

Wisconsin Veterans Museum
Research Center

Transcript of an
Oral History Interview with
FRANK BERTALAN
Cryptographer, Commander, Navy, World War II
2002

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Bertalan, Frank, (1914-2007). Oral History Interview, 2002.

User Copy: 1 sound cassette (ca. 50 min.); analog, 1 7/8 ips, mono.

Master Copy: 1 sound cassette (ca. 50 min.); analog, 1 7/8 ips, mono.

Video Recording: 1 videorecording (ca. 50 min.); ½ inch, color.

Transcript: 0.1 linear ft. (1 folder).

Abstract:

Frank Bertalan, an Edwardsville, Illinois native, discusses his World War II service as a cryptographer with the Navy aboard the *USS Hamul* and with the Commander, US Naval Forces in Europe (COMNAVEU). Bertalan talks about enlisting, taking a communications training course at Noroton Heights (Connecticut), and teaching communications classes to WAVE officer candidates at Smith College (Massachusetts). He describes the coding equipment and encoding procedures. Bertalan comments on assignment to the *USS Hamul* (AD-20), based in Bermuda, and training newly assigned Naval officers in communications for a year. He describes transfer to the Naval Forces European Headquarters in London (England) and duty handling the inventory and distribution of codes, ciphers, and communication equipment. He talks about security and accountability measures and mentions taking superseded codes to a power plant to burn. Bertalan explains the men were housed with different families so that buzz bombs would not cause mass casualties. He describes his experience staying with the family of Leonard Whiting, a British veteran of World War I, and discusses food availability. Bertalan says he did not sign any documents about keeping secrets, but they were verbally told what not to discuss, including any mention of the Electronic Coding Machine (ECM). He emphasizes that every country copied every other country's codes and relates a story about the British cracking a German message that was a copy of their own message, which the Germans had cracked, encoded, and resent. Bertalan touches upon his return to the United States. He speaks of writing his master's thesis while in London and using the GI Bill to earn a doctorate degree. Bertalan mentions discharge from the Navy after twenty-two years of active and Reserve service and teaching international relations at the Naval Reserve officers school in Washington D.C.

Biographical Sketch:

Bertalan (1914-2007) served as a cryptographer with the Navy during World War II. After the war, Bertalan earned a doctorate in library science from the Catholic University of America (Washington D.C.) and, after nineteen years working for the US Office of Education Library, he served as director of the library schools at the University of Oklahoma and the Texas Woman's University. He eventually retired and settled in California.

Interviewed by James McIntosh, 2002.

Transcribed by Jeremy Osgood, 2009.

Abstract by Susan Krueger, 2010.

Transcribed Interview:

Jim: Talking to Frank Bertalan, it's 20 June, year 2002. Where were you born, sir?

Frank: September 18, 1914.

Jim: 9/14. And where?

Frank: In Edwardsville, Illinois.

Jim: Okay. Says Chicago, but that must be just a suburb.

Frank: Oh, oh, no, no. It's way down state. Near St. Louis.

Jim: Oh. Then your home town is not Chicago.

Frank: Well, that was where I was born. I don't know where you meant by home town.

Jim: You were born in Chicago?

Frank: No, no. Born in Edwardsville, Illinois. I moved to Chicago when I was ten. Ten years of age. But I was living in Washington, DC, residing there when I entered service.

Jim: What were you doing on Pearl Harbor day?

Frank: Oh. No, this was, I was—

Jim: Wait a minute, we have to start over.

Frank: I had heard, that the Navy was in need of mathematics instructors, in the Naval programs. And having had a major in math, at Illinois State, I traveled to Washington, DC with the hope that the Navy would employ me as a math instructor. But, somehow that didn't work out, and I volunteered for the service, and was assigned a temporary Ensign's commission, pending completion of a communications training course, which took place at Noroton Heights, Connecticut. And, shall I continue?

Jim: No. When you left, how long were you in, you say you were in Edwardsville when you were born. When did you leave that?

Frank: In 1924.

Jim: When you were ten years old.

Frank: Yes, moved to Chicago.

Jim: Okay. I didn't have that in there. What did your father do?

Frank: Well, my father was a contractor, building. Rather, a one man operation. Very simple, circumspect. He did construction and renovating of interior, of housing. He was also a cabinet maker.

Jim: So, you volunteered for military service, rather than waiting to be drafted, was that the reason?

