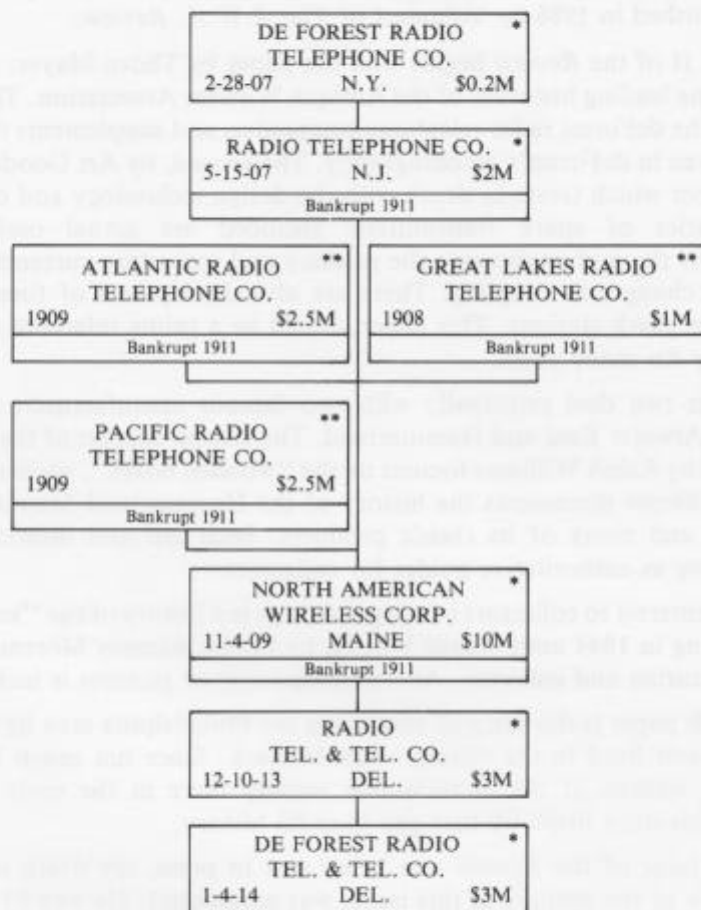


DEFOREST RADIO TELEPHONE COMPANIES 1906-1914



* Data from State incorporation papers.

** Data from report of trials.

T.L. Mayes
March 8, 1977

This chart shows the eight radio companies formed by deForest from 1906 through 1914. The name of each company is given at the top of each box, date of formation in the lower left corner, the state in which it was formed in the lower center, and the capitalization in the lower right in millions of dollars. Most of the data shown came from State incorporation papers; some from the reports of the trials.

DEFOREST RADIO TELEPHONE COMPANIES, 1907-1920

By Thorn L. Mayes, W6AX
Durango, CO.

Editor's Note: Thorn Mayes was one of the most dedicated and prolific historians of the Antique Wireless Association. He served with the General Electric Co. as an engineer and retired to Saratoga, Ca., where he assisted in the organization of the Foothill Wireless Museum at Foothill College in Los Altos Hills. He was the author of more than a dozen papers dealing with early wireless systems and the organizations and people that dealt with them. He was especially interested in recording a history of deForest and his work, and in the development of the oscillating arc by the Federal Company. He planned to publish a book of his collected historical papers in 1987.

R.M.M.

INTRODUCTION

This paper, after a brief review of deForest's early career, covers his work leading to patents on the three-element vacuum tube; his experiments with radio telephony using an arc to generate the carrier; formation of the six radio telephone companies and his subsequent trial by the U.S. Government for using the mails to defraud by selling stock in those worthless companies; development of the audion amplifier and oscillator while employed by the Federal Telegraph Co. at Palo Alto, Calif., 1911-1913; and finally, after selling the audion patents to American Telephone and Telegraph Co. for \$140,000, his setting up manufacturing facilities for building wireless equipment, including vacuum tubes, which he built for the U.S. Government before and after World War I.

I am indebted to Dr. L.F. Fuller, former chief engineer of the Federal Telegraph Co., for material on deForest's development of the audion amplifier and oscillator while with the Federal Co. at Palo Alto, to Gerald Tyne for data on deForest's work after returning to the east coast in 1913, and for other helpful suggestions in reviewing this paper, and to Lloyd Espenschied for materials on the deForest trials.

