ORAL HISTORY INTERVIEW

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DR. ABRAHAM SINKOV

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INTERVIEWER: What were the circumstances surrounding the initiation of cooperative efforts with the British in the late 1940 and early 1941? In particular, what was your role in both the planning for and the conduct of the trip to the UK in January 1941? Describe the journey to the UK.

SINKOV: I cannot speak for the circumstances that initiated the cooperative effort. The details of how the program of collaboration was arranged were carried out on a higher level than mine. My first awareness of an arrangement that was being made for a visit to the UK came with the information that a party was to be set up consisting of Army and Navy representatives to go to the UK on an initial visit of collaboration with their Signal Intelligence effort. The trip as originally planned was to be headed by Mr. Friedman, but just about this time he unfortunately became ill and was hospitalized, with the result that he

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was unable to participate and I was selected to head the Army component in his stead. The other Army participant was Captain Leo Rosen. There were two Navy officers--Robert Weeks who was in communications and Pres Currier. The arrangements for our trip were interesting. It was just about this time that a new Ambassador from Great Britain was being sent to the U.S. He was Lord Halifax, and his transportation to the United States was arranged on the King George V, a newly built battleship which made its maiden voyage to the U.S. when it carried Halifax here. It landed in the Annapolis area and our team, the four officers who were to go to the UK, were taken very discreetly to the ship which we boarded with the equipment which we carried to the UK. It included the PURPLE machine, a good deal of material which had been built up on Japanese systems, material connected with Italian systems, and some general information about cryptanalytic techniques. The voyage on the King George V was a relatively comfortable one except for the fact that we took a very northern route going much of the way about the 60th parallel and it was winter weather and quite cold. The ship started for tthe UK on the 15th of January and we finally completed our voyage at Scapa Flow on the 29th. At Scapa Flow we were met by a British group who

took us to a destroyer which then went from Scapa Flow down to the London area and in London we were met by Brigadier Tiltman with some transportation which took us to BP which is the way it was always referred to, Bletchley Park, the place where the British had their cryptanalytic installation. Do we want to go into the details of what happened there at this time? This says describe the journey.

(No, the next question I think we can get into those details on this page there)

INTERVIEWER: What specifically did you and Rosen concentrate on during the visit?

Technical aspects of the visit.

SINKOV: Rosen concentrated on displaying to the British the PURPLE machine and its functioning. I had been, at this time, in charge of the Italian section, and I spent my time talking with the Italian group in Bletchley, headed by a man named Catty, and we had some very interesting interchanges. They were in possession of a codebook which had been surreptitiously obtained for the use of certain superenciphered code systems which proved very useful to us. It had been a system that we hadn't been able to make much progress on. We were able to provide them with considerable information about the decrypt of some diplomatic material which was being handled rather

effectively at home. We were unaware at this time of the special interest and accomplishment that the British had in the ENIGMA. Apparently what was happening was that discussions on the higher level were taking place as to whether anything should be told us about the ENIGMA and not long before we were due to leave, apparently a decision was made to give us a preliminary briefing and we were taken to one of the particular buildings at Bletchley (I think it was Hut 8) where they were doing their work on the ENIGMA and we were given an introductory talk about the cryptanalysis of the ENIGMA system with some mention of the electronic equipment which they were using to assist in getting decrypts. It was essentially a preliminary discussion--we didn't get a great deal in the way of detail at that time so that when we came back home all we were able to tell was the overall cryptanalytic technique for getting solutions, but these techniques required rapid analytic machinery to accomplish their purposes and the arrangements for interworking in that direction did not come until later on.

INTERVIEWER: So essentially they did not then give you any of the diagrams of the wirings of the sketches or the Bombes, or any of that?

SINKOV: No. We were aware of the equipment and Rosen had some ideas as to how it could be made to function.

INTERVIEWER: Do you remember who gave you the briefing?

SINKOV: No. I have no recollection of that.

INTERVIEWER: Could it have been Turing?

SINKOV: Well, it might have been. He was there at the time. I dealt mostly with people who are in cryptanalytic activity of other directions. Rosen, I think for the most part, was the man that handled the aspects which were electrical in character.

INTERVIEWER: Did he go off on his own? He says he spent quite a bit of time with Welshman.

SINKOV: Yes. Welshman is a name that comes to mind. I think he probably did have a period independently of going into some discussion of this kind. I did spend a good deal of time separately with some of the people on the cryptanalytic side. For example, I spent some time showing them some things that had been developed in the solution of double transposition systems and spent quite a little while with the Italian group. Then there were people like Pollard and Pillingcooh(?) who were cryptanalysts and with whom we had some discussions. There were several periods when Rosen and I were operating independently. During all this time the Navy officers were having conversations

with Naval counterparts. As you can imagine the British were not at that time very keenly interested in what we were doing with Japanese systems because Japan hadn't really got into any activity which affected them; they had their hands full with the German systems in particular and to some extent with the Italian. It is a point of just general interest that during our two week stay in the UK we were very elegantly treated. We were put up at the home of Lord Cadman who was an official of the Anglo-Iranian Oil Company. He had not long before that been to the United States on a visit and had been quite royally treated and he felt that he'd like to respond. When he heard that some Americans were coming he offered his home as a place for us to stay. We never met him. It happened that shortly before we arrived he became ill and was hospitalized and we were greeted by Lady Cadman who after the first day excused herself and said she had to go and be with her husband and we didn't see her again. So for two weeks we were the sole occupants of this elegant establishment of Lord Cadman with a butler, and a cook, and a couple of maids. Really elegant living. I don't know if there is anything more to say about that. It was a period of difficulty in England; this was early '41, long before Japan came into the war, but they were experiencing regular bombing runs from Germany. A strict

blackout was on and they observed it very effectively so that essentially when darkness came the day was over, and you were cooped up for the night. They had their automobile headlights painted black and all the light you got came through a little cross that was inscribed in the blackness of the headlight. It was a rough period; rationing was in strict force but we were very lucky because the Cadman establishment had its own sources of food and it was quite a pretty big farm and they had lots of food sources so tht we were spared any of that concern. And, although we sometimes heard bombs, we were really pretty free of wartime concerns except for just one period. We went into London on a visit--a sightseeing visit--and it included an evening in a kind of nightclub which was in the basement of the building. They had a band that played music, a band of American musicians, actually, with a very strange name which I don't recall at the moment. The only reason I remember this is that the night after we had had this entertainment a bomb came down through the roof of the building all the way down into the basement and killed the whole band. It was an experience of being just 24 hours away from the real problem. Our day was a fairly standard one. We'd get up in the morning, have breakfast, be transported to the Bletchley organization where we would spend our time discussing various

cryptanalytic matters. When the day ended we'd go to the house and just spend our time there. I recall one amusing experience, maybe this is not the kind of information you want, they had a small collection of records in the Cadman home and one of our means of entertainment was to play records on a phonograph they had. There was one record which gave us a great deal of amusement. It was called "La Mulata Rumbella" which translates into the Mulatta who was a Rhumba dancer. I have a pretty good command of Spanish and Pres Currier is quite a linguist. The two of us enjoyed this record. The first half of it was ?C?Duban Spanish that we were able to follow reasonably well and then the second half, we couldn't get anything out of at all. Complete blank. We'd listen to it and couldn't understand it. And it was one of those funny situations where the first half of this record was perfectly clear and the second half didn't mean anything. And one day, out of the blue, as we were playing this record over and over again, Currier said, "I heard the word 'spinach'." So we concentrated a little and it turned out that the second half of the record was the singer singing in English so badly pronounced that we couldn't understand it. It went something like, "Mulatta like rabbit, she like tomato. Mulatta like rabbit, she like potato." We thought this was Spanish and we couldn't make anything of

it at all. We cryptanlyzed it finally because the third time around she said, "Mulatta like rabbit, she like spinach."

I can relate one other incident which stayed with me for a long time. We'd sit down to dinner at this place and there would be an array of silver on both sides of our setting and up in front and we'd go through several courses and after each course the butler would come by and make necessary rearrangements and invariably for the first many days when we'd be getting close to the end of the meal, the butler would come along and would pick up a small knife that hadn't got used and he would sort of look down his nose at us as though 'these boors don't even know what this is for', and I finally found out what it was for. The only use for that little knife was so you could take a bit of butter off the butter plate and put it onto your butter plate and that was all you did with it. Well we finally got enlightened.

INTERVIEWER: Do you feel that the exchange that you were having with the British was an equal one in that they were giving you as much information as you were imparting to them?

SINKOV: Well, if you leave out for a moment the ENIGMA then I think we were probably giving them cryptanalytically more than we were getting, because of the PURPLE which was a

pretty good accomplishment. But when the ENIGMA information is added in I think that throws the balance in their direction, because the solution of the ENIGMA was quite an accomplishment and of extreme importance in the conduct of the war. All these books that have been coming lately telling about how ENIGMA solutions were used in the conduct of the war are very impressive. But by and large it was an effective kind of interworking which built up to a program of very effective and pretty regular interworking with the British. Its existence was kept pretty secret for a long time. I think it would have been a political handicap to the administration if word had got out that we were doing anything like that and it wasn't for many years before any awareness, outside of the cryptanalytic establishment, became known that there was any contact of this kind.

INTERVIEWER: Do you recall whether you were sworn to particular secrecy on the ENIGMA?

SINKOV: Yes.

INTERVIEWER: Tiltman says he dealt with you during that time--sort of let you go off by yourselves and decide whether you wanted to comply with this sort of edict or not.

SINKOV: Yes, there was a condition imposed before we were given that general information about the ENIGMA, which was understandable, because it was to them almost a vital

consideration. The ENIGMA solutions meant so much to the British that they were very hesitant about any of that information getting out.

INTERVIEWER: Did you, and Rosen and Pres Currier and Weeks all agree to this condition as a group?

SINKOV: We must have--because otherwise they wouldn't have given us the briefing they did.

INTERVIEWER: Do you think all four listened to the briefing on the ENIGMA and sort of got the same information?

SINKOV: Now I don't remember about that. But I would assume that all four of us were initially involved. Well, I would certainly expect that they would have been, because tthe Naval ENIGMA was an extremely important system.

INTERVIEWER: Had you been doing any work on the ENIGMA before you went over? Did you know of the existence of the ENIGMA traffic, the use of the ENIGMA by the Germans?

SINKOV: Well, I can't answer that question. You would want to talk to somebody who had been involved in German systems during that period. My recollection is that Kullback headed the German section in this 1940 period and they were working with a number of German systems, the most important one of which was a system which used to be dubbed FLORADORA. It got the name from the fact that messages were all prefixed by a letter combination and

it turned out that this was a system in which a key book something like a hundred pages of numerical keys was used twice. They took, according to this eight letter indicator which gave information of where to go, they took one stretch of key from one place in the book and the second stretch from a second place in the book and combined the two by addition to form the key that actually got used in the message. Now, Kullback and his people were not completely aware of that initially. They were getting some information out by the fact they were able to deal with the combined key without details about how the two halves ever got together. What made the really important contribution to that system was the fact that the British somehow obtained something like the first 75 lines or so of this key, surreptiously obtained, and this then came after the interworking had developed. When that was made available to Kullback's section it made a tremendous difference because it effectively gave them a big entry into the key book and from then on they made a lot of progress with it. Now I think that was the main problem they had. There may have been some other German systems they worked on but I doubt they were working on the ENIGMA. I don't even know whether they had any ENIGMA traffic.

INTERVIEWER: Apparently the Navy was working on some ENIGMA traffic and they never made progress.

SINKOV: They may have got ENIGMA messages that were being sent in naval communications. I don't think we have any intercept of that kind on the Army side.

INTERVIEWER: Did you have any planning meetings between the Army and Navy people before you went? Did you know what the Navy was doing or did you kind of...?

SINKOV: No, we operated essentially independently. I don't recall that there was any interworking between Rosen and myself on the one hand and Weeks and Currier on the other. In fact, I don't think I ever met Weeks until we started out on this trip to England.

INTERVIEWER: So you didn't get together and plan what the Navy would present as well as what you would present.

SINKOV: No. I have no recollection of anything like that. I think we operated quite independently.

INTERVIEWER: That explains a lot of misconceptions or conceptions of what happened because....

SINKOV: And in fact in this rather close contact that we had with one another because we were together all evening at home, I don't recall that there was ever any discussion of what we were accomplishing. There was one period one time when I was explaining a scheme that I had developed for solving

double transpositions that I described it to the British and they were interested in seeing how it would work. They gave me a test message which I took back to the house and Currier and I worked at it at the house to see what we could accomplish. But in the main I don't suppose we talked very much about technical aspects of our trip when we were at the house, I think that was just social visit mostly.

INTERVIEWER: What did Currier and Weeks tell the British? Do you recall what sort of information they gave?

SINKOV: They had a number of Japanese systems solved. There was a whole series of systems called JN with numbers after it and that was one of the main things that I expect they carried with them. What else they were working on, I'm not quite sure.

INTERVIEWER: I didn't realize there wasn't any interchange or collaboration on this side? Tiltman implied you could only tell two or three people about the ENIGMA and that what he sort of agreed with you all about. Did the same condition go to Currier as far as you can remember?

SINKOV: I would assume so. My recollection is that much of the information with regard to the ENIGMA that we got was largely handled by Rosen because it was more in his degree of competence--his direction of competence--than mine.

Especially with regard to the equipment aspects. What we got cryptanalytically was the general idea of how, with a crib and the aid of this rapid analytic machinery, you could hope to locate the settings of the wheels. Of course assuming the wheels were known. You had to have the wheels, which they had, they had some.

INTERVIEWER: Did you bring back the wirings of those wheels?

SINKOV: No, none of that detail. No.

INTERVIEWER: In other words, you did not actually get a machine on that trip.

SINKOV: Oh no.

INTERVIEWER: Just an awareness of the problem and the fact that they were having a degree of success.

SINKOV: Yes. With some general idea of how that success was accomplishable.

INTERVIEWER: Do you remember seeing a Bombe?

SINKOV: I didn't.

INNTERVIEWER: You didn't. Rosen said he did so he must have seen things you didn't see then.

SINKOV: Yes, oh I'm sure he did, because my recollection is that there were periods when I was operating quite independently over on the technical cryptanalytic side talking about general techniques cryptanalytically with some of their people. I had several long visits with the Italian

section. Of course, I was intimately informed in that direction.

INTERVIEWER: Was there any discussion about crypto security?

SINKOV: You mean COMSEC?

INTERVIEWER: Yes.

SINKOV: We had one visit to Oxford where the British had established their communications security effort and were shown briefly some of the things they were doing in their own communications. But that, too, was quite sketchy. It was just a general indication of the sort of things that they were working on, and that they were doing in their own communications. Now, I expect that their cipher machine was operative at that time. What do they call it? (Type #X) Yes, they must have had a Type #X. It was, later on, as you probably know the fusion developed that produced the CCM which became the combined machine that both countries used and it was a sort of cross between ideas of Type #X and Sigaba. In fact, there were converters, weren't there, that you could use?

INTERVIEWER: Well, I think what they could use, the Type #X or CC, or the Sigaba as a Type #X, but you never exchanged either.

SINKOV: No. The details of the aba, on the one hand, and the Type #X on the other, were initially not interchanged.

