck	$3.50
" " less "	3.00
Chuck only	.60
Extra for special drilled chuck up to 3-8 inch	.30

KLITZEN WIRELESS APPARATUS COMPANY

1133 HERRICK ST., RACINE, WIS.

Pacific Radio News

50 MAIN ST., SAN FRANCISCO

Volume I | H. W. Dickow, Editor | No. 5

Contents for May, 1917

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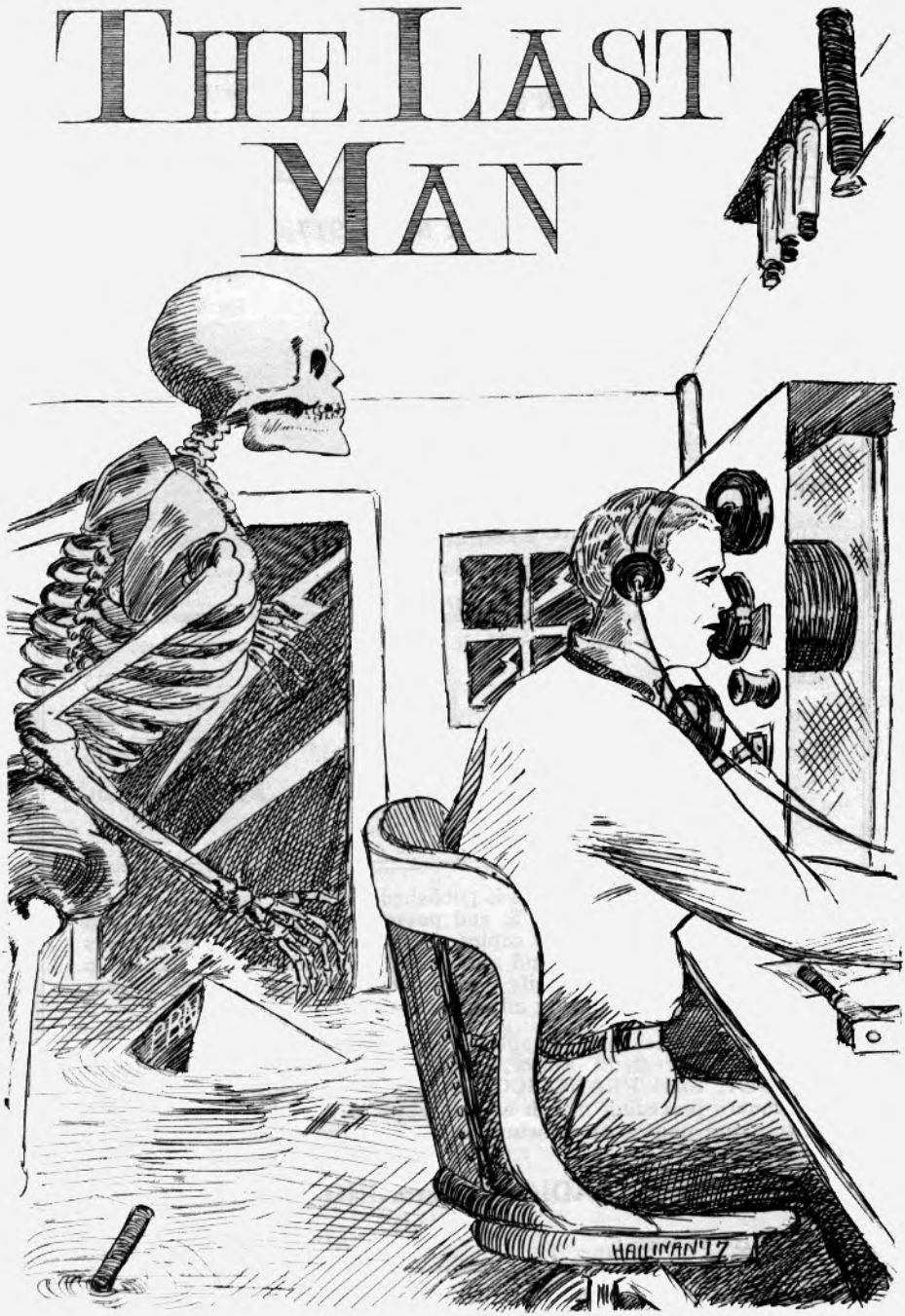
PACIFIC RADIO PUBLISHING COMPANY
PUBLISHERS
50 MAIN STREET **SAN FRANCISCO, CAL.**

Entered as second class matter March 10th, 1917, at the Post Office, San Francisco, California, under the act of March 3, 1879.

THE LAST MAN

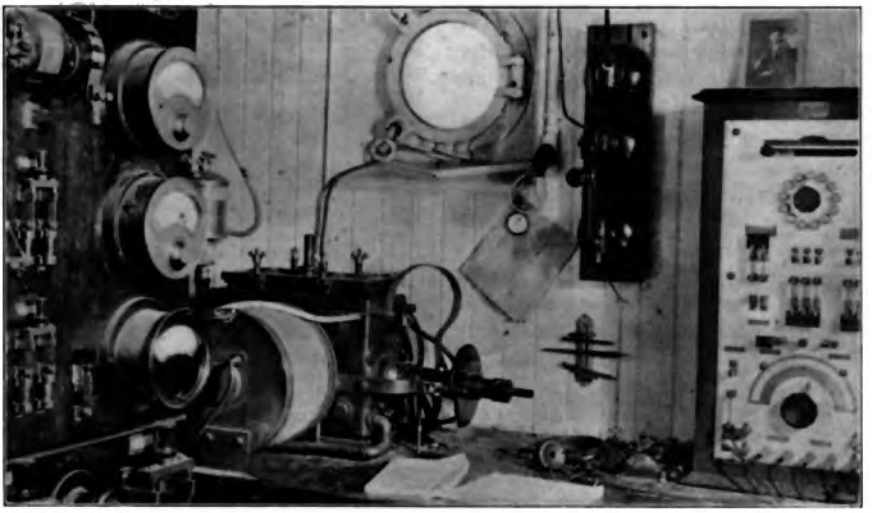


FROM A DRAWING BY V. HALLINAN

Pacific Radio News
50 MAIN STREET, SAN FRANCISCO

Vol. I MAY, 1917 No. 5

The Federal Telegraph Company's System



FEDERAL TRANSMITTER AND RECEIVER ON THE S.S. LANSING

There is no system of radio telegraphy that has come to the front more rapidly during the past few years than the Poulsen System as utilized by the Federal Telegraph Company of San Francisco and it is gratifying to note that the Federal Telegraph Company is a California concern with its headquarters in San Francisco and its factory in Palo Alto, California.

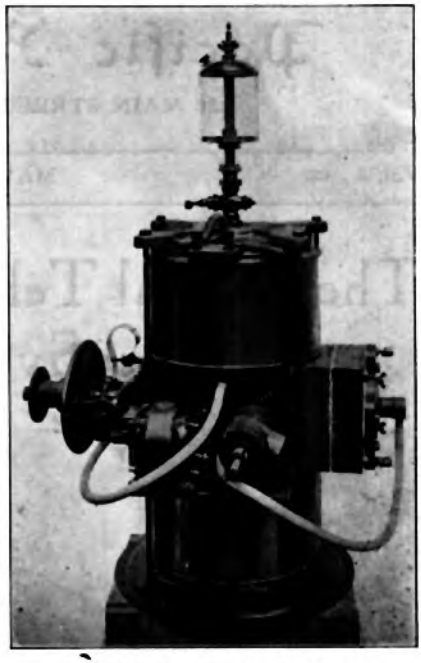
The development of the Federal Telegraph Company's apparatus was brought about through following the great advance in the science of radio telegraphy wrought by the discovery by Poulsen, of Denmark, of a method of developing undamped or continuous Hertzian waves as distinguished from damped waves that had previously been used by all spark systems.

In long distance work it has been found that long wave lengths are essential, and that, using a wave length of over 3,000 meters, undamped or continuous waves of constant amplitude gave better results for a given power. This type of wave can only be generated by an alternator or an arc. The alternator, it might seem, would be the ideal method of producing continuous alternating current

of high frequency (oscillations), but the difficulties of manufacturing and maintaining such a machine having the speed sufficient to produce such high-frequency currents and the fact that very small air gaps would have to be used between the stationary and moving parts would make such a machine a practical impossibility. The other method of generating high frequency current, namely, the arc, was found by Poulsen to be a very efficient one. It has the advantages of having no moving parts, bearings or small air gaps; and that no fine mechanical work is necessary in manufacturing. The wave length in an arc system may be changed instantly. A simple explanation of the arc method might be well to give.