Frank: Well, I had every reason to be drafted, because of my health, and age, and condition. And I felt certain that I would be drafted. But prior to that, I volunteered for the Naval service, and was signed up in Washington DC.

Jim: Did you have any boot camp?

Frank: No.

Jim: No boot camp. They wanted to make use of you right away.

Frank: Pardon me?

Jim: They wanted to put you to work right away.

Frank: Yes. I had three months training in Naval communications, as a communications officer.

Jim: Electronic, you mean? Radio, and that sort of thing?

Frank: Yes. Radio communications, and training in the use of codes and ciphers.

Jim: Where did they train you to do the code work? Where was that training?

Frank: Pardon me?

Jim: Where was the code training? The code training.

Frank: Training? Code? Oh, these were the very complex sophisticated systems of the highest level of secrecy.

Jim: Where was that training?

Frank: This was at Noroton Heights, Connecticut. I was there for three months. And then at the conclusion of that training, because of intense seriousness

and application, and having done well in the training, rather than being assigned to a ship, which I requested, I was assigned to teaching WAVE [Women Accepted for Volunteer Emergency Service] officer candidates at Smith College in North Hampton, Massachusetts. And, so, for six months I was assigned to the teaching of WAVE women, WAVE officer candidates, for six months, at North Hampton, Massachusetts.

Jim: What were you teaching specifically, what were you teaching them?

Frank: The same courses that I had learned, in the use of communications procedures, the secret publications and codes that were used for radio traffic.

Jim: What's to train about those, if they're already printed?

Frank: Oh, it was the application. It's very complicated, because obviously the communications that were transmitted were the highest level of Naval security and intelligence. And we were committed to do this very accurately and diligently. It's the heart of the Naval communications system.

Jim: Did they, did you learn Morse Code?

Frank: Although I did learn it, we never did have to use it. I had to pass an examination in the Morse Code, but actually, we had electronic devices. This is the heart, this is one of ten wheels that were used in what we called the electronic coding system. And this was one of the most secret items in the entire World War II period, this item.

Jim: Because?

Frank: But now, since the war's been over, for fifty years, it's no longer classified. It had been deactivated, anyway. But this is one of the—

Jim: What is that called? That wheel?

Frank: This is just a regular communications wheel. But this was a part of a unit of ten similar units that were coordinated, and they were integral. The unit had ten of these in it, so these could not be separated. It is separated now, but during the war time use, ten of these were on a particular mounting, and were used for that. But this is one of many devices that were used. But this was the most secure.

Jim: Who set the code for the day?

Frank: First of all, we were handed the message to be transmitted, in plain English. Then we sat before a keyboard. And that same message, then, was typed, and it was converted into a message of five letter words. Every word then was translated into five letters. But those five letters were gibberish, all mixed up letters of the alphabet. So, the plain English version was converted into the codified section. It was that codified version that was sent over the air.

It had to be codified, because every nation at war copied every other nation's transmissions. They tried, always with extreme diligence to break the code. And, this wouldn't be the occasion, but I am reminded, as many people are, of the solutions that were made, breaking the codes. Well, I could go on with some, very sort of amusing, fascinating stories of the code breaking and so on. But the whole idea of this transmission was to ensure our own internal security. Which is, this has been true I guess for hundreds, thousands of years.

Jim: Just like the Enigma Machine the Germans had.

Frank: Yes. My son described it to me, but from what he said, this version that we used in the US Navy had its origins in the German Enigma system. But I'm not familiar with that, I can not comment on that.

Jim: We have one down in the museum.

Frank: Oh, I would want to see it, maybe in the next day or two.

Jim: Tell Jo, she'll take you down there. They have one there.

Frank: Oh, while I'm in town, I would love to see it.

Jim: Yeah, we borrowed it from the English. They had it.

Frank: Borrowed it from where?

Jim: From England.

Frank: From England. Oh, I'd love to see it. I'll count on it.

Jim: Right. So, after you finished at Smith, when was that? When did you make your next move?

Frank: Oh, that was, let's see, early in 1943. Then at that time I was assigned to the *USS Hamul*, which was a destroyer tender. And boarded the ship in Norfolk, Virginia. And shortly after boarding the ship, we set sail for our headquarters then, which was in Bermuda.

