

An Interview with
ISAAC L. AUERBACH

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Conducted by Bruce H. Bruemmer

on

2-3 October 1992

Narberth, PA

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Center for the History of Information Processing
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Abstract

Auerbach begins by discussing friction between himself and J. Presper Eckert and his reasons for leaving Eckert-Mauchly Computer Corporation. He recounts the circumstances leading to his employment from 1949-1957 with the Burroughs Corporation, his relations with Irven Travis, who headed the computer department at Burroughs, and the formation of the Burroughs Research Laboratory. He describes a number of projects he managed at Burroughs, including computer equipment for the SAGE project, BEAM I computer, the Intercontinental Ballistic Missile System, a magnetic core encryption communications system, and a missile guidance computer used for the Atlas missile. Auerbach comments on his management of the Defense, Space and Special Products Division, the general management of Burroughs, and his decision to leave the company.

Auerbach outline the establishment of Auerbach Electronics (later Auerbach Associates), one of the first computer consulting firms, and describes his initial contacts with RCA (for the BMEWS system), Honeywell, Leeds and Northrup, and Hot Shoppes (Marriott). He describes the growth of the company and other ventures such as Standard Computer Corporation (computer leasing), International Systems (data processing system for parimutuel betting developed with George Skakel of Great Lakes Carbon Corporation), and Auerbach Publishers, a successful venture that became known for its computer product reviews. He describes his concern with military and government contracts, the sale of Auerbach Associates in 1976 to the Calculon Corporation, and his subsequent consulting activity. He concludes with a discussion of his work with the International Federation for Information Processing, the American Federation of Information Processing Societies, and his philanthropic work primarily in the Philadelphia

area and Israel.

ISAAC AUERBACH INTERVIEW

DATE: 2-3 October 1992

INTERVIEWER: Bruce Bruemmer

LOCATION: NARBERTH, PA

BRUEMMER: Let's start in on the Burroughs Research Lab. Was that its formal name?

AUERBACH: Burroughs Research Center. Let me go back and give you my perception about the lab with Irvin Travis as its director. At the end of the war, Irv Travis, who had been in the Navy, returned to the Moore School where Gris Brainerd had been primarily responsible for the R & D projects there, particularly the ENIAC computer. When Travis came back there was a reshuffling at the Moore School and I believe (I'm not 100% certain of this) Travis then became the director of R & D of Moore School activities.

BRUEMMER: This is 1946?

AUERBACH: 1946, 45-46. I'm not certain what Travis was doing during the Navy. I believe he was in fire control someplace. John Coleman, who was then the chairman of Burroughs, was looking for a consultant to advise Burroughs on their entry into the electronic computer business. Having heard what was going on down at the Moore School, he employed Irv Travis as his consultant. That went on until 1949.

BRUEMMER: Do you know how their paths crossed initially?

AUERBACH: I do not. Coleman was a leader and a visionary. Formerly a salesman, then in marketing, the man had vision, and good vision and good leadership. He convinced Travis to leave the Moore School to establish the Burroughs Research Center. One of Travis' conditions was that it be centered in Philadelphia where he felt he could acquire skilled people from the University of Pennsylvania, from Princeton, from the area where computer activity was going on, and that was approved.

BRUEMMER: Do you think he did that because he felt comfortable with the area or he really felt there was the base of expertise here?

AUERBACH: He was very comfortable with the area, having spent most of his life here. In addition, there was RCA and, by 1949, there was a lot of bubbling activity in the area. Travis set up his offices in an office building in downtown Philadelphia. I will not go into the schism that existed between Travis, Eckert and Mauchly, or why Eckert and Mauchly eventually left the Moore School -- it was a travesty, a big mistake and a pity. I had been working with Eckert and Mauchly from approximately May of 1947 and I believe some place I have recorded that there was a falling out on a personal basis between me and Eckert because I agreed with John Mauchly on a couple of occasions. Even though I worked for Eckert directly, Eckert thought that I was being very disloyal to him and started to treat me in a rather shabby manner, so I left the company.

BRUEMMER: You also said that you didn't see any business acumen on the part of either Eckert or Mauchly.

AUERBACH: Well, let's talk about both business acumen, leadership, and managerial style. Neither Eckert or Mauchly in my opinion were competent managers, competent leaders, or competent executives, or understood business at all. They were visionaries, and they were brilliant technically, and they would not let somebody else run the side of the company in which they were inept. The result was that over a period of years they had to sell out more and more of the company until they wound up with basically nothing. It's a pity. There are examples where people understand their engineering brilliance, take a position as chairman or some other position, but let somebody else be the CEO and run the company. When that doesn't happen, companies have serious trouble. Eckert and Mauchly lacked skill in dealing with people. These deficiencies were so profound that they and the company never fully succeeded in achieving what it could have achieved. For example, Control Data, which started roughly at the same time, had Bill Norris, who was somebody who understood management, leadership, and vision. When he was at Univac, and ERA, he learned how to manage and that is as direct an answer to your question as I can give you.

BRUEMMER: How old were you when you left Eckert and Mauchly?

AUERBACH: In 1949 I was 28. I had a major position in the company. I was handling all of the manufacturing of the product. I was also doing research and developing all the electronics for the memory, handled all the technicians, etc. So I was maybe the number three man in the company at the time.

BRUEMMER: In hindsight it's easy to say that Eckert and Mauchly didn't have business acumen. If you could project your thoughts to the time when you were 28, would that have been your response?

AUERBACH: Oh, yes.

BRUEMMER: It was clear to you that they were driving it . . .

AUERBACH: Well, they also brought Jim Weiner in. Jim came with a big reputation and was immediately made chief engineer. Jim was a competent engineer but he was a "yes" man, and no matter what Eckert said, Jim Weiner said "yes". Things got a little awkward when the man who's vice-president, is running the company, says something and his chief engineer *always* said "yes". The rest of us had difficulty because we didn't always agree. But Weiner would *never* confront Eckert with an issue.

BRUEMMER: Then you must have been fairly confident that you'd find a position. Did you have something lined up or . . .

AUERBACH: Well, I spent a few months with a company called Electronic Tube Corporation building cathode ray tubes. I was then told by a friend that Travis was setting this up at Burroughs and I went in to see him. I was the third person that Travis hired into what was to become the Burroughs Research Center.

BRUEMMER: That implies that you were not happy at the tube company.

AUERBACH: Oh no, that was a fiasco. In addition I loved what I had been doing in computers and I found Electronic Tube duller than dishwater.

BRUEMMER: And that was a six-month period, or . . .

AUERBACH: Oh, maximum.

BRUEMMER: Did you know Travis was building a laboratory?

AUERBACH: Yes, he was going to establish a laboratory in this area to develop computers for Burroughs.

BRUEMMER: You walked in the door, the third person?

AUERBACH: I went in for an interview and was hired almost immediately.

BRUEMMER: And did he let you know at that point what he expected the lab to become? How was it presented to you?

AUERBACH: It was not clear. He was trying to recruit people, primarily, and there was no clear mission for the laboratory at that time.

BRUEMMER: So he was just fishing for people, in other words. Who else did he hire?

AUERBACH: Joe Chedaker.

BRUEMMER: Another ENIAC person?

AUERBACH: Another ENIAC guy -- very good. A couple of other people from the University. I don't remember some of the early people that were there.

[INTERRUPTION]

AUERBACH: It's interesting that we moved into the space that Eckert and Mauchly vacated when they moved to 19th and Allegheny.

BRUEMMER: Nice symbolism. Alright, you were hired on the spot. What did you do the next day? What was your position?

AUERBACH: Research engineer. Very, very shortly after I was hired, an attorney from Eckert and Mauchly appeared in Irv Travis' office to remind him that I had signed a covenant that any inventions that I might make during the first year after I had left Eckert and Mauchly belonged to Eckert and Mauchly, and not to the company for which I was working. That put certain constraints on what I could do, and Travis and I agreed that I start looking at issues that had to do with printing. I was using the patent files at the Franklin Institute and did a lot of work there for about a month, digging through some very esoteric ideas has to how to put marks on paper. Among them was "smoke printing" which was a revolutionary idea for large, multi-color presses in which you used electrodes or electricity to attract charged ink to paper. Fascinating idea considering the period. In the course of that work I stumbled across a patent that had to do with xerography that was being developed at the Battelle Memorial Institute. I read extensively on that subject and was given permission to go out and visit them. I came back, reported to Travis. By that time he had one of his associates -- I'm not sure what Clarke Dilks' role was -- but the three of us went out to visit the work

that was being done on xerography at Battelle.

BRUEMMER: Was this before Rank Xerox in the United Kingdom came out with their big check printer?

AUERBACH: This was 1949-50. So it was pretty early. The project was in need of money. Battelle was looking for funds and I came back with the recommendation that Burroughs fund this research and get in line to commercialize this project. I was conceiving of a new way of high-speed printing using this technology, which eventually came into being. They came out and they looked at it and they were grossly unimpressed with the technology . . .

BRUEMMER: They, being whom?

AUERBACH: Travis and Dilks. They did not see it as a copying machine, did not see it as a printing device, and basically turned down the opportunity to invest in supporting the R & D. That was one of the earliest things that I did while I was at Burroughs. After the kibosh was put on that, I then stumbled across some magnetic material that was developed in Germany that had a square loop characteristic and wrote and got detailed data on it. Eventually I was able to buy some of the material, gave a contract to a small company over in Camden, NJ who wound this ribbon on little ceramic spools with alumina as insulation between the wraps to produce a magnetic core. By that time my problems with Eckert and Mauchly had finished and I spent the next couple of years developing magnetic core devices. During this period, as I said, Travis hired a group of very bright young engineers, among them was T. C. Chen, George Hoberg, Harry Kinoshian, Saul Kochinsky, Herman Epstein -- very strong-willed, bright, very young, engineers. He then -- I guess it was the June of 1950 class -- hired a group of graduates from Penn, MIT, and other colleges and basically assigned them to us here.

BRUEMMER: Were they seasoned engineers or fresh out of school?

AUERBACH: No, Hoberg came from the Whirlwind project, as did Kinoshian. Kochinsky came from in the tube

business somewhere. They were more experienced, about the same level of experience as I had, maybe. All of us in late `20s, early `30s at most, by 1950.

BRUEMMER: Did anything else become of your printer research?

AUERBACH: No. Much later Herman Epstein was working for me developing some printing technology -- jet printing -- that should have become a Burroughs product. They didn't know how to handle some of their tigers.

BRUEMMER: Want to elaborate?

AUERBACH: Yes. When you have a group of very ambitious, late 20-year-olds, highly educated -- almost all of us had at least masters degrees -- with some experience, you've got to treat them with kid gloves and learn how to deal with them in a manner that encourages them, excites them, and gives them freedom -- then you get some damn good stuff out of them. IBM is a classic example during that period. Unfortunately if you look back, most of the people that I'm talking about left Burroughs either immediately before I did in 1956 or very shortly after I did in 1957. As far as I'm concerned, that shouldn't have happened. Burroughs had a gold mine in us kids. By that time we were in our early 30s. We were running operations and activities, and I'm not saying they should have given us our head, but should have rewarded us in some ways to keep us in the company. IBM during that same period was very heavily rewarding some of their bright young tigers and giving them all kinds of perks that kept them in the company. You rarely heard during that period of the bright young guys who were developing the 701s or the other electronic computers, ever leaving IBM. Almost all of them left Burroughs for other positions, and somebody has to take credit, or discredit, for that.

BRUEMMER: And I assume it was not just an issue of compensation.

AUERBACH: Yes it was.

BRUEMMER: It was?

AUERBACH: Oh, yes. We were all undercompensated. I'd be happy to address that for you. I was grossly undercompensated by the time I left Burroughs. I had been promised stock options, I'd been promised bonuses, I'd been promised increases in salaries, and none of these came through. Year after year these promises Travis made to me were hollow promises, not fulfilled. I did not leave because of money -- money never drove me, but that was a total lack of recognition. These are the things that eventually made me say, "Why am I working for them so hard?" And the rest of the guys had the same attitude. It was not just me because every one that I mentioned left.

BRUEMMER: Was Travis aware of this? I mean was he caught in a bind or was he one of the problems?

AUERBACH: Oh, he allegedly said he was caught in a bind. I don't really think he went to bat for us and said, "Look, I've done a comparative study of salaries at Remington Rand and at IBM, and here's the kind of salaries these guys are earning and the kind of perks that they're getting." I don't think he ever went to bat for us. I remember very distinctly I wanted to hire Eugene Amdahl. I'd interviewed Amdahl, convinced Amdahl to come to work for us and Travis thought his salary demands were too high. I wanted to hire a mathematician who would have earned more than I was earning. I was not allowed to do that. That was not the appropriate thing to do. It wouldn't have bothered me because I certainly couldn't handle the problem that I was asking this mathematician to solve for me. But we never hired him. Yes, we ran into roadblocks like this, and he never broke the Gordian knot. Whether it came down from Detroit, which I think was highly likely, or of his own invention, I don't know.

BRUEMMER: Did they ever use contracted or sub-contracted expertise at that time?

AUERBACH: For what?

BRUEMMER: For computer technical research?

AUERBACH: I believe, if my memory serves me well, we had a small contract that I had with SRI. I used outside consultants that I hired from time to time. I can give you a classic example if you'd like. This occurred in the '50s when we were getting involved in two major projects: the Lincoln Laboratory's Air Defense System and then the ICBM program. I had been invited to go out and meet the director of the Willow Run Research Center of the University of Michigan, who was then Harry Goode. I was very impressed with Goode and came back and said I wanted to hire him as a consultant to help us. A week or so went by and the Purchasing Department called to advise that they found other consultants that they could hire for a lot less money. I went into Travis' office and said, "What's going on here? I wanted to hire a man who is eminent in his field and who is director of a major research center and your purchasing people come back and they think they're buying wire, they're going to buy something cheaper for me." I said, "Look, Irv, I have no objections their buying wire if they can get it cheaper somewhere else. I'm talking about a consultant, and if I don't have the right to do that, what kind of decision rights do I have?" Well, he straightened that out and I was able to hire Harry Goode as a consultant. But that was not atypical. I mean, purchasing, personnel -- the staff people had major decision-making rights.

BRUEMMER: Do you believe that the compensation was equitable with other firms when you started?

AUERBACH: Yes.

BRUEMMER: And it slowly fell behind.

AUERBACH: It did not keep up, rather than fell behind.

BRUEMMER: Let's go back. You were working on memory. Where is the move to the research lab at this time?

AUERBACH: During my early work in magnetics we were at Broad and Spring Garden street, occupied a number of floors there. We ran out of space so they rented a floor or two for the "Research Division" which was at 13th and Spring Garden streets. When I ran out of space, they rented an old parking garage which we renovated at the corner of 12th and Vine. So we were basically at three locations . . .

TAPE 1/SIDE 2

AUERBACH: Travis pretty much unilaterally made the decision that he was going to relocate the Research Lab near the Paoli train station because it would be easy for people to commute to work, missing the opportunity to put the facility at the intersection of what was to become the Schukill Expressway coming out into the King of Prussia area, where GE eventually put their laboratories. With the help of others, Travis basically designed the research laboratory. I was the first occupant of it during the period when it was still had a mud rather than paved parking lot. The biggest problem I had was that the laboratory was built with small cubicle rooms. At that time I was designing and building a pretty large piece of equipment. And I said "I don't want those walls -- can't do it. The walls have got to come down." It was a hassle and I said "Look, Irv, if you want to put the walls up, you may. Before I move in, I'm telling you, I'm taking the walls down." Believe it or not, they put the walls up and I had to take the walls down. These were ceiling-high partitions. It was a very fancy laboratory primarily designed as rooms a little bit larger than [my present office] with wiring under the floor. It was a beautiful facility on Route 30. The Burroughs Research Center had a handsome building, a lovely cafeteria, really first class. Certainly within a year or less we ran out of space. We then rented a group of connected buildings about two miles away where I was able to build rather large pieces of equipment. Then it became obvious that we still didn't have space so the Great Valley Laboratory was built primarily for my activity. I eventually moved into the Great Valley Laboratory for Burroughs and I ran that until I left in 1957.

BRUEMMER: Do you have any insight in how Travis sold to the corporation the idea of a research lab beyond just the need for more space?

AUERBACH: Yes. Travis was a good salesman; very believable, very sincere, certainly very honest. John Coleman really supported Travis very strongly in what we were trying to do. Now there was a lot of other activities going on. I had one small group. There was a whole research division that was very active. There was a whole group of people who were developing add-ons to the Sensimatic. There were groups of people who were making a lot of other electro-mechanical devices. Hoberg was building Testrac, which they eventually made a copy of and sent out to Wayne University. There were a lot of other activities going on. My activities just were of a larger scale and grew at a phenomenal rate. By the time I left, of the five divisions that reported to Travis, my division was larger than the other four combined. In addition I supported maybe an additional 1,000 people, a total of 1,800 people who were basically dependent on what my division was doing. I was not responsible for all of them because somebody else was responsible for manufacturing stuff, and running environmental tests equipment, and things like that. A service division.

BRUEMMER: One of the pitfalls that you traditionally see in the mainframe industry, especially in the 1950s, is the inability of executives to really shovel in enough cash to make a computer effort worthwhile. A classic example I think is General Electric, where they never really decided one way or another whether they were really going to be a computer company. Your comment about compensation later on and the scenario of Travis obtaining a rather nice research facility, your increasing your share of the pie in terms of research development, your increasing *needs* for more funds, might indicate that Travis was a little shy to keep going with his hand out to the main corporation. Is there any basis in fact in that assumption?

