VOLUME 1 NUMBER 6

PACIFIC RADIO NEWS

JANUARY, 1920 FIFTEEN CENTS

VICTORY EDITION

IN THIS ISSUE:

TREE RADIO TELEGRAPHY

NEW LIST OF LICENSED AMATEURS

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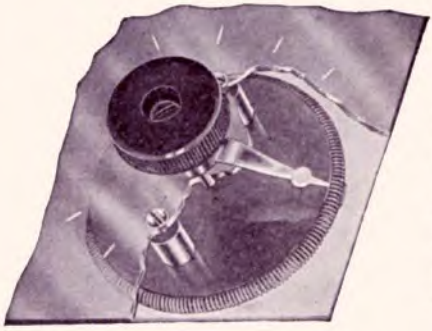

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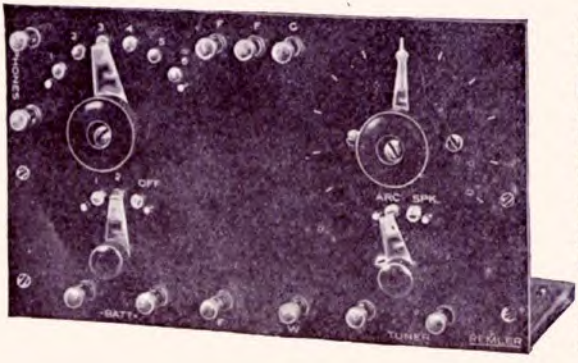

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Pacific Radio News

50 MAIN ST., SAN FRANCISCO

Volume I | P. R. FENNER, Editor | No. 6

Contents for January, 1920

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H. W. DICKOW, Advertising Manager

PACIFIC RADIO PUBLISHING COMPANY

PUBLISHERS

50 MAIN STREET **SAN FRANCISCO, CAL.**

Application for entry as second-class matter is pending.

Pacific Radio News
50 MAIN ST., SAN FRANCISCO

Volume I JANUARY, 1920 No. 6

TREE RADIO TELEGRAPHY

By Paul R. Fenner, who until July 17, 1919, was actively engaged in experimental work with tree radio telegraphy at Washington, D. C.

TO climb a tree about two-thirds of the way, drive a few nails there, run a lead from the nails to a receiver and then, with the addition of an ordinary ground connection, to hear signals from stations seven thousand miles away in day time is quite out of the ordinary. Yet this is exactly what was done by a group of Signal Corps men under the direction of the Chief Signal Officer, Major-General George O. Squier, in Washington, D. C., during the early part of 1919. A modest little portable house about three-quarters of a mile from the Bureau of Standards, situated in a wooded section of Washington, was the scene for the research work which led to this interesting disclosure.

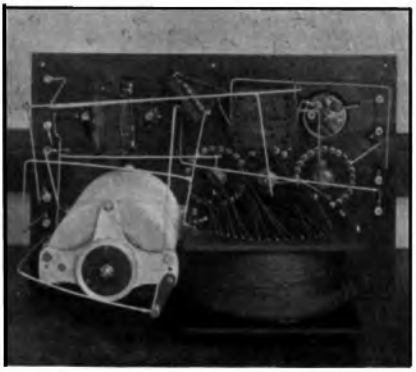
In 1905 General Squier had been granted a patent on the use of trees as antennae in radio signaling while he was in San Fran-

cisco. The comparatively crude apparatus then in use in radio telegraphy hindered much development and it was not until the early part of 1919 that some noteworthy results were obtained with modern radio apparatus and the tree antenna.

As the accompanying photograph shows, conditions were not of the very best, since the section of country about the field laboratory was wooded and absorption by trees other than the one used for receiving was likely to occur. However, this would not greatly affect the results.

It did not take long to find that a large oak tree about eighty feet high and with a trunk about three feet in diameter at the bottom was the best for receiving. It was found that the point of greatest audibility of signals was when the lead-in was connected to a nail driven in the main stem of the tree about two-thirds of the way up. This was called the optimum point. In order to determine the true effect of the tree in the reception of signals a man was stationed in the tree where the lead-in was connected to the nails. A distant station was tuned in and the assistant was told to

HETRODYNE RECEIVER

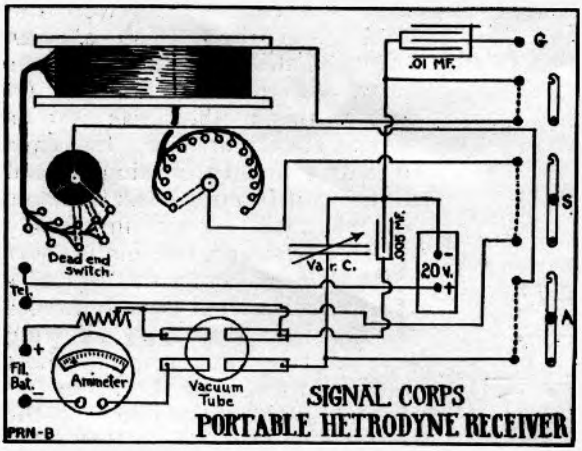


HETRODYNE RECEIVER—BACK

disconnect the wire from the nails and fasten it to an insulator attached to the tree, thus causing the wire to act as an ordinary antenna. No results were obtained upon disconnecting the wire; in fact, it is obvious that a wire about one hundred feet long acting as an ordinary antenna would not serve to receive signals from stations over six thousand miles away on a wave length of fifteen to twenty thousand meters.

In order to compare the strength of received signals with an ordinary antenna, two one thousand-foot wires were strung about fifty feet high from the laboratory. With these antennae it was possible to hear the station at Nauen, Germany (POZ), but in comparison with the oak tree, the signals faded at times so as to be inaudible, while with the tree the signals were easily readable at all times as long as local electrical storms did not interfere.

For several months a set of counterpoises were used. Due to the physical difficulties encountered in laying these, they were of unequal lengths, but a total of about one thousand feet was



buried in three directions—north, south and east. The very latest reports from Washington show that the best results are obtained without this counterpoise. This conclusively proves that the long wires buried were acting as grounds and not as antennae as many engineers had supposed.

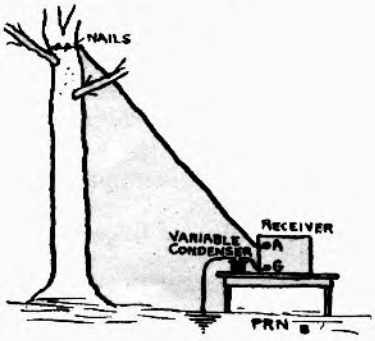
Experiments were also carried on with various connections to nails in the tree. These experiments showed that the only place for practical results was to connect the lead-in to a set of nails running around the periphery of the main stem of the tree about two-thirds of the way up. Several trees in parallel were tried, but one tree alone was best. Results obtained from a pine tree were not so good as from an oak. This is a significant fact, as the resistance of the main trunk of a pine tree is just ten times that of an oak. Another curious phenomena observed was that as the leaves began to fall, during this last October, signals came in with greater audibilities than ever. Static caused very little interference at this time.

It might be thought that any ordinary type of radio receiver might be used for this work. This was not found to be the case. A great number of receivers were tried out and everything from a seven-stage amplifying short-wave aeroplane set to an ordinary tube detector receiving set was used. After repeated thorough tests a certain special type of Signal Corps portable hetrodyne receiver was found to be ideal for tree receiving. A photograph of this receiver, together with the wiring diagram, is shown. In connection with this receiver an ordinary fixed voltage type of two-step amplifier was used.

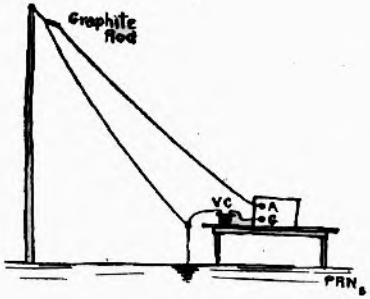
Some excellent directive receiving work was done when Mr. Kolster, of the Bureau of Standards, brought up some loops to the field laboratory. These loops were of three strands of litzendraht wound on a wooden frame five feet square. The loop was shunted across an inductance which was coupled to the tree receiving set. In this way the currents from distant stations were reinforced or weakened according to the position of the loop. The New Brunswick station, which often interfered with the copying of Nauen, Germany, was completely cut out by the loop if properly adjusted.