My recollection is that that was the total contact we had on our visit with regard to the communications security aspect.

INTERVIEWER: I noticed one point you make in your report on the trip after you're back--you say a point worthy of mention is the method of obtaining auxiliary material, collateral material. Could you elaborate a little bit on that? You said since cryptanalysis requires considerable use of collateral information the British have arrangements for receiving regularly from outside agencies special material that may prove of assistance.

SINKOV: I'm not quite clear as to what was in mind there. It could relate to the sort of information which we used to have here under name of CREF, I don't know if you still have that particular title. The kind of intelligence organization which has complete files from which you can get information to fit in with cryptanalytic effort. Maybe that's what I had in mind. Maybe on the other hand I had in mind some of the effective work that they had in surreptitious entry because they were able to get a number of things rather interestingly, like the Italian codebook I mentioned earlier, but I guess maybe that's not the point.

INTERVIEWER: No, I think here such as knowledge of ship movements, interviews of prisoners, conversations with diplomatic officials.

I infer from this that you did not have quite as organized an effort for collateral on the US side?

SINKOV: Well, we had a pretty effective intelligence group. It was, I can't seem to remember the exact title we had for it, but I know that as a cryptanalyst I used to get very considerable help from time to time from our--I've forgotten what we called it--the group that handled the intelligence. There would be occasions when we would get started out on a cryptanalytic solution and we have holes in the text and there might be some indication of a person's name or place or an activity of one kind or another and we could very often get information along those lines from the people who are keeping all the records. What did we call that intelligence group?

INTERVIEWER(S): Military intelligence. G-2.

SINKOV: No. No. I mean our own, within NSA.

INTERVIEWER: The forerunner of CREF, I guess.

SINKOV: There was a name which...

INTERVIEWER: But was that present back in '39 and 1940? That period of time?

SINKOV: Well, in a rudimentary form then, yes.

INTERVIEWER: Could you acquire from State Department collateral information to help?

SINKOV: Yes, we had contacts with the State Department. In fact Friedman himself had very close connections with State Department officials and we did occasionally get information through the State Department.

INTERVIEWER: Do you have any more questions, Dale, on the trip to the UK? I'm a little...I just assumed that there was more contact between you all and the Navy and I just had no appreciation that perhaps it wasn't as.... It sounds to me like maybe the Army and the Navy were holding out from each other.

SINKOV: Well actually that kind of standoffishness did exist for a long time. I mentioned it in connection with Australia. Here were two cryptanalytic organizations within spitting distance of one another. I was actually almost unaware of their existence.

INTERVIEWER: That explains Walter Day's lack of knowledge that anything existed in Australia other than FRUMEL.

SINKOV: FRUMEL was the name they gave it. Fleet Radio Unit, Melbourne. I don't know who Day is, but it was commanded by Fabian and I don't think I can mention another name of people there.

INTERVIEWER: Was there a fellow named McCollum there?

SINKOV: Oh, McCollum was up on staff level wasn't he?

INTERVIEWER: I don't know. I just ran across the name and wasn't sure where he was.

SINKOV: I think McCollum was up on the staff level.

I'm just now reminded that I haven't said anything about the circumstances of our initial arrival in England and our reporting to the Embassy. We were equipped, when we left, with a letter from Chief of Staff G-2, a sealed letter which I delivered to the Ambassador, our Ambassador in England, and essentially, I understand this to be so, essentially the letter told the Ambassador, that this group was on a very special secret mission to England which the Ambassador was not to be privy to, which he would make no inquiry about. This letter, when received by him, would introduce us to him. He was then going to turn us over to the British authorities and after that would have no further contact with us. So that, essentially, although our presence as Americans was known to the Ambassador, that was all that was known, and therefore our dealings were entirely with the British and we never again reported to American authorities in England.

INTERVIEWER: Were you in uniform?

SINKOV: Oh, no. At the time we went there was a law in effect which forbade any American citizen from traveling on a vessel of a belligerent nation, and the way this was circumvented, in connection with our trip, was we were all put on active military status and given....

INTERVIEWER: Well you weren't actually in the service at this time--really.

SINKOV: Reserve. And we were given diplomatic passports. In fact, I was appointed for this trip an Assistant Military Attache so I traveled on an official diplomatic passport as did the others of the group. We were all on diplomatic passports, and that was the way they got around this proscription against travel on vessels of a belligerent nation. And effectively, I reported to the Ambassador's military attache. It was really to the military attache that the letter we carried was addressed rather than to the Ambassador and he was as much as told, "You will have no dealings with these people and just forget that you have ever seen them." It was nothing more than a courtesy visit to make known our presence. At Bletchley an attempt was made to cover our visit by announcing the general information that we were a party of Canadians, but this didn't fool anybody.

INTERVIEWER: You couldn't go under cover as an Australian, certainly.

SINKOV: Well, it was a futile attempt to try to cover it up because the people at Bletchley very quickly realized what the situation was. I must say you have to give the British credit for their effective handling of security information, they seemed to do a pretty good job of it. Certainly the secret of the ENIGMA solution was really very effectively kept. In fact, it wasn't until only very recently that you could read in the open literature about the fact that the ENIGMA had been read.

INTERVIEWER: I was interested, also, after you got back, what kinds of things did you do as the result of the visit?

SINKOV: Specifically, I had brought back a lot of information that made the Italian problem a lot easier to handle because they had a number of things which were of use to us. What developments may have taken place with the information about this preliminary information about the ENIGMA, I don't know, because I did not follow through on that.

INTERVIEWER: Do you think Rosen handled that primarily?

SINKOV: I think Rosen was the man who handled it. And I think what happened, certainly, as I think about it now, is that there must have been a later contact with British officials that went more deeply into the consideration

of the ENIGMA and its solution, but I'm not aware of any of the details of how that was done.

Our trip was over in late March of '41. I don't know how soon we started to get into any kind of work on the ENIGMA. Is that appreciated or do we have information about that?

INTERVIEWER: I wrote to Rosen and he said his memory was as bad as the rest of us, but he said that when he came back that, within weeks, they went to Bell Laboratories to get started building the Bombes. Within weeks, as he described it.

SINKOV: Which means that he must have had some ideas about how the equipment would function. Well maybe he got that information during our visit. I'm not aware of what detail he did get. I didn't realize that he got enough to go to the extent of starting to build equipment, but perhaps he did. I guess it was quite a while before we were able to get into any work in that direction. Certainly before we do anything we had to get the rotors and we'd have to get those from the British so there must have been further contact that produced the rotors for us. The rotors which they had available at that time were on the military ENIGMA. I don't think they had the Navy at this time and they didn't come until a little later. Wasn't there something about....

INTERVIEWER: Well, they used the same wheels but the Navy had three extra.

SINKOV: They had an extra wheel.

INTERVIEWER: Three extra wheels.

SINKOV: Wasn't there something about a submarine that was sunk--from which they were able to get a machine?

INTERVIEWER: Yes.

SINKOV: That was how they got on to the Navy side. When was that? I don't know.

INTERVIEWER: I don't recall a date on that. But you don't recall any meetings that you had with the Navy after you got back to discuss who was going to do what on the ENIGMA or anything?

SINKOV: I was not involved in any. I have no recollection.

INTERVIEWER: When did Friedman get back from the hospital?

SINKOV: Well, he was back on duty when we returned.

INTERVIEWER: Oh, he was?

SINKOV: Yes.

INTERVIEWER: So he could have been doing some of this negotiation.

SINKOV: Undoubtedly. I know he was back because I recall that in our reports of what had happened in the visit to the UK, Friedman was present. I am quite sure of that. Oh, I don't think his hospitalization was anything that long. He was hospitalized somewhere about the middle of December. Now, we left on the 15th of January. I don't think he

was out of the hospital then, but he very likely did come out pretty soon afterward.

INTERVIEWER: Apparently then, Rosen must have dealt through--Rosen says he does not remember of dealing himself directly with the Navy. However he said it was a general agreement that he recalled, that the Army would go the relay route through Bell Laboratories and that the Navy would go the mechanical route like the British Bombes.

SINKOV: I would guess that if something like that developed it probably got worked out by Friedman dealing with Capt Safford. That was the main contact between the Army and Navy. It was on that personal level between Friedman and Safford and very few of the people under Friedman got involved in any of the...

INTERVIEWER: Capt Safford apparently maintained that the British held out and they never told him about the ENIGMA. Do you think it's conceivable Capt Safford was never told about the ENIGMA when Currier returned?

SINKOV: No, I don't see how that could be. That seems quite impossible. Because Currier and Weeks reported directly to Capt Safford and they must have conveyed to him all the information that they brought back. But, to repeat what I said a little while ago, interworking such as it was, whenever we had any, between Army and Navy on the

cryptanalytic side was essentially a one-to-one arrangement of Friedman and Safford.

INTERVIEWER: Do you recall any other British coming over or when they came over afterwards--after your visit?

SINKOV: Yes, we had a liaison officer in the organization from England--Geoffrey Stevens. Jeff Stevens--I know he was...

INTERVIEWER: Was there anybody before that?

SINKOV: Well I think Jeff was the first appointee.

INTERVIEWER: Was Cdr Dennison, did he visit you all?

SINKOV: I don't recall that Dennison ever came to the United States, but he may have.

INTERVIEWER: There is a record that he did--he came to Steven's office.

SINKOV: That would have been on a different level.

INTERVIEWER: Tiltman says that Jeff Stevens actually came from Hong Kong or Singapore.

SINKOV: Yes, it was that area.

INTERVIEWER: And he never actually went by GCHQ at all, before he came. He came directly from the Far East.

Well, that could have been. He stopped in the Philippines, though. In the files there is a write up on the Bombes and ENGIMAs and how they worked and everything called "Geoffrey Stevens' Treatise on the ENIGMA" undated, unsigned but I assume its Jeff Stevens who wrote it because it says

Stevens' Treatise. But it's like, somehow or other, he conveyed this information to the Americans and at some time, but Tiltman says, "I don't understand how he could have even known about the ENIGMA because he was never privy to it." So it's very confusing as to how he did this and when he did it. But I know he was there in like August or September when I arrived. I arrived in August of '41 and he was in this little room when we were starting to sort Japanese military traffic and...

SINKOV: I don't remember what kind of activity Stevens got involved in--I was aware of his presence and I knew he was a liaison officer but just what he did I don't seem to recall. He entertained the ladies... He was quite a ladies man. I remember there were some interesting stories about Jeff Stevens...he was a character. We had a practice blackout one time that was ordered from on high and it wasn't very effective. In fact, Jeff Stevens came in the next morning to explain that he had to sit at his window in order to read his paper by the street light. He was poking fun at our blackout which really wasn't very effective.

essentially all of their military personnel were in North Africa fighting with the British and they arranged for the return of personnel from North Africa. People who were with us had had a good deal of traffic analysis experience against German communications and they were fairly competent traffic analysts. There were really no cryptanalysts among them, and in the early days, this started in, I guess, April 1942, we had very little material to work with and were feeling our way. The Australians had intercept services further north in Australia, and some in Port Moresby of New Guinea which provided the main source of our material. American intercept organizations didn't come into the area until some time later. There were a number of R. I. companies as they were called that came into the area during the next year or more. The very first one I think was the 138th which was commanded by Morrison. And we began to try to study the traffic which was available to us to see what we could do with it. We were doing some little traffic analysis. We broke into some of the address systems that helped us identify where messages were being transmitted, names of units, gradually built up our small amount of order of battle information. The reason that we were established in Melbourne was that the general

feeling of insecurity that the Australians had had resulted in declaring that a line through Brisbane was their first line of defense and we were well south of that down in the Melbourne area where Gen. MacArthur established his headquarters. Not long after that, the situation--the military situation--brightened considerably. I think the Battle of Midway came in and we moved our headquarters north from Melbourne to Brisbane. This was in summer of 1942 and there we obtained quarters in a fair-sized building just outside the Ascot Racecourse, and were able to set up a small IBM unit which was commanded by Zack Halpin with some people who were assigned to him. We began to concentrate on Japanese systems. I don't recall when it was but sometime after that we made our first entry into one of the major water transport systems--that was the one which was carrying 2468 in its preamble. Without going into any of the cryptanalytic detail, we determined the type of system, were able to establish depth on this additive system that they were using, broke into the code, and started to read messages, which produced a good deal of information, in particular, information about location of transports that the Japanese were using to transport men and material. And it was really very exciting to see how the information we were supplying was

resulting in sinking of Japanese transports. It was a great motivation for the unit because the boys felt they were really getting places and accomplishing things. Our intelligence was proving very useful. Apart from that material that we were working on, there were some air-ground systems which were being used by the Japanese air service. These were being studied by Capt (Cdr ?) Nave, a member of the British Navy, who had been assigned to us to work in this general direction and who made some very good contributions. And then there was a lot of study of Japanese tactical communications. The effort there was headed by Professor Room, a man who had been seconded to us from the University of Sydney where he was the head of the Mathematics Department. And he did a very interesting job on that material, but it was very hard to get very far because most of the tactical was one-time systems for which the keys had been generated in the field. We knew that because we would occasionally capture keying material and with it, some decrypts were able to be accomplished, but in the main we didn't have a great deal of success against the tactical material. There was just not enough of it that was being transmitted too far away and there was a problem of its one-time character which made it extremely difficult. The general procedures that we

worked on were that--we would regularly provide the intelligence which we developed to Gen Akin's office. He was in the headquarters building which was downtown in Brisbane. We were out on the edge of the city and he then dealt through Gen Willoughby, MacArthur's Assistant Chief of Staff, G-2, who had the general responsibility of the overall handling of intelligence information. As we made progress in the war against the Japanese there were occasions when we were successful in capturing material that made things a great deal simpler for us. One of the really impressive times was when the Japanese on the northern shore of New Guinea were by-passed, I guess this was late in 1943, in the attack on Hollandia. What happened was that we read a good deal of information that told about the Japanese situation in New Guinea. The intelligence that resulted from this showed the Japanese strength was largely concentrated in an area around a place called Lae which was on the north side of New Guinea about centrally located. Then over at Hollandia further toward the western end of the island there was practically very little strength and in a surprise move MacArthur directed his troops to hit Hollandia, bypassing Lae, and we had a terrific and successful strike that practically cinched New Guinea for us. In the process

one headquarters was overrun. Apparently what happened was the Japanese were given last minute notice to destroy their materials before leaving the area, but the COMSEC people didn't have enough time to dispose of all of their materials and what they did was throw a lot of it into a mud hole, hoping that that would keep it from being obtained. I don't know how we found out about its being there--it may have been through a prisoner who was taken--at any rate we located these materials and fished them all out. They were in bad shape, they had been in the water for some days and we had an interesting problem of recovering this material. We had in our group an officer named Holmes, remember Holmes, who was a chemist, and he worked out some very interesting procedures for recovering the information from these materials. The books were water-soaked and practically stuck together and we had to separate the pages one by one and the writing, which was in pencil, wasn't very clear and he worked out an interesting procedure for swabbing the page with something like alcohol, I guess it was, which would cause the written material on the page to show up briefly but long enough to give us a chance to take a photograph of it and we were able to reconstruct practically all of this material. Oh, I shouldn't forget to say, first we put

these through a drying out process as much as we could accomplish and it happened fortunately that we had a big electric range which was being used for cooking purposes. It got commandeered for this and we used it for the drying out process. With this capture we had the whole cryptographic material of the division. Everything that the division was using, and it was early in the period. They used to change the systems about every three months, and this was early in the three month period so that we were able to read approximately three months worth of transmission without any problem at all. That was the highlight of some of our work*. We did accomplish a great deal by straightforward cryptanalytic procedures but as somebody in this business once said--a peek is worth a whole lot of analysis. This captured material was really very useful. At any rate we continued right through the war period producing quite valuable information. We would regularly be able to determine the order of battle of the Japanese forces. We read many messages of their shortages in connection with food, ammunition. In the campaign which MacArthur conducted against the Japanese, there

*Dr. Sinkov is actually describing the reconstruction of material captured at SIO, New Guinea in January 1943 by Australian troops.

was a regular kind of skip operation that took place. He would bypass a strongly held island that the Japanese were on to capture some place further toward their home land and this then cut off the area pretty completely from getting any help, so that many of these installations gradually withered away for lack of any support from home. They gave some special name of this type of operation that MacArthur conducted--I don't seem to think of it at the moment.

