

LICENSE FOR GENERAL AMATEUR RADIO STATION

(General or restricted)

DEPARTMENT OF COMMERCE BUREAU OF NAVIGATION RADIO SERVICE

Pursuant to the act to regulate radio communication, approved August 13, 1912,
E. G. Schalkhauser

Eric G. Schalkhauser W9CI
527 Spring Creek Road
Washington IL 61571

of Nebraska, having applied therefor, is hereby granted by the Secretary of Commerce, for a period of one year, on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the Schedule hereinafter) for the purpose of transmitting private radiograms or signals, notwithstanding the effect thereof extends beyond the jurisdiction of the State or Territory in which the said station is located: Provided, That no interference other than may result under the restrictions contained in this License shall be caused with the radio communication of stations of the Government of the United States or licensed stations.

2. The use or operation of apparatus for radio communication pursuant to this License shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President, and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The apparatus shall at all times while in use and operation be in charge of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

4. The station shall give absolute priority to signals or radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and shall refrain from sending until all the signals and radiograms relating thereto are completed.

5. The station shall use the minimum amount of energy necessary to carry out any communication desired, and the transformer input shall not exceed ^{one}~~one-half~~ kilowatt.*

6. The station shall not use a transmitting wave length exceeding 200 meters.

7. The station shall not use a transmitter during the first 15 minutes of each hour, local standard time, whenever the Secretary of Commerce by notice in writing shall require it to observe a division of the time, pursuant to the Twelfth Regulation of the act of August 13, 1912.

8. The President of the United States in time of war or public peril or disaster is authorized by law to close the station and cause the removal therefrom of all radio apparatus, or may authorize the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

9. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorized by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

10. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following Schedule except with the approval of a radio inspector, or other duly authorized officer of the Government.

11-4900

*Strike out "one" if the station be within 5 nautical miles of a naval or military station; otherwise strike out "one-half."

One of the first amateur licenses issued shortly after they were required.

The History of Ham Radio

- - part I

When trying to get just a glimpse of wireless history in a nutshell, it is traditional to lay most emphasis on the years from 1910 and on. This period coincided with radio rules and regulations, the three Rs, being formulated by the

United States government. We then project the general accumulation as far as 1927-1928, after which time some degree of order was again established in the radio industry, overall.

In telling our story, it is impossible to refrain making pertinent insertions of interest. There were many occurrences during those early years that stand out vividly in memory and need telling. Those beginning years were mostly of pioneering and exploring, bringing forth many discoveries and inventions in rapid order, in very short periods of time.

1909

To begin with, let me set the year 1909 as a reference. Why 1909? We will become aware of the reason as we review the history in relating the magic that is wireless.

And it sure was magic to everyone in those days, believe me! Let me take a short glimpse into the past history of wireless. There were no laws on the books. There were no rules or regulations pertaining to wireless. The general public was not even aware that radio waves existed. They had no inkling of what was meant by communicating without wires. Practically nothing was known about electricity. All this was a mystery.

1888

In 1888, just 89 years ago, a German Scientist made a discovery when he sensed

2

SCHEDULE OF STATION AND APPARATUS

Name of owner, E. G. Schalkhauser; Age, 22

Location: State, Nebraska; County, Johnson

City or town, Sterling; Street, W. L. Academy; No. -

Official call, "9 A H O"

Name of naval or military station, if within 5 nautical miles, -

Power: Transformer input, 500, W.*

Antenna: Type (T, T, fan, umbrella, etc.), "T"

Height, 55 ft.; Horizontal length, 60 ft.
(Above ground)

Wires: Number in vertical part, 1; In horizontal part, 4

The normal sending and receiving wave length shall be 200 meters and
(Not exceeding 200)

the station is authorized to use the following additional wave lengths, not exceeding 200

meters: 175 meters, - meters, - meters.

This License expires on May 4th, 191 7.

EDWIN F. SWEET,

Assistant Secretary of Commerce.

E. T. CHAMBERLAIN,

Commissioner of Navigation.

Delivered by [Signature]

(Radio Inspector)

Place, Cleveland, Ohio., Date, May 5th, 1916.

*Not to exceed 1,000; or if the station be within 5 nautical miles of a naval or military station, not to exceed 500.

11-4909

that there was something present in the vicinity of an electrical spark in a Lyden jar discharge. This elementary discovery made by Heinrich Hertz set the stage for many scientific investigations. They were carried on in university laboratories, stimulating research in the field of electromagnetic waves.

1892

About this time, along came Marconi from Italy. He was born in the year 1874. At the age of 18, while a freshman at the University of Bologna, Marconi discovered that an electric discharge from a condenser could be detected. This made possible the transmission and reception of signals over some distance. Playing around and experimenting for four years, he finally went to England, where he demonstrated his findings and equipment.

1896

In 1896, Marconi obtained a British patent for *wireless telegraph apparatus using electricity*. How utterly novel and primitive that description sounds today. And that was only eighty-one years ago! (At that time I was 3 years old, but do not recall the incident!)

1897

Within a year, commercial interests became aware of the possibilities in the application and use of Marconi's invention and organized the Wireless Telegraph and Signal Company, Ltd., in England.

1899

In 1899, Marconi and his assistants succeeded in sending signals across the English channel with their crude equipment. The main bottleneck was their iron filing coherer for detection of signals. The use of galena, silicon, or carborundum was not yet known for detecting wireless signals. In this same year, the Marconi Wireless Company of America was established.

Form 763

AMATEUR APPLICANT'S DESCRIPTION OF APPARATUS

DEPARTMENT OF COMMERCE BUREAU OF NAVIGATION RADIO SERVICE

The following form of description of apparatus will be filled out and forwarded in duplicate to the radio inspector by each applicant for an amateur's license for apparatus for radio communication of the general or restricted class (amateur applicants for a special license will use Form 761). The inspector, if necessary, will then arrange for the inspection of the station. The information is desired primarily as the basis of the description of the apparatus to be inserted in the license, but many of the details are desired to facilitate the classification and particularly the inspection of stations, and will not, of course, be incorporated in the license. This form will not be open to public inspection.

NOTICE.—This form must be submitted in duplicate to the radio inspector in the applicant's district.

I. GENERAL DESCRIPTION OF STATION.

Name of applicant, Prof. E.G. Schalkhauser Age, 86
Place of birth Hillside South Dakota
(City or town.) (State, Territory, or foreign country.)
Address, Sterling Nebraska.
Citizen of the State of Nebraska or a company incorporated in the State of _____
Location of station: State, Nebraska; County, Johnson
City or Town, Sterling; Street, W.L. Academy; No. _____
Station to be operated by E.G. Schalkhauser holding operator's license No. _____ grade, _____
(Name.)
Issued by _____ at _____
(Name and title of examining officer.) (Date.) (Place.)
Name of naval or military station, if within five nautical miles of the station for which a license is desired, none.

II. POWER SUPPLY.

From city mains, generator, storage battery, etc., From city mains. 110 volts A.C.
Give following data, measured under normal sending conditions, key depressed:
Amperes, 3-3 A. Volts, 110 V.
(Measured in primary circuit of transformer or induction coil.) (Measured across transformer or induction coil primary terminals.)
Power, _____ W. Transformer or induction coil rated at 500 W.
(Transformer input in watts.)
Description of oscillation transformer and transmitting condenser: spiral-wound, loose-coupled.
18 ft. heavy brass ribbon in primary; 30 ft. heavy ribbon in secondary.
Additional information: condenser of glass plate type, oil immersed.

III. ANTENNA.

Type (T, J, fan, umbrella, etc.), serial is of 'T' type.
Dimensions:
Maximum height above ground, 55 feet. Total length (from apparatus) 90 feet.
Horizontal length, 80 feet. Vertical length, including lead-in, _____ feet.
Number of wires in horizontal part, four In vertical part, one
Separation between wires, 30 inches feet. Length of ground lead, 25 ft. feet.
Ground lead connected to water-pipe running 7 ft. under ground to well.
Other essential dimensions, serial is 55 ft. above ground at one end and
35 ft. above ground at the other end.
Is series condenser used in antenna for transmitting? no.
Additional information: _____

Furnish sketch of antenna, with complete dimensions
11-4872

(over)

1900

At the turn of the century, the English company changed its name to Marconi Wireless Telegraph Company, Ltd., to be more in keeping with current developments.

1901

In 1901, Marconi and two of his engineers came across the Atlantic to set up their wireless equipment in Halifax, Newfoundland. They succeeded in receiving messages across the waters from a station transmitting out of Polduh, England. All this on

very long wavelengths, since the shorter ones were still undiscovered. By this time, many ships at sea were installing transmitting and receiving equipment and many shore and inland locations established communication centers.

IV. GENERAL INFORMATION.

Normal wave length used in sending 200 meters. Other wave lengths, _____ meters.

Morse.—In many cases two or more waves are simultaneously radiated from the transmitter. Care must be taken that no wave exceeds 200 meters in length.

Normal day communicating range with similar station No power during day. miles.

Give location of stations with which communication is carried on:

No. 2701 O St. Street. Distance, 35940 mi. Owner, H. H. Smith

No. _____ Street. Distance, 10 Owner, Lyle Francis

No. _____ Street. Distance, _____ Owner, _____

No. _____ Street. Distance, _____ Owner, _____

Additional information: _____

April 20, 1916
(Date submitted by applicant.)

Prof. G. Schalkhauser
(Signature of applicant.)

INSTRUCTIONS TO RADIO INSPECTORS.

Please send out this form in triplicate, one for the applicant's files, if he desires.

When filled in and returned, fill out the following:

Received by _____

at _____ Date, _____

Date of inspection (if inspected) _____

Licensed as ☒ general ☐ restricted } amateur station.

Serial No. _____

Date of issue, _____

Signature of Inspector, _____

The inspector will then retain a copy for his file, and forward the form to the Commissioner of Navigation, to whom the inspector should also submit a special report before issuing the license if he be in doubt on any matter concerning it.

11-4072

An apparatus description, one of the required parts of getting an early ham ticket.

1902

By 1902, a great deal of interest was shown in the

application of this relatively new phenomenon. Gradually, better detecting devices were

invented and larger stations were erected, in Europe, America, and other countries.



The station of 9AHO.

One should call attention to the contributions made at this time by Sir J. J. Thompson, a British scientist, who had discovered the electron, enclosed in a vacuum tube. It was a sequel to Edison's invention of the light bulb.

1904 and 1906

This led to the development of the use of vacuum tubes in detecting wireless signals, where J. A. Fleming in 1904 and Lee DeForest in 1906 made their contributions. While the sagas of the sea kept the newspapers busy and the public talking of the great wonders of wireless and its possibilities, what do you suppose was going on among the younger scientists across the country, especially in the eastern part of our United States? All of these intriguing possibilities of radio did not just belong to commercial companies — *by no means!*

Here we digress a bit and look into the back rooms and woodsheds around the country, taking note of the enthusiasm and the influence that wireless had produced among the young. We need to find out what was going on in these areas, since this part of early wireless history is vital in following the progress of the new discovery.

1909

This brings me to the year 1909, previously referred to. While the commercial interests considered wireless in terms of their restricted domain, we find a group of "wireless kids" in New York, no more than ten in number, all in their teens, getting together and forming a Junior Wireless Club on January 2, 1909. They were putting together metal plates, wires, and iron filings, making their own coherers, winding coils and other paraphernalia, and succeeding in sending dots and dashes according to the Morse code, between their homes, from block to block, and even across miles. They were listening in to what was going on, hearing the mes-

JUNIOR WIRELESS CLUB, LTD.

EACH MEMBER MUST HAVE
MADE HIS OWN STATION.

W. E. D. Stokes, Jr., Its President—Headquarters at the Ansonia Contains Much Apparatus—Club to Go to Washington to Oppose Pending Bill.

It is somewhat dangerous to attempt to enter the clubroom and experimental station of the Junior Wireless Club, Ltd. without a guide, for the officer in charge dispenses with the necessity of lock and key by having the knob charged with electricity to give the unexpected—and unexpected—visitor what he terms a "nice little shock."

But when proper guidance is secured from the club's young president, who maintains headquarters at his home,

many other things more or less electric add to the effect. A big electric turning lathe occupies one side of the room; numerous vari-colored models of aeroplanes—which the manufacturer asserts really go when wound up—hang from wire complexities overhead; zinc plates, worse than they look, are not to be ignored.

In fact it is not safe to put a hand to the most innocent looking object unless first reassured. A big box beneath the battery and motor table filled with perfectly staid appearing earth and plane which thrive on the rays of a makeshift sun specially arranged out of a 100 candle power electric bulb is not what it would seem. Those plants—roots, branch, leaf or blossom—are electrified and emit sparks when invited. On the side walls high and low, on the ceiling and suspended therefrom, bulbs of every conceivable variety, shape and power trans-

stations and steamers with wireless equipment.

These gleamers and signal stations are all intimately acquainted with the experimental station of the Junior Club—too much so at times, it seems, when the Manhattan Beach station has to ask it to stop receiving for a time, for the Manhattan Beach station is less powerful and is retarded in receiving.

The young president puts the receiving headgear on your head.

"Listen," he says. "They're talking to Manhattan Beach."

"How can you read it?" you ask.

"Listen," he says. "The waves: da-da-da-da—can't you hear it?" And he becomes a little impatient at your stupidity. He discusses coordinates, detectors, sensitive points and other appropriate topics for your enlightenment, but you are a poor subject.

Then the president tells how the Junior Wireless Club came to be, how it operates and what it intends.

About two years ago the Junior Aero Club, under the direction of Miss J. L. Todd, participated in the toy exhibition held at Madison Square Garden. Three of these youthful members, Frank King, Fainton Munn and Frederick Seymour, specialized on wireless telegraphy and frequented Miss Todd's studio on West Twenty-third street to experiment. Each of them made his own wireless apparatus, and through the newspapers they invited any other boy to come and show a mechanical set he had made himself.

W. E. D. Stokes, Jr., then aged 17, had rigged up a wireless outfit which he brought forth to display and which Frank King helped him set up. Such looks as the "A. B. C. of Wireless Telegraphy" and "Electricity of Everyday Life" and possibly, the random assistance of a random electrician were the principal sources of information.

The father of W. E. D., met the boys and invited them to his home to form a club. There the Junior Wireless Club, Ltd. came into being with headquarters at the Ansonia, there being just enough office to go around among the charter members. W. E. D. Stokes, Jr., was made president; George Kitz, 441 West Forty-seventh street, vice-president; Fainton Munn, East Orange, N. J., recording secretary; Frank King, 129 West 105th street, corresponding secretary; Frederick Seymour, East Orange, N. J., treasurer; Miss E. L. Todd was made honorary president. Prof. E. A. Fessenden of Brant Rock, Mass., was chosen as consulting engineer, and Seymour, Seymour & McGrath, 11 Broadway, as general solicitors and patent attorneys. Thus from the start the club's letterheads presented a complete and dignified appearance and are as yet unchanged, although the club has extended its membership to thirteen.

At 10 A. M. the first Saturday of each month from October to May the club holds meetings at the Ansonia, goes through the regular preliminary business, acts on the business letters received and the applications for membership, talks over schemes and, most of all, works with the wireless. The necessary qualification for membership is that the applicant has himself made his own wireless apparatus. Later he may have assistance and more elaborate mechanical contrivances, but the first rule is inviolable.

They first memorize the Morse code until they are able to think in dots and

Interference occurred and became objectionable for "the big boys." So in the following year, 1910, the existing problems were brought to the halls of Congress, to find ways and means to regulate wireless communication and define domains. True, the ether was free space and belonged to everybody, but the commercials and their interests sought to have vested right in their use of this "free" space. Thus, the conflict...

The conflict was brought to a head in the introduction of two bills, one in the House and one in the Senate. House bill #23495 and Senate bill #7243 were introduced. The senator strongly in favor of these bills was none other than Chancy Depew of New York, which was the bailiwick where the interlopers were operating. The contents of the bills were strongly against any use of the airways by anyone except the commercials. The teenagers with their homemade equipment and their determination, organization, and above all, their spirit, had other ideas. They wrote a letter to Chancy and told him so. Here we note something which will be of interest to all of you. The boys of the Junior Wireless Club had a meeting, selected their representatives, and asked to have a hearing in Washington. They composed another letter to Chancy Depew, were granted a hearing, and on April 28, 1910, were given the privilege of presenting their case. Believe it or not, these boys won their right to go on experimenting as they had done before. This Junior Wireless Club had performed like veterans in the halls of Congress, and to them and many others went the freedom of the ether for many years to come.

1911

So in 1911, the enthusiasm on the part of radio amateurs grew tremendously. In the same year, the Junior



W. E. D. STOKES, JR., AND HIS WIRELESS TELEGRAPH.

the Ansonia, many marvels and intricacies may be observed with some degree of security. W. E. D. Stokes, Jr., president, aged 17 years, points out the pitfalls.

"Look out. Don't step on that zinc plate!" says he. "It's charged!" And you look out and don't step.

The clubroom and receiving station is imposing, almost formidable despite its somewhat small extent. In addition to the wireless telephone instruments at one side of the windows, the sending station across the way and the aereals connecting with three conduits above

form the little room into an Aladdin cave of brilliancy.

"I'm always looking around at bulbs," says the president, "and when I see a new kind I try it."

So there they are, long and slim, short, fat and round, but all shining and bringing out dazzlingly the blueprints of scientific aspect which adorn one side of the wall, posters of the Postal Telegraph and Cable Company variety, illuminated letter placards bearing such legends as "No Smoking," "S. W. Co."—Stokes Wireless Company—and last but not least printed lists of wireless signal

This article appeared in a New York City newspaper early in 1910. The boy in the picture is the first president of the Junior Wireless Club, later renamed the Radio Club of America.

sages floating around between ships and shore stations. This was real fascination!

