

The Collected Works of George E. Sterling

A collection of articles written by George E. Sterling
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George E. Sterling (W1AE) and Margaret Sterling circa 1964

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PREFACE

The collection of articles contained in this document was written by George E. Sterling during the 1961 to 1964 time period. These works contain biographical information beginning during the early 1900s through World War I and post-World War II. Photographs have been added and the articles have been lightly edited to correct errors. In addition to these works, Mr. Sterling compiled a manuscript describing the history of the Radio Intelligence Division during World War II. This manuscript is contained in a separate document titled "*The History of the Radio Intelligence Division Before and During World War II.*" The articles contained in this document comprise all of the other known unclassified/de-classified writings of George Sterling other than his published book, "*The Radio Manual.*"

Since 1998 I have researched George Sterling's history. I have been contacted by his friends, associates, grandchildren, and great grandchildren who have supplied additional information and photographs.

More detail about this project can be found on the web at:

<http://www.w3df.com> (main page)

<http://www.qsl.net/w3df/> (mirror site)

The web page that I have assembled about George Sterling can be found at:

<http://users.isp.com/danflan/sterling/dfh1.html>

The web pages contain biographical information about George Sterling and additional photographs.

A description of how this project began and how it has evolved can be found at:

<http://users.isp.com/danflan/sterling/htpctb.html>

This document is being provided in PDF format to anyone who is interested in learning more about George Sterling, a radio pioneer, author, and the only amateur radio operator to serve as FCC Commissioner.

Dan Flanagan - W3DF (since 1977)

Dan Flanagan
W3DF

November 29, 2014

EARLY WIRELESS 1908-1916



Figure 1: FCC Commissioner George E. Sterling (December 1951)

The wireless bug bit me in 1908 at the age of 14 when I was in the 9th grade of grammar school. I spied one of my classmates reading from a small yellow-covered book concealed in his history volume. It attracted my attention. I passed a note to him inquiring as to what he was reading. His reply was only: "You should read this." At the end of the school day, I set out after him and discovered that the small book was a catalog issued by Hugo Gernsback of the Electro Importing Company of New York, the sole supplier of wireless apparatus at that time. This incident occurred in the little town of Springdale, Maine, where my folks were then residing.

Reading the wireless catalog was a fascinating experience, and the thought of communicating through space without wires made a tremendous impression on

me. The catalog, in addition to containing a thrilling introduction to wireless, contained many pictures of coils, condensers, earphones, and other essentials necessary to establish a wireless sending and receiving station. All of this equipment could be purchased – if you had the money.

Together with Ray, who owned the catalog, and the minister's son Deac, who lived next door, and myself a dedicated trio was formed, determined to learn more about wireless. Having no money with which to buy the gadgets listed in the wireless catalog, we proceeded to do what many other experimenters did in those days: we wound our own coils, made condensers from zinc and glass plates, and utilized the necks of glass bottles for insulators for our aerials. On Saturdays we often went into the woods with a hammer and chisel looking for silicon, iron, and other minerals which might serve as rectifiers in our detectors.

Having completed our receiving set, what was there to listen to? We were without knowledge of the location of wireless transmitting stations or what their signals

would sound like. We had, of course, never seen a wireless station. The words wavelengths and kilocycles were not in our lexicon. The only information we accumulated came from the wireless catalog.

Day in and day out, we continued to adjust and readjust the cat-whisker of our crystal detector hoping to hear something that might sound like a code signal. Finally we heard a sequence of strong crashes. Could these be wireless signals? We appealed to the town's railroad telegrapher when he came off duty one night, asking him to visit our home and listen in. After listening for an hour and adjusting the apparatus over and over again, he announced that the crashes we were hearing were not intelligible signals, but nothing more or less than static!

Soon thereafter came the great day. My pal Ray announced he had picked up a definite sequence and concluded it was a wireless signal. We then proceeded to memorize the code. I recollect that when I saw a billboard or the headlines of a newspaper, I would read these in terms of dots and dashes. By this simple method I gained my first knowledge of the wireless code.

The following night I carefully tuned over the entire range of my home-made gear, adjusted the condenser by sliding a set of zinc plates in grooves between a set of fixed plates mounted on a homemade wooden contraption, selecting first one tap on the tuning coil and then another, and – suddenly – well above the crashes of static, I heard the well-defined signal of a wireless station. It was one of the greatest thrills of my life. Night after night I listened in, jotting down a few letters at a time, and later complete words followed by broken sentences. It was the Navy station at Kittary, Maine, 60 miles away, call letters AB.

Thereafter the three of us would spend Friday nights together, discussing wireless and building new gear, all through the night we searched for signals from distant stations. We heard some signals from time to time but were unable to identify them because of our lack of knowledge of the code. Then we concluded the only way in which we could learn the code, was to make our own sending apparatus and communicate with each other. After much time and effort, we succeeded. We even made our own batteries from copper and zinc elements donated by a friendly Western Union telegraph station nearby.

From the proceeds of my newspaper route around town, I was able to save enough money to buy a ½ inch spark coil – and what a honey it was! I will forever remember the first wireless call I made to Ray, and his slow-sending reply when he answered with my call letters GS and signing his own, RH.

Since Deac, the minister's son, lived next door, he and I decided we could use the same antenna which was supported at one end by a huge maple tree in my yard and by a large elm tree in his yard. What would we do for the wire needed for an

aerial? One Saturday we explored the neighborhood and found a long length of telephone wire, a twisted pair, running to an abandoned gravel pit. We "borrowed" it. Believing that the wire had to be bare to serve as an aerial, we coiled it up and placed it in the furnace of the parsonage to remove the insulation. By the time the insulation was well afire, the black, acrid smoke smelling of rubber and tar filled the basement and seeped up through the hot-air pipes into the rooms of the parsonage, and in particular, into Deac's father's study where he was preparing the Sunday sermon. The story soon spread all over town, and we never did hear the end of it.

With determined practice we soon mastered the code and enjoyed many a rag chew. Then came DX (long distance). My pal Ray proudly proclaimed that he had exchanged signals with another amateur in town two and a half miles away. Prior to this time we were able to communicate over a distance of only one mile, between Ray's house and my own. The following night I worked CS, Charlie Spinney, in Sanford, Maine. We all used our initials for call letters, and mine were GS. This contact represented the first and longest DX with a ½ inch spark coil.

Spinney was Chief Electrical Engineer of a large manufacturing company. He was more ingenious and qualified than the rest of us. From his amateur station I heard my first radiotelephone signals. Spinney built an arc transmitter utilizing the carbons from an arc light; it emitted a continuous wave. One of the by-products of an arc transmitter is the emission of spurious radiation known as "mush." We could not, without a chopper, read the continuous-wave signals from CS when he used the arc, but during his experiments he modulated the wireless signal with music from a phonograph record. Thus for the first time, in 1915, I faintly heard music on my crystal set, accompanied by the heavy mush of the arc. The big thrill came when Spinney called me by voice – my first introduction to amateur radio telephony.

A few years later I copied the list of survivors of the "unsinkable" Titanic which rammed an iceberg on her maiden voyage to New York in 1912. The list of survivors was sent out by the Carpathis, which had more than 700 rescued souls aboard.

I likewise recall the experiments conducted by the Navy with Dr. Fessenden's station at Brant Rock. Each day, the call letters BO were transmitted repeatedly to two Navy cruisers on a voyage to Africa. An attempt was being made to keep in touch with these ships throughout the entire voyage. Dr. Fessenden had invented a system of wireless telegraphy which gave the emitted signal a very high pitch or tone which was more clearly distinguishable and readable through static interference.

There was also a large coastal station at Wellfleet, Massachusetts, call letters MCC, that sent press and messages to ships at sea each evening at 10 PM. I will never forget sitting up in our cold living room during the winter nights, wrapped in a blanket, and sometimes an overcoat in addition, thereto, awaiting the greetings from the big station at Wellfleet which began its transmission with: CQ, CQ, TO ALL SHIPS EQUIPPED WITH MARCONI AND DEBEG APPARATUS AND SUBSCRIBING TO THE MARCONI PRESS SERVICE.

Little did I realize that in time I would be an operator on one of these ships, copying the press reports from Wellfleet.

One of the earliest recollections of my wireless career concerns the visit of my grandmother to our home each winter. As she departed, she gave each of the children a dime. Discussing my wireless career with my father, she said: "That's the kind of thing that drives boys crazy." In the years that followed, I often heard it said that you don't have to be crazy to be a wireless amateur – but it helps a lot.

On August 13, 1912, a new Radio Act was passed and it went into effect in December of that year. Licensing of amateur wireless stations was made mandatory under this Act. I received notice from the radio inspector in Boston, Harry Gawler, to appear at the Custom House in Portland, Maine, and take an examination. I passed the test and became one of the first four licensed wireless amateurs in Maine. The call-letters 1AE were assigned to me, and I have retained this call through all the intervening years.

In the fall of 1916, I went to sea as a commercial wireless operator when I was assigned to the SS Princess Anne (KOB). When the war came in April 1917 I was aboard the SS Philadelphia returning from a voyage to South America. A group of Boy Scouts in uniform came to my home and lowered my wireless aerial, which was then suspended between 65 foot poles which I cut and trimmed myself. All amateur wireless stations were shut down for the duration of the war, and the Boy Scouts did their part to enforce the rule.

Shortly after the war, I served on the SS Lake Medford, SS Lake Treba and the SS Conehatta from 1919 to 1923.

MILITARY RADIO INTELLIGENCE IMMEDIATELY PRIOR TO AND DURING WORLD WAR I

Military Radio Intelligence AEF France 1917-1918

The character of Military Radio Intelligence which I will narrate herewith was accomplished by 12 officers and 402 men of the Radio Section, U.S. Signal Corps AEF, World War I, who operated five different kinds of stations in France for keeping tabs on the enemy and policing our own communications to see that the enemy did not keep tabs on us.



Figure 2: WWI Army Signal Corps receiving station, France 1918.

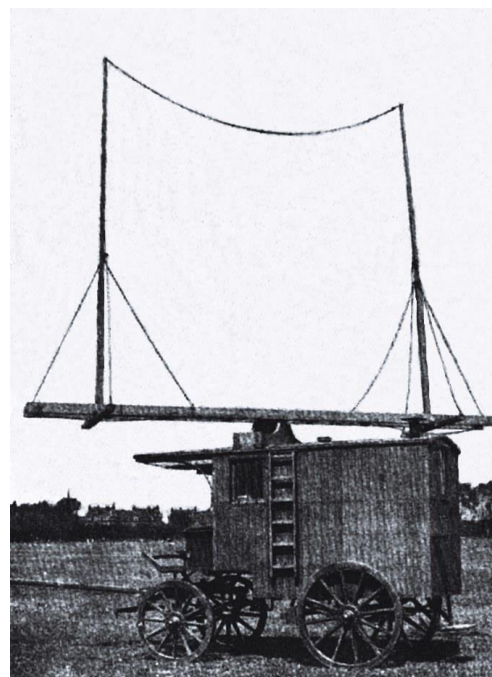


Figure 3: Direction finding wagon circa 1918.

This radio section operated intercept stations which copied German code messages transmitted to and between enemy ground stations; aircraft intercept stations which intercepted messages between enemy planes and their ground stations, direction finding stations which located enemy observation planes, control stations which supervised and policed the procedures of our own radio stations, and direction finding stations which took bearings on the enemy stations.

Another intelligence job performed by the Radio Section was the operation of listening stations which copied enemy wire telephone messages and TPS, Telegraphy Pour Le Soil. Telegraphy Pour Le Soil is better known as telegraphy by magnetic energy transmitted through the earth by powerful audio buzzer stations. I will narrate further on this activity subsequently.

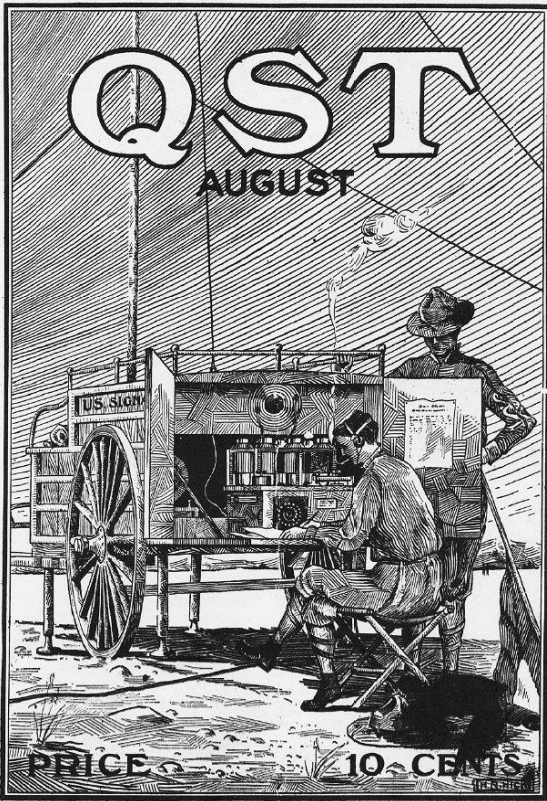


Figure 4: August 1916 QST depicting WWI military communications.