INTERVIEWER: Island Hopping

SINKOV: Island Hopping, that was it.

INTERVIEWER: Was CB in a position to provide Special Intelligence during operations on Guadalcanal or was that so early that CB maybe had not really been able to do too much?

SINKOV: We had some traffic analysis information at that period but I don't think much else. That was a very early operation. I was about to...I've forgotten now what I was going to say--perhaps it will come to me in a little while. We had success in New Guinea and this resulted in our establishing a forward echelon of Central Bureau at Hollandia. I think Cecil Corry was in command there and the push continued northward. It wasn't until '44 that the big operation took place in the Philippines. That's when we landed on Leyte and again it was a situation where the intelligence planners had a good deal of

information about what would be a convenient place to strike. When we were established in Leyte, I was summoned to a special conference there from Brisbane and attended a conference which had Navy representation. It was directed by Gen Willoughby. Gen Akin and I were there on the Army side, on the Navy side there was an intelligence officer named Munson, Fred Munson, and his superior who was Navy's G-2, too. I don't remember at the moment what his name was, and I guess this was after the period when an official order had come out appointing MacArthur an overall commander of both the Army and Navy effort, and Willoughby was essentially handing down directives with regard to our functions in the Signal Intelligence realm. The thing about the conference which I remember most is that Willoughby talked at us for about 45 minutes and sent us home. He could have just as well written me a letter--I had to fly 3500 miles back to get up there and turn around and fly 3500 miles back. It was a difficult period I must say, but we got the message and all our intelligence continued to funnel through Gen Akin to Gen Willoughby. Once the Philippines were completely occupied, which was sometime after the Leyte operation, arrangements were made for Central Bureau to move out of Australia and we went up into the Philippines because now the war was all

north of that area. At that time there was some very extensive operations being planned which included the invasion of the Japanese homelands. There were two major operations underway; one was called OLYMPIC and the second one was called CORONET and we were being moved up into the Philippines to support that operation. It was intended to be something of tremendous size because it was considered that the invasion of Japan would result in a tremendous number of casualties. In fact, I recall that they were in the process of establishing 10 general hospitals in the Philippines, each of which would have the capacity, if I remember correctly, of 1,000 beds and this was just to receive casualties from the OLYMPIC and CORONET operations when they took place. We were established in an area about 50 miles north of Manila, a place called San Miguel.

SECOND TAPE

In San Miguel we established our headquarters and continued working from there. But we didn't get to San Miguel and get established until some time in June of '45 and then before very much could happen, the atom bomb attacks on Japan took place in early August, and the war was over,

INTERVIEWER(S): Any more questions, Dale? Had not realized... What charter, charge or guidelines were you given in April 1942 when you were ordered to Australia?

SINKOV: As I remember it, there was nothing very specific set down. Essentially I was to command a group that was being sent at about the same time in Australia in the signal intelligence study of Japanese communications. It was understood that I would be working with an Australian contingent and when I arrived in Melbourne I met the Australian group we would be working with. It was an Australian Army and Air Force group. The Army component was commanded by Col. Sandford, Nick Sandford, and the Air Force contingent was commanded by H. Roy Booth. The American group consisted of several people: Erskine, Girhard, Chester Ray. Those are the only names I remember at the moment. Later Joe Richard joined us, and we set up in a building in Melbourne on Main Street. It was a rented private dwelling that had been obtained in which we were to do our work. The Australian group that was with us was a group that had recently been brought back from North Africa. When the Japanese got into the war, after Pearl Harbor, the Australians became very concerned about the possibility of attack from Japan and they were relatively helpless in their present situation because

so OLYMPIC and CORONET never took place fortunately. I remember the great excitement with which we were intercepting the message that came from the Japanese Emperor announcing that they were going to surrender and bring the war to an end. After that happened then our cryptanalytic effort was at an end, and essentially all that remained was to arrange for our personnel to go home. This was a somewhat lengthy operation for lack of transportation. We used part of that period in working up a kind of historical story, unclassified, that we called the SIS record. It was a means of keeping a lot of people busy working up a good deal of information about the organization and its activities and then I went on to Tokyo. In fact, I came into Tokyo soon after it was occupied by our personnel. The first group that entered Japan was the First Cavalry and I came up soon afterward. I remember a great big banner across the main highway as we were entering Tokyo that said, "You are entering Tokyo, courtesy of the First Cavalry." In Japan an arrangement was set up for an investigation of the Japanese cryptographic effort. It was called TICOM. A team was set up to go visit the installations that the Japanese had used during the war as their cryptographic installations. Col Erskine served as the interpreter-translator on the Army side, on the Navy side we had

Capt. Munson, that man I mentioned a while ago as being in the intelligence sphere, and I don't recall the final name, there was one officer with him. And we tried to track down where the Japanese had their cryptographic activities and the key people connected with it, in order to develop as much information as we could. The unfortunate situation was that we were given very strict instructions that, under no circumstances, were we to permit the Japanese to know what kind of successes we had had. The result was that when we visited the installations we found and tried to develop information from the authorities that we dealt with and they proceeded to hand us cock-n-bull stories that were wholly incorrect, we were not in a position to say, "Well, now, come I know you're talking nonsense because I know the right answers to these things." We couldn't do that. We couldn't pull them up short and say you're lying and we know you're lying. The result was they handed us a lot of information which was rather meaningless about what they did and how they did it and we didn't really accomplish very much in the effort. As a matter of fact, since the interval between the announcement of surrender and our arrival on the scene was rather substantial, they had had ample opportunity to destroy everything they wanted to get rid of and we either found

that the installations that we could track down and went to were gutted--there was nothing there--so the net result of the TICOM effort in Japan was negligible. After that was over I personally stayed on to do some general cleanup of cryptographic effort. There was a COMSEC unit that we had in Shanghai that had to be cleared away and sent home and there was some general planning with regard to our communnications, which had to be worked out, so I stayed on, under Gen Akin, who remained in the area, until Feb of '46 and then went home. This was six months or so after the war had ended and I came back to find a very different picture from that that I had left in '42. I can recall my entrance to Arlington Hall when I came back. I came in the front gate at a time when whole swarms of people were coming to work. I had known everybody in the agency by first name and I looked around and I saw these hundreds of people--I didn't recognize a single one. It was a whole new group, of course, and the tremendous numbers. I seem to recall that we sent regular reports back home of our activities from Australia but there seems to be some question as to whether they exist anywhere.

INTERVIEWER: We have them.

SINKOV: You have them.

INTERVIEWER(S): The monthly reports. Yes. Including one letter to Kully talking about the _____?_____ chasing a flashlight beam.

SINKOV: I don't remember this.

INTERVIEWER: Was that TICOM effort locally set up or was that set up through Arlington Hall?

SINKOV: By locally, you mean the Pacific?

INTERVIEWER: Or was it overall?

SINKOV: No, I think it originated from Washington. Just as there was a similar effort in Germany, but in Germany the advantage was that the war ended very suddenly and we were able to get our teams into position very quickly, and they accomplished a great deal more.

INTERVIEWER: Well, they were actually following things before the war actually ended.

SINKOV: Yes. Were you involved in that?

INTERVIEWER(S): No, only indirectly. You had units in Europe before the actual surrender who were within 2 or 3 hours driving time. They actually got into areas the Russians were going to occupy before the Russians actually got there.

SINKOV: I remember there was one silly story we were told by one of the Japanese officers that we interrogated of how they would use pencils with numbers on them and would throw them down on the table and sort them out and then get

random selections of numbers from the pencils they threw on the table. It was perfectly ridiculous. We do know that they did issue instructions to their field commanders as to how one time pads should be created in the field because within individual divisions they had their own one time systems. We captured many of them. In connection with this matter of captured material, maybe this should have gone on earlier, we had within our organization some very competent Japanese linguists. One outstanding man was a man named Mahrt, Otto Mahrt, who was quite an authority in Japanese. He was a rare creature who could take a Japanese decrypt and read a translation without having to have a dictionary beside him and flip through pages of a dictionary. It was something very few of the American-Japanese authorities could handle. Because we had this competence, there were one or two others as well, Erskine knew Japanese, and we had some other officers, there was a man who was from the Ministry, his name doesn't come to me at the moment. At any rate, we had good competence in Japanese and because of our special situation, with respect to the top secret work we were doing, a special arrangement was worked out with the organization that was normally responsible for all Japanese translation and interrogation. It was an organization

called ATIS (Allied Translating and Interpreting Section). The arrangement we had with them was that anytime that they would become aware of the capture of either written material or personnel from which any cryptographic information might be available, they would turn over the whole job of handling this to our people. So people like Otto Mahrt, for example, when we'd get notice of some material being captured in the field, would go up at once and would be authorized to pick out the things that affected us, to be brought back directly to Central Bureau and handled immediately. In other words, we had a high priority on the handling of any captured material or interrogation of personnel. And this was a big time saver on many occasions. It was one of the ways that we got into that material that was in the mud hole that I talked about and we were fortunate in having quite good Japanese capability. Of course, we had the problem of translating all these messages which we kept decrypting and that took a fair amount of capability.

INTERVIEWER: Did the Central Bureau have any work in conjunction with the messages that lead to the shootdown of Yamamoto's plane?

SINKOV: No. That was entirely on the Navy side. They were naval messages. The (Japanese) Navy had, as I understand it,

set up a schedule for Yamamoto in his visits and the schedule was read by the (U.S.) Navy cayptanalysts. Yamamoto was, according to the stories anyhow, a stickler for precision and he stuck strictly to this schedule that they set up for him so that the Navy knew exactly when he was coming in, to where they were able to set up their attack planes and shoot him down.

INTERVIEWER: Talking about the Navy, to what degree and how efficiently did CB and FRUMEL coordinate their work?

SINKOV: Not at all. As I mentioned earlier I was almost completely ignorant of the existance of FRUMEL. I couldn't even tell you where they were located, other than it was in Melbourne.

INTERVIEWER: In the Special Intelligence Bulletins issued by Willoughby's office, each item carried at the end of it, in parenthesis, apparently a source designation, UBJ, UMBJ, 7F, CB and so forth. Do you recall.... I run into these...bulletins issued by CB....

SINKOV: Well, they may have been put on by the people in our organization who were responsible for the translation and assembly of intelligence. I don't recognize them. Now I mentioned earlier the system 2468 that we solved--that wasn't by any means the only one of the Japanese systems that we solved. There were several. There was, almost

everyone of them had a four digit preamble along the lines of this pattern. There was 3456, and a 2468 and I think there was a 3579. Each of these preambles indicated the essential headquarters from which the message originated and gave a general idea of the direction of effort that it was involved in. 2468 was water transport, 3456 was an Air Force system and had to do with air movements.

INTERVIEWER: Then it indicated both the headquarters point of origin as well as the cryptographic system it was in?

SINKOV: Not specific point of origin, other than it told what major component of the military service was involved. In Central Bureau, as I perhaps didn't stress sufficiently, we had a good sized component of Air Force personnel, Australian Air Force personnel, as well as auxiliaries, the Women's Air Force; they did a lot of the clerical work. The reason largely, for the interweaving of Army and Air Force in Central Bureau was that it was patterned largely on the Japanese picture because essentially that's how their communications were separated. Their Navy was distinct from the Army and Air Force. We had, roughly, an equal division from the Australian Air Force, Australian Army and American personnel. There were fragments of others. We had some New Zealand personnel, we had some Canadian personnel but the main components were the

American Army, the Australian Army and Air Force. The Australians had their own intercept services. The Australian Air Force had one major intercept service out of Townsville in Australia; they had an intercept organization in Port Moresby of New Guinea; I believe they had one up in Cairns on the north coast of Australia and one in Perth, way over on the west coast. The Australian Army had intercept, too, and all of this intercept, the Australian Army, Air Force and American, funneled into Central Bureau. During this time the Air Force was not an independent component in the U.S. The original intercept companies were really Army intercept; it wasn't until later on that they became specifically Air Force designated.

INTERVIEWER: Well, this intercept capability of the Australians added was a great asset, I imagine to multi-national...

SINKOV: Oh indeed, in the early days they were well established in the area and they had good competence. In the early days of Central Bureau that was our main source of material.

INTERVIEWER: Were there any ~~dif~~ficiencies in this multinational organization, by it being multinational in character?

SINKOV: No, I think we worked together very effectively and I'm not aware of any problems of that kind. In large measure

we operated in the early days as three somewhat independent organizations but there was a lot of collaboration between us, and after awhile, I can't remember just when it happened, some sort of fusion took place and essentially I became the commander of the whole organization but that didn't happen until quite late, not that it mattered. We cooperated very effectively all along, right from the very beginning.

INTERVIEWER: What was your position in your organization before Col. ~~Sheer~~ Sherr was killed? Was he not sort of a deputy to Gen Akin?

SINKOV: Yes, he was. Well I guess you could say he was in command at the time. He went on special mission to CBI, I guess it was, and was killed on that mission. This was very early in the period. His experience with Central Bureau was quite limited. Now, we did have some American intercept from early on, headed by the people who had got out of the Philippines with Gen MacArthur. This was an organization commanded by Brown, Harold Brown. They were established for a long time just outside Brisbane in an area that was pretty close to our activity in the Brisbane area.

INTERVIEWER: There was one account that said they had been sent directly to Townsville to work with the Australians initially.

SINKOV: They may have gone to Townsville initially but for most of the period in Australia they were just outside Brisbane. Brown had with him two or three radio personnel who had been in the Philippines with him. I remember the name Phelan, a lt., and a man named Nurss, those three, maybe there were one or two others, had all come out of the Philippines when MacArthur got away by submarine. We had a limited number of British personnel, one in particular, a Major Webb who had escaped from Singapore and worked his way down to Australia. He was in the cryptographic field and he worked with us. Major Norman Webb. Before the war he had been with Shell Oil in the Far East and he was in the Far East when the war started unable to get away so he ended up in Singapore where he served with the troops there until the Japanese came in and conquered Singapore. He managed to get away and worked his way down to Australia.

INTERVIEWER: After CB moved to Tobees (?), to Manila, San Miguel the history that I've read the Australian ground forces were then concentrating in the Dutch Indies, Borneo and....