1910

Naturally there were bound to be conflicts

developing, especially between the commercial companies and the "interlopers."

Wireless Club changed its name to The Radio Club of America, and remains so to this day. The members became notables in wireless. The club was held in very high esteem, especially after their confrontation with Congress and their display of courage and dedication for a cause dear to their hearts and right in principle.

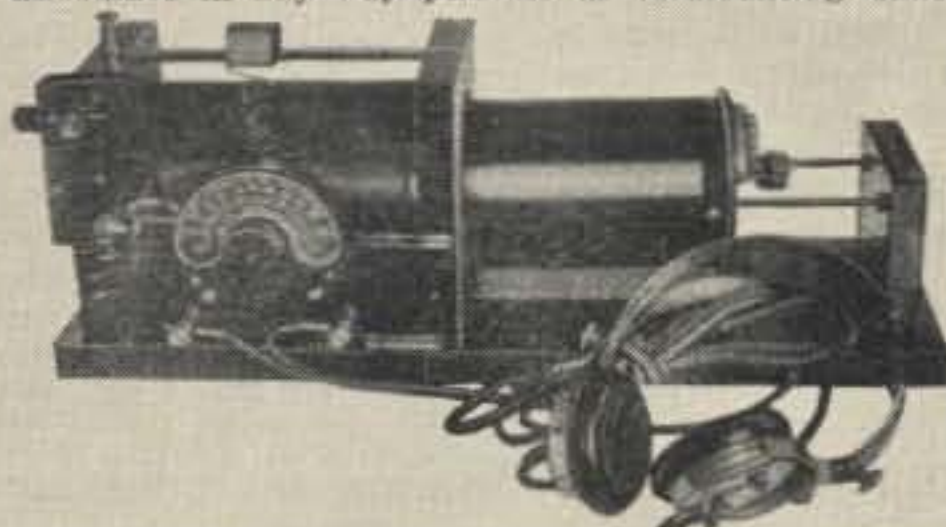
By 1911, every wireless company and operator on ship and shore knew that regulations were a necessity to hold down interference in radio communication. An Act, dated June 24, 1910, authorized by our Department of Commerce, Bureau of Navigation, became what at that time was considered the law of the land regarding radio transmission and reception. This Act consisted of four sections, all very general, and was labeled An Act to Require Apparatus and Operators for Radio Communication on Certain Ocean Steamers.

1912

On July 23, 1912 (two years later), and then only pertaining to section one of the four sections, the Act was amended, spelling out some specific details concerning operators and ships at sea. From then on, all transmitting stations would have to apply for a license to operate. The law was not too specific. It had loopholes, and many inland stations, especially amateur radio enthusiasts and experimenters, went about hooking up induction coils and going on the air with call letters assigned by themselves. For instance, a "one inch" spark coil was considered to be limited to no further than eight or ten miles, so did not fall within the law crossing state borders! What a "primitive" concept of wireless in those days. The type of signal coming from these amateur operated coils did not conform to any known bandwidth or frequency standard. A signal was "just a

"Radio Apparatus"

their efforts to form an unbroken chain of Amateur Stations linking the various states, and will offer our willing support and assistance in any way possible in surmounting difficulties that may arise.



THE "RADIO ARLINGTON" \$21.00

A desirable receiving set consisting of our model 7 Receiving Transformer, Fixed and Variable Condensers, Cat Whisker Detector and 2000 Ohm Brandes phones.

The above set equipped with our New Model 8 Transformer which is more elaborately constructed, having green silk windings, 3500 meter wave length, exceptionally loose-coupling and a slider that operates with absolutely no noise.

Price - - - - \$24.00
Model 8 Loose-Coupler, \$10.50

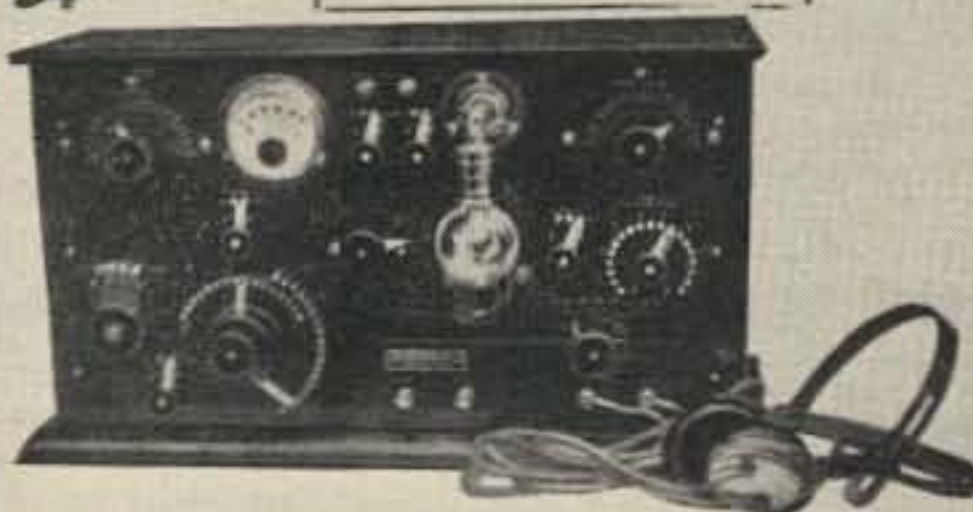
With Us You Get What You Want, When You Want It.

An honest guarantee backs every dollar worth of apparatus listed in our catalogue, mailed on receipt of 5c in which is displayed a line of products constructed in our own shops by skilled Mechanics, from the best materials that old Mother Earth affords.

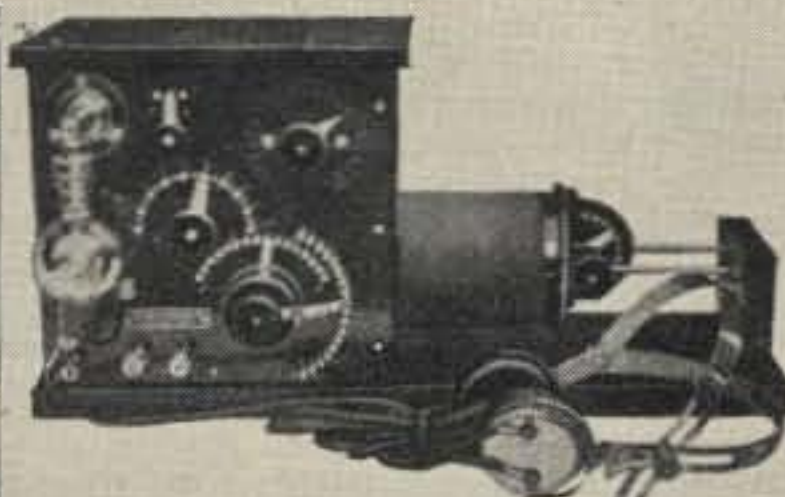
We earnestly request a careful study of our line when contemplating a purchase of new equipment for long distance transmission and reception.

Our August Bulletin will describe new designs of Panel Transmitters at exceptionally attractive prices.

Insist on "Radio" Apparatus and send your orders direct to our factory, which will insure you of positive satisfaction and prompt shipments.



THE "RADIO INTERNATIONAL" \$125.00



THE "RADIO SUPERIOR" \$70.00

The above is a combination of our famous model 5A Silver Plated Receiving Transformer and a super-sensitive DeForest Audion Detector. A case containing 33 number 6 dry cells operates the Audion and insures constant service for two years or more.

Receiving ranges can be increased 2 to 3 times with our Audion sets and the results in selective tuning are really surprising. A trial is sufficient to convince the most skeptical.

Classical Apparatus for an Advanced Class of Experimenters.

THE RADIO APPARATUS CO.

POTTSTOWN, PENN.

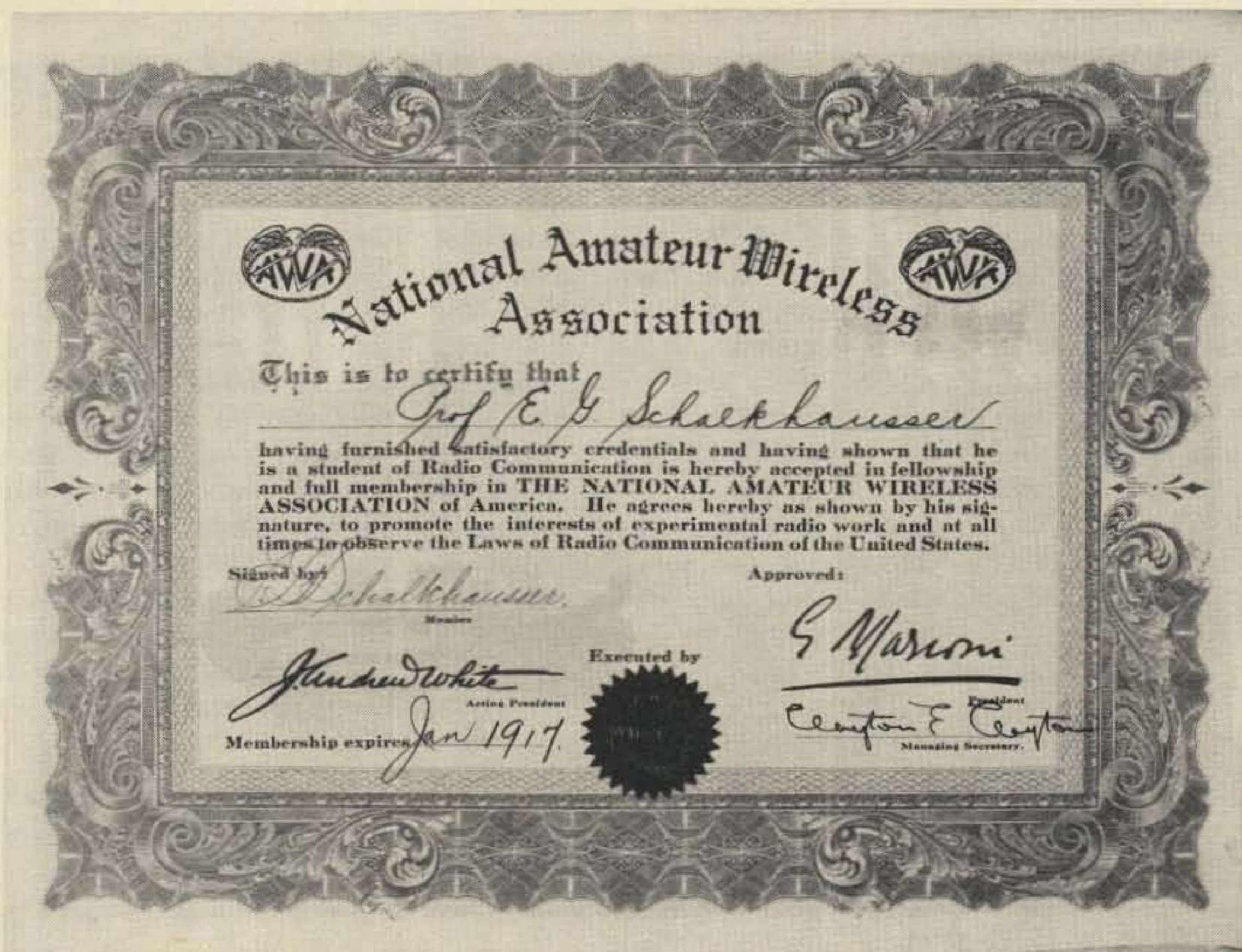
As soon as radio became popular as a hobby, equipment began appearing on the market. Note the flamboyant style of the copy, typical of the period. This ad appeared in 1915.

signal."

At this time, a number of wireless organizations blossomed. Notable among these were 1) The Institute of Radio Engineers, 2) The American Radio Relay League, and 3) The National Amateur Wireless Association. Up to this time there

was very little literature or published information available. It did not take long for these to appear. Soon small companies issued store catalogs offering everything from loose couplers to crystals and crystal holders, headphones, and all sorts of gear to get the amateur

started. Enthusiasm ran high. Wireless was a new found discovery and appealed to the young as well as to the old. Wireless could be used to span great distances and for so many experiments. The fascination of distant communication without wires was gripping and overwhelming.



Issued in January 1917, this certificate was one of the first of the "awards" that hams have always displayed with pride on the walls of the shack.

WHAT A GOVERNMENT LICENSE IS, AND HOW TO GET ONE

The law governing the operation of amateur stations was not passed with the idea of silencing the amateur operator—on the contrary, it is an official recognition of the amateur's rights—and a Government license carries with it advantages and privileges that otherwise the amateur would not enjoy—that is, if he keeps within the law. The law as it relates to the operation of amateur stations in itself is not a strict one. If you have a receiving station only, it is not necessary for you to get a license. If you operate a sending station whose power is great enough to reach beyond the boundaries of the state you are located in, or to interfere with the licensed stations in the state, the law says you must have a license. Briefly, it states that your wave length shall not exceed 200 meters, and your transmitter input shall not exceed 1 KW. Or if your station is located within five nautical miles of a military or naval station, your transmitter input shall not exceed $\frac{1}{4}$ KW.

The license is free, and the only requirements are, that you answer correctly the questions asked to the forms sent you, and that you are able to transmit and receive messages at the rate of at least 5 words a minute. To get one, write the Radio Inspector, Department of Commerce, Bureau of Navigation of the District headquarters nearest you, and ask for Form 756, (Application for Operator's License) and Form 757 (Application for License for Land Station) both of which will be forwarded to you. If you have a license, Official Call Letters are assigned you which no one else can use. You know what you can do, and what you can't do, and no one can interfere with you in any way so long as you obey the law. For your own protection you should get one.

In 1915, the Central Radio Association issued its Blue Book, a reference text for early amateurs. It included this explanation of why licenses were required.

1914

Hiram Percy Maxim was one individual who could

come up with the right ideas at the right time, and the ARRL was his heritage. No

sooner had this enthusiasm caught fire when World War I broke out in Europe in 1914.

To be continued.

This antenna was one of the most popular antennas for amateur use, and it deserves more attention than it gets now, although it was first designed in 1929. In that year, two amateurs, John Byrne and Ed Brooke of Bell Telephone Laboratories, under the direction of Professor W. L. Everitt of the Department of Electrical Engineering, Ohio State University, experimented with and perfected this antenna. It was reported in September, 1929, QST by Loren G. Windom, and therefore became known as the Windom antenna.

Its chief advantage is that it may be used on all even harmonics with a single wire feed. Since amateur bands are harmonically related, except 15 meters, it may be used without change for an all band antenna. By cutting it for 80 meters, it can also be used on 40, 20 and 10, without changing the properly placed single wire feedline.

The length of the antenna is determined by the formula, $468/\text{frequency in kHz}$. Thus, for 3725 kHz the length will

be 125'8". The distance of the feeder from the center is approximately 14% of the antenna length, or about 17'6". At this point there are no standing waves on the feedline. By tapping the feeder up on the plate tank until the transmitter loads properly, you can tune for whatever band you are operating in.

See Fig. 2. The feeder is #14 wire, any length.

To reduce the chance of getting rf in the station, the method in Fig. 2(b) can be used, with link coupling to an external tuned circuit. This antenna at the feedpoint has an impedance of approximately 600 Ohms.

There has recently emerged a similar appearing off center fed antenna which is incorrectly called a

Windom, as shown in Fig. 3. The theory is that this is fed at a 300 Ohm point with twinlead, which can then be transferred by a 4:1 balun to 75 Ohm coax. There is some controversy about this, but at any rate the feedlines should come away from the antenna at a right angle for at least a quarter wave length, and the equipment should be well grounded to prevent floating rf in the station. ■

Fig. 1.

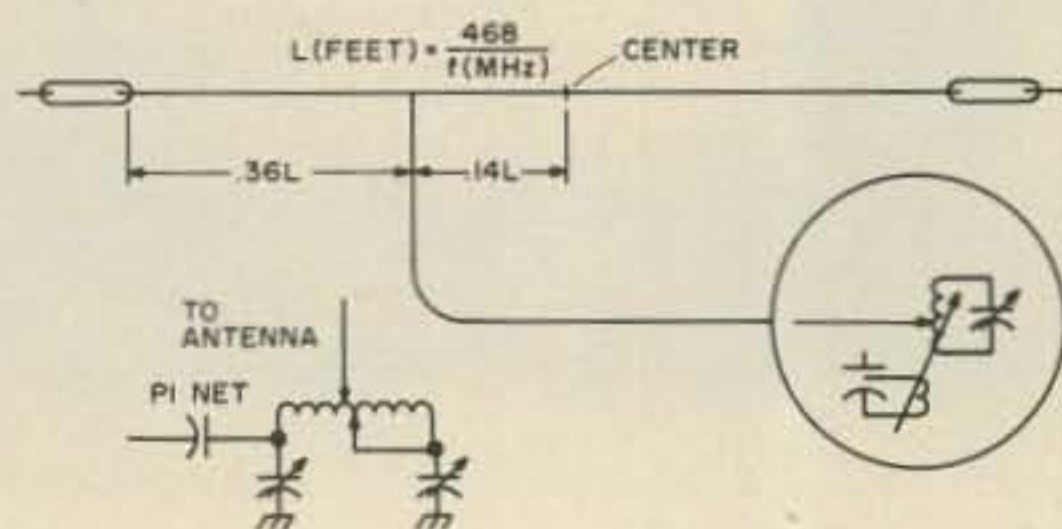


Fig. 2(a).

Fig. 2(b).