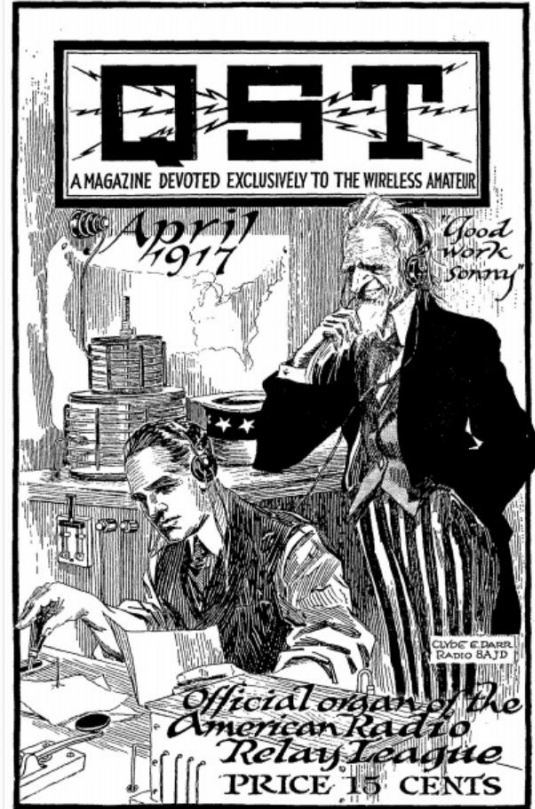


Figure 5: Beginning of WWI – April 1917 QST



Figure 6: Major General George O. Squier

During our participation in the war a total of 73,000 enemy messages were intercepted and 175,000 bearings taken on enemy radio stations by our direction finders. Significantly, seventy percent of the operators performing these tasks were formerly radio amateurs and their extreme loyalty was so great that not a single leak of their special work ever occurred. As Major General George O. Squier, Chief Signal Officer of the Army at the close of the war, stated, "The amateurs are certainly deserving of our country's highest appreciation and thanks for this great work."

As a Master Signal Electrician and instructor in the Radio Section, as well as Chief of the Radio Intelligence Division of the Federal Communications Commission in World

War II, I say “Amen again and again” to General Squier’s tribute to the amateurs.

I think it might be interesting at this point for me to digress for a bit and relate how a doughboy of the infantry and former Marconi Merchant Marine operator got into this interesting spy work, better identified as counter-intelligence.

At the time that we went to war with Germany in April 1917, I was a junior operator on the passenger steamship Philadelphia of the Red D Line operating out of Brooklyn, New York to Puerto Rico, Curacao and two ports in Venezuela. On our return voyage we received coded orders to paint the ship in Navy colors and sail without lights. The United States had declared war on Germany.



Figure 7: SS Philadelphia. In 1917 George Sterling was a junior wireless operator aboard this ship.

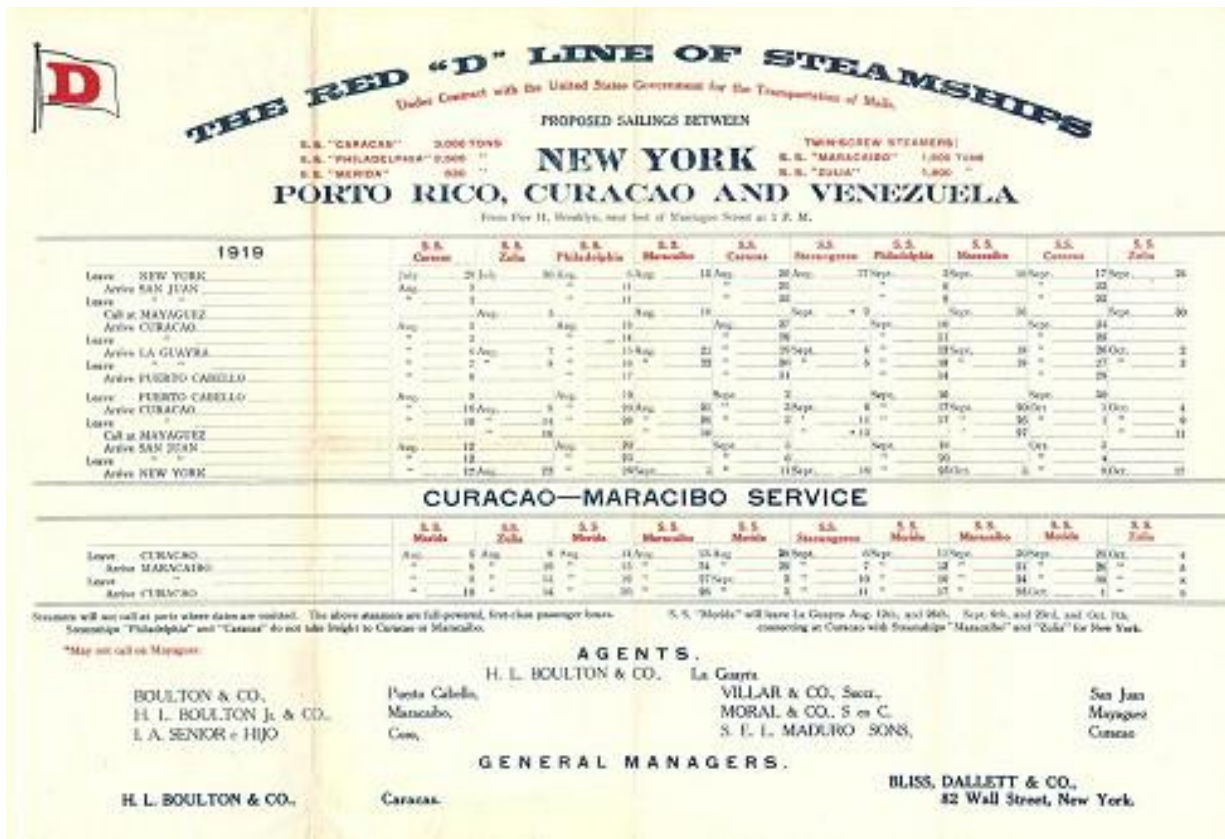


Figure 8: Red D Line schedule.

Chief operator Ribler on the Philadelphia had informed me previously that good ratings were being given to Merchant Marine operators enlisting in the Navy. When we arrived in New York I went directly to the Brooklyn Navy Yard and tried to enlist. I was informed that they could not take me until I received my discharge from the Maine National Guard.

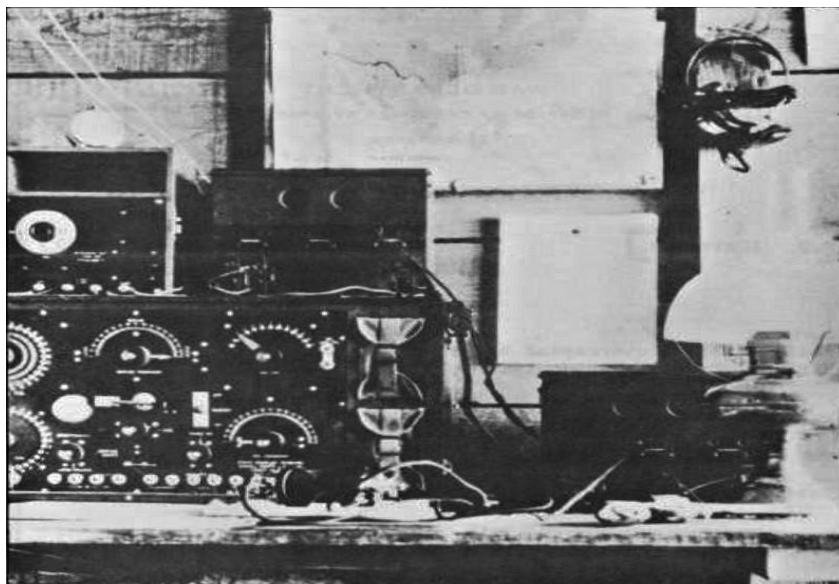


Figure 9: Mexican border intercept station 1918.

Prior to going to sea I had served on the Mexican border with the 2nd Maine Infantry, during the Pancho Villa raids on our border towns and ranches. I wrote to the Adjutant General of the State of Maine requesting a discharge. I stated that if I didn't hear from him in four days I was going to make another trip to South America. Word didn't come to me in time so I sailed again. When I arrived back in New York I found orders to report for duty with my Regiment in Maine. They had been called out to guard railway bridges of the Canadian National Railway and the Bangor and Aroostook railway in northern Maine. It seems that attempts had been made by German spies to blow up similar bridges in New York State.

In September of 1917 we sailed overseas as the 103rd Infantry, 26th Yankee Division (YD). Having been unsuccessful in my attempts to join the Navy I tried through my Company Commander to get transferred to the Signal Corps. I felt that my experience as a radio operator could be utilized to advantage there. The company commander tried to no avail. The Regimental Commander was a man adamant about losing a single doughboy by transfer.

My break came soon after we had landed in France and billeted in barns and stables in Le Fal Le Grand. The skipper recognized that I knew semaphore and wag-wag and detached me as a corporal from my squad. I was on my own. With another chap that I picked from the company we practiced flag signals while the other boys were learning grenades and trench warfare.



Figure 10: *Gondrecourt, France WWI*

The Old Man sent for me one day and advised that the Colonel was ordering me to a French Corps Specialists School where I would learn French Army Signal tactics. At the conclusion of the course I would return as Regimental Signal Officer. So I went happily off to Gondrecourt, Headquarters of the French 1st Corps School.



Figure 11: Bayonet training at Gondrecourt

This school trained specialists in all branches of the service; gas, grenades, artillery, aviation, signals, bayonetry and camouflage. It was attended by both officers and non-coms. As a doughboy I was low man on the totem pole, surrounded by officers of all ranks, Master Signal Electricians and Sergeants galore, mostly from the Signal Corps.



Figure 12: Training exercise at Gondrecourt

At the conclusion of each course, a combined maneuver took place, utilizing the students of each school. All hands participated. We went over the top with a rolling artillery and machine gun barrage combined with a gas attack from some of the crew representing the enemy. Our school handled communications.

I will never forget the guy who bunked next to me. He took his hand grenade training right seriously. At night, on his bunk, he would take both defensive and offensive hand grenades apart, reassemble them, open the door, pull the pin, and Zowie! Fortunately we had learned his lessons well. I was nonetheless delighted when he graduated.

Much to my surprise at the end of the course I was informed by the Major of the Signal Corps School that I was being retained as an instructor and that my Regimental Commander had been so informed. I was to instruct in wireless and pyrotechnics. I had some misgivings as to how I, a doughboy Corporal of the Infantry would make out instructing officers and non-coms of the Signal Corps.

In those days the Signal Corps tended to look down their noses at the doughboys.

I Try To Fly On One Wing

While at Gondrecourt I revived an interest in aviation which had been interrupted a few years previously due to parental interference after I had crashed a homemade glider in an attempt to take it off. Each day a group of aviators from the flying school at Monte came over to our school for code instruction. I struck up an acquaintance with several of them. In those days of 1917, aviation was only a branch of the Signal Corps. They took an interest in me and encouraged me to apply for a commission as observer. At that time an observer was a 2nd Lieutenant but received only one wing. Since aviation has always appealed to me I did so. When not doing my own duties I took up the Lewis Machine Gun, reading panels set out by the infantry, studied cartography, and use of coordinates in map reading. One of the duties of an observer was to correct artillery fire by wireless signals. My knowledge of the use of various pistols (flare gun) and rockets stood me in good stead.



Figure 13: WWI Flyers, British Sopwith (Camel)

My first airplane trip, in fact two in the same day, were in British Sopwiths, sometimes called Camels. What a thrill to me! These flights only served to stimulate my intent to be commissioned as an observer in the Aviation Section. My application had been favorably endorsed by the Major commanding the signal school and started its rounds through “channels”. I waited eagerly for over two weeks for final action. It came much to my dismay while thumbing through the endorsements I came to the Corps Commander General Ligetts, “endorsement disapproved”. This man’s qualifications make him a valuable man for the Signal Corps. Recommend he be transferred to the Signal Corps”. So all of my preparations for becoming an observer were for naught. It did lead to the Signal Corps from the infantry, as you will learn later.

As soon as possible I sought an audience with the Commandant of the Signal School. I told him of my disappointment. I have always remembered what he said. “Son don’t you want to go home after this war is over? You won’t if you go into aviation.” I had good reason to think of this statement. About each week a funeral procession from the flying field at Monte would go by us while we were on

field maneuvers. The fellows would chant dismally to the tune of the funeral march, "Ten thousand dollars going home to someone's folks". They alluded, of course, to G.I. insurance.

My reply to the Commandant's observation was that I had come to do a job and was disappointed after spending all my spare time studying for an observer to be turned down. He informed me that there was an interesting task to which I was to be assigned which would provide for my transfer to the Signal Corps. It seemed that the British and French had been successful intercepting, decoding and locating enemy radio stations, and that the Germans had been using wireless right up to the front line troops. This, he said, had led the U.S. Signal Corps to organize a section to participate in the same activity.

He revealed that already we had a few qualified operators with the French Army to gain experience with this endeavor. I was told that I was to go to General Pershing's Headquarters at Chaumont and from there I would go out to the front with Major Loghry to operate our own radio intelligence service.

Permit me to digress and relate two interesting incidents that occurred while I was on the staff of the Signal Corps School at Gondrecourt.

Infra-Red Ray Light Signaling

During my tour of duty at Gondrecourt as an instructor at the 1st Corps School, I was on occasion assigned some special tasks. I should mention that at the end of the course when I was told that I was retained as an instructor, another fellow, a 2nd Lieutenant of the field artillery, Richard Ranger, was also being retained. This same Richard Ranger, after the war became famous for his Rangertone Hi-Fi equipment, electric organs, and facsimile system. He designed the familiar NBC identification chimes. So the wireless school was in charge of an artillery officer and a doughboy Corporal, along with a Marine Corps Sergeant who specialized in maps. Each of us had been students in the preceding class. The Signal Corps apparently was hard up for radio men with such a motley crew to run their signal school. Lt. Ranger was my boss at the Signal School. He later made the rank of Colonel. I read of his demise recently.