- Jim: And, how did you enjoy your first sea duty?
- Frank: Oh, well, I had been to sea a number of times. Usually I'd be a bit woozy for maybe, oh, two hours or so. Then I would acquire my sea legs. I discovered them, and everything was fine.
- Jim: You'd been to sea before, in what capacity?
- Frank: No. That was my first extensive experience at sea, or on the water, was with the *USS Hamul*.
- Jim: Right. And how did you enjoy that?
- Frank: How did I enjoy it? Oh, well, we weren't there for enjoyment. My duties aboard the *Hamul*, I was now a fully trained communications officer. And my job, I was aboard the *USS Hamul* for one year. We were anchored in Bermuda in Great Sound. And our job there, we were with the Atlantic fleet training command. And our job there, our responsibility was to train the communications officers who came, their ships. In other words, all newly built destroyers and destroyer escorts, and this was prior to and all through 1943. These newly commissioned ships, with newly assigned officers, all reported to Bermuda for what was called their shakedown training. And my responsibility was to indoctrinate these newly commissioned Naval officers in the procedures and the whole manner of Naval communications. But subsequently, each ship then would be assigned to a squadron or division or whatever, and they then carried on their regular battle tactics, communications, anti-submarine warfare and so on. So my job was to train other communication officers in the conduct of their responsibilities. This was for a year.
- And then I reported back to Washington DC. And then I had an option, which I was happy to exercise. Well, when I say an option, so often we were given the opportunity to express two or three choices for the next duty assignment. Sometimes these were observed, and just as often they were not. However, I was assigned to the commander of the Naval forces in Europe. And our headquarters were at Grosvenor Square, in a portion of London. Eventually became called Little America. You've heard of it.
- Jim: Oh, I've been there.
- Frank: Oh, you were there?
- Jim: Not stationed there, but I've been there.

Frank: Oh, yeah. Oh, then, that's interesting. So, then there, this was for the next, about two years, during which time we worked with the, we had responsibility for the assembly and the distribution to other Naval activities, the secret codes and cipher devices, which then became a part of the overall program, prior and during the D-Day invasion. And for the months succeeding. So we had—

Jim: But what about your specific job? What was your job?

Frank: I had to inventory and distribute the codes and ciphers that were used for the invasion planning. And these were communication equipment and instructions and codes for all the Naval activities in the United Kingdom area. Well, all of Europe, for that matter.

Jim: Who gave you the codes and all this? How did you get your orders, and so forth?

Frank: Well, how did we get our orders?

Jim: Well, if you were going to distribute something, who gave it to you to distribute? That's what I'm asking.

Frank: Oh, they were sent from the States, aboard ships for security. These codes and ciphers were printed up way in advance. And the most secret ones were changed every day, in order to maintain the security. So my responsibility was, I acquired the documents and the equipment. Everything had a serial number. Everything had to be, when it was inventoried, two other officers had to join me in opening the shipments, in order to, we all had to certify that the specific codes and ciphers were received, which, their title, their serial number, date.

And then what happened, when these were superseded, which was a regular program, the same code was not used repeatedly. They had given periods of applicability. Then three of us officers had to go to the destruction. We went to a big power plant called Battersea, one of the major electrical producing facilities in the entire Great Britain area. This happened to be in a section of London. The three of us officers had to certify which publications were burned. The tremendous hot furnaces, we had to throw these publications into these incandescent furnaces for absolute destruction. And we all had to sign the statements specifying which documents and which serial numbers were destroyed. So that way the Navy had a precise accountability for every secret code and device from the original printing to the eventual destruction.

Jim: Did you do that every day?

Frank: Oh, no, no, no. Not every day. Maybe once a month for the destroy. Now these publications, for ensuring their security, if a ship at sea, the communications officer had instructions on his procedure in destroying this material so it would not fall in the enemy's hands. And ultimately these documents were printed on paper and with ink that would be completely destroyed with sea water. So that one of the procedures in the destruction, to guarantee or assure security, to throw them overboard, and the sea water would destroy the legibility. Those that could not be otherwise burned or destroyed. So.

Jim: And would things change on a day to day basis, or were they just about--?

Frank: Day to day basis, for what?

Jim: They'd change on a day to day basis? The codes and everything?

Frank: Oh. Some codes were so intensely secured that they were only good for one day. And then the most secure that could ever be imagined, is called the one time code. For only one message was that particular system ever used. That was the most ultimate, the most advanced security. Could only be used once. Once it was used, that whole printed list was destroyed. One time code. Well those were for the very, not used very often, because, for obvious reasons.

Jim: That type of a message, who would that go to?

Frank: Oh, these would go to the top senior officers.

Jim: Those were the only ones who would get that message.

