THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

The Creation of the Radio Fraternity

Part 1 — The Birth of the ARRL

At the beginning of the nineteenth century, there were no signals to be heard in the ether even if one were capable of listening. There were just sounds created by nature—the hiss of atmospheric noise and the occasional crashes of electrical storms. But then, scientists began to create emissions in their laboratories and inventors began to send and receive them at greater and greater distances. Radio was born and at the beginning of the twentieth century operators were communicating with each other utilizing the raspy rough notes generated by spark gap transmitters.

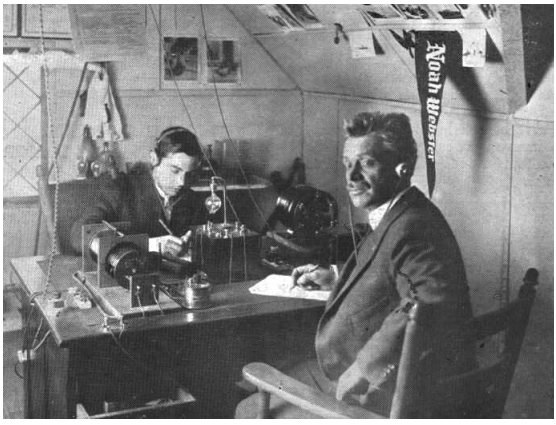
These early airwaves were shared by a number of interests. Most influential were the merchant marine and Navy followed by the commercial wireless services, which competed with the cable telegraph services. Relatively insignificant at this time were the "radio amateurs"—the neighborhood operators who built their own stations and communicated with each other over short distances. These were the enthusiasts who monitored the great commercial and naval stations to "learn the code" and managed to assemble modest "home brewed" stations to reach out to their colleagues.

There emerged from this group two individuals who were to determine the future of the amateurs in America, firmly establishing them in the pursuit which was to involve tens of thousands of enthusiasts for more than a century. They were Hartford, Connecticut residents Hiram Percy Maxim and Clarence D. Tuska.

In character, age and worldly experience these men differed in many respects. At the time of his formative interest in amateur radio Maxim was a middle-aged professional of many diverse and successful endeavors including invention and manufacturing. His prior and contemporary interests included the development and marketing of a silencer for weapons and autos, auto manufacture, glider flight, writing and movie making.

Thanks to his boundless enthusiasm for the new and unique, Maxim's interest was captured when his chief engineer at Maxim Silencer Company, Roland Bourne (later 1ANA) related his wireless experiences. Maxim and his son Hiram Hamilton, whose friends at school were experimenting with wireless, decided to pursue this new area of technology.

As the first decade of the century drew to a close, Hiram and Hamilton were studying the International Morse code by sending messages to each other utilizing a simple telegraph key and buzzer. But they soon felt



Maxim and son Hamilton in their attic radio room.

the need to acquire a receiver to practice copying the wireless signals of local amateurs and, more importantly, of powerful spark gap stations such as SLI the Telefunken commercial station on Long Island, New York or even those of NAA the Naval Station at Arlington, Virginia.

The first set they bought, purchased by mail order, was entirely useless. Then Maxim spotted a receiving device in a Hartford toy store window and borrowed it on trial. But the Maxims could not get it to work and returned it.

Enter teenager Clarence Tuska, then amateur SNT, who had built the single slide tuning coil and crystal detector combination. He returned it to the Maxims and instructed them in its operation.

Clarence D. Tuska

Tuska went on to provide other components and ultimately assembled a complete one-kilowatt spark gap station for Hiram and Clarence. This began a life-long relationship which had enormous implications for the amateur radio world.

During the late nineteenth and early 20th centuries, periodicals began to appear which appealed to the rapidly growing interest in electricity, electronics and wireless. Foremost of these was *Bubier's Popular Electrician* first published in 1890 and which, in 1906, was renamed *Electrician and Mechanic.* Hugo Gernsback's Electro Importing Company catalog spawned *Modern Electrics,* which in 1908 claimed 100,000 readers. These two magazines disappeared in a maze of magazine consolidations. However, in their early years they encouraged amateurs to organize into clubs and sponsored a number of small groups.

Hiram Percy Maxim was a prominent citizen of the city of Harford in that era. The local newspaper, *The Hartford Courant,* followed his social and business activities closely and had an interest in following the wireless scene in general. One significant report was as follows:

January 14, 1914
RADIO CLUB OF HARTFORD BORN WIRELESS OPERATORS FORM ORGANIZATION
D.L. MOORE PRESIDENT

Twenty-one wireless enthusiasts convened to form this club for the purpose of disseminating information about radio telegraphy; provide mutual assistance in acquiring apparatus for in its practice; band together against airwave interference; and to observe and support the laws of the United States pertaining to wireless operation.

An executive committee was formed with Hiram P. Maxim as appointed chairman. Nominations were proposed to the body and D.L. Moore was elected president and Clarence D. Tuska was elected secretary and treasurer.

A membership committee was established to review membership applications and the executive committee was charged with preparing a constitution, by-laws and schedule of fees and dues. To top off the evening the inimitable Maxim spoke about how to contend with interference a serious problem at the time created by poor operators.

The consummate organizer Maxim thus set the course of the history of amateur radio. The young secretary-treasurer of the new club took his responsibilities seriously. He set up the club offices in his mother's home in Hartford. He attended to the finances and to the correspondence which was later to become an important aspect of the union. Maxim and his son became active as amateur operators using the call letters SNY and SNW. Tuska used the call letters SNT. As federal regulation had set in, the trio went to Boston together in 1913 and successfully took the examination for First Grade Commercial Radio Operator's licenses. Their official new call letters were 1WH, 1ZH and 1WD respectively.

The transmission range of the typical amateur at the time was frustratingly short. A typical station consisted of an induction

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uates was $6,000 per year, equal to $82,500 today. Midland Radio School in Kansas City was an appealing choice because that school operated an experimental television station, W9XAL, broadcasting mechanically-scanned pictures in the 1930s.

My father obtained his training through a National Youth Administration Radio School established as one of Franklin Roosevelt's "New Deal" agencies. Some individuals with previous technical experience were self-taught, learning the necessary information from license manuals that included technical information and practice test questions.

Originally, commercial operators licenses had to be renewed every five years, but testing on new technology was not required. This meant that my father, who received his First Class Radiotelephone license in the 1940s, was authorized to be Chief Engineer of a color television broadcasting station, even though he had little knowledge of color television!

Today broadcast stations are highly automated and require little oversight, so the need for strict licensing is no longer necessary.

DeVry ad from Radio and Television News *for June, 1954.*

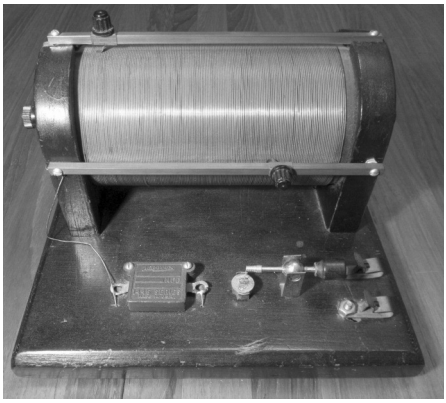
THE FIRST CENTURY, *cont. from page 26*

coil, a condenser and a spark gap for the transmitter. The receiver was usually a coherer-decoherer or galena crystal with a single headphone.

Being regulated to a maximum power of one kilowatt and restricted to operating wave lengths of 200 meters and down, a well-equipped station with an average antenna could not reach out beyond much further than 50 miles. This limited the operator's ability to send messages for third parties, or in emergencies, a principal amateur activity.

Maxim personally experienced these limitations in his own operations. Accordingly, he proposed to the Radio Club of Hartford at their April 6, 1914 meeting the formation of an organization of stations structured to pass messages, one to the other, in a prescribed manner over designated networks.

The "relay" was to be put to practical advantage within an ordered system. The concept, sparked by a suggestion by Tuska and elaborated upon by Maxim, was accepted and the new organization was christened *The American Radio Relay League*.



Early slide-tuned receiver.

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Part 2 — The Network Takes Shape

Members of the Radio Club of Hartford, and particularly Maxim and Tuska, began a recruiting campaign sending out solicitation letters and applications to licensed operators across the country. Maxim had the following letter published in *The Electrical World* issue of May 9, 1914.

Electrical World, May 9, 1914, page 1057
FOR A CHAIN OF AMATEUR WIRELESS STATIONS

To the Editors of The Electrical World:

SIRS:—*The Radio Club of Hartford, Conn., has been at work for some time on plans to organize one or two good amateur wireless stations every 30 to 50 miles throughout as much of the country as seems practicable. The object is to make it possible to relay messages between distant points.*

The plan has already reached a point where messages are being relayed from Hartford to Buffalo, N. Y., via Northampton, Mass., and Westfield, N.J. In a short time we expect to get through to Chicago by this relay system. All we need is to get in touch with those amateurs who have stations which will transmit at least 30 miles and who keep their station in continuous working order.

As a means of getting the names and addresses of amateurs who have stations able to transmit messages 30 miles, such amateurs are asked to write to Mr. Clarence D. Tuska, secretary Radio Club of Hartford, 136 Oakland Terrace, Hartford, Conn., who will forward blank forms which when filled out will be used as a basis for appointing official relay stations of the American Amateur Radio League, the name of the organization as already started.

The writer is taking an especial interest in this work and it has his hearty support, especially as it seems to be the only plan by which the amateur can reach distant points without getting into difficulties with the United States government. It may be that we have in this idea a great organization in the making.

Hiram Percy Maxim
Hartford Conn

Clarence D. Tuska

The standards for qualification as a relay station were stringent. Although the response of prospects was great, not all applicants were accepted. Only the best made it. It is reported that within six months more than two hundred stations had been appointed and the network was active relaying messages. The league published a map showing 237 stations in 32 states and Canada and in October, a *List of Amateur Stations* which detailed 400 stations.

In August of this year 1914, in which the League was establishing itself, war broke out in Europe. "The War to End All Wars" was to have a profound effect on the future of the ARRL and upon its to be highly prized constituent radio telegrapher members.

A dispute now arose between the host Radio Club of Hartford and its subsidiary ARRL. Was the ARRL an independent national organization or was it under the control of the Club? By February 1915, the

parties continued to disagree and by mutual agreement they separated. Maxim and Tuska went their way with the League and legally established it as a non-profit organization in the state of Connecticut. This was the first reorganization of the League.

In December, 1915 Hugo Gernsback made an announcement in his new magazine, *The Electrical Experimenter* which had been first published in 1913. An alliance of amateur operators was created and named *The Radio League of America* whose charter was to organize chains of stations to relay messages over great distances. Sound familiar?

QST *for December, 1915.*

The RLA and other organizations of the period, *The National Amateur Wireless Associatio*n and The Radio Club of America, although essentially facades, contributed to the public formation of the *character* of amateur radio and reinforced the image Maxim portrayed to government in the Leagues efforts to secure recognition and status.

The League was financially fragile deriving income solely from the sale of a booklet, eight maps and 50 message blanks for 50 cents and voluntary station dues of 50 cents per year. The booklet was a *List of Stations* which contained "*General Instructions Governing the Sending and Receiving of Relay League Messages,*" photos of the officers, eight equipment advertisements and of course the list of member stations. The League grew firmly and steadily aided by the introduction of a Maxim and Tuska independently financed publication *QST* magazine which unified the organization.

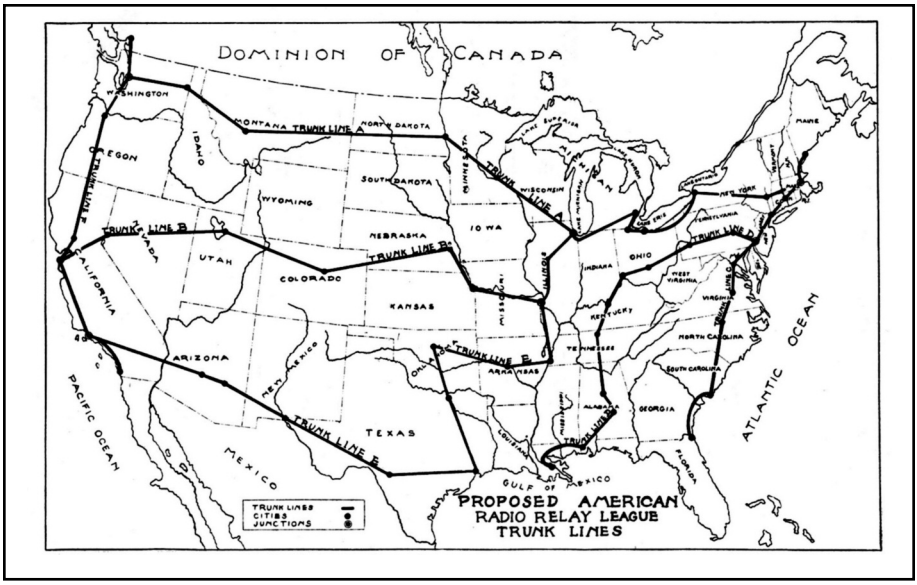
Two years after securing independence the League boasted of well over a thousand members, six trunk lines in operation and a record time of one hour and twenty minutes for a message to be passed from the east coast to the west coast and a reply sent back to the originating east coast station.

Maxim and Tuska, as the sole officials of the association, realized that they had reached the limit of their administrative ability. The League was growing and expanding too rapidly.

Consequently a meeting of leading amateurs was convened to develop the second reorganization of the League. In the first quarter of 1917 a constitution was adopted calling for election of four officers, and twelve directors. Maxim was elected president, Arthur A. Hebert vice-president and general manager, Tuska again secretary and C.R. Runyon Jr. treasurer. Hebert assumed the administrative responsibilities for running the League from his office in New York City and home in New Jersey. The League now was structured for growth and expansion.

The conflicts in Europe grew more intense until on April 6, 1917 the United States was provoked to enter the war. The landscape of amateur radio shifted dramatically. Only days later licensed amateurs received a letter from the Department of Commerce ordering that all receiving and transmitting activities cease, stations be rendered inoperative, and antennas taken down. Amateurs addressed were directed to return a completed form indicating their compliance. The growth of the League came to an abrupt "halt!"—stations were silenced and operators went to war duty.

It is estimated that between 3,500 and 4,000 amateurs served during the war period at home and in France, in the Navy, Army Signal Corps and the Army Air Force among some one million men total. Many of these were volunteers recruited through the efforts of the League. Those that served in the Signal Corps in France performed essential functions as radiomen, linemen,



Origial layout of the proposed trunk line system.

telegraphers, direction finder operators and trench communication interceptors, all occupations that would have required years of training to acquire. Those men who had responded to the Navy's first call for volunteers manned patrol stations along our coasts sometimes initially using their own receivers, others were radiomen aboard ship. The amateurs provided the services a ready wealth of experience and ability.

The war ended on November 11, 1918, but the ban on amateur operations was not lifted immediately due primarily to internal governmental disputes as to what authority would oversee the service. The Navy fought to maintain the control that it had exercised during the war.

The serving amateurs that began to be demobilized returned home to silent shacks and no *QST* magazine. The income stream of the League had dried up as operations were banned and members volunteered or were called to serve. The independent publishers of *QST* saw their market evaporate and were not encouraged to restart publication.

The concerned Board of Directors of the League met several time in February and March of 1919. With all memberships lapsed and only $33.00 in the treasury they determined firstly to reorganize and secondly to raise operating funds. A new constitution was drawn up, a slate of officers elected and a commitment made to purchase *QST* from its publishers. Funded personally by the members of the Board, a special "midget" issue of *QST* was published in April, 1919 announcing the reorganization and a bond issue to raise funds to put the League on its financial feet again.

The officers included Maxim as President. Maxim led the effort to resuscitate the organization and went on to continue to conduct the campaign for governmental recognition of the amateurs. The other officers were R.H.G. Mathews, Vice President; C.R Runyon Jr. Treasurer; Clarence D. Tuska again Secretary and in a newly created position, J.O. Smith as Traffic Manager.

Shortly afterwards, Tuska entered the radio manufacturing business and resigned. He was replaced by Kenneth B. Warner. Warner, 9JT and later W1EH, the first paid Secretary and later General Manager. Warner served in this capacity for nearly thirty years (ironically up to the brink of the

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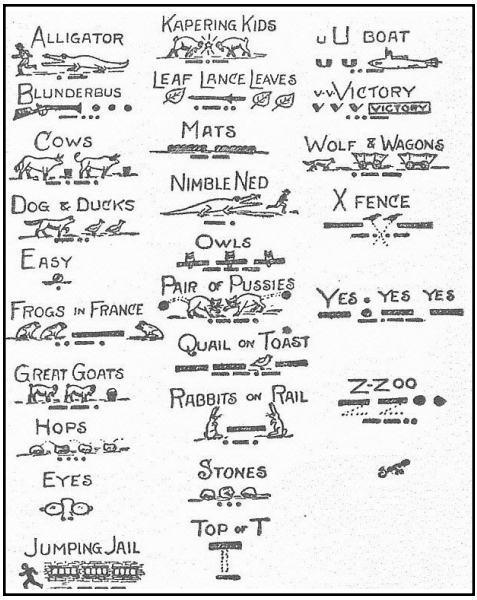

Pictorial device for learning the code by C.B. Stanford (From Popular Radio*, February, 1928).*

incorrectly, whether because of operator skill or radio static, the whole message might be incomprehensible when decoded.

Skilled radiotelegraph operators learn to identify each other by their "fists," or how they send code. I read a story about a radio operator in Alaska who was operating from a building that was heated by a wood-burning stove. Another operator listening to his messages sensed that something was wrong because his code was becoming sloppy. He not only alerted the impaired operator of his concerns but called another operator to send medical help. The rescuers discovered that the flue on the stove had become blocked and the radio operator was suffering from carbon monoxide poisoning.

My most memorable radiotelegraph conversation was with an amateur radio operator in Arizona several years ago. I answered his "CQ." His signal was strong and radio conditions were good, but even though his code speed was reasonable I discovered that his code was hard to understand. I struggled to continue with the conversation. He apologized for his poor "fist" and explained that he was recovering from a stroke and could not speak, but he was able to send and copy code. This had become his only means of communicating. I was glad I was able to continue the conversation and wished him well when he signed off.

I have always admired radiotelegraph operators who can communicate with high code speeds. It must give them a great deal of satisfaction and enjoyment. But unless something changes dramatically, I will probably be limited to a code speeds in the range of 15 words per minute.

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Second World War). He is legendary in the annals of the League, having contributed enormously to its growth and character.

The League goes on today, more than a hundred years since inception, as the preeminent national amateur radio society. Its voice, the headquarters station W1AW, signals daily the universal… "QST,—calling all radio amateurs"—bringing matters of interest to radio amateurs worldwide.

A demonstrator of the unity of amateurs, the League has been a deoted and persuasice voice in the International Amateur Radio Union (IARU) acting as the federation's Secretariat since its inception in 1926. The IARU strives to protect and improve the position and privileges of amateurs within the complex spectrum of radio frequency allocations and wireless regulation worldwide.

The League embraces not only domestic operators but those worldwide who, in the whole, constitute the unique international fraternity of not just amateurs at radio but "amateur radio operators", comrades in endeavor.

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The Initiation: The First AARL National Convention

In 2014, the American Radio Relay League celebrated its Centennial. The 100th birthday milestone was observed in many manners including the main attraction of a National Convention held at the Hartford, Connecticut Convention Center on July 17-19. More than 3,300 amateurs and interested parties from 40 different countries attended and helped blow out the candles on the cake at a banquet which 900 attended. This pinnacle event was the most recent in a succession of National Conventions beginning with the first which was organized only eight years after the founding of the association. The vitality and spirit of the participants of the earlier event have carried forward nearly a century inviting a retrospection of what occurred in 1921.

In its formative years, the League made significant decisions which were to strengthen the federation and set it solidly on its successful future course. Organizing on a national scale, adopting *QST* as its journal, appointing a Secretary-General Manager, and maintaining its focus on the trunk line relay system it created were among these resolutions. And, a singular planned event bound the early constituents. Prompted by the era's interest in meetings, as evidenced by two highly successful District gatherings, the leadership determined to convene a full scale National Convention. This was an audacious action by the hardly eight-year-old League. The resolution was consistent with the spirit of enthusiasm and energy of the maverick hobbyists who had only tenuous regulatory stature. Just two years prior they had eluded the governing grasp of the US Navy and achieved distinct recognition. At the time the fraternity comprised less than 6,000 members among a total census of approximately 8,000 licensed operators whose numbers was rapidly increasing.

Like the rest of Amateur Radio, the convention was a completely volunteer undertaking. The Chicago Executive Council (of affiliated clubs) suggested the idea and the ARRL Board of Direction (sic) heartily endorsed it. League headquarters provided prestige and logistical support and the volunteers at the Council attended to the planning and execution, as is still the case today with division, state and section conventions.

The elegant resort-style Edgewater Beach Hotel on Lake Michigan in North Chicago was chosen as the primary venue. The nearby immense Sixth Regiment (Broadway) Armory accommodated the exhibitors, and was the locale for lectures and seminars. The Sheraton Park Hotel was the secondary site and the Drake Hotel was the site of the principal banquet.

On August 31, 1921 President Hiram Percy Maxim convened the assembly terming the amateurs "pioneers" and

exhorting them to be steadfast in their faith and loyalty to one other. Marking the historical significance of this occasion he expressed his awe of the tremendous speed with which the events in radio had advanced. Secretary of Commerce, Herbert Hoover, sent a radio message stating that the Department of Commerce was by Congressional action the legal "Patron Saint" of amateur wireless operators. Further, he stated that the Department was anxious to be helpful in encouraging the important movement of amateur radio.

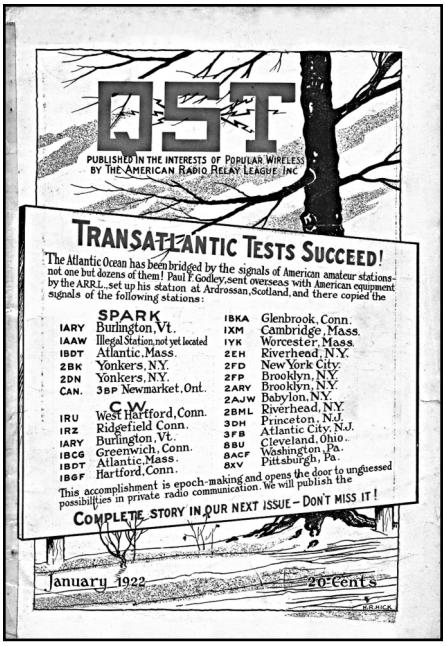
Edgewater Beach Hotel, Chicago, IL.

Among the attendees the principal interests were operating practice, the relative merits of spark gap transmitting versus the recent introduction of vacuum tube continuous wave transmission, and a lively technical debate on the definition of "power factor" and its measurement.

Much conversation concerned the first transatlantic test earlier in the year. The objective of the test had been to achieve one-way transatlantic communications from the United States' more effective stations to receivers in Britain. The test was scheduled for the nights of February 1, 3 and 5 of 1921. Twenty-five almost entirely U.S. east coast stations were selected to transmit designated signals at precisely designated times on 200 meters. The Wireless Society of London arranged for 250 British listeners. The test was a failure! Not one of the U.S. stations was heard! The disappointment was attributed to several factors principal of which was the deficiency of the British receiving equipment and interference from U.K. commercial and military stations.

