

# BROADCASTING 30 YEARS AGO

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In 1908 broadcasting required as much muscle as brains, what with cumbersome, temperamental equipment that would work continuously at least for a few minutes.



The DeForest tower in New York City from which the first opera was broadcast.

"FOR Pete's sake, change the tune!" Thus read our first unexpected "fan" communication scrawled in pencil on a U. S. Signal Corps telegraph blank handed us by the grinning operator in khaki.

"Just picked up from the U. S. S. Pennsylvania," he added verbally. "She's now passing the Hook on her way out to sea. Wireless operator telegraphs he has the wireless room packed with officers and men listening to your music. They've been snatching his earphones one from the other. Says you're getting out in fine shape."

So we had become wireless entertainers. Broadcasting was born. And transcribed programs had made their debut. All because, for the past ten minutes or more, we had been playing the familiar clanging strains of the Anvil Chorus from Verdi's opera "Il Trovatore" on our trusty Edison phonograph, over and over again, thereby giving our tired voices a merited rest from the shouting of test numbers and "How

do you get me now?" queries into the huge horn of the microphone.

*The Time:* 1908. *The Place:* Fort Hancock's wireless station at the tip end of that lanky peninsula known as Sandy Hook which sweeps northward from the New Jersey coast, seemingly in a last attempt to prevent shipping from slipping out of Lower New York Bay to the broad Atlantic Ocean beyond. *The Players:* Two engineers of the Telefunken Wireless Telegraph Company of America, one being your humble author, and a Signal Corps wireless operator. *The Plot:* A would-be serious attempt to span by wireless telephone conversation some eighteen miles of space as the crow flies between Fort Hancock and Fort Wood on Bedloes Island, in the very shadow of the Statue of Liberty. A contract for \$25,000.00 was to be the reward for a successful 5-minute talk between the two points.

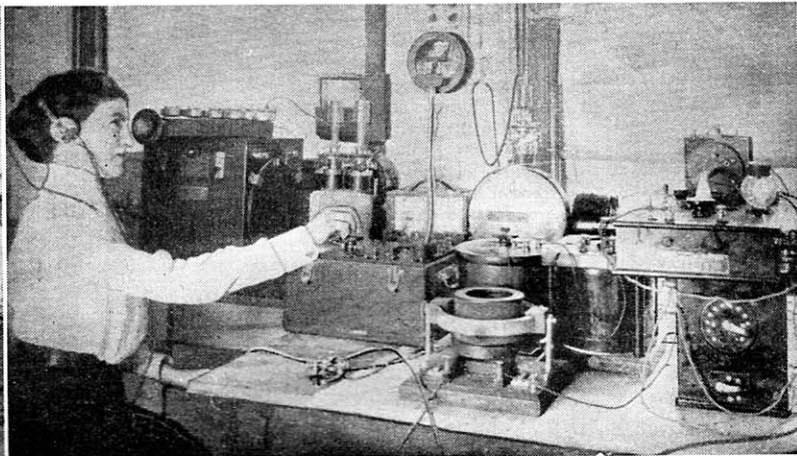
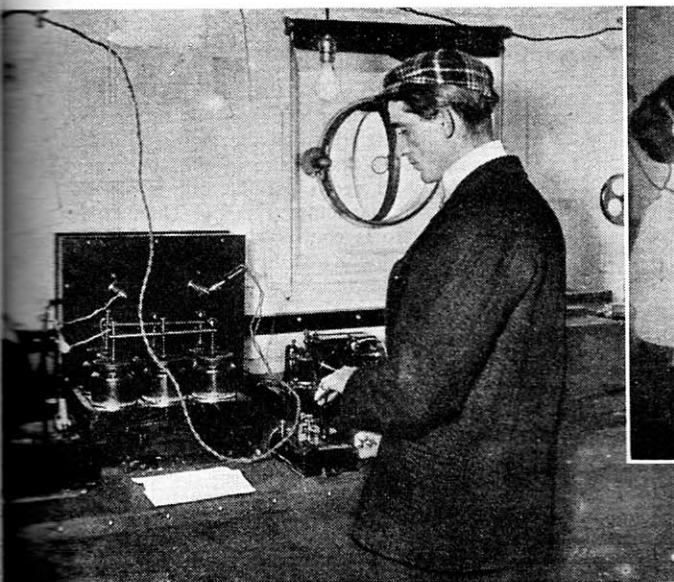
Such is the simple truth of the early struggles of radio broadcasting. My first job after leaving technical school was the taming of a new-fangled wireless telephone transmitter just arrived from Germany. It came in several crates. Also, the instructions in substantial technical German. But the descriptive text proved too formidable for our schoolboy German, and so we simply followed the pictures and diagrams in assembling the latest wireless rig from across The Pond.