SINKOV: Well a couple of things happened. One thing that happened was that although in Australia we had a large number of female personnel they did not come to the Philippines with us because an Australian law forbade female personnel

from leaving Australia in connection with the war effort so we lost all that female contingent. In fact, that caused a pretty big dent, but Australian Army and Air Force came with us, male personnel, to San Miguel. I don't recall that there was any specific reduction in that direction.

INTERVIEWER: Did you continue to provide material that was in support of the Australian effort in the Indies, Indonesia, so forth because that became their major...?

SINKOV: I don't remember that we had very much in that direction. There may have been some material. It may be that some of the decrypted material related to those areas, but I don't recall.

INTERVIEWER: Could we talk a little bit about the CB Bulletin that Capt Fuld (wrote about) in his report on his tour with CB?

SINKOV: Oh yes, Fuld was sent as a liaison officer to our organization but this was relatively late in the war. I guess he was with us in Brisbane although I don't remember that. My recollections of Fuld are largely related to the time he was in the Philippines.

INTERVIEWER: He reported that Gen Sutherland says that CB's Bulletin was the single most important asset in the theatre. Could you talk a little bit about CB's Bulletin?

SINKOV: Now I'm trying to remember just what he meant by that? Did he mean our intelligence output?

INTERVIEWER(S): That's what we're asking? We're not sure...he used the term....

SINKOV: He must mean the daily report that we issued of our translations and intelligence derived. I can't think of anything else. I don't know whether it was Sutherland or Willoughby but some one of the high ranking officials in the Pacific area made the flat statement, this was after the war was over, "that the results from cryptanalytic effort in his opinion had chopped two years off the war in the Pacific." It might have been Sutherland who said that or it might have been Willoughby. I'm not sure but it was probably one of those two. And that's a rather interesting statement because it carries quite a high compliment with it.

INTERVIEWER: Can you tell us something about it? I mean this is a daily. How was it distributed? What form was it? What did it comprise?

SINKOV: Essentially it was in the form of actual decrypts, translated of course. We'd never sent anything in the Japanese forward to headquarters. I believe that our, I don't remember this very clearly, but I believe our dissemination was to Gen Akin who then, from there,

funneled out any other copies that went to other people and to watch that there was collaboration between the intelligence efforts of the Army and Navy, I don't know. There may have been some.

INTERVIEWER: Gen Akin was then at MacArthur's headquarters rather than at CB?

SINKOV: Oh yes. Gen Akin was not at CB. He was on MacArthur's staff. He was MacArthur's Signal Officer and he had many other responsibilities than just Central Bureau. In fact, he was responsible for the whole Signal Corps problem in the Pacific. The building that was occupied in Brisbane by MacArthur's staff, was a building that was centrally located in Brisbane and about five or six miles from where Central Bureau was, roughly that. So it was something of a trip. Just as an aside, this really isn't very pertinent information, but I would get a summons every once in a while to come and see Gen Akin, sometimes it would come in writing in a cryptic notation that would say "Please see me" spelled PLS. I'd get into my car and go down to headquarters and I would wonder what it was Gen Akin wanted to see me about. I would try to figure out what might be wrong or what kind of problems there might be. Try to guess what he wanted to see me about. Invariably when I got to see him it was something

altogether different that I had any awareness of--he would always come up with something new, and he was a very keen individual. He followed the cryptanalytic picture very closely; it was very meaningful to him. He had had a lot of experience with it, I suppose you know. When a Major he was in command of SIS in the Munitions Building way back in the '30s and then he was a Signal Officer in Panama when I was there, and then he came back to Washington and was involved in the cryptanalytic picture again. So he had quite an acquaintanceship with the general situation.

INTERVIEWER: So Friedman was not the head of the Signals Intelligence Service. Akins was.

SINKOV: Friedman reported to Akin. And this was not the Chief Signal Officer. Akin was not then the Chief Signal Officer. Yes, Friedman was not technically in command. The Commander was an officer and during this period I'm talking about it was Akin. Friedman reported to Akin.

INTERVIEWER: At one point in his report Capt Fuld was advised of certain matters that should not be mentioned and reported to SSA at Arlington Hall such as plans to move CB or activities northward. We wondered what was behind that. Was there some reason?

SINKOV: Doesn't mean a thing to me.

INTERVIEWER: While I'm thinking about this I might point out that Akin's name is misspelled. It's AKIN.

SINKOV: No I don't know what this means.

INTERVIEWER: Did you have a very elaborate set up to exchange information between Kully and you?

SINKOV: I was in regular communication with Washington about the technical side of things regularly reporting on how we were doing and there was a constant exchange of keys which we were able to develop. All our cryptanalytic results were funneled to Washington so they got the complete story of the progress we were making. It wasn't two way--it was only a one way exchange. We didn't normally get Washington's output. Neither intercepts nor decrypts.

INTERVIEWER: Did they provide...in reading some of the background information in some of Joe Richard's handwritten notes...

SINKOV: Yes, Joe was very keenly involved. In fact he was the man who made first entry into information in the 2468 situation. He was able to discover something about the preambles that we hadn't noticed that gave us a clue as to the size of the additive book and how the additive book was being used and once that was discovered then I was able to show how we could set up depths in the system

and proceed to break into the code book. He was quite a competent man, Richard, and did some very excellent work.

INTERVIEWER: At one point in one of his many manuscripts he mentions there was some information supplied back from Arlington Hall.

SINKOV: I suppose we did get some material occasionally but it wasn't anything like a regular interchange. No. As a matter of fact, the amount of intercepted material which was available in Washington would have swamped us. We didn't have anything like the force that would be able to handle all that material.

INTERVIEWER: There was one other item that I picked up in Capt Fuld's report which instructed that in Congress he said that the SSO's (were) not authorized admittance to CB. They handled the materials, there wasn't any security restriction, but for some reason they were not allowed access to CB itself. I'm curious.

SINKOV: That might have been something Gen Akin had insisted on. I don't remember it either. Has it been considered, would there be any point in getting in touch with Fuld?

INTERVIEWER: I thought it might. I'd better start following up on some of these people.

SINKOV: Yes. My recollection is he is in New York City. He is an attorney and he has a law practice in New York. I could

track down an address which might be effective as of some years ago.

INTERVIEWER: I think Farley's got a sheet of paper with a large number of names and addresses on it. Apparently they've tried to keep track of most of the people.

SINKOV: I remember very little of any kind of contact with SSO's during the war. Because the kind of function that the SSO's as I understand it would have normally served would have been as intermediaries between our output and the intelligence services. Essentially that kind of contact with other directions was our Gen Akin's area through his working with Gen Willoughby. We did have a visit from a British official who I think was in that kind of organization that the British called SLUs. This was a visitor who came, named Burleigh, Cdr Burleigh, who was with us for a while. His dealings were mostly with the Australian personnel in Central Bureau. There was one other visitor who came through. A man who, let me see if I can recall his name, he was a British officer who had been in crytographic work in World War I and then became a civilian. He was, as I remember it now, a rather famous astrophysicist, and he was called back to active duty in the Second World War and was used in some liaison capacities in connection with cryptography. He

came out on a visit of inspection.

INTERVIEWER: This was the British type?

SINKOV: Yes, British. Then we had a visit one time by Cdr Travis and some of his people. Travis later became the Director and he had with him at that time Joe Loehnis who became the Director after Travis did. They came out on a visit of inspection and I expect they had a hand in that kind of function that the British referred to as their SLU handling.

Bennett? No that's not the right name.

INTERVIEWER: As MacArthur's headquarters moved forward it appears some of the CB activities moved with it. At Hollandia who was then merely a part of CB, I gather...

SINKOV: The unit at Hollandia was a forward echelon which served as a collection point for intercept material and for traffic analysis study. It was commanded by Cecil Corry and did a very creditable job of handling materials there. I had a couple visits to that area at times after its installation and felt that it was doing a first class job.

INTERVIEWER: They did a lot of cryptographic work?

SINKOV: No. They did not have any cryptanalytic responsibilities. Their signal intelligence effort was entirely traffic analysis.

INTERVIEWER: As a sort of wrap up, are there any thoughts you have of things we might have overlooked that you think are germane?

SINKOV: I want to think about this. I believe our conversation has brought all sorts of things to my mind that might be considered. I want to think about it and I'll make some notes and see how additional material could possibly be brought in.

SECOND TAPE, SECOND SIDE

INTERVIEWER: In yesterday's discussion of the TICOM effort we didn't get on to whether TICOM or anyone else acquired a copy of the working model of the Japanese diplomatic cipher machine. The one we solved as PURPLE. Was there one acquired?

SINKOV: No. The installations which we were able to get to, find out about and reach, had been so completely cleaned of everything that we found practically nothing in any of these places. The information that we got as a result of interrogation was limited by the difficulty we experienced of not being able to take advantage of the knowledge that we had of their procedures from our cryptanalysis and when they were not very forthcoming or were providing information which was clearly inaccurate, we couldn't

challenge them. The result was that it was really an abortive effort. It produced nothing really significant.

INTERVIEWER: You had mentioned among your linguistic capabilities at CB several people who were pretty good. Were any of your linguists Japanese-Americans? Nisei.

SINKOV: We had a young man named Yamagata, who was Nisei. There was Otto Mahrt, whom I mentioned yesterday, who had a most amazing ancestry, of his parents and grandparents, a total of six, there were no two of the same nationality. There was a Swedish ancestor and a Korean, I don't even remember any of the others, but it was a very mixed relationship. But he wouldn't come under any heading like Nisei, because, if there was in this group of ancestors a Japanese, there would have been only one, because I remember clearly this strange business of no hits whatever of nationality in these ancestors that he had. He was a very competent linguist, as was Yamagata. Yamagata's upbringing had been in Hawaii, as I remember, but second generation Japanese. He was sufficiently well-liked that if I remember correctly, we dedicated our record, that SIS record we printed after the war, to Yamagata.

INTERVIEWER: I can't think of any other questions.

SINKOV: We had among our linguistic people, people like Erskine who had lived for a long time in Japan. He was of missionary parents. Then, there were men like, the British officer, Major Webb, who had a long experience in the Far East as a Shell Oil Representative and there was a man, whose name I believe was Thompson who had had some Far Eastern experience.

INTERVIEWER: You didn't get any of the people that the Army and Navy did, that had been sent to Tokyo to study as Attaches. The head of ATIS was one of those men.

SINKOV: That was Sidney Mashbir. He had in his organization, ATIS, which he headed was a rather big allied organization which had a very large group of linguistic personnel. We, in the course of the war, captured such a tremendous amount of material from the Japanese that ATIS was barely able to scratch the surface of all the material they had. They had rooms full of stuff that never got handled. They had a big problem right at the start in an initial scanning of the material to decide on priorities of handling. In this process, as I described yesterday, we in Central Bureau had a big advantage; because we were enabled, in our interworking with ATIS, to skim off anything that might have cryptographic significance, and that came directly to our place. So that we were not

handicapped by this tremendous volume of material which ATIS was swamped with. As we continued in our successful campaigns against the Japanese in the onward push from Australia, the amounts of material that were captured got bigger and bigger. There was really an unbelievable amount of material available. This has to be coupled with the fact that the Japanese language is an extremely difficult one and even with all this Japanese capability that we had it was quite a problem, handling all the material. I can speak to this subject with some feeling because I have personally devoted a good deal of time to the study of Japanese and it's a miserably difficult language. I can handle several languages, most of them from the reading standpoint, but none of the languages I have studied begins to touch Japanese for difficulty. And just as an added item on to that I think Chinese is even more difficult still, but I haven't done anything with Chinese.

INTERVIEWER: I feel, that if we're going to have a really good solid oral history program here and that these tapes will be listened to 50-100 years from now as part of a cryptologic literature, I think it is worthwhile then to start off and have at least one small portion on the background, the lifestyle that you had prior to getting into cryptology.

So I'd like to broaden that one out, in general terms, the experiences that helped to prepare you for your career, obviously your education and things like that, but whatever aspects of your home environment, intellectual nature of it, etc., your father, your mother, what their education was--just a general sort of feeling so that the scholar fifty years from now who would only see the name Abraham Sinkov, as just a name, to get a little more understanding so that he then listens to your tapes with a little better perspective. So that's the reason for that first question. So you can go into it as much as you want.

SINKOV: I feel this is a rather special kind of topic. You, well it will develop as I talk about this, that I had no awareness of what kind of activity I was going to do.

INTERVIEWER: I think that's pretty much the same, but I think this is something...that's the leading question obviously.

SINKOV: There wasn't any such as preparing for this kind of activity.

INTERVIEWER: But I'm talking now about in retrospect those things you feel and then from then on the questions, well certainly the second question, circumstances surrounding your selection, that's obvious, in fact you could even go into that as you're doing the first one and then from then on

a lot of them, in the very beginning, the extent of guidance received from Friedman during initial training period, that certainly is something specific to you and then your role during those early years you were involved with Friedman in attacking some of the older systems, try to look at the ? Bright Red ? wrote a certain amount of things and that development of a base; he was so farsighted that he saw this was obviously necessary. So I thought those then would be first that we could get into right now, and they're general. Then as we get on into them, a lot of these you might not have the specific answers to but what I'm trying to do is to get your general perceptions so that a scholar could take, Ron Clark's book for example on Friedman, he could listen to, and I assume eventually these things will be declassified and made available, he could listen to Frank Rowlett's version and his ideas concerning the group and that would then enable him to listen to your impressions and then Dr. Kullback, hopefully we can get him. So then in that early period, which was the embryonic stage of this entire development in the United States really when you get down to it, I feel anyway. Then I could get a much better picture if we asked essentially the same questions to get sort of an impression then of the work force and what was going from

each man's filtered viewpoint. That's what I'm really trying to get at in this pre-World War II portion. And then of course some of the specifics which we can get into later on your work, like there is nothing written at all on your work in Panama, the reasons for going there, what you were able to accomplish there, if anything, the roles you saw...and that kind of stuff. That is a complete blank and it was probably a forerunner of the field processing, second echelon development which later came on and it was one of the very first, so I think it's valuable to delve into that with some detail. That's the method to my asking this and I wanted to explain it to you. I'm not really looking for the specific questions. If you have specific information on a specific question, fine, but if you don't, don't feel reticent to express your opinion and another thing, too, we haven't gotten into the aspects of the decision on the use of these tapes which will be yours. It's your decision. If you don't want anybody to even listen to these things for 100 years, fine, if you want them to be used by the Agency at certain prescribed ways, etc., I'll contact you. The reason I don't have it now is that in 1978 a new copyright law was written, and I'm sending over a little form that we used before back to our General Counsel to have them look at that in relationship to the new law to get a...and

then we also didn't have the declassification program the last time. This oral history thing was done back in 1976 was the first time. It was started with Frank Rowlett, and a few other people by Hank Schorreck and Dave Goodman who was there just for a year. Since that it has been dormant and I'm trying to get it going again and my plan is that I have about another year and a half before I am first eligible for retirement at 55, I'll have 33 years in then and my plan is hopefully to come back for at least the first two years as a reemployed annuitant to continue on the program to train some additional people. Because I am about the only person in NSA that's had any experience with oral history prior to this time. It's not that great, but at least I have a little bit more than anybody else and so I'd like to get as an ongoing thing to have this non-print media in the archives of our history and so much of cryptologic history has never been written in the first place and so much of it is stored in the memories of individuals like yourself. I think it is a very worthwhile and good thing to be doing. This is what I'm trying to do but we have a few little things to get started, etc. so you're the very first one that I've been involved in and we have a few others in the past.