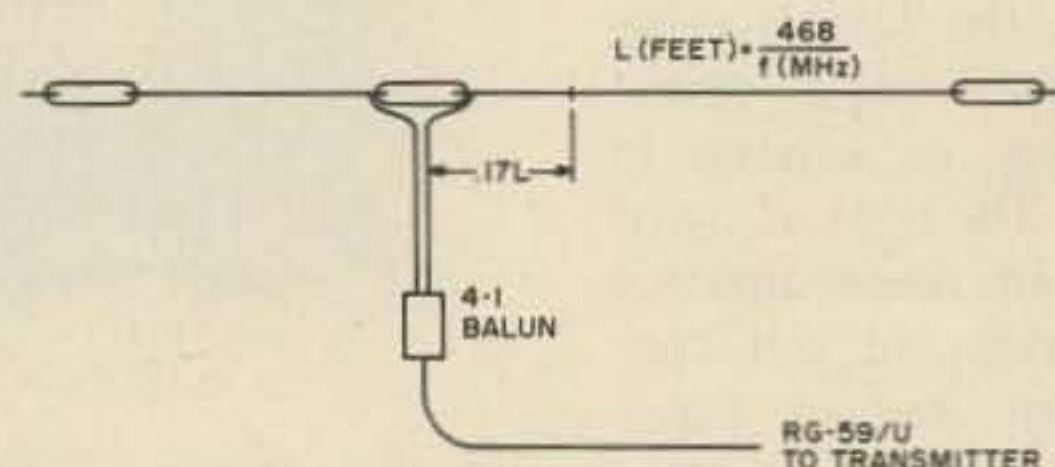


Fig. 3.

Jerrold Swank W8HXR
657 Willabar Drive
Washington Courthouse OH 43160

Remember the Windom!

- - is this the world's simplest
five band antenna?

The History of Ham Radio

- - part II

Eric G. Shalkhauser W9CI
527 Spring Creek Road
Washington IL 61571

Reprinted from QCC News, a
publication of the Chicago Area
Chapter of the QCWA.

1917

During the hostilities of World War I, in which the United States was involved from April, 1917, to November, 1918, there were no amateur activities on the air. After the armistice was de-

clared, amateurs still had to wait almost a year before permission was granted to dust off the old equipment, make repairs, catch up on the many changes to be made due to advancements in the art, and become active again.

It is interesting to follow the trend in activities among amateurs during the lull, due to the war. *QST*, the publication of the Amateur Radio Relay League, continued to appear every month until September, 1917. Then followed increased government restrictions, rather severe. The edict: "No radiation, no ground connections, no capacity or inductance to hook-up!" Amateurs were told, "You may read radio books, think radio thoughts, and learn the Morse code, until the call comes to join up." Many amateurs enlisted in the Signal Corps, the Navy, or found employment with the services.

1918

Although the armistice was signed on November 11, 1918, amateurs waited some months before radio publications were again available. The first postwar edition of *QST* appeared in July, 1919, and other periodicals made their appearance, notably *Wireless Age* and *Radio Amateur News*. Restrictions on amateur transmission were removed by the government

on October 1, 1919. Here it should be noted that an attempt was made through the introduction of a bill, known as HR 15159, requested by the Secretary of the Navy, to turn over all radio control to the Navy Department. This bill received very strong opposition from the amateur radio fraternity and was defeated.

What were the regulations which now governed the radio amateur? All licenses were cancelled as of April 1, 1917. Rules and regulations had to be followed to go back on the air. Amateurs knew that the Department of Commerce still had complete jurisdiction with William Redfield, Secretary of Commerce, at the time. A publication issued by the Bureau of Navigation, Radio Service, dated August, 1919, entitled "Radio Communication Law of the United States," indicated that no additional radio regulations had been added to those in effect as of the beginning of hostilities. In fact, no changes were made in the radio law during the interim between the introduction of the Act of June 24, 1910, and the ratification of the International Convention of Communications, finalized and signed by Woodrow Wilson, then President of the United States, on July 8, 1913.

1919

Applications for amateur radio operators and station licenses soon had the fraternity by the hundreds back into the swing. The spark coil, the rotary gap, and the old receivers had to be brought up from the basement or down from the attic, unpacked from storage bins, and put back into service. As soon as restrictions were removed, activity started with a vengeance. Radio shops blossomed everywhere. The old wireless bug put everybody to building loose couplers, variometers, honeycomb coils, simple detectors, and a host of new devices.



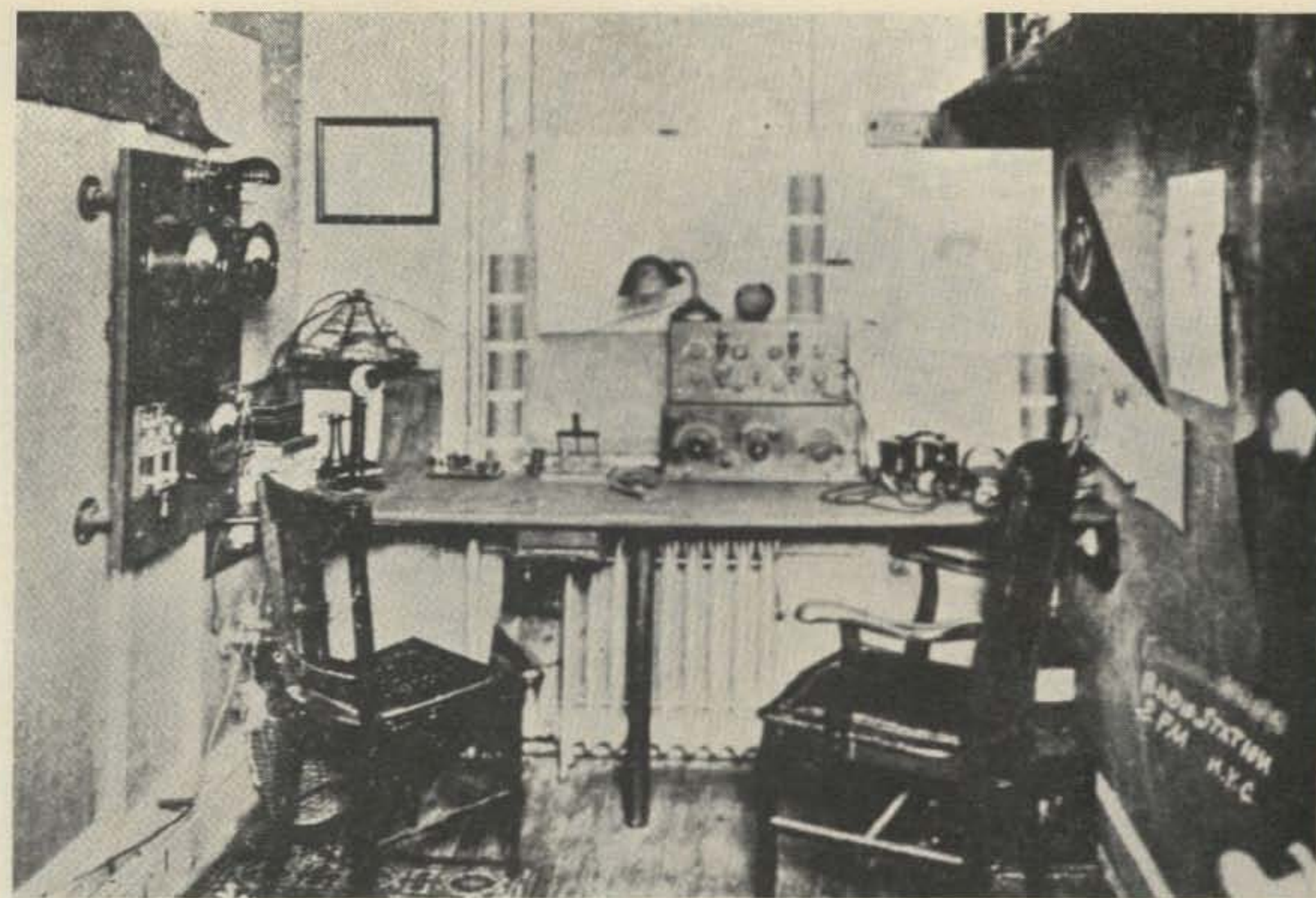
The transmitter of station "2PM", which produced the first transcontinental signals.

Along came the newly developed three element vacuum tube. Here was the beginning of the real revolution in reception and transmission of wireless signals. The VT-1 by Western Electric gave the amateurs their first chance to analyze its possibilities. There also were Morehead and Marconi tubes available, but they were very unstable as receiving as well as transmitting units. No two alike would respond equally in a circuit. We were all looking for the advent of larger and more powerful vacuum tubes, and anxious to replace the old spark transmitter. The amateurs knew that it was possible to do away with the noisy spark discharges with their interference problems due to wide bandwidths, and put a new kind of signal into the ether using vacuum tubes.

At ARRL headquarters in Hartford, Connecticut, where *QST* originated and where our newly appointed secretary and editor, K. B. Warner, took over right after the war, it was decided that the entire body of amateurs be organized into local and regional clubs and associations. The objectives were to foster and promote complete control of all ham activities such as relaying messages, establish relay routes across the country, and keep abreast of all governmental legislation pertaining to amateur radio activities.

K. B. Warner, the new secretary, came from Cairo, Illinois. A very active amateur, he operated under the call 9JT in 1915, using a 1/2 kW fixed gap transmitter.

All amateur radio stations were supposed to be operating on the 200 meter assigned wavelength. Adherence was not too strictly enforced. In fact, some stations were operating well above 200 meters. A few, with special permission, were well into the 375 meter range. So little was known about radio propagation that the erroneous assumption persisted, "the longer the wavelength, the



"2PM" operating position located at 808 West End Avenue in New York City.

greater the distance waves would travel." August, 1920, *QST* said, "For short wavelengths (below 200 meters) the signal strength is a function of the wavelength, and it may be said that the shorter the wavelength, the weaker the signal." *How strangely the ether waves behaved in those days!*

Everybody was still using interrupted CW, some straight, some quenched, with the only noticeable difference being in the pitch, the whine, and the characteristic interruption of the dots and dashes. Some found satisfaction in a 500 cycle note, if a 500 cycle generator could be found as the prime source of power. Interference created bedlam in many areas, especially before midnight, after which most of the spark coil operators quieted down and went to bed, giving the high-powered boys the ether. The maximum power transformer rating was one kW, usually a Thordarson or Clapp-Estham or equivalent rated at 25,000 volts secondary. The law was specific: "A transmitting wavelength not exceeding 200 meters and a transformer input not exceeding one kilowatt." The ammeter hot wire

in the antenna usually was asked to register from 4 to 10 Amperes into an L or T type antenna configuration. It had to be designed and built to a measured length, specifically not over 100 meters, to be within the law. There were plenty of parallel wires, usually at least four, to form a ground network of copper conductors (or buried copper washboilers) for a counterpoise.

The amateurs had a standby pal, "The Old Man," delivering pertinent information to all through articles in *QST*. He kept all in good humor and within the straightjacket of operating procedures. As an example of what could be expected from the OM, here is an excerpt directed to the editor from June, 1919, *QST* under the heading "Rotten Starting":

"I am sending you a specimen of a *Wouff Hong* which came to light out here when we started to get our junk out of cold storage. Keep it in the editorial sanctum where you can lay hands on it quickly in emergency. We will be allowed to transmit soon and then you will

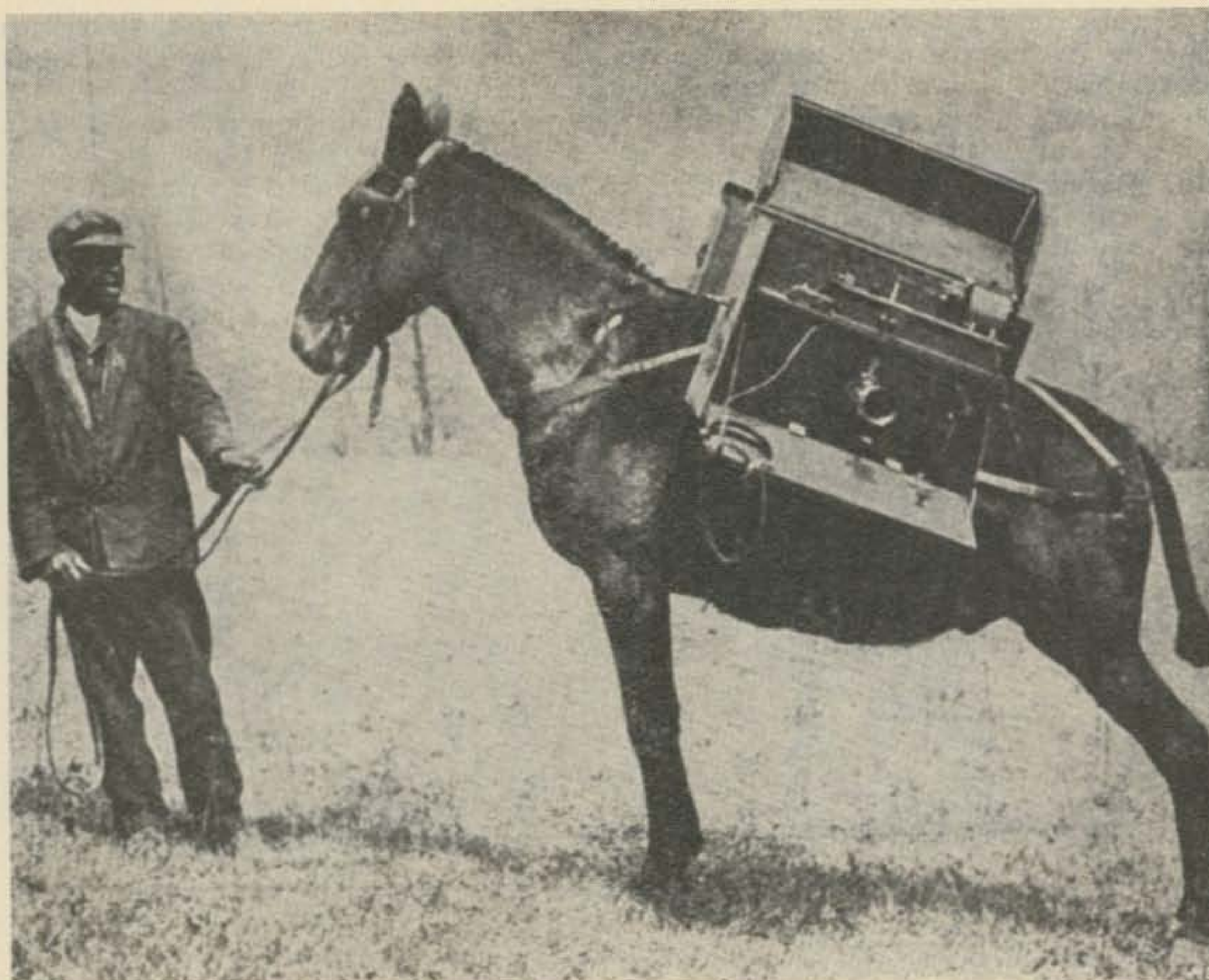
need it."

Who does not know the *Wouff Hong*?

What most of the amateurs surmised and expected was just ahead. We read in November, 1919:

"There will come a day when amateurs will not need to bother their heads about government or commercial stations, but THAT DAY HAS AS YET NOT ARRIVED. The radio millenium has still to come. We mean by this that with our present form of crude apparatus still in vogue, and when we are using quasi makeshifts, we cannot expect that we can tune our transmitters down to within the hundredth fraction of a meter. Usually the amateur wave is so broad that it can be picked up all over the scale. As long as we persist in sending out such waves, we must expect criticism from the big stations with which we interfere."

The junking of the radio spark gap was in the making. To actually let go was an-



"Mule Mobile" was used by the Signal Corps during World War I for carrying the not quite portable transmitting equipment.

other thing. Some of the old-timers in 1920 complained that there was no romance in tube transmission — that it has no individuality or traditional associations like the old spark. There was always a certain stalwart and hearty

attraction about the old non-sink rotary, noisy and inefficient as it was. So the *Old Guard* had to finally succumb also to the *little bulbs that had nothing in 'em*.

This is what Dr. Lee De-Forest had to say at this time,

the man responsible for the development of the three element tube, in November, 1919:

"The average radio amateur knows enough of the extreme selectivity which the pure

undamped wave makes possible, to realize that the problems of interference would largely vanish with the spark gap. Let the amateur urge upon his Congressman or Senator that if the government wishes to further legislate against radio interference, then legislate out of business the damped wave transmitter."

1920

So it became necessary that the amateurs gradually develop the use of the vacuum tube for the various modes of CW transmission, modulating via key and voice, and for better receiving possibilities. With better sensitivity and selectivity built into receivers, our efforts were now directed toward solving the *QSS Bugaboo*! What is QSS? The Q code gives no definition. So — take a look into the May, 1920, issue *QST*, page 25. Well, since you do not have a copy, this "new" abbreviation was added to the list, adopted by ARRL to fill a need. What does it stand for?

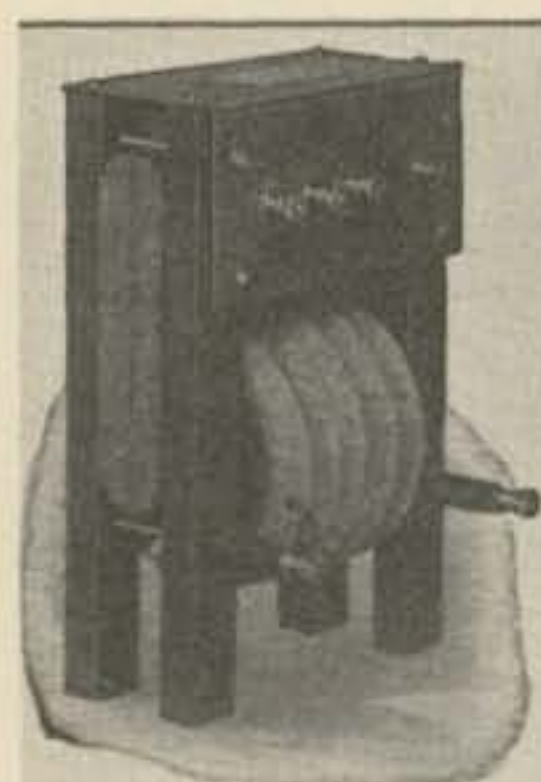
QSS? — Do my signals fade?