One day two Signal Corps Intelligence Officers arrived at our headquarters from the states with special signaling light gear. I was assigned to work with them. One of the problems of visual signaling, particularly from the rear to the front, as for example; headquarters to the front line position, was the diffusion of the light beam making it easy for the enemy to read and locate the source. Each infantry company was equipped with a French signal light which was much like that of an automobile light. Its beam spread over a fairly wide arc, even though it might be placed in a trough in a dugout. The two officers from the states brought with them some special bulbs and associated gear that confined the beam to a narrow arc. They also brought an infra-red signaling light and two receivers, one field glass and the other a small mariners telescope which were equipped with special dark red filters.



Figure 14: WWI Signal Corps signal light

I was assigned to field test this equipment. The one that intrigued me the most was the infra-red unit. I was told to go out quite a distance and train my especially equipped glasses on a certain position which had been laid out on a map. Much to my surprise when I intercepted the beam of the infra-red device the dots and dashes registered as crimson characteristics on the lenses, yet no signals were visible to the naked eye. After the war was over I learned that these lights had been developed by Dr. Robert Wood, the world renowned Johns Hopkins University physicist. They were used a good bit during the remainder of World War I and by all major armies during World War II.



Figure 15: Major Edwin Howard Armstrong, WWI

Still another special assignment related to the testing of some small direction finder loops designed in Major Armstrong's laboratory in Paris to replace the cumbersome French ones we were using. These small loops permitted our operators to take twice as many bearings in a given time as compared to the French version.

An Experiment With Rockets

During my tour of duty at the school there were times we engaged in a bit of experimentation as the following will indicate. Rockets were of course an essential part of pyrotechnic signaling. In attendance at the school during one of the classes were two brothers from Kansas City, the Perkins boys. They were licensed hams and had served on the Mexican border, in the Signal Corps. It was their suggestion that we do something to improve the range of our rockets. We did! We fashioned wings and stabilizers and attached them to the rockets. Our first tests were

promising, but one day we overextended our experimentation. We fired two rockets simultaneously, but something went wrong and they took off in a direction in which we had not intended them to go. After several loops and tailspins they landed in a battery of field artillery where a bull session of artillery trainees was going on. A runner hailed me with a summons from the C.O. When I reported to him, he informed me that the Commandant of the Artillery School wanted to know why signals were showering his batteries with rockets. When I told the O.M. what we were trying to do he suggested that we move up nearer the front and try it out on the enemy. This was the end of our experiment to extend the range of rockets.

We were indeed pioneers in rocketry. While we didn't succeed in getting anything into orbit, we sure raised hell with the artillery. We sure could have used a range officer to destroy the itinerant rockets had we had the radio facilities available today.

I Am Ordered To General Pershing's Headquarters

My travel orders arrived and eventually I reported in at Chaumont. There I was assigned to a long wave intercept watch to copy POZ and other long wave stations for a few days until the Major was ready to shove off for the front.

A hitch in my travel orders led to interesting results, to be of great significance to me sometime later. On my transfer to the Signal Corps, I was assigned to Headquarters Company at Langres, France, but my travel orders read to Tours, farther south in France. While enroute, from Gondrecourt I came to the conclusion that someone had made a mistake. One morning my train stopped at Langres which is near Chaumont and I hopped off and proceeded to find my company headquarters.

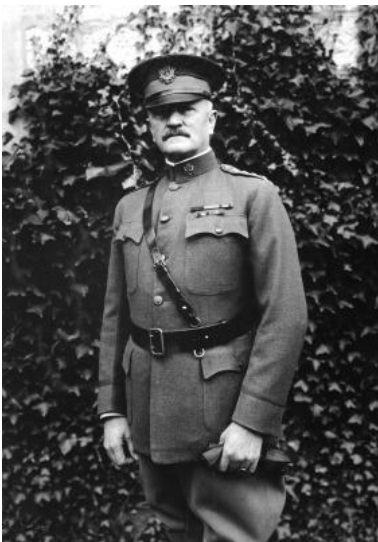


Figure 16: General Pershing, Commander AEF



Figure 17: The radio room at Chaumont

Langres, France is an interesting city. It is a walled city built by the Romans. Down below are plains on which the battles of the Franco-Prussian War were fought. During World War I, it was headquarters of the Allied Staff College as well as the West Point of the AEF which trained candidates for commissions. I little knew when I first arrived there that sometime later I would be graduated from this school and commissioned a 2nd Lieutenant in the Signal Corps Reserve.

On reporting at the headquarters of my company to my surprise I was told that apparently I did the right thing by leaving the train there instead of going on to Tours. I had expected to get bawled out for disobeying orders. I was told to stick around and report in each morning for orders.



Figure 18: Georges Carpentier

One day I learned that the French heavyweight champion, Georges Carpentier, a member of the French Army, was putting on an exhibition fight at the officers' training field. I went to see it and was very much impressed with his boxing ability. Little did I realize that months later I was to box in the same ring. Part of the officers' training included participation in athletics. I was chosen by my platoon at the school to fight a chap from California. I won the fight and gained two athletic points for the platoon. It was in the same ring in which I had watched the great Carpentier fight months previously.

I was not of much use on long wave intercept assignments at Chaumont. I had to take everything down with a stick since my hunt and peck method of typing on a mill limited me to slow speed. The day finally came when Major Loghry and Master Electrician Hopkins, Corp Dunn and I took off for Toul, France which was to be our headquarters.

Amateur and Commercial Operators Produce Results

The headquarters of our section had been established in French army barracks outside of Toul and night after night Toul was bombed by the enemy. Several intercept and direction finding stations were placed in operation and our operators farmed out to the French for training were recalled. In addition to the intercept and DF stations, listening posts were established in the trenches to enable us to listen in on the enemy's telephone and ground telegraphy communications.

It soon became apparent that many of our operators were not producing results while our former hams and commercial operators did produce good copy. A cryptographer needs solid and accurate copy if he is to be successful in decoding a message. Composite copy, copy that is made up from several fairly good copies,

can produce results.

The Germans were using five letter coded groups. They would call on one frequency and receive an answer to transmit. One would believe that they were about to transmit a message on that frequency. The intercept and DF operators would be ready to copy, but only silence on the frequency, except to the experienced operator. He knew that they had shifted frequency and would be quick to pick up the message. The inexperienced operator faced blank paper.

From the broken copy that was coming in we soon realized that our stateside trained operators were not producing. While hundreds of messages were dummies, it was necessary to copy all because the important one or ones would be included in the transmissions. Our cryptographers were complaining too. I had stood several watches and realized even with my experience how difficult it was to make solid copy of these code messages, because of interference and the procedures employed by the German operators. It was also necessary to copy with blocked letters, i.e., printed capitals.

The importance of making accurate and solid copy so that cryptographers could break the coded messages is best summed up in the words of the Chief Signal Officer of the AEF of World War 1, while reporting on the accomplishments of our radio section at the end of the war. General Russell said at that time, "On a certain occasion some remarkable interceptions of German code messages were made that enabled the Americans associated with the British and French code men to work out a solution of a new code. The cleverness of this work is apparent when it is known that a failure to get correctly any of three code messages would have defeated the accomplishment of this end. When it is realized that these code messages are the hardest kind of messages to copy, and that in order to be sure of getting the valuable messages it had been necessary to copy several hundred useless ones per day over long periods of time, and that copying is done under difficult conditions and through interference which confuses all but the best operators, it is possible to appreciate the fine work which has been done. In this one case a few minutes inattention, a single mistake would have made the others useless. The American operators are the only ones who copied all three messages with sufficient accuracy to be useful."

Necessity of Establishing A Training School At The Front

After consultation with our cryptographers and his staff, Major Logbuy decided it was necessary to train our operators in the German field procedure as well as how to copy through interference. I was selected to establish and operate a school, probably the only one as close to the front as the third line of trenches for this purpose.

Nothing was taken for granted and all groups of operators sent to us from the states were required to take the training course. Commercial operators and experienced hams made the grade easily. Trainees having no previous experience but who had attended Harvard and other stateside schools complained bitterly.

Several thought on arrival they were going to be commissioned and placed in charge of stations. Those who could not make the grade, particularly the older ones who could not obtain code proficiency were made cooks, chauffeurs, truck drivers or assigned clerical duties.

The school paid off and in due time we had enough experienced men to man our stations around the clock so subsequently the school was closed and I was assigned to prepare mobile intercept and direction finding units for the St. Mihiel drive. In preparation for this drive, I had another interesting chore assigned to me in a related field of radio intelligence.

A Radio Barrage To Fool The Enemy

A stepped up radio activity in a military sector is usually indicative of preparation for a drive, or withdrawal or re-employment of the armies. The appearance of new wireless stations as located by direction finders and the appearance of new call letters and identification of operators in a sector is generally proof that additional troops have been moved in for action. The strength of the opposing enemy is often identified by the number of radio stations in operation once it has been determined how many stations are associated with the corps, division, or regiment.

Consequently, in an attempt to detract the enemy from preparations for the St. Mihiel drive, I was ordered to establish a number of radio transmitting stations in a sector around Nancy, some kilometers from St. Mihiel. Each station was given a sheaf of coded messages and the operators were ordered to send them on a carefully worked out schedule around the clock.

The day after setting up the stations, I returned to the sector to see how things were going along. I had assigned a ham to one station, Corporal Howard Fogetti, of the narrows, N.Y. He complained that while he had sent the messages as directed, no station answered him. I told him to keep right on sending the messages on the schedule furnished him. The messages were in a code which we knew the Germans could read and of course contained misleading information for the purpose of distracting the Germans from our St. Mihiel preparations and focusing them around Nancy. The operators of the other decoy stations in the sector were busy doing the same thing.

My "Squeak Box"

Corporal Fogetti comes to mind in another instance. He was a confirmed "diehard" spark man. We had acquired for field use, several French made CW transmitters. They were unique in that when receiving, the oscillator of the transmitter provided the means of heterodyning the CW signals but with a series resistor in the plate circuit to reduce the output comparable to that required for proper mixing at the detector grid voltage with the incoming signal.

At each group of three intercept and DF stations, a runner gathered up all the messages and bearings and they were encoded in our own code for transmission

back to the cryptographic headquarters. I was in charge of all the vacuum tube transmitters of the outfit having gained my first exposure to them while at Gondrecourt.

Having access to spare parts, I made a home brew job and operated it from my command post. One evening Fogetti was in charge of receiving the transmissions from the stations along the front and as he asked for a repeat, I broke in and acknowledged the receipt of the traffic. This amazed the spark man from New York and from that time on he referred to my home brew job as a "squeak box." In fact he identified all CW transmitters by the same technology. He loved to recite his exploits with his spark transmitter at his home on the narrows of New York. I wonder if our old timers in that area remember him. I have been informed that he made the aural recordings of the TV program "DragNet."

Accomplishments of Our Radio Section

Those who are familiar with the history of World War I will recall that the St. Mihiel drive was a very successful one for the U.S. army and its allies, and we captured over 20,000 prisoners. I had the privilege of interviewing some through an interpreter. They said that they knew we were intercepting their messages but didn't believe we could decode them. They were youngsters and old men, the latter having served on the fated Russian front and tired of war.

Much of the success of the drive was credited to the endeavors of our section as I will relate herewith.

Two days after the Armistice, Captain Charles Matz, Radio Intelligence Officer G-2 reported as follows: "One of the sources of information concerning the enemy's intentions and dispositions during the recent war has been derived from observation from all possible angles of the enemy's communication service. This course of information, practically unthought-of before this war has been developed to such an extent that, at the close of hostilities, it constituted one of the main branches of intelligence. There have been times when radio intelligence has obtained information of the most vital importance which could be obtained in no other way, and it has constantly served as a check on information obtained from other sources. The ability to locate accurately enemy radio stations in the St. Mihiel salient on the day before the attack of September 12, 1918 was the only proof that the enemy had not withdrawn from the salient, and this proof even in the face of overwhelming evidence to the contrary, prevented an eleventh hour change in the plans for the attack and a possible change in the results."

The following is a typical daily report issued by the General Staff summarizing the radio information secured from the enemy by the radio intelligence section of the Signal Corps for the weekend of August 25, 1918:

"Activity"-east of the Meuse to Etain, a decrease in the radio activity was noted during the week. From Etain to St. Mihiel, there was a general decrease in activities, excepting the slight raise in the region of Etain on the 25th. The most

notable change in activities was in the Thiauourt and Euvezin area. During the greater part of the week, a general decrease was noted, but on the 25th rose to three times the normal rate.

“Distribution” The most important change in distribution of field stations in the 5th army is the apparent withdrawal of six radio stations from the area between Orens and Etain on the 18th of August. These stations appeared during the first week in August and were active for a period of only two weeks. The withdrawal of a group of stations after only so short a period of activity is unusual.

A general reduction in the number of stations between the Argonne and the Meuse has become apparent, particularly in the sector occupied by the 22nd Reserve Division. An increase in the number stations has been observed in the area of Euvezin and Thiauourt. This increase became apparent on August 25th, and as yet it has been impossible to definitely locate the new stations. There are several facts which indicate a probable change of radio organization in the sector occupied by the 227th division:

- (a) On August 24th the divisional station Euvezin changed from a “G” call to a “D” call sign;
- (b) On August 23rd the station located on Montsec which formerly was very active, ceased operation. On August 26th a station re-appeared in the same location, but with a “D” call sign instead of the former “L” call sign.

