



## **Computer Oral History Collection, 1969-1973, 1977**

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**Interviewee:** Grace Murray Hopper (1906-1992)  
**Interviewers:** Uta C. Merzbach  
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MERZBACH:

Would you perhaps give me some idea at first since we are starting now with Eckert-Mauchly who some of the people were whom you encountered there?

HOPPER:

Well, I started by looking for jobs because my contract was terminated at Harvard and I went down to that ACM Meeting at Oak Ridge and I had a wild assortment of job offers and that was one of the points at which I visited IBM and saw the flags they decided the morning ceremonies and the songs they sang which was too much for Hopper: I fled. I finally narrowed it down to two offers and that is rather interesting too because one of them... I had had as one of my instructors when I was at Yale graduate school Howard Engstrom and he had gone into the Navy and was during World War II a captain and had been over at the Communications Annex with the computers over there and his administrative assistant was Cdr. Norris (who is now the president of CBC) and when I had gone into the Navy I had thought I was going to his section because my training in algebraic number theory would have led straight into the work in coding and decoding. One of the job offers was from Howard Engstrom in St. Paul to go to Engineering Research Associates and the other one that I was seriously considering was... I had been sent down by Harvard to visit the ENIAC and had at that time met Mauchly and seen him at intervals up at Harvard and so on since, and then he asked me to consider and I met him and Betty Holberton in New York one evening and had breakfast at his house and we talked about it and then I came down to Philadelphia and they were then at the Old Broad Street building and saw their computer and everything. The thing that finally tipped my decision was the fact that they had BINAC running and UNIVAC I was well underway and would be running within a year whereas it look as though the work out at St. Paul was going to be quite a bit longer the computer was further away I wouldn't be able to actually code and run problems on it. I wouldn't be able to do anything with it for some time and then it was finally tipped of course. Those were professional decisions... The other was Philadelphia was much nearer home and my family had lived there so that's what swung the decision to go to Philadelphia. Of course, we all ended up with the same company in the long run anyway because eventually Remington Rand bought both of them which is rather interesting. So that the two first people that I had known of Eckert-Mauchly were John Mauchly and Betty Holberton. I had seen John quite a bit over the years from the time ENIAC first ran in '46 on, up at Harvard. I did not get down to ENIAC until just before I got out in '46 and I'd seen John Mauchly before that. I had seen

ENIAC when it was still at the Moore School in the University of Pennsylvania, and had gotten to know him and figured he was the kind of person I would enjoy working for which again influenced both of my possible choices.

MERZBACH:

What do you mean by that when you say the kind of person you'd enjoy working for? What were you seeing that you thought you might...

HOPPER:

Well, he was looking ahead. He was seeing much more than just running a computer and doing some interpolation and solving partial differential equations. He was envisioning much larger problems which hadn't even been stated yet. I mean going into all that whether prediction and everything at that time—people were even laughing at him. They thought it was a pretty wild idea, you see. They weren't even attempting to define the larger problems that he say—the computer was going to make possible the solution of them—that's a beautiful sentence. But anyway he did see that the computer was going to make possible the solution of much greater problems than anybody had attempted to solve before. All the matrix work; oh, whole areas which nobody had even attempted even to state in physical terms to define the functions for them or anything. He visualized it. The power this computer was going to make it possible to do those things and that we should get busy defining those problems. He was looking way ahead. And then in the business area, even though he was a college professor, he was visualizing the use of these computers in the business and industrial area, the things that they would be able to do. That things would expand beyond the ability of human beings to handle them just as I suppose some of the people at Bell Labs were already working on the direct distance dialing because they knew they wouldn't have enough girls to run it; well, he was visualizing that things were going to grow and that there were all kinds of studies he was thinking of that could be made. You used to keep a payroll file but you didn't know anything about your personnel and he could envision the fact that you could have personnel files and begin to know the quality and kinds and so on and know things about people and everything too. So, he was very definitely looking ahead and much more so than the St. Paul group was. They were looking almost entirely to the solution, not only of the coding and the cryptographic problems but to the commander control and to navigation and that area, but defense-oriented, if you will, because the missiles were in it by then. By '46 everybody was beginning to worry about them real hard. And they were swinging more toward that direction whereas Mauchly's whole vision, if you will, I'm not even sure he would've called it that, but he was thinking way ahead in the possible use of the computers in everything. I think that if you brought up any area of science, be it oceanography or medicine and he would promptly come up with some way a computer could be used. He saw much more of the future of the computer than just as a scientific tool for the solution of mathematical problems. I think that's what was exciting. On top of that he was a very delightful person to be with and fun to work with. He was just as