In the very latest developments the addition of a variable condenser in the ground circuit was found to be a decided help. The

connections used are shown in full in the diagram below.



In the course of experimenting with the tree radio, some accurate measurements of the resistance of trees were made. The oak tree which gave the good results was found to have a resistance of seven hundred ohms for every five feet of trunk. From this an estimate was made of the total resistance from the point where the nails were driven into the tree to the metallic ground used for receiving. This was found to be in the neighborhood of thirty megohms. The deductions were then drawn that the substitution of this resistance in the form of graphite resistances would give the same results as the tree. This was tried, using the diagram of connections shown below. Excellent results were obtained and the station at San Diego, California (NPL), was heard with good audibility. Of course, this method was not as easy as simply driving a few nails in a tree and connecting a lead to it, but it forms a basis for some new research. It was impossible to hear anything but high-power local stations when the graphite rod was connected directly across the set in the laboratory, showing that the combination of the short loop antenna with the series resistance was responsible for the exceptional results. With this "graphite-rod antenna" it was possible to copy New Orleans undamped wave station and secure perfect copy in competition with the Arlington Navy receiver, who did not secure a perfect copy of the message. It seems that short wires in the air may become efficient antennae for the reception of long waves merely by grounding one end through a resistance of several megohms. A rich field for experimenting along these lines is open.



Transmitting with tree antennae was not found to be successful. Some very fair results were obtained between the field laboratory and the Bureau of Standards

(Continued on page 246.)

JAPANESE INTERFERES WITH S O S

On October 22, 23 and 24 the operator on board the S. S. Siberia Maru interfered with S O S messages being sent from the S. S. Diablo. According to the operator of the Diablo, it was a case of willful interference.

Upon being questioned about the matter in the office of the local radio inspector the Japanese operator said that he was told not to "butt in" and that he did not know what "butt in" meant.

Navy Department To Establish Radio Compass Stations

THE Navy Department through the Bureau of Steam Engineering, will soon establish a number of radio compass stations along the Pacific Coast for the benefit of the ships of the United States Navy and merchant vessels.

It is understood that the present plans call for a complete chain of these compass stations all along the coast from San Diego, California, to and including the Alaskan shore line. These stations will be placed quite close together so that any ship will be within range of at least one and preferably two stations at all times. Operators will be in constant attendance, so that a ship may call a compass station and get her exact bearing from the point on shore, no matter what the weather conditions may be. In certain locations where there are dangerous passages or uncertain channels several of the compass stations will be built so that a vessel's position at any moment may be ascertained by securing the bearings from two of the stations and then, as the stations' position are known and also the distance between them, the ship's position can be easily determined by triangulation.

The first stations to be erected, it is believed, will be at Point Montara (about 18 miles south of the Golden Gate) and at Farralone Islands. Others will be placed on various points along the coast in due time. Where practicable, the stations will be established on the present lighthouse reservations, this being for the convenience of mariners, as but little change in the present charts will be thus necessitated.

The apparatus to be used will consist of the Navy standard short-wave compass receiving equipment, such as were installed in great numbers on naval vessels during the war, and the Navy type Western Electric radio telephone transmitting outfits. The receiver will be equipped with the ordinary compass coil receiver without external antenna, while the transmitting station will be located about a quarter of a mile away from the receiving station, operated by remote control, and will be so arranged that regular radio telephonic transmission may be used, or, for greater distance, a buzzer modulator used so that regular telegraphic signals may be sent. The range of such a transmitter is about fifteen miles for telephone and thirty-five miles for telegraph.

A corps of nine operators will compose the crew of each station —an operator in charge and eight men under him. There will be two men on watch at one time, one at the receiving station, who will be an expert on reading bearings with the compass coil, and the other on watch at the transmitting station.

With this type of compass very accurate results indeed, are possible. A number of readings are taken on the station on which the bearing is desired, and the average of them all taken. It is

claimed that an accuracy of one degree of arc can be easily obtained, provided the operator is familiar with the operation of the equipment and of taking the bearings. Taking the bearings itself is no little task, as an untrained observer, although he may be an expert operator, often cannot detect a variation in the signal strength over a large range of values, often ranging as high as ten degrees, while a trained compass man can at once notice the variations with almost unfailing accuracy and will at times get a station's bearing within thirty minutes of arc on the first adjustment.

MARCONI COMPANY WILL REORGANIZE

Wireless Concern to Be "Radio Corporation of America" of $25,000,000 Capital

(Reprinted from the San Francisco Daily Journal of Commerce, October 31, 1919.)

REORGANIZATION plans of the Marconi Wireless Company of America will be put into effect November 20 at a general stockholders' meeting to be held in New Jersey, according to advices sent out by Edward J. Nally, vice-president of the company. In effect the wireless company will be known as the Radio Corporation of America instead of its present name and the control of British capital eliminated in accordance with the wishes of the American Government.

While the present capitalization is only $10,000,000, the new plan calls for a $25,000,000 corporation. Five million shares of 7 per cent cumulative preferred stock, with a par value of $5, and 5,000,000 shares of common stock are to be issued. Each will have equal voting power.

The preferred stock may be returned on any dividend date at $5.50 a share plus accrued dividends. One share of the American Marconi Company stock is to be exchanged for a share of preferred stock in the new corporation plus a bonus of one share of common.

The Radio Corporation has secured all radio rights of the General Electric, which in turn has secured the English Marconi Company's interest in the American Marconi Company, thus becoming a stockholder in the Radio Corporation.

The General Electric Company is to furnish the Radio Corporation with the Alexanderson High Frequency Alternators, which have proven to be the most successful of the many radio transmitters, according to reports of Navy officials. These alternators are to be installed in the Pacific Coast and Hawaiian stations of the Marconi Company or its successors, the Radio Corporation of America, shortly.

Warning To Amateurs

The attention of all amateurs owning and operating radio transmitting apparatus is called to the following facts:

1. The radio law requires that all transmitting stations be licensed if, first, the effect of the radiated energy extends beyond the jurisdiction of the state; or, second, if it will interfere with the reception of signals coming from without the state. As the California jurisdiction extends but three miles beyond the coast line, practically all transmitters, even those using small buzzer sets, will in some cases very likely and, in most cases, undoubtedly interfere with the reception of distant signals, and hence must be licensed.

2. Spark coil transmitters connected directly in series with the antenna circuit result in a very broad wave being emitted and cause interference with the reception of signals at practically all stations in the vicinity. Licenses will not be issued to such stations on account of the fact that they cannot be adjusted to conform to the requirements of those sections of the law dealing with pure and sharp waves.

3. No transmitting stations shall be operated except by operators who possess a valid Department of Commerce license. Students or other unlicensed persons may operate under the direction of a licensed operator, but will themselves be held responsible for any violations of the students.

4. All station licenses were cancelled in 1917 when the United States entered the war; hence, the use of call signals assigned previous to that date is, in effect, the use or uttering of false signals, an offense punishable by both fine and imprisonment.

5. No call signals will be used except those assigned since October 1, 1919, by the Department of Commerce and no amateur will use the call of his own station while operating the station of another person. Failure to observe this requirement will result in the loss of the offender's license or other such action as may be deemed expedient.

6. No licensed stations shall operate with unlicensed or outlaw stations. The licenses of the stations and operators will be revoked in cases of stations that habitually disregard this rule. More severe action may be taken in special cases.

NEW PLAN TO CONTROL AMATEURS

It is the intention of the San Francisco Radio Inspector's office to empower certain reliable amateurs and other persons as district overseers or supervisors in order that the amateurs will be at all times under more direct control of the local office.

The complete details have not been at this time worked out, but the tentative schedule includes:

Mr. J. L. McKinnon, Y. M. C. A. Radio School, Los Angeles, Cal., in control of the Los Angeles district.

Mr. Paul Oard, Stockton, Cal., in control of the Central San Joaquin Valley district.

Mr. F. Van Why, 432 Palos Verdes street, San Pedro, Cal., in control of the San Pedro district.

There will be complete plans worked out and new names added to the list as appointments are made.

RADIOTORIAL

By the Editor

A Very Merry Christmas *and* Happy New Year to all

THE TRUTH AND NOTHING BUT THE TRUTH

SOMEHOW or other with the coming of peace we are not enjoying all that the word implies. We all know that. Prices of commodities and of luxuries are soaring to an unprecedented level. Strikes are being called frequently throughout our country. Red uprisings are becoming popular and bolsheviki are spreading anarchism over the face of the globe. Crime is increasing in our large cities. And right in our own lives we find that things are not right; in other words, we're not happy.