In due course we had a mighty imposing

assembly set up. The wireless telephone transmitter was of the electric arc type. In fact, there were ten arcs to generate the oscillations, arranged in two banks of five arcs. Each arc consisted of a tall copper can filled with water, for the top electrode, and a large carbon button held on a metal strip, for the bottom electrode. Pressing down on a handle at the end of each bank, caused all carbon electrodes to be brought in contact with the copper tanks, thereby striking the arc. A thumb nut on each handle could be regulated to set the gaps for all the arcs of the bank, and to feed the carbons towards their cans as the former slowly wore away.

Mounted on a colossal oaken table with a tall back, the ten shiny cans and the ten metal strips carrying the carbon buttons looked more like an organ than anything else. And when the boiling water in the copper cans sent up clouds of steam, we had the makings of a steam calliope, visually speaking. On the rear board were several huge measuring instruments indicating the power supply voltage, the conditions within the closed oscillating circuit, and the output to the antenna circuit. Also a big loose-coupler with a fixed coil and a movable coil whereby to transfer the radio frequency energy from the closed oscillating circuit to the open antenna circuit. Finally, there was a microphone socket with its huge fibre horn coming

(Please turn page)



Typical radio installation (left) aboard a British ship at the time radio was "wireless" and was trying to prove its case. Above is a lady announcer operating one of the early radio telephones between New York City and Newark, N. J., in 1908. The thing she is looking into is—believe it or not—a microphone. It was good for 2 minutes before burning out.

right out to the front edge of the table.

Talk about present-day microphone fright. In those early days a performer or speaker would have been justified in fainting right on the spot when facing that four-foot horn and a vast array of electrical equipment including ten sputtering, smoking and smelling arcs.

Our imported wireless telephone in due course found its way aboard an over-sized tugboat bound for Fort Hancock. Several days later we had it reassembled and perking in the wireless station building on the sand dunes of Sandy Hook, behind a battery of disapproving Coast Defense guns. And for weeks and months thereafter, we commuted several days each week via an Army overgrown tugboat from the foot of Wall Street to Sandy Hook.

It was a cold winter, back in 1908-9. So cold that the grease in the motor-generator bearings became as thick and unyielding as glue. The motor-generator, a huge 7-horsepower Crocker-Wheeler affair intended to convert the Army Post's 110-volt D.C. supply into 600-volt D.C. for our ten arcs in series, had to be started the first thing upon arriving on the job. We threw the switch and swung the starting-box handle. No soap. The motor-generator wouldn't move. What with stiff grease and weak power supply, the armatures wouldn't turn.

Whereupon our sergeant-operator friend-in-need would get busy on the phone, calling up various places about the Post and requesting "Lights Out" not because of an air raid threat, for such threat could not have existed at that early date when the Wright Brothers had yet to spring their flying contraption on a startled world, but in order that we might get our motor-generator turning. Then, with sufficient power supply assured, we would mobilize several husky soldiers for a tug-of-war with that stubborn electrical mule. Several turns of rope were wrapped around the protruding shaft. The soldiers pulled on the rope. And lo, the cursed thing would start up, virtually thawing out its

bearings, and in time providing the necessary electrical diet for the ten hungry arcs.

So far, so good. We had power. The next thing was the taming of the ten arcs. Each sputtered and fumed in its own way. Each had to be critically adjusted to the right arcing distance. As often as not, when all would be behaving fairly well, one would suddenly go off on a bat and had to be pampered and coddled and brought back again into the fold.

The oscillating circuit meter indicated the antics of our arcs. With patience and coaxing, we finally achieved a stabilized meter reading, whereupon the stage was just about set for our wireless conversation. Without loss of precious time a carbon button microphone—in the form of a neat flat cartridge—was slipped into the holder and the four-foot fibre horn swung into position. Then we started talking over the air.