QSS — Your signals fade.

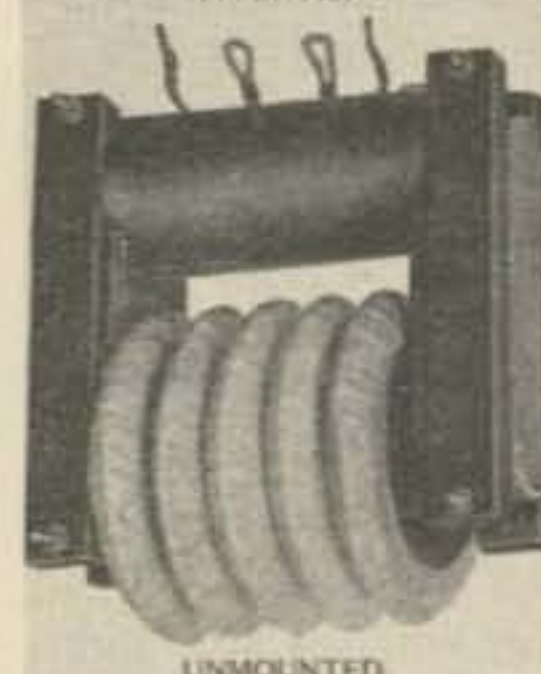
Although rarely used, this abbreviation, even in these days, makes sense.

Amateur radio was not out of the woods regarding clear sailing without periodic attempts on the part of the government to curb their activities. The Poindexter Bill, originating as document #165 through a letter from the Secretary of the Navy, was in the hopper. It stood facing the amateurs later on as Poindexter Bill S-4038, and did not bode good news for the amateur.

The time loomed on the radio horizon in 1920 to be thinking about international regulatory legislation to bring radio communication the world over under better control. A meeting of the International Communications



MOUNTED



UNMOUNTED

Winger's Closed Core TRANSFORMERS

14,000 VOLTS

Designed for use of 110 volts, 60 cycles. No impedance is required. All of our Products are Fully Guaranteed :- :-

PRICES

CAPACITY	MOUNTED	UNMOUNTED
1/4 K.W.	\$10.75	\$ 9.00
1/2 K.W.	15.90	14.00
3/4 K.W.	20.50	18.50
1 K.W.	25.50	23.50

The above ratings are considerably under their actual capacity, the 1/4 K.W. being nearly a 1/2 K.W. and the 1/2 K.W. being almost a 3/4 K.W.

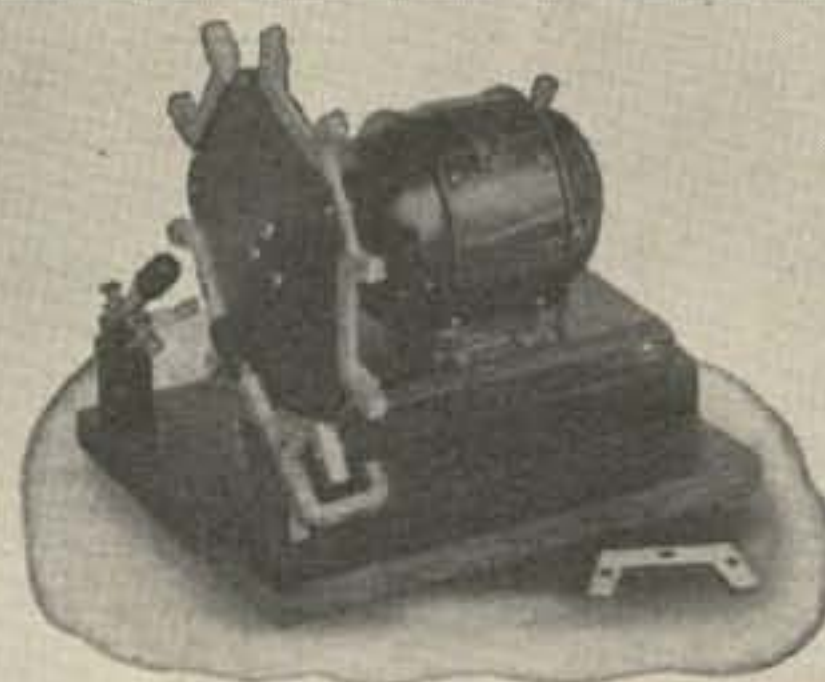
Send 6c in stamps for our NEW CATALOGUE. BIGGER and BETTER than ever; will be ready for distribution soon, — first ordered, first served.

Winger Electric & Mfg. Co.

(NOT INCORPORATED)

711 S. Dearborn St.

Chicago, Ill.



Winger's Rotary Spark Gap

Complete as above, \$11.50

Rotary Parts:—

Hub bored to suit 1/8" to 3/8"	\$.45
Bak-e-lite dielecto centers	.75
Aluminum (or Zinc) segments	1.00
Wood base	.50
Stationary electrodes, per pair	1.25
Disc, complete	2.75
Motor only, (variable speed)	5.00
Motor and Disc together	7.50

TOTAL WEIGHT OF DISCS from 3 to 4 oz. only. Runs like the "Old Nick" was after it. :- :- :-

The "latest" in ham equipment just before all amateur activity was banned during World War I.

Convention in Berne, Switzerland, was on the agenda. The radio amateurs had to have prominent representation. Intensive efforts were made to protect the rights and privileges belonging to the amateur. Charles H. Steward, member of the ARRL Board, was appointed legal counselor to speak for the amateur in these matters. In order to cement more firmly the ties that bind, amateurs decided that in numbers and in get-togethers there is strength, and much could be accomplished via this route. The thinking centered on having regional conventions, typical gatherings to meet each other personally, to set out program meetings, and to air mutual problems.

One of the early conventions took place in Chicago, sponsored by the Central Division Managers of ARRL. Held September 2 to 4 at the Edgewater Beach Hotel, there were about four hundred in attendance. There had been similar conventions held in

Boston and Philadelphia, but this one in Chicago was to be of wider scope in quantity and quality to bring home to all amateurs what we were up against. The report issued from headquarters: "The convention out-conventioned anything yet pulled off in amateur radio."

An early QSL card, sent in 1917.

Not to be outdone, and to top off the year 1920, the Midwest ARRL Division decided that St. Louis would be the next place for a meeting. The time, December 28 to 30, under the sponsorship of the St. Louis Radio Club. Everybody of note in amateur radio circles showed up,

from the President Hiram P. Maxin, the Editor K. B. Warner, the Chicago gang, Paul Godley, M. B. West, R. H. G. Mathews, and of course, "The Old Man" himself, who gave a stirring account of the "joyous" and glorious" three days.

To be continued.

1314 cedar st.,
Le Mars Ia, Jan. 19.

9AH0,
Dear friend,

Received ur card of the 15. Am sorry to say I hv never hrd u since that sunday nite. The other hrd YJ give u a msg, or something, dont remember. hv been hrd in Des Moines and Owatanna in the daytime. I hv a tuner with a slider which I am going to junk an then maybe I can hr more. It wrks ok this way but the slider must be set a certain way or the sigs fade. hv wrked YJ and 9MN. These two r my longest distances. Owatanna cld copy me in the daytime but he cldnt wrk me on account of QRM. nxt time I hr u I will call u.

Ur friend,
John C. Rees.

TS-1 MICROMINIATURE ENCODER-DECODER

- ☐ Available in all EIA standard tones 67.0Hz-203.5Hz
- ☐ Microminiature in size, 1.25x2.0x.65" high
- ☐ Hi-pass tone rejection filter on board
- ☐ Powered by 6-16vdc, unregulated, at 3-9ma.
- ☐ Decode sensitivity better than 10mvRMS, bandwidth, ± 2 Hz max., limited
- ☐ Low distortion adjustable sinewave output
- ☐ Frequency accuracy, ± 25 Hz, frequency stability ± 1 Hz
- ☐ Encodes continuously and simultaneously during decode, independent of mike hang-up
- ☐ Totally immune to RF

Wired and tested, complete with K-1 element

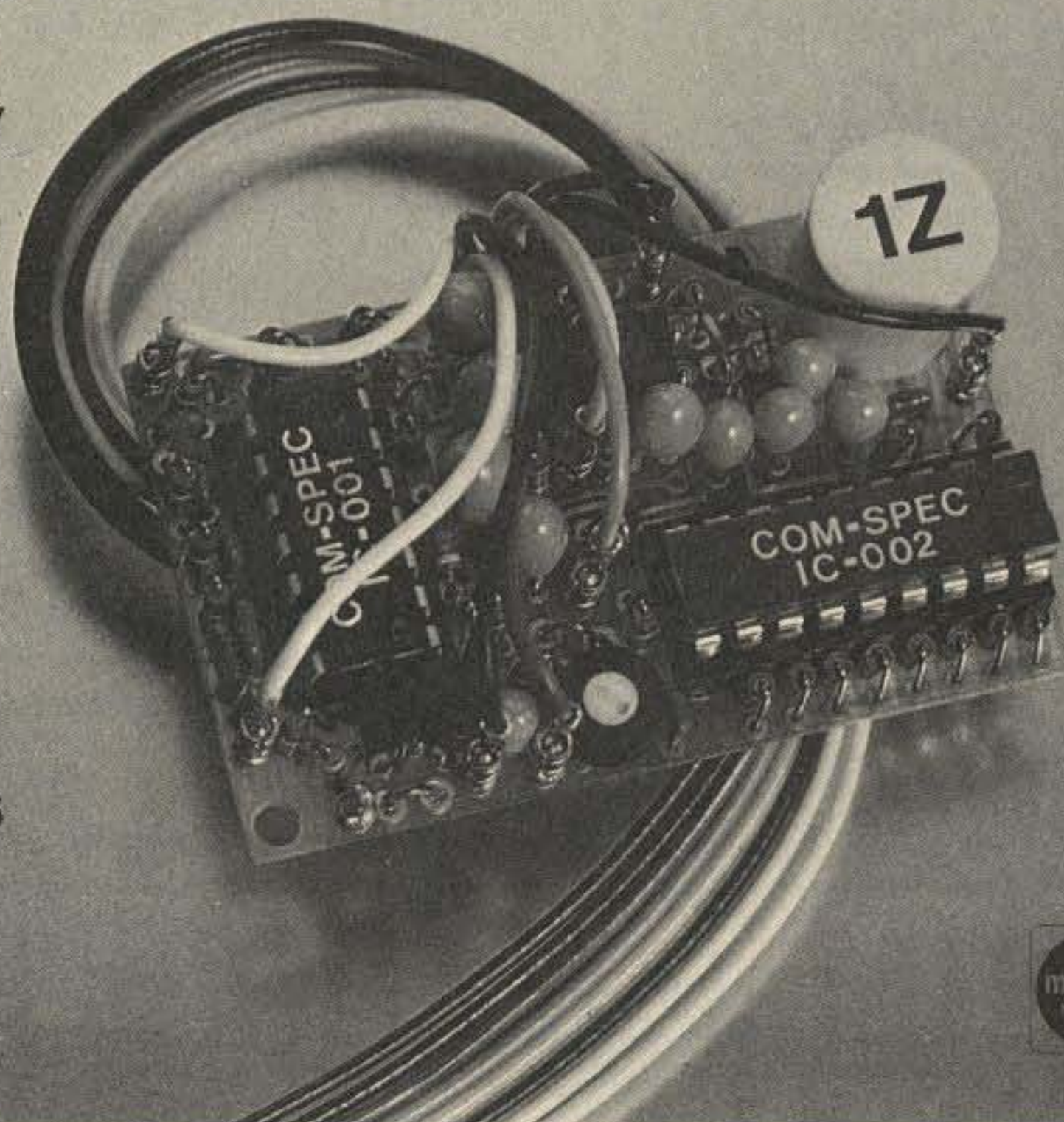
\$59.95

K-1 field replaceable, plug-in, frequency determining elements

\$3.00 each

COMMUNICATIONS SPECIALISTS

P.O. BOX 153
BREA, CALIFORNIA 92621
(714) 998-3021





A display of early amateur radio memorabilia now at the Pioneer Village Museum in Minden NE.

Amateur radio conventions and regional get-togethers back in the beginning 1920s were real festivities. The spirit which prevailed did so imbue all who attended that a broad new enthusiasm was born and dominated throughout amateur radio land in America.

Reference was made in our last installment to the 1920 grand finale convention in St. Louis. To prove that all the big-wigs, as well as hundreds of the hoi-polloi, were present, here is reproduced that convention's "Programme of Events."

Should any reader who was present have any recollections or recognize any of the "stalwarts" mentioned, I most assuredly would be willing to swap a few yarns.

It would be to the everlasting glory of the proverbial

The History of Ham Radio

- - part III

Eric G. Shalkhauser W9CI
527 Spring Creek Road
Washington IL 61571

Midwest A. R. R. L. Convention

DECEMBER, 28, 29, 30, 1920

St. Louis, Mo.

PROGRAMME OF EVENTS

TUESDAY DEC. 28th

REGISTRATION

Every one attending the Convention get your IDENTIFICATION BADGES in the lobby of the Hotel Statler. These Badges will admit you to all events listed. The Hotel Statler will be the headquarters of the Convention.

11:30 a. m. GET TOGETHER GATHERING. 17th floor Hotel Statler. Everybody come to this and meet your old friends and we'll all go down to the Statler Cafeteria for lunch. Statler Cafeteria is down in the basement.

3:00 p. m. RADIO CONTESTS 17th floor Hotel Statler.

The man who designs the CHEAPEST PRACTICAL CW SENDING SET will receive a Henwood Gap. The man who designs the BEST RECEIVING SET will receive 1/2 k. w. Acme Transformer. These contests will be limited to one hour each.

8:00 p. m. BUSINESS MEETING.

The old bugaboo of Q. R. M. will be discussed and several changes of importance are expected to be made in Methods of Handling Traffic. The main topic under discussion how ever will be, Bill 4048 which is designed to put the Amateur out of Business.

WEDNESDAY DEC. 29th

10:00 a. m. RADIO COPY CONTESTS

The man who makes the best copy of three msg's sent at a speed of eighteen words a minute will receive Honey Comb Cui Haunting. The man who can receive one msg. at the highest rate of speed will receive one Audion Amplifier Panel.

1:30 p. m. VISIT to STATIONS of ST. LOUIS AMATEURS

Automobiles will be at the entrance of the Hotel to accommodate the out of town men. A route which will take in all the well known DX stations in St. Louis has been mapped out.

8:00 p. m. TECHNICAL MEETING. 17th floor Hotel Statler.

SPEAKERS

The "PARAGON" — Paul R. Godley
"GAPS" — Mr. R. S. Glasgow
Mr. B. West
R. H. G. Mathews

THURSDAY DEC. 30th

9:30 a. m. DIRECTORS MEETING 17th floor Hotel Statler

2:00 p. m. THEATRE PARTY ORPHEUM THEATRE 9th & St. Charles Sts.

Arrangements have been made for a large block of good seats. All meet in the lobby of Theatre at 2:00 p. m.

7:30 p. m. RADIO BANQUET 17th floor Hotel Statler.

SPEAKERS

Mr. Candler Mr. Forshay

Prizes donated by the Linde Elec. Co., Benwood Co. Inc., Manhattan Elec. Co.

Reprinted from QCC News, a publication of the Chicago Area Chapter of the QCWA.