These conversations did not go unheard. A baseball game had been scheduled between the Board of Directions and the Chicago Council for the afternoon of the third day of the convention. But determining how to structure a future test took precedence. President Maxim withdrew the Board's participation in the event and summoned the Directors and staff participants to a full agenda executive session at the Edgewater Hotel. All but one of the elected Directors participated, two of them by proxy. Routine matters including the acceptance of the affiliation applications of twenty-three clubs were attended to before the major matter was tabled. Responding to the enormous interest in the Atlantic chal-

1921 ARRL Convention delegate's badge.



Front cover of QST *January 1922 detailing the successful transatlantic transmissions.*

lenge, it was decided to mount a second transatlantic test in December of that year and to send a receiver expert to Scotland to listen for U.S. Signals. Receiver circuit designer Paul F. Godley who was considered…"*the most expert operator in the practical reception of short wave signals*" was chosen for the assignment. Thus, within the context of one historical event, another event of historical importance was set in motion. This second trial was not only a success but also settled the transmission mode debate with CW proving its superiority dethroning "King Spark".

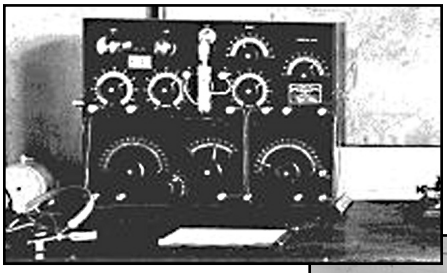
At the Convention, addresses, seminars, technical papers, and special interest group meetings were all important activities. The most prominent of these are detailed in the remarkable "Stenographic Report of the Proceedings of the American Radio Relay League Convention," the original typewritten version of which is shelved in the League's Vintage Volume library. This report was prepared by George W. Johnson, Court and Convention Reporter, and contains over 550 pages. The rendition captures the spirited ambience of the event.

A principal attraction was the "Radio Show" at the immense Broadway Armory. Over fifty manufacturers and suppliers exhibited the very latest in equipment, components and accessories. With only a few exceptions, such as Westinghouse and the Radio Corporation of America, the names of most of these exhibitors have passed into history and are now visible only in museums, i.e., Hammond, Grebe, Tuska, Remler etc. Significantly all the exhibitors were sufficiently impressed with the potential of the fledgling organization to invest in this display of their wares and abilities.

Central Division Manager, R.H.G. Mathews, 9ZN was the Director General of the affair. An ARRL board appointee, 9ZN not only directed the convention, but also conducted tours of his impressive home station nearby.

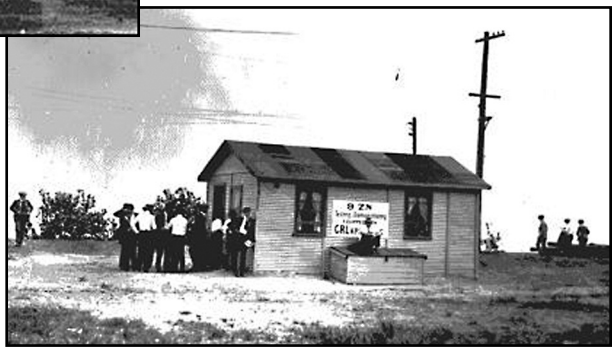
9ZN was an active traffic handler with a score of 370 messages passed in the month of January of 1921 alone. Two years later he, Eugene F. Mc Donald, and Karl Hassel formed the Zenith Radio Company, deriving

9ZN QSL card.



Zenith receiver at 9ZN station.

the company name from the call letters 9ZN (ZN-th). Among other achievements, the trio designed and provided the radio equipment that the MacMillan Arctic Expedition carried on board the schooner Bowdoin in 1923.



9ZN shack open for visiting convention delegates.

The four days of the convention were thoroughly filled with activities serious and otherwise. For amusement there were dinners, skits, sports events, sightseeing and beach side events sponsored by the hotel, including a cruise of Lake Michigan enjoyed by 800 delegates. The entire affair was a great success with something for everyone. More than twelve hundred amateurs attended from every district and almost every state.

Prior to adjourning, the Directors voted to thank the Chicago Executive Council for their successful effort and resolved to have similar gatherings every two years. And indeed national conventions were held in Chicago in September of 1923, and August of 1925. The scheduled 1927 convention was cancelled as the Board recognized that it had become less of a national affair, superseded by numerous Division and State conventions. Another National one was not held until 1938, again in Chicago.

And so the tradition has continued to 2014 as a vivid demonstration of the spirit and camaraderie which are the hallmarks of the unique fraternity.

OBITUARIES, *continued from page 26*

husband purchased a newspaper, *The Suburban List*, in Essex Junction, Vermont. She was at first the paper's only real reporter and she became well known in Vermont for forcing town officials to open their off-the-record meetings to members of the press.

Page was born in Upper Darby, PA, the daughter of a history professor, Morris Wolf, and Hilda Yerpe, a concert pianist. She studied English literature at Swarthmore College and moved to Vermont in 1945 after marrying a Vermonter, Proctor Page. She is survived by two daughters and a son and numerous grandchildren.

Acknowledgements: *NY Times*, *Boston Globe*, Wikipedia, Charles Griffen W1GYR, Peter Sypher, KC4SI, Ted Hannah, K3CL.

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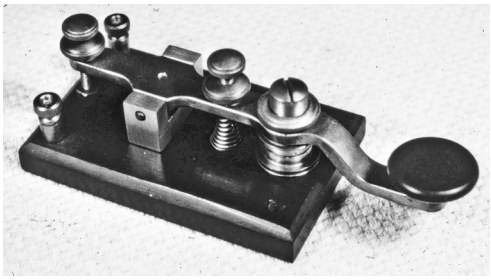
Challenging the Limits: Post WWI Operating Events

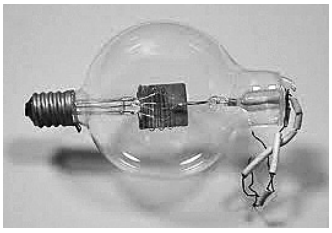
November, 1918 saw the end of the war and the third and final restructuring of the ARRL. By November, 1919 Amateur radio operations were permitted to resume. Amateur operators reassembled their stations and thoughts turned to bigger and better relays and even longer horizons.

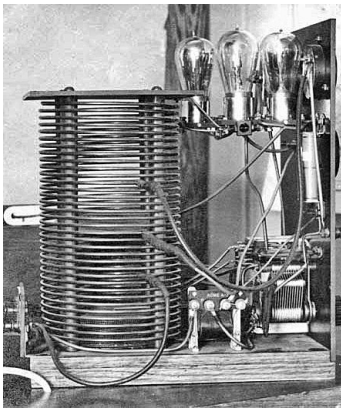


CW prevails.

The development of Amateur radio accelerated at a rapid pace. Every facet of the activity continued to grow despite the temporary abatement of activities necessitated by the war. Amateurs returned from service to find their wireless world rapidly regaining momentum—the number of participants, regulations, organizations, technology and operating activities all were in motion. Continuing technological advancements enabled Amateurs to challenge the envelope of distance and time within which they were constrained and, at this point, dramatic innovations were being realized. Amateurs strove to press the limits, progressing from spark to continuous wave transmitters and operating on shorter wavelengths. Their success was dramatically revealed by the progress of Amateur operating achievements during the period.

The thermionic valve or vacuum tube provided the radio Amateur with a practical solution to producing continuous wave emissions at modest power levels. Circuit designs utilizing tubes as transmitter oscillators and singly or in multiples as power amplifiers, were published in the late teens and early twenties. However, the availability of tubes was limited and they were expensive. This situation gradually improved as more manufacturers entered the market and made increasingly powerful tubes available at more affordable prices. The rapid conversion of Amateurs from spark





Left: Early transmitting tube—RCA UV-202, 5 watt.
Above: DeForest Audion triode amplifier tube.
Right: Quad RCA UV-202 tubes in transmitter.

to continuous wave is remarkably demonstrated by the methods used by Amateurs in the two events reported below. The first of the two events had only a few continuous wave stations—the second event, less than a year later, predominately reported participation by continuous wave stations. Simultaneously, the advent of the Audion amplifier triode coupled with advances in receiver circuitry enabled the Amateur to attain progressively better reception with improved sensitivity and stability.

Transcontinental Relay Test – January 14-16, 1921

With six trunk lines up and running, the ARRL now added an Operating Department, and designed a test to prove the system under prevailing conditions using newly available receiving and transmitting technologies. Cross-country relayed message deliveries were now a common occurrence, with accuracy, speed and proficiency being their desired attributes. This test's specific objective was to establish a new East coast to West coast and return round trip time record. Three routes to the West coast were designated—Northern, Central and Southern, with only specific stations selected to participate. Three messages were initiated each night from East to West—each to be received and to be replied to. This resulted in six messages crisscrossing the country each evening. Details of the structure were published in *QST*. The results appeared in the March, 1921 issue. Under the banner "The Story of the Transcons."(sic) General Manager K.B. Warner exclaimed "*Fellows, we did it! Smashed it into bits-just naturally lambasted the everlasting stuffing out of it! "Ain't it a grand and glorious feeling?"" (sic)* The new record…elapsed time…six and one-half minutes! The route was: 1AW Hartford to 9ZN Chicago to 5ZA Roswell to 6JD Los Angeles and reply back 5ZA to 9ZN to 1AW flawlessly at 30 words per minute. The record was achieved on the third and final morning of the event at 4:20 AM EST. The route and times were carefully checked before the rising sun curtailed operations. Conditions were so good that night that stations in the Midwest copied stations on both coasts. Coast-to-coast completions had been reported along other routes on the second night and earlier on the third night, but with longer elapsed times.

Washington Birthday Relay III – February 21, 1921

The indefatigable 9XE, W.H. Kirwan initiated and structured what was to be the last of the official Washington Birthday relays but not the last of the organized relay tests. Conducted with the cooperation of the League's Operating Department this relay presented a unique and quite difficult challenge to operators. A 30-word message from President Harding was composed. At the start, the message was divided into three component parts, each part becoming a separate message. Accordingly, the original message became three component messages. From the East a component with 14 alternative words only was sent; from the West the component with the center or intervening words only was sent; and finally from the Midwest the last component with the two remaining words was sent. Accordingly, a successful operator was required to receive each of the three components via relay, to assemble the complete message. The complete message from President-elect Harding was then to be delivered to the operator's governor, mayor, and/or highest local official. Astonishingly, 7240 amateurs reported assembling the complete message and making delivery. In total the message was delivered to 14 governors, outgoing President Wilson, 22 Senators, 35 State Senators, and over 500 Police Chiefs, Selectmen, Councilmen, Sheriffs, Postmasters, and News Editors. Receipts were obtained for all deliveries. The results were judged by a Prize Committee comprised of A.N. Goldsmith of the Institute of Radio Engineers, E.H. Armstrong, and H.P. Maxim. Entrants were judged for "speedy and correct reception" quantified to miles per minute in receiving and delivering. Seventy-eight operators were awarded prizes which had been donated by manufacturers and publications. The winners were an-

nounced in the June 1921 issue of *QST*, with the top six winners located in the West. All this on 200 meters and down, predominantly with spark gap!

9XE, W.H. Kirwan, suggested that another Washington's Birthday Relay be held in 1922. This suggestion was preempted by the two other relays which occupied continental operators during the year of 1922. The Governors-President relay in March conveyed congratulatory messages from forty-three governors to newly inaugurated President Harding and in June thousands of police chiefs nationwide received a message from the host chief of the International Association of Chiefs of Police, which was meeting in San Francisco. These events demonstrated the capabilities and effectiveness of the Amateur corps to the nation. But now the attention of Amateurs turned to reaching out and spanning greater distances and they engaged in the planning of a major event.

The early 20s Amateur radio world was energized with the innovative technology and the operating achievements that they enabled. New distance records were claimed daily.

- 2PM was copied by a ship off lower California
- 9ZN was reported by a ship at Colon, Panama – 2600 miles
- 8DA was heard off Venezuela
- 6EA contacted Honolulu
- 6ALE heard by 1ES
- 6XAD QSO'd consistently with 1s, 2s, 3s and the Midwest 8s
- 6KA reports 2FP
- 6BF reports 8BOX
- 8QM (Elmira, N.Y.) using two five watt tubes is heard 1008 miles away
- 4GL using three five watt tubes is heard 2450 miles at sea

and among many more, 1AW relayed a message to 6ZAC in Hawaii and an answer was returned in four minutes and eighteen seconds via 9AWM. A editorial in the November 1920 issue of *QST* acknowledged some of the above records and inquired.. "*What constitutes the supreme amateur DX record for approximately 200 meter*?" and requested that claims be submitted for verification.

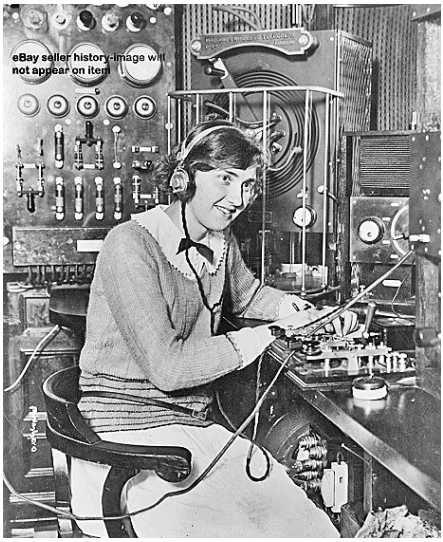
During the year 1921 the accomplishments of station 2RK in Brooklyn, New York were outstanding. J. (John) Kenneth Hewitt owned and operated this station. He distinguished his prior call, 2AGP, when in Albany, New York as a prolific traffic handler. He and his to some extent partner James V. Candido, 2RV, set out to create a record-setting station which was described and imaged in the February 1921 issue of *QST*. A United Wireless 30,000 volt transformer and Grebe synchronous rotary gap provided 3½ amperes of current to a 75 foot inverted L antenna of robust materials. The station broke one operating record after another:

- Heard by ships in Europe, Africa, Canal Zone, Mexico, Cuba and Bermuda
- Heard by ship at Gibraltar – 3200 miles
- Heard by ships off Brazil – 3800 miles
- Worked 5ZA in Colorado regularly
- Heard in Guatemala regularly
- Heard by 6ALE Los Angeles
- Heard in all but four states
- Worked ship 2700 miles south

AND

- Simultaneously handled 3200 messages in these 6½ months!

In our next installment we proceed to a grand period of Amateur radio history—the Transatlantic Tests.



Woman operating 1922 Marconi radio.

THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

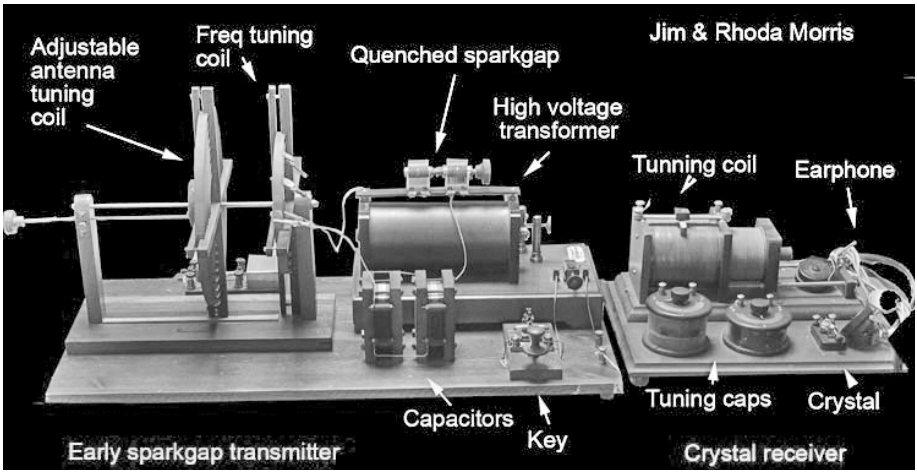
The Transatlantic Tests

The Great War was over. Amateur Radio operators on both sides of the Atlantic returned to their keys and contemplated the challenges of long distance communication. A decade ago the self-professed "amateur" Guglielmo Marconi had sent signals from Canada and the United States to England. The Marconi Company was providing increasingly reliable commercial communications in both directions across the Atlantic, while Amateurs, although limited in transmitting power and scale gradually improved their abilities. Following Marconi's lead, English Amateurs looked west while Amateurs in the United States looked east to reach their next historic milestone. Both shores organized to bring about this feat.

Their efforts to transmit signals easterly and later westerly across the Atlantic were exerted over a three-year period. Tests began as one-way exercises in being heard and culminated with the first two-way transatlantic QSO in 1924. The main event, which generated the most excitement and received the greatest publicity, was the second one-way test conducted from the United States to Europe in December of 1921.

The First Trial – 1921

Early on, Hiram Percy Maxim, President of the foundling American Radio Relay League (ARRL) had editorialized that, beyond the domestic relay tests that the League regularly conducted, the next hurdle was the Atlantic. The Board of Directors of the Radio Club of America likewise advocated for this effort. The war intervened, but shortly after the Armistice, Britain took the initiative. M.B. Sleeper, editor of *Everyday Engineering* magazine, proposed a plan for transatlantic experiments. The magazine intended to conduct the program utilizing its own resources, however, faced with a financial crisis, publication was suspended. The ARRL hurriedly assumed the leadership of



Spark gap station arrangement.

the project.

The proposed experiment was to test one-way transatlantic communications from the more powerful transmitters in the United States to receivers in Britain. This test was scheduled for the nights of February 1, 3 and 5 of 1921. Twenty-five stations, almost all on the U.S. east coast, were selected to transmit designated signals at precisely designated times on 200 meters. The Wireless Society of London, through the auspices of *Wireless World and Radio Review* magazine, arranged for 250 British listeners. The test was a failure! Not one of the U.S. stations was heard!

The Second Trial – 1922

The misfortune of the first trial was attributed to a number of factors: the poor design and sensitivity of the English regenerative receiving equipment which produced self-interfering heterodynes; harmonics from commercial press stations; interference from a Royal Navy station; the short period of time permitted for individual transmissions; and the fact that most of the transmitting stations were using spark. Controversy prevailed. Encouragingly, reports of reception were received from American ships plying the Atlantic, which obviously were equipped with superior receiving equipment. However, these reports only heightened the controversy. Failure of the 1921 test was a topic of great interest at a unique event which was to have great impact on the challenge.

In these formative years, the ARRL made significant decisions which were to strengthen its federation and contribute to its future. Among them was the decision to encourage and participate in regional Amateur Radio gatherings. These events created bonds among the early constituents. Prompted by the interest generated in these meetings, the leaders of this group of maverick hobbyists decided to convene a full-scale national convention. This audacious action was consistent with the spirit of enthusiasm and energy which propelled the fraternity of less than 6,000 members among a total census of approximately 8,000 licensed U.S. operators. On August 31, 1921 President Hiram Percy Maxim convened the assembly in Chicago. More than twelve hundred Amateurs attended, representing every state in the U.S. Principal interests among the attendees were the failed transatlantic tests, operating practices and the relative merits of spark gap transmitting versus the recently introduced vacuum tube continuous wave transmission. Addresses, seminars, technical papers, and special interest group meetings kept the attendees occupied. The affair was a great success with something for everyone.

The Board of Directions (sic) of the League met during the affair with thirteen Directors present. Responding to the enormous interest in the Atlantic challenge, they decided to mount a second transatlantic test in December of that year and to send a receiver expert to Scotland to listen for signals from the United States.

Accordingly, the staff of the League began to plan how this second transatlantic test would include what was thought essential—the presence of an American expert,

Paul F. Godley.

equipped with the most modern receiver at the European receiving end. The ARRL Board selected receiver circuit designer, Paul F. Godley for this assignment. Godley was a member of the ARRL Advisory Technical Committee, the Institute of Radio Engineers and the Radio Club of America. He was considered … "*the most expert operator in the practical reception of short wave signals*" said the General Manager of the ARRL. The intent was for Mr. Godley to augment but not supersede the British listening effort.

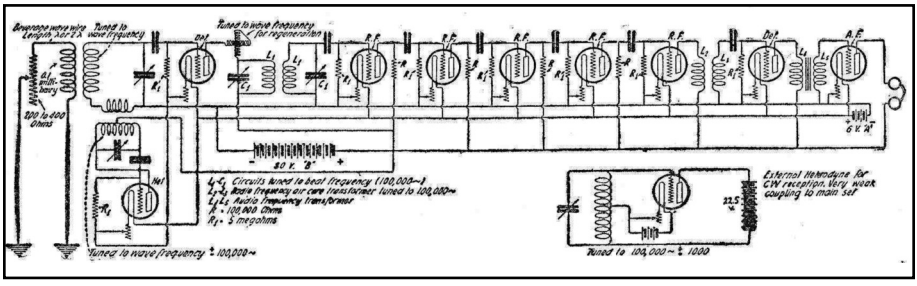
And so the intrepid went forward. Preliminary distance trials, held in November, qualified 27 station finalists. Each station was assigned a group of sealed secret code letters and specific and rotating transmission times. The operating window was set as the period of 9:30 p.m. to 1:00 a.m. EST on each of the ten consecutive days: December 7 to December 16. Non-qualifying stations were encouraged to transmit from 7:00 p.m. to 9:30 p.m. EST on each evening during time segments divided into rotating 15-minute segments by district. The remaining U.S. Amateurs were asked to remain silent.

Godley received a rousing send off in New York and the second day out received a radiogram from the ARRL… "*Bon Voyage. The entire radio world is pulling for you."*

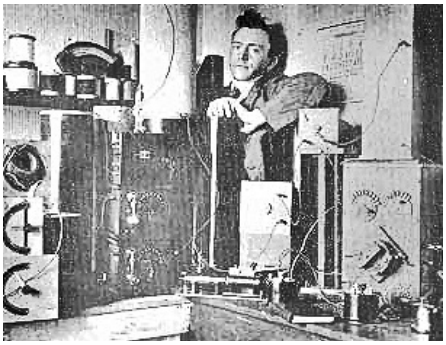
At Southampton he was greeted by personnel of the British Marconi group who assisted him in clearing his apparatus and sent him on his way to London. In London he was received enthusiastically by other Amateurs and notables. The staff of *Wireless World* magazine, organizers of the British side of the planned test, was particularly helpful. Godley attended meetings of the Royal Society of the Arts and the Wireless Society of London where he met Senatore Marconi, Dr. John Ambrose Fleming and other scientific and radio notables. The Wireless Society hosted an elaborate tea and a dinner in his honor. Godley reported after the tests had concluded that while in London he sensed a level of skepticism below the veneer of enthusiasm. This he attributed to the highly restrictive conditions that were imposed on that nation's Amateurs by the controlling British postal authorities. So restrictive were these rules pertaining to operating wave length, power, antenna length etc. that it was difficult for British Amateurs to imagine the successful accomplishment of the feat that was being undertaken.

From London Godley traveled to Glasgow where, with the assistance of the superintendent of Marconi International Marine Communication Company, he obtained materials such as a tent, wire, and insulators needed to establish a listening post at the farm where he intended to receive signals from the United States. The site was 30 miles from Glasgow, on the Ardrossan moor near the town of that name by the sea on the North Ayrshire coast of south-western Scotland.

The listener and Inspector D.E. Pearson, a local Marconi man acting as verifier, established themselves in the cold tent at midnight on December 7. The receiver, a battery powered Super-Heterodyne and regenerative receiver with five stages of



Godley's receiver.