Crooners would have been out of luck in those days. You had to shout to make any impression on that wireless telephone. So you stood in front of the huge horn with your face practically jammed into its wide mouth, shouting your stuff. For want of something better to say, we kept counting numbers from 1 to 10 and back to 1 again, over and over again, with "How do you get me now?" repeated at frequent intervals. Every once in a while we tried "This is Fort Hancock calling Fort Wood via experimental wireless telephone." As with present-day broadcasting, it was a one-way conversation. There was no immediate answer from the party at the other end. Occasionally the sergeant-operator jotted down a brief report he picked up via wireless telegraph from Fort Wood. But since the wireless telegraph didn't do so well either getting through that maze of conflicting signals in the New York area, we generally got our answers by Western Union or Postal Telegraph, and detailed reports many hours later when we returned to the home office in New York that evening.

It all seemed so silly, this business of

calling numbers hour after hour. "1, 2, 3, 4, 5. How do you get me now. 1, 2, 3, 4, 5—5, 4, 3, 2, 1. Fort Hancock calling Fort Wood. How are we coming in?" And so on and on. Little wonder that we included in our equipment an Edison phonograph and a choice collection of cylinder records. Those records were chosen not for their musical or entertainment value, but for their acoustical wallop. That's why the Anvil Chorus record was our favorite, for those clanging sounds wobbled the modulation meter at least two degrees beyond the next best noise maker. In order not to lose too much of this precious noise, the phonograph horn was stuck as far into the huge microphone horn as possible.

Now the contract we were aspiring to called for a continuous conversation of at least five minutes' duration, before Signal Corps officials. But what a goal that was! At the end of two or three minutes, the modulation meter would no longer flicker in step with our shouting. That meant no further modulation of the outgoing waves. Or in other words, the microphone was "shot." Just as the early motorist had to change tires frequently, so we had to change microphones and we were well trained for those quick changes.

The four-foot horn was taken down. The cover came off the microphone holder. We reached in for the hot microphone cartridge with a pair of pliers, and dropped it in a pail of water where it sizzled itself cool and then to the junk pile. A fresh microphone cartridge was slipped into the holder, the horn restored, and the conversation resumed—provided the arcs were still behaving themselves—all in the space of a minute or two. But since the terms of the contract called for a continuous 5-minute operation, we had to start all over again in establishing our endurance record on the air.

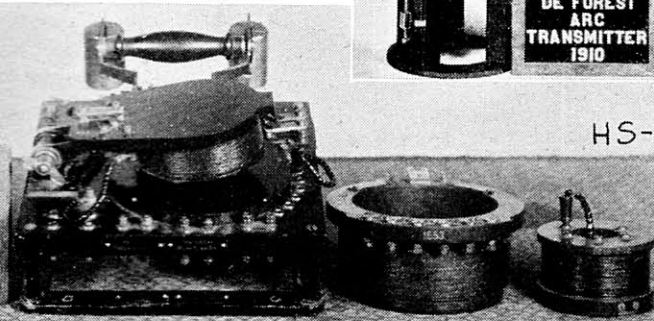
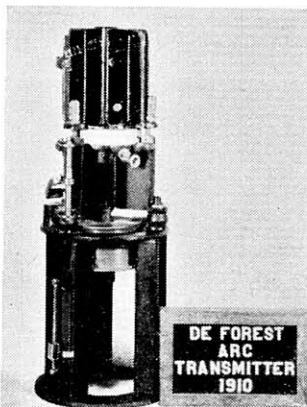
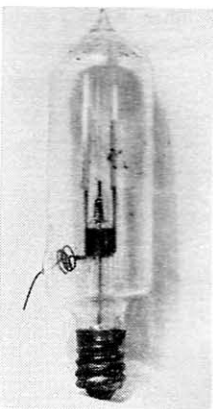
Some days we were fortunate—up to a certain point. Each microphone lasted for several minutes before its demise. The arcs could be adjusted continuously by turning the thumb screws, thereby maintaining an even gap and eliminating frequent striking. But then our tuning condenser would go bad, and that meant shutting down for the rest of the day. This tuning condenser was an elaborate-variable plate job in paraffin oil. It handled several thousand volts. Occasionally a spark would jump from rotor to stator plates, forming a carbon speck that shorted the condenser. Nothing less than taking the condenser apart, cleaning the plates with fine emery cloth at the site of the spark, and filling with fresh paraffin oil, would restore this particular Humpty Dumpty.

Our efforts continued through 1909 until the following winter. We tried, tried, tried. Once we held a steady conversation for six minutes. The contract loomed in sight. But the ranking Signal Corps officer who was to pass on our technical merits didn't happen to be on the job just then, so it didn't count. Finally, we dismantled the transmitter, placed it on the overgrown tugboat, and brought it back to our New York shop, where it finally sold for junk.