A direct-current electric arc is maintained between copper and carbon electrodes within a closed, water-jacketed chamber containing hydrogen, or a volatile compound with a large hydrogen component. Across this arc is placed a strong magnetic field. An explanation of the action upon the arc of the magnetic field and of the hydrogen atmosphere is too technical to make here, but the result is this: if the terminals of such an arc be connected, one to the antenna, and one to the earth, energy from the arc will be taken up by the antenna in the form of alternating pulsations of current. This energy is then radiated by the antenna as electromagnetic waves. The frequency of these alternations, and therefore the wave length radiated, is determined by the electrical characteristics of the antenna circuit; i. e., its "inductance" and "capacity", and these are adjusted to produce the wave lengths it is desired to send. In this system the signals are made by a relay key which switches the current from the antenna to a local non-radiating circuit, the relay is operated by an ordinary Morse telegraph key.

The waves intercepted by, and



A FEDERAL POULSEN ARC

therefore the currents induced in the receiving antenna are of a frequency above the limits of audibility: the human ear being unable to hear frequencies higher than about 15,000 per second. These currents are broken up by the device known as the tikker which is simply a piece of spring wire so adjusted that it will "kick" or "chatter" against a revolving brass wheel which is on the shaft of an induction motor. The actual principle of the operation of the tikker is rather vaguely known and is subject to much discussion.

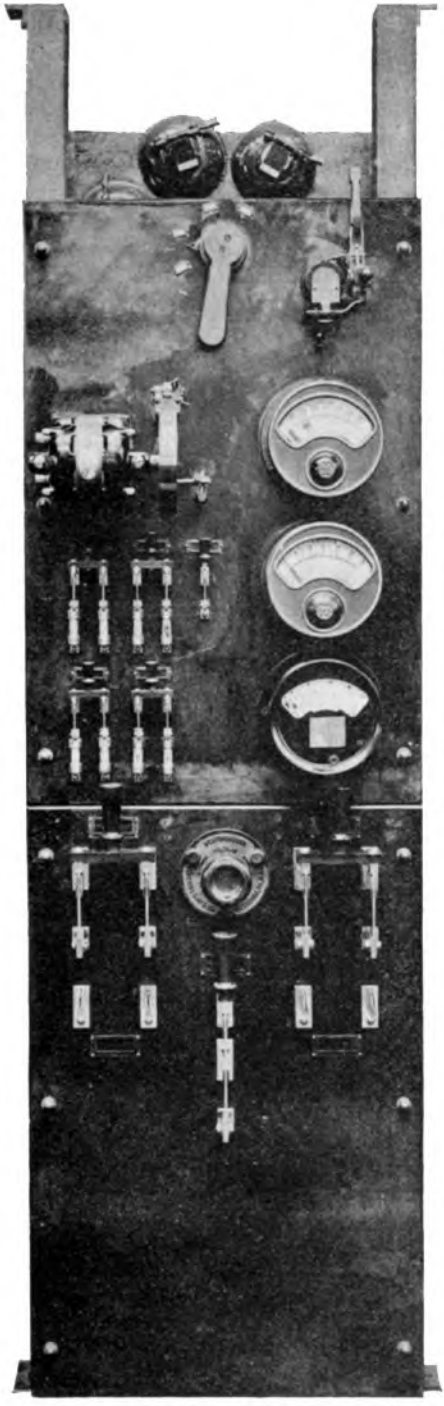
In the event an operator of a Poulsen station desires to communicate with a station employing the spark sytem of radio telegraphy he uses a device known as a "chopper" which is merely a commutator-like rotating device which cuts up the inaudible high frequency current in the sending circuit and enables the operator of the spark station to read the signals without the use of a "tikker."

Having briefly described the operation of the system in general it would probably be of interest to the reader to dwell on the extent of the Federal System, the various stations which are operated by this concern, and some of the achievements of the Federal Telegraph Company and the Poulsen System.

Seven land stations maintain the uninterrupted service of the Federal System. The most powerful station is at Honolulu, T. H., where a 60 K. W. arc set is installed. Other stations are the South San Francisco station of 40 K. W. capacity, the Portland station (30 K. W.), the San Francisco station (12 K. W.), the Los Angeles stations, two in number of 12 K. W. each, the Phoenix, Arizona, station (12 K. W.) and the San Diego station which is a 5 K. W. There are no Federal stations on the Atlantic Coast but there is one Poulsen station at Tuckerton, N. J. There are 19 merchant vessels carrying Federal equipment. The ship stations carry flat top T antennas, otherwise the ship equipment is identical with the land equipment.

The principal commercial station is the one located at South San Francisco, a short distance from San Francisco. It comprises one 608 and one 440 foot mast and the 40 K. W. arc. Service between San Francisco and southern stations is maintained by the station on the ocean beach, a short distance south of Golden Gate, in San Francisco.

For fifteen months the Federal Telegraph Company has had its offices in the Hobart Building, San Francisco. The great improvements in the radio apparatus in use by this company and which had been perfected at the time of moving in their new offices were taken full advantage of and an antenna was strung from the top of the Hobart Building to the top of the Flatiron Building; messages being received by the operator in the Ho-



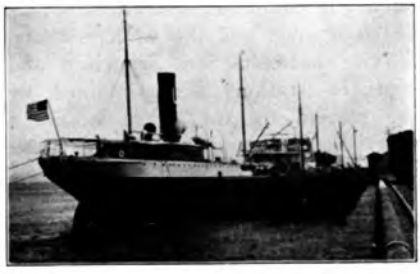
TRANSMITTER FOR USE ON SHIPS

bart Building for immediate delivery. Other operators send messages through the powerful station on the ocean beach and these messages are delivered at the downtown Los Angeles office of the company, thereby furnishing a service that is as rapid as physically possible. Two messages may be sent from the Hobart Building through the South San Francisco station simultaneously, one going directly to Honolulu and the other to Portland. At Portland an antenna has been erected on the roof of the Board of Trade Building, which, together with a station located at Lents, gives a complete wireless duplex service between San Francisco and Portland. Interference can be so completely eliminated that the Hobart Building operator can receive the Los Angeles station while the ocean beach station at San Francisco is sending under full power; the difference in wave lengths being 300 meters.

Besides duplex work, automatic receiving and transmitting is done which enables traffic to be handled at a speed of from 100 to 150 words a minute.

One of the latest Poulsen stations erected is the one at Chollas Heights, California, which the Federal Telegraph Company installed for the government. At the time the Federal Telegraph Company took over the entire rights of the Poulsen system, the largest transmitter built had been a 5 K. W. arc. The experimental and development work carried on by this company since that time made possible the 200 K. W. transmitter installed at the Chollas Heights station and the still greater 350 K. W. transmitter just being completed for Pearl Harbor and Cavite. The antenna of the Chollas Heights station weighs 16 tons and has a sag between towers of almost 100 feet. This aerial is twice as large as the one that is strung from the Eiffel Tower in Paris. In all about 25 miles of piping and copper cable have been laid throughout the radio reservation of 75 acres. A large part of this area is kept wet at all times to insure a good ground for the big aerial. The three 600-ft. aerial towers contain approximately one million pounds of steel and are the largest aerial towers in the world. They are triangular in section, the "legs" being 150 feet apart at the base and 8 feet at the apex. Huge porcelain insulators imbedded in concrete form the base for each leg of each tower. The towers are spaced 1200 feet apart. The sending and receiving radius of this station must be practically unlimited since its range is half way around the globe. It is easy for the operators to get messages from such distant points as the North Sea.