So, do you have any other questions?

SINKOV: No. Not really. I feel a little unhappy about the deficiencies in my recalling the kind of things that we should.

INTERVIEWER: If I was asked questions about what I did when I first arrived at NSA I'd have a very difficult time.

SINKOV: It was 1930 when I started--that was almost 50 years ago.

INTERVIEWER: But I think as you get into it you'll remember and don't hesitate to go back--that's okay. Because the people who listen to this and you go to a certain (and I will have these time segment index cards so they'll eventually be able to go back by subject and even if you repeat it and if something, you remember something about a previous question and you say I just remembered this, just go ahead and do it.)

SINKOV: Would it be helpful if I were to take time to kind of organize this series of recollections in order to get it into a better organized form or do you actually prefer that it be completely impromptu?

INTERVIEWER: I kind of like the impromptu because it starts a series of memory banks to start rolling so don't feel at all straight-jacketed. I'll just read this first question to start. What experiences in your home environment, intellectual interests, education, etc., helped prepare you for your career in cryptology?

SINKOV: Well, in response to this, all I can say is that...in my early life, my ambition and dedication was entirely to the field of mathematics. I was an ardent student of mathematics and it was my motivating force. My ambition was to become a mathematician. When I graduated from college I got an appointment to the New York City high school system where I taught mathematics and planned to continue my study of mathematics. At this time, I had just a Bachelor's degree. Circumstances in my case were such that it became almost impossible for me to continue the study of mathematics, to get into graduate work, because my appointment in the high school system was in a school which had three sessions. It was so crowded that there were three different sessions of students and I, as a new appointee, was assigned to the least popular one which began at 11 in the morning and ended at 5 in the evening. And practically all the graduate mathematics available in the New York City universities was between 2 and 6 in the afternoon, so that continuing study was preempted. I just couldn't manage it and this gave me sufficient pause, enough unhappiness to think that maybe I'd better shift my employment to something else that would leave me in a better position for continued study. One of the ideas that developed was working in mathematics

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in the federal government. In this period there were regular examinations for civil service appointment and there was one category called Junior Mathematician. Actually the main openings for employment from registry in that direction were limited to just two or three places. There was work at the...the name escapes me at the moment...in ballistics; there was work available in the meteorological area; and the statistical areas but opportunities in mathematics were actually quite limited. However, I elected to try that. I took the examination for Junior Mathematician and was placed on the register and then looked forward hopefully to some kind of appointment in Washington. This was the very period when Mr. Friedman succeeded in getting authorization for the hiring of some personnel to assist in the general work that he was doing. He had at the time, as I remember it, just one secretary and he got authorization to hire three employees. Further, he got permission to include an additional requirement for appointment over and above being on the register. He had decided to pick people from the mathematics register because he thought that was a good place to go. However, he also wanted to have people who had some linguistic competence, and he got permission through the civil service commission, I guess, to impose an additional requirement of some foreign

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language knowledge. And from the mathematics register, the junior mathematician, he checked the qualifications of the people involved and found three names that suited his requirement: Rowlett, Kullback and myself. Each of us had work in a foreign language. Rowlett had had some work in German, I in French, and Kullback in Spanish. We were communicated with by the civil service commission and asked whether we would accept employment in this general direction. I don't recall what particular phrase was used, it related to the cryptographic field but that was all we were told, and speaking for myself, it didn't really mean a great deal to me because I had no idea of its significance, but it sounded interesting and I accepted the offer of the appointment, as did Rowlett and Kullback. And within a space of two or three weeks we all reported to Washington. Rowlett I think came first, early in April. I came about the 10th and Kullback on the 21st or thereabouts in April 1930.

INTERVIEWER: Did you know Dr. Kullback?

SINKOV: Yes. Our relationship has been a very intimate one. He and I were classmates together in high school, in college and in graduate school. We had studied mathematics together, in fact, we would regularly visit in one another's homes and discuss the materials that we were studying. We had a considerable overlap in the courses

that we took and our relationship was a quite intimate one which continued throughout this entire period. Rowlett came from another area altogether and we didn't get to meet him until our arrival in Washington. The appointment as junior mathematician at that time was called P1. The classification series was a classification that went from P1 to a highest category of P8, I believe it was, with the salaries ranging from about $2,000 which was a start of P1 to something on the order of $5,600, which was as high as you could go. But in those days $5,600 a year was a pretty elegant salary. I don't believe Friedman's rating was that high. He must have been somewhere in the P5 or P6 category. Well, we reported, were introduced to Friedman; our employment was in the Munitions Building, room 3416. Actually room 3416 had just behind it, a vault which had been set up for reasons of security and storage and it was in the vault that we were employed. Our training, essentially, consisted of working with the materials which Friedman had generated. The first book we worked through was Friedman's original Elements of Cryptanalysis and then, after that, there were two volumes, Crypt I and Crypt II of graduated materials which Friedman had worked up with problems. Essentially the early part of our training consisted of working jointly through all of this training

material with a minimum of supervision by Friedman. He would just look in now and then and find out how we were getting along. He was available if we ever had any questions and his responses were frequently very interesting ones. I recall one time there was a problem that was assigned which started out with the information that certain materials had been captured and from it the system used could be determined and then after this capture some new material arrived and it was to be solved. The obvious thing to do was to try to apply the same kind of ideas to the new material, and after we worried quite a while and got nowhere we sort of solved the problem from scratch; it was only a limited relationship between the captured system and the new one. I remember going to Friedman and saying, "This answer that we have developed has practically no bearing on the captured material." He looked at me and said, "That's just too bad." He was always available for any real problems that we had and my recollection is that it was largely, with the aid of the effective materials he developed, a self-teaching program. As we progressed and learned about cryptanalytic techniques then our sphere began to expand. In those days there were occasional communications received from people submitting ideas for cryptographic systems. We had a rather extensive file, which we used to label our "nut"

file, of systems submitted by people outside, and there was a rather amusing kind of uniformity to these communications even though they came from widely different places and from many different people. Sort of idea that the letter carried would go something like this--it was started out by saying, "Recently I read in such and such a place that no one can devise a cryptographic system that somebody else can not solve. I immediately decided that that couldn't be, so I sat down and invented a system which is unsolvable and I'm prepared to offer it to the U.S. government for $1 million or a good job," or you can fill in whatever the individual thought he'd like for the system, and then interestingly enough, there would always be a final sentence that would say, "and if the U.S. government won't buy this from me I will sell it to the Russians or to the Germans." Part of our training consisted of dealing with these submitted systems which frequently were relatively simple. We did have a standard procedure for dealing with this material. In fact, on receipt of such a communication there would always be a form letter sent out within 24 hours indicating the conditions under which we would be willing to examine this material. It requested a certain amount of material to be made available and set down some general conditions which were quite reasonable with regard to our examination

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of the system. Then when that material was received we would study it and our rate of success was quite high actually. Of greater interest in this direction than just these nut letters that we received, there were several cases of quite interesting systems that were submitted that we examined. There was the KRYHA cipher machine we studied and solved. It was a rather interesting mechanical device which had a gear wheel which provided for the stepping of a disc at irregular intervals resulting in the equivalent of a rather lengthy period. But we were able to solve that relatively easily because, although the period was very lengthy, we were able to analyze the type of motion because the machine was made available to us and the interesting thing that happened in this case was when a test message was received, Friedman put a stamp on it showing the time of receipt and we had an approved solution in something like three hours, which was similarly stamped with a time machine and this was a very interesting indication of the kind of successes we were having. There was a machine developed by the ITT which we studied and solved. There were other systems which formed, in a sense, our training material. Simultaneously, we studied material like some of the wartime systems WW I. We conducted an analysis of the ADFGVX, a German system that had been used during WW I

and prepared a paper on the general solution of that system. One of our cryptanalytic efforts consisted in analyzing a U.S. recommended system, the strip cipher device. I think it had a name something like M138 or something of that order. What we did was to undertake a study of analyzing what the minimum amount of material would be in a system like that, without knowledge of the strips, which would still permit the solution. We came up with an answer you had to have something like 450 lines of traffic. Of course, if it were the case where you actually had the strips available to you the solution would be relatively simple. Comparatively, anyway. An additional direction of effort during this period related to the communications security side. The unit was responsible not only for the cryptanalytic work that we were studying but for the preparation of U.S. systems. We make up some code books designed for both field and higher level use. For the field uses, there were books called Division Field Codes. About 4500 groups each and we drew up two or three editions of division field cards. This was done by a process of using 3x5 index cards. The code groups that were to be used were ordered. The vocabulary which was to be used was drawn up, then what we did was to go through a process of completely scrambling the code groups and have them completely mixed up. The

ordered vocabulary was then put on to the rearranged code groups and that provided the encoding section of the codebook; then for the decoding section we had to alphabetize all these cards in codegroup order so we could print the decode section. It was a lengthy process because this matter of dealing with that many cards was not simple, it was all manual working. As I recall, it was a job of something on the order of three weeks of full time work to make up one of those division field codes. I mentioned this specifically because when later on we got into the use of IBM equipment, which I'll talk about shortly, we got the problem of making the field code down to something like 3 hours. A more extensive code construction problem was the army field code which had a vocabulary of about 100,000 groups. When you think of the fact that we had our 3x5 cards in boxes about the size of a shoe box each of which contained 2,000 cards, a 100,000 group codebook represented handling all the cards of about 50 of these boxes. The scrambling process and guaranteeing that you had pretty good scrambling was a slow and miserable matter. The final realphabetizing was also a very difficult one. That aspect of our work was (tape ended).

THIRD TAPE, FIRST SIDE

INTERVIEWER: I believe you were up to talking about the connection with the Coast Guard.

SINKOV: One other activity that we were involved in cryptanalytically related to some work in the Coast Guard where there was a cryptanalytic section that was headed by Mrs. Friedman. This organization was responsible for dealing with any of the communicactions which the Coast Guard was intercepting that related to activity in the coastal areas. Now this was the period of prohibition and a very common activity was bootlegging. There were some pretty big organizations which were bringing large supplies of liquor into the country; the way they would function would be they would have a mother ship which had rather considerable supplies of liquor brought from elsewhere. The mother ship would remain outside the 3 mile limit where it was essentially immune from any Coast Guard activity against it. It would arrange, by cipher communication, with smaller vessels to come out to the right place and pick up a load and bring it into the country. Well the Coast Guard would intercept some of this communication. It would end up in Mrs. Friedman's office where attempts would be made to read the messages, and some success had been achieved.

Each time success was achieved and information could be developed early enough, to know where rendezvous were going to be taking place, the Coast Guard could successfully intercept, which they did several times. Well, then it developed that these people got into some transposition systems, and the Coast Guard group was having trouble reading them. Through the connection between Mr. Friedman and Mrs. Friedman, copies of the material were made available to us in SIS, and we were able to solve these transposition messages without a great deal of trouble, because of a practice that the rumrunners were making, which was a very unwise cryptographic procedure. They used to send their text in four letter groups and when they were preparing to send a message through their normal columnar transposition procedures, they would always guarantee that the text had a total number of letters which was a multiple of four so that it would come out even when transmitted. But they would always add any necessary null letters in order to get the total, which was a multiple of four, as x's at the end of the plain text before inserting the message into a rectangle and transposing. Without going into much detail, the presence of those x's made it possible to solve the message pretty

easily and some captures were made and some success against them so they proceeded to change the system. This time it was still a transposition with x's in it, as before, but we were unable to read messages for a while until we made the final interesting kind of break. On one day, that we had a series of messages, and kept trying the old trick of using the x's and transposition to solve, they wouldn't read, but one of the messages did and we determined the key for that one message. It didn't read the others but we suddenly discovered that if we put the text through two transpositions, with that same key, it would read. In other words it was a double transposition system. This gave rise to our studying how you could solve systems in double transpositions and we worked out a method of solution and again nabbed a lot of their people. So that the Coast Guard had some significant successes. There were later systems that they used. There was one code system they used which we helped solve and they even went to enciphered code, but our success against them was significant so that some very successful arrests were made, and a pretty big crimp was put into the activity of this rumrunning group. They were operating mostly off the west coast, off in the general neighborhood of Seattle but with the speed of handling of the material

to Washington and our decrypts, some interesting successes were obtained in cutting down on that activity. That was one of the more interesting aspects of our being trained in the general efforts of cryptanalysis.

One other direction in which we did some work related to construction of codes. In drawing up code groups for a code book one normally uses what's called a permutation table. It's a special diagram that guarantees that if you pick the letters for your code groups in the right kind of way you would end up with what we used to call a two letter difference, which meant that any valid code group had to differ by at least two letters from any other valid code group. The point being that if in transmission an error were made and one letter was wrong you would immediately detect that there was an error. You had error detection capability. As for error correction that wasn't very difficult because since there are only five letters say in the group and you knew one of them was wrong you could try to turn to call each one wrong, find out what the correct group would be with the other four right, and then the context would tell you which was the right group. This incidentally is one of the very early efforts in the general direction of error correction in coding procedure, a subject which became very important later on in the

whole computer area. This matter of error correction in computer handling and in communications is a very significant subject. The subject has been advanced very considerably; some very impressive mathematical studies have been produced which produced error correction techniques that make it possible to detect and correct up to any number of errors that you might be interested in considering. By the application of special techniques of using redundant letters, I guess you're familiar with this, Sam, are you not?

INTERVIEWER: I think this would be a good opportunity to go into a little discourse on the application of computering to cryptanalytic attack.

SINKOV: We're still talking about this very early period, I might mention that along with the training which we were getting in these various ways that I have described, a procedure was initiated for the training of some Army officers in cryptanalysis. It started out with the appointment of a Lt Mark Rhoads who joined the group and went through the course material and studied along with us. Effectively we were helping train him. He and Preston Corderman were early students. Then an arrangement was made for one of these two to stay on for an extra assignment of two years and serve as the instructor for the next two officers who

came down and I think the next pair were: Capt Hayes and Harrod Miller; oh Bicher was before Hayes. Bicher and Miller was it not?

INTERVIEWER: Yes.

SINKOV: And I don't have the order quite correct but additional officers who came in to this general program were Joe Scheer, Lt. Jones of the Coast Guard, Major Baldwin, Leonard T. Jones...Hammel...Hamm was a civilian with us. He was not of the uniformed services. We had these officers in groups of two for two year assignments so, effectively, with these various names, I've mentioned that takes us up to about 1938 and then after than, quite a number of people were assigned to the organization. In fact, there was a big build up that began around 1938 and '39. We got a large number of civilians added to the organization. The table of organization was very greatly enlarged. We brought in a large group of reserve officers who had had a course of training at the University of Illinois. This was a program, which had been conceived by Friedman, of training personnel who were in the reserve corps. It was at this stage about 1939 or 1940 that the really big build-up of the organization began.

INTERVIEWER: These officers who were there for training, did they work in the operational aspects or were they just doing their training courses?