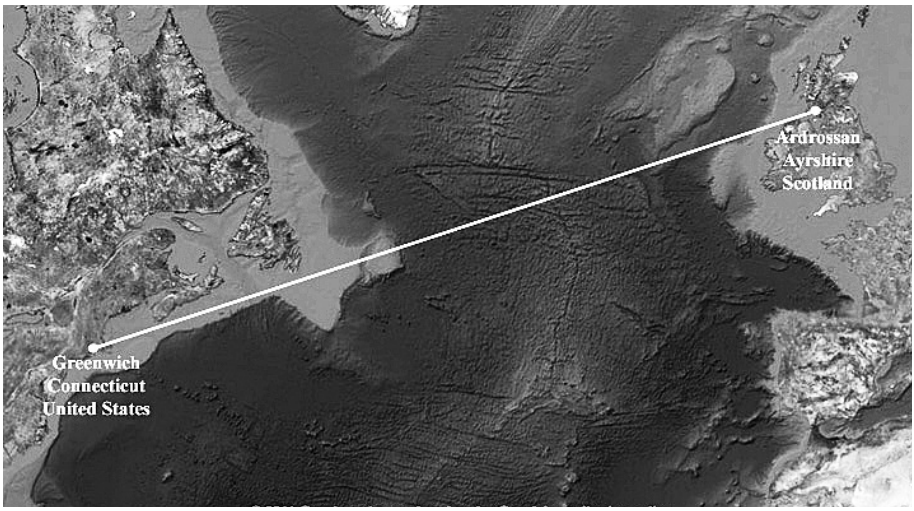


Paul F. Godley and various receivers.

January, 1922 QST *cover.*

amplification and a 1300-foot Beverage antenna suspended 12 feet above ground were set up and tuned.

At about 1:30 a.m. a 60-cycle synchronous spark signal from 1AAW was distinctly heard on 270 meters, but only briefly and not in test format. This, the first station to traverse the Atlantic albeit unofficially, was later determined to be a unlicensed pirate who the ARRL was unable to identify. The duo continued to listen on the subsequent mornings of December 8 and 9, to no avail. On the morning of the 10th, the CW signals of official entrant 1BCG were solidly heard on 230 to 235 meters. This, the specially designed and constructed station of the Radio Club of America at Greenwich, Connecticut was the only station heard that morning. During the nights and early mornings that followed until the end of the test eight spark and eighteen CW stations were heard. Eight English Amateurs heard eleven stations and five listeners logged 1BCG. A



Greenwich – Ardrossan map.

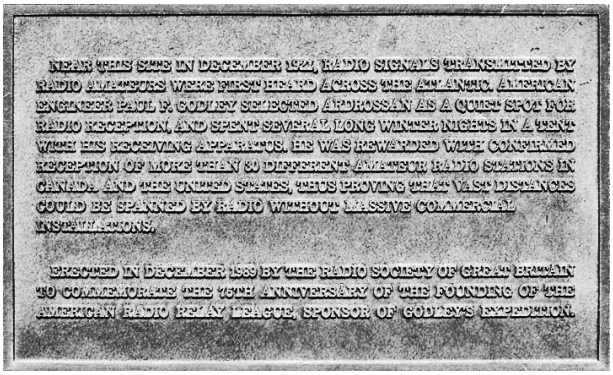
Dutch and a French Amateur each heard signals from the U.S., a distance of 4,000 miles. Surprisingly, many of the stations that qualified in the preliminary tests were not heard in Europe. Conspicuously, the CW mode won the day, adding the final blow to the demise of spark. The results were boastfully exclaimed on the cover of the January, 1922 issue of *QST* magazine.

Today, on this site in Scotland, a weathered bronze plaque is to be found.

The Third Trial – 1922

With barely a respite, planning began for the third test which was scheduled for the end of the year 1922. This test was to be conducted on a much broader scale than the previous two. The first objective was to give American stations the opportunity to be heard not only in the Britain Isles but also on the Continent. A second objective was to provide a generous period for the regulatorily disadvantaged westbound signal to be transmitted to the U.S. The intricate planning for this event was shared by the ARRL, the Radio Society of Great Britain, and an amalgamation of three French radio societies, the Comite Francais des Essais Transatlantiques.

A sophisticated and essential element in the program was the method for informing the world of interceptions. It was arranged that reports of successes would be forwarded to the transmitting nation by commercial long wave stations. English stations were to report to the U.S. by MUU Carnarvon, Wales on 14,200 meters and French stations were to report via UFT on 14,300 meters. These reports were



NEAR THIS SITE IN DECEMBER 1921, RADIO SIGNALS TRANSMITTED BY RADIO AMATEURS WERE FIRST HEARD ACROSS THE ATLANTIC. AMERICAN ENGINEER PAUL F. GODLEY SELECTED ARDROSSAN AS A QUIET SPOT FOR RADIO RECEPTION, AND SPENT SEVERAL LONG WINTER NIGHTS IN A TENT WITH HIS RECEIVING APPARATUS. HE WAS REWARDED WITH CONFIRMED RECEPTION OF MORE THAN 30 DIFFERENT AMATEUR RADIO STATIONS IN CANADA AND THE UNITED STATES, THUS PROVING THAT VAST DISTANCES COULD BE SPANNED BY RADIO WITHOUT MASSIVE COMMERCIAL INSTALLATIONS.

ERECTED IN DECEMBER 1989 BY THE RADIO SOCIETY OF GREAT BRITAIN TO COMMEMORATE THE 75TH ANNIVERSARY OF THE FOUNDING OF THE AMERICAN RADIO RELAY LEAGUE, SPONSOR OF GODLEY'S EXPEDITION.

Abbotsford Radio plaque.

repeated by the U.S. station WII in New Brunswick, New Jersey. For the reverse direction, U.S. reports were to be transmitted to Europe via WII.

The publicity of the partial success of the second trial aroused a great deal of interest on both sides of the ocean. Throughout the year 1922, popular radio enthusiast magazines featured equipment reviews, articles on every aspect of receivers and transmitters, and details and protocol for the tests. International enthusiasm was intense as the preliminary qualifying trials were held on both continents in October on 180 through 200 meters. The air waves literally pulsed with excitement as the official start was approached.

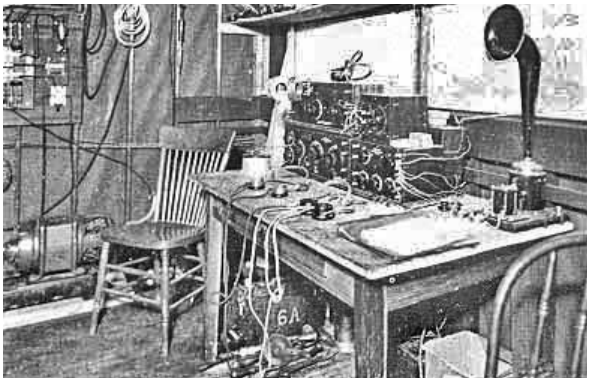
Radio history was going to be made and indeed it was! During the first ten-day session beginning December 12th, 316 American stations including three from the far western reaches of the continent were heard in Europe. Even more exciting was the news that during the second session 20 different U.S. Amateurs heard European Amateur signals. These emanated primarily from the French station 8AB and British station 5WS.

British station 5WS at Wandsworth, mounted by the Radio Society of Great Britain, was unique in that it was entirely modern and by special dispensation of the General Post Office was permitted to use up to a kilowatt of power.

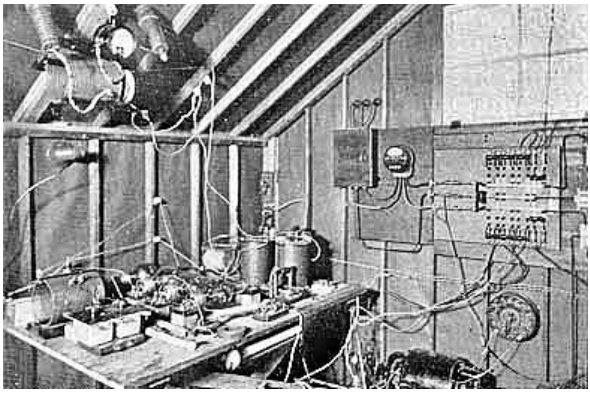
The First Two-way Contact – 1923

The exploits of French station 8AB in late 1923 overshadowed the upcoming fourth trial. The station 8AB was operated by Leon Deloy and was located in Nice. This amateur was determined to transmit his signals across the Atlantic. A late-1921 effort to contact Connecticut station 1KP on a prearranged schedule did not succeed. Undeterred, Deloy attended the second ARRL national convention in Chicago in mid-1923. There and in subsequent visits with prominent U.S. Amateurs he acquired knowledge of American Amateur methods and apparatus. He returned to France with American radio gear he had purchased and assembled a new station which was acclaimed as the most advanced on the Continent. By October of the year, he conducted successful tests of his new station with British 2OD and informed the ARRL by cable that he was prepared to make two-way contact with U.S. stations. On the night of November 27, 1923 radio history

(continued on page 35)



Receiver set up at 1BCG.



Transmitter arrangement at 1BCG.

to Crete, where his broadcasts to the troops began. In 1965 he was shipped to Saigon (now Ho Chi Minh City). At first he was news director for Armed Forces Radio but he took over the station host's show, Dawn Busters, when it became vacant.

Although he liked the movie, Cronauer realized that the Robin Williams film bore only a tenuous connection to his own career. The film deals in part with a Vietnamese man whose family had been killed by American forces, and can be read as antiwar film. Cronauer was not on the political left, and unlike Williams, whom he admired, was a lifelong Republican. He later became a lawyer with a degree from the University of Pennsylvania. His wife predeceased him and he is survived by two daughters and grandchildren.

Sources: New York Times, Wikipedia

FIRST CENTURY, *continued from page 32*

was again made when 8AB established strong contact with 1MO operated by ARRL staffers F.H. Schnell and K.B. Warner at Hartford, Connecticut and immediately afterward with 1XAM operated by transmitter designer John I. Reinartz from a Hartford suburb. The U.S. stations had special authority to make these contacts on 100 meters and all three stations used the CW transmitter circuits developed by Reinartz utilizing a Westinghouse 50-watt vacuum tube. The France-America connection was quickly followed by a British-American connection between G2KF and 1MO, and a British-Canadian contact between G2OD and C1BQ. Certainly very exciting times!

But, the excitement was not over yet! To those who were aware of these recent accomplishments the aura of expectation of what was to come was great.

The Fourth Trial – 1923

While these two-way contacts were being achieved, the planning for the last listening test was under way. Only westward transmissions were to be monitored from December 22, 1923 to January 10, 1924. U.S. stations were silent during the period. Thirty-seven official and five unofficial European stations were reported as heard by 100 U.S. stations on 108 to 118 meters. This was a remarkable improvement over the previous westward test when only two European stations, both of a special nature, had been heard.

Two-way contacts across the Atlantic became common and an increasing number of European countries began to participate. U.S. stations now turned their attentions eastward to spanning the Pacific to Australia and New Zealand.

The benefits of these tests were many. International camaraderie was strengthened; CW prevailed over spark; the effectiveness of the shorter wavelengths was proven; technological improvements were spurred; Amateurs received needed notoriety and last but not least, Amateur Radio history was made.

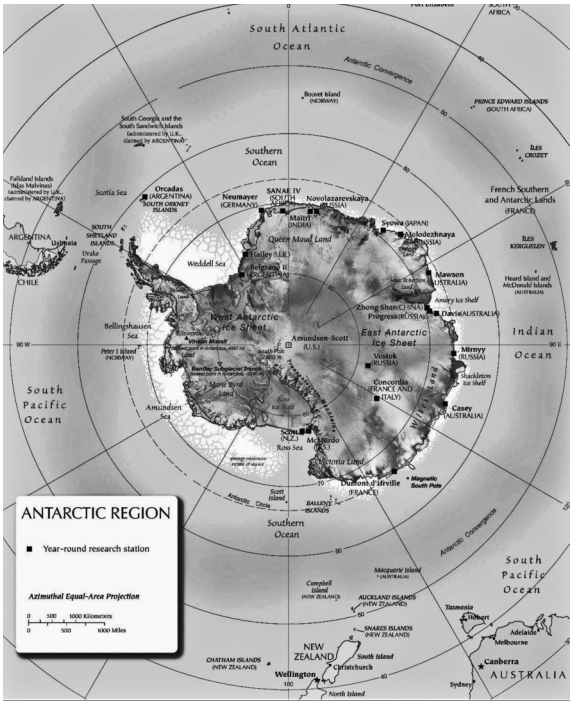
THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

The Expeditions

Today's DXpeditions provide ambitious radio Amateurs with "new" countries to add to their logs for awards. However, from the late 1920s through the 1930s, Amateur radio, still in its early days, provided an essential service to expeditions in unexplored areas of the world—*communications*. By that time most of the Earth's land mass had been explored, so these adventurers concentrated on the Arctic and Antarctic regions. They excited the world with continuous news of operations, distress, failure and success. Amateur radio operators not only provided live renditions of the progress of these expeditions but also essentially coordinated logistics, schedules and operations with their sponsors. These reliably transcribed experiences strengthened public confidence in Amateur radio, drove equipment technology, and challenged the skills and abilities of operators.

Excitement about the transatlantic tests of the early 1920s and opening of the world of DX was succeeded by the Amateur community's pride of participation in these intrepid explorations of polar territories and other unknown areas of the world. As participants and monitors, Amateurs became engrossed with these expeditions which relied so much on Amateur support for their success. The League's Communications Department actively followed these expeditions and regularly reported about them in their *QST* magazine column.



Antarctic polar map.

Although much information is available, it is not the author's intent to give a thorough narration of each expedition in this article. Accordingly, with the intent of presenting them for current recognition, and of encouraging further inquiry, we offer sketches of those polar expeditions which most involved radio Amateurs and impacted the contemporary Amateur world at that moment.

The Antarctic

The first explorer to utilize wireless was the Australian, Sir Douglas Mawson, whose 1911-1914 expedition to the Antarctic was intended solely to gather scientific information.

The main base on the continent, at Cape Denis on Commonwealth Bay, was able to establish and maintain contact with the base on Macquarie Island, 1200 miles away, which in turn was in contact with the outside world at Hobart, Tasmania, 850 miles away. All of this was accomplished on long wave lengths. It was through this link that the Mawson expedition heard that Roald Amundsen's Norwegian expedition was the first to reach the South Pole in December, 1911 and that the British Terra Nova expedition led by Robert F. Scott had reached the Pole one month later only to perish on the return trek. Primarily due to financial constraints, the vessels which accompanied these expeditions were not fitted with wireless and contemporary equipment was not practical for transport by sled.

Throughout the inter-war period many other expeditions were mounted by Australia, New Zealand, the United States, Norway, Germany and even Romania. They employed all manner of transport—ski/dog sled, motorized vehicles, fixed wing aircraft and dirigibles—to reach and cross the pole and to conduct their research. Some made it and others did not. But, the increasing use of wireless escalated as technology produced more practical equipment for use in ships, at the bases and in aircraft. Accordingly, the world became more aware of the efforts of these pioneers. Ultimately Richard Evelyn Byrd conducted expeditions in the periods 1928-1930 and 1933-1935 which established the base known to Amateurs as Little America. This base manifested enormous radio capabilities with increasingly modern radio equipment and antennas which signaled KC4USA worldwide.

Arctic polar map.

KC4USA Radio Little America QSL card.

The Arctic

The South Pole is located on a land mass, the Antarctic continent. The opposing North Pole was not as easily definable.

Explorers sought a continent or land mass which was thought to underlie the North Pole, an area of some million square miles. As their efforts determined, the top of the world was actually a sea of ice with peripheral land masses: Alaska, Canada, Greenland, Scandinavia and Russia. Explorers of different nationalities embarked from all compass directions to map the region, to conduct scientific investigations, and to determine navigable passages at the top of the world. They first approached by sea and later by air. Again, as their efforts increased so did their usage of wireless. From the early 1900s through the 1930s some forty recognized ex-

peditions were mounted by the bordering nations as well as the United States and others. These expeditions became increasing dependent on wireless for both safety and operations. Each expedition had experiences of interest, but two successive northward adventures stand out prominently for Amateurs. The first of these was the MacMillan Arctic Expedition of 1923, which for the first time provided Amateurs with an organized opportunity to participate on medium wave lengths; the second was the MacMillan, McDonald, Byrd Expedition of 1925 which utilized airplanes and shortwave radios for the first time.

In June of 1923 the seven men of the MacMillan Expedition sailed from Maine, carrying a modern radio station aboard the 88-foot schooner *Bowdin*, to a winter frozen in the ice near Etah, Greenland. This expedition spent some nine months of winter nights frozen in the dark reaches of the North about 540 miles northeast of the geographic pole. This was the furthest point north from which radio signals had ever been transmitted. Their mission was to observe the Aurora Borealis for the terrestrial magnetism laboratory of the Carnegie Institution, and to observe its effects and those of atmospheric disturbances upon radio transmissions for the Bureau of Standards Radio Laboratory.

Having experienced eight previous trips north, Dr. Donald B. MacMillan recognized how two-way wireless would enable the group to accomplish its mission as well as to inform the world, through the network of Amateur radio, of their progress. His two previous journeys had been equipped with conventional long wave transmitters which were unable to penetrate the screen of the Aurora Borealis. MacMillan turned to the League for assistance and it was enthusiastically provided. Hiram Percy Maxim and the Board agreed to furnish support, and to recruit and provide an expert radio operator. Donald H. Mix, 1TS of Bristol, Connecticut was chosen and his name is thereby inscribed in the history book of Amateur lore.

The radio equipment was specially designed for the application by League Board member M.B. West and constructed by Amateurs at his firm, Zenith. The transmitter emitted on 185, 220 and 300 meters, medium wave frequencies, with a total input power of 100 watts to two Western Electric "G" tubes. The station was assigned the call letters WNP "Wireless North Pole" which became famous as it began to be heard by an entirely new world of radio listeners. WNP was heard in late July off Labrador, was not copied for a while and then in late August worked 1ANA of Chatham, Massachusetts. These contacts led to a series of successful weekly transmissions of 500 word press releases and listings of stations worked and heard, which found their way to the League by relay and were subsequently published in *QST*.

The radios also relieved the crew's sense of isolation and provided a source of contact and entertainment from the outside world while ice-bound in the cold and dark.

MacMillan's subsequent attempt at the North Pole centered around wireless. The objectives supported by the Navy and the National Geographic Society were to determine the full capabilities of radio north of the Auroral belt, to explore the northern reaches by air, and to discover new land masses if they existed. In the summer of 1925 the *Bowdin,* captained by MacMillan led the *Peary,* a minesweeper enlisted as transport, captained by Zenith president Eugene F. McDonald, to a bay near Etah in Northern Greenland. Three amphibious aircraft were assembled on-site and directed by Richard E. Byrd. Severely limited by weather and mechanical problems, the aircraft only accomplished some seven missions within their limited range, and did not actually fly over the pole. The outstanding expedition accomplishment was in the sphere of radio. Utilizing short waves, the expedition was in consistent contact with the outside world throughout the journey, to the delight of Amateurs who were able to work them. This phenomenal success proved to the Navy that short waves were superior to the long and ultra long waves upon which the fleets had been relying.

NOTABLE RADIO EQUIPPED EXPEDITIONS 1920-1930

DATE	NAME	REGION	METHOD	CALL
1924-1925	C.G.S. *ARCTIC*	NEWFOUNDLAND	VESSEL	VDM
1925	NORWEGIAN ROSS SEA WHALING	ANTARCTIC	VESSEL	AQE
1925	MACMILLAN/BYRD	ARCTIC	VESSEL	WNP, WAP
1926	DETROIT ARCTIC	ARCTIC	AIR	7BU, 7UU
1926	BYRD ARCTIC	ARCTIC	VESSEL AIR	KEGH, KNN
1926-1936	AMERICAN MUSEUM GREENLAND	ARCTIC	VESSEL	VOQ
1926	SAVOY GEOGRAPHIC	SAHARA DESERT	VEHICLE ANK	
1926	ROOSEVELT MEMORIAL	BRAZIL	VESSEL	GMD, 2GYA
1926	FORBES-LEITH PERSIAN	MIDDLE EAST	LAND	FLP
1927	PUTNAM BAFFIN ISLAND	ARCTIC	VESSEL	VOQ
1927	MARSHALL FIELD	ALASKA	LAND	WMBE
1927	C.G.S.'S *STANLEY* & *LATCH*	ARCTIC	VESSEL	VDE
1928	AMERICAN BRAZILIAN	BRAZIL	RIVER	PUT
1928	BORDEN-FIELD MUSEUM	ARCTIC	VESSEL	KGEG
1928S	TOLL-MCCRAKEN	ARCTIC	VESSEL	VOQ
1929	ITALIAN ARCTIC	NOVA ZEMBLA ISLE	VESSEL	LDIV
1929	ALL AMERICAN LYRIC MALAYSIAN	BORNEO	LAND	PMZ
1929	OXFORD UNIVERSITY EXPLORATION	BRITISH GUIANA	RIVER	VP5OUX
1929	METRO-GOLDWYN MAYER- *TRADER HORN*	EAST AFRICA	LAND	W6OJ, FK5CR
1930	INTERNATIONAL PACIFIC HIGHWAY	MEXICO	VEHICLE	IPH
1930	WILKENS-ELLSWQRTH SUBMARINE	ANTARCTICA	VESSEL	WSEA
1930	SECOND ROMANIAN ARCTIC	GREENLAND	LAND	XORC
1931	HAARDT TRANS-ASIA	ASIA	VEHICLE	FPCF
1931	SIKORSKY PAN AMERICAN	BRAZIL	AIR	PY—
1932	LAMB EXPEDITION	TIBET	LAND	AC4UU
1933	RISER LARSEN EXPEDITION	ANTARCTICA	VESSEL	IMZ
1933	UNIVERSITY OF MICHIGAN	GREENLAND	LAND	NX1XL
1934	ROUND THE WORLD FLIGHT	WORLD	AIR	KHMZA
1935	DR. DANA COMAN SCIENTIFIC	SOUTH SEAS	VESSEL	WOFV
1935	HAMMOND RESEARCH	VENEZUELA	VESSEL	XW4PDA
1936	AMERICAN MUSEUM OF NATURAL HISTORY	NEW GUINEA	VESSEL-AIR	W2IVN
1936	ANDES-AMAZON	PERU-CHILE	LAND	HCAAE
1937	TERRY HOLDEN BRITISH GUIANA	BRITISH GUIANA	RIVER	VP3THE

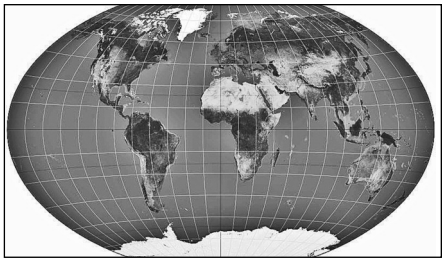
The Poles and the World

Radio-supported scientific exploration was not confined to the polar regions. Other searchers traversed remote areas of the planet. The preceding list notes significant scientific expeditions of the period as reported by the League's Communications Department in the pages of *QST* magazine and elsewhere. The intent is to reveal the broad scope and diversity of Amateur involvement.

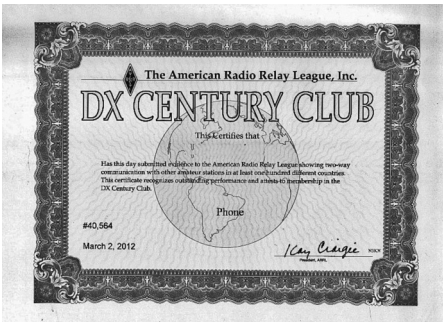
This era marks the progress of Amateur radio's capability from neighborhood message relays to vital worldwide support of some of mankind's more intrepid endeavors.