EARLY DEFOREST RADIO

Lee deForest's doctoral thesis at college was on wireless propagation, indicating an early interest in that subject. On his first job, with Western Electric Co., Chicago, he met Edwin Smythe, who was also interested in wireless. The

This paper was presented by the author at the Annual Conference of the Antique Wireless Association at Canandaigua, N.Y. on October 2, 1982.

two began experimental work together.

In those days the only detector, or rectifier, for receiving wireless signals was the coherer, which was insensitive and erratic in operation. DeForest recognized that the detector was seriously limiting the range of wireless, and for years looked for a more efficient device. He and Smythe developed an electrolytic detector they called a Responder, and using it, were able to pick up signals from a spark coil at a distance of four miles.

In 1902 deForest saw the electrolytic detector patented by Fessenden, consisting of a fine wire of platinum dipped into a cup of acid. Since the device was more sensitive than the Responder, deForest built a variation of the Fessenden design which he called a spade detector, and applied for a patent. Fessenden filed suit against deForest early in 1903, claiming the spade detector was an infringement of his design.

During their studies of various detectors, deForest and Smythe noted that the flame of a Welsbach gas light was affected by the operation of a spark coil. Later they learned that the flickering was due to sound waves, but deForest for years thought it was due to electromagnetic waves and that hot gasses might be a good detector of wireless signals.

THE COMPANIES

In August, 1901,¹ deForest, Smythe and others formed the Wireless Telegraph Co. of America, capitalized at \$3,000. The stock was distributed among the founders, so there was none to sell to the public and no way to raise money to continue their experiments. In February, 1902, a new company was formed,² the deForest Wireless Telegraph Co., incorporated under the laws of the State of Maine, with a capitalization to \$3 million. Later that year deForest met Abraham White, who saw an opportunity to sell a lot of wireless company stock. The name of the company was changed to the American deForest Wireless Telegraph Co.,³ and the capitalization was increased to \$5 million. In 1904 the capitalization was increased again, this time to \$15 million,⁴ as stock sales had been good.

DeForest and White formed a total of eight wireless companies, ending with the United Wireless Telegraph Co., capitalized at \$20 million. DeForest was the chief engineer of American deForest from 1902 through 1906. During that period, in addition to owning much of the stock in the company, he was paid a salary which he used to support a small laboratory, and carried out experiments with various vacuum tubes in the hope of finding a better detector for wireless signals.

DeForest took out a number of patents on wireless detectors which were reviewed by G.F.J. Tyne in his series, "Saga of the Vacuum Tube," published in Radio News during 1943-1946. He said the most important were:

No. 979,275—Applied for February 2, 1905, on a heated gas type detector using heat from a Bunsen burner or lamp filament enclosed in a partially evacuated glass bulb.

No. 836,070—Issued November 13, 1906, covering a heated filament in a partially evacuated glass bulb with a metallic plate. This was the two-element tube.

No. 879,532—Filed January 29, 1907, issued February 18, 1908, which disclosed a filament heated by an external battery, a rectangular plate, and a grid between the filament and plate, all mounted in a partially evacuated glass enclosure. This was the grid audion or three-element tube patent.

The deForest spade detector was being used in practically all of the stations of the American deForest Wireless Telegraph Co., and many of them had been sold to the Navy. In mid-1906, after long litigation, the courts decided that the deForest design was an infringement of the Fessenden design. American deForest was, therefore, forced to change the detectors in all of their stations. Fortunately Gen. H. H. Dunwoody, who had received a patent on the use of a silicon crystal for a detector, was now an officer of the American deForest company, and his detector replaced deForest's electrolytic.

President White held deForest responsible for the change, as well as for the cost of litigation. In a heated last meeting in White's office on November 28, 1906, deForest resigned from the company and turned in his stock holdings. He was given a severance allowance of \$1,000, plus ownership of the patents that had been issued on his audion detectors, plus those he had applied for, as White considered them worthless. The lawyer who drew up the severance paper charged deForest \$500, which left him with \$500 in cash and his patents.