excited about it as you were and he was right in the thick of it and thoroughly enjoying it and what I'd call a real good boss. I've always had a queer feeling that you shouldn't take a job unless you can learn and grow in that job. Because if you take on where you're not going to learn and grow where you're going—to give out all the time, you are wasting your capital and not replacing it. Whereas if you take a job where you can both do and use what you have already learned and learn more then you're continuing to build your capital. And certainly Eckert-Mauchly showed that opportunity for increasing your own capital as well as contributing to the company. And then of course they were building one of the...the computers were aimed for the Navy, and Army, and Air Force which I was still interested in seeing that they got the best possible, even though St. Paul was totally Navy but at that time pretty much still totally Navy.

MERZBACH:

To get back...you mentioned Betty Holberton; when did you first meet her?

HOPPER:

I don't know. I think she was up at Harvard once. We've never been able to figure out whether I met her at Harvard when she was up there or not. The first time I really remember sitting down and talking to her was that night we met at Ed Berkeley's house and John brought her down and we talked about my coming down to Eckert-Mauchly. And then she was in charge of all the programming at Eckert-Mauchly. So, I was working directly for her. One thing you see, we never had to have at Harvard, and we didn't use flow charts. Because everything was a perfectly simple sequence of operation because it just rode right along that tape. So that the BINAC and UNIVAC I with the ability to modify instructions and loop and everything were brand new to me. And the first thing I had to learn was flow charting and Betty taught me that. I think I brought to you once her first original write-up on what a flow chart should be like and first symbols and everything. Much of that developed is primarily due to Betty's work. She never says it but it is true that she did develop those techniques of flow charting to a very large extent. And she taught me that and gave me little things to program for BINAC and so on and got me on the computer and got me thinking in another dimension because you see the MARK programs had all been linear, and now I had two-dimensional programs to think about so that there was a lot to learn when I first got there, and Betty was terrific.

MERZBACH:

Who else was there?

HOPPER:

Well, go back for a minute to the physical layout. We were out on? Ridge Avenue in a long, narrow plant and it had been a factory. I don't know whether or not I said it before

but on one side was a cemetery and on the other side was a junkyard. And we always said we would push the computer out of one side if it didn't run and we'd jump out the other. As you went in, there was a small hallway and a guard's desk on the first floor and then in back of that was all of the engineering work and engineering research all the way to the back of the plant was a big open thing. And when you went up to the second floor along the front of the building there were one, two, three, four offices which were the only dressed-up offices in the place. In a little area, sort of like an open area and then in back there was a small room for a conference-board room. There were two tiny conference rooms downstairs which we used for classrooms. It was the board room but it was used for distinguished visitors. It had a table and some formal chairs and that was what made it a board room. Then you went through some double doors and BINAC was on the first floor right near the front of the building and as you went through these double doors we were on the right—the programmers were. That was later the area that was taken over by UNIVAC I and we went back on the left about midway through the plant and in front of us was the Williams tube to research. And then in back of was research area and through the rest of the plant we almost never got back there. There was an elevator that ran once in a while, not often, one ladies room which was very inadequate. Their floor was wood which had had grease and oil spilled on it for years from the machinery that had been there previously. The air we had was nothing but bare beams. We used to hang mobiles and plaster all kinds of signs on it like the one; Don't think... let UNIVAC do it, which was a doctored-up IBM sign. We had loads of all those things started there. But that first area where we were right inside the door, there weren't very many of us: there was Betty Holberton and I had suggested before I got down there, Mauchly had been in touch with me to try and find programmers and I had suggested Hugh Livingston to him and Hugh Livingston had been one of the enlisted operators on MARK I and had gotten out of the Navy and went down to Mauchly and he was there for quite a while; he eventually went to Burroughs and ran their very first computer and is now out at Burroughs, Paoli. Then there was Art Katz; he eventually left Eckert-Mauchly and went with RCA, I believe, and he's still with RCA. I'm trying to think of that other gal's name. There's one whose name I can't think of at the moment and then there was Marge Lee. Marge had been one of the group with Betty who had done the computing for Aberdeen in Philadelphia and had come with Eckert-Mauchly and she's still with UNIVAC. She was one of the brightest programmers there ever were. She would take time off enough to have a member of the family and come back to work again—an extremely attractive woman and she became the instructor and hostess. She could just handle people like nothing human; she was terrific, very very good-looking and she is still with UNIVAC in the systems programming group. I guess she had been there six months or 8 months before I joined them, because I think she is due to get her twenty-year pin any minute now or just got it or something, but she was there. And it was not long after that that...oh, dear, now I've got another name I've got to think of. I'd better bring over my telephone book and my Christmas card list. Art Gehring was partially logical designer. He was a programmer to begin with and then shifted over to logical design so he was the one who always went...The reason he shifted to logical design was when we were trying to find out what the programming steps would do for instance we found the fact that if you subtracted an