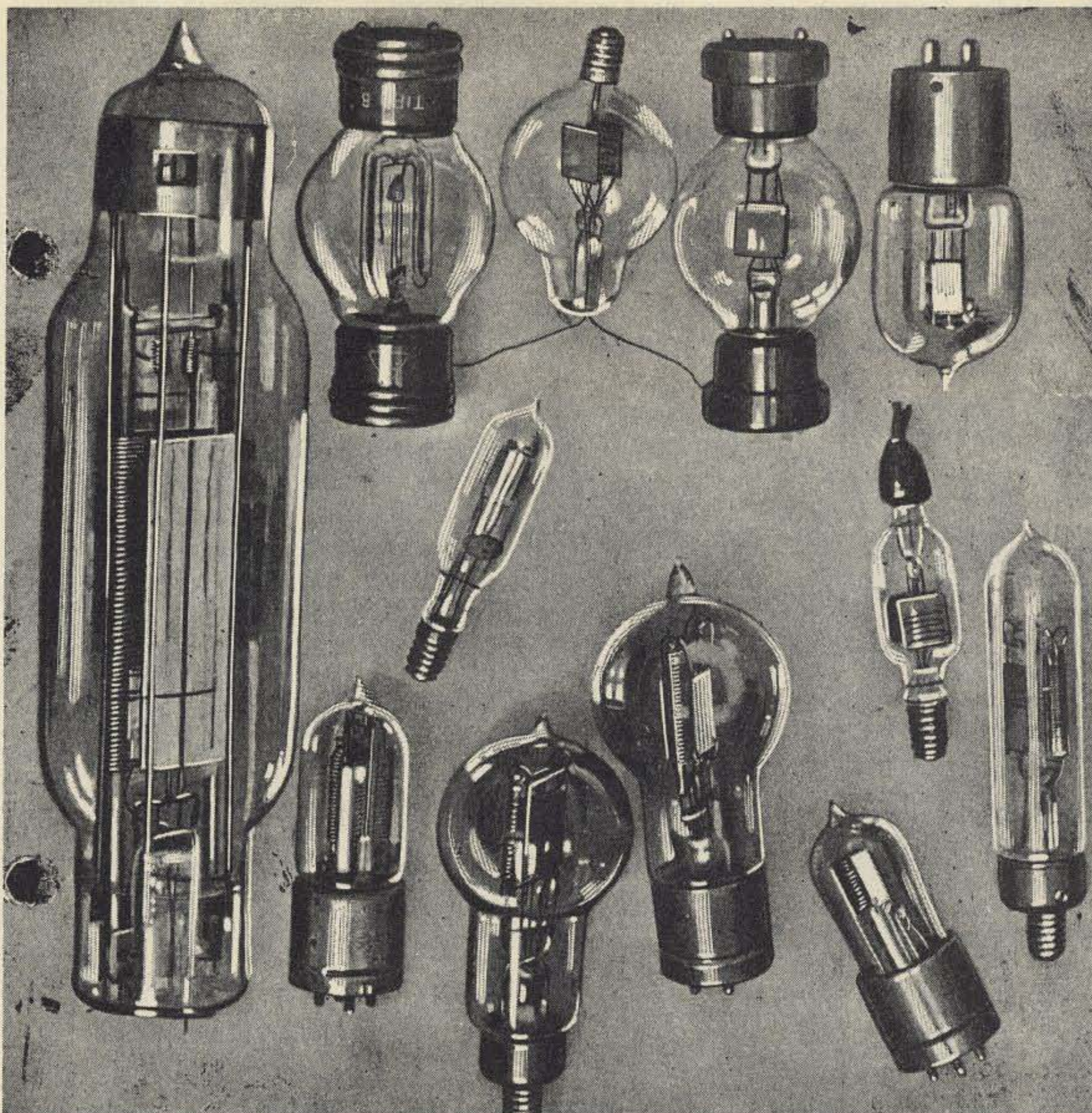
Old Man should any of the sparks of recording effort be transplanted into the pages of amateur history in the future. Probably nothing would surpass the account written in *QST*, February, 1921, pages 9 to 23.

For now, my notebook contains the following account of The American Radio Relay League Convention, as originally written and recorded in January, 1921:

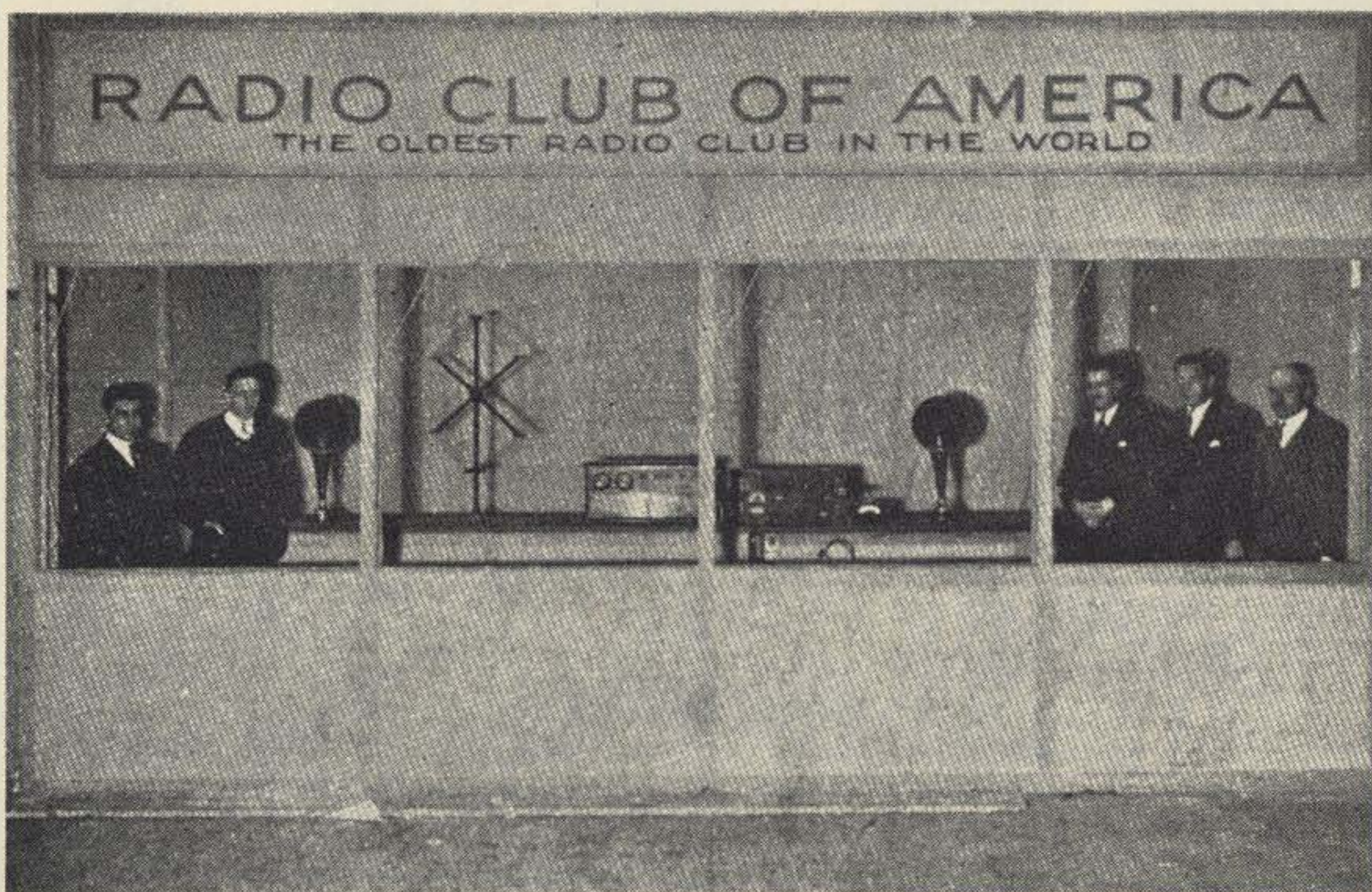
"The Midwest Division of the American Radio Relay League held its convention in St. Louis MO, December 28, 29, and 30, 1920. Representatives from all sections of the country were there, including all of the nine radio districts in the country. Never before in the history of the League has such a successful meeting in the interest of radio taken place. For three days, old and young met, in most cases for the first time, although they had known each other for years.

"Hiram Percy Maxim, well-known scientist and inventor, and President of the League, opened the convention with an address. Mr. Stewart, our representative in Washington, outlined the legislative situation, pointing out how the Poindexter Bill recently introduced in Congress is threatening the existence of amateur radio operators and experimenters. A committee was appointed to draw up definite resolutions to be sent to Washington protesting against the passage of the bill. Mr. Warner, Secretary and Editor of *QST*, gave a resume of our growth from its inception only a few years prior to the war up to the present time. He stated that membership of over 50,000 has placed the organization in a position where it ranks as one of the largest in the country.

"The technical meeting was held on the 29th. Among the speakers were Mr. B. West 8AEZ, naval radio aide and authority on spark dischargers; Mr. Paul R. Godley, chief designing engineer for



A selection of early vacuum tubes — a far cry from the ultra-miniature transistors and ICs of today.



Public relations were as important in the early days of amateur radio as they are today. In 1922, a group from the Radio Club of America set up and manned this booth at a radio show in Grand Central Palace in New York City.

the Radio Corporation of America; and Mr. R. H. G. Mathews, ninth district superintendent of the League. Topics discussed were in connection with apparatus used in amateur radio stations. Since all amateur stations in the country are restricted by law to operate on a wavelength not exceeding two hundred meters and

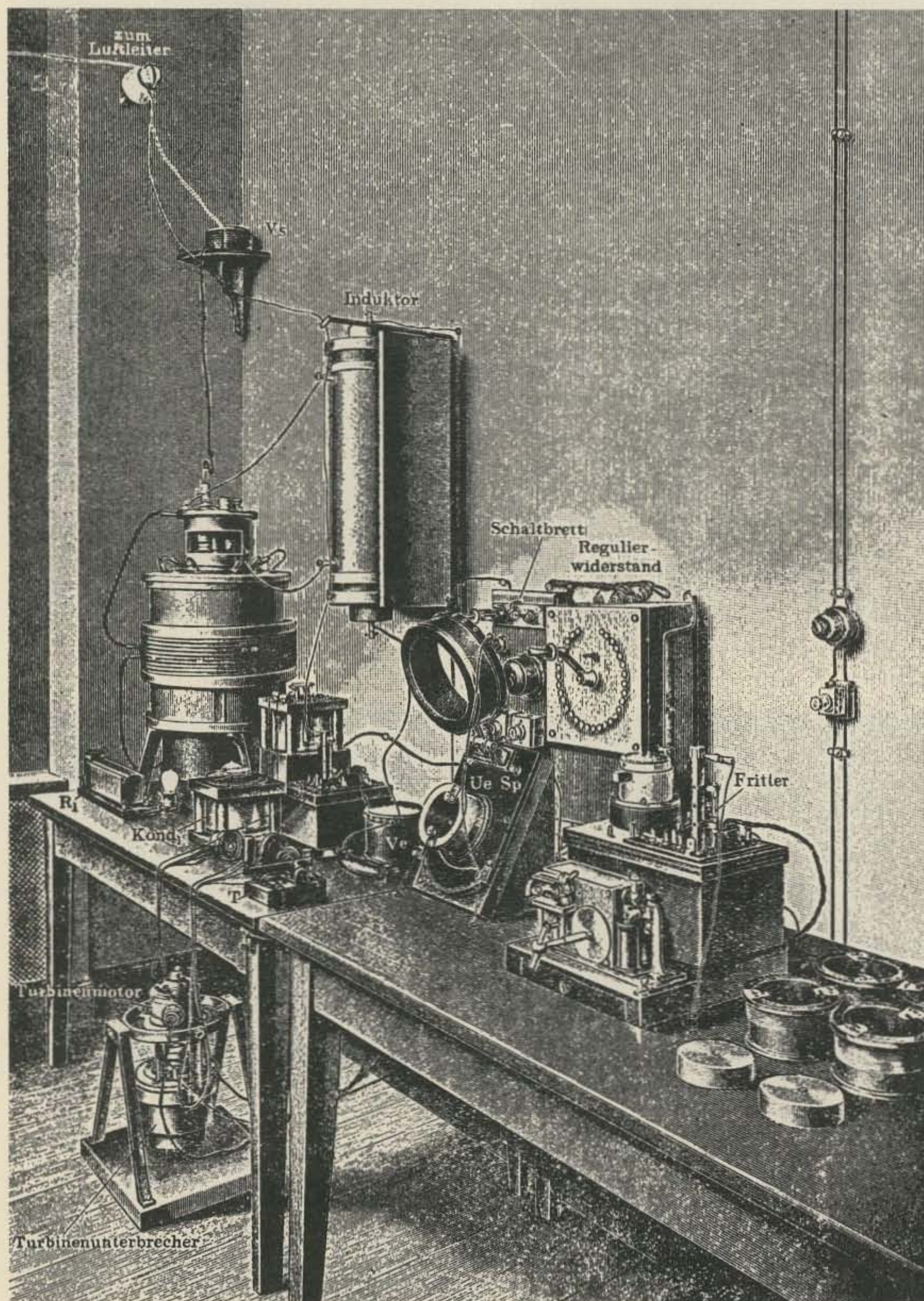
an input not exceeding one kilowatt, it is essential that all energy put into a set be used to best advantage. The maximum efficiency can be obtained only when apparatus is designed accurately and with special attention to details. The realm of radio is still wide open to improvements with new discoveries continually being made.

"Perhaps of greatest interest was the short but spell-binding address given by Mr. Haddaway, a young man seventeen years old. This lad came from a poor family. As a high school freshman, he had to use his spare time to support the family. He gave us a description of how he made the 'moonshine bulb.' Despite various handicaps, he

had built a complete and effective amateur radio station, located in a tiny closet in back of his mother's kitchen. How did he go about accomplishing an 'impossible feat'? Every piece of equipment, including the individual components, were meticulously fabricated out of anything and everything imaginable. Even the headphones and tiny vacuum tubes were homemade. He had located a wholesale drug firm discarding waste material and there found scraps of glass tubing, and bits of tungsten filaments from old lamps. With such parts, he made his vacuum tubes. He had built his own mercury pump to evacuate the tubes. He found the mercury from broken thermometers. His headphones were ingeniously fabricated from bits of wood, metal, and wire, but they performed beautifully. Everything else in his station, which was visited during the day, was very cleverly made and assembled. And his only financial expenditure was a 25 cent pair of combination pliers. I have met no one in my lifetime who has displayed such a passionate purpose to succeed.

"The climax of the convention was the radio banquet. To our knowledge, it was the first of its kind ever given in the history of the League. The spirit was there all right! What the St. Louis radio club did not think of was not worth considering. Even the menu savored of sparks and ozone, none of it, however, being charged to very high voltage. Mr. Chandler of 8NG fame, Mr. B. West, and the President, H. P. Maxim, gave short addresses. Bill Wood of St. Louis club acted as toastmaster. To him as well as to the entire club is due the credit for the overwhelming success of the convention.

"The keynote of the meetings seemed to be *More Unity and More Cooperation* between the various clubs and organization as a whole, in



The "ideal" amateur station in 1920, consisting of one transmitter and two receivers. One receiver uses an electrolytic detector and telephone set. The transmitter utilizes a mercury interrupter and an open core transformer.

order to be able to stand behind any move which the League attempts to undertake. Every city in the country should have an organized radio club affiliated with the League.

"The ARRL was organized with the intention of relaying messages from city to city, state to state, and ultimately from country to country. Messages accepted for transmission are not charged for. Amateur radio operators do this as a service for the com-

munity and for mutual benefit because they have an interest in the development of radio as a ready means of communication. The stations are privately owned and operated, in many cases entailing an expenditure of hundreds of dollars. To be able to communicate with others hundreds of miles away amply compensates the amateur for erecting a station. It affords one of the most fascinating and at the same time educational fields

of research to most any person interested in science.

"Radio is indispensable in many of our present day developments. Steamships and airplanes are lost if they have to do without the services of wireless. On railroad trains and automobiles, its application will eventually revolutionize modern business practices, just as the telegraph and the telephone have done. But to attempt to make far-reaching predictions, not even the most farsighted

radio engineer can come anywhere within the actual facts which will be known ten years from now. (Remember that this was written in 1921.) Too little is understood of this greatest of all discoveries. That we will be able to talk directly with our friend riding in his car in another part of the country seems to be a dream still to be realized." (End of 1921 written and recorded message.)

To be continued.

George Hovorka WA1PDY
John Hovorka, Jr.
674 Brush Hill Road
Milton MA 02186

Often after an FM rig becomes a few years old, it is desirable to retweak the final output stage. But if you don't have a dummy load and an inline wattmeter, this job can be a problem. Here is a simple device to tune up your two meter transceiver for maximum power output. It is both a dummy load and an rf indicator, and can be built for less than a dollar. It can be used for FM rigs up and into the 20 Watt output class.

The usual problem with constructing a dummy load is finding a resistor which will handle enough Watts and also remain relatively nonreactive at 146 MHz. In our design, this problem is solved by using a 50 Ohm, one Watt composition resistor, and immersing it in a small jar of oil. We can run 18 Watts into this setup for a few minutes without the oil even getting warm. I have used this method successfully to tune up my Regency HR2B and my TR-22. The diode and the capacitor serve as an rf indicator.

This device is constructed by wiring the diode, capacitor, and resistor together as shown in the wiring diagram. Then this assembly is wired to the leads of a piece of RG-58 coaxial cable. Run a separate piece of hookup wire out from the diode and then punch a hole in the top of a baby food jar. Slip the assembly through, and seal the hole with epoxy. Then fill the jar with a high viscosity

motor oil, such as SAE 30 or 40. Close the jar top tightly. Then connect a PL-259 connector to the end of the piece of coaxial cable.

To use your dummy load-rf indicator, connect the PL-259 to the back of the radio. Put your VOM on the plus 10 volt dc scale, and connect the positive lead of

the VOM to the wire which runs out from the diode. Connect the negative line from the VOM to the braid of the coaxial cable or to the chassis of the radio. Place the transmitter on a frequency which falls in the middle of the frequencies which are used (146.52 MHz). Tweak the capacitors in the final output

stage and driver stages with a plastic alignment tool, until you have the maximum indication on the VOM.

With this setup, you can peak your transmitter for maximum output both simply and inexpensively. ■

Parts List

PL-259 connector
18" length of RG-58 coaxial cable
1 W 50 Ohm composition resistor
1N34A or equivalent germanium small signal diode
.005 disc ceramic capacitor
Hookup wire
Baby food jar
SAE 30 motor oil
VOM
Epoxy

The Oily Resistor Wattmeter

- - how to put 20 W into a 1 W resistor

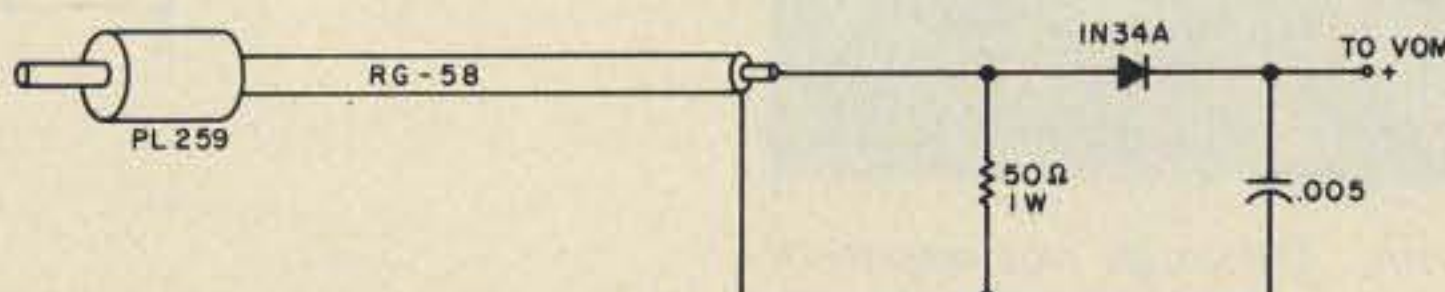


Fig. 1. Wiring diagram.