“To change the initial letter of a call sign on other days than 1st, 11th or 21st day of the month is very unusual procedure, and the above observations suggest that new stations were erected on the sites of the old stations.”



Figure 19: The Stars and Stripes newspaper of WWI

The Stars and Stripes reported on the accomplishments of the radio section with regards to the St. Mihiel drive in their April 4, 1919 issue as follows:

“There are times when figures, however large, seem to shrink before bigger things. For example, work of the Radio Section of the Signal Corps saved thousands of lives

in the St. Mihiel drive. The location of enemy radio stations the night before the attack of September 12th was the determining factor in the decision of the intelligence section that Germans had not withdrawn from the region despite almost overwhelming evidence to the contrary. At the time of the sending of the infantry forward without artillery support was being seriously considered. Thanks to the alertness of our Signal Corps, even the enemy's plans for a counter attack were caught by our intercept stations three hours before it was to have developed."

The following is another example of how important it was to copy evenly as well as accurately every message transmitted by the enemy. On March 13th one of our operators intercepted a message from a German station which had just received a message in a new code and then asked that the message be repeated in the old.

From the call letters given in the message it was possible to find both the original message in the new code and the repetition of the old. This assured the solution of the new code before the Germans themselves were familiar with it.

Inside The Enemy's Lines

On the second day of the St. Mihiel drive SGT. Myron Tong and I loaded up a small truck with batteries and supplies for our units advancing with the drive. We had difficulty finding one unit due to the fluid situation along the front, since the lines had not been consolidated. After driving along one road full of shell holes we saw a farm house and stopped to see if there was anyone in it. This was in Alsace Lorraine territory. Sure enough a farmer had survived the battle. He spoke only German but fortunately Tong could speak some German too. I noticed that Tong got more excited as they talked. He turned to me and quickly said, "Let's get the hell out of here, we are inside the German lines."

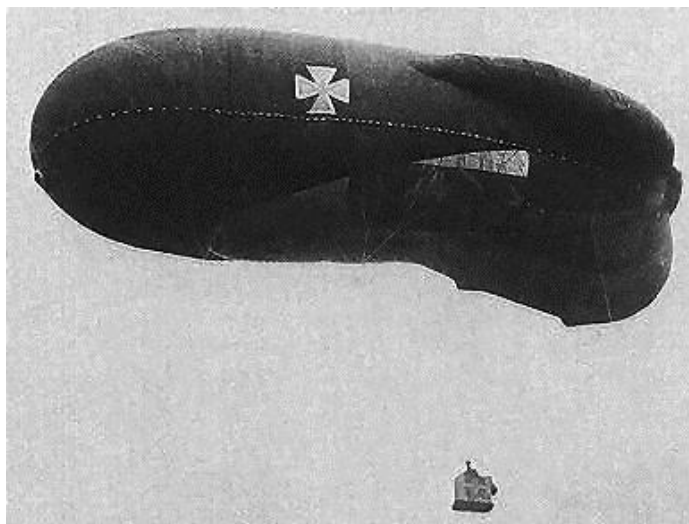


Figure 20: WWI German observation balloon.

We high tailed back down the road and after a while of driving, we found an American artillery unit manning French 75s. The C.O. informed us that our unit

was up ahead of his artillery in an old farm house which we could see at a distance. Seeming to hang almost over it was one of the Huns' observation balloons. The commanding officer told us "For the love of Pete, tell your men not to cook until after dark, as every time they do smoke comes out the chimney and the Krauts start shelling this sector."

As we neared our unit it seemed as if the sausage observation balloon was right over our head viewing us with a thousand eyes, but it was probably 3 or 4 kilometers away. We had no sooner left the artillery group when all hell broke loose. The enemy opened up with artillery and with shells bursting nearby, Tong and yours truly abandoned the truck and dug in. We thought sure they were getting a bead on us but we found later they were shelling the artillery unit behind us which we had just left. We reached the farm house and found our men had suffered no casualties and we tried in vain to have them abandon their position. They said receiving conditions were too good and that artillery fire didn't bother their amplifiers. We adhered to their request since no other place looked any better.

We knew at the start of the drive that the artillery was almost lined up hub to hub and when they opened up it practically put our amplifiers and receivers out of operation due to vibration and din.

Before leaving we told the crew to confine cooking until after dark.

(Miron Tong, referred to here, became a Radio Inspector on Charlie Kolster's staff in Boston after the war. He passed away a few years ago.)

Ground Telegraphy (TPS)

I mentioned previously a mode of communication employed by the enemy as well as ourselves during World War I. It utilized powerful keyed audio oscillators which were connected to ground stakes oriented such that the maximum currents traveled by induction through the earth in the direction of the receiving stations.

Each buzzer had a characteristic audio note in the musical scale, Do, Re, Me, etc. Variable calibrated weights on the vibrator determined the tone. They were generally used by infantry companies to communicate with battalion and division headquarters. For example, Company A would have the musical note Do, another Re, and so on.

Reception was accomplished by the use of three stage amplifiers of French design. Either ground stakes or loops of wire were connected to the input. Since the enemy too was using this mode of communication we established intercept stations as close to the front as possible, often by the men stepping out into no-man's land under cover of darkness and putting down ground stakes or loops. These intercept stations, often in dugouts, were manned by a special group of men who were recruited in the states after investigation and who could understand the German language since often they could pick up German conversations, as the enemy used

telephones right up to the front lines with a single line and ground return. Occasionally our men could hear officers talking better than they could hear themselves. This group also policed our own telephone circuits for violations of security, i.e., improper identifications or other information which might be of use to the enemy.



Figure 21: Soldiers using a field telegraph set WWI

While the Germans and the French used single wire field telephones with ground return, we did not. The introduction of our twisted pair for telephone use provided a high degree of security for telephone conversations since the lines of force neutralized each other. The only leakage occurred when a line might be grounded out by shell fire; however, because of the possibility of leakage, telephones were not extended to the front lines but used only to the third line trenches. Also it was known that the enemy had a similar spy system to our own and we were not taking any chances.

The “Stars and Stripes” paper of the AEF reported this activity in the following glowing language:

“There is no more thrilling page in the romance of the war than the history of the American listening stations of the Signal Corps. They were always to the front and sometimes in no-man’s land itself, but wherever they might chance to be located, they were, as one of them described them ‘very near heaven.’ Their business was ease dropping and if they didn’t hear any good of themselves, they managed to do the doughboy a lot of good.

Loops of wire were constructed out in no-man’s land parallel to the enemy lines,

and the tiny electric currents induced in them were magnified by means of an amplifier. Copper mesh nets or metallic rods were buried as near the enemy wires as possible and from them wires lead to the amplifier. By this means ground currents and leaks from the enemy wires were magnified to audibility.”

“The planting of these “grounds” near the enemy’s lines called out some of the most heroic instances of personal bravery and resourcefulness at the front. Time after time these men were caught by the spotlight of a star shell as they crawled out in the night towards the German lines and were seen no more. Often, however, they wiggled their way through barbed wired and shell holes, planted their wires, and returned to reap the benefit of their daring.”



Figure 22: Radio operator in a WWI dugout.

The audio amplifiers used for both radio interception and TPS were separate units from the receiver. The amplifiers were a three tube affair and on the front was a double pole-double throw switch. In one position the unit served as a detector and two stage amplifier for radio while in the other position it served as a three stage audio amplifier for TPS. One day while testing a unit in the audio position, I heard code and soon identified it as POZ. It puzzled me at first but I reasoned that since the amplifier stages were resistance coupled they were in the audio range of POZ which operated on a low frequency in the audio range. Either that or the high gain of the amplifier caused one of the tubes to oscillate at a low frequency sufficient to heterodyne POZ. This led me to run out a large loop connected to the input of the amplifier and I was surprised not only being able to copy POZ’s communique but FL and NSS as well.

It was interesting to compare the material in the communique as to how the war was going each day, particularly with regard to the number of prisoners captured, and aircraft and balloons shot down.

On To Chateau Thierry

Immediately after the St. Mihiel drive, I was ordered to take a freight car load of equipment and entrain for Chateau Thierry. The men who would man the stations were to follow. My buddy and I lived on the freight car for ten days on tinned rations, grabbing a cup of coffee whenever we could find a Salvation Army hut enroute.

The tracks were blown out ahead of us outside of Rheims while the Huns were shelling that section including the famous cathedral.

On arrival the intelligence officer advised me that the enemy was being driven back so fast that unless we had mobile units it was no use to set up shop. I so advised my C.O. and was ordered back to Toul, the long way via Tours. More canned willie and tomatoes. I believe we established a record for living on tinned cold rations.

I have never forgotten the amusing incidents that truly identify an American G.I. no matter where he is or regardless of his environment. Making my way up the pocked and gas reeking streets and ruins of Chateau Thierry from my digs in a freight car, I heard music and singing. I soon came upon a scene which I have always wished I could have photographed, but will never forget. On the second floor of a large home with the sides blown out was a G.I. at a grand piano surrounded by his buddies playing and singing, "I Want A Girl Just Like The Girl That Married Dear Old Dad."



Figure 23: Chateau Thierry WWI

On another occasion I was in Toul one evening and the bombers started unloading. I took shelter in a tunnel under the railway crossing at the station. As I proceeded down the tunnel, I heard the sound of music and turning a corner, there was a G.I. playing away on a harmonica while another was dancing a jig to the tune of the music. Their buddies stood around in total disregard of the detonations outside. The French civilians who had taken shelter couldn't refrain from laughing. Yanks running true to form!

Back To Langres

Soon after the Meuse-Argonne drive got under way, four of us including Sergeant Myron Tong were ordered to the officers' training school, the West Point of the AEF, as it was called. I have previously related some experiences there. Equitation was part of officers training and while I had never been on a horse before, I enjoyed it despite the fact that I was thrown several times racing and jumping. In fact I became so fond of it that I rode several years afterward while I lived in Baltimore and Silver Spring. We were riding one day in November 1918 when someone shouted at us that an Armistice had been declared. That turned out to be the false one. The real one came two or three days later. My platoon went into town and I remember carrying back a buddy on each arm. That night I had my first beer! Some of the boys really celebrated by getting out their rifles and shooting out the windows of the barracks. Two landed in the hospital as the result of sliding down the large winding bannister on the stairway. The Colonel was very understanding and while he didn't condone our actions as candidates for a commission, the spirit of the time permeated him and we had only to pay for replacement of the window glass.



Figure 24: French Ocean Liner La Tourraine

Our graduation was as reserve officers. We were offered active duty in the Army of Occupation or ten days leave in Nice and first class passage home. Having been overseas for 19 months, I elected to go home. So did Myron Tong. We had an elegant time at Nice and Monte Carlo and subsequently sailed for home on the French liner, La Tourraine. Both Tong a former Coast Guard operator, and myself were seasick most of the way home. I didn't get up to see the radio shack until the night before we docked at New York. Two sailors who had been too long away from the sea.

While at Camp Merritt in New Jersey waiting to be discharged I went over to the old Marconi office to see what the chances were for a job.

I expected to see Mr. Edwards or Duffy. Some other chap I didn't know was holding the fort.

I noted that my name was on the roll of honor of those that were in the service. Replying to my query about employment this guy stated in no uncertain terms that being a veteran and having been previously employed by the company gave me no priority. My name would be placed at the foot of the list. I left the office as the fellow says "Mumbling in my beard and cursing everybody from McNally down."

Name: George E. Sterling
Serial Number: 69532
Birth Place: Peaks Island, Maine
Age: 22 years
Residence: Gardiner
Comment: Enl: NG Augusta, June 13/16. Reported for Federal Serv: Apr. 13/17. Cpl July 18/17; Sgt May 16/18; Sgt 1st cl July 16/18; Mr Sig Elec Oct. 16/18. Org: Co M 2 Inf Me NG (Co M 103 Inf) to Jan. 5/18; Hq 1 Corps Sch to June 2/18; Co F Administrative Co Sig C to June 19/18; Radio Sec Sig C No. 1 to disch. Eng: St Mihiel; Defensive Sector. Overseas: Sept. 22/17 to Mar. 29/19. Hon disch on demob: Apr. 14, 1919.

Figure 25: Summary of George Sterling's military service

In Civies Again

On being discharged in April 1919 I went back to my home in Maine. I received a \$60 bonus and that is exactly what I paid for a new Hart, Shaffner and Marx suit.

I went back to my old job of learning the shoe manufacturing business and banking but the call of the sea was too great and in November, I went back to sea as a wireless operator. My folks then lived on the mainland having moved from Peaks Island. I was 1AE and after the war 1BE.



Figure 26: Tom Stevens (W6KAA)

On one of my trips to England I got blown off my course and fell in love with a beautiful English actress. She lured me into the sea of matrimony, but not before I had accepted a job ashore for RCA at the port of Baltimore. My main task was making routine inspections, repairs and converting spark sets such as the P-8 and P-5 into ACW transmitters. Who was my big boss in New York? None other than our good friend Tom Stevens, W6KAA. My local boss was Wesley Kelland, one of the first hams in the Boston area. The story goes that Kelland gave Tom, who was then running the Filene

Store Station, so much trouble with his ham spark set that Tom signed him up as an operator and shipped him off to sea. That's one way of getting rid of interference.

In June 1923, I was sworn in as a Federal Radio Inspector for the Department of Commerce, Bureau of Navigation in the third radio district. The third radio district covered Maryland, Washington, D.C., Delaware and parts of Virginia, Pennsylvania and New Jersey. As a radio inspector I was responsible for the inspection of foreign and domestic shipboard radio installations. My other duties included inspection of land, coastal and experimental stations including broadcast and amateur stations as well as examination of applicants for all classes of operator licenses from the third district headquarters at the Custom House in Baltimore City.