instruction from zero and it happened to be an add instruction it turned into a bring instruction. If an "A" was in the first character and you subtracted it turned into a "B" and you found that all the letters would jump dually. We found that out by hitting a bug one day. Consequently, we found that we needed someone who could read the logical diagrams quickly and easily. And very quickly Art Gehring turned out to be the one, of the programmers, who could read those darned Warning diagrams with some facility. And we kept going after him for it—what'll happen if I do this? Because there is nothing...programmers never accept... If we just accepted the instruction code and lived with it life would have been perfectly simple. Programmers, never do that. They always want to experiment. And so, Art was very busy doing that and he eventually shifted to logical design and still is in logical design at UNIVAC.

Dr. M

That...I think there was a question...How much interaction was there at the time among the various groups, the programming group and...?

Dr. H

A great deal because Mauchly, I think, as far as I could tell and I did get there a little bit later. The basic design of the logic of the computer and the instructions of the computer...oh, I know the instructions; the instruction code was the work of Mauchly and Holberton. The logic of the computer was Mauchly: not the detail necessarily, but the structure, the way it worked, the instruction code, the computer, the heart of it. The engineering, implementation of it was Eckert—the fast circuits, the mercury memory making it work, the tape units, all those things that were new with UNIVAC I was Eckert. So, that it was concept with Mauchly who was managing to make those things into reality and new concepts such as the tape, the fast tape units were Eckert and there were not 500 people in that building. I think maybe there weren't more than 300 when I got there—probably around 300—and we knew everybody in the building. And we regularly talked to the people in engineering who were building it because we wanted to know when we'd get...for instance, we started running with only one...only a couple of the tanks in the memory working and we'd have to go to ask so and so how many tanks we had today before we would find out whether we could run something. We knew all those people. It was a good deal of cross-mixing. And, quite a few of the people who were among those early first programmers like young Hobbs who's now chairman of the computer group and others like him started as half-programmers, half-engineers and then shifted to engineering and did programming still. Because you see he was one of the ones who worked on the beginning of the short code and then went over into engineering, permanently. A1 Tonic? was in that group. A1 Tonic was a programmer for a time and then went over into engineering and many of those early programmers went over into engineering via logical design because when they first had those instruction codes to work with you had to know the logic back of them. Nobody knew enough about anything. You had to know all of it. I could analyze that add instruction right down to the

last ending pulse and you almost had to know that to know what was going to happen when you gave a certain instruction. They were quite different from the instructions we have now which are pretty well locked up and do just exactly as they say they will and nothing more or less and there is no possible variation. There were ways into these things and ways of fooling some of the tables and the computer and so on so that we were always playing tricks. Of those early programmers, Hobbs and oh dear, there's one other whose name I will remember who is still at UNIVAC and A1 Tonic all went from programming into engineering. There's quite a group of that first group of programmers that went over and became essentially logical design. Before then there hadn't really been a separate logical design section, you see. The engineers had designed with Mauchly beating over their heads to make it do what he wanted it to do. There hadn't been an actual separate section I wouldn't say.

Dr. M

How did Eckert...

Dr. H

Eckert ran all of the laboratories that were developing all of the...by the time I got there they were already working on the Williams' tubes, and he ran the work on the tape units and all of the forward-looking work. The first work on the corps.

Dr. M

What I was wondering was when he beat the engineers over the head, how much beating of Eckert...