Our German confrères across the ocean couldn't understand our failure. With an

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(Left) An early form of radio tube. Note the plate lead brought out through the glass. (Below) One of the earliest German receivers. The top piece is a coil tuned by hinging it away from the lower plate. Various connections were made to the posts around it, and a plug-in tap switch was the latest feature. (Right) The famous arc transmitter over which the author broadcasted over thirty years ago.





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## Broadcasting 30 Years Ago

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exact mate to our transmitter, they had demonstrated wireless telephony to the German army over a distance of some one hundred miles. Perfect results. And we—bah! Couldn't even cover 18 miles!

The sequel to that story is simply this: Our intelligent German friends stretched their transmitting aerial parallel with a telegraph line running between the two points. Likewise with the receiving antenna. Of course they covered almost six times as much distance as we did. But we couldn't have found telegraph lines stretching over the Lower and Upper Bays of New York, even if we had thought of such aid.

For that matter, a stock promotion venture gave a marvelous demonstration of wireless telephony between New York and Philadelphia shortly after our tests. Clear, reliable two-way conversation took place. We were floored. Especially in view of the simplicity of the arc transmitters used, and the modest power. We would have been puzzled to this day save for the folding up of the stock promotion some time later. *Among the details coming to light was an unpaid bill presented by a telegraph company for the leasing of a direct line between New York and Philadelphia on the very day and hour of that marvelous wireless telephone demonstration.*

The oscillating vacuum tube or DeForest oscillation was yet to make its appearance, back in those pioneering days of 1908-9. But one Prof. Reginald Fessenden, somewhere in the wilds of Massachusetts at a place called Brant Rock, was experimenting with a high-frequency alternator, and Dr. A. F. Alexander was already at work in the General Electric shops on his high-frequency alternator. Dr. Lee DeForest, the Father of Radio, was experi-

menting in New York City with the oscillating audion.

For our part, we had little choice. The arc transmitter was the only thing available to us. And since the microphone had to control the output more or less directly, we couldn't expect it to stand up for more than a few minutes at a time. That is why our German confreres made the microphone in the form of a cartridge for quick-change acts. The microphone simply shunted several turns of the oscillation transformer secondary, thereby handling a current of several amperes at high voltage, soon baking the carbon granules into a solid cake.

All was not rosy at the receiving end either. The best we could provide was a crystal detector. Our German designers were trying hard to achieve fool-proof equipment. So the detector took the form of a hard-rubber tubular-case cartridge containing a sharp-pointed pencil lead pressing against a piece of galena crystal mounted on a spring. Provided with bayonet contacts, the detector cartridge could be instantly removed and replaced with another cartridge as seen fit.

Without amplification yet made available, the intercepted signals had to possess considerable strength to make a desirable impression. In our experimental transmissions from Sandy Hook we were picked up at such remote (!) points as Brooklyn Navy Yard, some 25 miles away.

Our German confreres, appreciating the need for amplification, came through after a bit with a microphonic or acoustic amplifier. This consisted of a telephone receiver mounted in a soft-rubber chamber, with plenty of sponge-rubber cushioning, facing a carbon microphone a couple of inches away. The idea was that the weak sounds of the sensitive receiver could be impressed on a microphone carrying a relatively strong current, thereby playing an electrical relay race, so to speak. It worked, after a fashion. Ultimately, the junk dealer got it for scrap rubber and metal.

Late in 1909, after nearly two years of wireless telephone work, my dad asked me just what I thought of the possibilities of wireless. My answer was promptly forthcoming: "Well, Pop, there's nothing in it. Wireless is simply an experiment, nothing more or less. Just so long as we have crazy arcs, hot-house microphones, temperamental crystal detectors and a bunch of engineers who simply don't know when they're licked, I can't see any future for wireless telephony."

"Wireless telegraphy may be all right. At least, with plenty of transmitting power, you can jam a signal through the air over a fairly decent distance. And you can get through often enough not to run up too big a cable or telegraph bill; or in the case of marine wireless, you can clear the accumulating wireless messages some time before the ship docks, so as to collect the tolls."

"No, I can't see wireless. I'm going in for something more substantial." And so early wireless lost one of its young engineers who wandered forth to the electric trolley car repair shop and the power house of a more substantial career. . . .

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