RADIO <i>3XX</i>	Baltimore, Md., <i>10/26/24</i>
YR <i>cw</i> SIGS ^{HRD} WRD HR ABT	A.M. E. S. T. <i>12.30a to 1.00a</i>
WAVE LENGTH <i>146 to 93</i>	MEASURED BY CALIBRATED RECEIVER OR ZERO BEAT RESONANCE CLICK WITH WAVEMETER
AUD <i>1 to 5</i>	UR "FIST" ^{EXCELLENT} GOOD <input checked="" type="checkbox"/> ^{FAIR} POOR
VIOLATIONS <i>Mr. C is better. Letter follows</i>	
TRANSMITTER HERE	RECEIVER-REINARTZ AND H. C. COIL 4-800 METERS. ALL WAVE LENGTHS
RADIATION	
WATTS INPUT <i>40</i>	
<i>loop experimental</i>	
3DF	
REMARKS: <i>Z-146 OK QSA - Q-123 ok QSA - G & W nil C ok 93 meters unsteady QRZ - 73's JS</i>	
G. E. STERLING, G. S.	ASSISTANT U. S. RADIO INSPECTOR THIRD DISTRICT
	CUSTOM HOUSE Baltimore, Md.

Figure 27: QSL sent to an Amateur station in violation of radio regulations

On Christmas Eve 1924, Margaret and I were married in a church in Welland, Ontario. After the honeymoon we took up residence in the Stoneleigh neighborhood near Towson, Maryland just north of Baltimore where we lived until 1937.

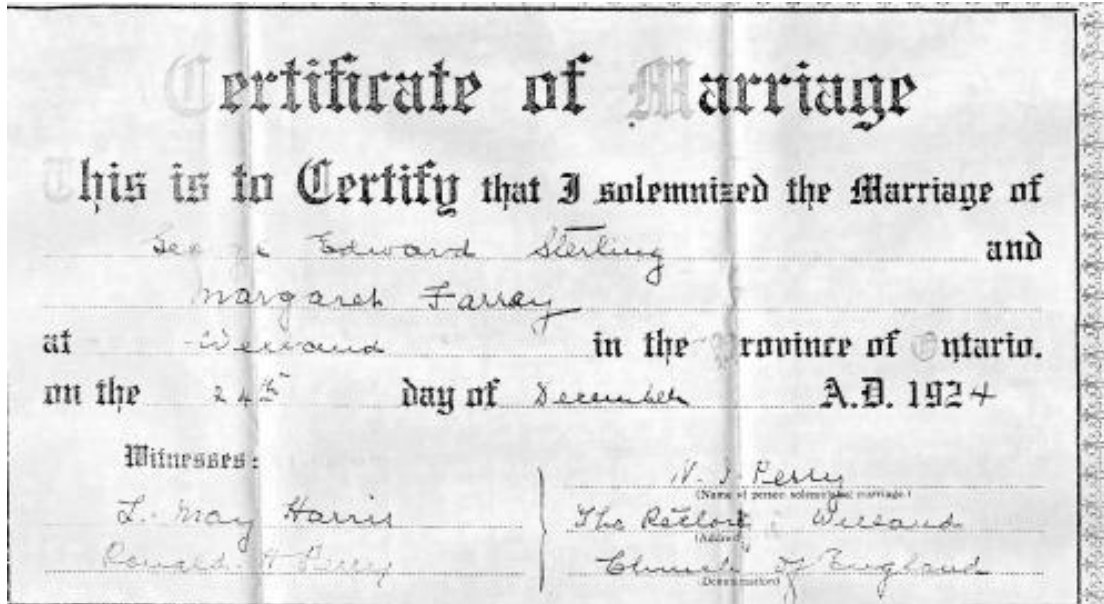


Figure 28: Marriage certificate of George and Margaret Sterling



Figure 29: George's wife Margaret Farrey circa 1920. Margaret was born in 1900 in Manchester, England. She was an actress and ballet dancer on the London stage.



Figure 30: Margaret was an actress and ballet dancer when George met her in London, England in the early 1920s.

Some Recollections Of An Old Radio Inspector



Figure 31: *George E. Sterling WIAE
Peaks Island, Portland, Maine*

Served the people and the Government of the United States from 1923 to 1954 in the following capacities:

*U.S. Radio Inspector
Inspector In Charge
Assistant Chief Inspector
Field Division Chief
Chief of Radio Intelligence Division WWII
FCC Chief Engineer
Commissioner FCC*

*Represented U.S. in several International Conventions
Author of the Radio Manual, 4 editions, 150,000 copies
Located over 200 Nazi spy radio stations while Chief of RID
Served in AEF WWI and commissioned 2nd Lt. Signal Corps by General Pershing*

On June 30th of this year (1964), the FCC, in a resolution commemorated the 50th anniversary of law enforcement by our government in the radio field. This service which was then the Bureau of Navigation, Department of Commerce, was 12 years old when I was appointed a Radio Inspector in the 3rd Radio District with headquarters in the Custom House, Baltimore, MD.

The nine radio districts were in charge of radio supervisors and Mr. W. D. Terrell, who celebrated his 90th birthday on August 10th of this year, was the Chief of the service. Bill Downey was then his first assistant chief.

When in 1923, I was sworn in as a radio inspector; little did I realize that I too, in years to come, would be his first assistant. I always remembered many of the words of wisdom voiced to me by Mr. Terrell when I was his assistant, but probably none better when he said, "Sterling, it is the policy of this service to try and help a man from getting into trouble rather than jumping on his head when he is in trouble." I tried to instill this policy into young Radio Inspectors who I too, had to swear into the service.

R.Y. Cadimus was my supervisor, and it was a proud and big day in my life when in June 1923, he swore me in as a Radio Inspector, pinned a beautiful gold badge on

me and announced that I was on twenty four hours a day and seven days a week. The announcement was made with emphasis. In later years when out running down illegal stations and chasing interference in all kinds of weather, I had cause to remember his words.

Other supervisors at the time, as you old timers will recollect were as follows; Charles Bolster 1st District, Arthur Batcheller 2nd District, R.Y. Cadimus 3rd and 4th Districts, (Walter Van Nostrand was made supervisor of the 4th District with office in Atlanta in 1924), Theodore Deiler 5th District, Bernard Linden who retired this year, 6th District, Otto Redfern 7th District, Sam Edwards 8th District and Ed Bean 9th District.

Our chief task at that time was the inspection of foreign and domestic ship board radio installations coming with the purview Ship Act of 1912 and 1910 requiring licensed operators, an emergency power supply, a few spare parts and communication facilities from the radio room to the bridge. Other duties required the inspection of land stations, coastal, experimental, a few broadcasting and amateur stations as well as the examination of applicants for all classes of operator's licenses.

The third radio district then embraced Maryland, District of Columbia, Delaware, parts of Virginia, Pennsylvania and New Jersey. It was Mr. Cadimus' policy to make two tours of his district each year, inspecting practically every assessable station, including amateur, regardless of whether or not the licensee was at home.

On occasions we were informed by an irate mother or XYL that we could not see the equipment as the licensee was not at home. Mr. Cadimus' stock reply was to the effect that when the licensee made application for license, that he agreed the station would be assessable at all reasonable times. A professor of physics at a small college in Pennsylvania tried to deny us entrance to an experimental station, but when the chips were down, we made the inspection.

I have often thought of the varied types of equipment I had to put on the air and measure the power, frequency and decrement in the case of a spark job. There was the ham with the mercury rectifier and tilting gear, the arc and the most bothersome and difficult to tune of all, the ship spark sets. I shall never forget my first introduction to an arc set as many of you did.

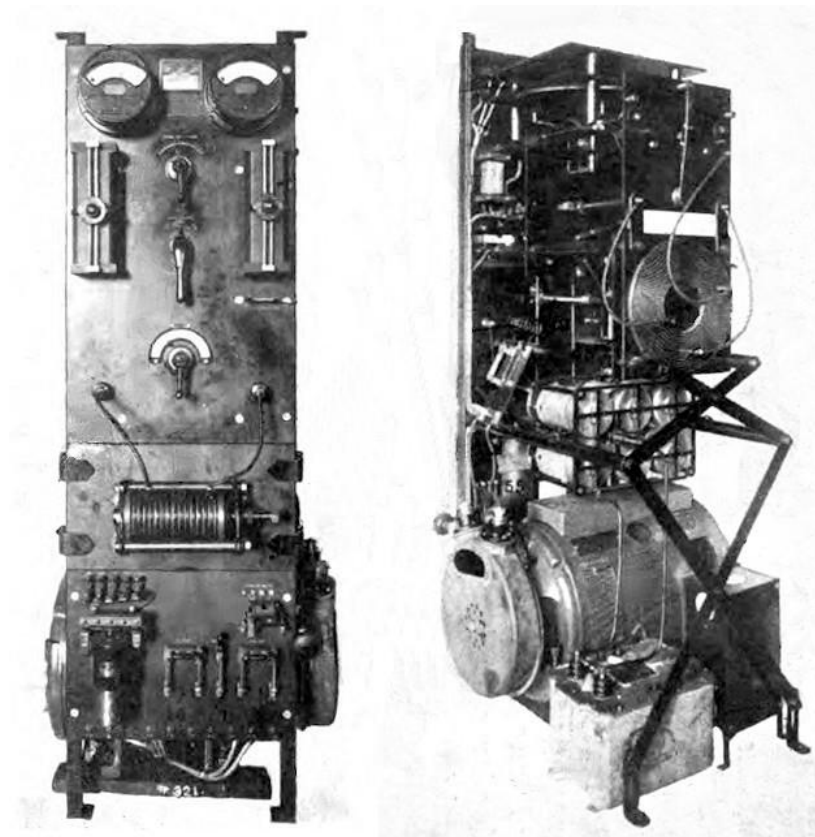
The year before I became a government radio inspector, I went ashore as radio inspector for Mr. W.P. Kelland converting spark sets to tubes and all the other associated duties. Lou Richineri was the government inspector at the time and I went along with him to inspect and tune an arc set on the SS 'Blacksmoke' (for want of the real name which I can't remember). We made a few adjustments and then BANG came the damndest explosion and I high-tailed it through the door for the boat dock. When I stopped running, I turned around and Lou stood grinning in the shack entrance. He explained to me how he had created the blast by use of excessive alcohol, but also stated that was the way novices had to be introduced to

arc sets. I wonder how many of you old timers pulled this on a striker or young squirt.

Broadcasting Stations

In 1923, radio broadcasting was just sprouting its wings. The greatest number in our district was in our city of Philadelphia, with one or two in Baltimore, Richmond and Washington. Our only real coastal station that I can recall was WCY at Cape May. Broadcasting stations along the coast were in fact classified coastal stations and as such, were required to be able to transmit on 300 and 600 meters, the international distress wavelengths.

Mr. Cadimus read the rules right down the middle and whenever we made a broadcast station inspection, the program was interrupted while the operator on duty or chief engineer demonstrated that the transmitter could operate on these two wavelengths. I recall that WBAL in Baltimore could not do this easily, so they installed a P-5 spark set. Mr. Cadimus accepted this as complying with the requirements of the rules.



*Figure 32: Marconi Model P-4
2 KW ship spark transmitter.*

This requirement was enforced at the time since marine receivers were not very selective and cases had been reported where broadcasting had interfered with distress and other marine traffic; consequently, whenever a distress call was picked up, and there were many in those days after WW1, each broadcasting station

hearing the call directly from the stricken ship or by relay, was forced to suspend broadcasting until the coastal station in charge gave the all clear signal.

On occasions, broadcasting was silenced along the whole Atlantic coast for a half hour to an hour or so and it was not infrequent that some of the calls originated as far east as the North Sea and by ship relay reached our coast.

As improvements were made in marine receivers, and because of protests from owners and the public, these requirements were done away with. I have no recollection of a broadcasting station communicating with a ship in distress while acting as a coastal station.

It will be recalled that we were in the Bureau of Navigation, and as such were also required to enforce the navigation laws as the Coast Guard does today. One of the things along this line that Mr. Cadimus "hipped on" was the prohibition on starting an automobile motor on a ferry boat before it was properly docked; so when we rode the ferries to Camden and Delaware, my task was to run about and take the license numbers of all cars that were in violation. Mr. Cadimus duly reported these to the Collector of the port from which the ferry operated, who in turn was empowered to levy the fines.

One of the boats operated by the Bureau in the enforcement of motor boat laws, was the M.V. Kilkenny. Former President Hoover was the Secretary of Commerce, and often on a weekend liked to cruise and fish in the Chesapeake Bay.

Lou Richineri who I succeeded as Radio Inspector at Baltimore, constructed a 50 watt radiotelephone transmitter which was installed on the Kilkenny each spring so Mr. Hoover could keep in touch with Washington through NAA at Arlington as well as for safety purposes.

When Lou was sent west to recover from an illness, it became my task to install the set and check it out while on a cruise on the bay. I broadcast many a recording on 360 meters and asked for signal reports to be sent to Baltimore, but have to report my fan mail could be counted on one hand. In any case I guess I was one of the first maritime mobile disk jockeys as were the operators on the SS America who broadcast recordings on her Atlantic trips and at the request of the skipper of the ship I was on at the time, the SS Conehatla, KUQQ. This was about 1921 or 1922, possibly before.

Illegal Operations

Unlicensed radio stations came to the forefront during the days of prohibition, when bootleggers employed clandestine stations to the coast to communicate with their boats bound in with their contraband cargo. I have heard reports and remarks that there were some unlicensed ham stations in those days too; I wonder.