In our own field, in radio work, see what is happening. The old days of earnest and honest endeavor are gone. Appropriations are being made and money is being spent to produce radio apparatus and equipment which has little merit. The conscientious, honest, hard-working radio engineer or inventor has given place to the sharp, scheming "politician," who makes his business one of grabbing the dollar rather than one of furthering the interests of radio transmission and reception. Designs of really very meritorious radio apparatus are being side-tracked and are given place in the obscure background, just as the inventor and engineer who has the interest of the science at heart is given a place where he may not be seen or heard. Official tests are being made of various new improvements of radio apparatus which are worth nothing—except possibly to determine what degree of sentiment exists between the inventor and the examiner. Salaries in many instances are being paid men in the radio game today not for what these men know or do, but for what they can get away with. "Pull" is securing positions for men which "push" should have won for them. Bad economics, graft, envy, jealousy, pride, conceit—all continue to exist.

It is now time for every true, red-blooded man of character so privileged to be connected with or interested in the radio field to take an inventory of himself and to outline his future stand. We are not going to see the wrong win. Our problem is stupendous, but not impossible. We are all students of a wonderful branch of science, the laws of which we all know to be eternal and unchanging. We are seeking truths in this great science, but we will never find them with untruth in our midst.

Let's start right in now and kill the graft, the unclean politics, the pride, the conceit and all the evils amongst us and establish TRUTH as the one and only principle. It's up to every one of us to help clean up the dirt. Then, finally, we will reap what we sow and each and every one of us will be happy. And, after all, happiness is what we're looking for, isn't it?

A NEW ASSOCIATION

In coming to the surface again after our long submerge during the war, we find a well organized and enterprising association on the Pacific Coast. We refer to the United Radio Telegraphers' Association. This organization is an association of radio operators, and its objects are to encourage a higher standard of skill; to cultivate feelings of friendship among the craft; to assist in securing employment; to secure adequate remuneration for services; and, by legal means, to elevate the conditions of all members.

It is indeed gratifying to learn that this association has already accomplished a great deal. All radio operators know that their conditions have been bettered more than a hundred per cent. Salaries have been increased and the radio man aboard ship is now receiving full recognition as a ship's officer. When we learn that this betterment of the radio operator's position has been brought about by the assistance and perseverance of the United Radio Telegraphers' Association, we feel that we indeed owe them a great deal.

The least we can do, especially those of us who are operating aboard ships, is to stand behind this organization and help them in every way possible.

AN INTERESTING RADIO SET

Can you imagine sitting down and operating a radio set by simply turning a knob to a number which indicated a certain station you wished to speak to, opening a switch on the key and sending, closing the switch and hearing your answer come right back at you? And can you imagine such a set communicating over fifteen miles without any aerial or ground and with nothing else than three small (type VT 1) receiving tubes to work with—and without over forty volts B battery potential?

Such a set was perfected by Lieutenant Ware at the Signal Corps laboratories at Camp Alfred Vail, N. J., near Little Silver. A loop of one turn of heavy brass tubing was used for transmitting and receiving and it was hardly four feet in diameter. One vacuum tube was used for transmitting and the other two for receiving. A constant hetrodyne was maintained between the two sets (analagous to the current flowing in a line telegraph circuit) and the opening of the switch in either set at the key allowed the transmitter to be operated. These sets were as easily operated as a line telegraph. It is hoped that Mr. Ware, who is now out of the army, will put amateur sets on the market similar to his portable army set.

AMATEUR PRESS NEWS QST

Every radio operator who has an available place to listen in should be on the air Saturday evening, January 3, 1920, if he is within several hundred miles of Stockton, California. Mr. Paul Oard is inaugurating Amateur Press. The news will start at 8 p. m. sharp and will be sent on exactly 200 meters. Full one kilowatt power input with a high-tone rotary will insure amateurs for hundreds of miles around Stockton copying this news.

The news is going to be the very latest up-to-the-minute information of general interest to all. Mr. Oard says there will positively be no advertising matter of any kind broadcasted. Amongst the interesting news items will be the latest calls of California amateurs. The call letters of the Oard station are 6FI

AUDIOTRON ON THE MARKET AGAIN UNDER LICENSE

We are reprinting a letter from the Audiotron Sales Company, which will be of interest to amateur radio men:

December 3, 1919.

Pacific Radio Publishing Company,
50 Main Street,
San Francisco, Cal.

Gentlemen:

On and after December 15 the well-known Audiotron vacuum tube, which has been on the market since 1915, will be manufactured and sold as a genuine Audion under the De Forest patents, Nos. 841,387 and 879,532, and is to be used in radio communication only for experimental and amateur purposes and only in audio frequency circuits.

The policy of this company in maintaining the highest standard of quality and fair dealing with the amateur trade will continue.

Yours very truly,

AUDIOTRON SALES CO.

(Signed): E. T. CUNNINGHAM,
Assistant Manager.

THE ABOLITION OF THE WORD "HAM"

Webster says that a ham is the thigh of an animal, especially a pig, salted and smoked. A pig and a radio amateur have no earthly relationship. It's a disgrace to the radio game to discourage the amateur. Don't call him a "ham." This term is the one and only brand of impudence that is deserving of condemnation. It is a passing fancy among commercial operators. It has been constantly cropping up in the history of radio and it's getting worse every day. The most obnoxious denouncers of the amateur are the very persons who should rightfully be called "hams." Let's abolish the word forever. Nobody likes to hear it.

LAMBERT TO TUNE UP AMATEUR STATIONS

Mr. T. Lambert of the Colin B. Kennedy Company, 140 Second street, San Francisco, California, has had an elaborate decremeter and wavemeter constructed with the idea in view to tune amateur stations. As every amateur cannot afford to buy a decremeter, this service will certainly come in handy. No amateur is sure that he is within the law unless his station has actually been tuned. In a recent inspector's test a certain amateur was severely reprimanded for operating unlawfully. This amateur had a loose coupled transmitter and yet his decrement was .22 with the rotary running. So you see, accurate tuning is very essential. Mr. Lambert not only proposes to tune the set to one wave length, but provide a resonance curve for the transmitter. This resonance curve will show the amateur how he may at any time change his wave length and still be operating within the law. Another important point about having the set tuned up by an expert is that the most efficient results can then be obtained. Many amateurs are using well-made and connected apparatus and plenty of power, but through lack of proper tuning have never secured any spectacular distance records.

Senator Penrose says that Government ownership of the railroads has brought about such demoralization of the railroad system that this method of ownership has set the cause back fifty years.

What would Government ownership mean to the future of radio? What has it done to radio in the past two years? Put on your thinking cap and try to figure it out.

RADIO ORGANIZATIONS

SAN FRANCISCO SECTION OF THE INSTITUTE OF RADIO ENGINEERS

The reopening meeting of the San Francisco section of the Institute of Radio Engineers was held on September 25, 1919. Mr. Abraham Press of the University of California presented a paper entitled, "The Mechanism of Antenna Radiation." This was the first meeting held since the outbreak of the war in 1917.

At the meeting held on October 17, 1919, Professor Harris J. Ryan of Stanford University read a paper entitled, "Transatlantic Radio Communication," by Ernest F. W. Alexanderson, consulting engineer, General Electric Company. The paper dealt largely with the radio frequency generator and its possibilities.

An election of officers was held at this meeting. Mr. W. W. Hanscom retained the chair; Mr. J. F. Dillon, radio inspector of the Sixth District, was elected secretary-treasurer, and Mr. Abraham Press a member of the executive committee.

The November meeting was undoubtedly one of the most interesting ever held by the San Francisco section. A paper on vacuum tubes was presented by Messrs. O. B. Moorhead, H. R. Sprado and C. E. Lang of the Moorhead Laboratories. Mr. Lang read the paper. An interesting discussion followed by the members, who filled the club room to capacity.

ATTENTION, SEATTLE RADIO MEN

We want to put Seattle on the radio map good and strong. That's why we take this opportunity of asking Seattle for her best, most wide-awake radio man to act as our representative. Nice clean-cut work to do for the right man. Are you interested? Write the editor.