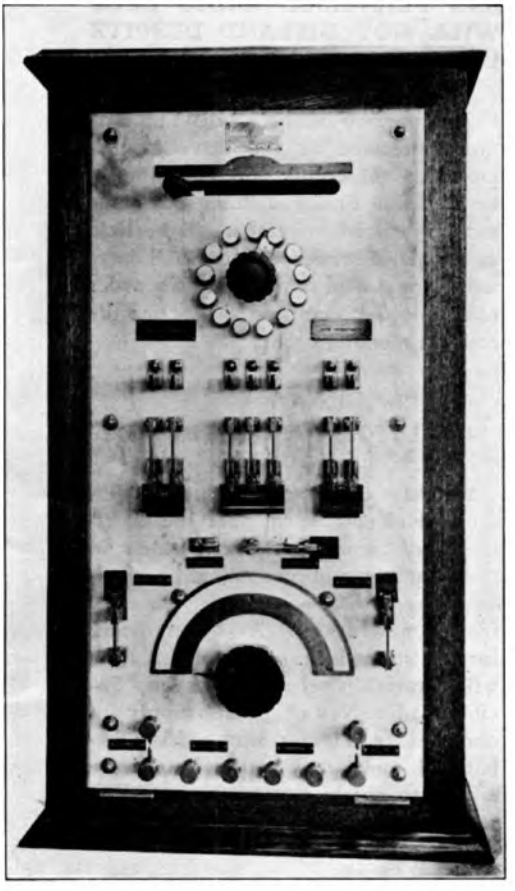
The initial trial of the Chollas Heights station brought together quite a notable gathering of radio experts, among them being Dr. L. W. Austin, chief radio expert of the Navy Department and Bureau of Standards; Lieutenant-Commander George Hooper, aide to the chief or the Naval Radio Service; Lieutenant-Commander George Sweet, U. S. N.; Naval Radio Engineer George Hanscom;



S.S. LA BREA WITH FEDERAL APPARATUS

H. P. Veeder, vice-president and general manager of the Federal Telegraph Company; L. F. Fuller, chief engineer, and H. L. Burross, superintendent, of the same concern.

The range of a 350 kilowatt station



STANDARD RECEIVING PANEL

is not known, but the 50 kilowatt station at South San Francisco is receiving regularly and commercially from vessels fitted with Federal wireless at distances well over 5,000 miles. The Honolulu station has copied messages from Eilvese, Germany, and the steamship Ventura, of the Oceanic Steamship Company fleet, while at Sydney, Australia, has copied messages sent from the Tuckerton, New Jersey, 60-kilowatt Federal Poulsen arc, a distance of over 10,000 miles. The 200-kilowatt station at Chollas Heights, San Diego, virtually encircles the world, as its range should be equal to half the circumference of the globe. In view of these remarkable results, it will be highly interesting to learn of the capabilities of the great stations being erected by the Government in the Hawaiian and Philippine Islands.

MARCONI OPERATOR HEARS MANY DISTRESS CALLS

Marconi Operator H. H. Long, well known among commercial radio operators on the Pacific Coast, recently returned from a series of trips on the "Manchuria," plying between New York and England, stated that he heard eight S. O. S. calls while crossing the English Channel recently.

The New Grebe Regenerative Receiver

The new Grebe Regenerative Receiving Cabinet is one of the most distinctive on the market today. With this set there is no such a saying as "Beauty is only skin deep." Every part on the inside is assembled and placed in a neat and attractive manner and is built as well inside as it appears from the outside. High grade materials are used throughout in the construction of this receiver. The variometers are made very accurately so that the rotors will spin freely and thus allow accurate adjustment. A safety gap is provided for protection against burnouts while the transmitter is in operation. There is not one single piece of magnetic material used in the construction of this set. The panels are fitted to the cabinet individually to insure the very neatest appearance. The design of the inductances is such that capacity, insulation and magnetic losses are reduced to a minimum. All permanent connections are made with hard-drawn square copper wire insuring against burnouts between wires while transmitting and allowing connections to be made in a direct manner.

SAN FRANCISCO RADIO CLUB ORGANIZES BAY CITIES SECTION

Commercial and amateur operators residing in the vicinity of San Francisco can now enjoy the privilege of joining a radio club. The Bay City Section of the San Francisco Radio Club was organized several weeks ago at 1510 Euclid Avenue, Berkeley, the constitution was read and accepted and members were admitted to the club in large numbers. Over thirty radio operators attended the organization meeting and a bright future for a Bay City Section is already foreseen.

Mr. L. E. Jeffery was elected Chairman of the Section; Mr. J. Squires and F. O'Neill were elected Secretary and Treasurer, respectively; G. T. Dooing was elected Sergeant-at-Arms and four members were appointed to act on a membership committee.

Meetings will be held on Monday evenings at 1510 Euclid Ave., Berkeley, until a permanent club room can be obtained.

All correspondence should be addressed to Mr. F. O'Neill, 1635 Addison St., Berkeley, Cal.

E. W. STONE RECEIVES COMMISSION IN NAVAL RESERVE

At the monthly dinner of the San Francisco section of the Institute of Radio Engineers, Ellery W. Stone, Assistant Radio Inspector, was highly commended on his success in obtaining the rank of Lieutenant in the U. S. Naval Reserve. Mr. V. Ford Greaves, local Radio Inspector, delivered an interesting address on the Naval Reserve and congratulated Mr. Stone on his success. He suddenly interrupted his speech by drawing a little sword made of tin out of his pocket and presenting it to Mr. Stone stating that he should go forth to fight for his country and use the sword to good advantage.

SAN FRANCISCO RADIO CLUB WILL NOT DISBAND DESPITE UNSETTLED WAR CONDITIONS

The war will have no effect on the San Francisco Radio Club; this was finally decided at the last business meeting. Meetings will continue to be held on Friday evenings and the monthly social meetings will be held as usual. Practice buzzers and keys will be installed immediately in order to enable the members to practice the code on meeting nights.

SUPPLY OF COPIES QUICKLY EXHAUSTED

We have made arrangements with the S. F. News Agency for the distribution of copies to all newsdealers in this country and you should experience no trouble in obtaining your copy from a newsdealer. Ask your dealer for the best wireless magazine and he will invariably refer you to the "Pacific Radio News." The supply of our first two issues was quickly exhausted and many enthusiasts were unable to obtain a copy.

SOMETHING ORIGINAL

The "DO YOU KNOW THAT—" department is one that has met the approval of many readers. We have been requested to publish a number of short articles under this head every month. Old time incidents, wireless kinks, humorous phrases and other valuable information will be published monthly in this section of the magazine.

ALL FEDERAL OPERATORS ENLIST IN NAVAL RESERVE

All operators employed in the service of the Federal Telegraph Company have enlisted in the Naval Reserve and high ratings have been awarded to many.

The Vacuum Detector Patent Situation

(From an authorized interview with
E. Cunningham, Sales Manager,
Audiotron Sales Co.)

Two infringement suits now pending will some day clear up the vacuum detector patent situation. Due to the complex character of the issues at stake and to misleading and inaccurate statements that have appeared in the magazines from time to time the radio world finds itself "at sea" in regard to this situation. A resume of the facts should therefore prove of considerable interest to everyone interested in radio communication. These facts were obtained from the Sales Manager of the Audiotron Sales Company, Mr. E. Cunningham, and the statements are the first ever published from data given out by this firm.

The radio world was unquestionably but agreeably surprised to see the announcement in the October, 1915, issue of the "World's Advance" of a new tubular vacuum detector. Hundreds of voluntary testimonials soon proved that this new detector outranked all others in quality, performance and sensitiveness. For five months the tubular Audiotron had the field to itself but after that time competitors sprang up and adopted the Audiotron design. The very fact that the De Forest Company, manufacturers of the round bulb audion, adopted the tubular form of the Audiotron Sales Company and made claims for their "new tubular audion," not theretofore made for the audion, was the best proof of the superiority of the Audiotron. In February, 1916, the De Forest Company filed suit against the Audiotron Sales Company and others claiming that the defendants' devices infringed some eighty-two claims of eight patents owned by Dr. De Forest. The Audiotron Sales Company, believing in the originality of their device, immediately retained the services of Mr. Wm. K. White, San Francisco's leading patent attorney, chief patent counsel for the Federal Wireless Telegraph Company, and who is probably the best posted attorney in radio patents today.

On August 7th and 8th, 1916, after the filing of many affidavits, direct and reply, the motion for preliminary injunction was argued and Judge Van Fleet held that the case was not one for the issuance of an injunction but that bonds would be required of the defendant pending final adjudication at the trial. Failure on the part of the defendants to file bonds would entitle the De Forest Company to a preliminary injunction, provided they filed bonds in like amount indemnifying the defendants. The Audiotron Sales Company filed its bond on August 14th, 1916, and has continued selling its regular three member vacuum tube detector under bond since that date; no injunction having been issued in favor of the De Forest Company. The injunctions against "maker" and "user" referred to in the De Forest advertisements have no connection with or bearing on the Audiotron Sales Company's interests. Although one of the local defendants failed to file a bond it is noteworthy that the De Forest Company has never filed its bond necessary to secure the preliminary injunction against this defendant.

After August 7th, 1916, the De Forest Co. limited the action to infringement of only four claims of only two patents. Infringement was no longer claimed on seventy-eight claims and on six patents by De Forest. This

concession was a decided moral victory and also a substantial one for the Audiotron interests. As yet the case has not been decided nor has it even come to a trial and it would be impossible to say when the final decision will be handed down. The Audiotron Sales Company has its defense in splendid shape and is confident of the final outcome of the case.