Dr. H

No. Eckert. The engineers we were beating over the head were the ones who had taken over at the production level, who were actually building the UNIVAC I. Whereas, Eckert was more in the future even then. In other words, the design of UNIVAC I, the components that we were going to use the circuits, the speed of the circuits and everything had been settled by the time I got there. So that Eckert was moving on toward what would come next and he had another group of engineers which were building on the basis of what he had already said would work. They were first though. But, he was already content that they were going to work. This of course was another point when those people from NBS came down and they'd question whether something was going to work or not and in Eckert's mind it was all settled, which produced some dissension at times. To question whether those tape units were going to work or not as far as Eckert was concerned was a silly question—of course they were going to work—he'd settled it though not quite perhaps a flippant as that, but he was sure that they were going to work. He'd done enough experimental and research for it to be assured that this was going to

work and he was moving toward the things out of which the next computers would be built. Now of course. see '49, it wasn't very long after that, a year, when Mr. Strauz was killed and everything became very uneasy. But when I was first there the drive was to build those first three computers. And they were already talking to Metropolitan and Prudential. I guess not Metropolitan yet...Prudential and A. C. Nielson and GE. But, Prudential and Nielson first, over and beyond the first three. But they were beginning to talk to industry. Eckert's crew of engineers were much more, even then...and even though they did come and work on and check on the stuff for UNIVAC I were really thinking ahead to the next future computers. He was already...even before the tape units for UNIVAC I were finished, he had the specs for the next set of tape units, master tape units.

Dr. M

What I've been trying to get at in my question was the question of how much interest in his planning also the planning for the future how closely did he involve himself with the suggestions from the other man?

Dr. H

Well, they were channeled as far as Pres was concerned, they were channeled through Mauchly, you see, very much so. Pres did not spend much time with people; I don't think he talks as easily to people as Mauchly does and I think that developments weren't...Our suggestions and stuff went through Mauchly. In the early days they were Mauchly's...that is the suggestions from programmers at that time I would say came only from Mauchly and Holberton. The rest of us didn't know enough, we didn't have enough experience, we weren't far enough along. We might once in a while have a wild idea but they were pretty minor and pretty wild, often, and so it was mostly of Mauchly talking to Eckert, and Betty talked to him because they'd been together such a long time. But, the rest of us—we didn't bother Pres. We'd argue among ourselves and if we thought it was good enough maybe we'd go over to Mauchly's desk. You see he had a front office but he spent most of his time at a desk right in with us...desk at the end where we were down this way. There was a very close relationship though between Eckert and Mauchly and Bob Shaw, who was doing a great deal of the engineering under Eckert. Lou Wilson was beginning to come up. He was building the typewriter—unitypers; the tape typewriter outfits. Jim (I'm going to have to...I should have looked on back and looked over some of those names before I came in here), was getting ready to take over charge of running the building of the computers and then Eckert would move back and do research entirely. Because it was getting too big. It was getting to be a management job and Eckert doesn't really enjoy that. He'd rather run a research laboratory and do the experimental work—not do the managing of building an office shop computer. We were getting near the time when he would in fact move into research and leave the actual development to Jim. (I can't remember his name right now but I'll remember it eventually). I'll have to get that list

because there are many that I could comment on but the names are all tangled up in my mind; I need to recall them.

MERZBACH:

To get back...you started to tell of your start. Could you recall some specific example of the first thing...?

HOPPER:

The first coding? Well, we were doing two things at that time. The BINAC was still there. We were programming and running it—running problems on it while we had it and that was primarily in the first June, July and August that first part of the time I was there was programming for BINAC. Also, we were programming since the codes were almost identical, we were programming for UNIVAC. We were getting ready for UNIVAC I and then transliterating by hand into BINAC code and checking them out. Because you see we needed sets of subroutines like we needed floating decimal packages; we needed sine packages; cosine packages; all kinds of things like that for UNIVAC. We needed programs which would run on UNIVAC. So that a good part of some of what we did at any rate was designed eventually to run on UNIVAC and what we did we used the BINAC to check them out. That is I'd write in the C-10 code a subroutine to compute the sine and I'd transliterate it into BINAC code and check it out on BINAC so that we would have something ready to run when we got UNIVAC running. I did program and run the Laplace...the solution of the Laplace equation and I got completely fascinated with that and even made drawings of the shapes I got out of it. I'm thinking of a stretched membrane; it was different pressures applied on it and what would the shape be.

Betty did a great deal of work. She checked out on BINAC for instance all the interlock difficulties for sorting the tapes on the UNIVAC. All her study of interlock and of timing so that tapes on UNIVAC I would read both forward and backward. And there was a question of how you scheduled the tapes, if you will—how you handled it to get the timing for the interlocks and she did all of that work on the BINAC. So that actually the first time a computer was used to design a computer I guess was when we did use BINAC to give us a great deal of information about the design for UNIVAC, particularly about the software.