Frank: Yeah, from the very highest echelon. We had, there was secret and top secret categories.

Jim: You were cleared for both?

Frank: Oh, yes. Yes.

Jim: Did they pay any particular attention about where you stayed and where you went to make sure nobody picked you up?

Frank: No, well, we were in London. And I guess that was secure. If I interpret your question. That we were not jeopardizing—

Jim: Where were your quarters?

Frank: Oh. In order to, because of the buzz bombs that were coming, the V1s and the V2s, we were quartered with different families. Or we could stay in a hotel, but we were dispersed, so that it wouldn't happen. I recall, one time, a busload of enlisted personnel was hit by a V1 rocket bomb that was sent over the channel from France. And a whole busload, about 52 men were completely, completely, all destroyed. All killed. So we were quartered, we were left to our own resources. But we were with different families throughout the city.

Jim: Did you have to sign a document, promising not to discuss this with anybody? Any document like that?

Frank: Well, it was so taken for granted. I don't recall signing such a document. Well, there must have been. I mean, that's a detail. We have many, many details involved in the service. But we, in fact, the security for this item, which was called the ECM, Electronic Coding Machine. If we ever uttered those three words in a public sidewalk, we were warned over and over again, we would be subject to a court-martial. We couldn't even mention the existence of the equipment that incorporated this particular unit. So, and of course, we were always told, never.

Now I recall, in order for some people to, when we had the, what you call, the scenarios, if we told them that the submarines had 16 inch guns, then anything we may have said, would have been taken with a grain of salt.

But, no, we were told never to discuss names of ships that were involved. Their sailing dates. Any particulars about them all. We were told, never. But to signing a paper for that, I'm sure that what was unnecessary. It was assumed, you know, that—

Jim: What about your Army counterparts? Did they have a similar set-up like yours? The Army?

Frank: Oh, the Army. I have no way of knowing. But they must have. Because the—

Jim: Right, but you didn't have anything to do with them, or you didn't meet them or talk to them, any of those people?

Frank: Talked about?

Jim: Talk to any of the Army people who were doing the same thing you were.

Frank: No. No we rarely saw, well, we did see in the hotel where I spent some of my time, the Strand Palace Hotel, in London. In the lounge I would occasionally see Army aviators. Army pilots. There was no Air Force

then, it was the Air Corps of the US Army. I would see them, and I could talk with them, but not very often. We had our own programs and lives and life routines and so on.

Jim: Certainly, I understand. And you stayed with this one family all the time you were in England?

Frank: I was in the Strand Palace Hotel for maybe six or eight months, and then with one family. South Kensington section of London. And I was, there was one other Naval officer, a Lieutenant Baker. He and I were both with this same family, Leonard Whiting.

Jim: How was that experience, staying with a British family?

Frank: Oh, well, he himself was a veteran of World War I. Leonard Whiting. In fact, the Battle of Jutland, he was on the destroyer and washed overboard. And here he was in World War II, although he was too old for service. But it was with Leonard Whiting and his wife that Lieutenant Baker and I were quartered.

Jim: Right. And how was that experience, living with a British family?

Frank: Oh, that was very pleasant. Very pleasant. They were very cordial. And, of course, we were on their side.

Jim: But, they were short of food. Did you help their kitchen by bringing food in from the base?

Frank: Oh, no, no.

Jim: You didn't?

Frank: No, no. Cause we were not, we had, see, although our food wasn't with the British, we had occasions when there were, oh, restaurants and hotels where the Navy would congregate, and maybe 20 or 30 officers would be invited for a dinner, or for some social occasion. But no, our meals were all with the family, with the Whiting family. There were restaurants that we occasionally went to. The Lion's Teahouses. But that was not our main sustenance.

Jim: So many of the British families were so short of food, and they couldn't get any fresh vegetables, a lot of the Americans who were over there would bring them stuff from their commissary to help out with the family.

Frank: No, we never, didn't have to, because there were, food was maybe short, but it was available. For example, in meat dishes, often times were mixed

with vegetables. Like if we had our so called hamburger, it was half of it was rice, in the restaurants. But, no, there were the butcher shops, the green grocers, they were all available. There wasn't a surplus, but nor was there any shortage.

Jim: So, how long were you there in England?

Frank: Two years. Till after V-E Day, the surrender of the Germans. And then I was, Captain Miller, who was my immediate commanding officer, I had to give him reasons why I was leaving the service. Because we didn't, we were a part of USNR, US Naval Reserve, and our original intention was to sign up for the duration, so that when we had the option of discharge, cause we weren't, as officers we were not discharged. There's a different terminology. We were—

Jim: Retired?