I remember one case where a licensed broadcast station was employed to play certain records at an agreed time which was a code message to the skipper of a

rum runner as to where to land. It was done so cleverly that even the management of the station was taken in for a while.

Long Island, Maine, and the Jersey coast were the scenes of some illegal wireless station operation and Charlie Bolster and Arthur Batcheller and their staff were kept busy aiding the Treasury Department in running down the offenders. Some of the stations taken in looked like small arsenals.

The Bureau had no direction finders of its' own and they were made by the inspectors, often at their own expense; I have a picture of Forest Redfern with his outfit taking bearings along the coast.

Once we set up a counter intelligence operation. The land station had been seized and a code book was taken into possession. On schedule, one of our inspectors sent a message to the skipper of a boat while we monitored the exchange of signals. The message changed the point of intended entry of the boat. There was quite a bit of suspense while the skipper decoded the message. It seemed for a while that he was suspicious of his new orders but he finally came around and gave an affirmative answer to the message. The Treasury agents were waiting when he landed.

Another source of illegal operation made possible by vacuum tube transmitters was the racetrack touts who are always trying to beat the bookies. The modus operandi in general is to have a small hidden transmitter on the person of someone in the grand stand or other point of good visibility. They can by coded signals report the progress of a race to a confederate outside the track. The latter either has a telephone line or transmitter to communicate to another in the ring in a city where the books are open while the race is being run or even after.



Figure 33: Transmitter used by a tout at the Laurel, MD race track.

On one occasion I was ordered to go to the Bowie, Maryland track, traveling by the old Baltimore and Annapolis Electric Line since we had no automobiles for official use at that time.

On arrival, I tried by wandering around to spot an antenna which might be of suspicious nature since it was reported that a radio transmitter was in use around there. I received little or no cooperation from the track police and got suspicious of this attitude. The reasons for my suspicions became obvious the following year after we had received information that the County Police had moved in on a house located on a hill a short distance from the track, and had taken into custody what they thought was a transmitter. It seems someone had observed a flashing light beamed on the track and located in the house.

I went to the Police Chief's office and found that they had seized a very cleverly constructed transmitter. It was concealed in a vest with a small storage battery in one pocket, a vibrator in another and a key with leads to feed down through the coat of the operator. The antenna was a loop which was sewn into and over the shoulders of the vest. The vibrator supplied power to a 200-A tube.

Since we had not caught the operator actually using the transmitter we had no Federal case, but I did talk to the ham operator who had been arrested with the others charged with gambling and making a book. I received permission from him to take the transmitter to Baltimore where I measured the frequency (150 meters).

I called in the Signal Officers staff of the Third Corps Area as I thought such a transmitter might have good usefulness for the infantry. I recall quite well that it took three men of an infantry company in France to carry a trench set used to communicate with battalion headquarters. Here was a very compact set utilizing ICW and carried by one man.

A very humorous and interesting episode occurred near lunch time. The police chief asked me if I would like a highball before eating. I agreed. He sent a deputy out to get some ginger ale while he opened his safe and brought out the hooch. We tossed a couple down and at the finish the chief announced that the liquor was evidence taken from a chap reposing behind the bars down the corridor.



Figure 34: *Charlestown race track, 1940s.*

It was during this session that I learned why I hadn't received cooperation from the track police the year before. It seems that when they arrested the crew at the house who were operating the signaling system, one of those who showed up to post bail was a former track cop.

An interesting race track case took place at Charlestown, West Virginia. My men were having difficulty locating the tout in the grandstand operating the transmitter, so I authorized them to jam him. Each time he went on the air he got a dose of raw ac from a unit my men had hastily put together. The guy outside did what we expected. He told him to move higher in the grandstand. It was a 5 meter job. After several shots, my man seated at the top of the grandstand operating the jammer was not too surprised when the operator took a seat in the same row. We took the whole crew in, including a large transmitter outside the track which was being used to communicate with Detroit and other cities in which the ring operated, but not before the air was let out of their car tires while we got the U.S. Marshal. Race track touts never seemed to be successful with their operation since in most cases when arrested, they could not make bail.

Probably one of the funniest cases of illegal operations occurred in Texas where a tout in a jail put an unlicensed transmitter on the air to negotiate for his release. I wonder if he ever got out.

All of these illegal operations made good target practice for men when just before World War II we learned of the fifth column, and Nazi activities in France and England and the way they landed spies with transmitters by parachutes and submarines.

How we organized to successfully combat this threat to our country is the story of the Radio Intelligence Division of the FCC which I had the honor and privilege of organizing and directing. If at some time later there is sufficient interest I will report on these operations which one or two of our members are familiar, since they were in the division.

Operator Examinations

As you all know, one of the main duties of a radio inspector is the examination of applicants for the various classes of operator license. The instrument in use when I came into the service was the Omnigraph. I imagine every old timer had, on occasion grounds for cussing it because of its erratic speed and often distorted signals.



Figure 35: *Omnigraph - used by FCC examiners to give morse code examinations during the 1910s and 1920s.*

One of my good friends in Baltimore likes to tell the story when we are remembering, about the time he came to the Custom House to take an exam for renewal. He had let his license expire. He reports that he cranked up the Omnigraph and after he had listened a bit he looked up at me and remarked, "That's not ten words per minute." He said I replied by saying, "It's ten words to you mister." Probably it was going around 15 words per minute. He got his renewal.

Another time, a chap off of one of the west coast boats came into the office and announced he wanted to take the exam for the Commercial Extra Class license. This threw me for a tizzy momentarily since I had never conducted an American Morse code test which was required for this class of license and my knowledge of American Morse was limited to 10 WPM. I believe the exam required 25 WPM. I got the morse dials for the Omnigraph and tried to follow along with the office copy of what was on the dials. I noted that the applicant was making heavy weather with his copy. I stopped the machine, went to the key and pounded it out from my copy. He passed the exam.

I have often wondered what kind of machine, if any, was used at the Boston Navy Yard by Radio Gunner Blakeslee when he examined me for my first commercial ticket in 1916. Perhaps some of you old timers can fill me in.

Test Cars

Our club members (the Old Old Timers Club) who were in radio broadcasting and possibly others will remember the special test cars we later acquired for the purpose of making field strength surveys, locating sources of interference and running down illegal stations.

The bodies of these Packard cars were of special composition since they were equipped inside with Western Electric 44-A field strength sets and other instruments. They greatly resembled a hearse or paddy wagon.

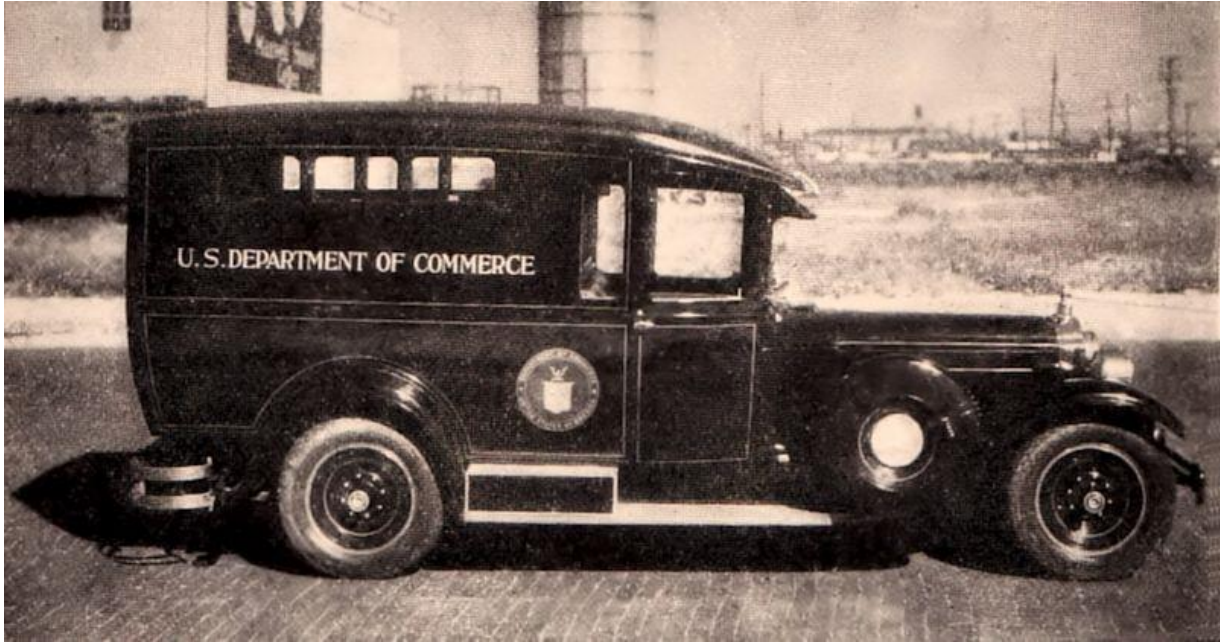


Figure 36: Test car used in the field by the Radio Division, U.S. Department of Commerce.



Figure 37: Internal view of the test car.

Cemeteries were fine places to take field strength measurements since there are no overhead wires to distort the field of a station. On one occasion Charlie Ellert, W3LO and I moved into a cemetery to take readings on a broadcast station, which it was alleged was not cutting down its power at sunset. We had just set up shop when a guy came along and announced that he thought we had made a mistake as there were no burials scheduled there for the day. We told him of our mission and went on with the task.

Lanes leading off of main roads, often free of wires overhead was another good place to duck in and take a reading. We ran up a farm road one day and a chap came running down and reported that his wife had just fainted. She thought we were bringing in a body.

I traveled far and wide in our old test car and the last job I performed was the measurements of WJZ and WBAL when they were synchronized on 660 kilocycles. I well remember the "mush areas" in New Haven where the fields were in phase opposition.

Early Television

No story of the old days, so to speak, would be complete without mention of our earliest TV systems in the United States. It was of course the electro-mechanical system of resolving the picture by means of a scanning disc rotated in front of a neon tube. We had only one TV station at the time in the 3rd district and it was owned and operated by the inventor Francis Jenkins.



Figure 38: Early television set.

The transmitter was located at Wheaton, Maryland and the studios were on Connecticut Avenue, Washington, D.C. The stations that were on the air at that time operated on frequencies between 2100 and 260 kcs. And all were of an experimental nature with X prefixes.

Night after night from our home in Baltimore, we could watch the little girl bouncing the ball from the Jenkins station and from the station in New Jersey, see the face of the "Father of Radio", Dr. Lee DeForest.

By changing the discs, we could on occasions, if skip was right, pick up WGY at Schenectady which broadcast hour on hour the GE monograph.

On occasions we would invite friends to our house to see the program. When it faded in we would get excited and exclaim, "See it, see it." On many occasions too when they left our house, they would knowingly look at each other and tap their heads.

Crude as they were, we saw images and my oldest daughter Patricia still talks about the TV shows she saw when she was a little girl. She never knew then that in years to come, she would be making appearances on TV shows as well as writing them when TV became truly all-electronic.

Due Process

Reflecting at times on law enforcement in the early days of radio, and comparing with the procedures employed today by the regulatory agencies in order to protect the rights of individuals and the public interest, I am amazed at what we got away with.

The FCC is today staffed with a number of hearing examiners, a general counsel, his lawyers and a large staff of lawyers in each bureau. Hearings and oral arguments to no end; but let's hark back a few years and see just how the supervisors of radio enforced the law, particularly as I remember it in the 3rd radio district.

I have in my possession, one of my work books for 1926, and in it I find this entry dated May 13th, "Amateur station in York, Pennsylvania; operating on excessive wavelength and without returning station license for amendment. License suspended!! "Suspended license of Mr. X at Gettysburg College for failure to take examination for Amateur 1st. Class", and so on.

In those days we had a broadcasting station in Philadelphia that was using a modulated oscillator, one of the few commercial jobs available. It was located on top of a hotel and the constant variation in line voltage due to the load of the elevators caused it to deviate considerably from its assigned frequency. After a couple of violations, it was ordered off the air until it could stabilize its frequency. No show cause order or hearing. Just, "you're off the air, we are taking up your license."

Yes, a supervisor of radio was a little czar in his own domain. There was one lawyer that I knew of and he was in the office of the Secretary of Commerce. All legal matters were referred to him.

However, time and progress changed things radically and with the creation of the Federal Radio Commission in 1927 and later the FCC in 1934, and more particularly with the passage of the Administrative Procedures Act governing all regulatory agencies, due process took on a solid and different meaning; let us see how it affected me, and particularly after I became Commissioner.

On September 15, 1950 I addressed the West Coast Convention of the IRE and the subject of my talk, of all things, was "Due Process and the Public Interest." In this speech I said this, "In licensing radio stations for example an applicant for station license, license renewal, or modification of his license, must be offered a hearing if the Commission cannot find without a hearing that a grant of the application will serve the public interest." "Nor may a station license be taken away without a hearing if one is requested. Full and fair notice of these hearings must be given of course, and judicial decisions have spelled out what is required for a fair hearing."

And, this too, "For the Commission, the Communications Act of 1934, which created it, sets the procedures to be followed. These procedures constitute due process of law when used in a spirit of fairness. They guarantee adequate consideration of all claims of all parties." Truly the mills of justice grind slowly but exceedingly fine.

Despite all the power they yielded, I am sure most of the old timers will agree with me that the supervisors and radio inspectors were fair and considerate in the discharge of their duties. As it concerned safety of life at sea, they had to enforce the laws and regulations without fear or favor.

Of the old gang I served with in 1923, the only ones other than Mr. Terrell who still survive are Bolster, Batcheller, Linden, Chappel, Du Treil, Cochrane Brown, Downey and Bean.



Figure 39: William D. Terrell.