The September 1937 issue of *QST* announced a new DX award to be made to any operator who provided evidence of having contacted 100 countries: The DX Century Club award. The official countries list for the award had been published in the "I.A.R.U. News" section of the January, 1937 *QST*. This list, apparently based upon a contemporary atlas, tabulated some 246 existing countries in the world and indicated call letter prefix designations for only 180 countries—these alone were considered eligible entities for the award. Eligible contacts were to be made by the applicant:

- Operating from the same country.
- With *amateurs* with amateur calls issued by the country claimed.
- Within the amateur bands.
- With *land* stations only.
- At *any time* prior to and after the initiation of the award.



World globe view.



ARRL DX Century Club certificate.

Any of the expeditions were acceptable entities when on land, operating within the amateur bands, and using amateur calls. The licensees accepted were announced in *QST* with W8CAA, Frank Lucas heading the first listing in the November 1937 issue, with 112 countries confirmed just two months after the announcement, along with W1BUX 105, W1TW 104, W6CXW 101, and G6WY 100.

The DXCC award spurred interest in DX and in the phenomenon which has become known as the DXpedition—a trip to an exotic place planned by Amateurs for the primary purpose of operating in a rare country, and to help operators who need to contact that area in order to obtain an award. It is difficult to identify an expedition during the inter-war period that fully conforms with this definition, as the primary mission of all was exploratory or scientific in nature.

The *Shenandoah* over Los Angeles.

We should also consider, as expeditions, the voyages of the great radio assisted airships, the *Norge, Italia* and *Shenandoah,* which will be discussed in detail in a future column.

THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

Catastrophe

Not every expedition was successful!

The Arctic…May 25-June 6, 1928

At the 55th minute of every odd hour this signal was repeated from the ice floe:

...—...S O S ITALIA NOBILE 81DEG 14SEC LATITUDE N 28DEG 14SEC LONGITUDE E...—...

But at first no one heard, or were they really listening? The coordinates were changed periodically based on astronomical observations made by naval officers using salvaged instruments. The ice floe was drifting about the Arctic Ocean near the small islands off the north coast of North East Land in the Svalbard Archipelago, and carrying one dead and nine live survivors to an unknown destiny. Six other men had flown off forever, caught in the remnants of the ballooning airship *Italia* which had crashed briefly to the floe and then rebounded.

The cabin of the airship had been torn open by the crash and fortunately much of the survival equipment fell to the ice. This included a tent for shelter, enough food for about thirty days, two sleeping bags, other useful items and most importantly the principal multi-wave receiver and emergency portable short wave transmitter with sufficient batteries for operation. And, among the survivors was a resourceful radio operator - Petty Officer 2nd Class Giuseppe Biagi, 31, Italian Navy I.D. 86891, who would raise a simple antenna and diligently repair, maintain and operate the code wave equipment.

Biagi was born in Medicina to a farming family on February 2, 1897. Known as 'Bacicia' to his friends, he grew up in the aura of the new age of radio created by Guglielmo Marconi, who was from the neighboring city of Bologna. Likely influenced by the excitement of the new phenomena, Biagi enlisted in the Navy in time to be trained and assigned as a wireless telegrapher during the First World War. He is said to have been acquainted with amateur radio operator and engineer Adriano C. Ducati, I1ACD who advised him about signal propagation and other radio theory.

How did it come to pass that Giuseppe Biagi and his colloquies found themselves marooned on the Arctic ice pack after successfully crossing over the North Pole?

Rome-October, 1927

The fascist government of Benito Mussolini approved a plan for an Italian scientific expedition to the Arctic. This journey had been proposed by engineer and explorer Umberto Nobile. Nobile had designed, built and piloted the dirigible *Norge* which had traveled from Rome to Spitsbergen, Norway over the North Pole and on to

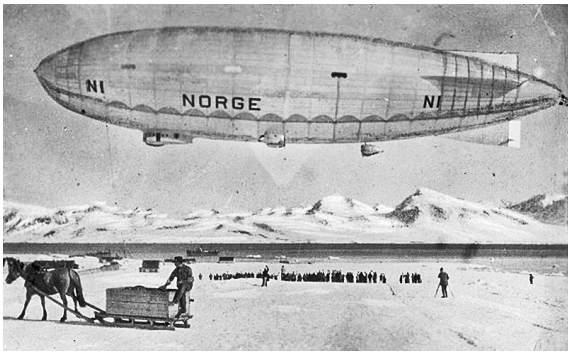


Fig. 1: Airship Norge *at Ny-Ålesund, Norway.*

Alaska in the spring of 1926. Known as the Amundsen-Ellsworth-Nobile Transpolar Flight, the expedition is credited with establishing that the Arctic region was a frozen sea and not a continent. This was first complete crossing of the Arctic sea by air, traversing 7,800 miles in 171 hours.

Nobile's objective was to mount an Italian scientific expedition to overfly the heretofore unexplored territory within the Arctic Circle along the coasts of Greenland, Siberia and Canada and to cross the pole again. The Italian government was anxious to demonstrate Italy's aeronautical supremacy and ability in scientific endeavors to the world.

The airship was to be sister to the *Norge*—a 385 foot semi-rigid dirigible of Nobile's unique design which had proven remarkably capable of sustaining the forces of turbulent weather. It was considered so reliable that models of the craft had been purchased by the navies of the United States and Japan. The ship was powered by three 225 horsepower engines providing a cruising speed of 75 miles per hour in still air.

Fig. 2: Umberto Nobile and his dog Titina.

The Italian Navy contributed their support to the mission with a ship, the *Citta Di Milano,* to be the expedition's support base at Spitsbergen along with a choice of operating crewmen. Nobile selected four officers and eight enlisted men including the radio operator Biagi. The complement included three scientists and two journalists for a total of eighteen adventurers, including Nobile.

May 23, 1928

At 4:28 a.m. on this day the ill-fated airship *Italia* slipped her mooring at King's Bay, Spitsbergen on her fourth and final voyage, never to return. She had flown from Milan to King's Bay and then had conducted two exploration flights in the Arctic regions at the top of the world. This was to be her next to last exploratory journey. It was planned to reach the Pole by crossing northern Greenland and then heading directly north. This was accomplished as the airship crossed the Pole at twenty minutes after midnight on May 24th. The ship then headed into a 30-mile per hour moisture-laden wind to a course that would bring it directly home to its base. Cruising at an altitude of 900 feet, the ship was traveling at a ground speed of approximately 30 miles per hour when it inexplicably began to rapidly lose altitude. It is likely that an accumulation of ice weighed the ship down. Despite every effort, the airship crashed onto the ice pack, severed the con-

Fig. 3: Italia *at Stolp, Germany enroute to King's Bay, Norway.*

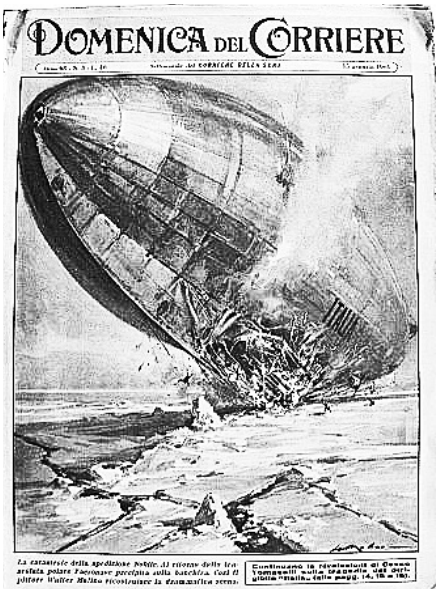


Fig. 4: Artist's depiction of crash of Italia.

trol cabin, then the envelope rebounded into the air carrying six crewmen to an unknown destiny. The survivors were left on an ice floe some 184 miles northeast of their base—just a few more hours flying time away.

Scavenging the hummocky surface of the floe, the survivors recovered many items useful for survival, not the least of which was the main multi-wave receiver from the radio cabin and the emergency short wave transmitter from amongst the equipment intended for a landing party. The shortwave receiver, a model MK IV produced by the British Company Burndept, contained circuitry with three vacuum tubes and could receive on wavelengths of 12 to 100 meters using interchangeable coils. Housed in a wooden cabinet, it had served as a seat in the radio cabin. It is amazing that the device survived the crash and remained operational.

The Ondina 33 S transmitter had been specifically designed and built by Italian radio Amateurs to function if a party were to be embarked

Fig. 5: Biagi and Italia *radio gear.*

on the ice. It was housed in a small wooden box. The single TB04/10 triode vacuum tube in a Hartley oscillator circuit provided only five watts of radio frequency output power to the antenna in the short wave range of 30 to 55 meters—sufficient for close-in communication but marginal for distance. A packet of batteries was also found, sufficient for sixty hours of operation.

Biagi set up the receiver in the tent as soon as it was erected and ran a long wire on the ice for an antenna and a ground lead to water. He was delighted to hear static in his earphones as the receiver came to life. Three hours after the disaster he could hear the support ship frantically calling to the prearranged emergency schedule.

Biagi decided that the best transmitting frequency to reach the base ship and further would be 9 megacycles or roughly 30 meters, the highest tunable frequency of the transmitter. This was a wise choice, as short

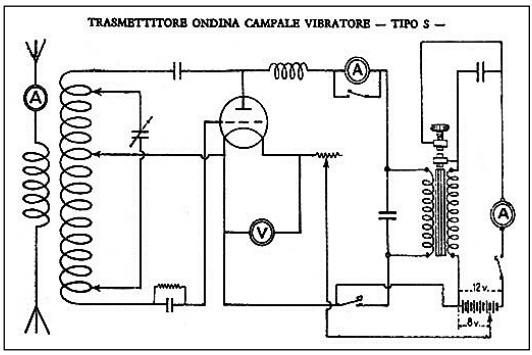


Fig. 6: Ondina 33 S transmitter schematic diagram, showing vibrator power supply.

waves provided the highest probability of being heard, and reflects Biagi's knowledge of propagation. Consistently, he constructed a roughly quarter-wave antenna of scrap metal tubing, and, again relying on his expertise mounted it vertically with a wire strung across the ice as a counterpoise. This again proved to be an optimal decision. The transmitter was another matter, as it would not key up.

Within the tent, with two collogues hovering over him and no lack of advice, Biagi was able to repair the transmitter. Due to the time required to erect the antenna and repair the transmitter, Biagi was not able to transmit until the third day. In the interim he was able to copy transmissions with the receiver, both from the support ship and, significantly, from shortwave station IDO, Marina di Roma Sao Paulo at Rome on 32 meters, which broadcast news of the disaster and the rescue efforts.

When the first transmissions were made on the third day, Biagi's routine was to make his transmission out on the ice and then scurry back to the receiver in the tent to listen for any response. Despite the arduous conditions and the despair of his fellow survivors Biagi persisted. The message was sent in three languages, and modified to include information regarding their personal conditions and importantly suggesting replies via IDO on 32 meters. He reverted to repeating the messages for an hour at a time. Listening to IDO on the evening of June 6, Biagi translated the coded news that their signal had been copied on June 3 by Nicolaj Schmidt, an Amateur short wave listener in Vokhma, in the Archangel region of Russia. Schmidt was using a home made one tube receiver. In turn the Soviet Government had informed the Italian Government and rescue preparations were underway. Communications improved and Biagi began to consistently communicate with the *Citta Di Milano*. So began the process of search, discovery and final rescue by the Russian icebreaker *Krassin* on July 12th. Finally, thanks to the radio and an Amateur radio, the entire world knew that the castaways were alive.

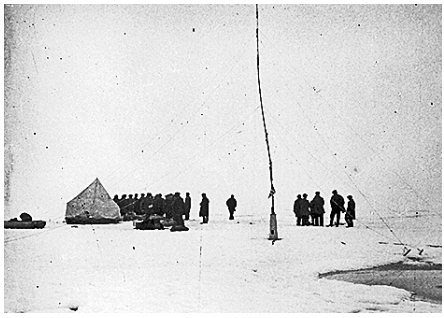


Fig. 7: Italia *surviving crew, tent and antenna on ice floe.*

Prior to the establishment of radio contact, three of the frustrated survivors resolved to walk across the irregular ice fields to the islands, which appeared to be approachable. Biagi was given the opportunity to join the party but elected to remain with the injured and ensure their rescue. The trekkers found travel to be extremely difficult due to ice obstructions, hummocks, and open water spaces. One died enroute from exhaustion and starvation, and the remaining two were found by the *Krassin* sitting on a ice mass virtually unable to move any farther. Biagi's decision to remain at the tent ultimately resulted in the rescue of not only those who stayed behind but also of the survivors of the trek. The envelope of the *Italia* and the crewmen who disappeared with it have never been found, despite multiple search efforts conducted as recently as August, 2018.

Thus ended one of the great sagas of polar exploration.

Finale

Biagi's tenacity, skill and courage were contemporaneously acclaimed by his colleagues, General Umberto Nobile, Benito Mussolini, Guglielmo Marconi, Pope Pius XI and a world excited by the entire adventure. Italian radio enthusiasts, represented by Associazione Radioamatori Italiani, ARI, the Italian association of amateur radio operators, honored his accomplishments by awarding him a gold medal in 1928.

Giuseppe Biagi continued to serve in the Italian Navy. During the Second World

(continued on page 32)

would be in keeping with the disdain he reserved for himself, referring to his show as "Ingram mess" or "Ingram travesty."

Ingram's musical roots go back to his family. He was born in 1934 in Oceanside, New York, a small town on Long Island. His father played sax and flute in big bands and his mother was a cellist who played in a chamber music group. Their son Dan loved radio from an early age and attended live studio broadcasts in Manhattan. At age 13 he entered a DJ contest on a radio show and lost. In an interview he gave in 2002 he mentioned that the winner became a carpenter. Before graduating, he quit Hofstra College, where he had worked on their station WHCH, in order to pursue a career in radio. Not only did he work in New York but went as far afield as Connecticut, Dallas and St. Louis.

In 1961 Ingram got a major gig in New York hosting a rock 'n' roll show on WABC-AM as it battled WMCA-AM for market share of rock enthusiasts. WABC had a stable of rock heavies, including Bruce Morrow, a/k/a Cousin Brucie. That assignment lasted until 1982 when the station became talk radio. For a while he had some brief radio jobs and voice-overs in commercials. Ingram's career was rejuvenated in 1991 when he joined WCBS-FM, a strong station featuring classic rock. Just before he retired in 2002 he told the New York Times "I'm lucky as hell that there's a place in New York where I can peddle my wares... Elderly disc jockeys aren't exactly in great demand around the country."

Ingram's life was not without tragedy. His first wife Kathleen was killed in a car accident. In 2014 he was diagnosed with Parkinson's disease and died in 2018, apparently after choking on a piece of steak. His surviving son Christopher wrote "Hey Kemosabe," a work of fiction based on his father. Ingram is survived by 4 other sons, and 26 grandchildren.

Sources: New York Times and Japan Times (in translation). Wikipedia, Chicago Tribune, Cleveland Plain Dealer.

Thanks to Keith Kunde, K8KK, for telling me about Christine McGuire.

FIRST CENTURY, *continued from page 28*

War he commanded the radio station at Mogadishu, Somalia, was captured by the British and interned in a prisoner of war camp in India. He reportedly built a receiver while imprisoned. Little is known about his life after the war. He became involved in the operation of a Shell gasoline station on the outskirts of Rome. Obscurity enveloped him and apparently he did not engage in any further radio activities. He died in 1965 at age 68. His death was widely reported in Italian newspapers and the saga of the *Italia* was resurrected.

The survivors had attempted to dye the tent red to make their location more visible from the air, using a red liquid dye salvaged from the wreckage. The job did not come out well—the tent now had red streaks and blotches. However, *THE RED TENT* became the popular identification for the event. It became the title for articles, and a movie.

The ARI published a number of articles chronicling the saga particularly honoring Biagi. In 2002 publisher Union Card Editions released the book *Giuseppe Biagi, Eroe Dimenticato* (*Giuseppe Biagi, Forgotten Hero)* by Rosa Irene Colizzi, whose title speaks to the biography. Paramount Studios released a film titled *The Red Tent* in 2005 which is mainly concerned with the politics of the expedition but does portray Biagi well. On a number of occasions since, museums in Milan and elsewhere in Italy have mounted exhibitions portraying the event utilizing the actual radios and paraphernalia of the ice-bound party.

Giuseppe Biagi is not likely to be forgotten in Italy, particularly within the radio fraternity. He surely deserves a place in Amateur Radio history and a marker amongst the heroic operators in the Radio Hall of Fame.

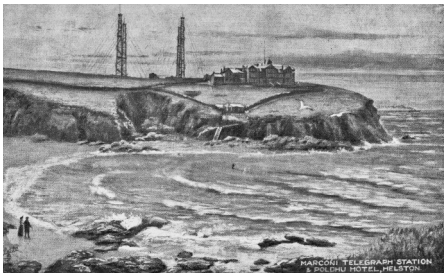
THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

Marconi In the Short Wave Era

Guglielmo Marconi achieved many "firsts" during his career as physicist and world esteemed inventor extraordinaire. The conduct of the *first* two-way wireless message exchange between the United States and Europe was accomplished from the major Marconi station, CC, erected at South Wellfleet, Massachusetts. This particular achievement in early 1903 received great notoriety. But, contrary to popular belief, this station at Cape Cod was not the very *first* Marconi wireless installation in the United States. And, this was not the *first* and only impressive demonstration of the character of electromagnetic waves, which substantiated Marconi's theory that they were not affected by the curvature of the earth. As early as 1898, seeking to establish credibility of his theories, Marconi conducted several successful transmissions over the horizon, including one to a station near Paris from an English station at Dover—the *first* international wireless exchange. The investors in the Marconi enterprise were believers, but also were eager to see returns on their investments. To generate revenues from message traffic and inbound vessel sightings, the Marconi group established the *Lizard Wireless Telegraphy Station*, with the call sign LD, on the cliffs above Housel Bay, in Cornwall. LD, along with seven other similar stations on the British coast, enabled ships at sea to communicate with each other and with the shore for the *first* time, utilizing leased Marconi equipment and operators. This now commercial endeavor was expanded through the establishment of a larger scale principal station, call sign ZZ, at Poldhu, Cornwall in 1901 some ten miles from LD.

Simultaneously, applying the same concept of ship to shore spark gap transmission, in August 1901 the Marconi interests began operating a station on Nantucket Island, off the coast of Massachusetts. This station, using the call sign MSC, communicated with the Nantucket Shoals lightship 50 miles southeast and with vessels sailing the Atlantic route. MSC was constructed by the *New York Herald* newspaper and was equipped and staffed under contract with Marconi. Essentially, this was not a Marconi-owned station. Shortly thereafter, in 1902, The Marconi Wireless Telegraph Company of America began operating a wholly-owned station at Babylon, Long Island, New York, which exchanged traffic with vessels at sea. However, again this was not the *first* Marconi establishment in the United States—actually it was the second.



Artist's depiction of Marconi's early Poldhu Station.

Although his short range demonstration transmissions in Europe had begun to dispel skepticism, Marconi's "space telegraph" was still considered a novelty in the United States, and was not well recognized. In the late summer of 1899, Marconi set up a temporary receiving station at a lighthouse on the New Jersey shore and equipped the yacht *PONCE* with a com-

Site of the 1899 America's Cup competition.

plete station from which to report the conduct of the America's Cup yacht race. The competition was held in lower New York harbor off Sandy Hook.

Marconi's reporting of the September race between the yachts *Columbia* and *Shamrock* created a sensation. With yachtsman-like precision, Marconi keyed over 1,200 messages describing the event moment-by-moment. A waiting audience of newspapers across the United States and Canada were linked to the lighthouse stations by telegraph. Wireless had come to America for the *first* time and received exceptional positive publicity!

Marconi continued working in the United States. Over the next eighteen years he and his colleagues established phenomenal transoceanic stations on both coasts and in Hawaii. These stations maintained regular communications with Europe and Japan, and were links in the wireless chain which was envisioned to gird the globe. However, the First World War intervened and forever changed the nature of the presence of the Marconi Wireless Telegraph of America, in America.

RCA logo.

Nationalism prevailed in the United States. In the interest of enforcing American neutrality during the growing European conflict, President Woodrow Wilson issued a 1914 executive order imposing strict controls on radio stations, which American Marconi unsuccessfully challenged in court. After the United States entered the war in 1917, the government ordered most civilian radio stations to cease operating. The United States Navy assumed control of most radio operations during the war, and appropriated most of the Marconi interests. Following the conclusion of the war, the government, led by the Navy, pressured Marconi to transfer its American interests to a domestic owner. In 1919 the American Marconi interests were purchased by General Electric and absorbed into its newly formed and patriotically named subsidiary, Radio Corporation of America (RCA). Essentially, RCA was created by the amalgamation of the General

Cancelled American Marconi stock certificate.

Electric Company and the Marconi Wireless Telegraph Company of America. The transaction was effected by an intricate exchange of preferred stocks, and cross-licensing agreements. All nine of the Marconi radio installations in the United States—Massachusetts, New Jersey, California and Hawaii—were transitioned to RCA.

A key precipitator of the structure of this transaction was the fact that General Electric was the exclusive manufacturer of the Alexanderson alternator, an advanced high-technology, very low frequency (VLF), continuous wave transmitter. The much sought-after machine was then considered the ultimate in wireless transmission, for a time superseding the less efficient long wave spark gap

transmitters. With the sanction of the Navy, a 50 kilowatt version of the Alexanderson apparatus was installed at the Marconi New Brunswick, New Jersey station in 1918. This resulted in excellent transoceanic service. The Marconi interests were anxious to obtain a license to purchase additional Alexanderson units. However, the Navy, citing national security considerations, resolved that alternators built in the United States could be used solely by domestic wireless entities. Accordingly, they promoted the amalgamation which produced the "all American" affiliation, RCA. Ultimately, RCA installed over twelve of these enormous and complex units.

Shortly afterward, the Radio Corporation purchased the International Radio Telegraph Company, owned by The Westinghouse Electric & Manufacturing Company, which in turn had licensing agreements with the Western Electric Company. Consequently, after negotiating a series of cross-licensing agreements, corporate rivals General Electric and Westinghouse became corporate partners in RCA. The Radio Corporation was now not only the sole radio telegraph entity in the United States but a significant factor worldwide. In November of 1921, RCA added a stupendous link to its worldwide wireless network, the Long Island, New York *Radio Central* station—the largest private radio facility ever built. *Radio Central*'s objective was to establish a worldwide communications network independent of the British Marconi *Imperial Wireless System.*

The enormity of the *Radio Central* project defied imagination at the time of its conception in 1920, as it does today, even when compared to mysterious modern military complexes and experiments. The facility was designed to utilize ten Alexanderson alternators. Huge "multiple tuned" antennas were required to radiate the VLF transmissions generated by these alternators. Accordingly, a ten square mile tract of land was purchased on the north shore of Long Island, near the island's eastern tip.