AUERBACH: Yes. Let me spin a couple of stories that substantiate it before I draw conclusions for you. I indicated earlier that I was working on magnetic core devices. Hoberg was building Testrac; I don't know whether you ever saw these units that mounted on the 19" racks that were about 3-1/2" high -- one was a flip-flop, and one was a driver, and one was a this -and-that, etc. He needed a shift register to make the system work, and I had been visiting Harvard and saw what T. C. Chen and An Wang were doing in development of a shift register up there. They were

also using magnetic cores. They were using selenium rectifiers to make the system work. I had by then some experience with selenium rectifiers and knew that they were very sensitive to humidity and the back resistance of them would change dramatically with humidity. So I used germanium rectifiers which were sealed. I actually finished the shift register that I was designing that went into Tetrac before they made their magnetic shift register work. They always had trouble with it because Aiken wanted a *cheap* solution and germanium was too expensive. At the time he was right, but unfortunately mine worked and theirs had difficulty. So we had finished that and I had then went on to develop magnetic logic using these cores, designing an adder, AND devices, OR devices, and all kinds of devices using magnetic core technology. When National Security Agency heard what I was doing (the name National Security Agency during that period was a no-no. It was the Department of Defense), they sent a couple of senior people up to see what we were up to. I was invited down to meet with some of their people, and Burroughs was awarded a contract to develop a device for them, which I then did. I would rank it among the most successful engineering projects that I ever did for which I could get no public credit. This was an encrypting and decrypting device with no transistors but all magnetic devices except for, I think, four vacuum tubes that were the driving circuits. Burroughs went into production on these products and manufactured them for a number of years. It may have been the longer single lifetime of an encrypting/decrypting device that NSA ever had in the field. Extraordinarily reliable, I mean, nothing failed. I recall one incident when they had a problem in North Africa and couldn't fix it, and they flew a technician over and they found out that somebody had forgotten to plug in something into it. I mean it was a phenomenally successful engineering product for them.

I had also designed a product called BEAM I (Burroughs Electronic Adding Machine), a computer. An honest-to-God computer, I guess, and when it was all finished about the size of this table. At that point in time, Burroughs went out and acquired control of [ElectroData]. It was very interesting that before they acquired the company, the then president of the company was trying to recruit me. We spent a whole day up in Princeton, he describing what they were building. I asked, "Why should I come to work for you; my product is already on the floor, Burroughs is going to bring this out before your product is ever going to hit the street. There's no point in my even thinking of coming to work for you people." The job was as chief engineer of that company and I said no. Much to my amazement,

Burroughs acquired [ElectroData] and gave them the responsibility of designing the machine that was on paper when mine was three-quarters finished in hardware. I think it was during that period I became very, very disillusioned with Burroughs' use of the research center to develop products. By that time they had acquired Control Instrument Company and now [ElectroData], and our role was becoming a little fuzzy.

BRUEMMER: And contradictory.

AUERBACH: Very. So personally I was wondering, you know, what I am doing here. The goal was to develop a product and bring it to market and the only way that I was able to do that was through the government. During a cocktail soiree up in New York, I got to talking in a rather personal and confidential basis with the then vice president of finance, and he sensed that I was not terribly happy. I told him why and said that we had the opportunity to go into some other businesses. Was I interested in the military business? Well, not particularly, but I said we could learn a lot. The government is going to pay for R & D and at least I will have the satisfaction of designing and building things that are going to be used and not just canned because somebody's going to go and pick something from somebody else. His response was, "If you can do that, I'll back you financially." I guess at that time Burroughs was having a problem with one of its projects with the Signal Corps that Travis was involved with up at Fort Monmouth. He asked me to go down and look at it and give him my assessment of this project and how they could get it finished. I guess it was during that exercise I developed a particular technique of scheduling projects using a 36" role of graph paper and taking each line and drawing what had to be done against a time schedule. I was developing all kinds of symbols and before I knew it I was creating Gant charts on how to finish this project and make it work. I showed it to Travis, and he asked if I would take it up and show it to the Signal Corps, which I then did. The way we displayed it was to just tack it up on the door and roll it over the door as this one large, long sheet of graph paper with all these projects laid out. All I can say is they must have been very impressed because shortly after I got back to Paoli I was advised that, "Isaac, take over the project and go do it." So that was a second project for the Department of Defense with which I was involved.

A third was another project that had to do with some communications that we had also developed. The next big project was with Lincoln Laboratories for the SAGE system. IBM was going to develop the mainframe and what they had learned was that if incoming planes dropped a lot of chaff, the memory of the mainframe overloaded and couldn't handle it. So what they basically needed was a front-end filter to decide what was chaff and what was a plane by some rather classical logical techniques. The design of the system had been done primarily by Irving Reed. Irving Reed, by the way, came from the old Northrop group to the group that spun off from them -- Computer Research Corporation with Floyd Steele and a couple of others. Then he came to Lincoln Labs. He designed this system mathematically. We then were given these designs and said go build this equipment, and that was one of the big projects that I had. We not only built the equipment using vacuum tube, but when it went into production it became a rather significant chunk of Burroughs activity for awhile. So these were the kinds of projects, and they were followed by getting involved in the ICBM project, which I think we ought to talk about separately. I don't think I answered the question that you asked (laughs).

BRUEMMER: Which was initially, was the company throwing enough resources to really make a go at this?

AUERBACH: I had bowed out of the commercial end of Burroughs by the end of 1953, basically washing my hands of all of its activities. I participated in only one commercial project and that was the design of a computer called then BEAM IV. Hoberg was going to run that project with a joint design effort from a number of us, and then he took over and that project never saw the light of day. They certainly built a big enough showroom to show everybody what this gorgeous new machine was going to look like in the research center right off the lobby. It was a beautiful facility for this thing, but it never got beyond that room.

BRUEMMER: That implies mismanagement of more than resources, or resource allocation.

AUERBACH: Yes ...

BRUEMMER: And is Travis the culprit in that scenario?

AUERBACH: Travis thought he was very tightly wired in to the upper echelon of the top management of the company. A number of us used to have executive suite type discussions. It was our opinion at the time that he was nowhere near as wired in as he thought he was. Decisions were taken and he was told about those that directly impacted what was going on at the research center. For example, we needed a facility to build the equipment that I had finished for SAGE for the National Security Agency. I said "Gee, Irv, if we want to buy a production facility why don't you get one within an hour's driving time of Paoli -- it's easy to go out there and make sure we know what the hell we are doing." A phone call comes on his desk -- I happened to be sitting in the office at the time -- to advise Travis that they just bought the Tireman plant and all this electronic production was going to go into the Tireman plant in Detroit. I said, "How in the hell am I going to get that done. You're being unreasonable." He had no input into that decision as far as I know. A manufacturing executive decided that was where he wanted the plant and that was it. The result was that we hadn't finished the design while we were constructing it and we literally had to ship guys out who walked around and checked to make sure we were doing the necessary corrections while we were designing and building equipment simultaneously. A very, very unsatisfactory way of dealing with that. Many, many years later they bought a plant in Downingtown where they did their manufacturing, where it should have been to begin with. It would have saved a lot of grief.

BRUEMMER: Do you think Travis had a significant hand in some of the acquisitions? We've talked about Control Instrument, we haven't mentioned ElectroData yet.

AUERBACH: He may have had with Control Instrument, I don't know. I was not that close to the seat of power to give you an assessment of that. I don't know.

BRUEMMER: You said you started with a division of five.

AUERBACH: Travis had five divisions reporting to him.

BRUEMMER: Yours was . . .

AUERBACH: Special Projects Division. We eventually became the Space Defense and Special Projects Group, which is what it became known as, as I was leaving.

BRUEMMER: And development R & D for commercial systems for Burroughs wasn't necessarily vested under Travis. I assume there was some activity beyond the research lab.

AUERBACH: Well, we then had [ElectroData] which was developing equipment. I cannot tell you what was being done at Control Instrument Company, but something was going on there.

BRUEMMER: But those reported to Travis, did they not, or they were separate entities?

AUERBACH: No, Bradburn, who was then the head of [ElectroData], reported to the vice-president of engineering, which was not Travis. I did a project for him to build the control system for a printer using transistors. I was doing the most transistor work in the company.

BRUEMMER: What was really right about this set-up? First of all, they got a lot of good, decent engineers on board quickly. There were some ends they produced in terms of products for defense use . . .

AUERBACH: . . . Sensimatic . . .

BRUEMMER: How did this set-up differ from the other corporation's research and development, and apart from the compensation issue, did it compare favorably? Was Burroughs on the right track in spite of some things, or did the

company just participate in the same problems that all the others were experiencing?

AUERBACH: It could have been on the right track. I'm not personally convinced that the senior executives or the board bought into the whole process to the extent that they could or should have to have been successful, but that was not atypical. I mean, Eckert and Mauchly at Remington Rand had the same problem. They blew their lead magnificently. I told you I thought that Coleman had tremendous vision and leadership. He was succeeded by Ray Eppert. All of these men came out of the marketing department of Burroughs -- electro-mechanical devices, banking, etc. Eppert may have been a very good executive; I never was impressed with his vision. The next guy that came along was McDonald. McDonald was a very strong leader -- by this time I had left the company -- I was consulting for them so I got to know these people very personally. He was a very forceful, very strong leader, very dominant and with great vision and an uncanny understanding of technology. During that period Chuck Exley was actually his chief financial officer, and I was *very* involved with a *very* major thing with him. As far as I was concerned, Exley was the heir apparent, very clearly. Instead, he picked Mirabito to be his president. Mirabito was an outstanding accountant, excellent contracts manager, and a good manager, but no vision. That was, I think, one of the major stepping stones that Burroughs took that led to their decline. I have a lot of regard and respect for Mirabito, but he didn't have the material to be chairman of that company. Then they brought Ray Stromback along. Ray was one of Travis' boys who came through the research laboratory, went out and ran a plant. Again, a very good executive, went to London for a year to study, came back and they made him I think initially first vice-president of planning and then president of the company.

TAPE 2/SIDE 1

BRUEMMER: We were talking about Burroughs executives.

AUERBACH: Well, I have a basic philosophy that to run a major corporation you have to be a leader, and the question is what are the qualities of leadership? To me, one of the most critical qualities is vision. Where would you

like to see this company five-ten-fifteen years from now, and how are you going to get from where you are to there? And second, the ability to understand and organize and structure the company so that you can fulfill the strategy that you have developed. Then you have to have excellent judgment so that you make right decisions, and second you have to be able to make decisions and enforce them and to make them work. You have to be able to delegate and hold people accountable, but they have to have full responsibility for doing whatever it is that they're trying to do. These to me are the qualities of leadership, and if you lack them and you put somebody at the top of a major corporation that doesn't have some of these and they stay there for a number of years, you can falter pretty badly, particularly in an industry that is moving as rapidly as the computer industry has moved over the years. You can't say, "Well, I'll get around to that." This industry does not tolerate laggards.

BRUEMMER: That would imply though, at least in the computer industry, that the more diversified a company was the greater handicap. More diversification might benefit from a bean counter as opposed to somebody with leadership. That's why a William Norris could take a small group of Control Data and fashion it as he did. That's also probably why Control Data faltered so miserably in the '80s is because they had become something without a mission -- or the bosses' leadership differed from everybody else's, or the bosses' direction differed from everybody else's.

AUERBACH: In addition to which there's another criterion that I impose on being at the top of a company. If the individual has the capability of leading a company and he has a mission and a goal and strategy and he's going to go do it, he ought to be able to accomplish this somewhere between eight and twelve years. If he hasn't accomplished it in twelve years, the odds are he's not going to, and second, if he just stays in office beyond that he tends to rest on the oars and the boat starts to drift off course. We have seen this in many, many cases where it doesn't make any difference whether it's in industry or in universities or in charities, you get complacent. You can't be complacent in a fast moving, highly competitive industry.

BRUEMMER: Given the statement about leadership, you have a company like Burroughs which fit in the mold of a

business equipment company moving into computers. How well do you think its leadership identified the company as a general-purpose computer maker as opposed to their main strength in the banking world?

AUERBACH: Burroughs was predominately an electro-mechanical purveyor of equipment to business and banking. Electronics was a tail that never really got into the mainstream until pretty late as far as the company was concerned, but I think McDonald did a reasonable transition to making it the main focus of the company. I think he more than Eppert. McDonald had one mistake as far as I was concerned. He was so strong that his successor was never groomed in the organization, and when he had one like Exley, he didn't put him in the slot where he should have put him in. Exley left and went to NCR and became the chairman of that company. Exley was bright, very bright. At some point I will have to tell you how I got involved with all of these guys.

BRUEMMER: Exley, NCR and . . .

AUERBACH: The whole . . . all those people . . . I mean that was after I left Burroughs. So let's finish with Burroughs.

BRUEMMER: Let me throw a quote back at you where in the earlier interview you suggested that one of Travis' major roles was to refashion marketing and sales to be able to deal with electronic machines. Can you comment on that?

AUERBACH: Travis saw his role as repopulating the company with bright, competent, knowledgeable engineers and other people who understood the future as to where we were going. That's what his goal was. Whether it was a George Baird or a Ray Stromback or a number of others that rose into senior positions in the company. They came all out of the laboratory, and he felt that was one of the major roles that he was going to fulfill for the company -- repopulate the future leadership of the company. As I said, he lost too many of his extremely capable tigers and was left with all these guys who came from the electro-mechanical equipment that they designed. Very few, in fact none,

came from the electronics side.

BRUEMMER: And the business of refashioning marketing, is that a misstatement on my part?

AUERBACH: I wouldn't have said marketing. He just wanted to repopulate the whole upper tiers of the company.

BRUEMMER: For someone in essentially R & D, especially where there's other commercial development going on in the company, I wouldn't think there would be much of crossing over with marketing reps, although that's typically where companies fell down.

AUERBACH: I don't know whether Travis aspired to do a great deal in marketing. I think what he really wanted to do was to move from vice-president of R & D to president of the company. At one time he moved his family to Detroit, which you may or may not be aware of, and continued running the research laboratory by coming back to Paoli a couple days a week. He had his offices in Detroit in the main sanctuary. His goal was to demonstrate that he had the stuff that was necessary to become the next president.

BRUEMMER: Do you know if he was given an opportunity to act that out?

AUERBACH: I doubt it. Not strong enough.

BRUEMMER: Well, from the photos of all the board pictures, it almost appears as if he is treated as you might treat the token academician that you put on a corporate board.

AUERBACH: Precisely. Now let me relate my personal experiences with Travis. I have to thank him and give him credit. When I got involved with all this military stuff, this was not Travis' interest -- literally, absolutely, categorically of little interest to him. He was interested in the commercial product, the Nixie tubes, the Sensimatics,

the Beam products, etc., etc. I then was moved down in my activity to the Great Valley Laboratory. He wanted me very much to move my personal office onto the executive row and I refused. I said I can't run a company or an activity sitting in an ivory tower. I'm a dirty hands engineer. I want to work down where the engineers are and I know what's going on every day, and so I stayed down at Great Valley Laboratory. Irv Travis came to visit the Great Valley Laboratory on two occasions in the four years that I ran it. One, to bring John Coleman through the laboratory to show them what we had done, and secondly by about '56, when I was saying that "Travis said" or that "Travis decided," a lot of the members of my staff were saying "Come on, Isaac, who's this Travis guy? I think you just invented him." And so I literally wrote Travis a formal invitation to come and visit us. When he came to the gate with his badge, which was the appropriate color to let him in, the guards didn't recognize him and refused to let him in. I had to go out to the gate to permit him to come through, and that was the second time that he ever came to visit my laboratories. He literally left me alone. I mean, I ran this operation. I ran the contract side of it with Paul Mirabito. Travis' interest in what we were doing was minimal.

I guess there was one other occasion that was embarrassing. When the ICBM project was just aborning and we had been awarded a contract to develop the guidance system, they called a super meeting down at the Pentagon of officers of the corporations to hear the Secretary of Defense and the Chief of Staff to tell these executives how important this project was and they had better really put their back to the wheel and get this thing done. The only people who knew what I was doing was me and my boss, who was then Travis. I think I was the only non-corporate officer in this room who was invited to the Pentagon. When we got there they had a security desk and the only way you could get into the room was by personal identification. Well, a number of people knew who I was because I had been involved. Nobody knew Travis and he stood outside for almost an hour until a few people from other companies came along and identified who he was. You talk about embarrassment.

BRUEMMER: Was he so laissez faire with regard to commercial development?

AUERBACH: No, not at all.

BRUEMMER: And how would he interject . . .

AUERBACH: I don't know. I literally divorced myself from the rest of the activity because I felt, aside from the electro-mechanical equipment, electronic stuff was not coming out of the laboratory and going into production and getting into the field. It was coming out somewhere else. By then, ElectroData, but the stuff that we manufactured that was electronic that came out of the lab was all military stuff that I designed. I was responsible for overseeing the design.

BRUEMMER: How would you critique your management style during those years?