Mr. Terrell was the first appointee to the post of Wireless Ship Inspector. Date, June 5, 1911. He retired as Chief of Field Engineering and Monitoring Bureau.

If this little ditty has brought back some memories of old, particularly as it concerns supervisors or radio inspectors you once knew or an examination you once took, or a bit of experimenting without a license, then I have been amply rewarded for my modest effort.



Figure 40: 1950 photo taken in the back yard of George Sterling's residence in Silver Spring, MD as Joe H. McKinney (left) was visiting and looking over George's new antenna support structure. McKinney was then Chief of the FCC Intelligence Division.

SHIPS THAT PASS IN THE NIGHT



Figure 41: Tom Stevens (W6KAA)

The passing of our esteemed friend and member of our club (OOTC), Tom Stevens, brought to mind a couple of incidents that always brought out that great big friendly grin of Tom's whenever we got together.

In one of my early stories published in "Blabber Mouth", I mentioned how I went ashore as a radio inspector for RCA at the port of Baltimore in 1922. Mr. Wesley Kelland was the local manager and Tom was the General Manager or Superintendent of the Marine Division of RCA, later Radio Marine, with offices in New York.

RCA had just brought out a small marine auxiliary vacuum tube transmitter. As I recall it, the circuit was a self-excited oscillator and was contained in an iron case with a removable cover. One tuned the rig with the cover off but when the cover was placed on again, the frequency changed. Tuning the rig was a tedious cut and try deal as one struggled to offset the effects of tuning when the cover was in place. Sometimes you were lucky and sometimes you were not.

An operator on one of the ships came into the Baltimore Office and complained to Mr. Kelland that he had difficulty raising the net control station of the Navy direction finding stations along the coast. Those were the days as our old marine operators will recall, the Navy Department operated a group of direction finders at the entrance of bays and harbors such as the entrance to the Virginia Capes. If the skipper wanted a check of his position, "sparks" would call the net control station on 800 meters (375 kc) and when directed, sent the letters "MO" for two or three minutes with intermittent transmission of his call letters. The net control station would then furnish the ship with an evaluated "fix" or approximate position.

Apparently, I did not do a good job on this ship, for a few days later after the ship arrived in New York, a note came down to the Baltimore Office from Tom Stevens, voicing a further complaint from the operator. Tom had added a final note to Kelland stating, "You better teach the fellow Sterling how to tune a ship's transmitter."

I sure was careful after that.

INAUGURATION OF WMH, BALTIMORE

While working for RCA at Baltimore, the company installed and leased to the city the equipment for a coastal station. It was licensed with the call letters WMH and located at the end of the municipal pier at the foot of Broadway.



Figure 42: Howard W. Jackson, Mayor of Baltimore 1923-1927

Tom Stevens came down from New York and Kelland and I went with him to participate with Mayor Jackson and other city officials in the gala opening of the station.

Tom assisted the Mayor in writing out the first message addressed to the Master of the Merchant and Miners passenger ship, Juniata, which was about to depart from its pier at the foot of Gay Street. The operator at WMH sent the message and shortly after the operator on the Juniata called with a congratulatory message from the Master to the Mayor.

It was read aloud. Tom then turned to the Mayor and with a great big Texas grin remarked, "Mr. Mayor, congratulations, you have sent a message and received a message." Everyone shook hands all around and as Tom, Kelland, and I came out of the radio shack on the pier, the Juniata all lit up, could be seen only a few yards abeam of the pier.

Both messages could have been handled by a megaphone. We all looked at each other and laughed and then proceeded to the Emerson Hotel to bend an elbow.

Many years later, when I was recruiting men for RID, I employed Tom as a Monitoring Officer and placed him in charge of the critical Los Angeles area. Whenever my travels took me there, Tom and I would chat about our old friends and events. I would never let him forget the two incidents recited herein. I can still see him smiling. God rest his soul.



Figure 43: Coastal Station WMH Baltimore, Maryland

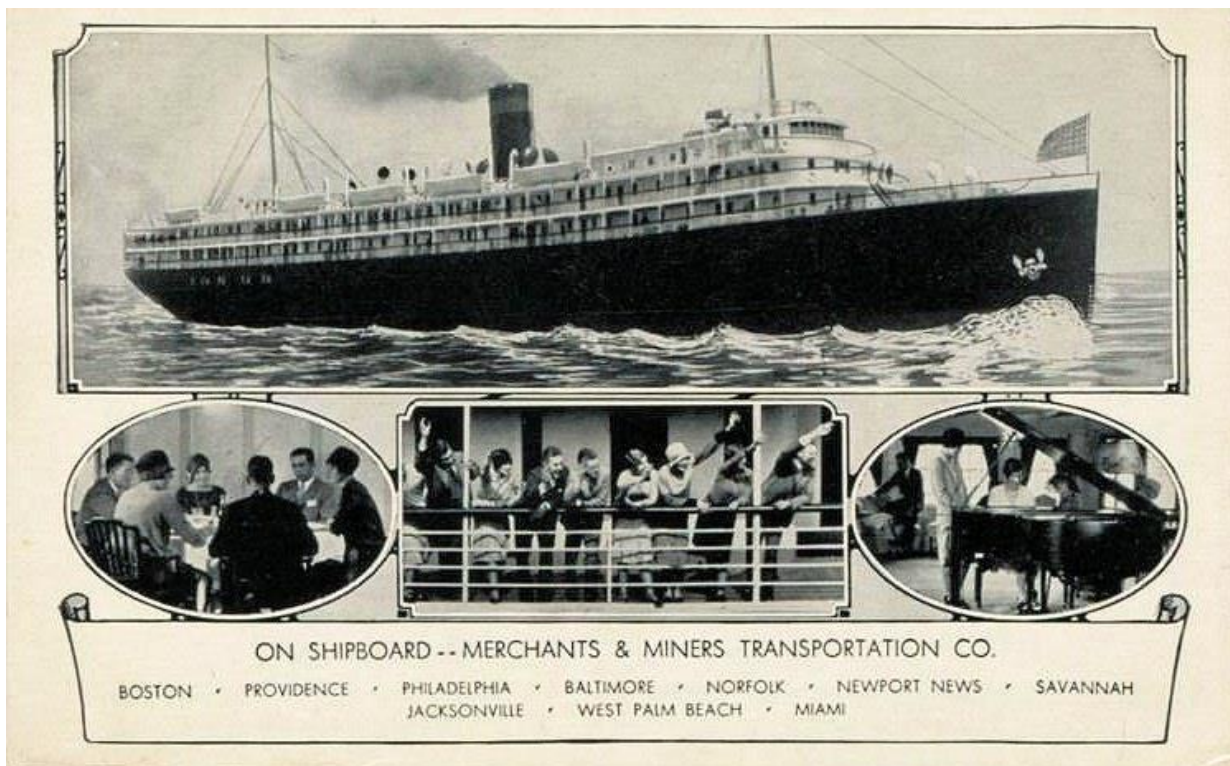


Figure 44: Post card advertising the Merchant and Miners passenger ships.



Figure 45: Federal Radio Commission seal 1927 and Federal Communications Commission seal 1934

A HISTORY OF THE LAUREL SITE

At the time that the Radio Intelligence Division (RID) began, in the fall of 1940, most of the FCC engineering staff were assigned to the Field Bureau. It then administered operator examinations, inspected ship radio installations and other transmitters, and located unlicensed transmitters.

The Baltimore office, where I was then assigned, was in charge of Charles Ellert, EIC, with Ed Chapin as Assistant EIC, H.A. Cohen, Lamar Newcomb and Al Kreis as senior Radio Inspectors, with Ed Sanders, G. R. McLeod, Tommy Thompson, Leroy Tuttle and myself mainly assigned to the Marine Watch, a relatively new activity which started about the beginning of WW II to oversee radio activity on marine channels with the objective of improving effectiveness of distress and other important communications.

Sometime in July or August, Mr. Ellert was called to Washington for a meeting. We were soon informed that there were going to be some changes in operations, with some remaining at their prior duties and others to be reassigned. Nothing definite was said then about what was going on, but we were all cautioned that it was a secret operation and that we should not divulge a thing even within the family. By September, some additional personnel had arrived, Ed Lang being one of them, and a training program had begun. All of the new personnel were radio operators, either amateur or commercial, so the training was in skills that were later to be useful in RID work. This included map reading and discussions of direction-finding techniques.



Figure: 46: Finch DF Loop



At that time, the Baltimore office had one vehicle, a Chevy van that had been equipped in 1935 with a loop antenna originally made for aircraft use and receivers, to be used in locating VHF RFI sources, which were then mostly industrial heaters and diathermies. The Baltimore office also had a Packard station wagon equipped with a Western Electric field-strength meter and there was also a model of this vehicle in the Federal Office Building (FOB) Headquarters. The station had a fixed monitoring installation consisting of Hammarlund Super-Pro receivers and several older types, along with a frequency standard devoted primarily to frequency measurement of broadcast and other stations before RID came along.

By late September 1940, Newcomb, Sanders, Thompson, McLeod, Tuttle and myself had all been formally reassigned to be Monitoring Officers, and Ellert had been placed in a new position in what was then described as the Radio Intelligence Division. Chapin became EIC Baltimore, with Cohen as his assistant. I do not recall whether Kreis was transferred elsewhere then or sometime later. We were all greatly surprised about that time to see a banner article in the Baltimore SUN which gave details on RID that even we were not aware of, but it gave us the opportunity to inform our families about our new activities.

On the basis of information later divulged, it appeared that President Roosevelt had called FCC Chairman Fly and the Chief Engineer to the White House and informed them that he wanted the FCC to immediately institute activities to control internal subversion and intelligence gathering by illicit radio operations, and passed a kitty of some \$10,000,000 for it. George Sterling was made Chief of RID and given the job of organizing the operation, with carte blanche to select personnel on FCC roles and to take over FCC facilities or acquire new ones as necessary. Sterling had, in World War I worked in Army Radio Intelligence. At the time, due to the military build-up in the US and overseas equipment orders, there was a general scarcity of radio equipment and practically nothing was available that could be used for direction-finding. Sterling arranged for Hallicrafters SX-27 and SX-28 receivers to be purchased from Hallicrafters, loop DF units for vehicle installation, and cars from Hudson which were modified for mobile monitoring. There was no commercial unit suitable for long-range HFDF work. Based largely on work reported in a book printed in England on the subject, (author: Keen), Roger Phelps came from the Philadelphia office to Baltimore and assembled an Adcock-type DF unit that was adequate for training purposes. This was located on the plot at Lake Montebello in Baltimore, where the FCC had leased a site that was used for recording noise at 530 and 1600 kHz, and various sky-wave signals in the standard broadcast band; to produce data ultimately used in frequency allocations in the broadcast band.

Mr. Ellert had been instructed to locate a suitable site in the Baltimore area for use as an FCC monitoring station immediately for RID purposes and for FOB in the post-war era. As secrecy was involved this took a bit of time, but three sites were eventually located. One was in the area later taken over by the Aberdeen Arsenal, a second was in the area now part of BWI Airport, and the third was the site now occupied by LR and the FCC Laboratory. The Laurel site (LR) was selected in part because of topography and soil conditions, and in part because of proximity to Washington DC as well as Baltimore. It was then the property of an estate that had

proven difficult to settle (rumor had it that there were some unknown heirs, and therefore clear title could not be guaranteed to a private purchaser). By agreement, a suit was instituted to condemn the property in Baltimore Federal Court (thus clearing the title) in February 1941, and the FCC was given immediate possession. The farmhouse (a brick building, built sometime in the 1800's and somewhat updated about 1908) was then occupied by a couple, kin of the party of the estate owner. For a few weeks, they occupied part of the building, while renovations were in progress. The buildings main part had two large rooms on the first floor (either side of a central hall) and two smaller rooms on either side of the hall upstairs. A wing at the left end contained a kitchen on the first floor and a bathroom (not operational) and a bedroom on the second floor. Other buildings on the property included a large bank barn (1/3 collapsed), a corn crib and garage combination, and a tenant house in a ruinous condition several hundred feet away. A shallow well (and bucket) provided the domestic water supply. In the 1908 renovation, water from a spring north of the building complex had been pumped by a hydraulic ram to a tank in the attic of the wing, and an acetylene gas generator had been installed in the basement for lighting. Neither of these were useable at the time the FCC took over. An outhouse was the only usable sanitary facility.

Upon obtaining possession, S. G. O'Conner, Morris Blum and I were assigned to get the place ready for occupancy. We obtained about \$3000 dollars' worth of electrical, plumbing and hardware from the Baltimore Ward's store and set to work in mid-February. Harry Mills and Nelson Mayne were soon sent out to work with us. Together we installed electrical and plumbing systems, cleaned up the place (the attic had about 1/2 ton of bat dung in it, and there were innumerable whiskey bottles), put a pump in the well, and put a new roof on the wing, and were ready to start operations by mid-March. There were three snowstorms of 8 to 10 inches during the first three weeks of this work, so we had no picnic.