SAN FRANCISCO RADIO CLUB

"The club that survived the war" is the slogan of the San Francisco Radio Club, Inc. This organization is one of the very few that continued its meetings despite the war. Meetings were held regularly during the past four years, sometimes only as many as four members attending. The club owes much thanks to Mr. Thomas J. Ryan, through whose efforts the meetings were not given up during the war. Not only was interest sustained, but the club finally became incorporated under the laws of the State of California, His Honor Judge Prendergast, honorary member of the organization, bringing this to come about.

The service banner of the club contains twelve stars, one being gold. The club lost an esteemed member through the death of Harry P. Schenck, a former Navy man.

With the close of the war and the return of many old members to civil life, developments came rapidly. A new club room was opened at the Veteran's Hall; a membership campaign was launched that added twenty-six new members; lectures were resumed, and an open house meeting was recently held. Addresses were delivered by Mr. T. Lambert, Mr. S. Petersen, Mr. H. W. Dickow and the chairman.

Initiations are held monthly. One business meeting and two experimental meetings constitute the monthly program. Meetings are held every Tuesday evening at 8:30 p. m.

An important talk to amateurs was given by Mr. D. B. McGown, U. S. assistant radio inspector, at the meeting held on December 2.

The secretary is always glad to hear from other organizations and should be addressed, 2056 Bush street, San Francisco, Cal.

DO YOU KNOW

THAT some of the best distance records in the world have been made in Alaska in the winter time?

THAT the Japanese radio operators are required to be able to copy 20 words continental, in English, and an equivalent speed in their own code, in Japanese, before they are issued operator's licenses?

THAT in the olden days some of the rotten mixed up Morse and Continental sounded like Japanese code, when operators tried to copy it through static, and interference?

THAT although requiring a very critical adjustment, a "gas" tube, or audion, is in most cases much more sensitive as a detector than the hard or perfect vacuum tube?

THAT a very good short wave regenerative receiver can be made by connecting a variometer between the grid condensor and grid, using the "Austin" or old Federal hookup, and that the regenerative action is under perfect control when this circuit is used?

THAT if a tickler coil cannot be placed in a tuner, a set of taps on the primary will give very good results, being connected in the same manner as the tickler coil?

THAT in some cases transmission over a few miles can be accomplished with an ordinary audion receiver, provided it is in an oscillating condition?

THAT the popular copper braid so often used for connecting high frequency circuits, is absolutely unsuited for this purpose, as its resistance is many times that of a solid wire of the same size?

THAT if all the strands in this braid were insulated, as is done in "Litz" wire, the resistance would be very greatly lowered?

THAT the average leadin on an amateur's antenna is so small that it acts as if it were a piece of resistance wire?

THAT for best results the leadin should be in the form of a cable, which has a high frequency carrying capacity equal, and preferably better than the total of all the wires in the antenna?

THAT a corona shield on an undamped transmitter's antenna will keep the current from leaking, or brushing over a single insulator which cannot, be prevented without the shield, by several feet of porcelain?

THAT the potential at the free end of the antenna often reaches as high as 100,000 volts?

AMATEURS VIOLATE LAWS

The following amateurs have been found by the San Francisco radio inspector's office to be operating amateur radio stations in violation of the radio laws and regulations and have been penalized as stated under their respective cases:

1. Paul Bickel, 1434 Twenty-fifth avenue, San Francisco, Cal.—Operating without station license or operator's license and signing false call letters; station closed for thirty days.

2. Fred Lane, 1362 Forty-second avenue, San Francisco, Cal.—Operating without station or operator's licenses and signing false call letters and using "plain aerial" circuit; station closed thirty days.

3. E. Payor, 904 Irving street, San Francisco, Cal. — Operating without station or operator's licenses, signing false call letters and interfering with licensed stations; warned and station closed sixty days.

4. C. Steffen, 1615 Arch street, Berkeley, Cal.—Working without station or operator's license; warned officially.

5. Edward Poage, 143 Fifteenth street, Richmond, Cal. — Operating without station or operator's licenses; station closed thirty days.

6. H. Holliway, 1175 Washington street, San Francisco, Cal.—Signing false call letters (very bad and wilful case); station closed thirty days.

7. A. E. Johnson, 1030 Delaware street, Berkeley, Cal.—Working without station license; warned officially.

8. Robert McCormack, 796 Delmas avenue, San Jose, Cal.—Using unofficial call letters; warned officially.

9. Tabor Differding, 644 South Thirty-first street, Richmond, Cal.—Operating without station or operator's license; warned officially.

10. Roy Abrahamson, 1351 Webster street, San Francisco, Cal.—Operating without station or operator's license, signing false call letters and interfering with licensed stations; action now pending in the Federal Court.

The U. S. S. Saturn, which has been the radio supply ship for the yearly Alaskan expedition, will be transferred to the Puget Sound Navy Yard, it is understood. In future all Alaskan radio parties will be sent out from Bremerton and not from Mare Island, where they were outfitted up to the present time. Mr. George Hubbard, who was at one time connected with the Mare Island Yard, will be placed in a responsible and desirable position at Bremerton, where he has been for the past several years, with the transfer of the Saturn to the North.

The U. S. Naval Radio Material organization relinquished the maintenance of all ships of the U. S. Shipping Board on October 1, 1919. All Shipping Board radio equipments are now maintained by either the Independent Wireless Telegraph Company, the Ship Owners' Radio Service (the Kilbourne & Clarke Co.), or the Marconi Company. All these firms now maintain repair depots at Seattle, Astoria, Portland and San Pedro, as well as at San Francisco.

UNLUCKY AMATEUR

A San Francisco amateur is the proud (?) possessor of the call "6 B S." He must be in wrong with the radio inspector to be assigned that call. Wait 'till they assign the call "6 H A M"—that poor unfortunate will be laughed off the air.

SEATTLE OFFICE

The United Radio Telegraphers' Association is going to open a Seattle office. From indications, this organization is growing fast and will soon have every commercial radio operator a member.

Recent Developments of Radio Apparatus

RADIO MANUFACTURERS MAKE STRONG VARIABLE

"This is a pretty good test for a variable condenser, isn't it?" asked Mr. T. Lambert, sales manager for the Colin B. Kennedy Company of San Francisco, as he placed the condenser on the floor and stood on it with both feet. Upon investigation it was found that the Kennedy variable is made with extraordinarily large posts and these, six in number, held the bottom and top of the condenser so rigidly that one could stand on it without fear of even getting the plates out of line. This is not the only feature of this condenser. The shaft carrying the moveable plates, while bushed with a brass bearing, is really supported by a bakelite standard, which is in turn fastened to the posts holding the stationary plates. This method of construction cuts down high frequency resistance as compared with other types, which have a metal standard bushed with a very small amount of insulation around the shaft of the rotating plates.

This company also puts out a limited number of types of very high-grade apparatus for amateur use. They aim to give the amateur apparatus equal to that used in the best of commercial stations. A feature of their receivers is the novel way in which they secure different changes in inductance values. Four push-button switches control each set of inductances. Any combination of inductances may be made from one to ten with the four switches. Thus with four switches they secure ten changes in tuning and at the same time never have a single turn of wire dead-ended.

The vacuum tube circuits of Kennedy sets are resonant throughout. That is to say, primary, secondary and tickler inductances are tuned to resonance. Maximum efficiency in receiving is secured.

From the appearance of their finished apparatus, no expense has been sacrificed in making the sets beautiful to look upon as well as efficient in operation.

NEW AUDION CONTROL PANEL

An Audion Panel composed of black Bakelite has just been developed and put on the market by G. F. Haller, owner and engineer of the Halcum Radio Co. of San Francisco.

The new panel has several unique features heretofore never used in amateur radio construction. The entire panel—lettering, switch-bearings, off or dead contacts, rheostat support, etc.—is molded at one operation in a solid steel die. The connecting wires, previously soldered to brass insert studs, are fastened into the dies. The connecting strips are so arranged that they will fit only one way, so that there can be no possibilit of mistakes in the wiring. The die is filled with pure Bakelite powder and a pressure of fifty tons and a temperature of 350 degrees are applied for one hour. The die is then opened—a beautiful glossy black panel one-half-inch thick, with beveled edges and all wiring finished within the panel itself, is the result. The finishing or assembly is completed by screwing in the binding posts, contacts and switches.

The wiring scheme of the Halcun Panel is truly universal. Every known Audion circuit can be used—standard damped-spark reception "tickler coil," "ultra" or other regenerative circuits. Two or more panels can be used as cascade amplifiers. All connections are indicated in raised lettering, so that any of the

new circuits can be tried out after a few minutes' study of the diagrams accompanying the panel.