AUERBACH: Good question. You have to understand I was 31, 32, 33 years old and would go out to Ramo - Wooldridge and other places where guys were in their `40s and `50s who were there. I looked very young. I was "the kid". On a number of occasions people used to say, "Fine, please introduce me to your father." [Laughs] I mean, "I want to meet the guys running this place." My style of management was a major delegator, hold people accountable, and support them. I mean, I would fight, literally roll up my sleeves and get involved to support my managers if we were having trouble with other parts of the company. I used to say, and I still believe, if subordinates don't want an executive at the top, they can do him in very, very quickly. They don't mind making fools of them and showing them how silly they are. So my attitude always was, the only reason I'm running this laboratory with 400 engineers and 1,800 people was that the people want me to run it, and any time the people didn't want me to run it I would have been done in. On that subject, I sold my consulting company in `76 and my publishing company in `81. The companies have just held their second reunion and 80-some people showed up who formerly worked for Auerbach companies with fabulous stories as to what they were doing and achieved, and I was presented with a plaque. That describes my style of management. I guess the other concept that I could leave you with is, while I may have owned a majority of shares in this company and was the President and CEO of the company, I worked for the employees of the company. There was nothing that they were doing that I was not willing to help. I took a deep

interest in how the warehouse and shipping activity went on. None of my other vice-presidents ever went back there to see what was going on. Come on guys, that's a critical part of the company. I mean, I was interested in every facet of what was going on all over the company, and another style of management by just wandering about. Always walked around and saw what was going on and knew what was going on. My only regret was that I did not have access to the ladies' room, because in the men's room I learned more damn things by standing next to a guy and saying "how are things going" and I would get an earful. That was the style.

BRUEMMER: Where did you pick up these skills?

AUERBACH: God knows . . .

BRUEMMER: For a 32-year old to run a facility like that . . .

AUERBACH: I read extensively in all of the management journals during that period. I had stumbled across the idea of a matrix organization in a journal. At the time I think there may have been three matrix organizations in the United States. One was at RCA. I went over there and sat down with somebody and said "tell me how you run this kind of an organization, it's fascinating." I came back to Burroughs and installed one over Travis' violent objection.

BRUEMMER: Why?

AUERBACH: He liked hierarchical structure, and the argument was won very simply. I said, "Irv, when John Coleman told you to go out and build the research laboratory, you had told me that you had the freedom to organize and do this any way you wanted. You are now asking me to go build this division and run all these projects. All I'm asking you for is the same freedom that Coleman gave you. That's all. Let me go do it the way I think I can run it. If I fail, fire me, but let me go run it." And he had to admit that that was a pretty strong position.

BRUEMMER: Can you be critical of your style at Burroughs? Were there some things you would have changed?

AUERBACH: We made a couple of technical decisions that I should have made differently a year or so before I did, in hindsight. I was certainly very happy with the managers that reported to me. I doubt that I would have made any changes there.

BRUEMMER: Picking up on that point, how does someone who develops in terms of doing technical research leave that aside and manage a company?

AUERBACH: From the time I was in college I was always interested in management and organizing. So from that time on I was always involved in organization and management, whether it was a philanthropy, or a small activity, or things like that. And I got good at it.

BRUEMMER: Where did some of your minions go after Burroughs? You said a good number of them left.

AUERBACH: Well, most of these guys initially were parallel to me. Hoberg went with a company out in the main line that he was involved with for a number of years. Herman Epstein left and went with Gillette. Each of these guys all left and ran significant operations. Some successfully, some I haven't heard from. They could have become a hard core around which Burroughs could have built a much more successful company than they did. But tigers . . . tigers don't like to be chained. Tigers have to be allowed to make mistakes, and you hold them accountable but you can't chain them down and expect them to do wonders for you. My success at Burroughs was my boss didn't give a damn about me and what I was doing, so I had the freedom to organize, to develop, to change, to promote, all of this with almost no interference. I mean, I was basically running my own independent company within Burroughs. It was that much freedom I had. Unbelievable, I mean, for a 33, 34, 35-year old guy. I went out to the West Coast monthly and represented the corporation, making commitments as to what we were going to do.

BRUEMMER: Now, Pasadena came in after you left?

AUERBACH: No.

BRUEMMER: Any observations on melding with those people?

AUERBACH: No. I had very, very little contact with them. You have to understand that I've just described the cocoon in which I operated which was pretty much independent of the commercial end of the business. The Pasadena group was commercial. Travis and Bradburn met frequently. I got to know Bradburn. Bradburn came through my laboratory and asked what we were doing, as I indicated that we were doing the most advanced work with transistors in the company. We negotiated a contract where I built the control system for a printer for him. Aside from that I had no contact with them. I think I visited their facility once when I was out in the area. I really did not get involved.

BRUEMMER: Any other comments on some of the projects that you pursued? You mentioned your magnetic one . . .

AUERBACH: No, this was encrypting/decrypting equipment, which was very significant. I think that the ICBM was a major engineering achievement, the guidance system for that. By comparison I think that the project and product we developed for SAGE was mundane, routine, not terribly exciting vacuum tube technology. There were three achievements at Burroughs. The work in magnetic cores and the logic technology, eventually the development of this encryption/decryption equipment, and the ICBM transistorized computer. I would say technically they were the three stars in my achievements at Burroughs. Not that the others were not good products -- they were, but only those three advanced the state of the art.

BRUEMMER: Now in '56 I assume you were getting fairly dissatisfied with things at Burroughs?

AUERBACH: When Travis gave me the job to run this division, I gave him my word on two things: First, he never had to raise the question where I was going to be for the next three years, and second, any project that I started I would finish. Travis literally sat across the desk from me one day when I had a phone call from Philco asking me if I wanted to come out and be interviewed to be the chief engineer. And I said, "I'm very sorry but I'm very happy where I am. I'm really not interested in wasting your time or my time coming out, but I appreciate your phone call." That was it. I mean, I meant exactly what I said when I took this job. I guess what started the wheels spinning in my head was that on Thanksgiving Day of 1956 I had a phone call from Bernie Gordon who was then with Ebsco. Bernie wanted me to come up and be executive vice-president for his company. I said, "I can't come up to see you, Bernie, I'm too busy," He said "I'll fly down to see you," which he did. I said, "Well, if I have to go up there and work that hard for you, let me think this thing through." I then decided I was not willing to go work for Bernie Gordon and stayed at Burroughs. In the winter months, I guess it was somewhere like February, I was invited by . . .

TAPE 2/SIDE 2

BRUEMMER: . . . five or six of your senior executives . . .

AUERBACH: . . . to one of their homes and they advised me that they were thinking seriously of spinning off and setting up a company and asked if I would I like to join them. I said I'd have to think about it. They said, "Look, we want you to run it, be in charge." I said, "I'll think about it." So during that spring I did a lot of thinking and decided that it looked like something worthwhile. By May, my mind was pretty well made up that I was going to leave Burroughs and go set up a company. I would ask some, but not all, of the people who invited me to join them for an evening to join this new company. I guess in June I went in to see Travis and told him that I had made a decision to leave the company, that my plans were to go start up a new company, and that at the time I had no obligations. We did not own a paper clip, did not have stationery, did not have a name, had nothing, but I wanted to make it clear that I wanted to do this and he and I should agree on a date when I could leave the company comfortably for him, I said,

"Irv, as far as I'm concerned you have any time in the next six months to pick a date as to when you want me to leave. But it's your choice. I have all these things yet to finish. I gave you my word I would finish them before I left and I will do that." He picked the date some time in August and I said "fine." He then selected someone to replace me, and I went into his office and said, "You can't do that. My staff won't work for him. They just do not respect him at all so before you announce that one, don't do it. Go find somebody else." He then selected a colleague of his who I guess was consulting or working part time for the company, a much, much older man to replace me. I said, "Well, at least they'll respect him. I mean, technically they can't fault him." He then came in and said "Fine, I'd like you to leave in two weeks." And I said "Hold the phone." I told Travis I had these projects to finish. I can't get them done in two weeks. I said, "I will rush them through as quickly as I can. I have negotiation for a contract that I think you want and no one else is as qualified to finish this job. Let me finish it." These other things that I promised I would finish, I did.

BRUEMMER: So he gave you the full time?

AUERBACH: No, I left some time in July.

BRUEMMER: Amiably?

AUERBACH: Oh, yes. The day I left Travis invited me to his home for cocktails and as I was leaving the front door of his home he gave me the second and finest compliment that I think I had ever received from him. He said, "You know, you and I are very strong willed people and we have argued on a number of occasions on issues. I want you to know that of all of the people I have working for me, you were by far the best. You are the one person when I have rendered a decision, I know that you will carry out exactly what it is I decided was to be done, and you're a fabulous soldier and I want to thank you for all you've done." I almost fell over [laughs].

[BREAK]

AUERBACH: An anecdotal story that I think may be of interest. I headed up this special projects division for Burroughs and was designing and building and even had a little production line going because the guys in Detroit screwed up in manufacturing this magnetic device. My manufacturing manager said he didn't want to use a large printed circuit board so he broke the thing down into a lot of small boards and it didn't work. I had all kinds of problems with ground currents and I laid it out and made it work on the big board. NSA then decided to hell with Detroit; you set up a production line right outside of Paoli and you make us some because we need some. This was what I had been working on up to here -- that project and the SAGE project. Along comes a request for bid for the guidance computer for the ICBM and I told my boss my plate's full, is there anybody else in the company that wants to bid this job. So they sent it up to Control Instrument who agreed that they were going to bid the job, and they wanted to come down and talk to me. The talk became taking up residence in my lab and before I knew it my boss said "Isaac, you better prepare this prop." I said "Okay, Irv, if we prepare the prop my understanding is that if we win, the project goes to Brooklyn. I've got my hands full. I don't need any more." Proposal prepared, time to make a presentation. Who's the natural guy to make the presentation? Me. I go out to Los Angeles to Ramo-Wooldridge. The presentations are being given in a church that they had acquired, strung with double barbed wire, Marine guards standing duty out in the street around this church, and we had to stand up on the altar to make the presentations. They had asked for a triplex computer to do this job to insure that if any one of the computers failed, two would work and you would have voting rights -- that's the way you insure a higher reliability. I took the position that a triplex computer was going to cost roughly four times as many transistors as a simplex computer to do the job, and I bid a simplex computer. So I went out and made my presentation, even came up with an extremely novel way to handle errors. I never published this information because I always felt it was too classified -- but it's long since gone. If you were dealing with analog devices in space and you're going to move gimbals to cause the missile to take on different attitudes and directions, you do it in an analog mode. There were no such things as a step function, and therefore I analyzed what the maximum rate of change a gimbal could have. Anything outside of that range would be considered a mistake or spurious signals. So I designed a system that compared the signals that the computer was generating, and they had to fall within this tolerance. If they're not, just chuck them out and go to the next number. Great idea. It

should be used a lot more in real-time work, and this is what I proposed. I finished, and Colonel Burlingame (who then became the General in charge of this whole program) then asked why didn't I bid the triplex computer that they had requested. And I said because I thought it was a mistake. The way to do this was simplex, and here was a solution to the problem. Well, he'd like to talk about that and I said, "Fine. Get who is responsible for conceiving of the triplex computer, put him up here and let the two of us discuss the issue and you guys can make a decision as to what you want to do, because quite frankly I think triplex is not the thing to do." My solution was a cleaner solution.

I think it was Pete Bowles who was responsible for conceiving the idea. It took them a while before they were willing to identify who was responsible for this idea, because nobody "challenged" the Air Force as to who wrote the specifications. You never point out that the specifications are wrong, you don't do that. So I stood up there and literally hassled with him and other technical people and said "Look, gentlemen, here is what quite frankly we believe and this is the way we think you ought to go." They conceded that maybe there was merit to my argument. They weren't willing to discard it and they would take it into consideration when they evaluated the bids.

That weekend I went with a group of other people who were sent out by the company, and I was told to return on a Monday morning (this was a Thursday or Friday) to go up to Big Bear. I went with a bunch of guys who were with Northrop and that's where I was exposed to space programs and wind sails -- what the hell is a wind sail -- and all these kinds of wonderful ideas. We discussed these as we walked across Big Bear Lake, which was frozen, not knowing if it was frozen solid enough for all of us to be walking on.

I got back on Monday morning and I was called into the office by Burlingame. I was asked who in the Burroughs organization could they talk with to discuss a contract. They had made their decision over the weekend, and it was Ray Eppert who was then the president of the company (maybe he was chairman of the company by that time). They got him on the phone. Burlingame said, "Mr. Eppert, we have evaluated all the proposals and we are prepared to award a contract to the Burroughs Corporation to design and build this. However, there are certain conditions that we want to impose on this. The condition is that Isaac Auerbach has to head the project." Needless to say, Eppert

was only looking to dollars and said "Of course, no problem." [laughs] That's the way we got the award. I then was on a plane to California every single month, I've forgot on what day of the month. If it was a Monday night we flew overnight to make presentations on Tuesday to report on what we were doing. During the time this was a transistor computer, the first one that was ever used for this space program in a real-time operation. They were very concerned and the radar expert who then became the head of NASA went to Pittsburgh and came back at the head NASA again. He really took me to task about the reliability of this computer and insisted that I have a backup vacuum tube design. And I said "Look guys, you're all competent technically. Do me a favor. Get on an airplane. Come out to Paoli. Look at what the hell we're doing. We will show you we've got all of the basic circuits all done. All we've got to do now is just put them all together in the logical scheme. This will work. This is no problem." They eventually did send some people out, but I had to have five guys separated out to give me a vacuum tube design until they came through and let me build this thing with transistors. That's how building three at Great Valley Laboratory came about. I didn't have any space to build this damn thing [laughs].

So I thought that was an interesting story, and literally I was *the* sole company representative at 33 years old for this whole project. Nobody else was involved. When we made the decision to go with transistors and a particular kind of a circuit, I had a whole auditorium filled with all of our professional people who had been developing alternate schemes that we should use, and I had my two most senior technical people sitting on either side of me -- each was taking copious notes as to what we liked, what we didn't like, asking questions, etc., etc. -- and we were unanimous as to the methodology that we were going to use. We used Philco transistors using circuitry that was developed at Bell Laboratories. It was as far as I was concerned, a solid approach; 90 percent certain that the thing would work. That was a Saturday afternoon. At 8:30 in the morning on Monday my phone rings, Irv Travis wants me to come to his office immediately. I walk in his office and sit down on my standard chair and he said, "I understand you had a meeting on Saturday." I said "Yes" and here was the subject and I said, "By the way, two of your associate directors sat in the rear of the auditorium and listened to the entire proceeding." "Yes, I know. They have reported to me. Didn't you think that a decision of this magnitude should be brought up to me and my associate directors to make?" I said "No. The most competent people in the organization who understand what we were doing were sitting

immediately around me. You guys were staff people, never came down to see what we were doing, and so as far as I'm concerned, no. The most qualified people in the company made this decision. Do you want to go with it or do you want to run the project? If you want to run the project, Irv, believe me I don't need this one. But if you want me to run it, we'll make the technical decisions." That's the last technical decision he and I ever discussed.

BRUEMMER: Was this the first big project using solid state?

AUERBACH: Yes, first ever done by Burroughs and the first in the space program.

BRUEMMER: And the computer was onboard missile guidance?

AUERBACH: Ground.

BRUEMMER: And was this the one that was eventually incorporated into the Mercury?

AUERBACH: I don't think so. This is the one that was displayed at Smithsonian.

BRUEMMER: Yes, that had been in service for a number, a number of years.

AUERBACH: Right.

BRUEMMER: It's reliability was quite nice. Did you have any misgivings about the reliability of the sources for transistors?

AUERBACH: Oh, yes. We had a major problem there. Philco was going to provide the surface barrier transistors. One of the conditions in the contract was that they could not move the laboratory line where they were

manufacturing these until their production line was up running and *we* approved the quality of the transistors coming off the production line. Philco, without talking to us, set up a production line, cut it over without going parallel, and we got a pile of junk coming in.

BRUEMMER: How did you test them? Just normal . . .

AUERBACH: Normal testing. I called Philco and ranted and raved and said, "Look guys, I don't care what you're planning to do. You set that lab line back up again and you run them on that line, and if you have to, you run the entire production line that we want on that line. I'm not whistling. Here's the project, here's the priority, don't screw around with this." And they did. They set the lab line back up. Eventually they cut over to a production line, but only after we were satisfied with the quality of the product that was coming off of it. Very messy, a very messy situation.

BRUEMMER: I remember reading about how they dealt with transistors for the 1604 and basically they'd get a new shipment and throw it into the air until it hit the ceiling and see which one busted after examination. So that period seemed to be . . . well, it's a new technology.

AUERBACH: New technology and surface barrier transistors were very delicate devices. We also had ground current problems, and the first machine that was built was not built in nice packages that you saw at Smithsonian, but built on a single large motherboard where one surface was solid copper and holes etched in and that was my ground plane. And I learned this one because Bell Labs was having terrible ground current problems. That's the way we shipped the first machine. There was a door and you opened the door and there was this one big circuit board.

BRUEMMER: And then eventually the reliability improved with it in terms of production?

AUERBACH: Yes, but the first honest-to-God missile that we flew in space that put men in space was the Atlas

missile, and that was our guidance system, with no failures in it. I just thought this was an interesting story that you should have. That one put me to the test. I will tell you that of all the things I was doing in my career up to that point in time, this one really put me to the test because I was *grilled* every single month by a guy by the name of Dean Dunn who was then the titular head of the project who became literally a father figure to me on this project for quite a while. He would take me in his office afterwards and tell me how well I did and how to deal with certain people on his staff. He supported what we were doing. At the age of 33 I threw a big cocktail party sponsored by the company for all these people to come and meet our staff who were then out there on one of these visits.

BRUEMMER: Since the door is still open, tell me a little bit more about the memory project that you were involved in. What ultimately became of those?

AUERBACH: I developed magnetic core circuitry. I developed the magnetic shift register. Following the shift register we developed logical circuits.