After leaving the American deForest Wireless Telegraph Co., deForest concentrated on his tube experiments, and according to Tyne,⁵ in December, 1906, assembled a tube which had a filament, plate and third element between filament and plate which he called a grid. This was the three-element tube for which a patent application was filed in January, 1907.

For some time deForest had been experimenting with a radio telephone, using an arc to generate the carrier which was modulated with a microphone. After completing the three-element tube, his interest shifted to the radio-phone and by early 1907 he was able to communicate across the laboratory.

The deForest Radio Telephone Co.⁶ was formed in February, 1907, under the laws of the State of New York, for the purpose of developing, manufacturing and selling radio telephone systems and parts. The company was capitalized at \$200,000. Directors were Samuel Darby, H.S. Mott, E.G. Sammis, J.V.L. Hogan and Oscar Shaw.

This company did not provide the money needed to carry on experiments, so on May 15, 1907, deForest formed the Radio Telephone Co.⁷ in the State of New Jersey, capitalized at \$2 million. From George Clark's *Radioana* 5-668 comes this quote from the prospectus of the new company:⁸

"The Radio Telephone Co., capital \$2 million, all common stock, par value \$10, a New Jersey corporation. President James Dunlop Smith, Lee deForest Vice Pres., Samuel Darby Sec'y., G.T. Ivory, Treas., Patent Council G.K. Woodworth, Samuel Darby."



Fig. 1. Lt. Weaver with deForest radio-telephone transmitter aboard the USS Connecticut, flagship of the "Great White Fleet", 1908.

Photo:

A.W.A. Museum

James Dunlop Smith was one of the star stock salesmen of the American deForest Wireless Telegraph Co., so it would appear that deForest had again reverted to stock selling to obtain money to support his experiments.

Amateurs, and others in the New York City area who were equipped with radio receivers, began hearing voices on the air and phoned in the results of deForest's experiments. In the spring of 1907 a radiophone was installed on the ferryboat Bergen, and a similar installation was made at the Hoboken terminal at 23rd Street, Manhattan. The two stations communicated satisfactorily.

Radiophone signals were picked up at the New York Navy Yard, which resulted in a request from the Navy to install radiophones on two Navy ships, the USS Virginia and the USS Connecticut. Specifications called for satisfactory communication over a distance of 10 miles, but under tests the vessels could carry on a conversation over a distance of 21 miles.

Based on those test made in September, 1907, the Navy ordered 26 complete sets⁹ to be installed on the main vessels of the Great White Fleet that was to make a good will trip around the world. The sets were built and installed on an emergency basis, and little time was allowed for instructing operators in their use. The radiophone at that time was still a laboratory instrument requiring special care and adjustment and was not suitable for general use. As a result, Capt. Howeth states that in March, 1908,¹⁰ Rear Admiral Evans, commander of the fleet, directed that all radiophone sets except that on the USS Ohio be dismantled, as their use interfered with regular radio communication.

In January, 1908, deForest's laboratory in the Parker building was destroyed by fire. The complete history, including tube samples showing the development of the audion from 1905, was lost along with records and note books.

In February, 1908, deForest went to Europe to demonstrate his radio telephone. He had made arrangements to broadcast from Paris using an anten-

na strung from the Eiffle Tower. For a week he experimented using an antenna from the 125-foot level. He was then permitted to use, for one night, the long antenna that came from the top of the tower, a height of 984 feet. With this radiator, his broadcast was heard in Marseilles, a distance of 400 miles.

From Paris he went to Germany, where he met Dr. George Seibt, who was working on development of the quenched spark gap. He discussed with Dr. Seibt the possibility of coming to America to continue his development and testing in deForest's laboratory.

Four radiophones were purchased for installation on Italian warships, so deForest went to Rome to supervise their assembly and tests. In September the British purchased two sets for installation on their naval vessels, so he then went to London to supervise that job. The New York Commercial of October 2, 1908, tells of their satisfactory communication over a distance of 50 miles.