SINKOV: They were trained and worked along in whatever other assignments we might have. Some of them distinguished themselves considerably. Corderman later became Chief of ASA. Hayes at one time was Chief of ASA. I guess those are the two that stand out. I don't know what happened to Jones, although I had some indication that he'd risen considerably in the Coast Guard structure.

INTERVIEWER: Harrod Miller was most vivid personality-wise.

SINKOV: Yes. I don't recall that he distinguished himself in any way after he graduated. He certainly distinguished himself before in some interesting ways, not all of them quite proper. I don't think I ought to go into this.

INTERVIEWER: After the training question, I had one here on the development of cryptologic literature.

SINKOV: In connection with the various problems that we worked on the different systems that were submitted, the machines that we examined, a number of these efforts gave rise to publications describing what we had accomplished. These were in a sense, additions to the cryptographic library that existed when we first started. That library, essentially, was a series of publications by Friedman. Apart from the course material we had there was a series of publications which Friedman had written when he was at the Riverbank Laboratories in Chicago working with

Col Fabian. Friedman had studied at Cornell University and on graduating from Cornell as a plant geneticist he was offered an opportunity to work for a Col Fabian, a very wealthy man in the Chicago area, and, essentially, his job originally related to looking after the extensive grounds and plantings at the Riverbank Laboratories which Fabian owned and operated. This man Fabian was an enthusiast, I might almost say a nut, on the subject the Bacon-Shakespeare controversy; the idea of attempting to prove somebody other than Shakespeare actually wrote the Shakespearean plays. It was in connection with this interest of Fabian's that Mr. Friedman got diverted at Riverbank into cryptographic studies and this is how he first got into the field. A co-worker was a lady named Elizebeth Smith, who later became Mrs. Friedman. It was while at the Riverbank Laboratories that Friedman served as an instructor for a group of army officers who were being sent to Europe as part of the AEF, American Expeditionary Force, that went to France during WW I. He trained a number of military officers in elementary cryptanalysis. It was soon after the war that Friedman was hired to come to Washington. I don't have any recollection of the exact dates and he was appointed to the job of looking after the general subject of U.S.

communications security and communications intelligence. He had the very extensive establishment of one sergeant and one female secretary and that was it. It was then known as the Signal Intelligence Service.

INTERVIEWER: It was 1921.

SINKOV: And it wasn't until 1930 that he received the authorization for some expansion and the first appointments were made that I talked about earlier, Rowlett, Kullback and I joined in April and then soon afterward came John Hurt and Larry Clark and that represented the organization until some years later. When did you come in Sam?*

INTERVIEWER: 1936.

SINKOV: I don't think there were any further appointments until about the middle '30s because just about this time the depression hit and getting extra money for additional personnel was pretty much out of the question. As a matter of fact we had the experience of reduction in pay as a result of the depression. One year I think it was '31 or '32 everybody experienced a 10% or 15% cut in pay and then the following year we were given a month's furlough without pay, which was equivalent to an 8 1/3% cut, but these reductions were restored the following year and we then went on with our normal salaries thereafter. That depression period was a difficult one

*Sam Snyder

to get through and it certainly put a stop to any of Friedman's attempts to build up the organization anymore at that time. But then things got a little brighter, and the desire developed for a better intercept capability outside the continental limits of the United States and they talked and discussed aspects of where one might go. At that time most of our intercept consisted of material from Fort Monmouth and some material was being intercepted personally and privately by Col. Mauborgne, who later became Chief Signal Officer. He was stationed on the West Coast at the time, and he was an amateur radio operator and he lent his services in his off hours to doing intercept for us, but this was a limited amount of material. We did, of course...I'm not just sure when this began...develop a procedure of getting material from the cable companies, from companies like RCA and IT&T. We were able to get from their records copies of messages which were being transmitted by them. This was sub rosa, quite improper I expect from a legal point of view, but it did provide us with material. One of the things we got in that period was a whole series of messages by an organization called AMTORG, which was a Russian trading organization. I'm sorry to say we never got anywhere with the AMTORG communications. We developed a little

information about the preamble and the signatures but that's as far as we went. As far as I know it may have been one time pad communication, but we never learned anything about it.

The idea of additional intercept was studied and the first thought that developed was that an intercept station might be set up in the Canal Zone in Panama. I was appointed to go down to the Canal Zone to help in the installation of a radio station and the development of intercept capability. As a technical officer I had assigned to me a Signal Corps Captain, Harry Lewis, who was pretty well informed along radio lines and an installation was put up in a place called Corrozal, very close to the canal, within the Canal Zone, and I, with Lewis, undertook a program of scanning the (radio) spectrum to see what intercepts we could accomplish. We got some material out of South America, we got some Japanese communications, very little out of the European area. In fact, it turned out on later examination that Panama wasn't a very effective choice as a place for intercept and I think that intercept activity sometime later was terminated. In my stay there I had occasion to work on whatever material came out. What was being obtained in Japanese communications was what turned out later to be in the machine we called RED, which was a

sort of manual system with very interesting property that consonants were replaced only by consonants and vowels by vowels. I made a little progress with it on my own in Panama but the solution of the system was achieved in Washington, but produced some useful information.

Oh, I should say, harking back a few years, that along about 1932 Yardley published his book which he called The American Black Chamber. In it there was one chapter which related to the negotiations between Great Britain, the United States and Japan not long after WW I regarding the general subject of disarmament. In some messages which Yardley and his group read, they were established in New York City, in an installation there which was doing some cryptanalytic work. He had been a telegraph employee with the State Department and while working with the State Department in Washington was able to do some interesting cryptanalytic work which resulted in his being put to work in a special unit in cryptanalytic activity. This was about 1922 or 1923 when the disarmament conference was taking place. He read some messages from the Japanese Government to their representatives indicating the furthest point to which the Japanese would go in the ratios that were to be set up in connection with the disarmament. The ratio is related to the strengths of

the navies of the three countries and the Japanese let it be known in their communications that they would settle finally for 5-5-3, meaning a ratio of 5 for the United States, 5 for Great Britain against 3 for Japan. Now in the actual negotiations they were trying to get more but since Yardley had been able with these messages to tell our people exactly how far the Japanese would go, the Americans and British insisted on 5-5-3 and they won out. When this information was published in the American Black Chamber, it caused quite a stir in Japan. Among other things, they published a pirated edition of his book in Japanese and must have given a good deal of consideration to their communications security because their procedures changed considerably from then on. This is something which regularly happens in the cryptanalytic field. Anytime any information gets out into the public domain about successes that are being accomplished in cryptanalysis it causes countries to reexamine their situation and, to reappraise what they think their security is.

Well, this wasn't very chronologically handled. In Panama I worked on the RED communications and on some of the limited amount of Latin American material we had. We gradually built up some capability in intercept, but it wasn't really a very significant amount. While all this

was going on an additional intercept station was arranged for and set up in Hawaii starting in 1937, which was the following year. Kullback went to Hawaii to serve in a similar capacity there to the one that I had in the Canal Zone. Not long after that, 1938, Hitler marched into Austria and it began to become clear that the military situation in Europe was pretty drastic. We received messages, Kullback and I, calling us back home because of that general situation and we returned to our cryptanalytic assignment in Washington, along with what then began as a very considerable buildup, which I mentioned earlier, of the Signal Intelligence Service. It was about that time that I was assigned to a special study of Italian communications. We were intercepting and getting through telegraph companies a significant amount of Italian traffic. One of the major systems was a commercial system based on a very large codebook, the best estimate that we could come up with somewhere in the order of a couple of hundred thousand groups. We made an entry into that system and proceeded to read messages in it. It was very extensive, I remember we had thousands of messages, and we were able before very long to get pretty much the entire content of most of the messages that we were reading. As I indicated, it was essentially

commercial information. Apart from that, there were occasional messages that we obtained in a military attache system and these turned out to be in enciphered code with which we made some limited progress but our ability to read those messages became much greater after the visit to England, when it turned out the British had surreptitiously obtained a copy of the codebook and we were provided with a copy of the codebook. Those were the two major Italian systems. The group that worked on the problem was about a dozen people. I had six of the group who had come from the University of Illinois, from the ROTC program. Mrs. Berryman, now Mrs. Davis, was in the group; Sam Snyder; a very interesting individual named Joe Greenberg, who had come from Yale University and was a linguist; he handled languages almost as easily as I handled numbers. Among other things he was an expert in a language called Hausa which was one of the North African languages in which he had done considerable work. That takes care of most of the group; we had one more a very charming little secretary called Virginia Shaver. That was the lot wasn't it?

INTERVIEWER(S): Harry Acoff? Peryenko?

SINKOV: Oh, I named him, yes he was an Italophile if there ever was one and quite an asset to the organization for translation purposes. At the time that I was assigned to

this Italian program, Kullback and a similar group of people were working on German communications and Rowlett headed up the group that was studying Japanese communications. It was during this period that the entry into the PURPLE was made along about 1940 or thereabouts which resulted in our being able to read top level diplomatic communications of the Japanese in their PURPLE system.

INTERVIEWER: You talked earlier about publication of the Black Chamber which was published after the Yardley group had been amalgamated.

SINKOV: It wasn't amalgamated; it was abolished.

INTERVIEWER: Well, some of the people were brought on board? Is that correct or were any?

SINKOV: Not that I remember. No. We had some occasional correspondence. Actually Friedman had it, with one or two people who had been associated with Yardley. One was Professor Manley of the University of Chicago, who had been with the Yardley group; and then there was Professor Mendelsohln, a history professor at City College. He, too, had been involved in earlier cryptanalytic work and Mendelsohln came for a period of a few months on a special assignment to SIS, but other than that I don't believe any of the people who were with Yardley came to work with us. There was a lady named Agnes Driscoll, who I think

was with Yardley who ended up in the Navy Department. Had she been with Yardley?

INTERVIEWER: I never realized that or thought she was with Yardley.

SINKOV: Maybe not.

INTERVIEWER: I was going to add that a few years later Edna Hackenberg who had been with Yardley for about 10 years from 1919 came into the agency for about one year, 1939, I remember this because she worked for me, and subsequently married him, of course you knew that; she is still around. Col McGrail was another who had worked with Yardley in secret inks.

SINKOV: McGrail came for a period in connection with secret ink work and with studying of question documents and similar work. Col McGrail was later followed by Bob Holmes, another chemist, who worked in the same general direction. Their concerns related to secret inks. As far as I know never did anything much with the utilization secret ink techniques. Our main interest in developing this direction was against the possibility of secret ink communications being used against us. I don't recall that there were ever any periods of actual accomplishment in that direction. The Yardley group, as is reasonably well known, was eliminated by Secretary Stimson when he was Secretary of State and was informed, I'm not quite sure just how, perhaps through seeing some decrypts that we were reading.

messages of other countries and he stated flatly that "gentlemen don't read other people's mail." He abolished the organization and that was the end of the Yardley group. It was probably the impetus that caused Yardley to write this book, The American Black Chamber, in which he disclosed a number of secrets of things that he had accomplished.

INTERVIEWER: I heard sometime later that the real decision about that "gentlemen reading mail" was not Stimson but President Hoover himself.

SINKOV: Conceivably, but in all the information I've seen, it's attributed to Stimson and I must say that Stimson took a very different attitude toward the whole subject when sometime later he became Secretary of War.

INTERVIEWER: When he was Secretary of War--he was in and out of our place.

SINKOV: He behaved very differently then and had quite different ideas about the utility of such activity.

THIRD TAPE, SECOND SIDE

INTERVIEWER: Did you utilize any of the material that MI-8 had gathered and used during their time, personally?

SINKOV: Some of the material in Yardley's book was of interest in connection with the cryptanalytic aspects. There was one

chapter about a couple of messages sent to Mexico and it formed a very interesting subject for cryptanalytic study. What actually happened was Yardley published two code messages and their decrypts with a brief description of how the messages had been encoded with the aid of a dictionary. There were five figure groups, the first three figures gave the page number and the last two figures gave the position on the page of the word involved and it was a straightforward one part code handling. Yardley describes in his book with interesting enthusiasm and verve how he succeeded in finding the dictionary after a few groups had been identified which permitted complete decoding. What he didn't say in his book, was information we got from Professor Manley, that the name of the dictionary was given to Yardley by the British, and he makes the story read as if it was a terrific cryptanalytic accomplishment on his part, which it could have been, but he completely omitted this additional help that he got that rounded out the story very neatly. Mr. Friedman had a copy of the Yardley book which was really a gem. It had marginal notations by Friedman, by Mendelsohn, by Mark, by Manley, by others contradicting things which Yardley said in his book or making comments about. There was a whole series of these which pointed

out that Yardley had really embellished in his book his accomplishments to a tremendous extent, and in a number of places had taken credit to himself for work that had been done by some of his subordinates. It was pointed out in connection with one or two of these places, that if the text is read very carefully you realize that Yardley hasn't said in so many words "I did this," but the implication is there, and it is written in such a way that you are given the impression that he accomplished something when, according to these marginal notations, he hadn't done it at all. Well this copy of the Friedman book is really quite an impressive volume and I guess it's now included with all of the rest of Friedman's collection in the Marshall Library.

INTERVIEWER: Is that open to the public now?

SINKOV: (Discussion relating to availability of Friedman's works/records.) I expect so. It's not classified material. All of his stuff was unclassified; it's in a separate room perhaps, but...

INTERVIEWER: But open to scholars.

SINKOV: I don't see any reason why this library would deny access to the material. There is no classified material involved, as far as I know. In the main it consists of a very large collection of early cryptographic literature. It's a very rare collection, because it contains items that go

back well into the 15th and 16th centuries plus a lot of more current material; a very wide collection of things having any relationship whatever to the cryptologic field. It includes such things as novels which had ciphers as the basis of the story, it includes a lot of, I think, press information related to our activity, but I'm reasonably sure there is no classified material there. Because there was a period in his later years when Friedman's collection was pretty gone over by either representatives of the Agency or the FBI, I'm not quite sure which it was. There was a careful check made to ensure that there wasn't any classified material there. It was a period that had caused Friedman some considerable distress, because he felt he had been treated pretty shabbily in this whole situation and he was not very well at the time anyhow. So, it had quite an effect on him. Yardley, incidentally after the success of his first book, which was considerable, it was a best-seller, and rightly so, I'd like to give the man his due. It is a fascinating book to read. Anybody who is at all interested in cryptology would find the book a fascinating book to read. He tells the stories very well of the different cryptanalytic accomplishments of his organization. The fact that he perhaps takes on his own shoulders somewhat more credit

than he really deserves is in some measure beside the point, because he was the driving force of this whole organization and he was the main contributor.

INTERVIEWER: Did he do a book for the Chinese?

SINKOV: Yes. Yardley then wrote a second book. It was in the form of a novel but had a lot of cryptologic information in it. Before it could go to press, official governmental action was taken through something equivalent to the British Official Secrets Act, I'm not quite sure what the actual legislation was, but an official authorization was obtained which prevented the publication of the second book. It never got into print. Yardley's later experiences were somewhat checkered. He was in China for a while where he was serving as a consultant in cryptology. Early in the period of WW II he appeared in Canada under an assumed name of Osborne and when somehow information got out to the British government that Yardley was in Canada, they brought pressure to bear on the Canadian government and that connection was eliminated. He died not long after that. He hadn't been a very well man in those last few years.