Frank: Oh, no. Not retired in our twenties. No, we were, the word evades me at the moment. We were assigned to a non-active status. Although I stayed in for 22 years more as a reservist. But we had the option of, I guess you call it resigning, because officer personnel were not discharged.

Jim: But you didn't have that option in England. You had to go home, first.

Frank: Yes.

Jim: How'd you get home?

Frank: Oh, thousands of us were aboard an aircraft carrier. And we sailed from South Hampton. Oh, can I think of the name?

Jim: That's all right. That's not important.

Frank: A big aircraft carrier. We sailed back to New York. With an aircraft carrier.

Jim: When did you get back to the states, do you recall?

Frank: Back to the states.

Jim: When?

Frank: Oh, this was 1945, about June as I recall.

Jim: And then you were processed out of the service?

- Frank: Right. That's one expression. Processed. Detached.
- Jim: Then, did you use your GI Bill when you got out? [**End of Tape One, Side One**]
- Frank: Oh, I had in the meantime completed a Masters degree. All I had left from the University of Illinois was the completion of a Masters thesis. And I actually finished that while in London, over on weekends and times when I had some free time. Although it took me about two years, I completed it, and then after the war—
- Jim: What was the thesis?
- Frank: Oh, it was in, I was in graduate library school.
- Jim: What was the thesis?
- Frank: My thesis? Oh, it was an analysis of administrative, administration of public libraries in the United States. You know, people don't realize it, some public library systems are very complex and extensive organizations. And I had completed my masters degree in library science, and after the war I took advantage of the GI Bill and went and got my doctorate at Catholic University of America, which was in Washington DC, and that's where I was living and working at the time. So—
- Jim: What job did you have in Washington DC?
- Frank: Oh, I was with the US Office of Education Library, I was the chief of reference and bibliographical services. By that time I'd completed my masters degree, and professionally trained librarians were very scarce. It was a mutually propitious situation where I came in to the US Office of Education, and then while there I started working on my doctoral program and eventually completed it. The GI Bill was a tremendous help. Without that I couldn't have done it. Also, my family was started. 1948 our first born arrived. Cause I was married, two months, let's see, April, May. I was married three months before I entered service. But our family didn't start until 1948. Our first born.
- Jim: Very good. So, from Washington DC, where did you go?
- Frank: Oh, I stayed there for nineteen years. Because—
- Jim: What caused you to leave?
- Frank: Pardon me?

Jim: Why did you leave?

Frank: Oh, I left Washington DC because, arranging for higher education for seven children would have been a financial burden. And I had the opportunity, I was offered the directorship of the school of library science at the University of Oklahoma. So, the entire family moved to the state of Oklahoma, and eventually all seven of our children eventually, they needed very little encouragement, because they realized they had no choice, to finish their college degrees. And all finished. Seven did so. But in the meantime, I kept up my Naval Reserve during the 19 years that I was in Washington DC, I remained active in the reserve. Many of those years I was an instructor in the Naval Reserve officers school. We had ranks through, I had students with the rank of Captain, which is the equivalent of a Colonel in the Army. So I continued until, finally, when I did retire, I was happy to have a monthly income from the US Navy.

Jim: What did you teach them?

Frank: Oh, international relations. Mostly international relations, and different aspects. Because, that was a topic was always changing post World War II. The Cold War coming on, and I taught international relations to the other Naval Reserve officers who maintained their connection in the reserve. And then every summer I would volunteer for, and go on a two weeks Naval cruise. Either aboard a Naval ship for two weeks, or further graduate study, like the Naval post War College as a student for two weeks. So, I kept that up until I finally retired.

Jim: What made you leave Norman, Oklahoma?

Frank: Oh, I had a promotion to the directorship of the library school at Texas Woman's University. This was a part of the University of Texas system, and I was there, ten years at Oklahoma, about seven years at Texas Woman's University. Then I retired from everything.

Jim: Where was that?

Frank: Denton, Texas, which is, you know, about 30, about 40 miles north of Dallas.

Jim: Okay. Did you enjoy living in Texas?

Frank: Very much. Very much. But nothing is like California.

Jim: Was it different than Oklahoma?