Emil J. Simon came to deForest's new laboratory late in 1908, and Dr. Seibt came from Germany in January, 1909. The two men then concentrated on the quenched spark gap development used with a 500-cycle power supply. Extensive testing carried on later proved that this design appreciably increased the range of a given powered spark transmitter. In addition, the 500-cycle note carried through static much better than the lower tone of the usual rotary gap transmitter. According to George Clark, Dr. Seibt filed for a patent on the quenched gap spark system on December 7, 1909.

A small shop in Newark, N.J., was leased, where amateur and Navy gear sold by the Radio Telephone Co. was built.

Sales of Radio Telephone Co. stock were not good, so the directors decided to try the system that had worked so well to increase sales of American deForest Telegraph Co. stock. A number of stations were to be built along the shores of the Great Lakes and the Atlantic coast to show prospective customers that the company was in operation and to let them witness an exchange of messages.

First, the Great Lakes Radio Telephone Co.¹¹ was formed in early 1908, capitalized at \$1 million, to operate the stations and to provide stock for sale. A publicity campaign was then launched in *Modern Electrics* magazine. The August, 1908, issue carried a two-page story on the new deForest Aerophone. The October, 1908, issue carried a picture of a large antenna on top of a 12-story building in New York City that would be used for development work. The article stated that the Radio Telephone Co. was getting ready to install a chain of stations all along the Atlantic coast from Eastport, Maine, to Pensacola, Florida, then west along the Gulf coast to New Orleans, Mobile and Galveston.

The December, 1908, issue carried a two-page article, "Aerophony on the Great Lakes," which is quoted in part, as it is written like a brochure used by stock salesmen.

"The use of the Aerophone upon the Great Lakes will so effectively safeguard the shipping, that we may expect it to act as a great object lesson in giving the necessary impetus to the completion of the great inland waterway system that the nation needs so much. Some

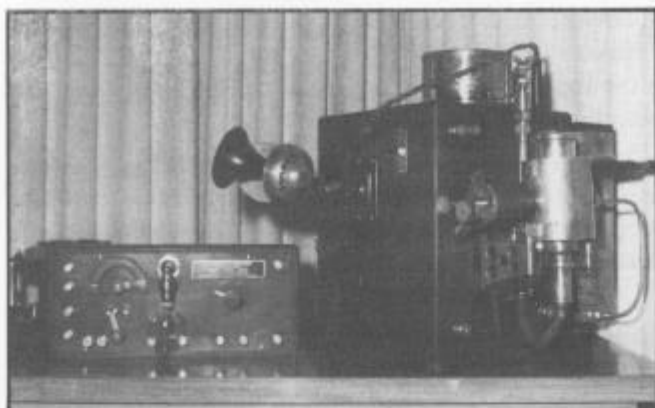


Fig. 2. DeForest arc-type radiophone transmitter with audion control unit (about 1912).

Photo:

A.W.A. Museum

25 long-distance stations will stand ready to carry on the great work when navigation begins this coming spring, including stations now under contract for Chicago, Toledo, Cleveland, Detroit, Benton Harbor, Muskegon, Bay City, Cheboygan, Manistee, Mackinaw, Alpena, Sault Ste. Marie, Port Huron, Ashland, Milwaukee, Duluth, Dunkirk, Buffalo and Erie, and we may look forward during the summer to the equipment of at least 100 intermediate stations, each having a range of about 75 miles, thus enabling every one of the thousand or more vessels to be equipped to keep in constant touch with the shore. The owners of several thousand freighters are anxiously awaiting the installation of the Aerophone, realizing that under the peculiar conditions governing the crowded commerce the Aerophone is as essential to the economy of the trade as the ship's hull of steel."

Also in that issue is an ad by the Ellsworth Company, stockbroker, which stated: "The Great Lakes Radio Telephone Co., using the deForest Wireless system, is erecting stations upon the Great Lakes, and plans to have over 100 stations and 1,000 boats equipped by the middle of the coming summer. If you can invest \$10 or more a month, write for full particulars."