The History of Ham Radio

-- part IV

Eric Shalkhauser W9CI
527 Spring Creek Road
Washington IL 61571

During 1921, for sending their signals, amateurs were still thinking in terms of spark transmitters. The vacuum tube, as a simple three-element detector, was being advertised prominently and illustrated profusely in all the wireless literature. Not until the VT-1, 201, 202 and other tubes came along could much conversion from spark transmitters take place. It was well into the 1921-1922 period

that this happened with the realization that wavelengths below 200 meters were of considerably more advantage for DX and better tuning characteristics than at 200 meters and above.

While in the Signal Corps Officer's Training Camp in College Park MD in 1918, I saw and operated the first three-tube transmitter. It was similar in appearance to the first three-tube DeForest set which was extensively advertised in radio periodicals in 1921. It came equipped with Western Electric VT-1 tubes.

Construction articles ap-

peared monthly in the 1920 and 1921 magazines. These were simple circuit diagrams showing application. The Fessenden, Marconi, the Telefunken, the Colpitts and many others were displayed. The radio amateur was doing a lot of experimenting in adapting this new device to all sorts of circuit layouts toward improving reception and transmission of signals.

Amateurs and commercial interests devised all sorts of receiving circuit combinations under such names as the *neutrodyne*, the *amplidyne*, the *Roberts*, the *Cockaday*, etc.

One must remember that radio broadcasting had its real beginning in earnest right after World War I, and the general public became all agog over this new mysterious phenomenon entering their homes. Hearing strange voices and music out of nowhere... through earphones... without wires... It was unbelievable!

From now on the ham was no longer alone with his dots and dashes in his little cubicle, carrying on his own brand of mysterious private conversation.

Serious consideration was being given by the amateurs to the possibility of making improvements in signal reception by adding several stages of tube amplification to the detector. The single crystal detector and the old coherer could now be permanently replaced and abandoned. Those weak and often inaudible signals could now be picked out with ease and at a greater distance. And so, with the discovery of the regenerative circuit by Major Armstrong, the vacuum tube started to oscillate and gave signals a thousand fold boost in strength.

The vacuum tubes were not quite ready for transmission purposes. Their lack of ruggedness, their size, their cost and their scarcity held back adaptation by the amateur fraternity of tubes for strong CW signal generators. After the war, and even into 1922, amateurs who had served Uncle Sam were still operating their spark transmitters.

Many of us were familiar with either the Army Signal Corps or the Navy gear. They all looked and operated alike. In the beginning of wireless adaptation to the armed services, very little innovation could be expected for field combat purposes. The quenched gap transmitter stood out as a most reliable unit. To the ham this was proven equipment. True, it operated in many instances from a 500 cycle source of



Peoria Radio Sales Co., 1923-1924.

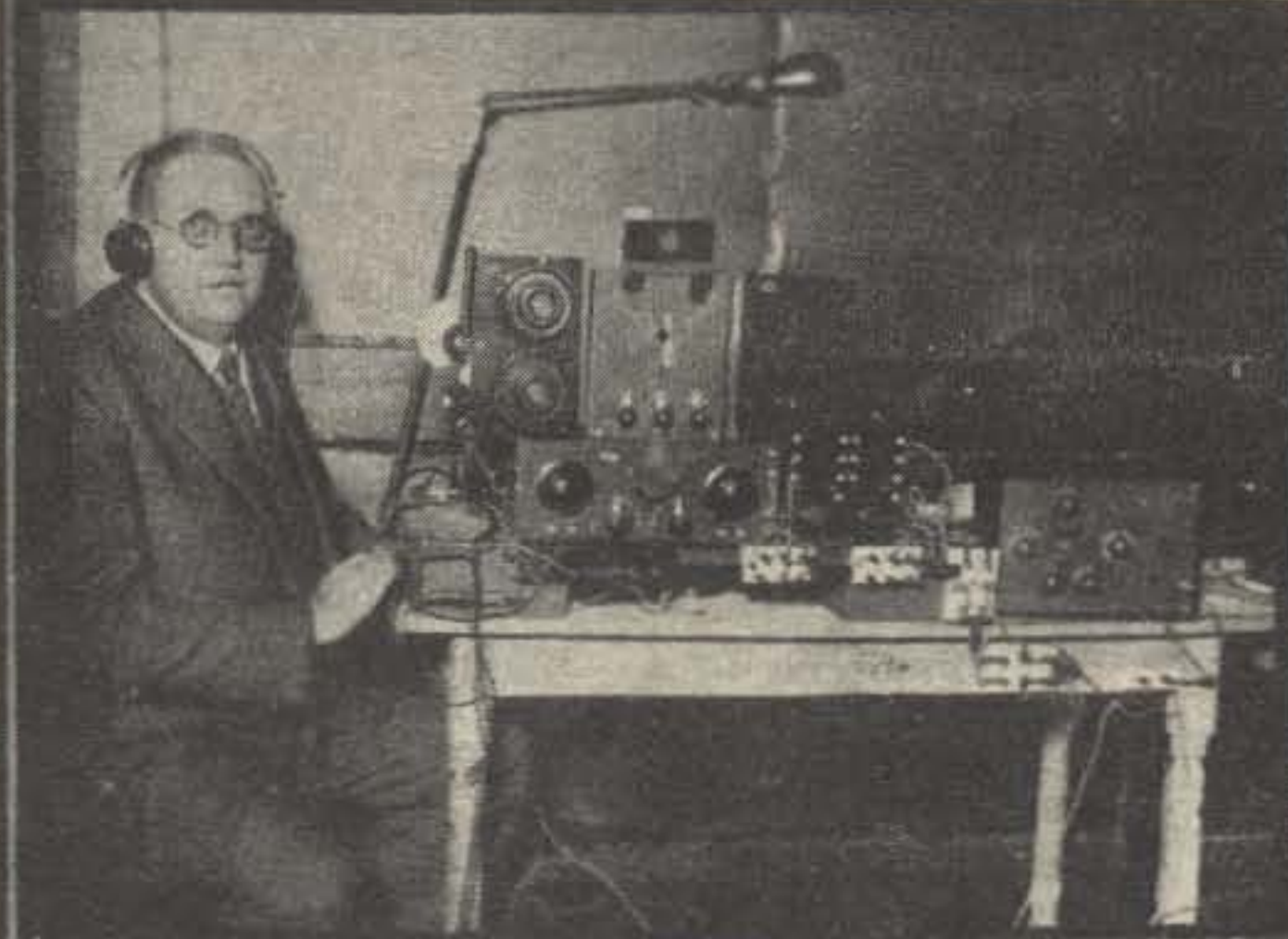
power, but it was regarded as a dependable unit to cover fairly long distances and was used by commercial companies in the field. It was semiportable when loaded on a horse, a mule, or two-wheeled cart.

The returning amateur was trained in the use of such transmitting equipment and took a fancy to the unit. He was very familiar with its performance, knew how to operate it, and had practical knowledge of its capabilities and application. During his period of service he was always thinking in terms of adapting it to his own use if and when he got back home. The one and only drawback was the 500 cycle power input. Replacing the quenched gap in the circuit proved a minor drawback.

When we examine the spark gap circuit used in all stations as illustrated and described in the literature of the early 1920s, it can be said that it was really quite simple and direct, and not difficult to understand in operation and performance.

The "spark-gap-ham" preferred to build his own condenser. He would use glass plates, mostly 8" x 10" in size, obtained from a photographer who was ready to discard them. (Exposures were made on glass plates "in them olden days.") These were covered, both sides, with tin or aluminum foil or other thin metal sheets. Tobacco pouches were often sources of foil. Enough plates were coated so that the assembled condenser gave a value of .01-.012 uF. To make sure that the unit could withstand potential surges as high as 25,000 volts, four of these sections were connected in series-parallel, making the capacitance still the correct value, approximately 0.01 uF. The whole thing was immersed in oil. Not to do so caused corona discharges around the edges. Being well soaked made them stand up much better under the high potentials. Even then they

Radio Pictorial



Just Recently Major Armstrong Started the World With His Regenerative Receiver. Dr. Franklin Lacey Satterlee, Noted X-Ray Specialist, Now Makes Public His Discovery on a Non-Regenerative Set Making One Detector Bulb Do the Work of Two Stages of Radio Frequency. It is Claimed With This Set that a Greater Receiving Range is Made than Heretofore Accomplished. This is the Set that Strongly Interested Gen. Squier, Chief Signal Officer of the United States, Who Said he Would Give but 15 Minutes to Test this Receiver, and Actually Gave Three Hours.

The Photo on the Left Shows Dr. Satterlee Comparing the Large Radio Sets with the Small One-Bulb Set on the Extreme Right, His New Invention, Embodying the Same Principles as the Large Set.

Few Users of the Vacuum Tubes Realize Just How Much Work is Involved in the Manufacture of These Tubes, and How Radio Engineers are Constantly Experimenting and Doing Research Work with a View to Improving Them. The Photo Below Shows Mr. Shu S. Men, Graduate of the Hong Kong University of China, Plotting the Characteristics of Vacuum Tubes at Columbia College, N. Y.

(c) E. & H.



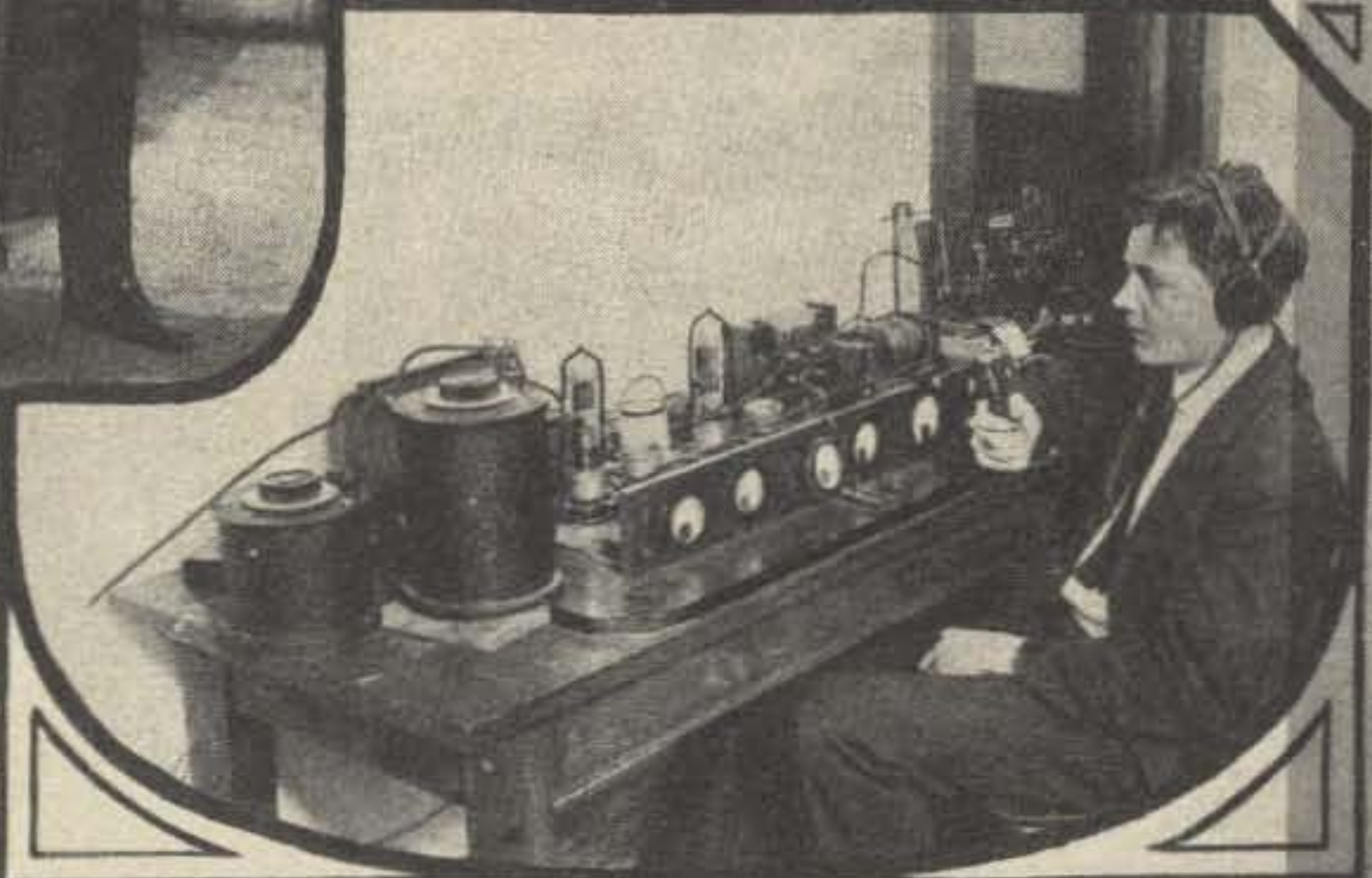
Above is the Latest Innovation, a Portable Radio Outfit, Including Loop, Batteries and Loud Speaker. It Can Be Operated Anywhere—on the street, in a Motor Car, on a Boat or in Any Building.

(c) Photo News.



While the Fordham University Station Was Designed Primarily for Relay Work Between the Various Colleges, It Has Proved so Successful that it Now Broadcasts Football Games Within a Radius of Many Miles. The Station Operates on 200 Meters and Uses Two to Four UV-200 Tubes.

(c) E. & H.



punctured unexpectedly!

The high potential was quite dangerous around the place. It was important that the condenser box be surrounded by a protective wall and openly marked: DANGER — HIGH VOLTAGE — KEEP YOUR DISTANCE!

The discharge gap in the circuit is in series with the primary spiral inductance, usually made of flat-wound

brass or copper ribbon. This was known as the oscillation transformer. Every time the key in the low voltage primary circuit was closed, the charged condenser let loose for the shortest fraction of a second, in rapid fire, and discharged across the spark gap. On discharge, the energy surged around the helical coil, and, in turn, the secondary coil inductively coupled to

the primary received a burst of electromagnetic energy. This in turn sent a damped wave signal out into the ether by way of the antenna configuration. A hot wire ammeter in series with the antenna to ground connection indicated the amount of current being emitted. A fuse block in the main power line provided protection against overloads.

Although the circuit

looked quite simple, we amateurs had other problems to contend with in meeting the 200 meter (or less) wavelength requirements. The condenser design value had to stay within the above stated uF limits. I will not attempt to delve into the mathematical equations to prove the point. Remember that we had a wrong concept of wavelength versus distance in those days.

Some amateurs were in a position to obtain 500 cycle power generators. Many signals could be heard on the air using such units. The signal coming from a 500 cycle source had a distinct tone quality. It was music to many an ear.

By way of interest, here is a statement which appeared in *Radio Amateur News* in 1920:

"Surely the US government is not imposing upon the American amateur when he limits the operating wavelength of your transmitter to 200 meters.

Contrast this law to that of Canada where the limit is placed at 50 meters. As a Canadian amateur recently remarked, with this short wave we may consider ourselves fortunate indeed to cover the extraordinary distance of one mile. As for democratic England, the would-be amateur is simply out of luck, for no license or permission is at present even obtainable under any condition. From the foregoing, we may therefore deduce the timely moral: *Keep your transmitter on the lawful side of 200 meters.*"

The amateurs up to now had really not discovered the potentially great advantage of the shorter wavelengths.

The rotary gap caused havoc on many occasions, since the studs had a tendency to become pitted after a short time of operation unless constructed of stuff that

withstood the constant arcing in an open oxygen atmosphere. Of considerable help was an enclosed gap, sufficiently airtight to exclude oxygen to the extent possible.

Much experimenting with the number of studs on the rotor and the speed of the motor improved the efficiency of the system. An 1800 rpm synchronous motor and a wheel with twelve well-designed studs, made of material that could withstand pitting, usually provided the right kind of pitch and whine to satisfy the critical ham in his quest to excel on the air.

By the characteristic frequency over the air, most ham stations were recognized without the usual QTH report. "I know the sound of his spark" was a common remark among hams.

After a station had its mechanical problems fairly well under control, the problem of decrement of the signal emitted received considerable attention. Specifications from the bureau in Washington decreed that the decrement could not, or should not, be higher than 0.2 when the energy was transferred to the antenna. Otherwise the signal emitted would be unduly broad with accompanying increased interference due to high damping.

What was this decrement all about? The subject was discussed at great lengths. It took front and center attention and was good for an argument anywhere, anytime. Decrement and how to meet its requirements waxed hot and furious from many podiums at conventions. Today you never hear the subject mentioned any more.