BRUEMMER: Right, but magnetic cores were used where?

AUERBACH: In all of this work. I actually built a supplementary memory for the ENIAC as a part of all these other activities going on to extend the life of that machine, again using this magnetic core memory technology. That was a separate technology, not logic.

BRUEMMER: But that was existing and patented . . .

AUERBACH: No-no-no. Burroughs has patents on that. These were core diode techniques. I was willing to bet the ranch on that kind of a memory. Lincoln Lab was still playing around with magnetic core memories and I had this technique that worked -- more expensive, larger -- but it worked. I'm a very pragmatic engineer.

BRUEMMER: Alright, we're towards the end of Burroughs. You've met with a group of individuals who is interested in starting up a company and you've given notice and you are leaving Burroughs. Tell me what goes on now.

AUERBACH: What went on was that once I had full clearance, a date, and everything was set, I went to look for a place to set up a company. We found a found a building in Narberth, a retired post office that was empty, a shell that was pretty badly dilapidated. We got a good deal on rent. We cleaned it up. We painted it. We built work benches, and we were in business. I was the only employee, unpaid for the first four months. I brought my secretary with me and that was the company. A few other people who agreed to join me came on Saturdays and helped me build benches, and equip the laboratories, and set up the facility.

BRUEMMER: There were other people, other funders, or you were it?

AUERBACH: Anybody who wanted stock in this company had to put up money. The two other people that joined me immediately from Burroughs were Paul Winsor and Arnold Shafritz. They joined in September or October of '57. I had to match their salary, what they were earning, but by that time I had a couple of contracts under my belt. In fact, two.

BRUEMMER: Before we get into those, what was your vision for the company?

AUERBACH: By the end of '56 and the beginning of '57, either people in Detroit or staff people working for Travis felt that they ought to have more input as to what we were doing. One group of people were sent out from Detroit to handle project control, another group was sent out to handle the warehouse, and all of a sudden my costs went through the roof. These were brand new people to us who were imposing rules and regulations with which we had to comply. I think it was before then that Paul Mirabito and I had an argument about who made the decision as to what jobs we bid. Since he had salesmen working for him in the contracts sales department, they felt that they had the right to make these decisions. I pointed out that we had to be comfortable that technologically we could design and

build this stuff that they wanted to bid, so we had to have the right to say yes or no. Well, for a number of months they had the upper hand until we bid a number of jobs and lost them and I just said forget it. We can't continue this way. This is a technologically driven activity and I'm perfectly happy to have all the salesmen working for you, and contracts working for you, and the legal people, but when it came time to decide what we could or couldn't do, the technical people in our division made that decision, not you. If we didn't think we could build something, we were not about ready to bid it. And so why did we leave? We were frustrated. We did not see that the company was willing really to support this activity and let it grow and develop. And I guess we were entrepreneurial.

TAPE 3/SIDE 1

BRUEMMER: We were on the vision for the company.

AUERBACH: The goal was to bring together people that we enjoyed working with, where the final decision as to what we did and didn't do rested with us, where our goal was to accumulate a pension fund that enabled us to borrow from it to send all of our children to college, and work together for the next 25-30 years. The goal was never to be big, the goal was never to be a manufacturing company, we never aspired to become millionaires -- none of these were part of our vision. We also felt very strongly that we would only do those projects that we were interested in. A very elitist attitude. That was the basic goals of the company when we set out.

BRUEMMER: And essentially it was just these three individuals, yourself and the other two.

AUERBACH: There were initially two other guys who were going to come with us and changed their minds . . .

BRUEMMER: Burroughs employees?

AUERBACH: Oh, yes. All of these were people that worked with me at Burroughs. Paul Winsor said he wanted to

retire at 55 -- we said fine. But these were the kinds of conditions -- it was not "make me rich, make me a millionaire, let's go public" -- none of that was in any of our heads.

BRUEMMER: Did you have an expectation for profits for the first year?

AUERBACH: My plan was, God willing, to break even the first year. We actually I think had over \$100,000 profit the first year. The biggest concern that we had during that period was cash flow, and I insisted that our customers put up one-third of the money on any contract when we signed the contract. Aware or not aware, they had to finance the work in progress. We avoided the government like sin. The goal was to stay out of the government and not get involved with cost-plus contracts. I had my fill of that and stayed out of that market.

BRUEMMER: And did anyone blink twice at asking for one-third up front?

AUERBACH: All of my competitors and friends could not believe that I could get this.

BRUEMMER: So it was not a standard agreement at that time.

AUERBACH: No-no-no, very unusual. I personally had no difficulty -- I mean go down the list of companies that did this -- Philco, Leeds and Northrup, Minneapolis-Honeywell's Division of Micro Switch, RCA, American Electronic Laboratories, Sandia Corporation . . .

BRUEMMER: These are not third tier companies.

AUERBACH: No, and I was very up front with them as to why it had to be that way.

BRUEMMER: And you assured the other two a salary for the first year.

AUERBACH: Yes, and we all pitched in \$5,000, \$4,000, \$2,000, \$6,000. We had three outside investors from day one. One was my mentor and two were personal friends who literally wrote checks without ever asking what they were getting for them.

BRUEMMER: Did they do well by their investment?

AUERBACH: Fabulously.

BRUEMMER: Alright, you probably had an eye in your Burroughs work in picking up some of the contracts. First of all, were you constrained at all from . . .

AUERBACH: No constraint. No contract obligations.

BRUEMMER: Tell me about the jobs that you started out with.

AUERBACH: The first contract that we obtained which was in August was to design a magnetic tape inscriber, and that was a device that inscribed computer code directly on magnetic tape, rather than punched tape from a typewriter. In addition it had to be a self-correcting process. We came up with a very, very novel idea where we put the correcting codes basically at the end of data. So if you ran the tape backwards you got the code and then you could check to see if the code data matched from a correcting point-of-view. It was not self correcting, just error detecting. If there was an error, it basically said, "That's a bad block of data, let's move on to the next and do it again." We designed and built such a product for Philco. Philco then decided not to build this equipment and said, "Guys if you want this product its yours." We didn't want it. It was one of the first tough, tough decisions we had to make because our intention was not to go into manufacturing but to design products and have a small royalty paid to us in addition to the design fee. That was a very, very interesting product. In order to manufacture this, we would have

had to change our objectives, build a marketing and manufacturing organization, and go out and raise money. The first thing we became aware of is that we would no longer control the company but somebody else would. We were much too young to try to get financing for something like this. So it was a "heads we lost the company, tails we lost the deal." If we were successful we would not control the company anymore. If we failed we would have blown the entire company. We elected not to pursue that. A company called Mohawk Electric or Mohawk Electronic designed an identical product and that was their first product.

BRUEMMER: Separate from your design -- no connection?

AUERBACH: No connection whatsoever.

BRUEMMER: Did you concern yourself with patenting at the time?

AUERBACH: I don't know whether that device was patented or not. I don't recall. I had a couple of bad experiences with patent lawyers at Burroughs and literally refused to put anything into my notebook that had to do with magnetic core devices, and as far as I was concerned there were three of us who were responsible for developing some of these things through discussions, and give-and-take, and playing around, and all that, and I wanted all three names on the patent. The patent lawyer was adamant, carried on like a stuck pig, that he had to have only the original, whoever conceived of the idea. I said you're going to try to destroy the environment I'm trying to create here by working together as a group. These young guys needed their names on patents every bit as much or more than I, and I don't want my name alone on the patent. Well, "that's the only way we'll file the patent" and so we decided, "Look, if you're going to impose this kind of rule on us I will tell you I have written the last line in my notebook. You'll never find me asking for a patent on anything ever again." That's what I did.

BRUEMMER: You mentioned that you had hoped to recoup a percentage for each design.

AUERBACH: A very, very nominal royalty.

BRUEMMER: Did you write that into contract initially?

AUERBACH: Yes, some of them.

BRUEMMER: And did you ever have to negotiate the basis or . . .

AUERBACH: We never got to the point where it materialized into anything.

BRUEMMER: And to have done that would have insured you of some rights that patenting would have.

AUERBACH: Either patenting or design rights . . .

BRUEMMER: Without having to go through the real hassles. Did you retain legal counsel for the company?

AUERBACH: Oh, absolutely.

BRUEMMER: And then did you stay with the same firm for . . .

AUERBACH: For 25 years.

BRUEMMER: Alright.

AUERBACH: The second contract was with Leeds and Northrup. I had done some work for them at Burroughs, and that project was taken away from me and given to another group to design and build. The other group made dramatic

changes in design from what we wanted to build for them, which was a very simple logging device from information from various transducers -- for example, in a refinery you typed these out on a typewriter -- a very simple logging device. The people at Burroughs who took this project over built all kinds of special gadgets and procedures into the system. It became so unwieldy that they never made it work, and so the project died. When we set up our own company, Leeds and Northrup came to me and said, "Will you do it for us the way you wanted to do it in the first place?" So we designed it and built it for them. It was a data logging and alarming system; if things were out of a particular tolerance an alarm was set off. Nothing about this was very complicated.

Also, I had been working with the Micro Switch Division of Minneapolis -Honeywell and two of their salesmen put me in touch with some of their technical people. In November of '57 we got a contract to consult for them on switches. To the best of my recollection that contract either ran for 11 or 13 years non-stop. We then had another contract from Philco to study high-speed printing systems and recommend what they should do with regards to Philco 2000. We then got a supplementary contract from Micro Switch to design a magnetic one-shot pulse generator. It was a very trivial device. I think the patent is in my name; there is a patent on that. When you press a micro switch, you get bounce on the end of the contact and if you look at the electronic signal you get a lot of bouncing. What they needed was one single pulse to come out of the micro switch. I said, "Gee that's easy to do, guys. I'll give you get a magnetic core device, I will discharge a condenser through the magnetic core, and you'll get one single pulse. We will recharge the condenser and wait for the next time you press the switch." A very successful project. It became the basis of a whole new keyboard line that they developed, and Paul Winsor and I would go out there, I don't know, every two months, to Freeport, Illinois, a crazy place to get to from where we were. You had to fly to Chicago and then there was this little puddle jumper that took us to Freeport and then we had to drive another 45 minutes to the town which was no bigger than a shopping center.

BRUEMMER: Now there you must have gotten a cut of the production.

AUERBACH: No, we didn't. Quite frankly I was very, very happy with the relationship we built there. That project

ran for like 11 or 13 years, either designing and building gadgets for them or keyboards for them, or advising them on all kinds of activity within the company.

BRUEMMER: But you did have a patent on that and must have been licensed to . . .

AUERBACH: Yes. Correct.

BRUEMMER: And was that license renewed annually or . . .

AUERBACH: We didn't get any fee for the patent renewal. They owned the patent rights. They used this device in control boards, not just keyboards, and if you add a control board and you wanted to press a button and get rid of the bounce that occurred on the switch, you put this device in, you pressed the button and you got out. They used it extensively in lots and lots of stuff. Everybody but the Honeywell Division that was in Boston; they were the only ones who didn't adopt it. Lots of other companies bought and used Honeywell micro switch keyboards.

BRUEMMER: At this point with three people in your office you must have been getting pretty down and dirty in terms of these prototype yourselves.

AUERBACH: Oh, we were expanding. We were hiring technicians, and I guess the sixth project was the one that gave us the biggest shot in the arm, and that was in February of '58. We were given the contract to become the consultant to RCA on the BMEWS project and this had to do with systems authorization. There were like five different computers in BMEWS. We were engaged in all five of them, either designing the system on paper, some of which RCA built. One was a contract with IBM, another was a contract with Sylvania. These were all contracts for various computer-like devices that were involved in the BMEWS. The executive vice-president of RCA was rather unhappy when the contract was given to IBM. They thought that they could do this but at that time they did not have the qualifications inside the company. Somewhere about 6 to 9 months into that project a decision was made

that the first computer be vacuum tube, and the second and third computers that were going up to the DEW line had to be transistor. I blew my cork and I said, "no way". The logistics of handling two separate supply lines and technicians to keep these two separate computers going is crazy. I said, "I just finished building a transistorized computer. I promise that I'll go out and I'll find one for you." So after a lengthy hassle with the executives at RCA I was permitted to go out and see if I could find a computer -- a transistor computer -- that would do the job, and that would be the Control Data 1604, which was a machine that would do this job fine -- a transistor machine. It had to be modified a little bit, but it was a machine that would do it.

BRUEMMER: Wasn't RCA producing transistors at this point?

AUERBACH: Oh, yes.

BRUEMMER: Was there a sense that vacuum tubes were more reliable?

AUERBACH: No, they just did not have the technical competence to do this on the time schedule that we wanted, and they admitted that. So I came back to the executives at RCA -- Brainerd Holmes, who then went to Raytheon, and a couple of other senior people -- and said, "Guys, here's a solution. You don't have to stick with the 790 computer from IBM. It's a big vacuum tube kludge and this will do the job." Well, IBM heard about this, flew a private plane down to Philadelphia, took a pile of us -- I was in Paris at the time with IFIP -- took them out to the laboratories at IBM and showed us their STRETCH work and other work that they were doing, and said, "We'll build you a transistor computer." I said it's much easier to have them do that than to cancel the contract and go through a whole hassle. I said, "Yes, we'll let you do that" and that's what became the 7090 computer. I said, "But if you're going to do that, there are certain things that Sylvania is building outside of the computer to make this thing work with BMEWS that you are now going to incorporate inside the computer. We don't need to go to that hassle to have all of that extra stuff," and we helped design the 7090 computer to meet what we thought was required by the BMEWS contract. The next hassle we had with IBM was that the core memory would not operate under the

temperature requirements on the DEW line. I scratched my head and asked where the hell did their engineers come from. I had worked earlier in my career in switch gears and was very accustomed to having things in oil. I said, "Look, take the whole magnetic memory and put it into a case, fill the case with oil, put a heater under it, maintain a temperature of the oil, and your home free." Eventually that's what we did, and if you go look at the machines that were built for the DEW line, their memories are sitting in oil. The ones that were commercial are obviously in air. We expanded our staff very significantly and the first brochure that I showed you . . .

BRUEMMER: Before you get into that, you mentioned that RCA was looking into a 1604 for that project.

AUERBACH: Oh, we did. The problem was the 1604 that I wanted was being built and the biggest headache was one of their . . .

TAPE 3/SIDE 2

BRUEMMER: How did you get your foot in the door at RCA?

AUERBACH: Knocking on doors, walking the halls and introducing myself. By the time I left Burroughs, I had a national reputation. I was at that time chairman of the Philadelphia section of the IRE. So again, I had exposure. Most of these people knew who I was so I had no difficulty getting into see Brainerd Holmes or some of the other senior people on the project.

BRUEMMER: And you had obviously accumulated a lot of information on others' computers.

AUERBACH: I would say that the Burroughs group at that time was among the top five computers systems designers for real-time systems in the world. We never lost a contract if we bid it. With all due regard, this was a *good* staff. I mean really people who were good. I don't know how else to tell you.

BRUEMMER: So you're expanding staff now at this point.

AUERBACH: Well, I had mentioned earlier to you Paul Winsor and Arnold Shafritz. We needed a mathematician so here was our mathematician who did a great deal of work in analyzing re-entry . . .

BRUEMMER: That's Morris Plotkin for the record.

AUERBACH: Right, Morris Plotkin. Harry Goode, who I told you was at Willow Run, became a consultant to us on projects, as did a Morris Rubinoff from Penn, and Charles Estey was on the staff, Ernest Cohen, Bob Dickson (a mathematician -- a very bright mathematician type), administrator Nolan Goldberg -- and this was the beginning of another technical guy very involved in the BMEWS project for years and eventually went to work for us -- Isadore Goldhurst -- John Harris, Jerry Kertzburg, Gene Miller who was with Burroughs. Ken Rose, Harvey Smith, Frank Wycall, Bob Whorf (more commercial than some of the other work we were doing), Fred Wolfe, etc. We were a very competent engineering design group. What year? Oh, the end of '58, beginning of '59. We grew very rapidly. We grew out of the post office. We had to rent space above a bank, rented this space initially in July-August 1957 and by Thanksgiving 1960 we had to move out and move into another facility in Philadelphia.

BRUEMMER: So you were out in Narberth . . .

AUERBACH: Two and a half years.

BRUEMMER: You produced that RCA survey early on in '58 or so. It was an assessment of the computer industry, and I think RCA commissioned it very early on -- something I use *all the time*.

AUERBACH: That could have been as a part of any one of a number of projects. I'm looking for the name of the

project that had to do with STORE/FORWARD equipment that we designed and RCA built. I know we did a survey on that project. We could have done the survey as a part of this BMEWS transistor study that I was telling you about. That would have been in `58-59. You have to appreciate that by the end of `58 we had already logged our 18th sale, that's a year and a half. So we were not letting much grass grow under our feet. The people we were trying to bring into the company were predominately the people we knew. We were not advertising. We gave bonuses to people who were bringing in certain people that we wanted or knew. We built with known entities.

BRUEMMER: So you have about 15 staff and consultants listed in the book here, this would be a year and a half or so into the creation of the company.

AUERBACH: Yes, at least that many. Maybe 20; 15 to 20.

BRUEMMER: And organizing the company pretty much on a project basis.

AUERBACH: Yes.

BRUEMMER: And your management duties, were they changing significantly?