Under the caption, "Wireless Banquet," *Modern Electrics* for April, 1909, carried the following story, quoted in part:

"At a banquet given February 13th last, in the historic Fraunces Tavern, New York City, in honor of Dr. Lee deForest's work in Aerophony, and on account of the successful financing of the Great Lakes Radio Telephone Co., the inventor, Dr. deForest, spoke of his achievements. Mr. Smith, president of the company, announced plans for the immediate erection of a chain of wireless stations along the Atlantic and Pacific coasts, as well as certain points in the interior. Over 100 wireless men attended the banquet."

In spite of the large number of radiophone stations that were to be built by the Radio Telephone Co., according to articles in *Modern Electrics* for 1908, none were listed in the call books for 1909, 15 were listed for 1910, and 14 for

1911. No stations belonging to the Radio Telephone Co. were listed in the 1912 call books.¹²

All of the stations, except the two in New York City, were equipped with spark transmitters. In addition, a few had short range radiophone. A total of 11 stations were built on the shores of the Great Lakes, five on the Atlantic coast, and none on the Pacific coast.

Five-kW quenched gap spark transmitters using 500-cycle alternators had been installed in the New York and Philadelphia stations which were demonstrating unusually good performance and were being watched by the Navy.

George Clark, the historian, in his book *The Life of John Stone Stone*, on page 111 states that Stone, in 1908, while developing a 15-kW transmitter for the New York Navy Yard, had discovered the principle of the quenched gap, but at the time did not apply for a patent on the design.

On page 117 he wrote that when Dr. Seibt proposed the 500-cycle quenched gap system, the Navy bought samples, tried them and immediately accepted the design. This spelled the end of the Stone Wireless Telegraph Co., as it had specialized in building equipment for the government and now its market for spark transmitters was gone.

Two other companies were formed by deForest in 1909, the Atlantic Radio Telephone Co.¹³ to operate stations on the Atlantic coast, and the Pacific Radio Telephone Co.¹⁴ to operate west coast stations. Each was capitalized for \$2.5 million.

At a directors' meeting late in 1909, President Smith announced that the Radio Telephone companies were bankrupt, with debts of more than \$40,000 and no cash to pay them. He also announced his resignation. After Smith left the meeting, several possible plans were discussed. One was to report Smith's raid of company treasuries to Federal officials for prosecution. Burlingame disagreed with that plan as it would have seriously hurt future stock sales. He proposed that a new company be formed from the three Radio Telephone companies. This plan was accepted, and on November 4, 1909, the North American Wireless Corporation¹⁵ was formed under the laws of the State of Maine, capitalized for \$10 million, which took over the assets and operation of the Great Lakes, Atlantic, and Pacific Radio Telephone companies. Stock outstanding in those three companies was replaced with North American Stock.

In the formation of this new company, deForest turned over his stock in the Radio Telephone Co. to Burlingame, thus losing clear title to his audion patents. This transaction would later interfere with his sale of those patents to the telephone company.

Stock and bond sales were hurt by the demise of the Great Lakes, Atlantic and Pacific companies. Operations had to be reduced, so a number of stations along the Great Lakes were closed. The laboratory and the Newark plant were kept open, as both the Army and Navy were beginning to buy quenched-gap transmitters. Income from those sales, however, was small compared to income, normally, from stock sales.

DeForest installed a $\frac{1}{2}$ -kW radiophone transmitter in the Metropolitan Opera House, and on January 13, 1910, broadcast the performance of several opera stars. Unfortunately he had selected a wavelength of 850 meters for the broadcast, the same wavelength used by a busy United Wireless station in New York. This spark station DF was operating most of the time, so little of opera broadcast was heard by the amateur audience because of the interference. He continued the transmission of voices of various opera stars, and in May the program was heard in the Radio Telephone Co. station XAW in Newark, N.J.

The Signal Corps bought two quenched spark gap transmitters to be installed on U.S. Army transports, one in Seattle, one in San Francisco. Early in 1911 deForest went west to supervise the installation, adjustment and testing of the sets. Before the work was completed, he heard from the east that stock sales were very low. The Radio Telephone Co. went into bankruptcy March 11 and its assets, excluding patents and stock, were sold to the Garwood Co. The Newark, N.J., factory and the New York City laboratory were closed and deForest's paychecks discontinued, so he decided to stay on the west coast.