In addition to the technical facts of the case there are many more points which might interest the radio engineer and experimenter. These points are those which have been set down in the history of patent suits and points about the theoretical side of the question.

The first litigation between the Marconi and De Forest Companies dates back to 1914 when the Marconi Company obtained a preliminary injunction under its "tuning" patent preventing De Forest or his company from marketing complete radio transmitting and receiving sets utilizing four circuit tuning. The Marconi Company, after obtaining the foregoing injunction, filed suit against the De Forest Company in 1914, alleging the three member Audion to be an infringement on the Fleming Valve Patent, U. S. A. No. 803,684. A counterclaim and answer was filed by De Forest on December 8th, 1914. Eleven months later, on November 15, 1915, and eleven days before the trial commenced, the Marconi Company filed a disclaimer on the Fleming patent. To understand the significance of this move reference to the Fleming patent will show that it is entitled "An Instrument for Converting Alternating Electric Currents into Continuous Currents." In 1884 Thomas A. Edison had discovered that in an incandescent lamp containing a cold plate or electrode inserted between the legs of the filament and connected externally to a circuit leading to the positive terminal of the filament a current was found to flow in this circuit, but substantially no current was found to flow if the circuit was connected to the negative terminal of the filament. Edison took out a patent in 1884 (No. 307031) utilizing this phenomenon. Thus, long prior to the date of the Fleming Valve Patent, it was a well established fact that the space within an incandescent lamp possessed unilateral conductivity, that is, would rectify alternating currents. As originally filed the Fleming Patent was sufficiently broad to cover the original Edison device and naturally was, in view of the previous discovery, invalid to that extent. The De Forest answer clearly set forth the genesis of the Fleming Patent and hence the necessity of the Marconi Company's disclaiming the Fleming Patent "except as used in connection with high frequency alternating electric currents or electric oscillations of the order employed in Hertzian wave transmission." The Fleming Patent is therefore, if anything, merely a new use for an old device since Fleming applied the Edison Valve, as a rectifier, to detect radio frequency alternating currents. The Fleming Valve never has proved to be very efficient in the commercial field and it is significant that De Forest had been selling the audion for over six years before the Marconi Company claimed it to be an infringement on the Fleming Valve Patent. In their counterclaim the De Forest Company alleged that prior to the filing of the suit the Marconi Company had attempted to arrange an exchange of licenses between the audion and the Fleming Valve. After the filing of the De Forest counterclaim the Marconi Company conceded infringement of the De Forest audion with three elements and therefore the Marconi Company was perpetually enjoined from using the third member or grid of the De Forest audion. The Marconi Company claimed that the third

member was of no value to them on account of new engineering developments on the Fleming Valve.

On September 20th, 1916, Judge Mayer handed down a decision holding that the De Forest audion infringed on the Fleming Valve and since that date an injunction was issued against the De Forest Company preventing them from selling their three member audion detector. The De Forest Company are preparing an appeal now to the higher court and Judge Mayer's decision may or may not be sustained. Meanwhile neither De Forest or the Marconi Company can manufacture or sell a three internal member vacuum detector.

A knowledge of what constitutes an infringement is necessary to understand the issues involved. A claim of two elements cannot infringe one of three elements even though the two elements are identical each to each. That the same result is secured is no proof of infringement. The question of infringement involves the question of substantial identity between two devices. There can be no substantial identity between two devices if their respective modes of operation are materially different.

Briefly the Fleming Valve and the De Forest two member audion have the identical elements, an evacuated vessel, a heated electrode and a cold electrode. De Forest claimed in the Marconi suit that the use of a high voltage or "B" battery, not shown or claimed in the Fleming Patent, changed the operation of the Fleming Valve from a rectifier to a relay and therefore no infringement existed. The Marconi Company contended that the use of a local battery was well known and was necessary for the efficient rectification of the received oscillations. The well known form of audion contained all the elements of the Fleming Valve with a third intervening or grid electrode. Again the De Forest Company attempted to prove relay action instead of rectification and used the now well known test of a three member audion in which all the electrodes are heated. In view of the lack of demonstrated commercial utility of the Fleming Valve as compared with the audion it appears unfortunate that the audion was held an infringement. A careful study of the De Forest and Marconi briefs will show, however, that the De Forest case was grossly mismanaged and the showing which would have been possible against the Fleming valve was not made.

The De Forest Audion Patents claim a device utilizing a sensitive gaseous medium in connection with three inclosed electrodes. The mode of operation is dependent on the conduction of electricity between the electrodes by gaseous ions. The Audiotron and similar vacuum bulbs is a high vacuum device in which no gaseous medium or gas iron conduction is utilized. The Audiotron is therefore lacking in one essential element of the De Forest combination and does not infringe. Furthermore the conduction in the inter electrode space is by means of a stream of electrons discharged from the incandescent tungsten filament. The mode of operation is therefore also different from that of the audion combination and a further proof of non-infringement exists. No interest in the present suit attaches to the detector made by the De Forest Company which is a reproduction of the Audiotron combination. The question of infringement depends on the Audiotron combination, that is, the elements and mode of operation as compared with that of the audion as set forth in the De Forest Patents.

Any one as well as the Audiotron Company has the right to start with previous discoveries, in this particular instance the Edison Valve, and build on the idea and arrive at a new result

in a new way. Fleming used the Edison Valve as a rectifier of radio frequencies (without local battery) and claimed the invention. De Forest, by devious ways apparently arrived at an Edison Valve with an additional electrode and local battery to detect radio impulses. If it could be proved that the audion does not utilize the radio frequency rectification feature claimed by Fleming, then the audion cannot infringe the Fleming Patent.

De Forest's parent audion patent is well termed the bunsen burner patent. It describes the mode of operation in a most complex manner, which Judge Mayer has stated in simple words as meaning,

"I (De Forest) will try to make the gas conductive between two electrodes by heating the gas to the dissociating point."

Later patents added a third electrode, substituted a filament for the gas flame, and a glass inclosing vessel. The gaseous medium still remained the essential part of the combination and this is the part which the Audiotron lacks.

(The Audiotron Sales Company will be grateful for any information regarding the theory of the difference between the Audiotron, having the bulb exhausted so that no gaseous medium exists therein, and the audion having the bulb so exhausted that there are particles of gas (air) still resident therein. Address communications to Audiotron, in care of Pacific Radio News, 50 Main Street, San Francisco.)

LATE ARRIVAL COMPLAINTS

If your copy does not reach you by the 25th of the month, kindly notify us to this effect. This applies to Eastern subscribers. Western subscribers should receive their copy no later than the 20th of the month.

ALL AMATEUR STATIONS MUST CLOSE

We are printing herewith the order sent out by local Radio Inspectors to close the amateur stations in the United States.

Naval Communication Service

Pursuant to the President's War Proclamation, ALL radio stations of all classes are hereby ordered closed and dismantled immediately, except such stations as are specifically permitted to remain in operation under competent naval authority.

ALL aerials, antennae or wires for radio or wireless communication, whether for transmitting or receiving, or both, must be taken down and all apparatus disconnected.

Failure to comply with this military order may result in severe war penalties being imposed upon the owners and those responsible, and confiscation of the apparatus.

Owners of stations heretofore licensed by the Department of Commerce are requested to bring this order to the attention of owners of unlicensed stations and receiving stations in their vicinity.

All Federal, State and County authorities, and Municipal police, are requested to co-operate with the Navy Department in the enforcement of this order.

All reports of violations should be made to the District Communication Superintendent, Naval Radio Station, San Francisco, California.

Amateurs need not take down the poles which support the antennae, but all wires for radio or wireless communication MUST be taken down and ALL APPARATUS DISMANTLED AND DISCONNECTED.

In addition to the closing of the amateur stations all commercial stations have been taken over by the government and are in truth nothing but naval stations, pure and simple; commercial stations have ceased to exist.

Young Man, Your Country Needs You Now!

Now that the United States has declared war it is the duty of every able-bodied young man to join one of many branches of service in either the Navy or Army (Regular or Reserve).

Those who act at once to obtain positions are the ones who will obtain the choice of positions since the higher openings are filled first.

For the guidance of those desiring to enlist we have made up a summary of the various departments in which excellent opportunities present themselves to men who possess a moderate amount of technical or practical knowledge, or both, of radio telegraphy, telegraphy, electrical engineering, aviation, radio telegraphy as applied to aircraft, etc., etc.