The filament control rheostat consists of a special resistance coil supported by a groove molded in the back at the same time the panel itself is molded. The rheostat unit can be renewed in the event of burnout in a few seconds' time at a cost of ten cents. All switches are of the laminated lever type, revolving in brass bearings. Dead contacts, also of molded Bakelite, are provided so as not to short the "B" battery.

Among the advantages claimed for this panel are freedom from shorts or opens, no possibility of corrosion of connections by salt air at sea, elimination of noise due to poor contacts, a universal wiring scheme allowing all circuits to be used, a heavy unbreakable panel which will not change color or warp with age, etc.

NEW RHEOSTAT

An economical and efficient rheostat of entirely new construction has recently come to our notice. It is called the Parkin panel type rheostat and is one which combines the low cost of a front-connected rheostat with the advantages and neatness of a back-connected instrument. The new construction lies in mounting the resistance wire in the form of a spring, right around the handle of the instrument, but sufficiently in back of the handle and countersunk so as to be out of sight from the front of the board. A contact bearing on the resistance wire is fastened to the panel board. Thus this type of rheostat is like the other kind, with the difference that the resistance element moves back and forth over the contact instead of the contact moving over the resistance. The instrument works very smoothly as compared with the former types. Only two holes need be drilled in the panel to mount it.

PERSONALS

Lieutenant T. M. Stevens, who served as personnel officer at the Naval Radio Station, Yerba Buena, during the war, was, after his discharge, appointed as Pacific Coast superintendent of the Independent Wireless Telegraph Company. Mr. Ed Lovejoy is now acting as his assistant. He is located at 110 Market street, San Francisco, Cal.

Mr. D. Mann Taylor, who is well-known on this coast to all the radio men, is now in charge of the radio department of the Pacific Mail Steamship Company in San Francisco.

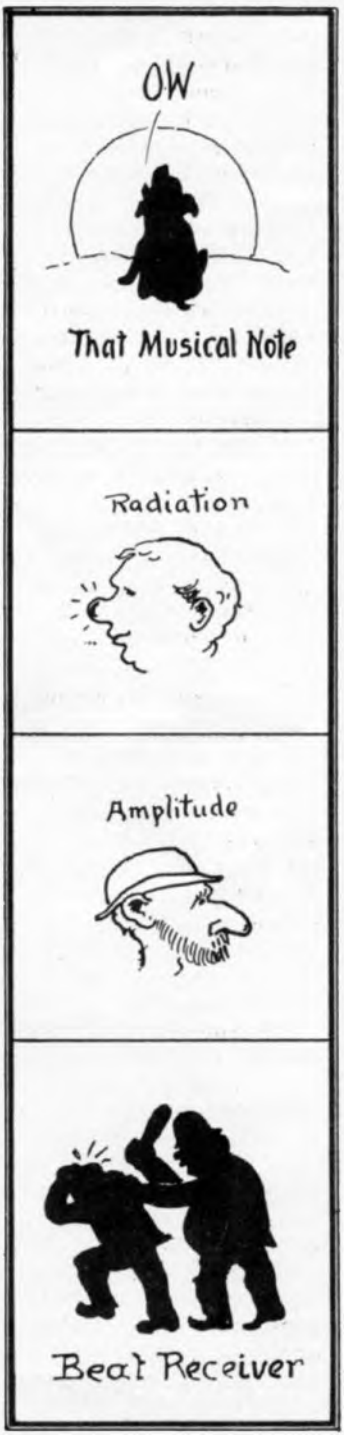
Lieutenant E. W. Stone, formerly district communication superintendent, U. S. Naval Radio Station, San Diego, Cal., is now branch manager of the Ship Owners' Radio Service and the Kilbourne & Clarke Co. Mr. K. G. Clarke, formerly chief gunner, U. S. N. R. F., is assisting Mr. Stone in his duties. Their offices are in the Fife building, 1 Drumm street, San Francisco.

Mr. George Baxter, ex-gunner, U. S. N. R. F., is now in charge of the city office of the Marconi transpacific high power circuit, located on the corner of California and Battery streets, San Francisco.

Mr. L. Malarin of the Marconi Wireless Telegraph Company is now in charge of their marine department with the title of Marine Superintendent. Mr. J. A. Miche is now filling the position of chief operator at 109 Stuart street. Mr. W. A. Vetter is in charge of the shop in the maintenance and installation departments.

Mr. D. B. McGown, ex-chief petty officer, U. S. N., and formerly progress inspector at Mare Island Navy Yard, radio department, has once again resumed his duties at the Custom House, San Francisco, California, as assistant radio inspector.


PUTTIN' UP THE SET
Give me another boost Fat,-and I'll be almost halfway up
Yes, and your mother willgive you another boost when she'll miss the — Clothsline
1.
Alright Fat! Let's have that leadin. Goin' to ruin it thru a hole in the window..
2.
Little more Steam Fat and we'll have this Transformer on the Table
Steam Nuthin! what you need is a five ton Crane
3
For the Lord's sake! If I ever catch hold of that Kid I'll
This hole will getus to the water pipe for Ground
Clean it your Mom's Comin
4
Now that we got our aerial up Fat,- we need a receiving set,- Fones - detector etc.-!?
Well- seein-as how I haven't got em, and Carnegie didn't leave me any money.- what's ans'r?
5
I gotcha !?
6
Well.- this does look like a good piece.
How, if I can only get out with this,- Slim'n I goin't have a reg'lar station
7
D'ja hear that Fat?
Yep! It sounds like a quenched Arc set.
SQUEAM
8


OW
That Musical Note
Radiation
Amplitude
Beat Receiver

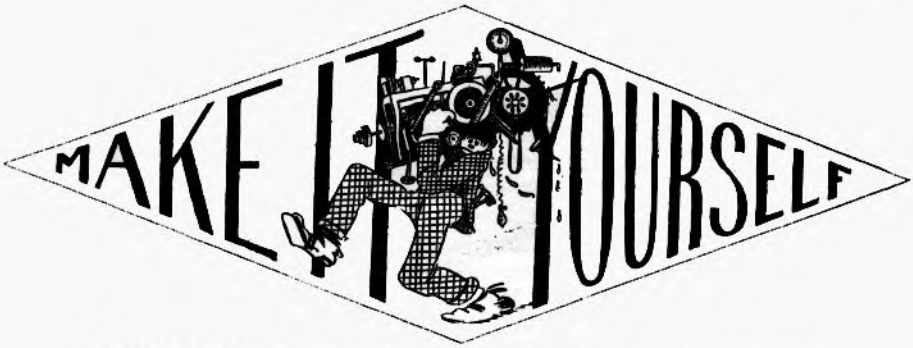
Sixth District Amateur Stations

(Corrected to December 8, 1919.)