C.F. Elwell, then chief engineer of the Federal Telegraph Co., in the first draft of his autobiography, said that Dr. deForest came to San Francisco early in 1911¹⁶ and opened an office for the purpose of selling stock in his various radio telephone companies. Sales were not good, so in July he went to Elwell saying that he would like to work for Federal. Elwell commented that deForest had invented the three-element tube five years earlier, but so far had found only one use for it—as a detector—and that he felt there were other things it could do. An amplifier was badly needed by Federal to help in receiving weak radio signals, so he hired deForest to head a team to concentrate on development of a circuit that would cause the audion to amplify.

DeForest was hired at \$300 per month and went to work in the Palo Alto laboratory of Federal Telegraph. Two capable men were assigned to work with him, C.V. Logwood and H. van Etten. Logwood was a radio amateur and a born experimenter; van Etten had worked for the telephone company so he understood the circuits they used.

After starting work on the amplifier, deForest began the study of the problem of increasing the rate of communication between the Federal stations in Los Angeles and San Francisco.

With the arc system, the arc burns continuously, generating a radio frequency carrier. Communication is accomplished by changing the carrier frequency with some device connected to the telegraph key. A common method was, through a relay, to short out turns in the antenna tuning inductance. As a result the transmitting frequency was higher than the standby frequency, or as it was called, the back wave.

Operators at the Los Angeles and San Francisco stations had learned that under certain conditions they could communicate better if they used the lower standby frequency, and had switches on the operating tables for making this change.

DeForest observed this phenomena, studied it and was the first to report on selective fading on different frequencies. He prepared a paper on this subject,

which he gave at one of the first meetings of the Institute of Radio Engineers.¹⁷ Later Dr. L.F. Fuller made a detailed study of selective fading between the Federal stations at South San Francisco and Heeia, Hawaii.¹⁸

In March, 1912, deForest was served a warrant by two U.S. Marshals which stated that he, Captain Darby (his patent attorney), Smith and Burlingame, had been indicted by the U.S. Government for using the mails to defraud in the selling of worthless stock in his four radio telephone companies. Beach Thompson, president of Federal Telegraph Co., raised the \$10,000 bail so that deForest could continue working.

Elwell continued in his autobiography that in August, 1912, Logwood invited him to witness the performance of a cascade amplifier using three audions. It amplified the ticking of a watch, held in front of a microphone, so that it could be heard all over a large room through headphones, as there were no loud speakers available at that time.

Dr. L.F. Fuller said that when he came with Federal in September, 1912, the amplifier circuits were completed. Several amplifiers were built by Federal for test in the South San Francisco station. Performance was not dependable, for sometimes they amplified, sometimes they did not.

Fuller had come from the National Electric Signaling Co. where he had been working on the development of a small arc generator for supplying the carrier for Fessenden's heterodyne receiver. He said the operation of these small arcs was erratic, and that if the audion could be made to oscillate it should be a much more satisfactory source of signal. DeForest, van Etten and Logwood immediately began work on developing an oscillator circuit.

Later that year, Elwell took the amplifier with him to Washington where he demonstrated it to Dr. Louis Cohen, a radio expert with the U.S. Navy, who was so impressed with its performance that he took it to the Bureau of Standards where test showed an amplification of 120 times.

DeForest knew that the telephone company had been trying to build an amplifier for their long lines. Based upon the Bureau of Standards tests, he decided to take it to Western Electric for a demonstration. John Stone Stone, a friend of deForest's and then a consulting engineer in New York City, had been a former telephone company employee. He arranged for a demonstration which deForest gave on October 30 and 31, 1912.¹⁹ Dr. Arnold, a high vacuum specialist for the telephone company, who was working on the problem of developing a suitable amplifier, was not present at the deForest demonstration. He did witness the amplifier's performance the next day, however, when Paul H. Pierce, an assistant, operated the equipment.

W.R. Ballard, patent attorney for the telephone company, writing in the *Bell Laboratories Record* for July, 1931,²⁰ made these comments on the tests:

"The performance of the tube was far short of what, they knew, would be necessary for practical telephone repeater operation. Any attempt to handle loads comparable to those in commercial telephone circuits resulted in choking, blue glow and unintelligible reproduction. Nevertheless, they were greatly impressed with the

performance of the audion when the power levels were kept low and the variations in voice currents were small.”