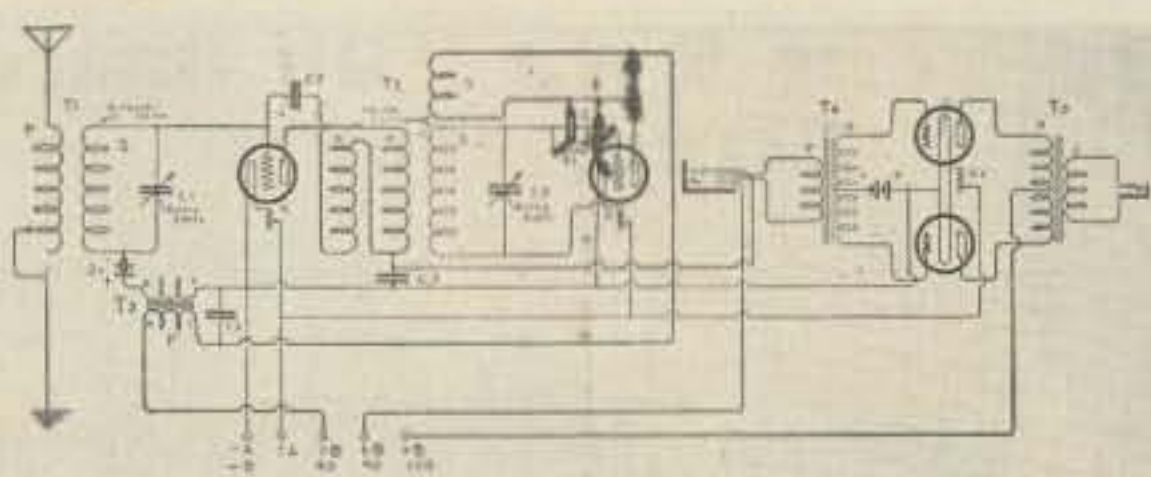
Decrement, logarithmic decrement: Nobody knew very much about the subject, even though the Department of Commerce issued their well known Bureau of Standards book entitled *Radio Instruments and Measurements* #74, on March 23, 1918. This gave technicians and engineers an in-depth documenta-

tion on the subject. Mr. B. West ex-8KEZ discussed spark dischargers at the St. Louis convention in 1920. In the course of his presentation, he was interrupted repeatedly by well-meaning listeners in the audience, as they confused the issue by introducing the "damping factor" and then wondering what was meant by *napierian*. The confusion usually brought down the house, and the heated discussion ended in a draw. Not even well-meaning intellectual cowhands from the western ranches knew what to make of these arguments and decided to leave well enough alone when they got back to their radio shacks.

So decrement, damping factor, impulse excitation, and increment — all these factors — were eventually solved the usual "over-the-ether-waves-reporting" way — experimentally — trial and error methods prevailing. It was understood that a low resistance (the lower the better) in the secondary discharge circuit gave a low decrement and allowed the energy to oscillate freely with consequent low heat loss. We seldom worried about impulse excitation any more.

Our problems were put away for a while until the next convention came along. This was to be the First National American Radio Relay League super meeting at the Edgewater Beach Hotel in Chicago, to be reviewed in the next chapter.

We go back to our midnight operating hours when all is quiet and serene about the house. The ham does not want disturbances to interfere with his concentration on distant code from some far-off place. Besides, when the key is closed, the spark noise could disturb the neighbors, and any intruders into the privacy of the shack would be overcome by the ozone that often permeated the atmosphere. QRX till we meet later on when fully recovered in fresh air environment. ■



ROBERTS SETS

The famous Roberts Circuits have given a wonderful degree of satisfaction to thousands who have built them. Excellent selectivity, fine tone quality, and extraordinary volume. The two-tube set gives volume equal to the ordinary three-tube set, and the four-tube set, using push-pull amplification, gives volume equal to the ordinary five-tube outfit. If you haven't built a Roberts set, you've missed one of the best bets in radio to-day.

Complete Parts 2-Tube Set

1 Set Stanley Coils.....	\$ 8.00
2 Haynes-Griffin Extra Plate Vernier Condensers.....	10.00
2 Mica Condensers, .002 Mfd.....	.80
1 Mica Condenser, .0025 Mfd.....	.40
1 Amertran Audio Transformer.....	7.00
1 10 Ohm Rheostat with Knob.....	.75
1 UV 201A Socket.....	1.00
1 UV 199 Socket.....	.50
2 25 Ohm Resistance Strips.....	.50
1 Grid Condenser .00025 Mfd.....	.45
1 Grid Leak 2 Meg.....	.50
1 Switch Lever.....	.20
7 Contact Prints.....	.07
7 Binding Posts.....	.35
1 Hard Rubber Panel 7 x 21 x 3/16 (Un-drilled).....	2.30
1 Wood Base.....	.75
Misc. Spaghetti, Bus Bar, Screws, Nuts, Bolts.....	.75

\$34.32

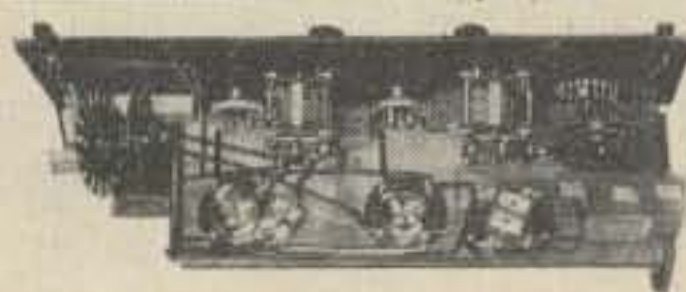
Complete Parts 4-Tube Set

1 Hard Rubber Panel 7 x 21 x 3/16, Drilled and Engraved.....	\$ 4.00
1 Base Board.....	.75
1 Set Stanley Coils.....	8.00
2 Haynes-Griffin Extra Plate Vernier Condensers .0025 Mfd.....	10.00
1 Switch Arm.....	.20
7 Switch Points.....	.07
2 Switch Staps.....	.02
4 Sockets \$1.00 ea.....	4.00
1 Amertran Transformer.....	7.00
2 Push Pull Transformers (set) Como.....	12.50
3 Rheostats, \$.75 each.....	2.25
2 Jacks (Open and Double Cut).....	1.40
7 Binding Posts.....	.35
1 Neutralizing Condenser.....	.50
1 Grid Leak (3 to 7 Megohms).....	.50
1 Grid Condenser .00025 Mfd.....	.45
2 Mica Condensers .005 and .0025.....	1.00
2 C Batteries 4 1/2 Volts, @ \$.60.....	1.20
Misc. Bus Wire, Spaghetti, Screws, Bolts, Nuts, Lugs, Etc.....	1.00
1 Set Layout and Direction Sheet.....	1.00

\$56.19

WELL WORTH HAVING

"Radio Broadcast's" booklet describing the famous Roberts Knockout Series of Receivers. Tells the whole story of these wonderfully efficient sets. Send for your copy now. Price, 50c.



The History of Ham Radio

-- part V

Reprinted from QCC News, a publication of the Chicago Area Chapter of the QCWA.

The first amateur radio get-together of any size was the St. Louis Midwest Convention in December of 1920, shortly after our licenses became available in 1919. No sooner had the enthusiasm at the St. Louis gathering died down, than the

ARRL Board of Directors proposed a national convention.

In these early years after World War I, there was so much newness in everything connected with wireless, and there were so many original and worthwhile ideas to be aired, that no mere Morse code contact was sufficient. Voice communication had not as yet entered our amateur wireless channels. Ama-

teurs were on the verge of many new developments. Major Armstrong had announced his "single" signal regenerative and then his superregenerative receiver designs. There were new circuits to be tested in the transmitter field, including the Colpitts, the Meissner, the Hartley, and the Heising, among others.

Amateurs wanted to be informed. They found themselves in new technical surroundings. So, for the first time, citizens of the United States and Canada, all interested in privately-owned and operated radio communication, decided to come together from far and near to a big first national convention.

The first gathering of the clan took place from August 30 to September 3, 1921, at the Edgewater Beach Hotel, located on the shore of Lake Michigan in Illinois. History relates that, following the success achieved at this first national convention, it was ordained that two succeeding ARRL national conventions were also to be held at the Edgewater Beach Hotel in Chicago at two year intervals — September 11 to 15, 1923, and August 18 to 23, 1925.

There was no telling what impact these get-togethers would have on the future destiny of amateur radio. Great effort and meticulous preparations were made for

months in advance to insure success. Everyone connected with the preparations hoped that this first national meeting would find attendance coming from the far reaches of the States and Dominion, representing all districts.

The midwest location proved to be a most strategic and advantageous choice. The Edgewater Beach Hotel was at the far north edge of Chicago, away from heavy traffic, with R.H.G. Mathews' 9ZN station located just to the north on the lake shore, spurting two tall station towers, a multiwire antenna, and up-to-date equipment in his spacious shack. All agreed that this was an ideal spot to congregate.

The convention committee had booked a large arena, the Chicago Broadway Armory, located within walking distance of the hotel. About fifty manufacturers and dealers in ham radio gear of all description displayed and demonstrated their products. For the first time, amateurs had an opportunity to talk shop with those people who had kept amateur radio alive through their advertising in *QST*, *Radio Amateur News*, *Wireless Age*, catalogues, and other literature. This was a ham's paradise!

The convention hall, where all the sessions took place, was a beehive of activity. There was no letup in making personal contacts, exchanging QSLs, and discussing many subjects slated on the agenda.

The First Day

The ARRL President, Hiram Percy Maxim, addressed the members with an inspiring talk concerning the aims and accomplishments which amateur radio had achieved in the relatively few years of the ARRL's organization. In his introductory remarks, the founder of the League had the following to say:

"As we meet and open this great convention, it is indeed

Hurry Up Fellows!

WE DON'T WANT TO MISS THAT
FIRST TRAIN TO THE
FIRST NATIONAL A.R.R.L.
CONVENTION & RADIO SHOW
IN CHICAGO
AUGUST 30th to SEPT. 3rd. 1921

It sure is going to be some affair and you don't want to miss meeting those fellows that you have heard so much about.

And the Radio Show with all the manufacturers and dealers with their latest apparatus will be on hand. The immense Broadway Armory will be just filled with apparatus and fellows you want to see.

And Oh Boy, that banquet will be one great affair!

Come along, fellows, and spend five of the happiest days of your life with a real live crowd at Chicago during convention week.

Banquet reservations should be made immediately with:

N. C. BOS.

118 No. La Salle St., Chicago

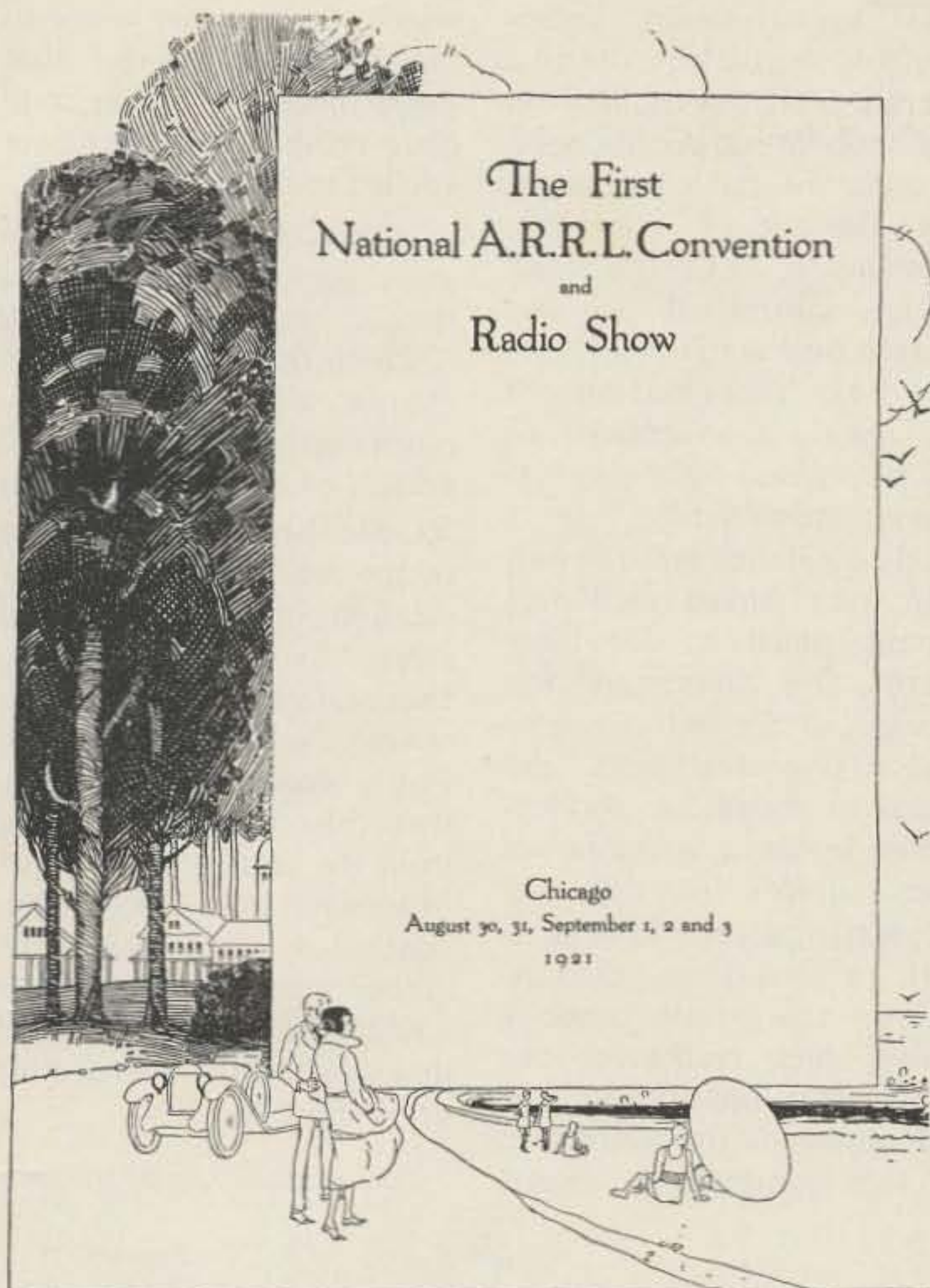
Manufacturers and dealers wishing exhibit space should write to

N. E. WUNDERLICH

4533 No. Sawyer Ave., Chicago

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS





a historic event . . . In years to come, much will be said about what we do here at this first convention. We are striking out into the unknown, and even the smaller actions which we take here during the next few days will weigh heavily in the future, for they will establish precedents and standards . . . Let us not forget that we are pioneers, blazing a way many are to follow. Our responsibility is great, and we must so regard it. It is one thing to repeat what has already been done, but it is another altogether different thing to do what has never been done before. What you see before you here today has never happened in the affairs of man. Not only is it a great pioneer effort in radio history, but it is a great pioneer effort in political history. We American and Canadian citizens assembled in this room represent pioneers in the development of something totally revolutionary in the art of communication. The like of what we are doing and proposing

had never crossed the brain of man a short ten years ago. We already have a privately-owned, absolutely free continentwide means of instantaneous communication and no man may say we shall not make it worldwide." (What prophetic statements emerged from this gathering of dedicated and enthusiastic men!)

"It is no small distinction," our President went on to say, "to be one of those who make history."

General and Technical Sessions

There would be no point in listing the names of the high and low notables in attendance. They were all present. The program committee had topics scheduled for discussion pertaining to club organization, interference control, observations of laws, legislative matters, message handling, and many technical subjects.

Charles H. Steward, member of the ARRL legislative committee, reviewed pending legislation, a matter

The Convention

THROUGH the many years of amateur radio there has developed an increasing desire to meet the other fellows that are, like yourself, interested in radio communication either as a pastime or business. And now comes a time when your wishes shall be gratified.

For, in Chicago on August 30, 31, September 1, 2 and 3, 1921, the American Radio Relay League will hold a First National Convention and Radio Show, which everyone is cordially invited to attend.

Chicago is itself a wonderful summer resort, offering every opportunity in any sport or diversion. You will never regret having spent part of your vacation here. The details of the convention are exceedingly comprehensive and every minute of the convention will be taken up with interesting and educational conference and lectures, being in all a most complete and co-ordinated program. Mornings, afternoons and evenings are fully arranged for, so that you will remember this convention as some of the most enjoyable days of your life.

There will be people that you know and many that you do not know that will be present from every district and city in this great United States. Probably the most important feature of the convention will be the huge banquet on the night of September 3rd, and there should be none failing to attend. Everybody from the Young Squirt up to President Harding will be there to pass you the sugar and tell you what a record station he or she is going to have this season.

The first day will be given over entirely to the arrival, registration and locating of the many delegates. The program will start promptly at ten A. M. August 31st, so you should arrange to be in Chicago some time during the previous day, August 30th.

We have arranged to accommodate you at the finest hotels in the city, very close to all activities, at rates from two dollars per day up.

From the moment that each delegate arrives, and they should not forget to bring the ladies, until their departure, the utmost of consideration will be devoted to their safety, comfort and pleasure.

Convention delegates will be admitted to the meetings, lectures, sportive expeditions and the Radio Show without any charge.

Banquet charges will be five dollars per plate, and reservations should be made immediately with convention reservation manager,

N. C. BOS
118 No. LaSalle Street
Chicago, Illinois

(Make all remittances payable to Chicago Executive Radio Council)

The Radio Show

THE manufacturers and dealers' exhibit at the First National Radio Show, which is to be held in conjunction with the convention, will be the most spectacular conglomeration of modern radio equipment that has ever been put on display under one roof. This gorgeous and pompous affair will be well worth the trip itself.

The Broadway Armory, the most modern and largest exhibit and convention building in Chicago, will be used entirely for this great show.

Divided into model exhibit booths and beautifully decorated in one accord, it will equal in splendor any of the successful automobile shows. The magnitude of the affair is positively stupendous.

It will indeed be a great thing for the manufacturer and dealer, as it is held at a time that marks the opening of a new and more active radio season. Business conditions are rapidly improving and a very successful season is predicted.