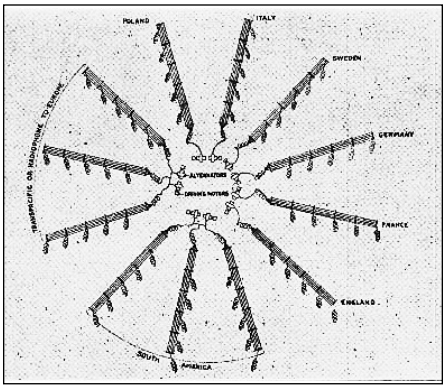
Five complete transmitter arrangements were planned to be in simultaneous duplex

Early RCA stock certificate.

communication with stations in Europe and South America. The antennas were to be supported by twelve 450-feet-high towers with 150-foot cross bars situated in a star pattern with the headquarters building and power station at the center. Each of the twelve arms of the system was to consist of six towers, 1,260 feet apart, extending on a radius of two and one-half miles.

The remote receiving station was located sixteen miles to the south at Riverhead, New York. Four receivers were placed in service. The principal receiving antenna, called a "wave" type, ran for an amazing nine miles, supported 30 feet off the ground by telephone poles to conform to the 14,000-16,000 meter transmissions it was intended to receive from the stations at Wales, Norway, Sweden, Germany and France.

Just as quickly as it was progressing from concept to full reality, aspects of *Radio Central* were overtaken by the rapid advance of technology. No sooner had two Alexanderson alternators been placed into service and two of the eight spokes of the antenna system completed than the entire design was rendered obsolete. The alternator concept was superseded by the advent of vacuum tube technology and the use of short wavelengths for communications, as advanced by British Marconi. The demise of the alternator was marked with its final use at low power to drive valve transmitters. Vacuum tube transmitters, amplifiers and receivers became increasingly more sophisticated and quickly became dominant as the apparatus of the period. Until it was gradually abandoned in the 1970s, *Radio*

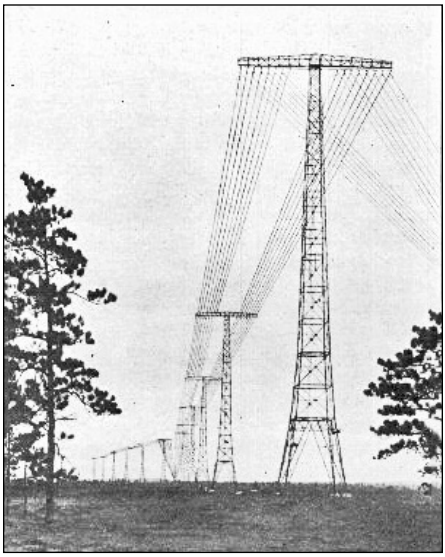


Schematic diagram of the planned Radio Central antenna system.

Central, WQK/WSS was the world's foremost shortwave station, renowned as it could be heard from any place on earth at any time of day.

The gigantic facility gradually diminished in size and was finally closed when communications technology progressed to the use of satellites, digital modes and fiber optic undersea cables. During its lifetime the scientists and engineers of *Radio Central* were at the forefront of communications technology entering the shortwave era and beyond. Many technological advancements can be attributed to their research and application including: the Beverage antenna concepts, high power vacuum tubes, single side band, frequency shift keying, radiophoto and facsimile, VHF and UHF television transmission, and the comprehension of the effects of sun spots on wave propagation.

There is much chronology and performance history to debate here. Which entities, and there were others, developed innovations perfected by whom. Marconi scientists, led by Marconi himself, achieved enormous leaps in basic technology. The Marconi interests, with many titles in individual countries, led the way through the most romantic period of radio—the short wave era of 1920 to roughly the end of WWII. During this period the Marconi Wireless Telegraph Companies continually upgraded a world-spanning global network



Two of the immense antennae at Radio Central.

which became to be known as the *Imperial Wireless System*. The Marconi institution was dedicated to scientific research and engineering excellence. Their application of advanced physics to engineering, and their leader's personal inventive genius and tireless quest for knowledge and advancement of the wireless realm, moved radio technology forward at a stunning pace. Beam tuning (selective) receivers and transmitters, the triode valve, the use of high frequency low wavelength transmissions, effective directional antennas, tropospheric scatter

Classic Marconi valves.

transmission, microwave communication, radar and other innovative technological leaps maintained the Marconi interests as world communications leaders.

Although there were divergences, the short wave era saw the world's giant communications companies grow enormously. But, like everything to do with radio, new discoveries and demands drew them into allied fields. These departures became their primary endeavors as the short wave era faded. Broadcast radio, television, defense and avionic electronics, and manufacturing are what these companies are known for today. Looking back we can envision the excitement of the time of their early development – the short wave era and the glow of the valves which were its hallmark.

SILENT KEYS

We record the passing of the following AWA member with deep regret.

LLOYD L. JURY

Longtime AWA member Lloyd L. Jury passed away on August 15, 2020 of natural causes at the age of 94. He was born in Canton, Ohio on May 7, 1926. He served in the Army Air Corps as a B17 ball turret gunner during WWII.

Following WWII, Lloyd was employed as a radio and television repairman at Eshelman Supply Co. and later as an electronic technician at Electronic Test Equipment Manufacturing Co. He was a member of the Antique Wireless Association for more than 50 years, and belonged to the Radio Club of America, the Tube Collectors Association and the Lancaster County Historical Society. Lloyd enjoyed making displays and won several AWA contest awards. At one time Lloyd had a remarkable collection of broadcast and early wireless equipment, early tubes and a reference library. He was a regular participant in the AWA annual convention. Over the years, Lloyd mentored several young collectors and introduced them to the AWA.

Lloyd was preceded in death by Ellen, his beloved wife of 57 years, his parents, a brother and a grandson. He is survived by his twin brother, Floyd, four daughters, a son, seven grandchildren and three great-grandchildren. He will be deeply missed.

This issue's submission was prepared by AWA Member Robert Millard. Please submit all information about members who have become Silent Keys to David D. Kaiser, Editor, 375 Yarmouth Road, Rochester, NY 14610, e-mail: awajournaleditor@antiquewireless.org. Silent Key notifications must confirm the person's death by one of the following means: a letter from a family member, a copy of a newspaper obituary notice, a copy of a death certificate, a letter from the family lawyer or the executor or mail returned by the U.S. Postal Service marked "Deceased."

THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

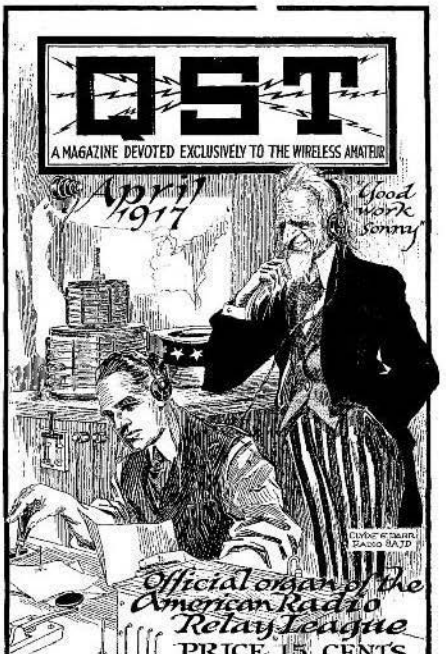
Early Wireless — Magazines, Clubs and War

As the calendar advanced into the twentieth century, the Marconi Wireless Telegraph & Signal Company continued to astonish the world with its wireless accomplishments. Radiotelegraph signals were traversing rapidly increasing distances, linking ships, countries, and imminently would link continents. The future of wireless was infinite. The early twentieth century's superstar was Guglielmo Marconi, an inventor who would share the 1909 Nobel Prize in Physics and twenty years later be titled First Marquis of Marconi by his native Italy.

With Europe behind him, Marconi came to New York to further demonstrate and publicize the practicality of wireless to the United States. His wireless reporting of the 1901 America's Cup race off Sandy Hook in New York Harbor created a sensation. The yacht *Ponce* was fitted out with an appropriate antenna as the transmitting station. From this vessel, Marconi, with yachtsman-like precision, personally keyed in 1200 messages to a receiving station at the newspaper syndicate tower ashore—from where the news was telegraphed nationwide. He described the sailing duel between the *Columbia* and *Shamrock*, moment by moment, and intensified the wave of interest in wireless.

Generally men, and mostly young men, were caught up in the wireless whirlwind. The promise of participation in a new world was irresistible. Fascinated, enthusiasts joined the fraternity of locals who were limited by radio range. They were bound by their interest and became further bound by a

Guglielmo Marconi.



Early QST *cover.*

proliferation of specific-interest electronics and wireless magazines. Electricity, electronics, construction – these publications covered a full gamut of subjects appealing to every level of knowledge and proficiency.

Radio clubs were the rage, and enthusiast magazines abounded. These magazines varied greatly in content and style; however, they enthusiastically supported the hobby and encouraged banding into clubs. Many publications appeared and then disappeared during this period. The two most prominent journals founded related clubs buttressed with distinguished "radiomen" who had appeared in their pages. These enlistments were underway even as Hiram Percy Maxim and Clarence Tuska were recruiting devotees and traffic men for the American Radio Relay League (ARRL) traffic system. And, they published *QST*, the League's journal, a gallant effort directed toward on-air operating – the core interest of ARRL members. The first issue appeared in December, 1915. From an initial few pages *QST* grew, solidifying a fraternity consisting of special interest traffic men, DXers, and devotees.

The British Magazine

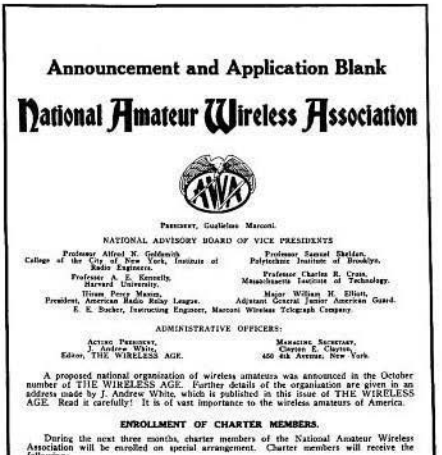
The Marconi Telegraph and Signal Company of the United Kingdom developed at a rapid pace and fashioned a voice. In April, 1911 the Marconi Company of London published the first issue of a journal, *The Marconigraph*. This monthly magazine was a sophisticated publication devoted to wireless communication. It initially resembled an in-house organ, directed to Marconi employee engineers and operators worldwide. Its audience grew beyond the Marconi Company and its content diversified. Among its technical articles, *The Marconigraph* reported company activities and expansions, descriptions of stations, and individual articles of wireless interest. Recognizing the appeal of its content, this journal reached out to a wider audience. In April, 1913, after two years and 24 issues, *The Marconigraph* was superseded by *The Wireless World*, an illustrated monthly magazine for all interested in wireless telegraphy and telephony. This chronicle was available from news dealers in Britain and by mail subscription elsewhere.

Publication of *Wireless World* continued without interruption throughout World War I,

Early Issue Marconigraphs.

featuring exceptional content concerning wireless at war. After the war, the magazine began to publish fortnightly. Then, in April, 1922, the publication merged with the few-month-old *Radio Review* and became known as The *Wireless World and Radio Review Journal*. With the initial merged issue, publication frequency of *Wireless World* became weekly. (Beyond the scope of this writing—the publication's title was changed in September, 1984 to *Electronics and Wireless World* and from January, 1996 to *Electronics World*. A sister publication was *Wireless Engineer* which was more of a technical journal than a popular magazine, featuring high quality, scientific articles.)

"JOIN A CLUB!" exhorted the magazine. This advice applied to both British and U.S. Amateurs, as all were struggling with their respective governmental regulators for distinction and recognition. In October of 1915, *Wireless Age*, a Marconi publication introduced in October, 1913, announced the establishment of a club for American readers—The National Amateur Wireless Association—with distinguished founders including Hiram Percy Maxim, who had initiated the specifically-purposed American Radio Relay League the year before in 1914.



Announcement and Application Blank

National Amateur Wireless Association

President, Guglielmo Marconi.

NATIONAL ADVISORY BOARD OF VICE PRESIDENTS

Professor Alfred N. Goldsmith, College of the City of New York, Institute of Radio Engineers.
Professor Samuel Sheldon, Polytechnic Institute of Brooklyn.
Professor A. E. Kennelly, Harvard University.
Professor Charles R. Cross, Massachusetts Institute of Technology.
Hiram Percy Maxim, President, American Radio Relay League.
Major William H. Elliott, Adjutant General Junior American Guard.
E. E. Bucher, Instructing Engineer, Marconi Wireless Telegraph Company.

ADMINISTRATIVE OFFICERS:

Acting President, J. Andrew White, Editor, THE WIRELESS AGE.
Managing Secretary, Clayton E. Clayton, 450 4th Avenue, New York.

A proposed national organization of wireless amateurs was announced in the October number of THE WIRELESS AGE. Further details of the organization are given in an address made by J. Andrew White, which is published in this issue of THE WIRELESS AGE. Read it carefully! It is of vast importance to the wireless amateurs of America.

ENROLLMENT OF CHARTER MEMBERS.

During the next three months, charter members of the National Amateur Wireless Association will be enrolled on special arrangement. Charter members will receive the following:

CHARTER MEMBERS' EQUIPMENT.

1st. **CERTIFICATE OF MEMBERSHIP.**
The handsomely steel engraved Certificate, with shadow background half-tone, is sealed and signed by Officers, with the endorsements of Senatore Marconi, as President. Every member will want to frame and place it alongside of his Government License certificate, two documents establishing status as wireless amateurs.

2nd. **AERIAL PENNANT.**
The 36 inch aerial pennant, painted in four colors on scarlet felt, will stand long service at your aerial mast head. Every member will be proud of the National Insignia flying from his aerial.

3rd. **MEMBERSHIP PIN.**
The National Amateur Wireless Association Pin in gold and enamel is the National emblem of the Association. The design shown on this page can but faintly describe its handsome appearance in three colors and gold. The pin has a special concealed lock and shank which permits it being securely fastened on the coat lapel or on the vest without turning upside down.

The details of NAWA membership.

Britain's Radio Society

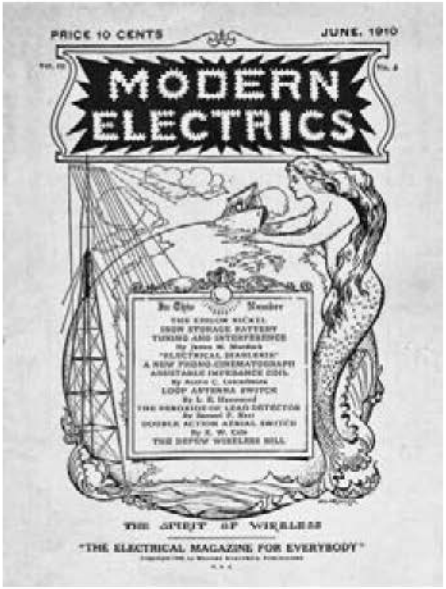
The Radio Society of Great Britain evolved from the London Wireless Club, which was founded in 1913. It continued as the Wireless Society of London until 1922 when the current name and insignia were adopted, reflecting that the organization had broadened its scope to include the entire nation.

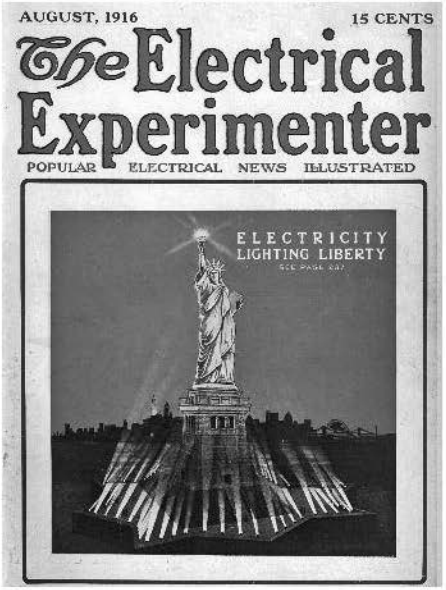
The ARRL was founded a year later, in 1914, recruiting operators to maintain, in the public service, an extensive message relay network. This relay, The National Traffic System, distinguished the League from the Society while other activities and interests were conducted somewhat similarly—club support, technical edification, and a professional journal. Significantly, both were challenged to advocate, in their respective nations, for the existence and formal recognition of Amateurs within the wireless universe.

Radio Society of Great Britain logo.

An American Magazine Sponsors a Club

In 1908 Hugo Gernsback began publishing *Modern Electrics* in New York. This publication initially appeared to be more of a catalog than a periodical. Content was directed to the Amateur and electronics enthusiast. It was succeeded in May of 1913 by a newly created journal—*The Electrical Experimenter*—with a broadened format that included technical articles of interest to operators, constructors, experimenters, and followers of the science of radio with some interspersed technically-oriented science fiction articles. Five articles by Nikola Tesla appeared in the latter part of the decade. Gernsback was apparently the first publisher

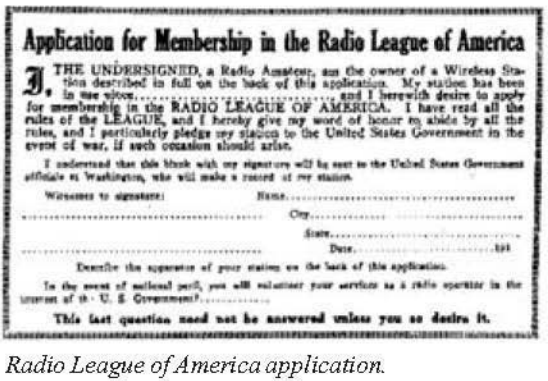




Gernsback publications.

to propose a magazine-sponsored club, The Wireless Association of America, proclaiming "The Wireless Association of America has been founded with the sole object of furthering the interests of wireless telegraphy and aerophony in America." The January, 1909 *Electrical Experimenter* contained the following announcement noted below.

The WAA was a formidable defender of Amateurs during the confusing period prior to and during, the organization of governmental regulatory bodies. The Association gradually faded as rules solidified and other matters, such as preparedness, took precedence. The Radio League of America succeeded the WAA in October, 1915 with an impressive charter reflecting the demands of wireless at the time.


Application for Membership in the Radio League of America

I, THE UNDERSIGNED, a Radio Amateur, am the owner of a Wireless Station described in full on the back of this application. My station has been in use since..... and I herewith desire to apply for membership in the RADIO LEAGUE OF AMERICA. I have read all the rules of the LEAGUE, and I hereby give my word of honor to abide by all the rules, and I particularly pledge my station to the United States Government in the event of war, if such occasion should arise.

I understand that this blank with my signature will be sent to the United States Government officials at Washington, who will make a record of my station.

Witnesses to signature: Name.....

..... City.....

State.....

..... Date.....

Describe the appearance of your station on the back of this application.

In the event of national peril, you will volunteer your services as a radio operator in the interest of the U. S. Government?.....

This last question need not be answered unless you so desire it.

Radio League of America application.

WIRELESS ASSOCIATION OF AMERICA

Under Auspices of "Modern Electrics"

BOARD OF DIRECTORS

Dr. Lee de Forest, President

John S. Stone, Vice-President

Wm. Maver, Jr., Secretary

Hugo Gernsback, Chairman & Business Manager

The publisher claimed a circulation of 51,000 in 1919. Monthly editions were produced until 1925 when the publication was taken over by *Popular Radio* magazine.

The Radio Club of America

These serious magazines encouraged the formation of common in-

terest groups by devoting sections of their publications to club activities, news and opportunities. However, there was one elite national group without a chronicle that arose among the myriad of radio associations, The Radio Club of America (RCA). Founded in 1909, RCA is considered by some as the most prestigious of associations of wireless communications professionals. Somewhat resembling a scientific society, it envelops not only amateur radio but the wide world of wireless communications, broadcasting and radio science. The *Proceedings of the Radio Club of America*, published twice annually, is reputed to be the oldest radio periodical in existence.

Radio Club of America logo.

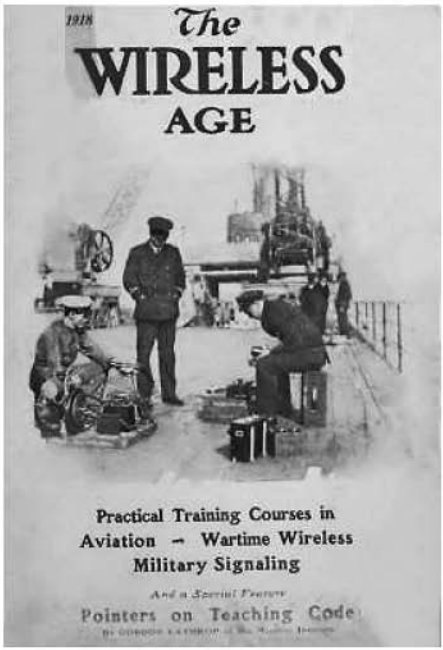
During the early days of wireless, RCA members were highly influential in the intense governmental regulation maneuvering which preceded and followed the Great War. The only signals heard in Scotland during the 1921 transatlantic tests were those of club member station 1BCG.

Today, the club is actively maintaining its status among successful leaders in all spheres of the communications/telecommunications industry with a website, newsletter, meetings, recognitions and appointments. The caliber of the membership has been sustained by making approximately 30 awards annually to the grade of "Fellow," often including Amateurs who have made achievements and lasting contributions to the radio arts and sciences wireless communications.

The National Amateur Wireless Association, and to a lesser extent, the Wireless Association of America and Radio League of America mentioned supplemental membership benefits in their club recruiting, stating that they provided career guidance and employment consulting, employment assistance, and training guidance. In addition, members would be directed to military organizations, on a preferential rank basis, should they be created. Regrettably, it came to pass that the latter incentive was soon to be implemented on an unprecedented scale.

In August of 1914, the year in which the American Radio Relay League was establishing itself, war broke out in Europe. "The War to End All Wars" was to have a profound effect upon the future of wireless and upon its constituent radio telegrapher members, who would find themselves to be highly prized. The awe of wireless was shrouded by the fog of war and the growth of wireless was focused on its application in warfare.

The United States was determined to remain neutral, or at least tried to do so. The Navy assumed authority for all matters wireless and commandeered the domestic commercial stations of foreign operators. The nation resisted preparedness efforts but the armed services did not entirely agree. The Navy proceeded with a reorganization to accept recruits and importantly, to train them in wireless techniques essential for land as well as sea service. The first recruits to respond manned patrol stations along the nation's coasts, sometimes using their own



Wireless Age—*typical wartime issue.*

receivers, while others became radiomen aboard ships. The Army Signal Corps began to extensively train operators to conduct telephone and telegraph support, and later radiotelephone communications, that would be required for land and air campaigns.

The conflicts in Europe grew more intense until on April 6, 1917 the United States was provoked to enter the Great War. The landscape of amateur radio shifted even more dramatically. The League continued its recruiting efforts even while the traffic system was shut down. It has been estimated that between 3,500 and 5,000 Amateurs served in the U.S. military during the Great War, providing skills that likely would not otherwise have been readily available. Some of those who passed were honored in the pages of *QST*.

The war ended on November 11, 1918, but the ban on amateur radio operations in the United States was not immediately lifted, primarily due to internal governmental disputes as to what authority would oversee the service. The Navy fought to maintain the control that it had exercised during the war. The wireless world to which the veteran Amateurs returned was indeed far different and will be the subject of future articles.

AUTHOR'S NOTES:

1. Amazingly, most of the magazines highlighted are available online.
2. I have not indicated statistics concerning magazine performance, membership etc. as it is either unavailable or generally unreliable for the early periods.
3. The Antique Wireless Association was founded in 1952.
4. This was the fourth war to employ wireless—Boer 1899, Russo-Japanese 1904, Tripoli (Italy versus Turkey) 1911.