He continued that Dr. Arnold felt the tube’s performance could be greatly improved by pumping to a higher vacuum. Arnold immediately started constructing and testing tubes pumped to higher vacuum, and by late spring of 1913 was sure that satisfactory repeater tubes could be produced.

According to Lubell, deForest had given Stone a six-month option to sell patent rights for the use of the audion as a repeater to the telephone company for \$100,000. He had expected to hear from the telephone company in a short time, but when he had not heard by January, 1913, he returned to California to his job with Federal.

DeForest had taken a second amplifier to New York, and had interested the officers of the American Telegraphphone Co. in exploring the possibility of recording sound on a wire that was synchronized with the taking of motion pictures. In April, 1913, that company advised him that they had enough money to start experiments, so he quit his job with Federal and returned to New York City, taking Logwood with him. His wire recordings were so poor that American Telegraphphone soon lost interest, and deForest was again out of a job.

Meanwhile, the telephone company, after determining that a successful repeater could be made, investigated deForest’s patents and found that he did not have a clear title. In giving title of his Radio Telephone Co. stock to Burlingame in the formation of the North American Wireless Corporation, he had lost control of the patent. The telephone company hired an outside lawyer to try to straighten out the situation. This job was turned over to Sidney Meyers, who after four months’ work was able to get all those involved to sign papers agreeing to sell the telephone repeater patent rights for \$50,000. In July, 1913, the telephone company acquired the audion patent rights for repeater service for \$50,000.²¹ DeForest was later able to get a clear title to his patents, but only after considerable difficulty with former officers of his companies.

Using part of this money, deForest re-established his New York City laboratory, and with Logwood’s help, began making RJ-4 audion detectors for sale to amateurs, and ultraudion regenerative detectors for the Navy.

In March, 1912, deForest had been served an indictment by the U.S. Government on four counts of using the mails to defraud in selling worthless stocks and bonds in his wireless telephone companies. On October 14, 1912, he pleaded not guilty.

On December 1, 1913, the trial of deForest, Capt. Darby, James D. Smith, former president of Radio Telephone Co., and Elmer Burlingame, his assistant, began in the Federal District Court, New York City.

It was brought out at the trial that from January 5 to July 6, 1909, stock sales in the various radio telephone companies amounted to \$844,000.

On December 10, evidence was submitted by government witnesses that of \$1,507,505 in stock sales of the companies, only \$346,000 went into the



Fig. 3. Lee deForest and wife Maria display one of the earliest audions to Alan B. DuMont (about 1952).

Photo:

A.W.A. Museum

treasuries of those companies, with \$1,162,000 going to agents and promoters.

Dividends on Radio Telephone Co. stock were paid from money received from the sale of other stock.

The companies did not build the stations they promised in their advertisements, they had not set up substantial operating companies as promised, and the whole scheme was one of selling worthless stock to the public.

The Radio Telephone Co. and the North American Wireless Corp., which had been formed from the Great Lakes, Atlantic and Pacific Radio Telephone companies, had a total capitalization of \$12 million. Their only asset was ownership of the patents on the deForest audion detector, which at that time were worth little.

On December 30 the case went to the jury. After deliberating until 1:00 the following morning, they returned with the following verdict:²²

Smith and Burlingame—Guilty on counts 1 and 4, disagree on counts 2 and 3.

Darby and deForest—Not guilty on counts 1, 2 and 3, disagreement on count 4.

On January 7, 1914, Judge Hunt gave the following sentences:

Burlingame—Two and one-half years in prison, fine of \$10,000.

Smith—One and one-half years in prison, fine of \$5,001.

Darby and deForest—*nolle prosequi*, meaning no more prosecution.

Lloyd Espenschied attended many of the sessions of the trials and made these comments:

“The Prosecuting Assistant District Attorney Stevenson was noticeably easier on deForest and his patent attorney, Darby, than upon the other two defendants. This resulted from recognition that deForest had been a rather noteworthy inventor, a fact brought

home to Stevenson by a petition gotten up by members of the Wireless Institute headed by Robert Marriott.