In addition to publicity thru radio publications, circulars and placards, the daily newspapers with circulation over the million mark will be employed to advertise the show. This should result in a daily attendance of anywhere from three to eight thousand of interested people. The results to the advertisers, both direct and indirect, will be unprecedented.

This is not a money making proposition and the booths are being sold on approximately a pro-rata basis. The convention delegates will be admitted without charge, and the general public will pay an admission fee. Permanent passes will be issued to exhibitors. The show will open at the same time as the convention, ten A. M. August 31st, and everything must be in readiness the day before.

Here are some reasons why every manufacturer and dealer should be an exhibitor: It is the biggest affair that has ever been promoted in the age of radio. It comes at a time that marks the opening of the regular radio season. There will probably be over ten thousand people reviewing the apparatus. By personal contact with the field which he is selling he may gain good will. The exhibit cost is low and the results will be big.

Your competitor may have an exhibit and if you do not—well, think it over.

There will be every accommodation available for the exhibitor, delegates and the general public. The Armory is conveniently located near the three hotels at which the majority of the delegates will stop. There are also excellent amateur stations near by which will supply both spark and phone transmission for the reception of exhibitors.

It will be a long while before such opportunities as are here offered will again be presented.

which required constant attention. Seven bills under debate in Congress at that particular time related to sub-

jects concerning radio control, radio regulation, and enforcement. Observations made at this meeting were that: "If just two of these bills go through in their present form, the wavelengths, power, and decrement are then subject to control of the Commission, and they keep us champing around from one wavelength to another, increasing and decreasing the power available for amateurs. Constant vigilance is of vital importance to insure the amateur's place in the radio spectrum."

Probably the topic which drew top attention during the convention, and which was subject to heightened debate, proved to be the controversial question of power factor in ham transmitter circuits. As one reporter remarked afterward, "Without a doubt, this debate was the main attraction at the convention."

There were staunch supporters of the two main participants in the discussion, and it did not take long before sides were chosen. At the outset, Ellery W. Stone from the west and W. B. West 8AEZ were the antagonists in this struggle for definition and thoroughness of detail for presentation of facts.

Said Mr. Stone: "Power factor is unity in any ac circuit in which inductive and capacitive reactances cancel."

Said Mr. West (ignoring inductance and capacitance): "I confine my views in the matter to the relation of real Watts to apparent Watts."

This confrontation went on for hours, with other participants joining, until all agreed that it appeared that the confusion lay in the definition of power factor. There

was no common understanding reached by the two parties. So it was decided, on the spot, to submit the question to the radio section of the Bureau of Standards, Washington, D.C. The statement submitted to the Bureau read as follows:

"For information of National Convention of ARRL, please wire our expense immediately: In a freely oscillating radio circuit, and in a forced oscillating circuit tuned to resonance with the impressed frequency, if the inductive and capacitive reactances are equal in magnitude and opposite in sense, is the power factor unity? One side contends that, according to present alternating current theory, the power factor is unity, and reactances are equal and opposite. Other side contends that resonance is that condition in circuit

which causes power factor to automatically assume that degree necessary for the complete dissipation of the power applied to the circuit."

Within hours after the telegram was forwarded to the Bureau, the reply came back ... with the answer which, in essence, left both sides very much up in the air. Supporters of both Mr. West and Mr. Stone hailed the outcome of the reply as complete vindication of their respective sides. Even a committee thereupon appointed to review the entire discussion finally ended up by stating that they are not reasoning from the same premise. Most of those in attendance finally concluded by these vague decisions that another subject could be more productive and down to earth and headed for other meetings.

Of great interest to ama-

January, 1920

Q S T

-27



RADIO 9ZN



Radio 9ZN, the station of the Central Division Manager, is located at 5525 Sheridan Road, Chicago, Ill., on the shore of Lake Michigan.

The station consists of a two room, one story frame building situated midway between the two towers supporting the antenna. The building, towers and plane of the antenna are in a north-and-south line, at a distance of 60 feet from the edge of the lake. Because of this location, the station is clear of practically all high buildings and obstructions in all directions.

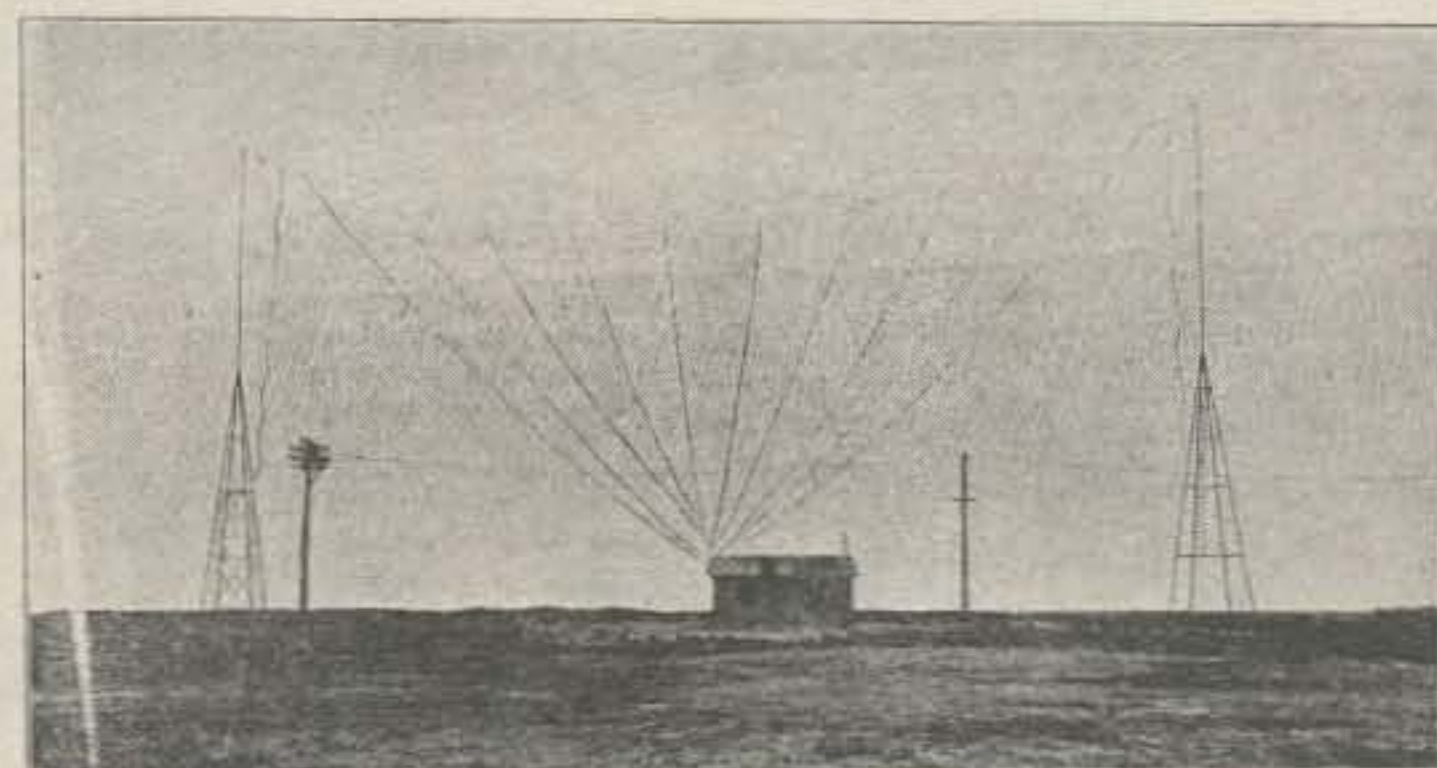
The aerial is 95 feet high, over all, the towers being of steel, 50 feet high, and the masts being also of steel, 45 feet in height. The towers are 150 feet apart, the ten wires composing the antenna being spaced equally within this distance, in the well-known vertical fan fashion. The aerial wires are 7 strand No. 22 tinned copper wire, the top cable being 7 strand No. 18 phosphor bronze, with three 10 1/4 inch Electroose insulators at each end. The loose end wire attached to the tower sides of the insulators are to provide downhalls

for the cable should the aerial give way.

The ground system of the station is perhaps one of the principal reasons for its success. It is composed of two banks of wires, one consisting of 20 wires (No. 14 bare copper) each 30 feet long, buried radially from the station, and the other consisting of 8 wires (7 strand No. 22 copper) each 150 feet long, buried similarly. In addition, two wires, each 100 feet long are submerged in the lake, and a number of 6 foot rods are driven into the ground about the station.

Power is provided by a 4 K.W. special power line, shown in the illustration. Telephone is also provided, the number being Sunnyside 10153.

Hy-Rad rotary gap. The rotary gap is contained within a double walled padded box, just behind the marble panel, on which are mounted the radiation ammeter, power variation switch, power ammeter and main switch, the transformer being directly beneath the gap box. The oil condenser is immediately to the right of the switchboard, and consists of 1200 square inches of tinfoil separated by 3/4 inch plate glass immersed in transformer oil. The oscillation transformer is made of 1" x 1/4" brass ribbon and is mounted as shown. The full condenser is used for the 425 meter wave, but only a part is used on 200 meters, the amount being such that only one turn of inductance is used



The receiver consists of a Chicago Radio Laboratory Paragon RA-6 short wave regenerative receiver and Amplifon type AGN-2 audion control and two step amplifier. An Audiotron tube is used for detector, Western Electric VT-1's or Marconi VT's being used as amplifiers. With this receiver are used Baldwin Mica Diaphragm headphones. Practically all the long distance amateur stations are heard with the phones on the table on average nights; many, such as 2CS, 2ZS, 5AF, 8AA, 8ER, 9BT, 9BR, etc., being generally heard at distances up to 100 feet from the headphones. Six hundred meter stations are heard similarly. At present no set is provided for longer waves than 600 meters, but an undamped wave receiver is under construction.

The transmitter consists of a Marconi (United W.T.Co.) open core 1 K.W. transformer, having a secondary voltage of 30,000, with an oil immersed plate glass condenser, and a Chicago Radio Laboratory

in the primary on this wave.

Because of the high fundamental wave length of the aerial (300 meters) all 200 meter transmission and reception are done through series condensers, the transmitting series condenser consisting of 175 square inches of tin foil separated by 3/4 inch plate glass and immersed in oil. This condenser is located just above the loader, which is used for 425 and 600 meter waves.

The radiation on 200 meters is 8 1/2 amperes, and on 425 meters is 9 amperes, the 425 being really better than would appear from a direct comparison of these readings, because of the elimination of the series condenser, and also because of the greater carrying ability of this wave.

The 200 meter wave is used ordinarily, with a shift to 425 to avoid interference or to work over greater than average distances. The answering wave of this station is invariably 200 meters, unless otherwise specified by the calling station.

(Concluded on page 35)

teurs who were still purchasing and installing spark gap transmitters was the subject of broadband interference. It was contended that spark gap units were doomed to fade out of ham stations, because the waves they transmitted on the air were not as sharp as a CW wave. It is true that they could be held better in reception and did not have tendencies to jam each other, like the CW signals did. Also, each spark on the band had an individual characteristic that identified it, and what distances could be covered (having 1000 Watts available)! The overall sensitivity and selectivity of circuits was a hindrance. The CW signals were difficult to tune and hold. Wave shifting was usually noticeable. Regenerative receivers had shortcomings, especially since they were asked to be equally effective in bringing in CW, ICW, and the broad spark signals. Receivers lacked adequate control to meet requirements. Being regenerative, they radiated energy and caused considerable interference, especially in more congested areas.

For most signal reception, the oversized loose couplers in station equipment were still serving their major purpose. Domestic and foreign longwave stations were very much on the air with news broadcasts, weather reports, time signals, and general information. Many stations served as sources of code signals for

practice — NAA, 2,500 meters; POZ, 12,000 meters; PL, 10,000 meters; and MUU, 14,000 meters, continued on the air for years.

So loose couplers were in constant use by amateurs until, with the introduction of the honeycomb-coil design, units which occupied far less space but had equivalent inductance gradually replaced them. Amateurs also began to convert to shorter and shorter wavelengths with the move to CW and the application of available transmitting tubes. Amateur station layouts began to take on new and revitalized appearances. Power supplies had to be designed and built to accommodate larger tubes for that new requirement of "juice" for the "bottles." In turn, many new receivers were being built using variometers and vario-

couplers.

As is the case each year, with the coming of fall and colder weather, radio conditions improved, static tapered off, and interest in DX and relay activities increased. So the ARRL Board of Directors decided that a determined effort should be made to span the Atlantic via amateur radio. There had been an earlier try, not organized, that had failed. Undaunted, plans were laid by the ARRL traffic department announcing that all radio amateurs should enter into a series of transmitter tests. Selections would be made to find the best and most far-reaching transmitters to qualify for the proposed undertaking. The following form appeared in *QST*, September, 1921, page 12, directed to all hams:

"Traffic Manager, ARRL, 1045 Main Street, Hartford CT.: Please enter my station as a transmitter in the Transatlantic Sending Tests, Dec. 8th to 17th. I will be ready to transmit in the preliminary tests on Nov. 7th to 12th, and if I fail to cover the specified distance in the preliminary tests, I shall relinquish my rights to transmit in the final tests. Name ... Call ... St ... City ... State ... Power of transmitter ... type (CW or spark) ... greatest distance heard (give three records) ..."

The stated goal was: "We want the Atlantic Ocean spanned on schedule by an amateur station, and we want definite proof that it has been done." ■

To be continued.

teurs who were still purchasing and installing spark gap transmitters was the subject of broadband interference. It was contended that spark gap units were doomed to fade out of ham stations, because the waves they transmitted on the air were not as sharp as a CW wave. It is true that they could be held better in reception and did not have tendencies to jam each other, like the CW signals did. Also, each spark on the band had an individual characteristic that identified it, and what distances could be covered (having 1000 Watts available)! The overall sensitivity and selectivity of circuits was a hindrance. The CW signals were difficult to tune and hold. Wave shifting was usually noticeable. Regenerative receivers had shortcomings, especially since they were asked to be equally effective in bringing in CW, ICW, and the broad spark signals. Receivers lacked adequate control to meet requirements. Being regenerative, they radiated energy and caused considerable interference, especially in more congested areas.

For most signal reception, the oversized loose couplers in station equipment were still serving their major purpose. Domestic and foreign longwave stations were very much on the air with news broadcasts, weather reports, time signals, and general information. Many stations served as sources of code signals for

practice — NAA, 2,500 meters; POZ, 12,000 meters; PL, 10,000 meters; and MUU, 14,000 meters, continued on the air for years.

So loose couplers were in constant use by amateurs until, with the introduction of the honeycomb-coil design, units which occupied far less space but had equivalent inductance gradually replaced them. Amateurs also began to convert to shorter and shorter wavelengths with the move to CW and the application of available transmitting tubes. Amateur station layouts began to take on new and revitalized appearances. Power supplies had to be designed and built to accommodate larger tubes for that new requirement of "juice" for the "bottles." In turn, many new receivers were being built using variometers and vario-

couplers.

As is the case each year, with the coming of fall and colder weather, radio conditions improved, static tapered off, and interest in DX and relay activities increased. So the ARRL Board of Directors decided that a determined effort should be made to span the Atlantic via amateur radio. There had been an earlier try, not organized, that had failed. Undaunted, plans were laid by the ARRL traffic department announcing that all radio amateurs should enter into a series of transmitter tests. Selections would be made to find the best and most far-reaching transmitters to qualify for the proposed undertaking. The following form appeared in *QST*, September, 1921, page 12, directed to all hams:

"Traffic Manager, ARRL, 1045 Main Street, Hartford CT.: Please enter my station as a transmitter in the Transatlantic Sending Tests, Dec. 8th to 17th. I will be ready to transmit in the preliminary tests on Nov. 7th to 12th, and if I fail to cover the specified distance in the preliminary tests, I shall relinquish my rights to transmit in the final tests. Name ... Call ... St ... City ... State ... Power of transmitter ... type (CW or spark) ... greatest distance heard (give three records) ..."

The stated goal was: "We want the Atlantic Ocean spanned on schedule by an amateur station, and we want definite proof that it has been done." ■

To be continued.



EDITORIAL BY WAYNE GREEN

HAM GEAR FOR HAMS

Somewhere around 300,000 ham transceivers have crossed over into CB hands so far ... where will it end? The manufacturers and importers of ham rigs estimate that about 75% or more of the new rigs end up in CB hands.

Sure, the use of these transceivers

by CBers in their "HF" band, those channels in the 27.5 to 28.0 MHz band, is illegal. But, like the 55 mph speed limit, the enforcement is so slight that most CBers use the band with impunity. On those frequencies, up above the hurly-burly of the "bottom 40," sidebanders sit and make skip contacts with ease. Their ham transceivers and ham power amplifiers, aided by antenna installations which would make a dedicated DXer fidgety with envy, give them a very good taste of hamming.

Most of these chaps are much like the rest of us, a fact attested to by the large number of them who are getting their ham tickets. Recent estimates from a number of ham clubs indicate that almost 90% of the people in ham

classes are CBers. Most ham classes have a dropout rate of around 40%, though this depends a lot on factors such as the instructors, the code tapes used, etc. The fact remains that very few of the HFers are among the dropouts. They seem to have a much higher degree of determination to succeed. The estimate is that at least 40% of the newly-licensed hams are now coming from the HF group.

When you figure how relatively small that group is, the number of HFers getting ham licenses is most remarkable. This also may explain why we have so far had only minor trouble with HFers bootlegging in the ham bands. The redneck crowd hasn't

Continued on page 190

from page 16

vide amateur radio with growth and to offer a reasonable alternative to CB manufacturers to opening a Citizens Band in the amateur 220 MHz band. Now that history has eliminated the need for a Communicator license, will we be able to stop the FCC?