ABOUT OUR AUTHORS

ROBERT LOZIER, KD4HSH
Making Atwater Kent Breadboard Bus Sleeving, A 1920s Vintage Home-Built Super-Regenerative Receiver

For over 53 years **Robert E. Lozier, Jr.** has been a collector and amateur historian of radio broadcast receivers and related items. He enjoys preparing radio equipment for exhibition while also documenting the hardware and methods employed for conservation and restoration. Robert's "Moonlight Restorations Seminar" has become a perennial favorite at AWA Conferences. Some of his work has appeared in the pages of the *AWA Review, Radio Age, The BVWS Bulletin, NZVRS Bulletin* and the Italian magazine *Antique Radio*. Robert retired in 2012 after a lifetime career in the industrial engineering departments of electronic instrumentation and control manufacturers until their closings. His final 13 years before retirement were spent at a small contract engineering firm as Compliance Testing Program Engineer and 3D Electromechanical Design Engineer. In recent years Robert has become aware of the nearly complete loss of pre-1935 battery artifacts. These items are absolutely necessary for the operation of a large percentage of receivers that are so prized in collections today. He now spends a significant portion of his spare time in creating museum grade replicas and making his recreated graphics and construction methods available gratis on his website: http://kd4hsh.homestead.com/

RICHARD PLACE, WB2JLR
A 1920s Vintage Home-Built Super-Regenerative Receiver

Richard Place has had a passion for radio since building his first crystal radio kit at age six. He received his Novice license, WN2JLR, in the ninth grade followed by his General and Extra in high school. During college at Rensselaer Polytechnic Institute he was a broadcast engineer for several Capital District radio stations, and operated a television repair business. Upon graduation, he moved to Rochester to work for Harris Cor-

THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

Epilogue – Wireless Bridges the Atlantic

Signor Guglielmo Marconi, the eminent inventor, was instrumental in first introducing wireless from Europe to North America at the beginning of the 20th century. The author's article "Origination–Wireless Comes to America," which appeared in the Autumn 2019 *AWA Journal*, relates the progression of this accomplishment. This sequel details some unique aspects of the saga.

The radio station of which we speak no longer exists and very little evidence remains of its prowess. However, considerable history exists of this facility, which participated in the most significant wireless event of the early 20th century and convinced the world of the value of wireless.

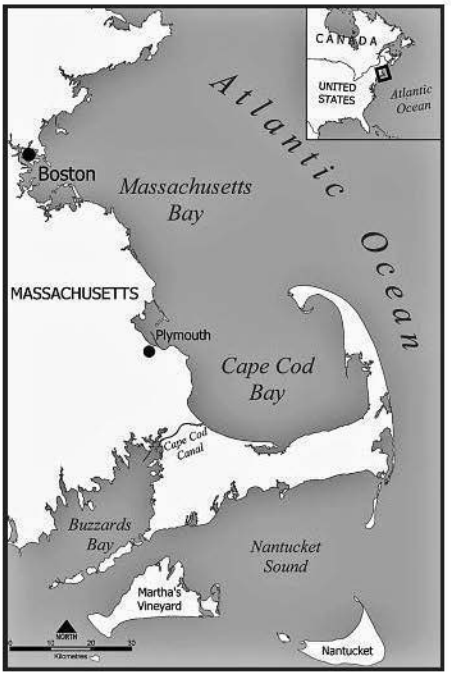
As the 20th century dawned, The Marconi Wireless Telegraph Company of America (known as American Marconi) proceeded with the next major step in the creation of the transatlantic leg of the Company-envisioned global wireless network.

Publicity photo of Guglielmo Marconi posing with his early radio apparatus. Spark transmitter is on left, coherer receiver on right.

The small initial stations in the United States were to be augmented by a major transoceanic station on the East coast. It would complete a triangle with the existing station at Poldhu, England and another new installation at Glace Bay, Breton Island, Nova Scotia.

The Cape Cod peninsula in the state of Massachusetts was an excellent site for the location of this new complex. The ocean bluffs near the town of South Wellfleet offered an unobstructed oceanic sweep to the east—a direct path to Europe and to the mariners on the Atlantic and its fringes.

The Atlantic side of the hook-shaped Cape's north-south elbow was comprised



Cape Cod map.

of sand cliffs of varying heights running for about 40 miles. Midway, a path from town, that would come to be known as "Wireless Road," cleaved the dunes, giving way to a flat plateau about 200 feet from the cliff edge and about 40 feet above the sea. $240 purchased eight acres of the plateau. It was here that the station buildings and antennas were to be located.

Materials for construction of the station arrived at the town of Wellfleet's docks and railroad station. Transport to the site was achieved over a town road connecting to a sand trail between the dunes. The loads were borne by horse-drawn wagons. Horses also were used to power construction lifting devices and tools. With use, the sand trail was widened and gravel was added.

The essence of the station was contained in three buildings, the power house, the transmitter house, and the headquarters building. Foundations for these buildings and for the individual pieces of heavy apparatus within were cast from poured concrete. As technology advanced beyond 1902 the apparatus contained in the first two buildings changed only modestly.

Marconi spark gap key note the large contacts.

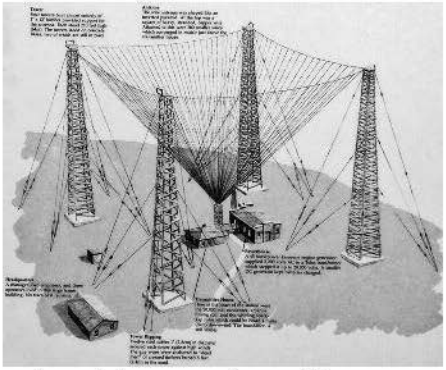
The initial wireless apparatus was elementary, and so it remained. Power was generated by a 100 HP kerosene fueled engine belted to a 50 kilowatt, 60 cycle generator, which in turn energized a 50 kilowatt, non-synchronous spark. As technology sped forward to the vacuum tube and transmission of continuous wave (CW) signals, CC/MCC (and the first WCC) continued to keep the airwaves alive with the unique buzz of its spark signals at 200 kilocycles or 1500 meters.

The initial installation was spectacular. Masts supported an array of wire shaped as an inverted cone terminating at the top of the transmitter building. Twenty masts, each 200 feet high, were situated in a 200-foot circle. Each mast consisted of three sections spliced together in military style. Each mast was set in concrete and was guyed both to the ground and to the other masts, creating an enormous maze.

The world was experiencing the transition from sail to mechanically powered marine propulsion. The station constructors had the good fortune to find local sailors who were adept at the intricacies of sailing ship rigging to string this elaborate arrangement. However, a difference of opinion arose between the riggers and the designers. The design engineers specified that the masts be guyed one to another. The sailors recommended that the masts each be guyed independently. The engineers prevailed and the entire structure collapsed upon itself in an early gale before the station was operational. The designing of a replacement antenna support system delayed the project but resulted in a superior, enduring system duplicated at other installations. Ironically, an identical mast arrangement at Poldhu had been leveled by a gale several weeks earlier.

Four towers were set in place, one at each corner of a 200 foot square backing on the cliff edge. Each tower was composed of wooden components bolted together to form a square structure 210 feet high, tapering from 20 feet wide at the base to eight feet at the top. The towers were embedded in concrete and the mariner riggers ran a system of steel guy wires featuring the new concepts of isolation sections and strain insulators. At the time, it obviously was of no great concern to the engineers that the base of the farthest tower was a mere 165 feet from the cliff edge.

The four towers of the first Marconi Transatlantic Wireless station, painted red, were clearly visible for quite a distance above the flat terrain of Cape Cod. The locals called the site "Marconi Towers," although to the wireless world it was known



U.S. Park Service rendition of the station.

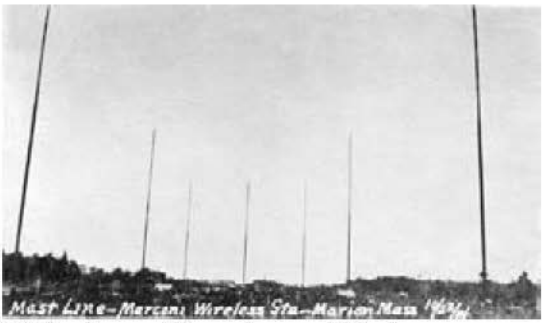
initially by its call letters as CC, later MCC, and finally WCC. The towers afforded the opportunity to experiment with various antenna configurations. Radiomen were becoming aware of the characteristics of horizontal versus vertical wave polarization, and directivity. The final set up at CC was an omni-directional "Z" design. This was consistent with the evolved principal mission of the station—service as a wide-range press broadcaster.

From its inception in 1902 the station's signals were received well, both over the Atlantic and in Europe. In February of 1903, American Marconi announced the occurrence of a momentous event—likely the most significant of the decade. Messages had been exchanged between CC and the sister station at Poldhu. This mistakenly became identified as Marconi's first *wireless* crossing of the Atlantic.

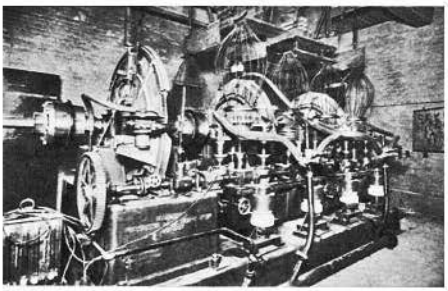
Although engaged in handling ship-to-shore traffic, the station emerged primarily as a press broadcaster. Daily content was received by direct telegraph from the *New York Times*, in New York City and punched into transmission tape. The news was then broadcast on schedule, at the same time every evening, to those listeners utilizing receivers leased from the Marconi Company. Schedules were likewise maintained for the reception of westbound press from the *London Times*. The station was in service for more than 15 years.

The progress of this endeavor was followed by the periodic vacationers to the area and of course, the operators. Some aspects of their observations have survived. Of particular interest are the contemporary accounts of Frederick Parsons who recalled the site before the station was created and the *QST* journal articles of Irving Vermilya, W1ZE. Irving was the last manager of the station before moving on to the succeeding

WCC—Receiving antennas at Chatham.



WCC—Transmitting antennas at Chatham.



WCC—"Timed Spark" transmitter at Chatham.

WCC site nearby at Chatham and Marion, Massachusetts at the elbow of the Cape. The transmitting and receiving facilities were located separately, at distant locations, to permit "duplex" operation—unobstructed simultaneous operations.

Irving was a legendary pioneer Amateur Radio operator known as "VN" in the early days of spark, and was the first licensed Amateur operator in the United States. As a professional he was the last of the managers

Irving Vermilya QSL card.

of "Olde WCC," managed the succeeding RCA WCC complex at Chatham, and had a successful career in commercial broadcast.

Accounts describe the operation of the station as a spectacle. Irving describes it as follows in the February 1942 *QST* article, "Wireless Cape Cod":

We ran 30 kilowatts on that old spark, and the noise from the old gap was terrific. The flashes from the spark were blinding. We worked in a sound proof room. The flash from the spark could be heard and seen a mile or more from the building. The radiation from 'that baby' was 50 amperes to the antenna. Everything that was loose was throbbing with the code.

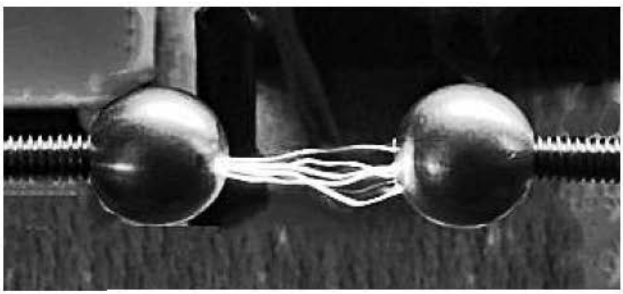
Indeed, a "sound proof room" was built on one side of the transmitter building to isolate the operators. It had a door with a glass pane to observe the spark and housed the receiving apparatus and switching devices. The pump handle of the key protruded into the space, permitting the operator to interrupt the secondary of the keying relay. The operator's stool was insulated. Most traffic was sent on perforated tape, however the shore-to-ship traffic was manually keyed at a limited 16 words per minute. The "normal" speed was 30 words per minute.

The station operations began at early evening, every hour, for 45-minute intervals with the 15-minute interval for cooling!

This is how Irving described the demise of CC in the February 1920 *QST*, "The Passing of Old WCC":

None other than the U.S. Navy acquired the station from Marconi and instead of using it, they entirely dismantled it. Yes, right to the ground...all that remains are the buildings. Every article was positively taken out and junked. The engines, generators, batteries, d.c. machines, lathe, transformers, etc.—even the door knobs taken off and the water pipes pulled up out of the ground. The towers are all down—given away for the wood to the men that took them down.

Except for sporadic wartime military training activity or the passing of the occasional hiker the site remained dormant in the grasp of nature as the wind and surf sculptured the cliffs. Historians and wireless enthusiasts however, recognized the significance of the location. In 1953, a bronze plaque was placed at the site. Control of the site reverted the National Park Service, and by 1974 an exhibit shelter was erected containing a scale model of the station and a recently created bronze bust of Marconi. But, nature's relentless action continued and on



Spark is King!

July 23, 2013 the shelter was removed before it fell over the eroding cliff. The contents were moved to the nearby Park Headquarters building.

My recent inquiries produced this response from the National Park Service staff at the site:

Most of the remains of the station are gone. Remnants of foundations are likely still under the sand or have already eroded out of the bluff—half of the original site is now eroded away by the ocean.

2 of the 4 tower concrete bases can occasionally be seen at very low tide on the beach at the waterline. The other 2 tower bases still on dry land on top of the bluff are buried by sand. A few small bits of tower support structures are around on the site for display purposes.

There are a handful of items at park Headquarters on display, and there are a few Marconi related items on display at Salt Pond Visitor Center. There are no additional plans to display anything else at this point.

The park does periodic talks at the site, and we offer a 12-minute movie, etc. ...We also host an annual Marconi Day with ham operators communicating from the site all over the world in January to commemorate the 1903 overseas transmission.

The work of Frederick A. Parsons speaks for itself. Originally licensed as 2ABM, Fred also managed the South Wellfleet station from 1912 to approximately 1918 and went on to manage the WCC transmitting facility at Marion, Massachusetts. In addition to his writing he built the model of the CC station which was the centerpiece of the pavilion-protected display on the site sand cliffs.

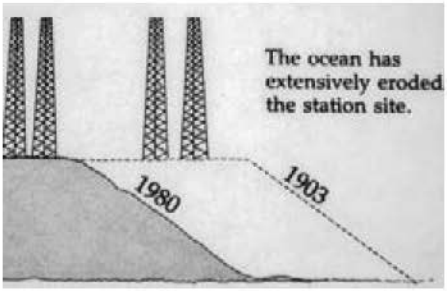
Fred's book, *Wireless Road*, is an account of the station site and environs before and after demolition. Never published, the original typewritten manuscript has been preserved in the ARRL Heritage Museum, Vintage Book Library. This book along with Parsons' survey of early wireless towers, *Tall Towers* is available electronically by request to the ARRL Historian.

Pavilion before removal, tower remnants in foreground.

Frederick A. Parsons QSL card.

Both Irving and Fred were early amateur radio licensees who appeared in circa-1910 listings and directories. Irving claimed to be the first one licensed based on his testing date. They both lived history and made the history of wireless in the United States.

Nature reigns and the wind and sea prevail but the memory of Marconi lives. And, so it is with *the most historic wireless memorial on the continent!*



Cliff erosion has claimed the Marconi Site.

The First Century
Wireless and Amateur Radio History

BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

The Knights of the Valve (The Partners in Wireless)

The 20th century dawned with the world astonished by the phenomena of wireless.

Scientific theory and concept were applied to generate signals heard across the ocean by a creative practitioner who defined himself as an "Amateur of Science."

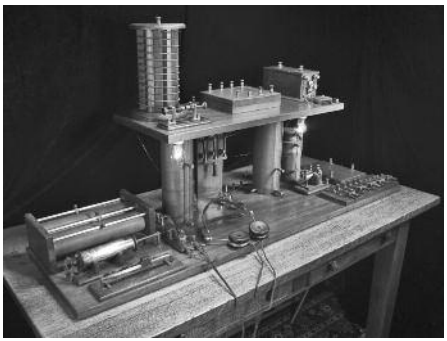
A quad of EL-34 tubes in a stereo amplifier.

What is (or was) a valve?

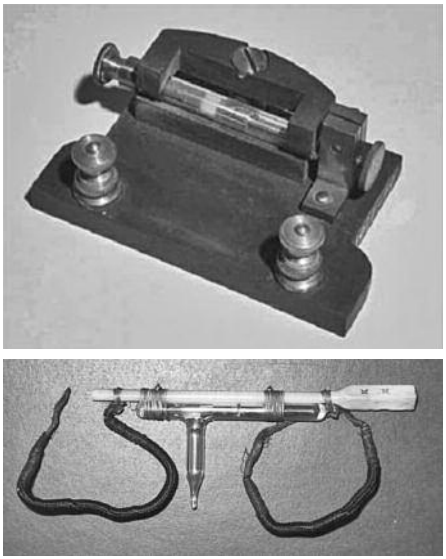
In electronics: vacuum tube, electron tube (in North America), tube, or valve (in British English). A device that controls electric current through a vacuum in a sealed container. Vacuum tubes rely on thermionic emission of electrons from a hot filament or a cathode heated by the filament.

Ask "What were the ten greatest inventions of the 20th century?" The answer would of course depend upon the responder's perspective and it would probably encompass many more than ten individual inventions. Of course "Radio"—the discovery of the universe of electromagnetic waves—would appear prominently on the list along with other electrical devices such as the telephone, telegraph, light bulb and induction motor. Then narrow the inquiry to "What were the ten most important inventions within the sphere of early radio?" At that point, the thermionic valve-detector would be mentioned frequently. The early valve-detector, essentially a diode, evolved, along with its future embellishments, to be the most consequential element of electronic circuitry. Until the advent of solid state devices, the transistor and integrated circuits in the 1950s, tubes were the basic components of all electronic equipment and are utilized today for high power amplification and specialized audio applications.

The three essential components of radio communication at the turn of the 20th century were the detector, the transmitter and the antenna. As technology progressed, each of these components received the attention of scientists and inventors intent on improving the performance of these elements, both singularly and in unison. The detector or receiver was the focus of such attention as better receiving sensitivity and selectivity became essential to detect the ever more distant transmitted signals. Essentially, the detector sensed the presence or absence of a telegraphic signal as it was keyed in at the transmitter. Beginning in 1890 the most commonly used detector was the coherer, a device which consisted of a



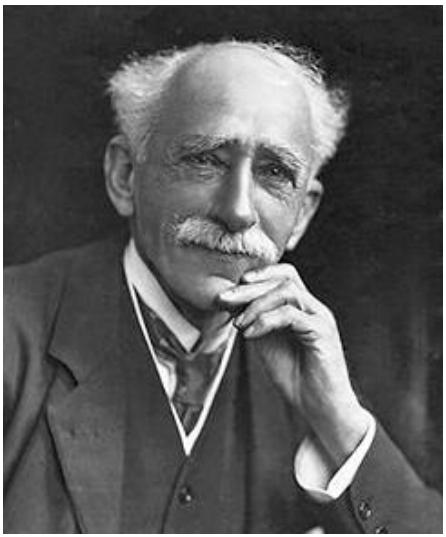
Spark gap transmitter display circa 1910.



Coherers.

tube of metal filings that clung together when a radio frequency signal was applied.

As we embark on the evolution of the valve we first encounter an achievement illustrating the pre-valve world of early wireless. Two wireless age celebrities collaborated to create more powerful signals, using coherers to receive the signals generated during these early events. These innovators utilized markedly different styles of technological and scientific practice. However, their combined efforts bridged the theoretical to the practical, producing a synergistic result as is evident by this achievement.



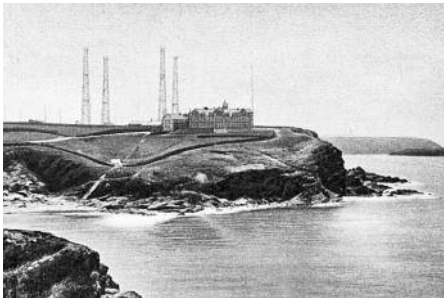
Dr. John Ambrose Fleming.

In May of 1899, Dr. John Ambrose Fleming, Professor of Electrical Technology at University College, London accepted a scientific advisorship in the Marconi Wireless Telegraph Company. This appointment followed his 10-year tenure as advisor to the Edison-Swan United Electric Light Company, which experience was significant to his later work with Marconi. Marconi, the practitioner, needed a scientist, particular a power engineer who could bring wireless transmission to the next step of development—sufficient signal strength

Senatore Gugliemo Marconi.

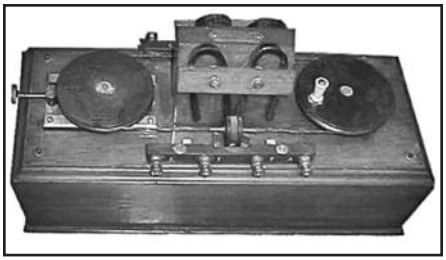
to bridge the Atlantic. Marconi had been incrementally increasing the distance of his transmissions and determined that the distance achievable was directly related to the power of the transmitter and the antenna. He was confident of his ability to design an adequate antenna system but had reached the limits of conventional power sources—his longest transmission in early 1900 was 185 miles. To span the Atlantic, to cross more than 2500 miles, Marconi calculated that he would need a power system capable of maintaining a 2-inch spark on a 0.02 microfarad condenser. This would require in excess of 100 kilowatts of generated power. Fleming's assignment was to engineer and build a power plant on a scale never before attempted.

The firm undertook to establish this



Poldhu Station.

unique station on the cliffs of Cornwall above Poldhu Cove. The first successful test of Fleming's power machinery and Marconi's antenna was concluded in July of 1901. Signals were sent from Poldhu to Crookhaven, Ireland, a record distance of 250 miles. Confident that he had the right combination of apparatus at Poldhu, Marconi set off to St. John's, Newfoundland. Here in December of 1901 he copied

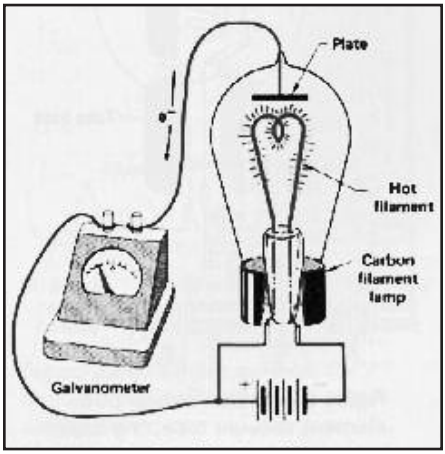


Marconi magnetic detector.

Poldhu's signals using basic equipment—a kite antenna, a mercury coherer and a telephone. The prearranged signal S "…" was copied at four different times. Marconi announced to the world that wireless had traversed the Atlantic for the first time. Fleming then went on to other important endeavors.