- Frank: I think so. Texas was economically a little more ebullient. There's a little, although we loved Oklahoma very much, loved it very much. Texas we liked every bit as much.
- Jim: And then you're off to California.
- Frank: And then off, like so many daydreamers.
- Jim: You were through working then, when you went to California?
- Frank: We went there all fully retired. Was no further employment. By that time I was 67 years old, when I left Denton, Texas Woman's University. I was 67. Been retired since.
- Jim: What prompted the move to California?
- Frank: Oh, all my life I had heard of it. But I had a brother and a sister there. Had a brother and sister living in California. Visiting them. Family visits. We saw the many, many attractions, the wonderful things about California.
- Jim: Okay. Did you keep track of any of the people you were in the service with?
- Frank: Oh, from England? Yes, we went back about, five or six times to visit people that we had met. Families that we had met in England. Even as of today, we still keep in touch with a half a dozen of them. And people marvel at how, after 50 years, we still maintain regular contact. We still do. But, of service people, cause now that in three more months I'll be 88, so many people now have gone on to their better rewards. Not too many of us left.
- Jim: Right. I understand. And, did you join any veteran's organizations?
- Frank: Oh, I had, back when I was in Washington. When I say living in Washington, some of that, most of that was across the river in Virginia. And I had maintained for a while with the American Legion. A very dear friend of mine was a commander of the local post. And I maintained, but very short time. I was, academics pretty much absorbed my available activity, and so on.
- Jim: And, did the code work give you any insight into your future life? I mean, did you learn things there that were valuable to you later?
- Frank: Well, I guess our association with people, a maturity that sets in. But as far as anything very specific, I could not my finger on that.

Jim: What I need to know more of is how you got the daily codes. Was that printed on a piece of paper and given to you each morning, or how did that arrive to you?

Frank: Oh, well we had, let's see, what could I. The equipment that we used, first of all, we started with a plain English version of the message that had to be transmitted.

Jim: I know that.

Frank: Well, then we would have printed instructions. It was really electronic material, electronic gear. Almost like with a computer today. You sit before the keyboard of a computer and you transmit your message. The message we transmitted was the Naval message. And the computer then took care of, then that was handed to a radio man who used the Morse code. Mostly the Morse code. These were enlisted personnel who were adept with the Morse code. And they would take. We had our English version which we would, with this equipment translate into five letter words, which are gibberish. And then the enlisted men and chiefs would take that message, which was in gibberish, and with the Morse code key it out over the air.

And then every station, when they see a message coming in, if it was addressed to their region or their area, they would translate it back to plain English. But every station received all the messages, but they would be overloaded if they had to transcribe everything. So each one had a key address. Like, for example, you had five battleships. The message would be addressed to one of the battleships, in code. The other four battleships would have it, but they would not decipher, not decode it. So it was, I guess, the best I could compare that to is our modern day computer.

Jim: I understand this part. What I'm trying to get at is, who set your machine each day? Your machine had to change its code every day, didn't it?

Frank: Oh, the machine, well, it was, in all of the Naval units, they had the equipment, but the secret codes and ciphers were maybe delivered, maybe once a month. And they were dated ahead. Say, if we received a shipment of codes, of the new ciphers, say, in the middle of month, that would be good till the end of that month. The supply. But the codes would be changed every day.

Jim: Right, but you got that on a printed sheet of paper? What the code was for that day, so you could set your machine?

Frank: Oh, yes. Oh, absolutely. The day, and even the hour and the minute was all specified. So that we would not use, it would violate security if you had

too much traffic sent in the same code. So by changing, even with that preplanned security, still some of our codes were broken. I have an interesting illustration, if I have time. There was a situation we were aware of where the British, in sending to, like in North Africa, and the Mediterranean, and the North Sea area. They sent-- weather information was very, very critical. In this particular case I'm describing, the British transcribed their weather reports, so that they would, for secrecy, to all their stations in this vast area. Of course, the Germans copied all of their traffic. Every nation copied every nation. The Germans copied that British transmission, and they broke the British code. Then the Germans sent that same weather report to their stations. The British copied the German version, and broke the German code. Lo and behold, they had received their own message back, was deciphered twice. There are many, I could revile you with many such situations. But that illustrates how radio traffic can be copied by everybody. Of course, not in South America, that's too far away. But transmissions in the North Sea and the English Channel, and the Mediterranean were all receivable. Well, I don't know how else—

Jim: That's fine. That's good. What else was there. Okay. I guess that's just about everything I can think to ask you. I think that's about all I can think of. I appreciate it.

Frank: Oh, well, I'm—

[End of Interview]