AUERBACH: By that time, very little. I was involved in certain technical projects and decisions that I can enumerate. You have to understand that these were people with whom I had worked for a number of years, 5-6-7 years. Paul Winsor and I had worked together for a long time. When Paul told me something, I knew exactly what it meant and what to do about it. When Arnold Shafritz said something, I didn't have to sit and decide if he knew what he was talking about. Gene Miller was the same, and a lot of these people that came from Burroughs were people who were very well known entities.

BRUEMMER: So you had to keep a minimal amount of tabs on them?

AUERBACH: Correct.

BRUEMMER: Did you have weekly meetings?

AUERBACH: Staff meetings? Yes. You have to understand that during this period starting by October or November we had two work nights where the senior staff and I worked every Tuesday and Thursday night, and we always went to the same Italian restaurant for dinner. We worked Saturdays. So this was not a 40 hour job that we were talking about, these were I would have guessed 60 or more hours a week, and we were all working on this, writing proposals at the same time that we were working on projects.

BRUEMMER: What would be the next straining point for the company in your consideration, or major turning point?

AUERBACH: The one thing that we did not have were financial problems. I brought in a very senior administrator type, Dick Lamb, who became our treasurer. Initially he was a business manager, then became treasurer, then vice president. We watched cash flow like a hawk and it didn't make any difference whether it was RCA, Philco, or Honeywell, or anybody else. This was when checks were due, and we expected them. People lived up to their obligations. So during this entire period we did not have "financial problems." It was very unusual. I should tell you now the company would have grown very much more larger and much faster had I been willing to take on debt. I'm the product of a depression. I don't believe in borrowing money and never borrowed money, and this has been my philosophy. The next crunch point came when we ran out of space in Narberth. We tried to get the town to build a building for us which they wouldn't do. We then went out and tried to get somebody to build a building for us and we bought a piece of land out in Willow Grove. The banks required that we have three-year financial statements. Well, it's pretty tough to have a three-year financial statement if you're only in business two years. Nobody would build for us so we held the land and eventually sold it, and our legal person, Larry Bonnin, found us a six story building at the corner of 17th and Arch streets in Philadelphia. It had a very small footprint, but gave us the room

that we thought we needed at the time. That was 1960. By '63 we had rented space in the adjoining building and filled that up, and by '65 we moved to Broad and Cherry where we wound up with 12,000 square feet on the floor and had options on floors all over the building. I don't remember if we occupied 7 or 9 of the 12 stories in that building.

BRUEMMER: This is not a small business anymore.

AUERBACH: No-no-no. By that time, shortly after '60, when we had a recession, we went out of the hardware design and construction business, and wound up in a publishing business -- the stuff that you're familiar with. In addition we had a couple of other activities on the side. Certainly before 1965, we with two other companies as partners set up the first computer leasing company in the United States.

BRUEMMER: Before you get to that, what led you to get out of the hardware?

AUERBACH: Recession. All these companies were pulling design jobs back into their house. I learned to live through recessions.

BRUEMMER: Was there resistance on the part of some of your engineers? Did many walk?

AUERBACH: Oh, sure. Yes. Technicians as well.

BRUEMMER: But throughout that period you were still doing a number of consulting jobs, just not related to hardware.

AUERBACH: Oh, yes. We built no hardware for RCA at all. Everything we did was paper. The ninth project was for the American Electronic Laboratories. It was an automatic speech articulator in which you could keyboard in numbers and the machine would speak these numbers over a loudspeaker; a train announcing scheduler and things

like that. Another contract was with RCA, Sandia, a memory tester for Philco 2000. We did an interesting job for Hot Shoppes, that was in `58.

BRUEMMER: Was Hot Shoppes under Marriott at that point?

AUERBACH: Marriott owned the Hot Shoppes. It was a Marriott chain. I went to see Mr. Marriott who wanted to build a business auto control system so that his waiters and waitresses did not have to leave their stations to go in and place orders in the kitchen. What he wanted was to have a keyboard device out in the restaurant and little lights would go on telling them when things were ready so that they only came into the kitchen when they had to pick up food to bring it out. The goal was to increase the turnover in a restaurant from maybe 3 to 4 seatings for lunch. That 25% increase in business was basically no additional cost except for food. They were designing and building a device in their warehouse and all we did was to advise and tell them that the way they were designing and building that system would never work. It was either a son or son-in-law, somebody very close to the top of Marriott who was running this project. We were not the most welcome people in the world when we came in with our report to say stop, this damn thing won't work, and if you want to do it here's the appropriate way to do it.

BRUEMMER: Did they . . .

AUERBACH: Yes they did, but we didn't do it, they did it.

BRUEMMER: They adopted your plan?

AUERBACH: Yes. Another very exciting project was with the Teleregister Corporation. They had a contract to build the first seat reservation system for United Airlines. Somebody I knew from RCA went to work for them and we were called in as consultants. We examined their design (Gene Miller was the key guy on this project) and found out that it was a terrible design, both from a hardware and a logical point-of-view. We then received a contract to

redesign the logic and respecify how they were to go about building the product. The contract required the delivery of three computers. We demonstrated through all kinds of analysis that you only needed two. United Airlines said the contract was for three, and they wanted three. I'm happy to tell you that they never used the third computer as backup, they used it for something totally separate. A very successful project.

BRUEMMER: What projects during that period were you more intimately involved in?

AUERBACH: I was working long, long hours these periods. The guys at Teleregister were guys I personally knew very well and so I used to go up there with a Gene Miller. I had a less to do with the BMEW S project by that time, almost nothing. I was the front man. I had to go out and they wanted to talk to me, and that was my job.

BRUEMMER: Were there others in the company scurrying around for contracts?

AUERBACH: Miller was some. Certainly not Shafritz or Winsor or Plotkin or any of these people, no.

BRUEMMER: Were you advertising at all?

AUERBACH: No.

BRUEMMER: Although soon you had your name in the publishing company.

AUERBACH: That was after `60 or `61, and that was a joint venture with the Bureau of National Affairs in Washington. They were the front on that. We provided the editorial content, they provided the sales and production and all of the financial follow through on that particular project.

BRUEMMER: Let's go back to the leasing company now. What year are we talking about?

AUERBACH: I'm going to guess '62 or '63, by which time Herman Affel and Bob Wallace had joined our company; Herman Affel from Philco where he was the chief engineer became vice-president of our company; Bob Wallace who was very involved in ComLogNet, a project we were doing for RCA.

TAPE 4/SIDE 1

AUERBACH: By the time 1960 rolled around we had a number of contracts overseas. So the activity was going rather full tilt. In 1962 we had a major contract with Standard Telephone and Cable. Israel involved us in a big project involving the selection of a computer. There was another company in Denmark that we did some work for. We were well known. The reputation of the company was much larger than the company.

BRUEMMER: You were doing some U.S. government work as well, weren't you, by now?

AUERBACH: No. The first contract with FAA was in the mid '60s. We were sub-contractors to companies that did work for the government, but I stayed out of the government. Israel was August of '59. We had been aware that there was an anomaly in the marketplace by the way RCA leased their 1401 computer. Companies had contracts that enabled them to buy the equipment at a very small fraction of the cost of the deal by the end of the lease. We examined this in some detail and realized that economically this was out of balance, so we developed a rather detailed proposal to go into the leasing business. We would go into a company that had a lease for a 1401 with IBM and we would basically buy the lease, sublease the product back to the company and nothing moved. Then we acquired the ownership of the 1401 for a nominal amount of money at the end of the lease. Companies were willing to do this with us. Good idea; the problem was you needed cash to do this and we did not have cash and did not have an easy way of getting large quantities of cash in which you put the equipment up as collateral. In addition we did not have a sales force to go out and resell or remarket the 1401s, and so it was a good idea . . . and we always had things like this brewing in the company. The publishing activity is another example. We had interesting ideas and people were

willing to spend some time developing them. We took the leasing plan and put it in a notebook similar to the blue notebook over there, a three-ring notebook, and it sat on the shelf in my office because we didn't have the wherewithal to implement this project.

One day the telephone rings on my desk, the receptionist tells me there are two gentlemen downstairs without an appointment who would like to meet with me. One was Oliver Vanderbilt who was the chairman of Blair & Company, totally unknown to me; the other was another gentlemen who's with a company called Leasing Corporation, again totally unknown to me. "What kind of people are they?" -- we've had beggars come to the door on a regular basis. I said fine, send them up, and they sat down on my big green couch in front of a table and they said what they were looking for was a computer consultant. They wanted to go into the computer leasing business but they didn't know anything about computers. One was financial, and one was marketing and leasing, and please can you provide us with the technical moxie to enable us to make sound decisions for computers. I listened to their story. I said, excuse me, I went over to the shelf and put the book down in front of them and said why don't you gentlemen just leaf through this book. I could have just taken their teeth; they were just stunned that here was the whole idea laid out. They said, "How would you like to be our partner?" I said, "I might be very interested but quite frankly, gentlemen, I don't even know who you are. I don't know who Blair & Company is, I don't know who the leasing company is." They were out here in Wynnewood -- I said, "Why don't you give me some references and let me check it out and in the meantime let's put together a proposition and let's sit down and talk." We met the next week, the next week, and within six weeks we had a company up and running. We each put in \$50,000 and Herman Affel became the head of this company. That was Standard Computer Corporation, I think was the first name of the company, headquartered at One Wynnewood Road in Wynnewood (PA). That company originally raised money from Montgomery Wards, and we then went public. We may have raised money from somebody else -- you're talking about a quarter of a million dollars by this time. The only bank that would do business with us that understood what we were talking about was Continental Illinois in Chicago, and my partners were responsible for putting this deal together. To give you an idea of delegation, once this was set up and running I was not even a member of the board. Other people represented the company on the board. I was kept informed and used to attend meetings with the principals from time to time --

dinner if I was in New York or something like that -- but this was total delegation. "Herman, you go run the company and just keep us posted as to what's going on." The company eventually went public, merged with I think UCC or one of their leasing companies (Universal Leasing Company), and then with Greyhound we were absorbed completely and I've forgotten what year we all bailed out. It was a public company. But that was the first public computer leasing company in the country.

BRUEMMER: Greyhound Leasing eventually got involved in some fairly large lawsuit, maybe it was just one of the IBM . . .

AUERBACH: This was years and years later. We were talking '62-63, you're talking '70 something.

BRUEMMER: So you were out of it completely by that time.

AUERBACH: Oh, we were out. We were out and made a significant chunk of money. A lot of us invested privately as well as the company. Dick Lamb managed the finances for the company.

BRUEMMER: Essentially you just picked up computers at the end of their lease period. Was there physical movement of computers?

AUERBACH: Sometimes. Sometimes the machines had to be rehabed and sent down to South America or somewhere else for a sale.

BRUEMMER: And in the case of IBM were they willing to live with this given the fact that they were in the leasing business.

AUERBACH: They had little choice. They had a contract with X-bank and Y-company and these were the terms of

the lease.

BRUEMMER: They didn't try to alter their terms . . .

AUERBACH: Not during the tenure that we were in the company. We were out of this whole deal within four or five years.

BRUEMMER: And it sounds as though you were happy enough just to leave it off to the side.

AUERBACH: Oh, yes. It was business I didn't understand. Affel didn't really understand it either. It was a financial business that the Blair & Company people understood, the leasing people understood, we were technical people to advise them should we make a deal for this product on these terms and what we had to do was to evaluate the value of the equipment at the end of the lease, that's what our job was.

BRUEMMER: A marriage made in heaven, that sounds like.

AUERBACH: Yes. Do not think that we ran this company. Herman was the titular head of the company but the Computer Leasing (that became the name of the company somewhere down the line) Corporation staff was responsible for leasing the stuff and Blair & Company was responsible for putting the money in the bank and arranging the deals with the banks. Our role was to evaluate whether or not it was a technically sound investment, whether we should buy the lease and what was the value at the end of the lease, and what was the potential of leasing it. And what we learned was a very, very unusual thing. An airplane engine is always evaluated as to how many hours it is flying, an automobile how many miles it is driven, and you always talk about a '92 car or a '93 car, etc. Computers don't have value that way. The biggest mistake that other companies made was they thought they were evaluating products that they were familiar with. The life and value of a computer is determined from the day it was announced as a product and from that day on its value decreased over time. So if you bought the machine in the

fourth year of its cycle you already lost roughly 50% of its value. We were one of the very few companies who understood this and made our decisions based on this.

BRUEMMER: The traditional way of thinking being that . . .

AUERBACH: In real time, from purchase date. Purchase date has nothing to do with the residual value of a computer.

BRUEMMER: In terms of the consulting you didn't have to worry about competition. You had all the business you wanted.

AUERBACH: Correct.

BRUEMMER: So to generate business you just got new shoes and went hustling.

AUERBACH: Frankly the phone was ringing. By '60 we had, as I said earlier, a reputation many, many times the size of the company. In 1960 North American Phillips engaged us to do a major study on one of their digital operations. We did a big spreadsheet analysis for the Office of Naval Research. Again Honeywell shows up, this time it's the EDP Division with Cap Smith and the crowd from Boston. Sprague Electric, IBM in '61, Datamatic Division of Honeywell in '60. As you can tell from the number of contracts we were receiving, this was going great. I see that I did a major study of European computers in 1960 following the conference sponsored by UNESCO=. I see that I had two, four, six engagements to go out and give a lecture to these people on European computer technology. None of this hurt [laughs].

[INTERRUPTION]

AUERBACH: I had to answer the phone, I had to call people, we certainly didn't have any salesmen, we were not actively engaged in the federal market at this time, and we were having a good time, doing very, very well.

BRUEMMER: What education did you receive by going international? Surely there must have been a little bit different twist by dealing with Israel and the United Kingdom.

AUERBACH: From roughly December of '57 on I was involved with UNESCO. Interestingly enough, European scientific and technical people always addressed me as Doctor because they could not conceive that I had achieved what I had achieved by that time without a doctorate. I'm receiving a doctorate on the 19th of the month from Drexel, by the way.

BRUEMMER: Congratulations.

AUERBACH: A little late, but [laughs] . . . Europeans will not talk directly to a subject, and the Dutch will not discuss things over lunch. I was known then as I am today of being very direct. I mean, that is what you should expect from an American, right straight to the point. I very frequently used to be an interpreter between the Spanish representative and the Russian representative, both of whom spoke English and neither of them understood each other. I guess the Standard Cable was a fascinating contract . . .

BRUEMMER: Standard Telephones and Cables.

AUERBACH: Standard Telephones and Cables. They had two contracts. One to deliver an airline receipt reservation system for BEA [British European Airways] and the other for Air France. Initially we were asked to look at the BEA contract because BEA was suing ITT on this contract. I think that we got to them because an executive from RCA left and became a senior executive at ITT and they were told call Auerbach. So, on my way home once I stopped off and they had a mess. They were going to build the computer for their German subsidiary and their

problem was that this wasn't going to do what they had wanted. They were going to sue. We had brought some people over to study the issue and really probe it in great detail. We came up with a new design for a system that we thought could do the job, preferably to be built in the United States with things that we knew that existed up in north Jersey. We walked in to make a presentation. We had briefed the Standard Telephones people so that they could make the presentation to BEA. When the questions got a little sticky, I was sitting way down at the end of the table as just a guest and questions started to fly at me. By after lunch I was put in the middle of the table directly opposite Brian Bruff (?) who headed up the BEA group and we had a discussion that went on to the point where they withdrew their lawsuit. Then we had to design and build the machine.

At that point we ran into a lot of flack from Harold Geneen and the director of the European operations for ITT. Why did we have to take this computer out of Europe and out of Germany and why didn't we let them build the machine in Europe? Our comment was that as far as we were concerned the level of competence that existed in the German company was so poor that they should start all over again with a whole new staff. "You can't do that, we can't fire people." I said you can do with them what you want but don't waste your time and money having them building computers for you because that they don't know how. We then did a survey of ITT all through Europe in every laboratory and learned that the Belgium lab really was doing some outstanding work. The French lab was doing some good work, but the Belgium was head and shoulders over everybody. Paul Winsor and I then had a session with Harold Geneen and the technical guru from Europe at a restaurant. We were picked up in a big stretch limousine and taken to this fancy restaurant. Harold Geneen was livid that his people had gotten themselves into this mess. He was telling people that the company shouldn't be in the computer business at all. I said, "Mr. Geneen you're in the telephone business, and you're going to be in the computer business whether you want to or not. Why don't you tell them that they should not be competing in business or office equipment in the computer field." I told them what I want and that's the way it is. I said, "Mr. Geneen, you have 50,000 or 100,000 people out there. I can't go re-educate them as to what words mean. Let me re-educate you so that you use words correctly. Your people are going to go into the digital market with a vengeance and you had better recognize this and understand it." That argument went on for an hour and a half. Eventually when he drove us back to the hotel he said, "This is very worthwhile; you don't

bow down to me." I said, "Nope, but you're a lot easier to convince than all of these technical people around the world for whom you've got to know what you're saying."

I'll never forget that evening. I was drained. The guy from Europe was on my back through the entire evening. He was relentless trying to convince Geneen that they should be allowed to build the machine in Europe. The machine was designed in the United States using one of the laboratories up in north Jersey. They sold a number of these machines to some people. We then tackled the Air France contract, a totally different set of political problems, but we eventually got them off of the hook on that. The vice-president, a technical director of ITT, claimed that we saved their company 12 to 15 million dollars by injecting ourselves into this. Otherwise they would have been over the barrel. We got to know a lot about a lot of people over there and ran a major training program for ITT in Paris as a result.

BRUEMMER: Now your Israeli contracts, were those more defense related or . . .