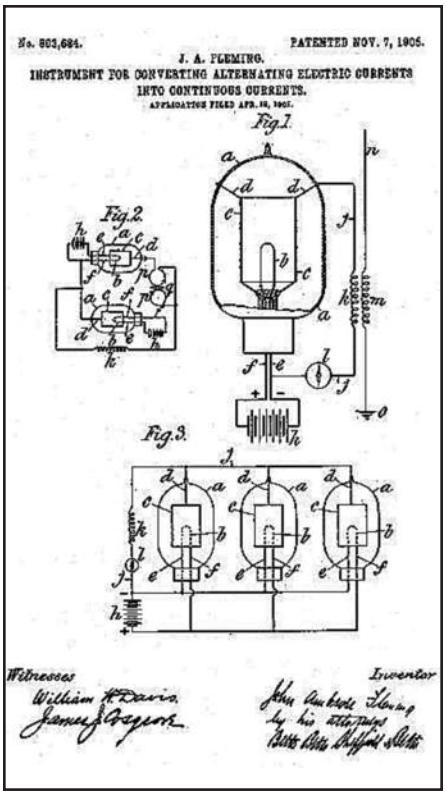
Wireless had now reached another limit. Signals could be transmitted for greater distances but Marconi deduced that they could not be heard well, if at all, at these new limits. The coherer was the "weak link"—a poor receiving device for detecting the faint signals inherent in long distance transmissions. Recognizing this deficiency, Marconi applied himself to developing a superior signal detector. His magnetic detector was a simple but ingenious device which in a practical manner applied the findings of several earlier wireless researchers including John Ambrose Fleming. The apparatus works by the hysteresis action created in an iron wire pulled through the field of two permanent magnets and through the centers of two concentric coils. A radio frequency pulse in the first (antenna) coil produces a stronger current in the secondary coil, heard as a click in the earphone. For the time being the need for a better receiver was satisfied. It was more sensitive than a coherer and permitted a much higher speed of transmission. The magnetic detector was widely used and served for many years even after the introduction of other methods.

As mentioned, Fleming had consulted to the Edison interests since 1882 and was aware of Edison's laboratory work, particularly with respect to a light bulb phenomenon termed the "Edison Effect." The effect was that, in a vacuum, electrons flow from a heated element such as an incandescent lamp filament to a cooler metal plate. In 1882 Edison observed that if a conductive element were added to the bulb and positive direct current applied to it, current flowed from the filament to the element. If the polarity of the applied power were reversed to negative, no current flowed between the two elements. Edison did not pursue appli-



The Edison Effect.

cations for this effect, but Fleming did. Beginning in 1885, he studied the phenomenon in his own laboratory and prepared scientific papers speculating on its basis. As his work continued, somewhat sporadically, he began to utilize better materials for the filament and the extra element, and more efficiently evacuated bulbs. His work gradually moved from laboratory exercise to an exploration of practical applications until it took a significant leap forward. Fleming conceived of using the modified lamp for rectification! Assembling a power source, a bulb with tinfoil added as the extra element (anode), a galvanometer and a transformer he was able to rectify the output of a small spark transmitter as shown in the patent illustration below. High frequency electromagnetic waves induced in the receiving antenna were rectified, with the device acting as a detector.


No. 803,684. PATENTED NOV. 7, 1905.

J. A. FLEMING.

INSTRUMENT FOR CONVERTING ALTERNATING ELECTRIC CURRENTS INTO CONTINUOUS CURRENTS.

APPLICATION FILED APR. 19, 1904.

Fig.1.

Fig.2.

Fig.3.

Witnesses

William H. Davis.

James J. Geyser

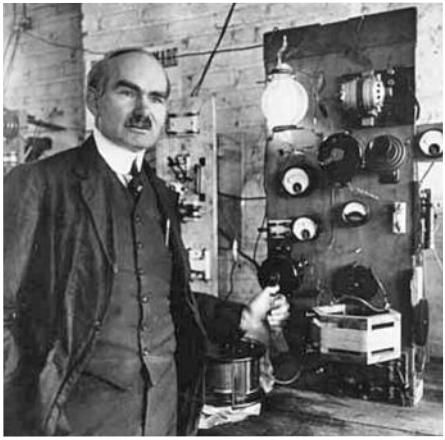
Inventor

John Ambrose Fleming

by his attorneys

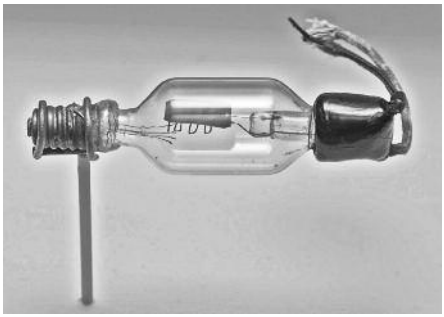
Bakewell Page & Phleger

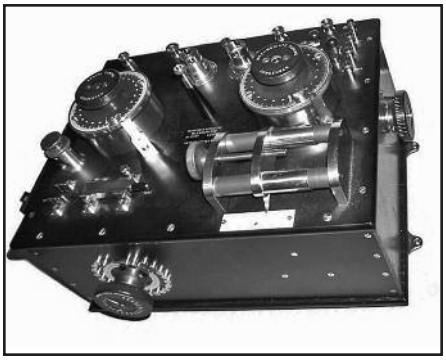
Fleming patent showing transformer.


Dr. Lee de Forest.

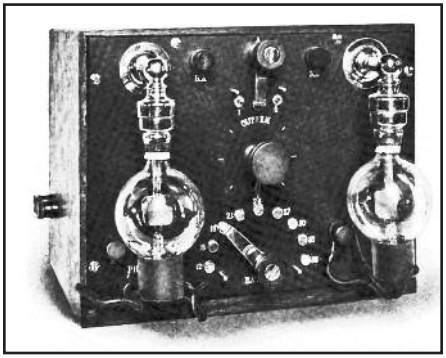
Fleming shared his discovery with Marconi, who in his characteristic style set out to configure a practical apparatus around the device. He replaced the galvanometer in the circuit with a telephone inductively coupled through an oscillation transformer. This basic receiver proved far superior in sensitivity to other detectors existing at the time, including the newly popular crystal and the prevailing magnetic detector. As this work was in progress during 1906-1907 a new type of valve was patented in the United States.

The Audion or triode, the creation of Dr. Lee de Forest, raised the thermionic valve to a vastly higher level of potential. Dr. de Forest, our third celebrity partner, also was a scientist and engineer. His Audion (Audion being a contraction of "Audio" and "Ion") was a simply a Fleming valve with


Triode Audion valve circa 1906.



Fleming valve receiver circa 1908.



Early Audion radio receiver, constructed by de Forest in 1914.

a control element (grid) added in the vacuum space between the filament and anode plate. De Forest thought that this configuration would amplify signals received. In application, the Audion was a poor amplifier; it performed better as a rectifier. But, it did amplify while the Fleming valve did not.

Patent disputes raged, Marconi and Fleming versus de Forest about who invented what, when and how it would be used. But the controversy did not discourage intrepid technicians from exploring the facets and applications of the device—they and others were drawn into the melee. As new applications were discovered challenges to Fleming's original patent continued, with courts in the United States ruling in favor of Fleming, and dismissing Edwin Armstrong's plea.

Manufacturers, including Marconi, the General Electric Company and others, as well as independent engineers, created new applications for the triode. Additional functional elements were added to the original triode design, and improvements were made in the materials used for the components and to the extent of vacuum achieved. As these developments progressed, new circuits and functions were continually designed for both receiving and transmitting. The triode's amplifying and oscillating possibilities were soon developed, leading to the ability to transmit and receive continuous waves.

With the end of First World War and American Marconi's holdings effectively melded to RCA, the demise of spark transmission was apparent. The first progression was to the Alexandersen Alternator which enabled the use of continuous waves and higher frequencies. Shortly thereafter, thermionic valves assumed their inevitable ascendancy. The progression of this transition can be measured by the equipment used at the Marconi Company's major station at Caernarvon, Wales (which was the European base for wireless during WWI). The spark transmitter was replaced by a 200 kW Alexandersen device in 1920 and subsequently replaced in 1921 by a 100 kW thermionic valve device comprised of 54 valves.

This is only one illustration of the rapid evolution in wireless technology that brought about the demise of the damped wave producing spark gap transmitter and the massive impractical low frequency alternators.

Although the heyday of vacuum tubes has passed, they are still visible in high power amplifiers and other specialized applications. The full extent of achievement and development of the science of tubes is most visible in the sophisticated all-tube receivers in use at the sunset of the tube era, including those designed and produced by the Marconi interests, Collins Radio, Hallicrafters, National, and Hammarlund. Let us also remember the all-tube transmitters by E.F. Johnson, Collins, Heathkit and oth-

ers which capped the era. Some of these names have disappeared from the electronics lexicon but enthusiasts cherish this equipment to this day and keep the valves glowing brightly.

Marconi inspired not only his subordinates but myriads of enthusiasts who, like him, also called themselves "amateurs". In future articles we intend to present the further unique achievements of the visionary application of electromagnetic waves.

Hammarlund SP-600 Super-Pro receiver, introduced in 1947.

MARC ELLIS, SILENT KEY, *continued from page 19*

David Kaiser, Editor, with whom I have an equally harmonious relationship!) As it became possible to produce the entire *Journal* remotely, Marc and I saw each other less, and in 2004 I moved from Illinois to California. However, our close collaboration for each issue continued until his retirement, after which we communicated occasionally to catch up on each others' lives. That Marc is now a Silent Key feels strange as it seems only moments ago that he was explaining to me for the first time what this unfamiliar phrase meant. I know others, many of whom are reading this, join me in remembering Marc with great fondness, and in sending condolences and best wishes to Marc's son Eric and all of Marc's family.

Claudia Gray Sweet
Design and Production Editor

Marc Ellis (1933-2020) was a long time member of ARCI, AWA and many other radio organizations. He spent a lifetime educating others on circuits, operation, and the history surrounding radio and its inventors, developers and users. Marc was the antique radio editor for *Popular Electronics*, and then wrote or edited for other Gernsback publications including *Hands-On Electronics* and *Electronics Now*. His column continued to be published in *Monitoring Times* after Gernsback exited the market. Marc was the long time editor of the *AWA Journal*, and a contributing editor of *The AWA Gateway*. He was the former publisher of his own journal, *The Radio Collector Monthly* and was the author of *Vintage Radio: The Sky Buddy Saga*. Marc's work was read by millions, inspiring further exploration of the art and science of radio communications.

Marc grew up in Boston and received a BS in Communication Arts from Boston University. He also received a BS in Quantitative Biology from MIT, and an MA from the School of Education at Loyola University in Chicago. He began his career by working on the editorial staff of the *Encyclopedia Britannica*, where he met his future wife Carolyn, who also was a staff editor. Marc then worked on the editorial staff of *Popular Electronics* magazine, a Ziff-Davis publication, in the 1960s. He later worked as an ad-agency copywriter, and spent several years as a writer-producer in the education-film field. He was a training program developer at USG Corporation in Chicago where, among other subjects, he was an early contributor to computer managed instruction systems for self-paced training.

Marc continued to contribute columns on radio history and restoration to numerous publications over the ensuing years. He was the Production Editor and a principal author of the 50th anniversary special issue of *The Old Timer's Bulletin* that documented the history of the AWA up to 2002. Marc held an amateur radio license, N9EWJ, and was a member of ARRL. He received the AWA's Houck Award for Documentation in 2002, President Award in 2004, Director Award in 2010, Dr. Max Bodmer Award in 2014, and the Board of Directors Award in

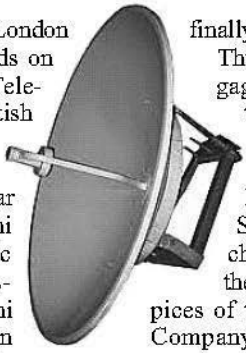
(continued on page 45)

THE FIRST CENTURY
WIRELESS AND AMATEUR RADIO HISTORY

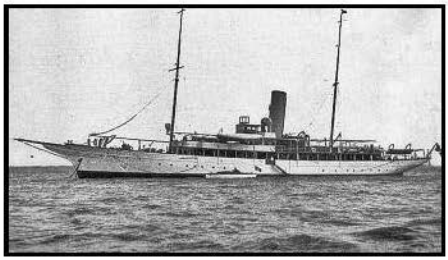
BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

Marconi Introduces the Microwave Era

A plaque is affixed to the London building that now stands on the former site of the Telegraph Office building of the British General Post Office. It was in this long-gone facility, in 1896, that the twenty-one year old inventor, Guglielmo Marconi conducted the first public demonstration of the transmission of wireless signals. Marconi was disappointed that the Italian government was not interested in his newly-developed wireless communications system, and accordingly had brought his equipment to England. He demonstrated to the Postal authorities that a spark coil could generate signals which then could be received by a carbon granular coherer. The Postal authorities were sufficiently impressed to entertain further demonstrations, culminating in a transmission spanning 3.7 miles across the grasslands of southern England's Salisbury Plain. Subsequent demonstrations consecutively spanned the Bristol Channel, the Atlantic Ocean and finally, the globe.



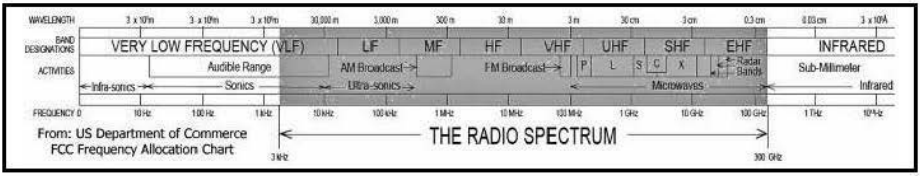
Thus commenced the practical engagement of the Wireless Age and the initial Spark Gap Era, which extended for two decades before progressing into the Short Wave Era. In late 1919, early into the Short Wave Era, Marconi purchased a 700-ton steam yacht from the British Navy through the auspices of the Marconi Wireless Telegraph Company. The craft was refurbished to serve as both a luxury accommodation and a floating laboratory. This 220-foot coal-fueled steam-powered vessal was capable of achieving a cruising speed of 10 knots.



SY Elettra.

GPO telegraph office building plaque.

With a staff and crew of thirty it could sail to anywhere in the world, although it most frequent cruised in Italian waters or between Italy and England. This sailing yacht was christened the *Elettra,* registered in Italy, and flew the Italian flag. The floating radio laboratory was fully equipped for research and experimentation, augmenting the Company's Chelmsford facilities in Wessex. The shipboard environment of the SY *Elettra* was the ideal work place for Marconi, giving him both independence and seclusion. He could perform experiments at any hour of the day or night with-



Frequency spectrum chart.

out interruption as he began to understand the propagation effects of short wave transmission. It also had suufficient room to accommodate the Marconi Company engineers who often assisted the inventor.

In 1923 the SY *Elettra* sailed the waters around the Cape Verdi islands of the South Atlantic, listening for transmissions from the central station at Poldhu, in Cornwall. Progressively shorter wavelengths were tried. It was determined that the shorter the wave length (Marconi utilized 32 meters), the greater the distance traversed during both daylight and night time hours, and at lower power. Shortly thereafter, these experiments were repeated, with the *Elettra* cruising the Mediterranean off the Levant. Marconi had discovered the practical characteristics of the F2 layer of the ionosphere surrounding the earth but at that time was not able to scientifically define it.

By late 1927 the results of the short wave development were manifest. Paralleling the Marconi Company's world-wide commercial wireless system, the Imperial Wireless network commissioned by the British Government now was fully functional. Marconi-designed wireless stations equipped with directional beam antennas operated 24/7 on 32 meters and linked the vast Commonwealth Nation community worldwide. Both systems were enhanced by the newly-implemented ability to impose several channels on one carrier wave, permitting multiplex transmissions of separate messages and the means to send and decipher super high speed telegraphy of thousands of words per minute. These achievements far exceeded the bounds of contemporary expectations and brought great honor to Marconi, the Marconi Wireless Telegraph Company, and their associates. In June of 1926 the world had celebrated the thirtieth anniversary of wireless telegraphy. At a public celebration in his home city of Bologna, Marconi was awarded a gold medal. In an inspired speech he summarized his past work and divided his life into periods conforming to the eras of the Wireless Age we have recognized here. However, at that time he was not aware of the fact that he had already crossed the threshold into another era—that of microwaves—which was to be equally phenomenal and of benefit to society.

After a short pause, the "Daring Genius" (as nicknamed by Dr. Lee de Forest), redirected his attention to hyper/ultra short waves. The Propagation Section of the Marconi entity had done considerable investigation of the behavior of very high and ultra high frequency waves. Consistent with his style, Marconi sought to apply this research to the practical utilization of this portion of the radio spectrum for communication. His first objective was to determine the useful communication range of the high frequency waves in comparison to the optical range, along with the effects of the earth's curvature and surface obstructions. These explorations first required the development of heretofore nonexistent equipment capable of operating at the wavelength of 50 centimeters (frequency of 600 MHz) chosen for this research. Marconi engineer Gaston Antoine Mathieu undertook the assignment. His experience from previous work on the beam-system development was ideal for this new venture. Mathieu, incorporating valves recently developed for use at high frequencies designed a radiophare (ship position locating beacon) transmitter producing a constantly pulsating, sequenced signal at 25 watts output, a sensitive receiver and a dipole antenna with a parabolic reflector. The transmitter and an antenna were initially placed at a land site,

Elettra *radio room and laboratory.*

Hotel Miramar – Santa Margherita Ligure.

and the receiver was installed aboard the *Elettra* with the receiving antenna placed atop the mast at about 16 feet above sea level, or at the stern.

Successions of practical demonstrations were undertaken commencing in October of 1931 along the Italian Mediterranean coast. The first demonstration established a link from the Hotel Miramar in the commune of Santa Margarita south to the commune of Sestri Levanti, 11 miles over open sea. This was followed by a link from Santa Margarita to the town of Levanto 11 miles further south. In early 1932 these links were equipped to transmit duplex telephony. This marked the world's introduction to communication by microwave, which today is common.

In August, 1933 another series of trials was conducted aboard the *Elettra*, utilizing improved transmitting and receiving equipment, while sailing off the Tyrrhenian coast. Signals of 57 centimeter wavelength were transmitted from atop the Hotel Miramar at a height of 40 feet, with a power of

Caption translation: "The parabola of 1.5 meters mounted on the terrrace of the Grand Hotel Miramare. On the left is a very rudimentary "herringbone" reflector."

25 watts. The receiving antenna aboard the vessel was situated at a height of 16 feet above sea level. Signals were consistently received at a distance of almost 100 miles and intermittently at a distance of 160 miles—these ranges were five and nine times beyond the respective optical ranges.

Further tests were conducted in the more southerly Tyrrhenian Sea in the straits between the port of Rome-Civitavecchia and Cape Figari, near Olbia in northern Sardinia. The transmitter, broadcasting at 57 centimeters, was first positioned at Rocca di Papa south of Rome, 15 miles inland and at an elevation of 2,460 feet. A distance of 115 miles was achieved with this arrangement. Four days later, the receiver was removed from the *Elettra* and installed on a land-based signal sta-

Northwestern Italian coast.

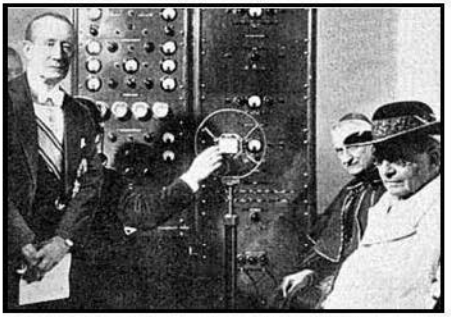
tion at Cape Figari, 1,115 feet above sea level. This land link produced strong, consistent signals over the distance of 168 miles—more than double the optical range.

These experiments established that microwaves could be propagated to distances beyond the optical range, as they were being deflected earthward to some extent, like the longer, lower frequency waves. The experimental variables were elevation, frequency, antenna configuration and power.

In the time between these series of tests, Marconi demonstrated his remarkable abilities by engaging in other related activities. During the 1929-1931 period, Marconi installed an elaborate short wave station at the Vatican in Rome. This system was capable of broadcasting to the world and brought the Roman Catholic Church into the modern era. Subsequently, in 1932, he and his associates installed a microwave telephone channel between the Vatican and the Pope's palace at Castel Gandolfo. Traversing a span of 15 miles, this was the first commercial link on a wavelength shorter than one meter. In the course of operation this link produced an ultra-wave phenomenon that would prove to have enormous consequences.

While these activities were occurring Marconi took time off to participate in a ceremony in his honor. He and his wife Marchesa Marconi landed in New York aboard the SS *Conte di Savola*. During a *New York Times* interview, reported in the

Map showing Marconi's Tyrrhenian Sea test area.



Marconi and Pope Pius XI – 1931 inauguration of the Vatican radio station.

September 29, 1933 edition, he is quoted as saying: "*There is a great vista opening up in the micro-wave spectrum. We have discovered that the tiny waves are not limited to optical distances, as originally believed, that is, the curvature of the earth is no barrier.* He went on to say… "*As prior experience has proven, it is dangerous to put limits on wireless. Now, if we succeed in sending micro-waves over long distances, we may revolutionize the whole art of radio.*" The Marconis' next destination was Chicago and the Century of Progress Exposition—the World's Fair. The following Monday, October 1, 1933 had been designated "Marconi Day" at the Fair.

Marconi and his associates initiated a navigation system utilizing radio-phares transmitting ultra-wave signals. This concept involved the employment of beams of high frequency waves in direction-finding systems, with the transmitter and receiver situated separately. A receiver equipped with a directional antenna aboard a ship or aircraft homed in on signals which were emitted by a specifically located radio-phare beacon, thereby establishing the vessel's direction relative to the beacon. Tuning to several separate navigation beams would enable calculation to establish the ship or aircraft's exact position. This concept was demonstrated in June, 1934 in the waters off Santa Margherita. The *Elettra* repeatedly navigated blind between buoys using only the guiding beam of a beacon placed on a hill on shore. This methodology evolved into today's elaborate and sophisticated com-

puter-assisted navigation systems.

An inadvertent discovery at Castel Gandolfo revealed that the microwave beams were reflected off solid objects in their path. This was fundamentally the mirror or RADAR effect. Other than a few brief tests using an aircraft as a target, other research commitments and health issues prevented Marconi from exploring this marvel prior to his death on July 20, 1937. Marconi and his assocates would be the first to admit that they were not the sole parents of Radio Direction Finding (R.D.F) or RAdio Detection and Ranging (RADAR). They were, however, leaders in establishing the fundamentals, and were among the early applicators of microwaves. Many scientists and engineers came before and afterward to contribute to the development of the system which became a major factor in the outcome of the Battle of Britain and World War II—known as RADAR—which is so significant in today's world.

Chicago World's Fair 1933 – "A Century of Progress."

MEMBERSHIP NEWS, *continued from p. 12*

Canyon Lake, TX 78133. Email: dwjw@gvtc.com; website www.gvtc.com/~edengel/TARC.htm.

• Vintage Radio and Phonograph Society (VRPS) — Meets monthly on the third Saturday. Located in the Dallas, Fort Worth Metroplex, our current activities are annual convention, auctions, swap meets, repair training sessions and monthly programs. For details visit our website www.vrps.org, or by contacting VRPS President Jim Sargent at (817) 573-3546 or bsargent@swbell.net.

BOOKS AND LITERATURE, *continued from p. 30*

for the military, *Stars and Stripes*, also credited Phelps with the invention, although the paper misspelled his name.

The remainder of the book covers virtually everything you would want to know about foxhole radios. It even starts out with a chapter on how to dig a foxhole for your radio according to military specifications, complete with two drawings. Clearly, the author has a sense of humor. According to the author, the foxhole as described in 1940 was a simple affair—a hole three feet wide at the top and a depth illustrated in three stages of digging for prone, crouching, and standing positions.