Naval Reserve Force

The Naval Reserve Force consists of six classes as follows:

Class 1—The Fleet Naval Reserve.

Class 2—The Naval Reserve.

Class 3—The Naval Auxiliary Reserve.

Class 4—The Naval Coast Defense Reserve.

Class 5—The Volunteer Naval Reserve.

Class 6—Naval Reserve Flying Corps.

Amateur radio operators would come under Class 4—The Naval Coast Defense Reserve. It is probable that many amateur operators (of course only those who are capable of receiving at least twenty words per minute) will receive positions in the city in which they reside and will be able to live at home and still be in the employ of the government. It will be necessary for applicants to write to the District Communication Superintendent of the Naval District in which they reside. Those desiring information who live in the Twelfth Naval District will obtain information from the District Communication Superintendent, Naval Radio Station, San Francisco, California. Those in the vicinity of San Diego (south of 35° latitude), may apply to the District Communication Superintendent, Naval Radio Station, San Diego, California. It does not obligate you in any way to write to the Communication Superintendent of your Naval District; why not write and find out what an excellent opportunity presents itself to you.

Signal Reserve Corps

The Department Signal Officer has been authorized by the Chief Signal Officer of the Army to enlist in the Signal Reserve Corps, Western Department, the personnel to form three field battalions, less outpost companies, and one telegraph battalion. The enlisted personnel for these four organizations aggregate seven hundred and one (701) men, with grades and pay as follows:

		Pay per Mo.
10	Master Signal Electricians each	$75.00
54	Sergeants, first class, each	45.00
77	Sergeants, each	36.00
115	Corporals, each	24.00
8	Horseshoers, each	30.00
16	Cooks, each	30.00
352	Privates, first class, each	18.00
69	Privates, each	15.00

A Master Signal Electrician must be an expert radio operator and have knowledge of radio apparatus; an expert telegraph operator and have a knowledge of the construction, operation, and maintenance of telegraph systems, primary and secondary batteries, and motor generators; or possess such qualities as would fit him to act as senior non-commissioned officer of a company of signal troops, to act as a leader.

The other qualifications for lower grades than Master Signal Electrician are similar but the knowledge required is not so comprehensive.

Information will be furnished, for men in the vicinity of San Francisco, by the Department Signal Officer, U. S. Army, Western Department, San Francisco, California. Men residing in other parts of the country may obtain information from the Department Signal Officer, of the Department near which they reside.

Officers' Reserve Corps

Examinations are being expedited for applicants for commission as reserve officers of the line, with special reference to the following requirements:

1. Character and sobriety.
2. Personality, address and force.
3. Reputation and standing in his community.
4. Whether or not he is likely to command respect of officers and enlisted men.
5. Whether or not he has adequate education.

In the event that the applicant has had no military training, or military training of little value, he may nevertheless be recommended for commission as second lieutenant (subject to the 32 year age limit), provided he is a college graduate, or senior in college, or clearly a well educated man, and provided he has demonstrated in business, athletics, or otner activity, that he possesses, to an unusual degree, the ability to handle men.

Those desiring appointments in the line sections of the Officers' Reserve Corps, may obtain application blanks by addressing, and should forward their completed applications to:

"Officer in Charge, Officers' Reserve Corps, Headquarters Western Department, San Francisco, Cal."

Just a Side-Dish, or "War is Hell" for Peace

THE KAW VALLEY RADIO ASSOCIATION

The Kaw Valley Radio Association was organized November 9th, 1916. Although at that time the association only consisted of six members, it now has thirty members. The object of the association is the promotion of wireless telegraphy amongst amateurs.

The officers of the association are:
President, Mr. Ralph Relm.
Vice-President, Mr. Parker Wiggin.
Secretary and Treasurer, Mr. Harlow Eppert.

THE NEW ENGLAND AMATEUR WIRELESS ASSOCIATION

The New England Amateur Wireless Association is a live wire organization of amateurs in and around greater Boston. Many fine operators and owners of select apparatus are amongst the members. The association has its rooms on the eighth floor of the Wm. Filene Sons Company building in the heart of Boston.

Two meetings are held each week, one on Tuesday and one on Friday. The Tuesday meeting is given over to code practice and most members are very proficient in the code. An omnigraph, key and buzzer set is used. The code is never sent slower than twenty words a minute. The Friday meeting is given over to theory lectures and discussions and to the business of the club.

The association recently held its first annual banquet. Among the speakers were: Mr. Hiram Percy Maxim, President of the American Radio Relay League who spoke on the development of the transcontinental relay; Captain H. C. Gawler, Radio Inspector for the First District; Lieutenant E. G. Blakeslei, District Communication Superintendent; Mr. Melvin Eastham of the General Radio Company and formerly of Clapp–Eastham Company; Mr. Nichols of the Marconi Company; Mr. H. J. Power of the American Radio Research Company, and Mr. R. L. Harlowe, publicity manager of the Wm. Filene Sons Company, through whose work the club owes its existence.

The officers of the club are Guy R. Entwistle, President; Wm. G. Walker, Vice-President and Chief Operator; F. D. Webster, Secretary and Treasurer, and Mr. Brackett, Exchange Manager.

The club has a wave meter which is in the hands of the chief operator, Mr. Walker. It also has an exchange department under Mr. Brackett, and

a small but promising annual paper of which Mr. Bixbee is editor.

The members of the club act as a committee in and about Boston in assisting the Radio Inspector maintain the law.

AN "SOS" IN GREEK

"Shorthy" was the new first operator on the liner "Terrific," this being his first assignment to a vessel as wireless operator. On the northward trip from San Francisco he heard some far-off ship send the letters S. O. S. The operator developed a very jerky style of sending and suddenly stopped sending without signing the call letters of the ship. "Shorthy" was frightened stiff upon hearing the S. O. S., and immediately started to call C. Q. to find out the name of the ship that was in distress. Strange as it may seem he received no reply to his repeated calls but the entire mystery was solved upon his return from the north when he was told by the Superintendent that it was unlawful to send out a C. Q. asking what ships are in distress when apparently all was well. He was informed of the fact that no S. O. S. was sent but a message bearing the Greek name of Hyksos was transmitted from a near-by liner to a costal station, the liner's operator being a poor sender and spaced the last three letters of the signature which was responsible for "Shorthy's" reception of his first distress call.

A LITTLE REMINDER

During the past two months we have received a great number of requests for back numbers of "Pacific Radio News" and in many instances have been unable to fill the orders.

The demand for the "Pacific Radio News" has been greater than the supply and it therefore becomes necessary to start all subscriptions with the current issue.

SPECIAL NOTICE!

Since the declaration that the United States is in a state of war the directors of the "Pacific Radio News" have been in deep thought in regard to the advisability of continuing to publish the "Pacific Radio News" or not. After much grave thought and deliberation it has been decided to discontinue the magazine, in view of the difficulties which will arise to hinder the publication of "Pacific Radio News," until such time as the present war has been brought to a close. At that time it is proposed to continue the magazine as before and all subscriptions will be extended over the intervening period.

Offices at 50 Main Street, San Francisco, California, will remain open.

Undamped Wave Tuners

By H. R. Sprado

This article shall endeavor to show as clearly as possible the type of receiving apparatus best suited to receive undamped wave signals from the high powered stations now in operation in the United States, its insular possessions, Panama and Europe. The wave lengths of these stations vary from 3000 meters to 12,000 meters and as higher powers are adopted they shall no doubt increase to 20,000 meters.

As the reader already knows, the vacuum tube detector in its oscillating state is the most desirable for undamped wave reception because it facilitates extremely sharp tuning and, in the better types of this device, very clear signals are received even through moderate static interference.

As the common form of vacuum tube detector is purely a potentially operated device the main requisites for an efficient tuner using this detector are maximum inductance and minimum capacity.

To begin with, measurements and calculations were made of the apparent inductance, distributed capacity, and the natural wave lengths of a number of solenoids of single and multiple layers and of pancake type coils of various sizes and shapes in order to determine the type of inductance best suited.

The apparent inductance LA was measured by taking wave length and capacity readings with a known capacity in circuit with the inductance to be measured (see Fig. 1), and calculated by the formula $LA = \frac{\left(\frac{\lambda}{596}\right)^2}{C}$ where LA is the apparent inductance, λ is the reading on the wave meter, and C is the capacity in circuit with the inductance to be measured.

The natural wave lengths of various coils were then measured and their true inductance and distributed capacity were calculated and the following data obtained.