AUERBACH: No. The Defense Department was buying a Philco S2000, which was their first computer. We were to design the acceptance test for that machine. We had nothing to do with the military; just design an acceptance test for the S2000. We then got called in at a later date by someone that I had known in Israel to evaluate which computer they should have. We, with a minority vote that was eventually accepted by the ministry. And it was tough. We received a tremendous amount of press in Israel over that because we did not vote with the power structure.

BRUEMMER: So, "tough" politically.

AUERBACH: Yes.

BRUEMMER: Did that make you shy away from other international engagements?

AUERBACH: No, not at all. As far as we were concerned we knew what the hell we were talking about and what we were doing and we were perfectly willing to argue things out on their merits. The guy who came from Teleregister and joined our company, their chief engineer, Levine, was handling that project. He was the front. All I did was answer the phone on a couple of occasions. You have to understand I was not involved in every project we were doing here, believe me. These were senior and, as I've already indicated, a couple top-level engineers who had come from other companies to join us. I understood what it meant to have hands off. By that time Arnold Shafritz was given a different post in the company and he had to go around and review every project on a regular basis. If I found something that I found awkward I would say, "Arnold, go up to Boston. They're on this particular crazy project and I don't think they understand what they're doing. Go find out if I'm right or wrong and straighten it out." We had senior people who managed by walking about. I mean they literally sat down and did a project review of every office and understood in some detail what we were doing.

BRUEMMER: Did you choose to limit the size, your growth, in terms of your consulting business or were there constraints placed on you?

AUERBACH: No, we made a mistake and that taught us a lesson. I found that we could digest a 15% growth per year with no great difficulty. One year we had a 30% growth and I said never again. We can't digest that many new people and incorporate them into our culture. That happened only once. Though 15% of a couple hundred people is still not a small number, but you have to remember by this time there were five offices in the United States, two offices in Europe, a subsidiary office down in Mississippi -- not a full office, just a project office -- so there were a lot of senior staff around who understood what we were doing.

BRUEMMER: And you still stayed away from hardware after that?

AUERBACH: Oh, after that we were finished with the hardware business. By this time and by that size we started to get involved with some government business. I was doing fine until some SOB admiral kind of put the screws on us .

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TAPE 4/SIDE 2

AUERBACH: . . . and forced us to accept a cost plus fixed fee contract.

BRUEMMER: Up until this point were you pretty much following the same formula -- one third up front, or . . .

AUERBACH: Labor hour. I mean, you want us to work for you, fine. Here are our rates, here's what we expect to be paid, here's when we expect to be paid, please do not come in and audit our books, our books are not for audit. RCA did an audit on the BMEWS project. I think that was the only audit that we had. We just said no.

BRUEMMER: How did that work when you got into government?

AUERBACH: It worked fine until we hit this one contract with somebody in the Defense Communication Agency who did not pay his bill and let the bill build up. The condition of paying the bill was that we'd go CPFF, and he had us over a barrel. That's why I said he was an SOB. Up until that time we had refused to do any CPFF work, just by choice. It was our decision.

BRUEMMER: And did that affect future government work?

AUERBACH: Yes, we then got squeezed into the classical CPFF mold. Once you do that then the audits start, then you have people leaning over your neck and wanting to evaluate your rates and what you're paying for rent and what you're paying for health benefits and all of this crap, and I found this kind of activity not to my liking. I'll now take you ten years ahead when we got more and more involved in government -- the Atomic Energy Commission -- doing a very big job for them. When we bid the job we inherited 40 or 60 people from another contractor. We then had

to rehouse them and we suddenly, as far as I was concerned, became body shop people, which I abhorred. My then executive vice-president was delighted because he kept the small margins and figured out how much he was making.

By 1975 I decided on a couple of bases that I wanted out of this business, personally. I became aware that I and Winsor and Shafritz and the senior people in the organization were no longer as up-to-date with technology as we were in '57. Twenty years earlier we were the hotshots, we were the bright kids on the block. By '75 there were a lot of other people out there who were as smart as we were and maybe smarter, some of whom spun off companies from our company. We went into business with bright young guys who understood transistor technology better than we did, so I was aware that we were on a downhill run as far as where we stood technically. We could still put people out on a body shop basis, but that was not my interest. Furthermore, the Atomic Energy (they changed their name to something else . . . Department of Energy) contract was getting bigger and bigger; I had a rule that nobody was ever allowed to have more than 10% of our total volume in one contract. This group took on more and more work and we suddenly were well over 20%, and I said, "Guys, no more." And we started having some pretty heavy disagreements in the company, like, "We can't turn down business like this." I said, "I can. I have no difficulty. You've got to go out there and find other work because if they cancel this contract, or if someone underbids us the next time we bid, we're going to get clobbered." As I said, it was a serious disagreement. I had also made a presentation to all of our vice-presidents on the development of the first relational database system in the country for New York State on a major contract with them. I said, "Boys, we've got a tremendous asset here. Let's commercialize this product. Let's take it and make a commercial product and go sell relational database systems." I said, "I'm willing to invest the money to do this but it's going to change the direction of the company because we're now going to go into packaged software." There was a long harangue and discussion on this subject and they all said we're happy being in the business we're in, we don't want to go into this other business. I thought they were making a big mistake. To me that's where the future was going to be and we had an opportunity to get into the future right at the beginning. So I was outvoted by my executive vice-president and my vice-president who didn't want to do that, they wanted to stay in the same business. At that point I said, "Look guys, I tell you what. Why don't you buy me out." And I arranged for a leveraged buyout. I arranged the bank that financed them. My parent company financed them over a five-year

period. I took back personal stock that they owned in the parent company and exchanged for their interest in Auerbach Associates, and that's what became Calculon. That you have in the archives. Very amiable. I offered to help them, but I refused to continue as chairman. I refused to have any financial interest in the company. I wanted a 100% clean break because if they got into trouble I didn't want to be called in to bail them out. That's how we sold the company on May 1, 1976. I've been delighted ever since. A number of years later they eventually lost the contract with the Department of Energy. By that time the company had merged with others and was completely absorbed into other organizations.

BRUEMMER: Another big government contract seems to be HEW. I seem to remember a fairly long . . .

AUERBACH: Here's the project register. There are lots and lots and lots of them. I became less and less interested in the government side of the business, put in appearances as was expected of me as president of the company. By the beginning of '75 I said this is the last time I'm ever going to set foot in the Pentagon. I really didn't want anything to do with these people anymore -- I had had it. All they were interested in was, "What have you done for us lately." We did the command and control system for the Pacific and the Indian Ocean, we replicated it for the Atlantic Ocean, we built a whole programming staff for them down in Washington. Our people supervised that for a year and a half or so, installed the system, and made it work. This was a whole battery of computers on one axis and peripherals on the other axis and we accessed the information through a control switch. I went in to see the admiral who had taken over the operation on a courtesy call to introduce myself, telling him what we had done. And he said, "That's fine. You got my predecessor a promotion. What are you going to do for me?" I said, "You mean we basically are starting from scratch just because you're now sitting behind this desk rather than somebody else?" He said, "Just think about it. What are you going to do for me?" That was the last time I set foot in the Pentagon.

BRUEMMER: Did you always have an antipathy for the federal government or was it just the way they did this . . .

AUERBACH: No, I have a very *strong* antipathy for cost plus fixed fee contracts. I don't think that they're efficient.

The projects were fascinating technically, challenging, delightful, great projects to work on. A royal pain when it came to getting paid -- submitting ourselves to audits, having auditors hang around for weeks and weeks to go find some stuff that were in the books. Rarely did they find anything, but they were just an annoyance. I devoted myself to building up our commercial business. Nobody else was interested in that one, by the way.

TAPE 5/SIDE 1

BRUEMMER: I know this is probably on the record, but when did Auerbach Electronics turn into Associates?

AUERBACH: I don't know. It would be in those record books that you have here because it was a formal change in name.

BRUEMMER: What prompted you to . . .

AUERBACH: Well, when we became aware that we were becoming more and more a design company and a consulting company, electronics didn't seem to fit what we were trying to do.

BRUEMMER: Did this sort of coincide with your decision to get out of hardware?

AUERBACH: Yes. You present it to me as if it was our decision. It was the economy that drove us out of the business, and it was most coincidental that as we went out of that business we then started to create the publishing company the same year. There was never a shortage of ideas.

BRUEMMER: While you didn't have to look at your competitors in terms of getting new jobs, I am interested in if you were eyeing any operations that were most similar to yours? As a consulting firm, were you unique in the 1960s?

AUERBACH: No, there was another company whose name I have forgotten that was out there doing similar kinds of things. It was certainly not competitive. I mean, we never bid against them. In fact I taught them how to deal with their taxes. So it was a nice, friendly relationship between this other company, up in Connecticut somewhere. I don't remember the name of the company.

BRUEMMER: I remember the guy from Arthur Andersen at the Univac conference claiming that Arthur Andersen was truly the first, and at one point only, computer consulting firm by virtue of its work with Univac.

AUERBACH: They may have been. I'm very careful not to use the word "the first". . .

BRUEMMER: I avoid it like the plague myself.

AUERBACH: . . . among the early, among the first, but not "the first".

BRUEMMER: I did have a question about when we received the material from Calculon, all of the final reports. There were proprietary projects that were pulled and I think I even sent some back that they had missed. I want to be sure that I don't miss some aspect of about the collection that I'm no longer able to document. Was there anything unique about those proprietary projects? Were they a significant part or was it just somebody worried about trade secrets?

AUERBACH: There was one where we formally were not supposed to have done this job. It was a piece of investigation that we were doing on behalf of one branch of the government as to what another branch was doing. We were then told that we never had this project, so that's the one we pulled. I believe to the best of my knowledge it burned. There were very, very few other projects that I think we did not give you information on. The one that I decided yesterday not to give you was a major project done by Auerbach Consultants for Bank Leumi in Israel. There we got deeply, deeply involved with people and were interviewing people at the highest level of the company for promotion for jobs that they should have and things like that. We did not think that that was appropriate for our

cause.

BRUEMMER: That seems a bit far flung from computers.

AUERBACH: Many of our jobs were far flung from computers. We went in through the computer door and as we established rapport with the chief executive, he would turn to us and say have you met so-and-so, what do you think of him, and how would he be in this job? The answer was no, I haven't met him yet but I'll be very happy to have lunch with him and give you an assessment, and that led to many, many other activities, the Bank of Leumi in particular. We completely reorganized the operations department of the bank including selecting an executive to run it after interviewing a number of persons. Hal, Rachel and I went over and spent the entire month of August in Israel where I did nothing but interview and hire for the company. The company took a strike to enable us to hire 15 people, which is when I said, "There's nobody in this company who is a qualified systems analyst. Let's go get some senior type people around here." You get involved, very deeply involved on the people side of issues. That one was a total reorganization of the operations department from how you clear checks to the qualifications of the supervisors on the night shifts. We spent an awful lot of time literally reorganizing the company. We did a strategic plan for MIS. We asked about the strategic plan for the bank. There wasn't one, and so we interviewed the senior executives and based on their input, literally drafted a strategic plan for the bank. We then had a major meeting -- about 20 people -- to discuss the issue and said, "Let's just make sure that this is really what you want the bank to be five years or ten years from now. If that's what you say you want it to be we'll design an MIS system so that when you get there, you will have something that will work."

So, we got very involved with strategic planning for companies, and no, we didn't advertise such services, but I guess one thing that I've learned in the consulting business is people want experts in a field when they hire you, and after they get more acquainted with you and find out that you can think and come up with reasonably good judgment, it expands. ITT was a classic example where we got initially involved with this BEA job and before we knew it we were evaluating whether or not one of their local companies should be in a particular business and what

we thought of the top four executives in the company. One of the rules I established very early on was we would never write our opinion of executives. We'd evaluate them and we'd sit and talk to the boss about them, but we've learned that if you put it in writing you never know who is going to see it or read it, and it could cause a lot, a lot of problems. We did it once and that was the end of it. That's the reason I will not give you that file because Bob and I wrote very detailed memos back and forth about people. Each of us made separate trips and when we came back we would write up our impression and then sit at this table and talk about them for hours before we formed an opinion that we expressed to the bosses. But there are an awful lot of people issues in those files that I don't think are appropriate. Other companies for whom we've done management consulting are endless. A little meat company here in Philadelphia who just had a terrible guy as their controller who didn't know what the hell he was doing, and our evaluation was replace him and get somebody who could do that job.

BRUEMMER: Someone once said that he thought the role of a consultant was to borrow somebody's watch to tell them what time it was [laughs]. Do you think that's a fair statement?

AUERBACH: No. That always says you ask them what they think and then you replay it and tell it back to them. No, I don't believe that a good consultant does that. One of the things you learn as a consultant is to keep your eyes and ears open 24 hours a day. This is not casual. You can sit at lunch and overhear a conversation and say what the hell are those two guys talking about and what does that mean and you have to put that into context. I'm sure you're aware, the loneliest job in any company is the CEO because he literally has nobody to talk to. He can't confide in his subordinates because they will know too much and use it against other people in the organization, so he has almost nobody to ask, "What do you think about this." As you gain the confidence of a CEO in a company, they will open up and start talking to you about things that have nothing to do with information processing. The critical thing is relationships and how comfortable the CEO is in talking to you about "anything."

BRUEMMER: Was this the type of work that you pursued after Calculon was formed?

AUERBACH: Yes. It was an area that I personally got much more deeply involved in than my associates, even my closest associate, Bob Wallace. He is a brilliant, superb analyst, but when it comes to people issues, he defers to me. I've always had a fifth sense about people and it has worked for me. I guess the one thing I have learned over the years is that if God has blessed you with certain skills, use them. I only learned about maybe 15 or 20 years ago that I had a gift for vision and could conceive of systems. Systems design to me is one of the most enjoyable aspects of the things that I have done. I'm not an analyst; I'm a synthesizer. I will conceive a system and then test it to find out whether it will work and how to make it work, rather than doing a detailed analysis and saying, Q.E.D., here's what should follow. So I've been blessed with vision and broad thinking, and I can turn around and implement and dot "i's" and cross "t's" with great detail. I was not aware until somebody pointed out that they were very uncommon characteristics to find in the same person. It's normally that you find one or the other, but rarely both.

I guess if I'm describing myself I would say that I have one other talent. I can look at something and sense something's wrong. "You should not come to that conclusion," or "That kind of a number is inappropriate for what you're showing me here. Let's go back and see where the mistake is." I used to literally drive my controller up the wall by just saying, "Dick, I read it, something's wrong." After hours and days of analysis he would come back and say, "How in the hell did you ever figure that out." And my answer was that I didn't know. Once, we had been underbilling the government for almost a year and I said, "The ratios are wrong, don't ask me why, something's wrong, Dick. It doesn't make sense." And he always used to ask, "How did you know?"

BRUEMMER: Would you attribute that somewhat to your engineering background or do you think it's separate?

AUERBACH: I attribute a lot to my engineering background -- I'm very, very pragmatic. I'm truly a technologist, not a scientist. I look for the practical solutions with the tools or the resources that are available and not dream about how things might be or could have happened.

BRUEMMER: At some point Auerbach Associates begins to expand internationally through subsidiaries. Can you

tell me about how those were set up and what relation they had to you and the main company?

AUERBACH: The international activity was something I personally was involved with because I was the overseas on IFIP business. As these clients grew I said, "Gee, why don't we have an office over here and we can then service these people." I was always looking for joint ventures because if somebody had an established name, for example, in Switzerland, Holland, or in England, it was much easier to join with them and go out attack a market rather than try to do it on our own. In hindsight I'm not sure that they were smashingly successful. We opened them, we built staff, we did a lot of work, but we never made a lot of money. When recessions came, my partners got very squeamish. By '76 I had closed those offices so that when we divested Auerbach Associates to the management, they had no international operations. Interestingly, that came to me personally and continued in a follow-on company. In '76 when I sold the company there was a condition imposed on me that if I wanted to go into the consulting business I could have only a maximum of three people for five years and then could expand after that. The only name they would permit me to use was "Isaac L. Auerbach, Inc. Consultants." That worked fine and all the international business came to me, not to them. They never got further involved in anything. Calculon did no international work. We did a lot.

BRUEMMER: Were the international offices usually represented by one person? Were you dealing one to one with the head of the office?

AUERBACH: Sometimes we would provide the head of the office, sometimes we would provide two or three people who would go over there and take up residence. On one occasion my partner provided the head of the operation. The staffs ran as large as a dozen people in one of the companies. They were nice little operations.

BRUEMMER: And this restriction of three people, that was a domestic restriction?

AUERBACH: No. That was a follow-on after I sold Auerbach Associates imposed on me, personally. The fact of

the matter is that that company has never had more than one employee, me. I decided that was enough, this is the way it's operated and . . .

BRUEMMER: But you still retained interest in the international operations.

AUERBACH: No. They were closed, all closed, 100% closed. They were all part of Auerbach Associates. Oh, I closed a number of offices before the company was sold. We were in a very severe recession in the '70s.

BRUEMMER: Was anybody unhappy about the final closing of the international offices?

AUERBACH: Me. Nobody else. Nobody else really . . .

BRUEMMER: Wasn't it hard to dismantle some of those international operations?

AUERBACH: No, we drew very, very careful agreements as to how either party could get themselves out of a relationship. I used a very, very unusual technique that has served me extremely well on every deal that I've gone into. It was taught to me by an attorney, but it's a great idea. If you and I are in business and we each own 50% of the company (don't worry about the management, we'll decide how to manage the company) and if either one of us is unhappy and wants out, the guy who wants out basically sets a value on his interest in the company. For example, say, "For \$100,000 I will either buy you out or you can buy me out and you have 30 days to make the decision." So one guy makes the offer and puts a value on it and the other one has to make a decision as to whether he wants to buy or sell, and it has worked extremely well through every deal.