MERZBACH:

One question; you just mentioned using C-10 code. Now earlier you told me that this was...

HOPPER:

By the time I got there it was C-10 code.

MERZBACH:

So that the preliminary in those stages had passed?

HOPPER:

On the whole the A and B part of the alphabet. You will have to ask Betty about those. She is the one that can answer questions about them. So that when I first got there I was learning to make flow charts; I did program that Laplace; the solution of partial differential equation and then I was working on these subroutines only we didn't call them that. I've forgotten what we did call them. They were a sine. sine program, I think is what we said. We didn't have the word routine yet. But we were going to compute sines and cosine's into various accuracies and using floating decimals and not, and these little packages we kept making. And it is fairly early there...No, I guess it's not until '52 or '3, I can't remember right off, I put the date on that. that I did that job on extended insurance for Prudential. I've forgotten where that came in but that's not until after we get UNIVAC. That's later. That's when we get UNIVAC I...actually get it. Now the early work on BINAC was the solution of those partial differential equations that I did and the subroutines and then Betty was doing, as I say, the studies for interlock, quite a lot of other studies in this question of updating files and handling files and how many units you put them on and so on because there was going to be ten tape units on UNIVAC I and these had never been on anything...on the control, the computer so there were very large questions of how you use them. Betty did a terrific job and she wrote a two-volume basic text on sorting and sorting techniques for tape machines and you should... She's got a copy of it. My copy got stolen some point, so you'll have to get hold the Betty's and Xerox it by all means.

Marge? Legg was putting together...Oh, what's the famous book of tables—tables of logs and trigonometric functions—Barrow. Marge Legg was programming what we call Barrow's tables. You let somebody type a number in and it gave you back its sq. root, and a cube root, and a square and a cube and a sine or cosine or something. And this was just to show that the computer could compute. You invited people to type a number in and it gave back—printed out right across Barrow's tables. That was for demonstration purposes.

MERZBACH:

What kind of people came to...?

HOPPER:

Lots and lots of government people because, of course, the NBS was there with great regularity. So were the people from Army maps and the Air Force those who were going to get those first computers. The groups of government officials, admirals and generals

who were still going around and looking at hardware of all kinds. We saw a lot of generals and admirals come in, and industry was beginning to come—these committees—looking into it for management and vice presidents and what have you. Some times even presidents of companies came in groups of three to give to see BINAC run and later to see UNIVAC run and to see demonstrations of their ability to do things. Everybody got there one way or another, I guess. And, we did have certain demonstrations ready. Also, Betty had already started work with some assistance from, I guess, Art Katz and Hugh Livingston worked with her at least partially, and Betty Bartlett, in building test routines. There was a routine on BINAC known as "old faithful" which could be relied upon to find out if anything was going wrong in the computer. It read diagonal numbers through the memory and checked out the various other functions of BINAC. And, then that got re-written into "new old faithful" for UNIVAC. And some of the work on that was done on BINAC, the preparatory work for it. The engineers had asked for some way of checking out the machine and Betty had started to write little routines and then she gradually built them into a system. But, she had been working on...those were her responsibility also; all those test routines for BINAC and UNIVAC. We also prepared some problems on BINAC for the opening demonstration of UNIVAC because we had a chance to at least partially check them out before it was taken away from us. And, then there were some of them that were working on classified programming on BINAC and this was on the problem for Norfolk but I never knew anything about any of that...outside of my bailiwick. The really productive work that I was my own Laplace equation and Betty's of the design of the sorting techniques for Univac I.

MERZBACH:

In your own work, were there particular problems, difficulties that you recall that bothered you and that you felt needed to be...?

HOPPER:

No, no. After coming from MARK I, I slipped into UNIVAC I like duck soup. I felt as if I'd acquired all of the freedom and all of the pleasures of the world; the instruction code was beautiful. And, of course, to this day if you add in an index register and build me a UNIVAC I with an index register out of integrated circuits, I'd buy it over almost anything else. That was an amazing instruction code; you can do anything you want to with it, and it had a tremendous advantage over all the other machines at that time and I think if it were still possible that alpha-decimal code was duck soup to write. Remember everybody else was using? octal to write binary code and this puts a barrier...I don't care what anybody says we had to use the octal on BINAC and until you can get to the decimal, the alpha decimal...see we wrote in octal; we wrote in alpha octal—alpha for the instruction and octal for the storage locations. But before we put it into the machines, we transcribed that alpha into two digits, two octal digits. And, we were still awful close to the machine and when we moved to UNIVAC I coding where the alpha character was