6AA	Heuter, N.	1434 Jones St.	San Francisco, Cal.
6AB	Henry, W. J.	544 11th Ave.	San Francisco, Cal.
6AC	Little, J. W.	1035 Lincoln Way	San Francisco, Cal.
6AD	Webb, M. L.	1125 Geary St.	San Francisco, Cal.
6AE	Terman, F. E.	Stanford University	Palo Alto, Cal.
6AF	Schubert, F.	209 Nevada St.	San Francisco, Cal.
6AG	Schivo, E. A.	1477 19th Ave.	San Francisco, Cal.
6AH	Rheem, R. S.	478 Orchard St.	Oakland, Cal.
6AI	Petersen, C. T.	4344 Howe St.	Oakland, Cal.
6AJ	Mundt, C. S.		Concord, Cal.
6AK	Mesler, L. D.	(moved to new address)	
6AL	MacMullen, G. F.	2425 Le Conte Ave.	Berkeley, Cal.
6AM	Lyon, Robt.	1365 43rd Ave.	San Francisco, Cal.
6AN	Lohry, R. B.	1921 Irving Ave.	Alameda, Cal.
6AO	Litton, V. C.	160 26th Ave.	San Francisco, Cal.
6AP	Dodge, H. W.	1035 Ortega St.	San Francisco, Cal.
6AQ	Cormack, A. H.	1235 7th Ave.	San Francisco, Cal.
6AR	Byrne, P. F.	2417 18th Ave.	San Francisco, Cal.
6AS	Brown, T. B.	690 3rd Ave.	San Francisco, Cal.
6AT	Arnold, E. G.	181 North 17th St.	San Jose, Cal.
6AU	Collins, W. A.	788 19th Ave.	Oakland, Cal.
6AV	Nesbit, P. T.	620 Fitch St.	Healdsburg, Cal.
6AW	Stellson, F. B.	451 Rutliven Ave.	Palo Alto, Cal.
6AX	Brown, J. F.	295 Perkins St.	Oakland, Cal.
6AY	Watkins, E. S.	2232 Huntington Ave.	Alhambra, Cal.
6AZ	Highstone, H.	1436 12th Ave.	San Francisco, Cal.
6BA	Newman, H. L.	2242 San Jose Ave.	Alameda, Cal.
6BB	University of Cal. Radio Club		Berkeley, Cal.
6BC	Maynes, W. W.	2433 Telegraph Ave.	Berkeley, Cal.
6BD	Muller, Lloyd	4156 25th St.	San Francisco, Cal.
6BE	Barry, G. F.	3036 Octavia St.	San Francisco, Cal.
6BF	Van Why, F. W.	432 Palos Verdes St.	San Pedro, Cal.
6BG	Carroll, R. W.	354 Perry St.	Oakland, Cal.
6BH	Dilts, K. V.	760 E. California St.	Los Angeles, Cal.
6BI	Fonesca, U. W.	42nd and Broadway	Oakland, Cal.
6BJ	Berringer, Hall	6 Arundel Road	Burlingame, Cal.
6BK	Wright, G.	2533 Dana St.	Berkeley, Cal.
6BL	Smith, R. A.	338 Fell St.	San Francisco, Cal.
6BM	Silent, H. C.	1730 La Loma Ave.	Berkeley, Cal.
6BN	Holliway, H.	1175 Washington St.	San Francisco, Cal.
6BO	Preston, H. M.	514 McDonald Ave.	Richmond, Cal.
6BP	Parkin, Miss K.	22 Terra Dillo Ave.	San Rafael, Cal.
6BQ	Beedle, H. S.	97 Bell St.	Reno, Nevada.
6BR	Bessey, E. A.		Sunnyvale, Cal.
6BS	Shaw, H. R.	1546 Portola Drive	San Francisco, Cal.
6BT	Diemal, F. H.	1281 21st Ave.	San Francisco, Cal.
6BU	Thygeson, P.	222 Kingsley St.	Palo Alto, Cal.
6BV	Lake, R. E.	401 Gates St.	San Francisco, Cal.
6BW	Hudd, S.	612 Anza St.	San Francisco, Cal.
6BX	Vick, C.	218 Cortland Ave.	San Francisco, Cal.
6BY	Smeker, L. J.	2329 Carlton St.	Berkeley, Cal.
6BZ	McCormack, R.	804 Delmas Ave.	San Jose, Cal.
6CA	Strong, S. E.	268 Jayne St.	Oakland, Cal
6CB	Perkins, G. S.	210 G. St.	San Rafael, Cal.
6CC	Cornell, R. H. Jr.	509 Washington Ave.	Pt. Richmond, Cal.
6CD	Schnarr, H. J.	611 Allendale Ave.	Oakland, Cal.
6CE	Harmon, O. A.	817 34th Ave.	Oakland, Cal.
6CF	Toles, J.	2723 Benvenue Ave.	Berkeley, Cal.
6CG	Skilling, W. C.	2910 Linden Ave.	Berkeley, Cal.
6CH	Brown, H. C.	843 Hayes St.	San Francisco, Cal.
6CI	Johnson, A. E.	1030 Delaware St.	Berkeley, Cal.

6CJ	Barnes, L. S.	827 Green Ave.	Los Angeles, Cal.
6CK	Bascom, C. V.	1020 E. 27th St.	Los Angeles, Cal.
6CL	Burkey, H. T.	2017 Lincoln St.	Berkeley, Cal.
6CM	Campbell, D. M.	Highland Av. & Shendale	Los Angeles, Cal.
6CN	Campo, V. J.	207 Gaven St.	San Francisco, Cal.
CCO	Clark, P. U.	898 S. 8th St.	San Jose, Cal.
6CP	Deetkin, F. I.	1535 6th St.	Alameda, Cal.
6CQ	Greene, H. A.	313 Lighthouse Ave.	Monterey, Cal.
6CR	Dennis, G. H.	1227 Crenshaw Blvd.	Los Angeles, Cal.
6CS	Denny, R. C.	1516 McKenzie Ave.	Fresno, Cal.
6CT	Downs, R. F.	3938½ S. Grand Ave.	Los Angeles, Cal
6CU	Fiktead, C. F.	1240 Arapahoe St.	Los Angeles, Cal
6CV	Frazier, E.	1334 39th St.	Sacramento, Cal.
6CW	Hand, H. C.		Carmel, Cal.
6CX	Hatherell, G. A.	833 Idlewild St.	Los Angeles, Cal.
6CY	Lundy, C. E.	592 N. 17th St.	San Jose, Cal.
6CZ	Hewitt, G.	796 Delmas Ave.	San Jose, Cal.
6DA	Hillen, R. W.	162 W. Alvarado St.	Pomona, Cal.
6DB	Holladay, W.	301 S. Fir St.	Inglewood, Cal.
6DC	Isham, C. G.	1323 96th Ave.	Oakland, Cal.
6DD	Keast, Philip	379 Mill St.	Grass Valley, Cal.
6DE	Ingram, S. P.	95 S. 5th St.	San Jose, Cal.
6DF	Kluge, A. A.	638 S. Figueroa St.	Los Angeles, Cal.
6DG	Lake, R. E.	401 Gates St.	San Francisco, Cal.
6DH	Launtzar, W. E.	R. F. D. A No. 530	Fresno, Cal.
6DI	Appleton, DeW. Jr.	323 Larkin St.	Monterey, Cal.
6DJ	Marsh, W. C.	848 Main St.	Albany, Cal.
6DK	Martin, L. E.	2413 Stanislaus St.	Fresno, Cal.
6DL	Mayo, C. I.	2328 Channing Way	Berkeley, Cal.
6DM	Milbralte, H. W.	986 63rd Street	Oakland, Cal.
6DN	Morse, W. A.	2029 Turk St.	San Francisco, Cal.
6DO	O'Neill, F. M.	1635 Addison St.	Berkeley, Cal.
6DP	Harris, E. H.	26 Washington St.	Santa Cruz, Cal.
6DQ	Ponnay, C. E.	651 Denver Ave.	Los Angeles, Cal.
6DR	Robinson, S. E.	2829 Broadway	Oakland, Cal.
6DS	Sanderson, J.	601 N. Stoneman Ave.	Alameda, Cal. alhambra
6DT	Schwendt, O.	1046 Blackstone Ave.	Fresno, Cal.
6DU	Scruggs, C.	1178 E. 47th St.	Los Angeles, Cal.
6DV	Stine, C.	1226 W. 30th St.	Los Angeles, Cal.
6DW	Taylor, J. B.	111 Gaven St.	San Francisco, Cal.
6DX	Tilden, C. W.	1035 Waltman Ave.	Los Angeles, Cal.
CDY	Topping, H. F.	222 W. Richmond Ave.	Richmond, Cal.
6DZ	Tulp, R. A.	1228 Sycamore Ave.	Highland Pk. Los Angeles
6EA	Seefred, H. C.	343 S. Fremont Ave.	Los Angeles, Cal.
6EB	Seefred, L. F.	343 S. Fremont Ave.	Los Angeles, Cal.
6EC	Waters, J. E., Dr.	Suite 7, Mitchell Bldg.	Anaheim, Cal.
6ED	White, H.	822 E. 4th St.	Santa Ana, Cal.
6EE	Whitehead, S. K.	138 N. Bixel St.	Los Angeles, Cal.
6EF	Widing, C. G.	904 E. 42nd St.	Los Angeles, Cal.
6EG	Williamson, E. A.	2101 Stockton Blvd.	Sacramento, Cal.
6EH	Wright, H. E.	315 Alvarado Court	Pomona, Cal.
6EI	Carter, Ed. S.	7105½ Franklin Ave.	Hollywood, Cal.
6EJ	Wise, J. V.		Walnut Grove, Cal.
6EK	Vale, N.	637 N. 43rd St.	Los Angeles, Cal.
CEL	Mackey, G. G.	1526 Crenshaw Blvd.	Los Angeles, Cal.
6EM	Delimlow, L. T.	426 First Ave.	San Diego, Cal.
6EN	Duvall, H. A. and Esler, C.	4965 Wadsworth St.	Los Angeles, Cal.
6EO	Needham, E. H.	118 Fairmont Ave.	Eagle Rock City, Cal.
6EP	Seeburger, S. H.	371 60th St.	Oakland, Cal.
6EQ	Salome, F. W.	1361 Underwood Ave.	San Francisco, Cal.
6ER	Blasier, H.	3200½ S. Hoover St.	Los Angeles, Cal.
6ES	Underwood, E. G.	903 E. Commercial St.	Los Angeles, Cal.
6ET	Fenner, Paul R.	1338 Masonic Ave.	San Francisco, Cal.