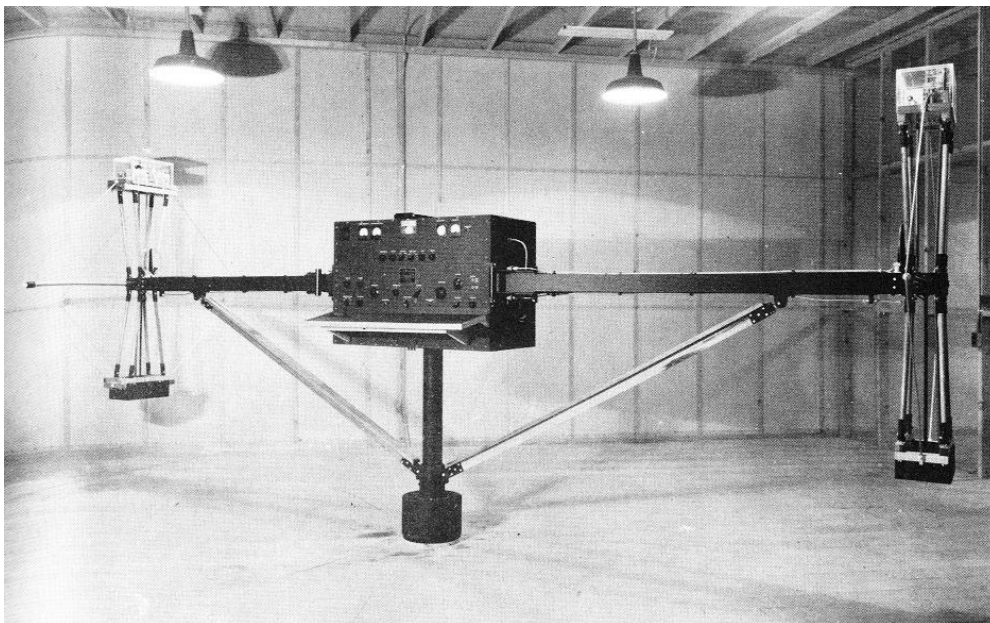


Figure 47: DAB3 Direction Finder developed by Collins Radio Company

Installing the radio equipment in the Hudson cars began soon after LR began operations. Radio equipment was shipped out to other locations as soon as they were available. A military Type DAB direction finder arrived and was put to use despite its shortcomings - this was a semi-portable H-type Adcock with the instrument hut at ground level. As its antenna system was not well balanced (to minimize reception of horizontally-polarized waves), nor did it have an effective antenna matching unit, it was not very effective. In the summer of 1942, a research activity was set up at LR, to look into HFDF improvements and to continue development of new devices needed by RID. The first step was to erect what was termed a Type A Adcock a short distance south of the LR building for development use. This had a hut about 5 x 5 feet atop a wooden tower. The initial effort at antenna mechanical construction was a wooden truss device about 20 feet long, with vertical dipoles at each end, rotated on a vertical tubular shaft at its center. The antenna connections were exposed on insulators above the top chord of the truss, which was the major shortcoming of the device.

The first antenna was replaced with one having a hollow truss with masonite skin, and with the antenna connections contained inside the truss. After development of a satisfactory tuner, these improvements were translated into what was named the Type B Adcock. An initial lot of 25 antenna beams and tuners was manufactured, and sent to various stations along with plans for construction of the supporting tower and equipment hut. That series had the receiving equipment operated from batteries in most cases, with heating provided by a kerosene heater.

About 100 more of the Type B Adcock antennas were manufactured during the remainder of the RID period. Tuning units for those were manufactured by a small business set up by Manuel Kann (later a partner in Kann-Ellert Electronics in Baltimore) who had a well-equipped metal-working shop. Mr. Kann had been a friend of Ellert and Sterling for many years and also an amateur radio operator. The antenna structures were manufactured at LR for these units, and the Kann tuners were checked out there before shipment elsewhere (which included more than 10 units to North Africa and South America).

In the post-war period, the antenna structures of most FCC-operated Type B's were replaced with a structure of tubular plastic material and re-designated Type C units. The original tuning units continued to be used in these. In recent years, these have been replaced by the Wullenweber type, which was not developed to practicable use in the RID (except for some classified installations).

While this Adcock development and construction went on, Sterling managed to obtain for LR and Santa Ana the Navy Type DAJ HFDF systems. These were an Adcock type having an array of vertical antennas at the corners of the square, with a sense antenna at the center of the square; with four such arrays to cover the frequency range 2-20 MHz. I installed the LR system (about 200 yards of concrete, a couple thousand feet of 10-ft. deep ditches, and cables as required to interconnect the antenna arrays to the LR building, where the remotely-controlled bearing indicators were located. The Santa Ana installation was made by others, although I was sent there to look into its performance. Neither of these DAJ

systems was very useful; the individual antennas had untuned amplifiers at their bases to couple the received signal to the underground cable, and these were subject to cross-modulation and inter-modulation due to the presence of strong undesired signals in the areas of the systems. The Santa Ana system was more affected by this, as there were quite a few strong VHF signals in that area, whereas LR had none of those, but only signals from local broadcast stations to contend with. In the same installation program at LR, a UAL HFDF was also installed. This had a shielded loop mounted at either end of a rotatable boom about 30 feet long. The loop axes were aligned along the boom. As a practical device, this was some improvement over the DAJ, but not enough to reach the performance of the Type B.

Some of the people that either worked on these projects or contributed materially to them follow. Charles Ellert was the RID Traveling Supervisor, and also generally responsible for the research and training program. Edwin J. Rudisuhle and James Ramsey were in the research and development lab with me. Red Rollins, Bill Hoffert, and Stu O'Conner were, successively, EIC LR during that period, Bill Holland helped a great deal with some of the construction, and there are quite a few others whose names I do not recall that also made contributions.

In the summer of 1941, under a contract let early that year, the Cape Cod building at the present LR Laboratory site was built. GSA supervised that contract. When completed about Pearl Harbor Day, it was available for housing an Army detachment of some 30 servicemen that were obtained from Ft. Meade by arrangements made by Mr. Sterling. After a few months, they were replaced by civilian guards, who manned a booth at the old entrance road. As I recall, there were two on duty at a time, and one of them periodically patrolled the property, to the Cape Cod, LR 20 building, and the transmitter house nearly a mile south. After the Army detachment was replaced, the Cape Cod building was occupied by two engineers of the FCC Field Division (or 'Routine') who were engaged in various research projects in the broadcast field. These two were W. K. Roberts (later Assistant Chief and then Chief, Laboratory Division) and Jules Dietz.

In late 1942, a 20 x 20 ft. prefab transmitter house was erected in the southern part of the property, near Mission Road, with public power and a remote-controlled emergency generator, with control lines via buried cable from the Monitoring Station.

During the 1942-1945 period, the training program for new monitoring personnel, that was first at Fort McHenry, Baltimore, was relocated to LR. The classes were held in a 20 x 20 ft. prefab building (known ever since as the 'School House') behind the Cape Cod building. The field exercises and DF training were centered at LR. It was nothing unusual to have several Hudson (or later Plymouth) mobile monitoring units careening around the countryside, sometime without any license plates, and at least once with crews of trainees that spoke English very differently (being from South America). Kann also made several devices for RID other than DF tuning units, one of these being the Aperiodic receiver, that was intended to alert monitoring personnel to the presence of a strong signal on the air so that the frequency might be located more swiftly.

In 1943, HFDF improvements continued, resulting in isolation chokes that enabled operation of the receiver on AC power and connection of a telephone to the monitoring room, as well as better heating (usually an electric heater with a duct up to the hut).

In 1943, the idea arose of having the content of foreign HF broadcasts monitored for intelligence information. This resulted in the establishment of the Foreign Broadcast Intelligence Service. Some 15 or 20 additional staff were added at LR (more at Scituate and other stations) along with additional receivers and antennas as needed for the work. At peak the total staff at LR was between 40 and 50 persons, not including trainees. The new antennas added at this time included a set of rhombics to the northwest of the monitoring building, oriented to provide reasonably complete 360 degree coverage. In June of 1944, I was commissioned as a LTJG USCGR, as was Ed Rudisuhle. Both of us were assigned to CG Headquarters initially, in Communications Operations, then Ed was sent to the Coast Guard Training School at Atlantic City for duty as an instructor. My duties were in connection with planning and operational requirements for the CG AIR-SEA RESCUE HFDF Net, which was anticipated to be a national necessity in the post-war period. As the conditions existed at the time of initial planning, this was probably a rational need; however, beginning in 1946, the increases of range and reliability of commercial aircraft soon made it clear that there was no safety requirement for the service and that it would be difficult to staff in the post-war era. Adequate information could be obtained from the FCC for locating aircraft in distress since the FCC intended to continue operating several of the stations formerly run by RID during the war.

The decision was made to continue use of the LR facilities as the monitoring station, and to set up a laboratory in the Cape Cod building as a division of OCE, to administer the program of type approval of ISM equipment just then beginning under Part 18, and to conduct research in areas of interest to the FCC in communications technology. The equipment and staff of the RID Laboratory and of the Field Bureau Laboratory (then in the Cape Cod building) were amalgamated at the Cape Cod. Charles Ellert, former Traveling Supervisor, was made Chief of the new Laboratory Division, and W. K. Roberts was made Assistant Chief.

Upon my discharge from active duty, I returned to FCC service and was immediately assigned to the Laboratory. Several former RID staff were also reassigned to it - R. Gabor, Adolph Andersen, C. W. McDormand, and Bill Holland were among those reassigned.

This chapter was provided by Mr. Milton Mobley.



Figure 48: Milton Mobley

Biography George E. Sterling (1894-1990)



Figure 49: George Sterling 1909

Born on June 21, 1894 in Peaks Island Maine, George Sterling's experience in radio dates from 1908 when he built his first amateur radio station at the age of fourteen. In 1913 he obtained one of the first amateur licenses in the state of Maine. He was continuously associated with radio since 1908

except for a brief period while he served in the armed services on the Mexican border in 1916 in Company "M" of the Second Maine Infantry and overseas during World War I with the 103rd Infantry, 26th Division. He was later transferred to the Army Signal Corps serving nineteen months in the American Expeditionary Forces (AEF) in France.

During World War I he was a radio instructor in the Signal Corps School of the AEF, completed Officer's Training School at Langres, France and was commissioned a Second Lieutenant in the Signal Corps Reserve. He assisted in organizing and operating the first radio intelligence section of the Signal Corps in France which located enemy radio stations and intercepted their messages. For this work he received a citation from the Chief Signal Officer of the AEF for "especially excellent and meritorious service."

After the war he became a radio operator in the Merchant Marine and in 1922 was a marine radio inspector for RCA. In 1923, he entered the federal service as a radio inspector in the Bureau of Navigation, Department of Commerce and was continuously engaged in the enforcement of radio laws and regulations during his federal career.

In 1935, he was appointed Inspector-In-Charge of the 3rd Radio District, Federal Radio Commission with headquarters in Baltimore, Maryland. In June 1937, he was transferred to Washington, DC as Assistant Chief of the Field Division, Engineering Department, Federal Communications Commission. He was appointed Chief, National Defense Operations Section of the Field Division on July 1, 1940. On June 1, 1942, he was promoted to Assistant Chief Engineer and Chief, Radio Intelligence Division and on December 19, 1945 he was made Assistant Chief Engineer in

charge of the Field and Research Branch. On May 1, 1947, he was promoted to Chief Engineer of the Federal Communications Commission.

George Sterling is the author of "The Radio Manual" (three editions) which was used as a standard textbook on radio communications equipment and procedure by radio schools, for Government training courses, and as a reference book used by colleges and universities.

In 1946, George Sterling served as a delegate of the Provisional International Civil Aviation Organization at the demonstrations of radio aids to air navigation by the United Kingdom at London, England and at a demonstration at Indianapolis, Indiana of the same year. He was Chairman of the United States delegation to the technical conferences preceding the Third North American Regional Broadcasting Agreement (NARBA) session at Havana, Cuba in late 1947.

On December 26, 1947 he was appointed to the Commission by President Truman and on January 2, 1948 took office as FCC Commissioner. He serviced in this position until September 30, 1954 when he retired from federal service.

In 1948 George Sterling was elected a fellow of the Institute of Radio Engineers (IRE). He was active in the Quarter Century Wireless Association (QCWA) Yankee Chapter #112 and Pine Tree Chapter #134, the First Class Operators Club (FOC), and the Old Old Timers Club (OOTC #51). He was president of OOTC while he was serving as FCC Commissioner. He was a pioneer member of the Antique Wireless Association (AWA) and an honorary life member of the Radio Club of America. He received the DeForest Audion Gold Medal Award from the Veteran Wireless Operators Association in 1979.

After his retirement, he returned to his home in Peaks Island, Maine. There he spent time with his family, enjoyed fishing, lobster fishing, amateur radio, and writing articles that appeared in various publications describing his many experiences during World War I, with the Radio Intelligence Division during World War II, and his career with the Commerce Department, Federal Radio Commission and the Federal Communications Commission (FCC).

Toward the end of his life he resided in a retirement home in Portland, Maine and took mini vacations with his family away from the retirement home. George Sterling passed away in Portland, Maine on November 14, 1990 at the age of 96. He was buried in Pond Grove Cemetery in Peaks Island, Maine.



Figure 50: George Sterling circa late 1980s.

RECORD OF A BIRTH.

Child's Name *George Edward*
Date of Birth *June 21, 1894*
Place of Birth *Portland (Mkts.)*
Sex *M* Color *W*
Living or Stillborn *Living*
No. of Child, 1st, 2nd, etc. *2nd*
Father's Name *Wesley S. Sterling*
" Birthplace *Seacoast*
" Color *W*
" Residence *Seacoast*
" Occupation *Sloop cutter*
Mother's Maiden Name *Annie S. Thomas*
" Birthplace *North Portland*
" Color *W*
" Occupation *—*
Name and address of Physician (or other person) reporting said Birth
G. H. Cummings, M.D.

STATE OF MAINE.

I hereby certify that the above birth record is correct to the best of my knowledge and belief.

Edwin L. Lyon

Clerk of *Portland,*

Figure 51: George Sterling's record of birth June 21, 1894.