INTERVIEWER: You had touched on, I don't know how far you got in discussing, the use of tabulating equipment.

SINKOV: In the first few years of our work at the SIS it was all

manual operation; all frequency distributions, all studies, everything we did was manually done. We had no other means. It was along about the middle '30s that Mr. Friedman had an occasion to find out about what was then called Hollerith equipment. He was given a demonstration somewhere of how this equipment worked and realized its utility for our work. The first step he undertook and arranged for was the rental of Hollerith equipments. It consisted of a keypunch, a sorter, a tabulator and a collator and a reproducer. These were the normal punch card equipments which represented what was then known in the way of office equipment, but they proved extremely useful to us. We were able to do things with them that reduced very greatly the time element in work that we were doing. For example, I mentioned earlier that we had an occasion to build up division field codes which used to take us in manual operation something on the order of three weeks to make the code book, once the Hollerith equipment became available we were able to get a codebook accomplished in something like three hours. It was a tremendous improvement in capability and we made some modifications to this Hollerith equipment for our own purposes, for example, a scheme was worked out, I think this was largely something that Rowlett accomplished, by

means of which we could effect a scrambling technique. As you may know, the punch card equipment, in a sorter for example, operates on a single column at a time. The column that it is operating on depends on the setting of a control that reads a particular column of the card. But what was done was to introduce an arrangement of being able to shift from one column to another, from card to card so that instead of getting into the same column all the time you are looking at different columns, one card after another, and this produced a very effective scrambling technique so that when we, for example, were making a division field code and wanted to scramble up all of the cards it was very quickly done on the scrambler, which at the time operated at about 100 cards a minute. Not much more than that.

INTERVIEWER: I had an occasion to write this up a few years ago and I dug into it and found a copy of the patent that was granted.

SINKOV: On the Hollerith.

INTERVIEWER: On this scrambler device. In the name of Friedman and Rowlett.

SINKOV: Yes. I hadn't remembered that they got a patent for it. We did other things. For example, we worked out schemes of using the tabulator for transposition procedures by rewiring the plug boards in various kinds of ways and

having, for example, the tabulator, instead of reading a particular column, as would normally have happened, read a different column instead and operate on varying columns of the cards. But those are side issues; essentially the main accomplishment with the IBM equipment was that we could much more rapidly accomplish many of the tasks that we were performing and from then on the utilization of IBM equipment kept improving. In fact, it lead into developments of rapid analytic machinery which SIS personnel designed and had built. It lead into techniques which we were able to make use of later on in the early days of the war period. When I was in Central Bureau we had an IBM installation headed by Halpin, which did some very effective things for us in connection with our study of the Japanese codes. From that, of course, we expanded into the whole computer field beginning in the early '50s and what the Agency has done in computers is pretty well known and very impressive. I point to an authority, and a second. (Dale Marston and Sam Snyder who were participants in the interview.)

INTERVIEWER: Did you have any role at all in the development of the RED and PURPLE analog machines?

SINKOV: No. I was involved to a slight extent in the initial studies of the cryptanalysis of RED and that was all.

The machines were solved and reconstructed in the Japanese section which was headed by Rowlett and which had a very large complement of personnel. It stands out as one of our very big accomplishments. I am reminded at the moment of one accomplishment in machine cryptography, cryptanalysis that related to the Hebern machine and the successor of the Hebern. The Hebern machine had been solved by Friedman and resulted in the denial to Hebern of the use of his machine for U.S. purposes. The navy organization came up with an idea of an improvement on the Hebern machine and they designed a model, under Capt Safford, of a rotor machine with five wheels in which, at every operation two wheels would step instead of just one as in the Hebern. An arrangement was made for a test of that machine by SIS. What we were given was a set of ten messages, as I remember, and the plaintext of some of them, I don't remember now how many, but we had plaintext for some of the messages. With that information and our study of the system we solved it and we read the messages for which we hadn't been given the text. As a result of which the Navy cancelled the project of considering that machine for U.S. use. It was after that that ideas of Rowlett and Friedman resulted in the development of the SIGABA machine, which was built, accepted, and made ready just in time

for our getting into the war. It was a very useful machine and handled a high percentage of U.S. traffic during the war years. It was an improvement on the Hebern idea in that there were two sets of rotors; one of which, in its motion, controlled the other and the combination was a sufficient amount of security that it was pretty well protected against cryptanalytic effort.

INTERVIEWER: As you mentioned earlier the very first efforts were intercept sites in Panama and Hawaii. Did this develop, this early intercept, in the preparations in the intercept field or collection towards the beginning of WW II--late '30s, was that done according to any intensive planning or did it just develop haphazardly?

SINKOV: I don't really know the answer to that. It was not long after that some capability was developed in the Philippines where we had intercept personnel but whether this was on any well organized program of development, I don't know.

INTERVIEWER: Who was handling the intercept aspects of things within the group? Friedman himself or Rowlett?

SINKOV: No. Not Rowlett. I would imagine this was something that Friedman himself was handling. I don't recall that any of the officers that we had assigned to us worked in that direction.

INTERVIEWER: When was the second Signal Service Battalion...?

SINKOV: That had existed for quite a while. I remember having a tour of active duty as a reserve officer with the Second Signal Service in 1932 or '33 when we studied direction finding techniques. It consisted of tests of the following variety: what we would do would be to send out a truck with a transmitter and it would go off into the countryside and start to transmit, and with loop antennas that we had, we would undertake to try to get direction finding information. That was one of the activities of the Second Signal Service. It was, I expect, helpful in the matter of intercept as well. When the Second Signal Service started out with this kind of activity, I can't say. I would expect that Fort Monmouth, which was essentially the Signal Corps center, had some activity along these lines.

INTERVIEWER: That was in 1933 when Mark Rhoads set up the first provisional intercept unit at Fort Monmouth?

SINKOV: That's when it started. Well, that must have been the year when we had our tour of active duty. Kullback and I both had completed four years of ROTC activity in 1932 and were appointed Second Lieutenants, so that we were eligible for this kind of active duty in 1933. We had both had two years of ROTC at City College in New York. City College, when we were students there, had compulsory

ROTC. Everybody had to take it and we had two years worth. After we joined the SIS, it was pointed out to us by Friedman that it would be helpful and desirable if we got commissions in the reserve, so we spent two summers, '31 and '32, at Citizens Military Training Camp at Fort Meade, actually, and finished the third and fourth years of ROTC training. They were called White and Blue. The four years were Basic, Red, White and Blue. We finished the White and Blue programs and then did some correspondence work as well, and the correspondence courses, commissioned us as Second Lieutenants in the Signal Corps Reserve. Then, it was in '33, that we participated in that direction finding experiment with the Second Signal Service Battalion or was it Company? Company. Company, later became Battalion when they expanded it. There was a station called Fort Hunt? Now--down below Washington, near Belvoir, in Virginia.

INTERVIEWER(S): By 1938 there were stations at Fort Monmouth; the Presidio, San Francisco; Fort Sam Houston; Quarry Heights (where Dr. Sinkov was); Fort Hughes and in Manilla, Fort Shafter in the Hawaiian Islands. I think Fort Hunt was...Vint Hill...

SINKOV: Vint Hill originally was a training school, wasn't it. Did they do intercept at that time?

INTERVIEWER: Moved to Vint Hill...Two Rock Ranch at Turoc...

Petaluma, California.

SINKOV: From those statements that you read it was obvious that by then the intercept picture had progressed very substantially.

INTERVIEWER: Apparently then it was the Signal Corps that was doing that work outside of your little group.

SINKOV: It was the Signal Corps all along. For the first many years of this effort it was essentially a Signal Corps effort.

INTERVIEWER: I have another question concerning the collection and the processing of the collection efforts, that any of the routines which you might have followed in the early days after you had gotten the intercept.

SINKOV: You mean traffic handling?

INTERVIEWER: Yes, that type of...anything noteworthy there?

SINKOV: No, not that I remember. In those days we really didn't do very much with traffic analysis. It was mostly a cryptanalytic effort and when the traffic would come in we would sort it down to its recognizable systems, and then concentrate on the various systems that we were studying.

INTERVIEWER: Probably because pre-war those parts of messages were not hidden.

SINKOV: That's true. Traffic Analysis is largely a war time problem. When address and signature information are

normally concealed, and it takes analytic procedures to unbottom them. In normal peacetime addresses are normally in plain language. I don't recall at what stage we really began to get into considerations of traffic analysis but I guess it was not until after we got into the war.

INTERVIEWER: Joe Richard in his draft memoirs mentions it. He studied it at Fort Monmouth in the fall of 1940 when he was in the early draft effort. So he had done some effort.

SINKOV: Oh, well, that's earlier than I had realized.

INTERVIEWER: But I think he said there was no formal training material available until the summer of '42?

SINKOV: Yes, right.

INTERVIEWER(S): Early student...? You mentioned earlier, too, the depression and the cuts in salaries, etc. I had one question in here on the level of support given to the SIS in terms of funding, of personnel, equipment in the austere days of the depression. Did ingenuity replace physical resources in order to cope with the lack of support that you might have gotten, or was that a problem?

SINKOV: As I recall it now, that period was a period during which we were really in our training phases. We were just learning about the material and techniques and there was really relatively little effect on that aspect of what we

were doing. It carried on. All the materials that we needed were already available. It was a matter of our studying the materials that Friedman had provided, and that carried us for quite a while, along with the ancillary tasks of preparation of codebooks, handling of submitted systems and dealing with any special requests that may come in. I don't recall that the fact that there was a depression had any noticeable effect on the progress of our whole program.

INTERVIEWER: What about, aside from the code compilation and the development of their cryptographic techniques, you touched a little bit about the Nut File and the submissions of new equipments that you tried to break into. Did you have any regular aspect of your job, to search for vulnerabilities in the U.S. code and ciphers which were already in being?

SINKOV: Yes. I indicated earlier, we ran some special studies on the strip cipher device to determine how much traffic in it would be required for solution. The idea there was that if we could change the keys daily on the strip cipher system, in other words, have a complete rearrangement of the strips each day an enemy would have to have enough material in any one day to be able to solve the system and determine the cipher strips. This is with the

assumption that the material was not available to an enemy. We came up with answers as to how much limitation should be imposed on the amount of traffic in order to get protection just from that point of view alone. I'm reminded that, in addition to codebook compilation, we also had one task of developing enciphering alphabets which were used on a military attache system. It had the feature that, because of the codebook construction, the enciphering alphabets were made in such a way that consonants were replaced by consonants and vowels were replaced by vowels because the code groups had a certain kind of pattern of vowel content and we didn't want the substitution which was imposed to change that. That was another aspect of our work in communications security. Much of this material that we prepared by way of reserve COMSEC material never got used because although we produced a large number of codebooks and enciphering material for the codebooks by the time the war came our cryptography had advanced so far, especially in machine cryptography, that that older material was not really utilized.

FOURTH TAPE, FIRST SIDE

SINKOV: I am reminded that in our early days, in the '30s beginning about '33 or so, we had as one problem that we worked on, material intercepted of Japanese communications. These were mostly in the nature of codes carrying commercial information and the general designation we gave them as LA. They were 2 and 4 letter systems so designed that each digraph consisted of a consonant and a vowel and the encoding tables were of three kinds. There was one table for the encoding of vowel-consonant digraphs; and the third table, which utilized only combinations not assigned meanings in these other two, was a table whose row coordinates were digraphs and column coordinates digraphs so that the individual cells were represented by 4 letter groups. Thus, the result was that, the cipher text was text that consisted of intermixed 2 and 4 letter groups. We had reasonable success against these systems. They changed every several months and often many of the codegroups remained unidentified. Many actually didn't actually occur in the traffic, but we were able to read enough of the material so we could get pretty good sense out of the messages and these were among the materials that John Hurt was able to exercise his linguistic

capabilities on in providing necessary translations. Some of John's translations were especially interesting because he had a literary turn of mind and he used to make the translations rather flowery statements which gave the meaning, of course, but at the same time expressed in quite elegant terms.

INTERVIEWER: Let's turn our attention to the post WW II era. May I suggest something else along the same line--the transposed codes.

SINKOV: No, I am for the moment stopped--I don't remember.

INTERVIEWER: Say 19th? Thought it might trigger something for you.

SINKOV: Yes, now what was the cryptography there? I don't at the moment recall? This was another series with designations J followed by numbers. The number representing the addition. We went though a whole series of these systems. Do you recall what the system was like?

INTERVIEWER: Maybe this is vague for you, because by this time you were into maybe some of the other systems. I worked on them for a while, and Frank Rowlett maybe dominated that work, but they were relatively simple systems but superenciphered of the 2 and 4 letter codes set up that you described with the transposition.

SINKOV: I see, yes. I don't remember working on those.

INTERVIEWER: They got more sophisticated in later editions as they included blanks or nulls. They made life more interesting for us each time there was a change but we kept up with it fairly well.

SINKOV: And incidentally, in this connection, in addition to the fact that text was encoded, as I've described for example in the LA system, there were special abbreviations that the Japanese used for names of places and for particular individuals, so that we had quite a problem determining the significance of designation of cities. I remember that San Francisco was called So Co and Los Angeles was Ra Fu and there were a whole series of these special designations. A point which is of some interest because in the days of the Midway campaign the people in Hawaii, who were reading Japanese messages, had an awareness of an attack being planned by the Japanese on a place which was called AF and they were not quite sure what AF was. This is a rather interesting aspect of cryptanalytic work because they conceived an interesting idea of trying to determine just what AF was and the way they did it was to have Midway, which was suspected to be the meaning of AF, send out a message announcing that they were experiencing a water shortage, and this message was sent out in plain language so there wouldn't be any question of the

Japanese being able to read it and understand it. They then deciphered a message within the Japanese system that they were reading in which they were told that AF was having a water shortage and that fixed Midway and was a big factor in our success in the Midway battle because we knew they were coming there and we had a pretty good idea of when and we had our forces poised. This was a similar use of an abbreviation to the kind of things we used to see regularly in the LA systems and in the J number systems.

INTERVIEWER: One additional point about those transposed codes, it seems to me very likely that the beginning of the use of transposition on top of the codes must have coincided or followed the Yardley book. In other words it was part of the complications that the Japs added on due to the publication of the Black Chamber.

SINKOV: Yes. And undoubtedly it was at that time, because of Yardley's book, that they must have begun to think along the lines of designing cryptographic machines.

INTERVIEWER: Do you feel that was the long term impact?

SINKOV: I wouldn't be at all surprised because RED came in not very long after that. It is quite likely that the impetus of the Yardley book resulted in these COMSEC developments within Japanese services that led to the new systems that came in.

INTERVIEWER: Do you think they would have put those systems in anyway or perhaps saved them until the wartime situation?

SINKOV: They might, but one must feel that whatever developments were taking place, must have been spurred and hastened by the kind of disclosures that came in the Yardley book. There was an additional impetus to their whole field of work in communications security. As I said yesterday that is the normal consequence of any disclosure in the cryptanalytic field that becomes public knowledge. It causes an immediate examination, at the very least, of cryptographic systems by nations which have become concerned, in order to guarantee that they are getting the kind of security they would like to have.