(Continued on page 249.)



AN UNDAMPED TRANSMITTER OR RADIO TELEPHONE
PART I—THEORY OF OPERATION

By Bob Velner

(Mr. Velner has written this article so that the amateur can readily understand it.)

Before describing the actual constructional details of a practical radio telephone or undamped wave transmitter it is well to go over the theory of the operation of a vacuum tube which plays the leading part in the set.

To familiarize one's self with the vacuum tube as a generator let us think of the filament as similar to the nozzle of a hose. Lighting the filament is like turning on the hose, and, instead of a stream of water, we have a stream of electricity or negatively charged electrons. Ordinarily, this stream leaves the filament only to return again since there is no means of escape.

In this respect it is like water being projected from a nozzle into a closed bulb; as soon as the bulb is full the flow stops. Now let us think of the plate circuit as a pipe line. The plate is always connected to the filament in some way even though the circuit first passes through the high voltage battery, or an inductance, too. The high voltage battery may be thought of as the valve; if it is connected so that it gives the plate a positive charge, it assists the flow of the nozzle (filament) to escape, and keeps up a continual flow of electricity, direct current, from filament to plate and back to filament by way of the high voltage battery. If the battery were reversed in polarity the flow would stop because the flow from the filament would be opposed by the negative charge on the plate, and we know that like polarities repel one another. But we can forget about this because in vacuum generators the high voltage battery is always connected so that it assists and carries away the current from the filament. However, we have learned the effect of polarized elements in the vacuum bulb. Now suppose we put another element in the bulb with less surface and call it the grid. This is placed between the filament and the plate. Of course this grid, when it is given a charge of electricity, will act just like the plate, only we give it less surface so that its effect will be weaker and the principal flow of current will still be through the plate circuit and from filament to plate. The fact is now clear in mind that we have a flow of direct current from filament to plate and thence through the high voltage battery back to the filament again. But we have another valuable feature, the grid, which will control the current to the plate from the filament like a valve. So let us utilize this feature. Put a coil of large

(Continued from page 230)

on wave lengths of about three hundred meters, with only a radiating current of a few hundred milliamperes, using an undamped wave vacuum tube transmitter. Radio telephone intercommunication was also successfully carried on between the bureau and the field laboratory, using tree antennae. Later tests were made with five hundred cycle quenched-gap transmitters, but since several amperes were radiated and signals were barely heard a half mile away, it was abandoned.

But for efficient long or short-wave reception, using only about one hundred feet of wire, an easily constructed receiver and two-step amplifier, what easier method could be found than using a tree?

THE SYNCHRONOUS TWINS

Mr. H. C. Brown and Mr. T. B. Brown are brothers. Each has a station, the spark frequency of which is exactly like the other. Their wave lengths are the same; they send alike. They are both members of the San Francisco Radio Club. When they are heard on the air no one can tell one from the other until he signs. Radiolly speaking, they are twins; physically they are not. Their nickname is "The Synchronous Twins."

RADIO CLUBS

Secretaries of radio clubs, especially those in the Western States, should send material for publication regarding the activities of their organization to the editor, Pacific Radio News, 50 Main street, San Francisco. Due publicity will be given items of interest.

wire in the plate circuit and then couple to it another coil of finer wire which will be connected, one end to the grid, and one end to the filament. As the entire connection is completed let us see just what happens if we have the fine wire coil connected right, and we will assume that it is. First there is a surge of direct current through the plate circuit which tries to reach a certain value and stay there. But it is not permitted to reach its final value because we have the large wire coil in the plate circuit and the fine wire coil coupled to it. In other words it is nothing else but a transformer. It is true that a transformer will not operate on direct current but it will if we observe what happens in this case. The very first surge or rise of current is exactly like a part of a cycle of an alternating current and just that first rising current starts our whole system in operation. First we have a transfer of current into the grid coil of fine wire. This puts a negative polarity on the grid and causes the current from the filament to the plate to decrease. But now we have caused a decrease in the plate circuit which was originally responsible for the current generated in the grid and which in turn caused the decrease in the plate circuit. Looks like a vicious circle, doesn't it? That's exactly what it is. Let's go back again to the decrease in the plate circuit. That will cause a decrease in the charge on the grid. And now that the negative charge (negative when the grid coil is connected right as mentioned before) is removed, why the plate current starts going right up to reach its maximum value again. But, as explained before, it cannot reach this maximum because every time it tries it, it induces current in the grid circuit which gives such a polarity to the grid that it never allows the current in the plate circuit to reach its maximum, or allows it to be a direct current. But still, you may say that the grid would not have enough power to stop the plate current from the feeble current induced by our transformer (tickler). You are right. But it causes a small decrease in the plate current each time, and while it does not bring the current in the plate circuit anywhere near zero it causes a sine curve alternating current no part of which goes below or close to zero. Such a current is really an oscillating direct current but its action is just as if it were an ordinary alternating or oscillating current. Thus we have an automatic oscillator. If we measure the length (electrical length) of the plate circuit (from plate, through high voltage battery and coil to filament) we find that the frequency of the oscillations, or, in other words the number of times per second that the plate current is decreased by the grid, is equal to the number of times this length goes into the total distance electricity will cover in one second.

(The next installment of this article will take up the constructional details of the oscillator. The oscillator will be such that either a receiving bulb or regular transmitting bulb can be used.)

SOME SHORT NOTES

The Pacific Mail freight steamer Point Bonita, which recently left for Baltimore, is the first merchant ship to be regularly equipped with the new 2KW Federal arc transmitting equipment. The Point Bonita, which was purchased from the Shipping Board by the Pacific Mail, is the first of a number of freighters to be put on the San Francisco-Baltimore run. All these ships will be equipped with the new type Federal 2KW arc sets and great results are expected with them. The 2KW arc was developed during the war, and this is the first commercial equipment to be installed.

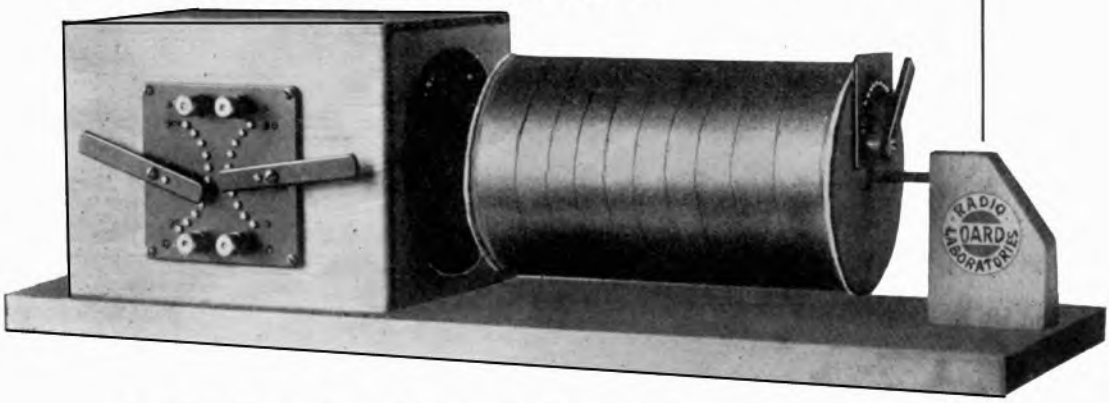
(Continued from page 244.)