A single layer solenoid 6 5/6 inches long and 7 inches in diameter had a natural wave length of 346 meters, a true inductance of 915 microhenrys and a distributed capacity of .0000366 microfarads. A multiple layer solenoid had a natural wave length of 100 meters, a true inductance of 1721 microhenrys and distributed capacity of .00000163 microfarads. A pancake with 3 layers of 40 turns each showed a natural wave length of 464 meters, a true inductance of 1960 microhenrys, distributed capacity of .0000307 microfarads. Another pancake of 28 layers of 3 turns per layer showed a natural wave length of 215 meters, true inductance of 865 microhenrys and a distributed capacity of .000015 microfarads.

The foregoing data shows that a pancake type of inductance is far superior to any other form, giving the greatest amount of inductance in the smallest space and the smallest distributed capacity per unit of inductance. The space factor is important where tuners are to be made up in cabinet form as inductances made up in solenoid form would require immense cabinets especially where tuners are built to receive wave lengths on the order of 12,000 meters, using a capacity of .001 microfarads or less in the secondary circuit.

A number of pancakes were now made up of different dimensions to determine the form possessing the best characteristics and it was found that a coil four times deeper than wide has the smallest distributed capacity per unit of inductance.

Four coils of 40 layers with 10 turns per layer were made up, two being used as the primary and two for the

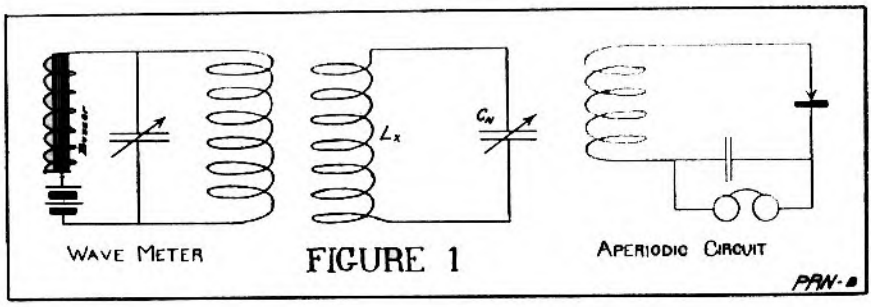


FIGURE 1

secondary. Suitable taps were brought out, that is, on the primary every ten turns for 100 turns then every 100 turns for 700 turns and on the secondary coils taps were brought out every 30 turns for 300 turns then every 150 turns for 450 turns or the remainder of the secondary winding. These coils were of 6½ inch inside diameter and 8 inch outside diameter wound ½ inch thick. Number 20 enamelled wire was used throughout.

The Austin circuit was used as shown in Figure 2 and the following capacities were found best in their respective circuit; secondary condenser .001 maximum, grid condenser .0005 maximum, plate to filament condenser .001 maximum, and grid to filament condenser .0005 maximum.

The above coils and capacities were mounted in a mahogany cabinet with a ¼ inch Bakelite Dilectro panel as shown in Figure 3. When used in connection with a two wire antenna 350 feet high and 600 feet long, Hanover (OUI) was copied clearly in daylight in San Francisco without the use of amplifiers. Among other stations received were Darien, Panama, Chicago (NAJ), Honolulu (KHX & KIE), Arlington, and Tuckerton.

Large wire is of the greatest importance especially on the long wave lengths where a large number of turns are used, and for this reason the No. 20 enameled was chosen as the total resistance of the secondary was only 12.45 ohms as compared with 90 ohms when No. 28 wire was used. Of course, larger wire still would have made an improvement but with the present price of copper it was found almost prohibitive. Litzendraht is, no doubt, the ideal wire but is hardly within the reach of the average experimenter.

In the construction of undamped wave receiving sets there is one point to bear in mind and that is MAXIMUM INDUCTANCE WITH MINIMUM CAPACITY BETWEEN WINDINGS is the only producer of the best results and, as experiments show, the pancake type inductance is the best form for obtaining the desired result.

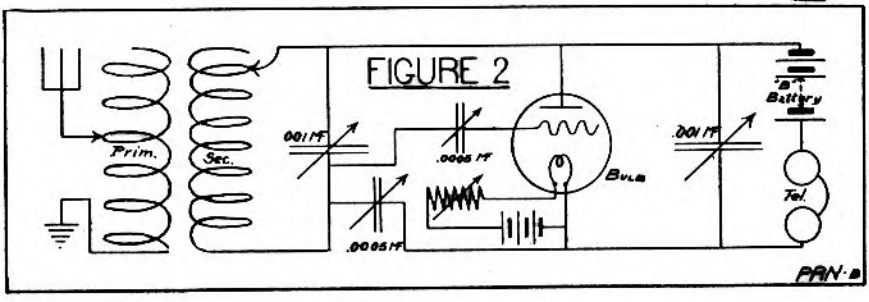


FIGURE 2

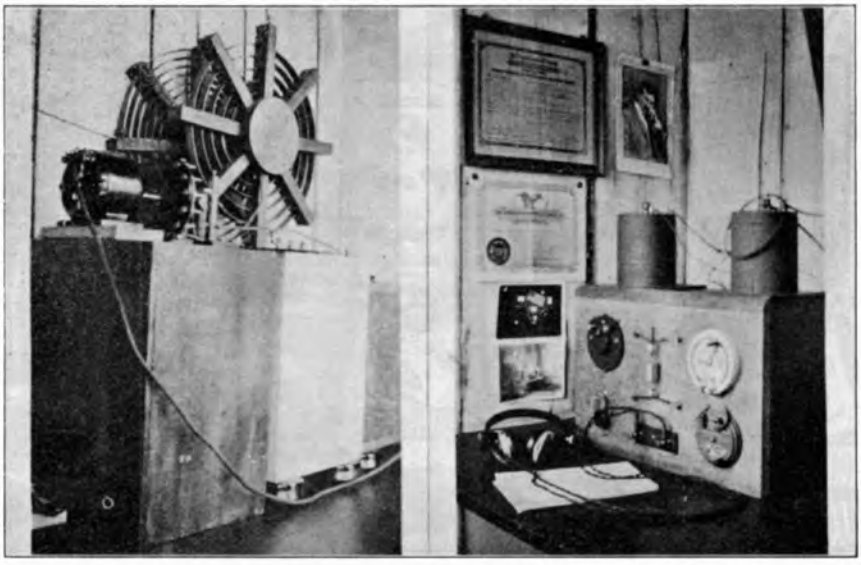
RADIO TORIAL

By the Editor

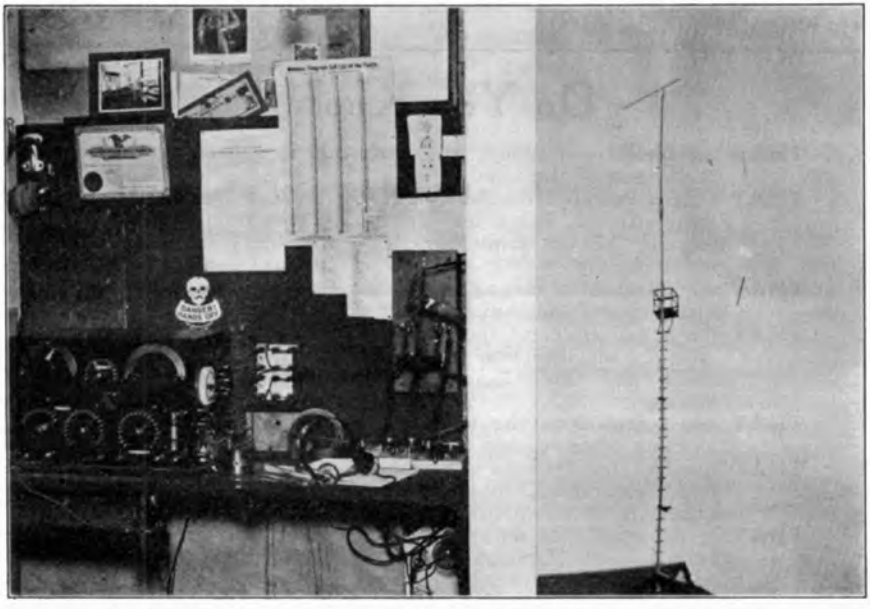
Many years ago the problems confronting the amateur who dabbled in the mysteries of wireless telegraphy (as it was then called) were indeed very numerous. In the very first place, at that time, literature was not available on the subject and apparatus was either not to be had at all or else was very high in cost. But the amateur of that time had one advantage which many of us today wish for every time we put the 'phones on and throw in the aerial switch. That advantage, practically unknown to us today, was the absence of needless interference. The modern amateur does not worry about the construction of his apparatus, the purchase of the materials therefor, the design of his apparatus and the assembling of the parts of the complete set nearly so much as he worries when he sits at the table of his finished installation, hears about fifteen other amateurs on assorted wave lengths from three hundred (maybe two hundred) to several thousand meters all trying to talk at once. It causes him to wonder why he ever constructed a transmitting set being too discreet to try and work through such tumult and confusion in the ether. If he has an analytical mind he may be able to fathom a few of the reasons for the interference. We have heard many amateurs speak in an antagonistic and satirical manner about the amateur who asks about his spark, how he "comes in," whether he should raise the tone of his spark and so forth. These amateurs who criticise invariably are the relaying "bugs" and imagine the field of amateur radio telegraphy is open for relaying and relaying only. By no means do we recognize the malicious interferer who spends all of his spare time with some poorly made and tuned apparatus asking everyone who can hear him (usually those within the radius of a half mile) how his spark is when he himself can hear it is arcing so badly that the gap is burning up; but we think it should indeed be legitimate for an amateur operator, who has spent some of his time toward improving his apparatus, (perhaps building new parts, trying original ideas, or new "hook-ups" and the like) to ask a fellow amateur, by radio, if his transmitter seems to live up to certain cogitations which he had in mind while making the said improvements on his apparatus. Relaying is, no doubt, very beneficial to the art of radio telegraphy since it stimulates transmitting and receiving over long distances under very difficult conditions, namely, within the limits of short wave lengths and low powers, but relaying, as experience shows, seems always to involve too much of the operator's personality. By personality we mean that those amateurs who are appointed as "official" relay stations get ideas that they are above the ordinary run of human beings and have the right, because they are "official," to hold the ether with indisputable priority. Thus it is that personality offsets most of