There are drawings, schematics, sketches, photographs, and other memorabilia associated with various radio designs, including detailed instructions on how to build a foxhole radio. To determine how well some of the razor blades worked, the author actually tested selected razor blades by various manufacturers in a foxhole radio similar to the one Elton Phelps designed, and he used both safely pins and pencil lead as a cat whisker. There is an impressive four-page layout with photographs of his collection of razor blades by various manufacturers of the day.

This book is extremely well researched with many original sources. There are 140 clear images in black and white, 38 pages of endnotes, and a 12-page chronology of foxhole radio sources. If you have any interest in foxhole radios, this book is a must-read. It is a real bargain at $12.95.

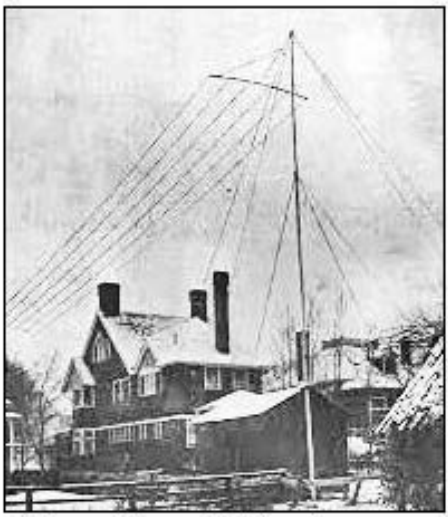
BY MICHAEL W. MARINARO, WN1M • EMAIL: WN1M@MSN.COM

The Historian's View: The Early Logbooks of Hiram Percy Maxim

A Glimpse Into the Early Era of Wireless in the United States

Editor's Note: This article consists of the author's own research in addition to excerpts from material in "The ARRL Heritage Museum – Archival Collection," which he prepared as Historian/Archivist for the ARRL Board of Directors Historical Committee, used with permission of the ARRL.

Under the auspices of the Historical Committee, appointed by the ARRL Board of Directors, the volunteer Historian and Archivist at headquarters has been cataloging the previously unrecorded assemblage of paper material contained in the League files. This is the material that was not catalogued in the earlier effort done in the Microsoft *Word* program and which occupies more than 40 file drawers. To continue the project, a new format was developed utilizing the Microsoft *Access* database program for ease of "finding." Over a two year period, 24 file drawers of specifically recorded material, and 145 boxes of general and executive correspondence have been catalogued, and stored in archival containers.



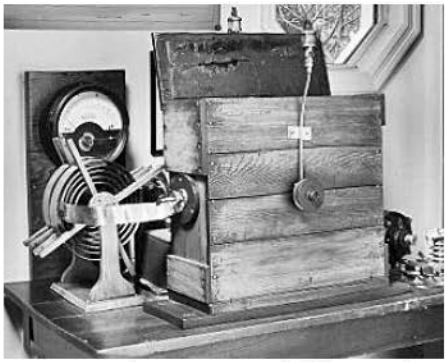
Maxim residence with later antenna.

In the process of cataloging this material, several discoveries of documents of historical import have been made. These documents had been preserved but not previously recorded.

The following are comments on one of these finds—the *Logbooks of 1ZM and 1AW*. These logs are contained in two ordinary ruled school notebooks. The entries are mostly in ink and are remarkably clear after almost 100 years of storage—only a few pages are illegible.

The first book, labeled, "French Notebook, H H Maxim", with the first page entered as "Log of 1ZM," covers the period May 14, 1919 to March 18, 1920. The second book, labeled "Log No. 2, Radio Station 1AW," covers the entry periods March 2, 1920 to December 16, 1921; September 26 to September 29, 1922; and at the end contains a number of fragmentary entries along with typewritten attachments and insertions.

These post World War I logs are likely not the very first written logs of ARRL founder Hiram Percy Maxim and his son Hiram Hamilton Maxim. They began operating in 1911 as 1NY and 1NW and in 1913 became officially licensed as 1WH and 1ZH. Their activity continued through the



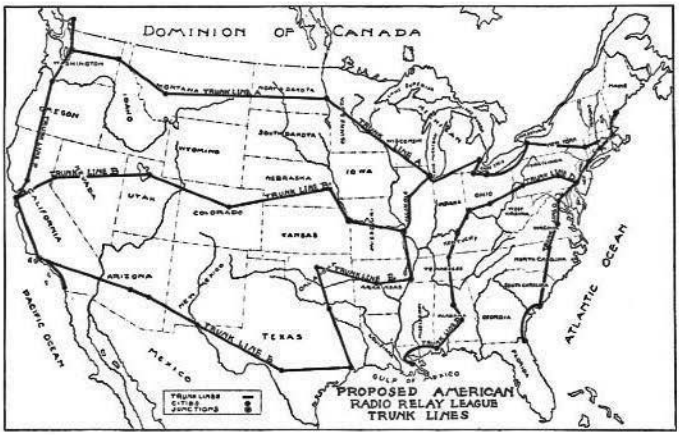
Maxim spark transmitter—"Old Betsy."

time of the founding of ARRL in 1914 and up to the April 1917 government-imposed World War I amateur radio silence. After the war, the station call 1AW was issued to the senior Maxim.

From its inception, the station was a major relay link in the National Traffic System (NTS), which was the founding principle of the ARRL. During these early years, the station not only handled traffic but also originated and transmitted bulletins and announcements addressed *QST*, "to all radio amateurs."

The United States government ban on amateur radio operations was not lifted until November 1919. In anticipation of an imminent return to the air, the first entries in the log book, from May through August 1919, are concerned with copying code transmissions of governmental and permitted commercial stations, along with notations regarding preparation of Maxim's station. Finally, on November 24, the first contacts were made with 1FD and 2ZS and duly entered. Subsequent entries record the re-emergence of the NTS, number of messages handled, band conditions, and the maintenance and performance of the station. Individual stations heard and worked were recorded and later transcribed to appear in *QST*.

Throughout, the names and signatures of visitors appear. Besides Hiram Percy Maxim, notable and frequent operators were ARRL functionaries General Manager K.B. Warner, Communications Manager F.D. Schnell, Secretary C.D. Tuska and two of the six original Directors, D.L. Moore and R.S. Kruse. This crew engaged in handling traffic and broadcasting announcements of events of interest to the organization's growing member ranks. Each operator either signed or initialed his individual logbook entries. In addition to those that operated, the station hosted observing visitors too numerous to mention. Accordingly, the book contains the signatures of several noteworthy early wireless dignitaries.

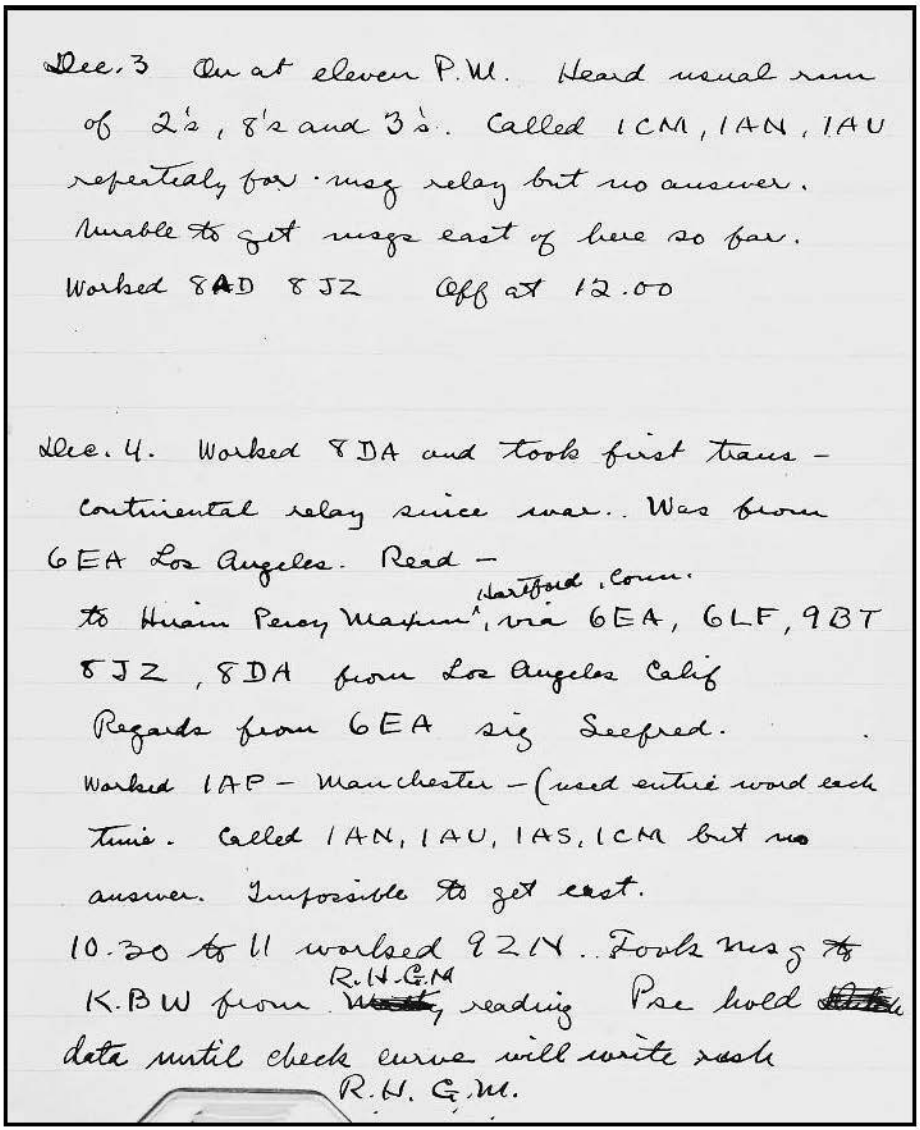


National Traffic System preliminary concept (from February 1916 QST).

A typical and significant extract from the first logbook, as entered in penciled script, follows below.

This extract records the receipt of the first message relayed across the North American continent after the end of the war. The 10:30 (p.m.) entry concerns a message to K.B.Warner, ARRL General Manager from R.H.G. Matthews, ARRL Vice President.

Many log entries complain of noisy/static conditions (QRN) and fading signals (QSS).[1] In an effort to understand the nature and cause of fading, the ARRL and the United States Bureau of Standards undertook a cooperative program of study. A



Dec. 3 On at eleven P.M. Heard usual run of 2's, 8's and 3's. Called 1CM, 1AN, 1AU repeatedly for msg relay but no answer. Unable to get msgs east of here so far. Worked 8AD 8JZ Off at 12.00

Dec. 4. Worked 8DA and took first trans-continental relay since war. Was from 6EA Los Angeles. Read — to Hiram Percy Maxim, Hartford, Conn. via 6EA, 6LF, 9BT 8JZ, 8DA from Los Angeles Calif Regards from 6EA sig Seefred. Worked 1AP — Manchester — (used entire word each time. Called 1AN, 1AU, 1AS, 1CM but no answer. Impossible to get east. 10.30 to 11 worked 9ZN. Took msg to K.B.W from R.H.G.M reading Pse hold data until check curve will write rush R.H.G.M.

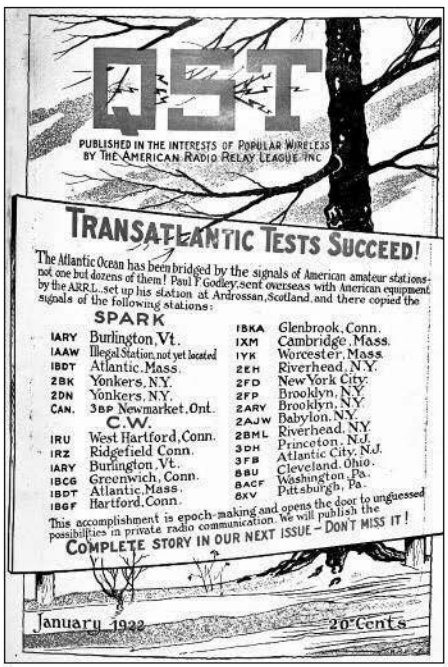
Log extract recording receipt of the first message relayed across the continent after the end of World War I.

total of 243 receiving stations were enlisted to record the simultaneous transmissions of 17 sending stations including W1AW. The logs indicate that W1AW, with Hiram Percy Maxim operating, made the first transmission for this test on June 1, 1920, and that the station was a consistent participant in the program until its conclusion in the spring of 1921. Although the resultant data was inconclusive, it did provide insights into short wave propagation.[2]

The 1920s roared in with a rush of interest in radiophone. Broadcasters appeared and competed with both amateurs and commercials for wavelength. This situation was relieved in 1922 when the United States Department of Commerce recognized amateurs as a distinct entity and imposed precise frequency allocations, separating the services. In March 1920, Tuska installed gear and introduced W1AW to the phone mode. The station sporadically utilized this mode to send announcements but rarely to make contacts.

Two major operating events occupied the station's staff during 1921. The first of these consisted of transcontinental tests which were held between the nights of January 14-15, and January 17-18. The objective of these tests was to send a message from one coast of the United States to the other and receive a responding answering message in the least amount of time. The standing record was one hour and 20 minutes for an East Coast to West Coast round trip. Both the efficiency of the National Traffic System (NTS) and the competence of its relay operators were challenged in this event. After several other round trip relays had been successfully completed, a new record was established on the last night of the event, just before morning dawned on the East Coast. 1AW (Hartford) sent a message via 9ZN (Chicago) and 5ZA (Roswell, New Mexico) which was received by 6JD in San Francisco, which dispatched a response that traveled back over the same route with a total elapsed round trip time of six and a half minutes. The back of the logbook has a number of typewritten pages stapled in, comprising a draft report of the event, which later appeared in *QST*.[3]

The second 1921 operating event was the first transatlantic test, which was run during early February. The objective was for prequalified stations in the United States to be heard by British amateurs. On February 5-6, F.S. Schnell recorded in the log "Ran off transatlantic on time—not much hope." This signified that 1AW had transmitted the signal that had been assigned to the station, on 200 meters at the precisely designated time. This carefully orchestrated event was a failure—not one of the 25 American stations was heard by the 250 or so listening Englishmen. But, this was not to be the last thrust in this effort.[4] The station was inactive during early August as the staff attended the First ARRL National Convention in Chicago. At this event, the Board of Directors met and considered actions to reverse the failure of the first transatlantic tests. The Board decided to conduct a second test in early December with an official listener from the United States posted in Britain. The log records the stations heard in the qualification preliminaries in No-


QST

PUBLISHED IN THE INTERESTS OF POPULAR WIRELESS BY THE AMERICAN RADIO RELAY LEAGUE, INC.

TRANSATLANTIC TESTS SUCCEED!

The Atlantic Ocean has been bridged by the signals of American amateur stations—not one but dozens of them! Paul F Godley, sent overseas with American equipment by the ARRL, set up his station at Ardrossan, Scotland, and there copied the signals of the following stations:

SPARK

1ARY	Burlington, Vt.	1BKA	Glenbrook, Conn.
1AAW	Illegal Station, not yet located	1XM	Cambridge, Mass.
1BDT	Atlantic, Mass.	1YK	Worcester, Mass.
2BK	Yonkers, N.Y.	2EH	Riverhead, N.Y.
2DN	Yonkers, N.Y.	2FD	New York City.
CAN.	3BP Newmarket, Ont.	2FP	Brooklyn, N.Y.
	C.W.	2ARY	Brooklyn, N.Y.
1RU	West Hartford, Conn.	2AJW	Babylon, N.Y.
1RZ	Ridgefield Conn.	2BML	Riverhead, N.Y.
1ARY	Burlington, Vt.	3DH	Princeton, N.J.
1BCG	Greenwich, Conn.	3FB	Atlantic City, N.J.
1BDT	Atlantic, Mass.	8BU	Cleveland, Ohio.
1BGF	Hartford, Conn.	8ACF	Washington, Pa.
		8XV	Pittsburgh, Pa.

This accomplishment is epoch-making and opens the door to unguessed possibilities in private radio communication. We will publish the

COMPLETE STORY IN OUR NEXT ISSUE – DON'T MISS IT!

January 1922 — 20 Cents

January 1922 QST front cover.

ARRL Hartford offices.

vember, the actual tests in December, and Schnell engaging the station in the "free for all" finale on December 16-17. The event was a major success, but not for 1AW, which was not among the 30 American and Canadian stations heard in Great Britain. This event also settled a controversy—spark was dethroned and CW was crowned king.

Hiram Percy Maxim's May 13 log entry states "No regular log kept up to here—station not operated regularly because of pressure of other affairs." The discipline of the log deteriorates from this point onward with fragmentary and sometimes unintelligible records. The operations of the station at the Maxim home were gradually assumed by expanding operations from the League's confined Hartford offices, utilizing the call 1MK.

In 1928, these functions were fully assumed by a modern station constructed at the newly created suburban airport, Brainard Field. The most advanced Amateur Radio station of its time, W1MK became the loud voice of the League. This station was destroyed by a flood in 1936, and was replaced in 1938 with the ultimate Amateur Radio station, the renowned W1AW – The Hiram Percy Maxim Memorial Station in Newington, Connecticut.

Overall, the logs provide insights into the operations of a significant wireless era institution. They fill in a great deal about the nature of this eventful period and provoke questions of detail and background that suggest matters for further research.

By Michael W. Marinaro, WN1M
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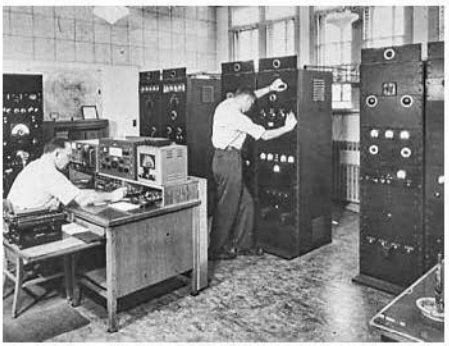
W1MK layout.



Early W1AW arrangement.

REFERENCES

1. Later changed to the current Q signal QSB.
2. "First Report of the Fading Tests," ARRL, *QST* August, 1923 pp 29ff, and other articles accessible from the online *QST* archives.
3. Warner, K.B. "The Story of the Transcons," ARRL, *QST* March, 1921, pp5ff.
4. Marinaro, M.W. "The Transatlantic Tests," ARRL, *QST* May, 2014, pp72ff.

Rotators with a meter indicator. Clockwise from top left: Crown CAR6A, Crown CAR6B, Alliance T-45, Alliance DIR.

More rotators with meter indicators. Clockwise from top left: Trio TR2M, Trio Aristocrat, Emerson-Brach Radio Rotator, La-Pointe Vee-D-X.

brown plastic cabinet. By contrast, La-Pointe Electronics' "Vee-D-X" rotator controller of the same year was a small and sleek type that came in heather green and cordovan mahogany. Trio did redeem itself in late '54 with its trim new "Aristocrat" model and its four color choices: Mahogany, Golden Wheat, Decorator's Gray, and Broege Marble (whatever that is). Brach Manufacturing even teamed up with Emerson to make a "Radio-Rotator" in 1956. *That* would be quite a find!

The other major category of antenna rotator is the automatic type. No more holding down a switch until the antenna is pointed where you want it, just dial in the compass direction and in less than a minute you're there. But part two of the story will have to wait until the next issue. If you've enjoyed this, or hated it, or have any suggestions or comments, please let me know, at television@tv-boxes.com. I'd love to hear what you collect.

WORKING FOR DENTRON RADIO COMPANY, *continued from page 28*

console about 36 inches high with digital panel meters. These prototypes were fully functional but were never produced in quantity.

The Station One was a Morris Messenger pet project, which I think it would have been very successful. It was to cover 80, 40, and 15 meters on CW only; the receiver covered the full 80/75, 40, and 15 meter bands so SSB could be received to monitor activity by turning off the sharp CW receive filter. The transmit power was to be about 40 watts input; giving at least 25 watts output on 80 and 40 meters. This prototype was in the process of being finalized when the bank shut Dentron down, so it never had the chance to enter production. I have no idea where the prototype unit in process wound up.

The two-meter Clipperton V problem child

The Clipperton V was a problem child when I started at Dentron. This unit was a two-meter amplifier for FM, SSB, and AM. It took about 10 to 15 watts of drive and ran about 250 watts input power to a single 4CX250. The basic problem with the design was insufficient cooling due to too much back pressure on the small squirrel cage blower, plus issues with the final tank coil and tuning capacitor resulting from overheating due to the RF current. I found a larger blower that could be fitted into the existing amplifier; it improved the issue but did not totally solve it. I replaced the four turn tank coil with a tuned

(continued on page 50)

Radio and wireless apparatus and parts made in Rhode Island, including the following manufacturers: Standard Radio & Electric Co (Giblin Radioear), Royal Radio (PolleRoyal), Allan T Hanscom, Walter W Massie Wireless, CeCo Tube Co, Triad Tube Co, Argus Tube Co, Blackstone Tube Co, Everite Tube Co, United Tube Co, Coto-Coil Co, Apco Manufacturing, India Ivory Co, Warren Radio Phone, William E. Cheever (WECCO), Martin-Copeland Co (Mar-Co), Inlaid Co, Frank B. Perry & Sons, Hope Webbing, Ford Radio Co, Donle Electric Co, Bell Products Co, Willemin Radio Co, Everett Scanlon Radio Co, *Radio Progress* magazines from the 20s, O E Cote Keys, DEFELCO Battery Co, Sahara Dry Battery Co, Edson Radio Sales, Electrical Products Manufacturing Co (Dymac). Len Arzoomanian, 508-958-7391, arzoo623@webrightservices.net.

Japanese WWII tubes for a restoration of a Type 94-3C receiver. Types UF109A, UZ135, UF134, UF111A, UY133A. These have a 1 volt filament, 5 or 6 USA pin or British 4 pin base. Ray Robinson, VK2NO, email: robinson@tuberadio.com, vk2no@ yahoo.com.

WORKING FOR DENTRON RADIO COMPANY, *continued from page 40*

line tank circuit; it further improved the unit but did not totally solve the issue. A prototype of a new version of the Clipperton V was built using an RCA 8122 tetrode tube; it worked great but never made it to production. Like most prototypes, I have no idea what happened to it.

The one prototype I still own, the MLX-7400 SSB-CW transceiver

The only prototype I currently have from my Dentron days is the MLX-7400 160 to 10 meter SSB-CW transceiver with digital frequency readout and two internal VFOs. The unit was not finished when Dentron was closed down; I bought it not working for a low price at the auction to sell Dentron's assets, and I finished it about a year and a half after Dentron was gone. I still have it and it works very well.

Fate of my leased car

I kept my company-leased car for about six months after Dentron closed down by paying the lease company directly. It was a nice car but not worth $447.00 per month. I bought a 1970 Lincoln Continental Mark III when I turned in the leased Oldsmobile Toronado; I liked the Lincoln much better and it could have easily blown away the Olds, performance-wise. I had the Mark III for years and enjoyed it a lot.

THE BACK PAGE, *continued from page 52*

in rank since he is wearing canvas-top boots versus the leather boots on the fellow on the right.

The portable field station pictured on the front cover utilized an antenna mounted on an extension ladder that could have a tendency to become quite shaky in the wind! The antenna depicts an incredible example of one brave cadet at the top of the tower, calmly using binoculars. The instructor must be the hatless operator wearing headphones at the far left. A notation on the back of the photo reads: *A field wireless station at Culver*. That antenna image is a hoot!!

The school was founded in 1894 as the Culver Military School, and is located on the shores of Lake Maxinkuckee near the present town of Culver, Indiana. Now known as Culver Academies, the school currently offers programs for young men and young women, as well as summer schools and camps.