the code, was the operation code, and where we had decimal storage locations, ah, it was heaven. It was all the difference in the world. I think that was one reason at first why we went straight to compilers instead of going to assembly because we already had alpha-decimal code which is all that assembly did for most of the octal machine, you see. Because, they did not have that alpha-decimal code that we had; they had octal. So the step was to put in the alpha character and the decimal locations. But we already had that so we made the step first to compiler and then backed up and made assemblers. We would not have gone quite as naturally, I don't think in the direction of assembler because we already had an alpha-decimal code; we were working it which makes a big difference. And, that code to this day, of course, maybe it's true that your first computer is the one you'll always remember the code and...not quite because you see the MARK I code I very quickly lost; I can still remember it but any desire to use it went certainly when I got into the Univac I code and its logic and its ability to use it. For its time, it was awfully far ahead. It had buffers, remember. While you were transferring one ? block to memory you could read another in from tape and/or you could read and give an instruction to read from tape and go ahead and compute while that was being read in from tape and then transfer it to memory later. That had buffers both on the input and output so that all of that thinking was possible that you could read the tapes backwards all that thinking was possible. The "T" and "Q" instructions—whereas in the 701 which came a couple of years later you had to subtract two quantities and then check against zero and decide whether you are greater than equal to a less than zero in this difference. In Univac I you had an actual test—if "A" is greater than "B" go to, and you had an equals, if "A" is equal to "B" go to. So that you had a much more flexible... You didn't have to subtract two quantities and everything you could just toss them between two registers and compare them. And, the flexibility of that code was really fantastic. And, the ability to read forward and backwards—the buffers—it was an outstanding code, and it made the coding very easy. So that to this day, I swear, I tend to write any program I write whether it's in COBAL or anything else, I think in my mind it probably goes on in UNIVAC I code. Because it contained the basic essential operations of running a computer. So far as needing and wanting things until the word came from England, and the concept of index register appeared we were very happy. But of course we were just writing our loops and counting to do the indexing.

MERZBACH:

And when did the word come?

HOPPER:

You mean on index registers? Well, it got into MARK II, I mean UNIVAC II in a way in that you could add to memory. There were three of them in the 701 in 1953. I think the word began to come from England probably in about '51, just about as we were sending the first UNIVACS out and MIT was already to try it out. Maybe I should stop for a minute and (go to the...)

MERZBACH:

Pick up on the things that we forgot...

HOPPER:

Yes, the thing that I forgot at Harvard was the fact that Aiken had put in for and I had been awarded the Naval Ordnance Development Award for work on programming MARK I and on the development on MARK II so that was the first time that I was given an award for computers.

MERZBACH:

Also, I suspect...Had there been any women before you who received that or do you know?

HOPPER:

No, I don't think so. There may have been during World War II, but then I don't know who they were, if there were. No, that was a sort of a first.

MERZBACH:

And perhaps you might like to mention what you just told me about the people who were taking an interest in BINAC.

HOPPER:

Yes, IBM was beginning to show some interest then. Although it didn't really come until after Mr. Strauz died and the company went up for sale. But there were some IBM people at that first BINAC demonstration not at IBM, but because they were interested. They had latched on to this new development of computers and they already were...and of course they had been interested in MARK I you see. And even though Watson himself didn't think it was going anywhere there were people at IBM who did, and Dr. Samuel, some of those people did come down to the BINAC demonstrations and did take an interest in it.

MERZBACH:

One other thing...we should probably get on with...

HOPPER:

They had started work I think on the so-called "Defense" computer by the time BINAC was running which was the 701 later.

MERZBACH:

You mentioned Mr. Strauz earlier on the tape. Did he take an active interest in the...?

HOPPER:

Oh, yes. He was head of ? Totalized of course. And he had not only put up the money for Eckert and Mauchly to get started but he took a very active interest in it. He came and visited us; he looked at programs; he found out what we were doing; he delved into the engineering; he was very actively interested and so was the man whose name I cannot remember who was his general manager, and those were the two that were killed you see in that airplane accident. But they had been very closely interested not just in the financial side but in the developmental side. He very definitely saw the possible future of the computers and he was actively interested in selling them and in telling industry about them. He was quite a man. We all liked him very much.

MERZBACH:

Well, I guess I should let you go...