the advantages of amateur radio relaying. Whereas there once was peace in ethereal domain amongst amateurs there now is constant war. But this rivalry between the relay "bug" and the experimenting amateur is not the only discordant trouble. We are beginning to see the dawn of still another evil, and that, the rivalry existent between the relay leagues themselves. As yet this has not developed into full seriousness but time will soon prove the truth of this statement. We have thus far told only of the causes of interference; it behooves us, then, to suggest a remedy. To begin with, we believe the United States Government has been the organizer of the greatest "relay league" of all and that they publish one of the most complete lists of amateur stations in the United States which binds this "league" together. The United States Government list of radio stations represents the universal brotherhood of radio men in this country, so to speak, and the government does all that is necessary in the line of organizing amateur stations; then we can see no use for further organization. In a few words, why not INDIVIDUAL RELAYING? Let each amateur relay messages when he so desires or if he is of an inventive turn of mind let him construct his apparatus and then prove its worth by actual tests. There are often times when an amateur feels inclined to design and build new apparatus, then, when this is completed he may operate his set and have occasion to relay a message or two. If amateurs would relay individually, without affiliations with sub-organizations, relaying could be carried on much more efficiently. Imagine a relay league consisting of every amateur licensed by the government in the United States and unhampered by rival sub-organizations. The scope of relay work among amateurs by individual relaying would be increased one hundred fold. Interference would be cut in half because that "official" amateur would be no more and each amateur would be just simply a licensed amateur operator and that alone. Moreover, without sub-organizations there would be less unnecessary transmission of messages. If there is relaying to be done why not make it play a useful part in daily business life instead of a play-toy in the hands of idlers? There is the way we could cut down another twenty-five per cent of the interference—by the transmission of messages of more commercial value instead of the transmission of "idle prattle." But lastly, there remains the interference caused by the amateur, commonly referred to as the "ham," who insists in communicating with another amateur (of the same kind) about nothing in particular. There is no necessity for two amateurs living a few blocks from one another discussing the after effects of some wild orgie in which they had indulged the night before or something equally foolish. This kind of interference is the most difficult to cope with. In some cases insistent offenders might be visited by a few of the more serious and discriminating amateurs and quietly talked to. After trying this method twice without success the malicious interferer should be reported to the government authorities. In the matter of reporting to the government any malicious interferers it would be well to carefully consider whether the case warrants reporting or not. We must remember that the radio officials of the government have a far greater amount of work on hand than merely attending to amateurs. But interference MUST BE STOPPED or if it is not there will come the time when the United States will boast of their amateurs engaged in radio telegraphy no longer, and licensed amateur installations shall no longer exist.

Amateur Stations



THE SEEFRED BROTHERS' RADIO STATION, LOS ANGELES, CAL.



(6AU) PAUL U. CLARK'S AMATEUR STATION, SAN JOSE, CAL.

TROUBLES OF THE FEDERAL OPERATOR

Do You Know

THAT the dielectric is under greatest strain in a condenser near the edges of the conductor?

THAT a great number of small condenser plates are said to be more efficient than a few large ones, even though the total capacity be the same, for the small ones can discharge more rapidly?

THAT the effect of a magnet on an audion or Moorhead Tube often effects the tuning of the receiver?

THAT the actual effect of the magnetic field seems to be that it changes the direction of the electron flow from the filament, and this changes the intensity of the currents flowing?

THAT the potential at the upper or high potential end of an antenna often reaches a value of 75,000 or 100,000 volts?

THAT some of the stations established by the old United Wireless Telegraph Company were for overland communication only, in competition with land lines?

THAT at the station of the old Pacific Wireless Telegraph Company on Mt. Tamalpais a spark coil was installed which had a core over twenty feet long. and about three feet in diameter, and extended outside of the station building?

YES! IT'S HUMAN

Classified Advertisements

Advertisements in this section are 2 cents per word net.

Remittance, in form of currency, money order or stamps must accompany copy.

Advertisements for the March issue must reach us no later than February 1st in order to insure classification.

In counting words, count name and address.

Figures count five to the word in one group.

The "PACIFIC RADIO NEWS" being the first and only wireless magazine published on the Pacific Coast on radio engineering and operating subjects and not being connected with any wireless company or corporation, which might influence in any way its editorial policy, enjoys a select circulation, exceeding that of any other publication of its kind.

It will pay you to try an advertisement in this section.

PACIFIC RADIO PUBLISHING CO., 50 Main St., San Francisco, Cal.

FOR SALE—½ K. W. Winger Transformer, $10. H. de Ben, 1044 City Park Ave., New Orleans, La.

SELLING CHEAP—Four inch medical coil. Brandes navy type phones. Switch panels, automatic switch, etc. Write or call on R. Ormsby, 1624 Chapin St., Alameda, Cal.

AERIAL FOR SALE—2 poles 50 and 75 feet, 320 feet No. 14 hard drawn copper wire, 2 strain insulators, $15. Can be seen at 5427 Locksley Ave., Oakland. Communicate with H. C. Houston, King George Hotel, San Francisco.

BARGAINS THAT ARE NEVER MADE TWICE—When we make a special offer in this and other publications it is really a SPECIAL OFFER and is the best value in the wireless field. If you order your apparatus thru me within thirty days we will make the following reductions on vacuum tube apparatus: Bakelite panel complete with double filament tested Electron Relay, circular Bakelite rheostat mounted on back of panel, 10 point "B" battery switch, 45 volt "B" battery with taps, filament switch, all necessary binding posts and complete wired for instant use. Scales and figures neatly engraved on panel. Complete for $15.00, prepaid. High voltage "B" battery with ten taps $4.00. Complete wood panel ready for use and supplied with high voltage battery $9.10. One double filament tested Electron Relay FREE WITH THIS PANEL. ORDER AT ONCE. VERY LIMITED SUPPLY. Electron Agencies Co., 4608 18th St., San Francisco.

HERE THEY ARE—ANOTHER SUPPLY OF BOOKS HAS ARRIVED. The first shipment was soon exhausted. You must order at once in order to insure receipt of copy.

Electric Wiring, by J. G. Branch....$2.00
Electricity at High Pressures and Frequencies 2.00
Alternating Currents Simplified..... 1.50

Prepaid to any address. PACIFIC RADIO PUB. CO., San Francisco.

JOIN THE S. F. RADIO CLUB. Address Secretary, 218 Haight St., for full information.

ONE POSITIVELY UNUSED ELECTRON RELAY (Genuine Moorhead Manufacture), $2.25. One pound new single silk No. 28 magnet wire $1.25. V. Mathison, Str. Whittier, Oleum, Cal.