6EU	Garrison, F. L.	405 Willow St.	Stockton, Cal.
6EV	Kramer, A. A.	1603 6th St.	Coronado, Cal.
6EW	Phillips, C. J.	1016 San Antonio	Alameda, Cal.
6EX	Steffen, C.	1615 Arch St.	Berkeley, Cal.
6EY	McCargar, J. L.	1413 16th St.	Oakland, Cal.
6EZ	Lee, G. R.	2619 Manitau Ave.	Los Angeles, Cal.
6FA	Mundt, Edw. L.	2418 Eagle Ave.	Alameda, Cal.
6FB	Diamond, Bert	408 S. Catalina St.	Redondo Beach, Cal.
6FC	Schulz, A. H.	1445 Cole St.	San Francisco, Cal.
6FD	Midkiff, Hallie	Minnesota and Ada Sts.	Glendale, Cal.
6FE	Briggs, Wm.		Gas Point, Shasta Co., Cal.
6FF	Dugan, R. B.	3003 La Salle St.	Los Angeles, Cal.
6FG	Hibbard, C. H. Jr.	156 Bellefontaine St.	Pasadena, Cal.

ANNOUNCEMENT

2,500 miles with Galena **$10** 4,000 miles on a Vacuum Tube

FOR THE FIRST TIME IN THE HISTORY OF AMATEUR WIRELESS, A NAVY STANDARD TYPE RECEIVING TRANSFORMER IS BEING PLACED ON THE MARKET AT A HITHERTO UNHEARD OF PRICE—$10. NOT A CHEAP, INEFFICIENT TOY, BUT A STRONG, WELL BUILT, BEAUTIFULLY FINISHED INSTRUMENT THAT ANY RADIO OPERATOR WOULD BE PROUD OF. THINK OF IT—A 4,000 TO 5,000 METER RECEIVING TRANSFORMER WITH GENUINE BAKELITE INSULATION FINISHED EITHER IN MAHOGANY OR IN DULL MISSION. READ THE SPECIFICATIONS, NOTE THE SIZE AND THE BEAUTY OF THE INSTRUMENT, AND GET YOUR ORDER IN IMMEDIATELY.



Size—24 inches long, 10 inches wide, 6¾ inches high.

Primary—Wound on non-shrinking tube 8 inches long, 5½ inches in diameter. Genuine Bakelite panel with regulation switch, point variation. 10 points for fine tuning, 11 for coarse. Quick action switch levers of Bakelite—easy running, firm contact.

Secondary—Section wound, 10 point switch variation on Bakelite panel. No sliding contacts—flexible cord connections, binding posts mounted on primary panel. Secondary slides on floating bearings, absolutely non-sticking.

Finish—All metal, satin nickel plate; woodwork in mahogany or dull mission.

Weight—6¼ lbs.; packed for shipping, 10 lbs.

OUR OFFER—Try the instrument 3 days—if you are not satisfied that it is worth double the amount, send it back and we will refund your money. This price guaranteed only until Jan. 15, 1920. After that, subject to change without notice.

You can also buy this instrument knocked down ready for assembling with primary and secondary wound, all woodwork finished, for $7.00

OARD RADIO LABORATORIES
Stockton, Cal.

"Your ears tell."

CALIFORNIA ELECTRIC SUPPLY CO.

Exclusive Pacific Coast Agents
643 Mission St., San Francisco, Cal.

Listen for OARD amateur press each Saturday starting 8 p. m., Jan. 3.

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

WIRELESS

THE RADIO EXCHANGE will buy and sell radio apparatus. What have you to sell? What do you want to buy? We will sell your apparatus, new or second-hand, on a commission basis. All apparatus must be sent on consignment, prepaid, to our address. Here is a list of some real bargains for the month: Two Rotary Spark Gaps, complete, $10 and $8, motor included; 1 Murdock Aerial Switch (new), $9; 3 big Telephone Condensers, 40c each; 3 Marine type single receivers, about 1,000 ohms, 75c each; ½-point switch snap type, 50c; 1 Micarta Board, 6½ in. by 13½ in. by ½ in., with 20 points, $4; 1 good Helix Clip, 40c; 3-12-in. hard rubber insulators, 30c each; 1 radio operator's cap, size 7⅛ with ½-in gold band, $2.50; 1 uniform coat with sparks, $7; 1 chopper disc, 50c; 1 rotary motor mica, 75c; 1 Omnigraph (new), $8; 1 ½-KW Clapp-Eastham transformer (new), $25; 20 feet ⅜-in. copper cable, stranded, 2¼c per foot; 1 pair 2000-ohm phones, $4; 1 Tikker, complete, without motor, $3; 1 set taps and dies (Little Giant), brand-new, $15; 1 heavy contact relay key, $3.75; 1 10-K.W. key, $3; 3 four-point snap switches, 75c each; 3 push-buttons, 25c each; 1 vest-pocket Volt-Ammeter, $1.75 (new); 2 good telegraph sounders, $2.50 each; 2 S. P. S. T 30-amp. switches, 60c each; 1 corrugated porcelain insulator, 20c. Also a supply of brass switch points, nickel-plated; switch parts, knobs and supplies; ground plates, brass rod, lug and wire connectors, detector parts, etc., etc. Write for our proposition regarding the sale and purchase of your apparatus. R. W. CARROLL, 354 PERRY ST., OAKLAND, CAL.

MURDOCK double head-set without cords, $2.50; Murdock single head-set without cords, $1.50; good condition; postage on two pounds extra. BOX 101, RADIO, 50 Main St., San Francisco, Cal.

NO. 3 UNDERWOOD TYPEWRITER, 14-inch carriage, rubber cushion keys, practically new, $75. C. M. JACKSON, 109 Steuart St., San Francisco, Cal.

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200 copies of the February, 1917, and March, 1917, issue of "Pacific Radio News" have been returned by the news stands. All in good condition. Twenty cents takes a copy of both issues. Act quick; they won't last long. PACIFIC RADIO PUB. CO., 50 Main St., San Francisco, Cal.

20000 Meter Long Wave Tuner Type BS.

Weight, 2 lbs. Gets all the "sigs" in this hemisphere. Involute coils machine wound, beat honeycomb. XDA on first tap, NSS on fourth. Formica top and nickel finish. Coils set in special wax, works through worst static. Hookup glued on bottom. Fits Deforest cabinets. Absolutely, we will refund money if not as represented and does not work as we say. Round or square pattern.

200 Meter Amateur Regenerative Tuner Type CS2.

Designed for short waves and just the thing for relay work. Machine wound coils set in wax and has tickler coil and ten taps. Hookup on bottom. Carry them with you. Same weight, and finish.

3000 Meter Arlington Tuner—Type AS

Designed to get NAA and does it. Range 600 M. to 3000 M. small aerials. Price of either of above tuners **$15.00,** delivered to you.

Knocked Down Variable Condensers

43 plate—.001MF.—**$2.50;** 21 plate—.0005MF.—**$2.25,** 11 plate grid variable **$1.75.** Assemble and save money. Packed in neat box with full instructions.

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2. **Experimental Radio Laboratory No Admittance**
3. **Government Licensed Radio Station**
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15c EACH, ANY TWO FOR 25c ALL 5 FOR 50c

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Copies of the April, 1917, issue of the Pacific Radio News in good condition. We will pay fifteen cents apiece for them.—Advt.

Type SWR-6 Short Wave Regenerative Receiver

Polished Bakelite panel. Genuine mahogany cabinet, hand rubbed finish. Rotary air-spaced variable condenser. Two ball type variometers. Specially designed loose-coupler unit with precision adjustments. Connection posts arranged for simplicity of wiring to Vacuum Tube control panel. All metal parts satin nickel plated. Efficient range of from 125 to 700 meters. Shipping weight 24 pounds.

Type SWR-6 Short Wave Regenerative Receiver.....$70.00

The Short Wave Regenerative Receiver shown herewith is one of the several units we are placing on the market for amateur and experimental use.

In designing our apparatus we have endeavored to furnish the field with instruments more nearly approaching the type in Commercial use than, with a few exceptions, are at present obtainable at a price within the limits of the amateur purse.

While our slogan is—BUILT TO A STANDARD—NOT TO A PRICE, we have not ignored price entirely, but have merely placed it secondary to quality, feeling that the great majority of experimenters are willing to pay a fair price for value received.

Practically all of the parts entering into the construction of our apparatus are manufactured by us and by dealing directly with the amateur trade we are able to keep our prices within reasonable limits.

Our apparatus will be found to be honestly represented and up to specification in every detail, and is sold with the distinct understanding that every article found to be not entirely satisfactory may be returned and money refunded without question.

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