“But the extent to which deForest had been infringing other people’s patents, notably Fessenden’s electrolytic detector, the Telefunken quenched gap and the Poulsen arc, was not brought out in the trial.”

In a letter to Jerry Tyne, dated February 10, 1964, Lloyd Espenschied stated that he found two old newspaper clippings—that looked like the New York Herald—dealing with the deForest trials.

March 7, 1911

“WIRELESS CO. IN LAW’S GRIP

“Sheriff Seizes for Auction All Tangible Assets of the Radio Telephone Co.

“The Radio Telephone Co. wound up in the Sheriff’s hands yesterday. The company was launched in May, 1907 during the height of the wireless telegraph excitement, as a two-million-dollar corporation, to exploit Lee deForest’s wireless telephone. It was involved in patent litigation, which went against it both in this country and England.

“The company’s furniture and apparatus, which are now in storage, will be sold on Friday at a Sheriff’s sale to satisfy the \$1,286 claim of Col. Samuel E. Darby, once the company’s council, and Louis Duncan’s \$949 claim. Deputy Sheriff McDonnell found the company’s furniture and apparatus, the only tangible things which remain of it, in a warehouse.”

Friday, March 10, 1911

“NORTH AMERICAN WIRELESS CORPORATION”

“Deputy Sheriff Katz has received two executions against the North American Wireless Corporation of Madison Avenue in favor of Joseph M. Chapman for \$1,027 and Samuel E. Darby for \$803. He levied upon 578,315 shares of stock of various companies of par value of \$5,783,150, and was to have sold the right, title and interest of the company in these shares yesterday, but the sale was adjourned for two weeks. The stocks are: Radio Telephone Co. 110,173 shares; Atlantic Radio Telephone Co., 17,651; Pacific Radio Telephone Co., 7,019; Great Lakes Radio Telephone Co., 11,001; and North American Wireless Corporation, 425,000 shares.”

This trial, with the failure of his radio telephone companies, marks the end of deForest’s long association with wireless and radio communication companies. His radio operations from here on were limited to developing,

manufacturing and selling radio equipment, with no more sales of bogus stock.

Initially the Telephone Co. had purchased the rights to use the audion as a repeater tube, but in October, 1914 for the sum of \$90,000²³ they purchased additional rights. With this money, deForest enlarged his manufacturing facilities at High Bridge, including the installation of glass blowing equipment and high-vacuum pumps. Up to this time all audion tubes for sale had been manufactured by McCandless in New York City, but now deForest could produce his own tubes and McCandless had gone out of business.

DeForest, while on trial in December, 1913, formed the Radio Telephone and Telegraph Co. under the laws of the State of Delaware,²⁴ capitalized for \$3 million. This company was formed from the old Radio Telephone Co. of 1907 that had gone bankrupt in 1911. On January 4, 1914 the name was changed to the deForest Radio Telephone & Telegraph Co., but many of the RJ-4 audion detectors produced after that time carried the old nameplates, the Radio Telephone Co., as he was using up old stock.

With these new facilities, he developed, manufactured and sold an expanded line of receiving and power tubes, and also a complete line of amateur receiving equipment. Before and during World War I he built radio gear and tubes for the U.S. Government.

Soon after the war deForest became interested in perfecting sound on film for the movie industry.

Thus ended his long career with radio, for he sold his interest in the deForest Radio Telephone and Telegraph Co. and moved to Southern California to work on this new project.

NOTES

1. From incorporation papers, State of New Jersey, August, 1901.
2. From incorporation papers, State of Maine, February, 1902.
3. From incorporation papers, State of Maine, December, 1902.
4. From incorporation papers, State of Maine, amended March, 1904.
5. *Saga of the Vacuum Tube* by G.F.J. Tyne, H.W. Sams Co., page 61.
6. From incorporated papers, State of New York, February, 1907.
7. From incorporation papers, State of New York, May, 1907.
8. George Clark's *Radioana* 5-668 filed with Smithsonian Institute.
9. *History of Communications-Electronics in the U.S. Navy*, by Capt. L.S. Howeth, page 521.
10. *Ibid.*, page 522.
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