OSCILLATION TRANSFORMER brass tubing primary wound secondary wound with phosper bronze wire. In perfect condition. 10 turns on primary, 12 on secondary. Adjustable. Sell for $3. J. Spatafore, 1934-B Folsom St., San Francisco.

EXPERIMENTERS, OPERATORS, ATTENTION!—TO BE SUCCESSFUL, YOU MUST UNDERSTAND CHEMISTRY. To introduce our absolutely pure, money saving chemicals and apparatus, we quote the following bargains, good for 30 days only: Erlenmyer style Wash Bottles, complete with stopper and glass tubes, 160 cc. capacity, postpaid, 40 cents. Engraved double scale conical graduate, 4 ounces and 120 cc., 50 cents postpaid. Chemicals for growing Chemical Plants, 10 cents postpaid. No stamps accepted. Write your wants. Study Chemistry now. Small chemical laboratories from $1.25 up. Catalogue for stamp. Zenith Chemical Laboratories, 307 West Second St., Duluth, Minn.

MAHOGANY, HARD RUBBER, and Nickel Plated Brass used in the construction of the "AD" and "AU" Loose Couplers. Type "AD" tunes from 150 to 3000 meters, $6.50. Type "AU" for long wave work up to 15,000 meters, wave length variations accomplished by fine rotary multiple point switches, $12. SPECIAL FOR MAY: Selected Improved Electron Relay FREE with every order for ultra-sensitive "PARAGON" Amplifying Short Wave Receiver at $35. Central states experimenters, buy your Genuine Improved Electron Relays from me; immediate shipments, carefully tested tubes. Send stamp for new catalog of QUALITY radio apparatus at money saving prices. Also ask me to include a catalog of the Famous REVEREND Rotary Spark Gaps. Arthur B. Church, Lamoni, Iowa.

8c. in Stamps Brings You

DUCK'S BIG 300 PAGE ELECTRICAL and WIRELESS CATALOG

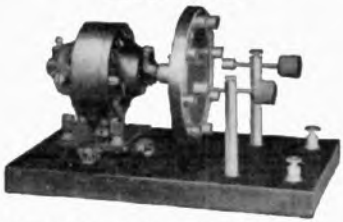
You then have everything in wireless and electrical supplies worth while at prices that mean a substantial saving to you. Our catalog is recognized by all experienced and advanced amateurs as the BEACON LIGHT on what to buy. Ask your wireless friends. Great cost of catalog and low prices prohibit distribution unless upon receipt of 8c, which you may deduct on first dollar purchase.

SHORT WAVE REGENERATIVE SET

$24.75 Prepaid to any part of U. S. or Canada

Every worth while feature is incorporated in this Regenerative Set. Initial tests in our laboratory and at the Local Scott High School brought in with remarkable clearness amateur stations in Texas, Louisiana, Wisconsin and all eastern states. Amplification and selectivity surpassed several other sets tested in conjunction with it. We have no hesitancy in claiming for this instrument no superior, and in fact we thus far know of none that equals it. It is designed for wave lengths from 180 to 475 meters. Case 6¼ in. x 11 in. x 6¼ in., hand rubbed mahogany finish. Panel, polished Formica. Set has variable coupling. This is essential for selectivity and the elimination of static, thereby insuring the greatest possible range. Primary circuit adjustable by single turns. Grid inductance adjustable by 12 point switch. Special variable condenser included in circuit for close tuning.

TYPE "C" SAYVILLE GAP COPPER ELECTRODES



Rotary Wheel ½ in., Bakelite 5½ in. dia.

All electrodes are of ½ in. round copper. Revolving electrodes ⅝ in. long. Stationary electrodes ⅝ in. long. The use of copper for the electrodes and their unusual size makes this gap much more efficient than any other gap of its type on the market. The copper conducts the heat away from the sparking surfaces. All advanced radio engineers concede that copper is unsurpassed for electrodes. Gap equipped with Universal Motor. For use on stations up to 3 K. W.

UNDAMPED LOADING INDUCTANCE

Hear the Arc Stations in Germany and Elsewhere

No. 528, for secondary loading coil and for tuning the wing circuit $7.75

No. 1526, for primary loading coil 7.75

Two No. 528 and one No. 1526 ..... 22.00

None on the market equals these undamped loaders at $10.00 each. No. 22 and No. 28 Silk Covered Wire is used on primary and secondary, respectively. Variation of inductance is by means of 20 point instrument type switch mounted on ¼ in. bakelite. With an ordinary loose coupler wave length 15,000 meters.

SOME STARTLING REDUCTIONS FOUND IN CATALOGUE 11

			Reduced Price
Type T-0	Thordarson Flexible Step-Up Transformer...	$15.00	$12.50
Type T-1	Thordarson Flexible Step-Up Transformer...	20.00	16.50
Type T-2	Thordarson Flexible Step-Up Transformer...	25.00	20.00

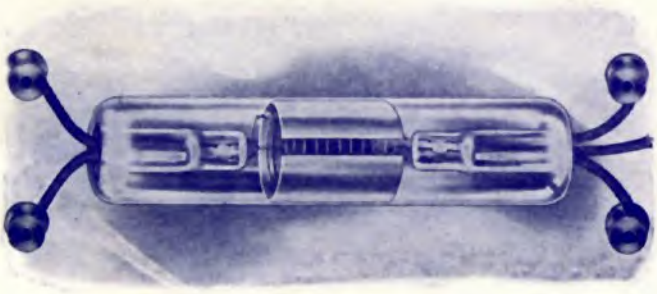
Note.—A Thordarson Special Protective Device included free with each transformer.

No. A395	Commercial Type Oscillation Transformer	15.00	13.50
No. A7628	Oscillation Transformer.	6.75	5.75
No. R41	Receiving Set with Condensers	32.00	29.50
No. R41	Receiving Set less Condensers	24.00	22.00
No. 1915	Detector Stand	2.00	1.50
Model 5AA	Navy Type Receiving Transformer	19.50	17.25
No. 1091	Arlington Receiving Transformer	9.00	7.50
No. 1092	Arlington Type B Receiving Transformer ...	7.25	6.50
No. A7721	Receiving Transformer..	6.50	5.75
No. 39X0	¼ inch Spark Coil.....	2.25	2.00
No. 40X0	½ inch Spark Coil.....	3.15	2.65
No. A6012	Detector Stand	.65	.55
No. 61X10	Standard Tuning Coil...	3.60	3.35
No. A560	Pancake Helix	1.50	1.40
No. 71X0	Electrose Insulator	.30	.27
No. 73X0	Electrose Insulator	.20	.18
No. 17X0	Electrose Insulator	.50	.48

THE WILLIAM B. DUCK CO., 219-223 Superior Street Toledo, Ohio

AUDIOTRON

The Only Original and Genuine Tubular Vacuum Detector — Amplifier — Oscillator



Patent Applied For

The Audiotron has smashed all records—Seattle copies OUI in daytime with one tube. Your receiving range will be more than doubled if you equip your station with the genuine AudioTron—not imitations.

The internal action or mode of operation, not the mechanical structure, determines the quality and sensitiveness. The AudioTron differs from all other bulb or tubular detectors since it utilizes the variations, produced by the impressed grid potentials, in a pure electron flow from negative incandescent tungsten to a cold positive plate. Its operation, in no way, utilizes a sensitive gaseous medium.

The genuine electron operated AudioTron is not a "so-called AudioTron", Radiotron or other form of tubular detector. The genuine AudiTron bears that name. Do not be misled.

Double Filament Audiotron . . . $5.25

Guaranteed super-sensitive as a detector-amplifier-oscillator

Delivered free by express when cash accompanies order

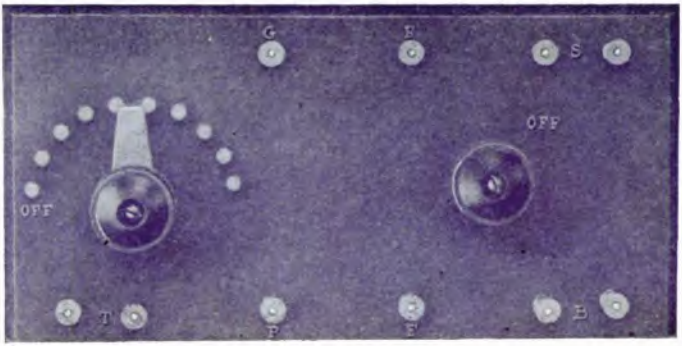
Send for catalog of vacuum detector panels and accessories

Biggest Values Ever Offered

AudioTron Sales Co.

315 Lick Building **San Francisco, Cal.**

Now is the Time to Buy Your Apparatus



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