BRUEMMER: Did any of the international offices go at it alone after you closed them?

AUERBACH: One.

BRUEMMER: Which was . . .

AUERBACH: In Holland. They basically absorbed the staff and the business.

BRUEMMER: The publishing company was another opportunity started in . . .

AUERBACH: 1960. Maybe a word as to how we got into that business. A number of our consulting assignments involved deciding what kind of a computer a company should have. Being a good engineer I did that by putting a drawing board and graph paper in my office and writing down all of the characteristics that were pertinent to their need. Then on the other axis I listed all of the computers that were of interest, and then analyzed the data so that I could do an apples to apples comparison. For example, tape drives in the early days were quoted in a dozen different ways as to what their characteristics were and nobody could ever figure out who had a better tape drive. It was very difficult. So we basically established criteria for evaluating a tape drive and used our criteria for filling in the blanks. When we were all finished, you had a big sheet of graph paper with all of the characteristics. You could then go down and look at which ones gave you the biggest bang for the buck in meeting your need, and a logical decision could be made as to why you would select one manufacturer's equipment versus another's. In the early days we were buying hardware, not software (reversed today). I had done this for a number of companies always on a fixed-price basis, so there was never a hassle. One of my clients said, "You know, this is so good why don't you just make this available on a regular basis to people." I said, "Well, what do you mean?" He said, "You did this for five companies now. Why don't you figure out how to present this in a published form and then update it for everybody and we'll all subscribe?" Interesting idea. On my drive all the way home I cogitated on that idea and created a multicolor proposal with the various sections on addressing various attributes and functions of the computer and how to analyze it. Very interesting proposal. I then looked for a partner. I didn't know anything about the publishing business and the most logical was McGraw-Hill, and I went to see one vice president after the other at McGraw-Hill. I had a total of seven visits to McGraw-Hill, eventually winding up in the chairman of the board's office with my same

proposal. A number of the vice presidents -- and what really floored me was that they had not explained to him why I was there -- explained it to him. I knew that they had an operation out at Wright Field doing something similar to this in another field. He hemmed and hawed as to whether they were interested or not interested and couldn't make up his mind. So as I left his office -- I've forgotten the man's name, the chairman -- I said, "Look, you have a decision to make. I'll give you 30 days. You either decide whether we're going to collaborate or compete, but I need a decision from you." They decided not to work with us.

I then learned about a company called the Bureau of National Affairs in Washington. I went down to see Dean Dinwoodey, who was then the chairman, and presented the idea. He liked it. We struck a deal very, very quickly and we had a joint venture, BNA Auerbach, publishing the standard EDP reports. We did all the editorial work. BNA did the production, the warehousing, the distribution, the billing, and the selling. Our role was the editorial side.

TAPE 5/SIDE 2

BRUEMMER: BNA was a private concern in spite of its name?

AUERBACH: Private company, correct. Employee-owned company like ours. Very, very good rapport. We met regularly. Unfortunately their sales organization did not understand the product well enough to sell it and after almost two years they decided that they wanted out. We had a big decision as to whether we wanted to continue it or not. The final decision was made that the PR value of this to Auerbach Associates in the consulting game was sufficient that we were willing to put a couple of hundred thousand dollars a year into continuing the product to see if we could get it up to break even. We did break even and continued to operate. At that time it was not a separate, independent company. It was an activity of the consulting company to publicize what we were doing and give us greater exposure to the market. About six months or more after that I ran into Dean Dinwoodey in the Washington train station and said, "You know, Dean, I really miss the opportunity just to talk to you on a regular basis." He says, "I do, too. We really had established a very, very fine rapport and it's a damn shame we can't continue." I said,

"Dean, how would you like to be a member of our board?" So in the early '60s Dean Dinwoodey became a member of the board of the parent company, and that continued until literally he became incapacitated due to varicose veins. A superb human being with excellent advice, he understood the difference between a private and a public company and really was an outstanding advisor to me. So we continued this activity. I went to England and found a young man who came over and became the editor of the product, Sean . . . ? . . . , I think was his name, and built the operation up, but it was always a stepchild. It was never looked upon as a significant business, and I did not pay a lot of attention to it aside from conceptually working on ideas as to how to create other products.

BRUEMMER: There was a certain amount of quality assurance in that product, though.

AUERBACH: Oh, yes.

BRUEMMER: Who held reign over that?

AUERBACH: Well, at one point Bob Wallace managed that product and then a young man by the name of Dick Riedle managed that product line. He had an excellent editor in John s. They were primarily responsible for quality assurance and running the business. I guess you asked in your questionnaire how it was sold. We were one of the very first companies almost in any industry to sell a product 100% by telemarketing, very successfully. We built up quite a staff of people doing nothing but telemarketing for us.

BRUEMMER: Just called likely candidates, individuals who might be in companies and . . .

AUERBACH: Yes, a lot of cold calling. We were getting lists from other people who had subscribed to certain publications and things like that. By this time it occupied at least one solid floor, 12,000 feet at Broad & Cherry. In fact it was more than that, it was two floors because the warehouse was on the separate floor and we ran into a lot of problems with the police department because every time we backed a truck up to load it we were blocking a small

alley. Eventually they told one of the managers that he had to go and find another facility. My brother-in-law, who was also our attorney, eventually found us a fabulous facility much closer to Philadelphia in Pennsauken overlooking the Cooper River. I can't give you the exact year for that -- late '60s, early '70s. By that time this was a real company. I had an executive vice-president who ran the business, who had a staff -- editorial, sales, shipping -- the whole bit. One of the advantages of separating the two companies was that there was much comparing of salaries between the consulting people and the publishing people. There's no reason on God's earth why they should be compared because they're not comparable, but the publishing people always felt that they were underpaid because they were not being paid as much as the consultants. I separated them and it has worked very well ever since. That company was managed for a number of years by Howard Morrison who was the executive vice-president at a growth rate of about 3% a year. By that time we had created the Auerbach Information Management Series and it was doing very well. Within weeks after I closed the deal to sell Auerbach Associates, Morrison came in and resigned. He could not have done a nicer or better thing for me or the company in his entire life. I decided to go over there and run that company, and so I moved my office to Pennsauken, New Jersey. From day one instead of growing at 3% a year we grew at 30% a year. I would say that one of the most productive and creative and enjoyable periods in my career was creating products in the publishing company. I used to go to conferences and exhibits, take my badge off so that nobody would bother me, and just walk around the show with a dictating machine and commented on companies, their needs, and how we could meet their needs. By the time I got home I had two or three other ideas about what we might do in creating products. It was a thoroughly, thoroughly exciting period of product creation. We developed a methodology for creating new published products. Are you interested in a brief description?

BRUEMMER: Yes, please.

AUERBACH: We decided that there were various people out in the industry who had different needs for information, and if we could isolate them and their needs we could clearly identify a market. There were programmers, systems analysts, personnel people, communications people, operations people running the back room, etc. Once you could identify them, the question was what were their needs for information. The way we created products was

to sit down with a group of us in a conference room for a number of hours and create an outline of need, they needed to know something about general management, programming, how to deal with certain kinds of problems that came up as a programmer, how to debug, how to set standards, etc. etc. We wrote these all down as an outline. We would then assign one of our editors to flesh out the outline by writing down subheads underneath that, and within a week we would get together again and bang the ideas around. One of the rules was that there was no rank in the room, everybody was equal. You could put up any idea you wanted up on the board, and the idea had to stand or fall on its merits. So there was a very free easy flow of ideas. I complimented people when they contradicted me and I truly meant that it was open season for just putting how we should do this product. Within weeks we had broken the outline down within subsections and then titles of articles that were to appear in the product on specific attributes of doing a particular job. We tried to go with bullets highlighting the procedure that you should follow to get something done, charts, lots of sketches which made it easier to explain to people. We were creating products at a furious rate. I think in one year we turned out eight new products. Yes, a lot of work for everybody, but everybody pitched in in an extraordinary manner.

BRUEMMER: You must have been bringing in new people because there wouldn't be necessarily those vested skills among the people working for the publishing company prior to when you came in. about are . . .

AUERBACH: Most of these were editorial type people.

BRUEMMER: But what they were providing were insights into different . . .

AUERBACH: Well, to be very honest you didn't need a lot of people to do this and none of the top people who ran the editorial side of the company were skilled in EDP. One was an actor, another one was a historian, third was an English major. One man in particular was excellent in communications and understood that subject thoroughly. A couple of young editors who were not managers but were very good. [Jean] Bartik for example, who had been programming on the ENIAC, had been around the industry a long time. [Jean] and I could get into a pretty heavy

arguments as to what we thought their needs were. I think the point I'm making is that the group was rarely less than six, and there could have been as many as ten people in the room. There were always the managers who were not necessarily EDP-oriented but enough other people to spark and really make this fly.

BRUEMMER: Well, if you had access to people like [Jean] Bartik, you had the expertise.

AUERBACH: Yes. Right. She was not alone. We had a couple of very hotshot programmers who were within the group. One of the young women that we hired was a magna cum laude graduate of Temple University in English who became the recognized expert in mini-computers, and IBM used to invite her down to Atlanta to spend the day to show us what they were doing so that they had the opportunity to talk to her. I mean she just literally steeped herself and learned that subject magnificently -- very, very bright young lady.¹

BRUEMMER: Was there some pull in that publishing operation to move in consulting?

AUERBACH: No.

BRUEMMER: And people were prohibited from . . .

AUERBACH: Not prohibited, there was no interest. No, they were not interested in consulting.

BRUEMMER: And the increase in growth after you took over the operation is primarily because of the new product offerings?

AUERBACH: Oh, all of it, yes. I learned later from the company with whom we affiliated within the International Thomson organization, a company called Warren, Gorham & Lamont, that you cannot slice the baloney thin enough

¹ This was Ms. Merle Jaffe, according to Philip B. Auerbach.

if you are trying to sell published product. You just slice, slice, slice very thin. You do not create an omnibus issue, you segregate it. They took an example of accounting where they had 30 products in the accounting field. Now depending on what subject you were interested in accounting, you only need one or more of these products to meet your needs. Great idea. Taught me a smashing lesson, and we capitalized on it. Aside from just straight EDP field we got into all areas of manufacturing, computer-aided design, CAD/CAM, and material handling. We had developed things in security control, auditing, telephone cost, and call management. We then created handbooks from these kinds of things. One of the other very interesting products we created was a product in the engineering and scientific application field. It was a list of those programs that were applicable for this field that would operate on an IBM computer. We did this under contract to IBM. IBM then distributed these by the tens of thousands to customers, and there's a whole series of those. The other things that we were working on was to put the whole product line online, which has since been done, so you can get easy and fast access to the things.

So we not only created product that we took out and sold to the general marketplace based on the information we had accumulated, but we created specialty products for companies that wanted to disseminate them with their name on them. There is an IBM product and the only byline we had was "prepared for," and that was fine. I never had any problem with that. That was a very interesting source of income. When I indicated we were creating as many as eight products a year, you have to understand that this is a product. Then we went and created a whole series of five different volumes that looked like this that had to do with manufacturing and resource planning.

The secret of this business is the concept of a database, and what was different from most publishers was that we contracted with all of our writers on a work-for-hire basis. We owned the product. Many companies will go with royalties, so if I reused material from one product into a second product, I would have to pay a royalty on both. For reasons that I can't explain, we owned our product, we owned the content, and so we had a fabulous database. The question was what is the need and how can you repackage the material to meet a need from existing material. So when I say we were creating as many as eight products a year, and you ask, "how can you do that," the answer is "without great difficulty." The secret was to create a table of contents of the material that you wanted in the product

and then go back into the warehouse and pull it off the shelf. The stuff was there. What does a person want to know if he wants to know about time sharing? All of the articles existed someplace else in the company, and you had to find somebody who would go and select those that met the need of the client and reviewed them editorially to provide continuity and consistency. That is not a very difficult thing to do, and you don't need high skill. So if you ask how many people in the publishing company were very knowledgeable in the computer field, it was not very many. Almost no one in the sales department. Copy editing, none. So we had three, four, five people who were technically au courant with what was going on. The gurus conceived of the product, the editors were then given a list of people as to who could potentially write on that subject, and they went out and contracted with them to write an article on that subject and outlined where it would fit into the total context of the product. We were using outside resources at a phenomenal rate.

BRUEMMER: You mentioned that this eventually was or is going to be on line.

AUERBACH: It is.

BRUEMMER: Isn't that like handing the customer the knife to slice the baloney thin?

AUERBACH: Well, let me then tell you what happened to the publishing company. I was having a ball, as you can well imagine. During my tenure as the general manager directly running the company, my goal was growth. The least number of new products produced during a year was six, so we were creating new products and you don't have to use much imagination to guess how staff reacted. There was something every other month that we have to deal with, a tremendous challenge. There was excitement throughout the company on a very deep personal basis as to seeing who could sell the most products in the first month. So there was tremendous esprit de corps and I was having an absolute ball, and my phone would ring all the time. Are you interested in selling the company? I said, no, leave me alone, I'm having a good time. I am not exaggerating. I mean I even had one guy drive up in a chauffeured driven car, cold call, said he wanted to take me for lunch and wanted to buy the company. First, who are you? This was going

on monthly. We were growing at this phenomenal rate and had a national/international reputation. We were on every continent with our product, and so people were knocking at the door all the time.

TAPE 6/SIDE 1

AUERBACH: I always had an outside board of directors from the very beginning of the company in 1957. My outside directors always were the majority of the board. I've learned to work with outside directors superbly and have lectured on this subject all over the world. I came to the board and as we were closing a board meeting I said I guess I should mention to you that people are knocking at the door and I just keep telling them I'm not interested, go away, leave us alone. The board said, "Well, you know, at some price you certainly might be interested and you might want to think about it." So we went away and came back at a subsequent board meeting and tried out different prices on the board. And they told me to at least listen next time somebody calls. Well, within a matter of a month or so we narrowed it down to three companies who were interested. The price didn't bother them at all. They all wanted to enter the information field and we were hot. I then imposed conditions. For a minimum of five years, you may not move the company or make any major changes in the personnel of the company. I would continue to be involved in creating new products but the company has got to stay where it is because these people have been extremely loyal to me. I wanted to give them plenty of time if they want to change jobs to do so, and if they wanted to stay here they had a job for the next five years. One company balked at that and walked away. They immediately wanted to take the marketing department to New York, and etc. No way. International Thomson came back and said "Isaac, whatever conditions you want to impose, impose. I'll live with them, and here are five companies you can call and check that we live up to our word." I did. I really had no great desire to leave. I had an excellent contract. I continued on as chairman of the board for six years. I was very involved in continuing to create new products, and it was a most amiable relationship. At the end of six years they decided to take the sales department and move it to Boston and the editorial department and to move it to New York and save some overhead. In the process of doing that they split the product lines so that all of the EDP reports, the 8-1/2 x 11 product line, was sold to . . . the company's name begins with F . . . who continued to operate it in the same facility with the same people. They took the management series

and all of the other products that were spun off from it to New York. Brought quite a number of the editorial people to New York with them, one of whom eventually became senior vice-president for new product development.

Everybody was happy. That plaque that I showed you was predominately from those people, and Carol was always stunned because she said, "You know they may not be very happy with you because you sold the company." But there was never ever an issue about my selling the company. It never, never, ever came up with these people. They had only one plea: please start a new company, we'd like to rejoin you.

BRUEMMER: Nice compliment. You were going to talk about competition in that field.

AUERBACH: That's less than pleasant. Two of my editors, [Burt] Totaro and [John] Hillegass, who never got along when they worked for me, each quit independently each stating categorically that they would never work with the other because they couldn't stand each other's guts, and each went someplace else in the industry. Two, three years later the two of them got together and started Datapro. There was no hassle initially. We were the dominant product in town. And then they came and hired our sales manager to become their president. I have to be very careful with how I speak about him because many of the things that he then did bordered on the illegal and unethical. I'll give you an example, one of a whole series. We each used to send our products out on approval. If you didn't like it you returned it. He turned around and said to the prospective customer, "Gee, don't return it, save the postage, send me a check for what you are willing to give me if I'd let you keep the sample." And the price was literally whatever the customer picked. Twenty dollars, ten dollars, nine dollars, any number in the world, they all varied. The result was that the prospective customer now had material that was becoming very outdated, but they had a reference source, and so when you called in and said would you like to buy this, "Oh, we had the Datapro product." And what we learned to ask was, was it being updated. No. There's some questions about the legality of doing that. They became a real thorn in our side.

BRUEMMER: Did they aggressively go after your customer base?

AUERBACH: Oh, yes. There are people on the company staff who insisted he walked away with our mailing list, with our subscriber list. Go prove that. You can't prove that very easily.

BRUEMMER: Was there ever any question of legal action?

AUERBACH: Yes, but the hassle of trying to prove it in court we were told was not worth it. Did you have buried in the list a bunch of phoney names, etc. We didn't at that time. Most companies do today.

BRUEMMER: Is this the same scenario that is usually played out when people from inside one company form another? I mean Control Data certainly was sued by Sperry.