INTERVIEWER: I think we can then turn to the post war period. What is the extent of your knowledge of the post war efforts to centralize and unify cryptologic operations?

SINKOV: I can shed very little light on this. I would say that probably what happened was that on the top levels, probably discussions on the Friedman-Wenger level, Adm Wenger was then the Commanding Officer of the Naval installation, and possibly with some input from higher levels within the services and the executive department itself. The idea of bringing together the cryptanalytic efforts of

the two services was gone into. There must have been discussions along this line. It was in line, I'm sure, with the general feeling that was developing at that time of the desire to combine military efforts of the services which later gave rise to the establishment of a Department of Defense, which we didn't have in the earlier days. We had separate departments--Army Department, Navy Department. The decisions of heading toward combined effort which were taking place on that top-most level must certainly have been having an influence in the examination of a similar action on the cryptographic level.

INTERVIEWER: After they formed AFSA, the central organization, what were the benefits as you saw them, technically, from this amalgamation?

SINKOV: Tremendous I'd say, because, after all there was a lot of competence in the Navy organization and a combination of Army and Navy just strengthened the capability overall. There were some minor problems of getting things properly organized and deciding who would run what, where the key positions would be, but my recollection is that it went rather smoothly. When I came back just after the war I was assigned to head up the communications security effort and I was intimately involved in the fusion of Army and Navy COMSEC which, as I recall, went pretty smoothly,

without any problem. Actually we moved most of the Army COMSEC effort over to Nebraska Avenue, where the Navy was established. They had some excellent facilities for such things as rotor wiring and preparation of cryptographic materials. We had a fairly effective analytical section which was added to by some analytical people on the Navy side. In the main, the shift to AFSA, I think, went very smoothly and very effectively. It was at this time that they began thinking at Arlington Hall of moving to a bigger installation and there were some very interesting studies made of where a new organization might be built.

INTERVIEWER: What were some of the options?

SINKOV: There were teams that were sent around to various places. There were a number of places considered--I can think of only one or two, but a major point that came in was the fact of the acquisition of ground would be a very expensive matter and this resulted in emphasis being placed on places where the services already owned ground so that there wouldn't be any real estate costs in the selection of a site and that's one of the reasons that Fort Meade, eventually, was picked. I remember there was some discussion, which was rather interesting, of trying to guarantee that the place where we would go would be exempt of radiation effects in case there were atomic bomb

attacks by the Soviet Union. There were studies made of what damage would result from atomic bomb attacks and what possible areas of the country would be free of these radiation effects and this gave rise to one thought that maybe the organization ought to move out to the northwest, somewhere in the State of Washington area which according to these studies would be an area that would be free of any radiation effects. I think the emphasis in that direction was pretty well played down and that aspect of the move was set aside. As you know, we ended up with the decision to go with Fort Meade and then there was a task of building the new building which took quite a while and a considerable amount of planning and effort. I guess it was a period of some three or four years from the time that it was decided to go to Fort Meade before we finally had the building available to move into.

INTERVIEWER: I was going to make a side comment that is interesting, that I recall, in fact I have a written note about it, that the Director came out with the official definite announcement that the move will take place to Fort Knox, Kentucky.

SINKOV: Oh yes, I remember that was one of the places.

INTERVIEWER: It wasn't a rumor; it was really going to take place, and it wasn't more than a few weeks before that was shot

down and changed. Do you remember any of the other places that were talked about?

SINKOV: Yes, Kansas City.

INTERVIEWER: What do you think was the deciding factor on Fort Meade?

SINKOV: A major factor was location, closeness to the whole Washington area; and a second factor which I'm sure must have had considerable effect, was the economy of being able to go to an area where ground was available at no cost to the government and the availability of military services right at hand to assist in whatever other aids were required.

INTERVIEWER: What about your negative reaction on the part of the key civilian work force to some of these other ideas like that?

SINKOV: Well, places like Fort Knox really caused quite a stir and a lot of unhappiness. There was a significant amount of unhappiness even in the selection of Fort Meade because the Arlington Hall installation had resulted in many of the personnel living out in that general direction in Virginia. The shift to Fort Meade was a significant shift in distance.

INTERVIEWER: Well, there are two people sitting around this table who never made the move, Dale and I.

SINKOV: I used to live way up near Great Falls on the Virginia side and for me it became a consideration of a drive of something like 45 or 50 miles (and that was a drive back in those days). Well I personally just never considered going through that kind of commuting. Before the new building was built I had already established residence in Maryland, in Greenbelt, in anticipation of going to Fort Meade from a more convenient location. That's just one indication. There were many people who lived out in the Virginia area who felt that this was going to be something of a burden, but over the first few years many shifted their location and there was quite an exodus from the Virginia area into Maryland. We even had people who lived as far away as Manassas and from Manassas to Arlington Hall wasn't all that much of a burden, it wasn't easy, but then from Manassas to Fort Meade became...

INTERVIEWER(S): I remember Pappy Young, he lived in Warrenton, and he made that trip for years. Jim Payne...he made that trip...

SINKOV: Payne lived in Manassas.

INTERVIEWER: There were carpools coming in.

SINKOV: That, with the passage of a little time, got pretty well adjusted and I don't think there was any really adverse effect on Agency personnel with the change to Fort Meade. What I mean is I don't believe we had any significant

amount of resignation by people who just felt they weren't going to go to that new location.

INTERVIEWER: Well, that says a lot about the organization itself, really. The fact that its perception on the part of the majority of the work force that really is a good place to work and that's terrific. Do you recall when we moved there was very tight hiring on the part of the government. Economic pressure.

I was wondering about the period during the Korean War, 1950-1955, are there any things that you recall there that are particularly interesting or significant in our work or developments? There was one thing that occurred during that time--the change from AFSA to NSA.

SINKOV: Yes.

INTERVIEWER: What do you feel was the main reason from your viewpoint of that change? What do you feel was the driving force to do that? Essentially, it took us out from under the JCS and placed us directly under the Secretary of Defense. That's one of the major things beside the change of name.

SINKOV: I really have little view of this topic itself. I really have no comment. Again I was not involved, or privy to any of the actual negotiating and discussion that took place that produced that change.

INTERVIEWER: You didn't see any effect on the work?

SINKOV: No. None at all. Not that I remember.

INTERVIEWER: You were still in COMSEC then, weren't you?

SINKOV: No.

INTERVIEWER: When did you leave COMSEC?

SINKOV: It was, essentially, just about the time of the move, when Gen. Canine, who was then Director, decided that he would like to have some rotation among the three of us who were the three deputies for SIGINT, R&D and COMSEC and he assigned me from COMSEC to SIGINT and whether he had considered moving Kullback I don't remember but that didn't enter. He then had Rowlett go to COMSEC. As it happened, Rowlett was made quite unhappy by this suggestion; he wasn't very keen about moving over to COMSEC, and he transferred to CIA.

INTERVIEWER: That would place it around 1953, '52, '53?

SINKOV: A little later I guess. We didn't move into the new building until about 1957.

INTERVIEWER(S): Rowlett was gone by that time.

He was. Definitely.

Because he was already working on the (Berlin) tunnel, because I was introduced to the traffic in the tunnel back in late '55, '56 and that was after a certain amount of negotiations that we could even get it in the first place.

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SINKOV: I remember, there was a period before the move, when I was heading the SIGINT effort at Arlington Hall. I don't recall how long...

INTERVIEWER: It would have to be '53, '54--(the tunnel was blown about '56)--and we got our first information on it through an agreement with CIA to get the traffic for the first time, about '55.

SINKOV: Did they originally restrict the traffic and not make any of it available?

INTERVIEWER: That's correct because this was old traffic. I was one of the first groups of people, an analyst, who started to look at it, only because it happened to be a military ground forces problem. Most of the material they were picking up that and the East German stuff so it just happened, and it was about nine months old when we first had our first inkling of it.

SINKOV: It was quite an accidental occurrence, wasn't it that caused the blowup of this operation?

INTERVIEWER: Yes. I think it lasted about nine months, too. Something about the heat from the underground installation melting the snow above and disclosing the existence of something in that area.

Tell us about the Korean War. It must have been a rather marked increase in effort, perhaps even some increase in personnel required when the Korean conflict began.

SINKOV: There probably was, certainly on the military side, but I don't seem to recall much in the way of significant change within the Agency itself.

INTERVIEWER: Well, of course, you were in the COMSEC section.

SINKOV: I guess that is the reason; I must not have been involved in the SIGINT during the Korean period. I don't seem to remember anything about it. Now the dates are a little vague in my mind. I'm trying to reconstruct when I left COMSEC. There was an interval at this stage in '54 when I spent the year at the National War College. I think maybe the rotational idea of Gen. Canine developed after I came back from the War College. That would put it at 1955. Does that fit in with the approximate date?

INTERVIEWER: Yes. That's the time of the Petersen problem.

SINKOV: Gen. Canine had succeeded in 1953 in getting special permission for NSA to be included in the quota of students at the National War College.

INTERVIEWER: Were you the first one?

SINKOV: No, Tordella was the first and I followed immediately after him in 1954. I think that's right. Then it was when I came back from the War College that this idea of rotation was presented by Gen. Canine and resulted in that change I mentioned of my going to SIGINT and Rowlett, as a result, leaving and going to CIA. When did the Korean War end?

INTERVIEWER: 1955, I think.

SINKOV: So when I stepped into the SIGINT spot it was already over.

INTERVIEWER(S): The first big flap after that was Lebanon. That was about 1960.

After you got back into the production, SIGINT production world, for the next five years or so, what is your appreciation of the interservice relationships between the new NSA, relatively embryonic NSA, and its relationships with the services who are essentially doing most of the collection? What were some of the frictions and problems that you had?

SINKOV: That is a pretty big subject. There was, of course, on the part of the services, a desire to have significant responsibility in these general directions. Each of the services had its own component. The AFSS was by this time established down in Texas. The Navy Security Group at Nebraska Avenue and ASA at Arlington Hall. In large measure they were doing very little in the way of cryptanalytic work although I expect that they were desirous of being somewhat involved in it. They did provide essentially most of the intercept capability. It was at this time that a program developed of trying to establish a kind of priority system with respect to the

application of our cryptanalytic effort. A priority system which was based, in a large measure, on the expressed wish of the recipients, the customer community, and the service agencies, of the directions in which they would like to have effort expended. They had very specific desires about directions in which intelligence was desirable, necessary and we would have regular meetings of examining the many different directions of effort cryptanalytically with the idea of trying to arrange for our priorities of effort to be organized in such a way as to meet the needs of the consumers. This was a very complicated kind of matter, really difficult to deal with. It was easy enough to express desires for intelligence in certain directions but how to guarantee that the cryptanalytic effort would be satisfying these desires was quite involved. I never did feel that that effort was really productive. It did produce a good deal in the way of discussion with the recipients of their utilization of SIGINT material, and their general satisfaction with it, but as can well be imagined there is always the desire for more. Frequently desire for information in directions which could be easily expressed as needs of the consumer agency, but with very little realization of how SIGINT could be expected to produce in these particular directions.

INTERVIEWER: What about the technical versus operational control of the Service Collection Service? The NSA role in collection as opposed to the role that the services felt in collection. Any major problems?

SINKOV: With regard to direction of effort?

INTERVIEWER(S): Yes.

I believe that was in the pre-MUSSO days where they had the MUSSO, USSIDs; where everything was written out or an attempt was made to write it out.

SINKOV: I'm having great difficulty recalling much of the kind of things that happened in those days. The whole subject of the service agencies, we had some special name for them.

INTERVIEWER: SCA, Service Cryptologic Agencies. That was the name used.

SINKOV: There was a very specific word that was used to designate these service groups. At any rate, there were a number of touchy aspects to the relationship between NSA and the service agencies and I'm having trouble recalling in detail how they were dealt with, what kinds of discussions arose. It was essentially a consideration on the part of the service components that they wanted more authority, greater independence, ability to decide for themselves many of the directions or contributions that they would be employing. We managed all right, as I remember, but it was a constantly touchy sort of situation. I

don't really have much more to contribute to that particular topic at the moment. I may perhaps, if I think about it, recall some more.

INTERVIEWER: Might it be helpful, in your view, for you perhaps to take a look at the more interesting things that occurred in the last five, six or seven years--really in terms of outstanding successes in the SIGINT production organization in the technical sense.

SINKOV: You mean from the point of view of solution effort?

INTERVIEWER: Yes.

SINKOV:

INTERVIEWER:

SINKOV:

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stands out in my mind as the really big contribution that we made. We were dealing with systems of many different nations, for example, in the organization called ALLO, which stood for all other nations--the Soviet Union was one big chunk, and ALLO was all the rest--in ALLO we were handling the systems of dozens of countries, in many cases quite successfully.

INTERVIEWER: You touched a little bit on the relationship with GCHQ and our very special Second Party relationship with them. Would you talk a little more about your personal contacts with them and that type of thing.

FOURTH TAPE, SECOND SIDE

SINKOV: The inter-working which, essentially, began in '41 blossomed into a very effective collaboration. I believe that when I took on the SIGINT assignment, the BRUSA agreement had already been worked out and it was an agreement of an exchange of personnel between us and the UK which resulted in our appointment of a senior liaison officer and a technical assistant to him; the liaison officer being established in London and the technical assistant in Cheltenham with some few additional US

personnel who were assigned to various areas of the cryptanalytic effort within Cheltenham. There were similarly British personnel assigned here to serve both on a policy and administrative level, as well as fitting in with the technical effort. This process of interchange of personnel continued right up to the present date, as a very effective means of accomplisning the interworking and the liaison between the two agencies. It was about this same time, in the mid '50s, that we established a group in Frankfurt; the first sppointee there was Hugh Erskine, who established our effort in the Frankfurt area, and that, too, has continued to the present date. A very effective service of liaison and contact with the activity on the continent. The technical interworking with the UK has resulted in quite an effective interchange of techniques, solutions, general cryptanalytic effort, as well as close interworking on the policy levels. I might say that, in addition to this general interest, the assignment to the position of SUSLO in England was considered one of the most desirable assignments within the Agency. It was truly a plum because, in addition to a very effective and interesting position that SUSLO is in, in the cryptanaly~~sis~~tic effort, it carried with it the interest of being stationed in London, a delightful city,

and the opportunity of considerable travel from there, at times when travel would be appropriate, to the continent. The keenness of the competition for this assignment was quite evident each time that a new appointment was to be made. In a few cases it resulted in the individual who accepted this assignment, or was given the assignment, actually making it a terminal assignment in his career with the Agency to be followed soon afterward by retirement.

INTERVIEWER: (S. Snyder) I had the responsibility for a while of a group of new programs and one of the programs that was written while we were still in R&D but was for a PROD problem, operational, at the conclusion of this, we had to know how to classify the worksheets and being destined for PROD, I contacted [redacted] who was the PROD Classification officer then, and Al says I'll call you back on that and let you know. He contacted whoever his boss was, and it reached the technical director of PROD, who happened to be Dr. Sinkov and Abe this time received this request in a form which didn't show where it came from and he looked at it as a computer problem, program classification, and said, "I know I'll call Sam Snyder," and he called me up and said, "Sam, I've got a problem here."

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