AUERBACH: Yes. We did not bring suit. Our attorneys did not think it was worth the cost of suing, not to mention the difficulty of proving what was going on. We found that there were some moles in our organization that we summarily fired. In a highly confidential discussion of a new product we heard that they were talking about the same product within days. We tracked this down. We had one of these telephone systems to record every phone call and found out who was making the phone calls.

BRUEMMER: Were there other competitors besides Datapro?

AUERBACH: No. You mentioned a number of companies in your questionnaire -- Berkeley, McGovern, no.

BRUEMMER: There used to be an office automation series, but that was a very early publication. It was from Gill Publications out of Detroit.

AUERBACH: Yes, that's correct.

BRUEMMER: But that seemed to have faded by mid `60s.

AUERBACH: Right. The major competition aside from Datapro were the magazines who would do those large spreadsheets, multiple pages. We never sold them, but Datapro used to sell them and let them run them in their magazines. That's competition.

BRUEMMER: I've also had a number of people ask about the performance criteria in your early technology reports. Did you have a hand in that or was that somebody else's' . . .

AUERBACH: It was assigned to a couple of consultants and associates who worked on that problem and maybe one of the editors who came up with these criteria.

BRUEMMER: Anything else to add about the publishing firm?

AUERBACH: It was great fun. I would rank it among the four or five most enjoyable professional activities in my career.

BRUEMMER: There were some other ventures, some of which you have mentioned. The leasing company we covered yesterday. International Systems?

AUERBACH: Yes. A former executive from ITT joined a company called Great Lakes Carbon -- makers of wall board in the Chicago area -- a big, big privately owned company. The head of the company was a young man by the name of George Skakel, the Skakel family who owned the company. Skakel was a great horseman and a polo player, and he was offered the opportunity to acquire a Swedish company which was in the pari-mutuel business. A guy by the name of [William] Marx, who was then his executive vice-president who came from ITT, said, "Before you make that decision, George, why don't you bring Auerbach in and let them evaluate that company." Which we then did. In fact

Lou Wilson was sent to Sweden to evaluate that situation. He came back and said it's an interesting idea but really not that much of an advance in the state of the art. Skakel then said, "Well, do you guys know anything about this business?" I said, "George, I've never been to a racetrack in my life." He said, "Well, I'm going to take you." And he and Marx took me and this one other guy [probably D. Loring Marlett of Great Lakes Carbon] to the racetrack and showed us the pari-mutuel system and said why don't you think about it. So we did, came up with some very interesting ideas as to how to automate the whole process by using a magnetic stripe on the back of a ticket . . . like a credit card today. We developed it under their financial support and we owned 50% of the company that would eventually come out of this. We did that one at cost, and we developed a pari-mutuel system. Came up with a beautiful presentation, multicolored slides, etc. etc. Skakel was very well connected with Santa Anita racetrack in California and we would fly out there to see if we could get them to buy the first system. Very exciting joint venture. We also talked to a track in New York, a track in Canada, to buy and install one of these systems. Skakel was very excited about this and things were going very well. I don't know if you are aware, Skakel was [Robert] Kennedy's brother-in-law. Skakel was a very outdoorsy athletic type and one of the things he used to do was to sit on the end of the wing of a plane and tackle yak. Pin yak by jumping off of the wing of the plane and nailing the yak. [Laughs] Unfortunately my partner flew a plane into a canyon out in [Idaho] and didn't come out, and nobody else in Great Lakes Carbon was particularly interested in this business, so it collapsed. There's patents on that system by the way. We would have become a direct competitor of Automatic Totalizator, and that's what he wanted to do, to build a company that would be directly competitive to them. So that was that venture.

BRUEMMER: International Programming?

AUERBACH: This was a self-created subsidiary to just do programming in the New York area. We made some basic mistakes in the way the company was structured and the compensation of the executives in that company, with the result that instead of cooperating with Associates they were fighting with Associates, and nothing would change those peoples' attitude, and so I said the hell with it. I really couldn't spend all my time arbitrating between those guys, so we closed the company.

Honeywell-Auerbach Computer, Inc. was a company we called HACI. At this point in time, Dick Bloch, formerly of Harvard and Raytheon, joined our company as a vice-president. We clearly identified the very big market in service bureaus that were dedicated to a single kind of service. Interestingly this preceded EDS. We surveyed the industries to see who was serving what kind of businesses. I think Dick came up with the conclusion that the liquor businesses, both wholesale and retail, were a prime prospect. We wrote up a pretty detailed description of how a company like that could be built and run, and since we all knew the players up at Minneapolis Honeywell, we went up (to Waltham, Mass.) and presented it to them. We then took it out to Minneapolis to present it to the senior executives and they thought it was a good idea, so we formed a joint venture. On my board at that time was a former executive of Univac and he said there were some people in Univac who he thought would be ideally suited to get involved in this company. We met them and interviewed them. He was certainly right. They all had the right characteristics and skills and we brought them into this company. We were in the process of acquiring space in the King of Prussia area. We had committed to a Honeywell computer that was . . . ? . . . designated to the company from their production line. We had been talking to a number of potential customers and they looked very excited and interested. Things were moving along swimmingly when two of the Univac types flew out to Honeywell and met with the executive vice-president of the company and tried to blackmail Honeywell into giving them a share of the company. His reaction was identical to mine. First question he asked was had they talked to me, and the answer was no. So he picked up the phone and talked to me and said these guys are demanding 25% of the company or they will quit. I said, "I'm not interested in listening to this kind of nonsense, and situations like this I just don't deal with very gracefully." He said, "neither do I." I said, "fire them." So we then tried to go back and pick up the pieces and see who we had left and how we wanted to rebuild the operation. There were a couple of other guys associated with these two. They were the front men. Oh, I guess we must have had a half a dozen, a dozen employees at the time. This was a real honest to God operating company, and Honeywell asked how they could avoid a problem like this in the future. They were happy with us. We were happy with them. Blackmail was not something that either of us could handle very nicely. Honeywell was not interested in anything less than 50%. We got out of the negotiations involving acquiring space and everything else, and we closed the company. Damn shame. It would have been a very

successful company.

BRUEMMER: I don't understand. It was focusing on the liquor industry, offering what services?

AUERBACH: Inventory control, being able to identify for every store the rate at which product was being sold so that they could be replenished at the appropriate rate. Analyzing what the profitability was on the various product and prices.

BRUEMMER: And would this have involved point-of-sale techniques?

AUERBACH: Yes.

BRUEMMER: And then all centralized within Honeywell to the computer?

AUERBACH: All centralized to the computer.

BRUEMMER: And different liquor chains, I assume, as well.

AUERBACH: Yes. There were other kinds of industries that were also on the list to go after once we did one.

BRUEMMER: Could have been very big.

AUERBACH: It was a good idea.

BRUEMMER: That was about what period?

AUERBACH: I don't know. Late '60s, I think that was when Dick was with us. Dick's wife never wanted to move down to this area so he commuted and eventually he returned to the Boston area.

BRUEMMER: Comp Data?

AUERBACH: I'm a member of the Young Presidents' Organization, one of the firms here in Philadelphia that was in the business of providing engineering, drafting, construction talent on a body shop basis, and they came to us and said why don't we do something in the data processing field and provide people in that area as well. A very big company, by the way. A New York Stock Exchange firm, CDI -- Comprehensive Designers, Inc. We tried to put together a company in the early '70s. The recession came in and nobody was out looking for people. We kept the company alive for a number of years and then it was much better for them to take us out than for us to take them out, so they kept the company, and they're operating it, not as Comp Data, but as a part of Comprehensive Designers. Auerbach Investment Company was just a shell to hold investments in some of these companies, not an operating company at all.

BRUEMMER: Have I hit most of the major ones on that list?

AUERBACH: There was one other that was trivial -- Auerbach Simpact -- a joint venture with an English company. When I look back on these, a number of them were not very successful. Standard Computer certainly was. International Systems should have been, but I couldn't keep George Skakel from piloting his own plane up a canyon. Honeywell Auerbach would have been.

TAPE 6/SIDE 2

AUERBACH: In hindsight I'm basically an innovative entrepreneur. I was too entrepreneurial and would have been better off concentrating more of my energy on lesser matters, but as my wife will tell you, after I get things up and

running and running smoothly I become less interested. I look for something new to start because the creative juices tend to run more strongly through me than operational juices. So I will either sell the company or make it public or divest it somehow and go onto do something else that I find more challenging. Personal quirk.

BRUEMMER: It's very hard to bat one thousand.

AUERBACH: Yes, that one's tough.

BRUEMMER: Let's move into IFIP. How did you get attracted to international activity? You admitted in your IFIP address that you had only spent time overseas in the war, in the Navy, and this was a period where you're just coming out of Burroughs . . .

AUERBACH: I'll tell you where that started. I was at Burroughs at the time, so the idea started around '55-56. It was at the time that JCC [Joint Computer Conference] held its major conference in Boston at the Copley Plaza Hotel, and one evening I was sitting in the bar with three or four other guys and I said, "You know, we all come back to these meetings every year and we meet the same people and kind of talk about the same kinds of things. Does anybody have any idea what's going on overseas. I mean are they doing anything that we should know about. Is there any value in them knowing what we're doing. We say one of our purposes is dissemination of information. What's going on outside of the bounds of the 48 states? I mean we really don't know. Only a few of us have casual contact with foreign computer people, non-U.S. people. What's going on out there?" Everybody thought it was an interesting problem. I said, "So why don't we see if we can organize an international conference and put everybody together and maybe we'll learn something about European and Japanese activities and they could learn something about what we're doing." Good idea. I think the following day the JCC executive committee met, somebody suggested that I proposed this idea, the chairman agreed and appointed me chairman of a committee to investigate it. The members of the committee were Sam Alexander, representing IEEE, and Alston Householder, representing ACM. That was exactly how the idea was born. Sam, Alston, and I met whenever we could get together, and I was investigating how

something like this could be done under U.N. auspices. I didn't know people that I could call up or contact. So we kind of agreed that we ought to do a proposal for UNESCO. While I was still at Burroughs I drafted a proposal to UNESCO for them to sponsor an international conference on information processing and ran it by some people in the State Department. They said that it was a crazy idea, but UNESCO was having their general assembly in India in another six or nine months and thought it would be worthwhile to put it on the agenda and see what kind of reaction it got. I said fine. So with Sam and Alston as my partners in this deal, I mailed out 40 or 50 copies of this proposal to UNESCO representatives from various countries saying that this is an issue that's going to be on the agenda, and we'd appreciate your looking favorably upon this and UNESCO sponsoring such a conference. Much to everybody's pleasant surprise they agreed at the meeting in India and appointed Pierre Auger to head a group to put together an international conference.

The first meeting was called in December of '57. Each of us who came to that meeting were official "representatives of our government to UNESCO to discuss this subject." We were not part of professional societies but government representatives. I represented the United States. Some very good people came from other countries -- Panov from Russia, Santemas from Spain, Ghizzetti from Italy, a man by the name of Coales from England who was an automatic control type, not a computer type (who I convinced was the wrong person -- Wilkes ought to be there), a mathematician, van Wijngaarden from Holland, a representative from Sweden, etc.

BRUEMMER: What was the protocol for you to represent the United States? Did you have to deal with, say the State Department and . . .

AUERBACH: I had to deal with State. State told me certain things that were verboten. An example was the United States did not recognize East Germany, therefore East Germany was not to be a part of this. The Soviet Union was fine. We all sat down in this room with the questions: A) is this worth doing, and B) how can we go about doing if it is, what does a budget look like, etc. At the next meeting of UNESCO they approved the budget and authorized us to proceed to organize a conference. We then met frequently in Paris through UNESCO, organizing a program, organizing an exhibit. We had the help of [Jean] Mussard, who was outstanding, from UNESCO to help us put this

together. We each identified appropriate people for giving papers. The program was not difficult to do. The exhibit was much more difficult to do. We got representatives from each country to twist arms of certain companies to come and give us presentations. It was a very, very good exhibit, by the way, a lot of very new and interesting ideas that were presented for the very first time at the exhibit.

BRUEMMER: What was the attitude of American computer professionals towards this? Was there a certain level of provincialism? Were the Europeans thinking that they were getting a great deal out of this? I think I recall you talked about in your paper that there was a dominance of U.S. people . . .

AUERBACH: We dominated the conference by far. The reaction was, let's find out what's going on over there. You had ICL and Siemens and a number of other companies who were in the industry and we had no contact with them. There were a number of firms in Japan as well. We felt that IFIP was an opportunity for us to enlarge the market by reaching out and teaching people something about computers and how they can be used, and it was not difficult to convince IBM, or UNIVAC, or Burroughs, or NCR that it was good business to enlarge their markets.

BRUEMMER: Besides being an exhibitor, did they use the opportunity of the first meeting as a platform internationally?

AUERBACH: For papers?

BRUEMMER: More for considering their international scope.

AUERBACH: Many of them had international businesses. If we, the professionals, were able to help the rate of growth of professionals in other parts of the world, that would stimulate business. So broadening markets was not the goal of highest priority. The principal purpose was the dissemination of information among our colleagues overseas. However we had no difficulty getting all of these companies to join us because they saw the other aspect

of it.

BRUEMMER: Now you talked a little bit about your lobbying effort to secure the support of Aiken . . .

AUERBACH: No, there was no lobbying involved with getting Aiken.

BRUEMMER: Well you said . . .

AUERBACH: Aiken initially thought this was a lousy idea, and said so bluntly to Householder and me. He was not supportive of the idea at all. But then again, Aiken was not involved with JCC in any way, and so his position really had little bearing on what we at JCC were doing. Aiken was Aiken and left alone.

BRUEMMER: Why did you seek his support then?

AUERBACH: The Europeans looked to Aiken as the biggest name in the United States that could come to Europe. Alston Householder was a close personal friend of Aiken and was responsible for getting Aiken to give the keynote address. You have to understand that Santesmases spent six months in Aiken's laboratories, van Wijngaarden was close to Aiken as a mathematician, and I could go on and on. So if you were in Europe, the big name in the United States in the late `50s was Howard Aiken, and that was their choice. By the way, at that point in time my relationship with Aiken was very positive. It was negative with Eckert and Mauchly when I went to work for Burroughs, and because of the change I was persona grata with Aiken. But Alston Householder was primarily responsible for getting Aiken to do this.

BRUEMMER: Did either Householder or Alexander have experience in international forums? I know Alexander at some point did some work in India.

AUERBACH: They all participated very openly and I was the gopher.

BRUEMMER: You mentioned there was considerable effort that the exhibit required.

AUERBACH: Well, the exhibit was tough to do.

BRUEMMER: Why?

AUERBACH: First it was hard to convince American companies to exhibit in Europe, and that took some influence on the part of a number of people from JCC to convince their bosses' boss that this was a worthy objective. The exhibits weren't big but they were decent.

BRUEMMER: Customs problems, all that type of stuff to work with?

AUERBACH: I was not personally on the exhibit committee. I've forgotten who was the chair of the exhibit committee from the United States.

BRUEMMER: The first meeting is held, then the discussion about making IFIP an ongoing . . .

AUERBACH: The first meeting was held in December of 1957. We started to meet in 1958 and during one of the meetings I broached the issue about how to continue the cooperation and relationships that we had established with each other on an ongoing basis. UNESCO made it very clear that they wanted no part of that. If we wanted to do it, we could either do it as an inter-governmental activity or a professional activity. Following the meetings that we held at UNESCO we all used to go to dinner together, and during dinner meetings we discussed this subject in much greater length. All of us agreed that dealing with the bureaucracies of government was not something with which any of us were enamored, and so if we're going to do it why don't we do it as professional societies. After each of the

UNESCO meetings thereafter the UNESCO people, except for Mussard, left the room. We then convened a band of brethren to determine how to go about putting together an international group that would continue this work. I chaired those meetings. I was asked to draft some constitution and a set of rules and bylaws for participation. I brought these back each time for review and for modification and hassling, and we came up with a [final draft]. We agreed to circulate these and invite people to attend a meeting during the UNESCO conference in '59. The bylaws and constitution were acceptable to the body, and the next question was whether we could get, I think, seven organizations that could agree by January 1, 1960 to adopt these and become a member of the International Federation for Information Processing. By January 1 we had 13 members who had signed up and the first meeting of IFIP was held in Rome in June 1960 -- it was hot as hell in Rome. At that meeting I was elected President.

BRUEMMER: At the point of the first UNESCO meeting you were setting up a company of your own. It sounds like a prescription for stress management. But you must have gotten a kick out of it to continue in the international scene.

AUERBACH: One thing God blessed me with was the ability to juggle many balls in the air at the same time. Second to be able to delegate and get people to stretch themselves to do outstanding jobs. My reaction was very positive when I left the UNESCO meeting and I felt this was going to be a lot of fun, a lot of activity, exposed me to cultures and people and backgrounds and technology that I had not been exposed to before. I was quite excited about what was going on and. I indicated earlier I've always been involved with having three careers running simultaneously. This was one of my careers, and the others are philanthropy and business. There's no question had I put all of my energies into business, the businesses would have been very much more successful. If they had been very much more successful, I'm not sure that Carol and I and our children would live one iota differently than we're living today. So I look back on these things and feel, "Sure I could have done that, but look at all the fun I've had doing all these other things in life." I must confess to you that they have been the spice of life on so many different bases that if I was asked if I would redo it differently, the answer would be no. I had a ball, both professionally and personally in all of these different things.

BRUEMMER: You said you had a story that you would tell.

AUERBACH: When I left UNESCO I thought, "You know Isaac, you don't get the opportunity to come to Europe -- this is your first time, it is just before Christmas -- why don't you go down to Rome, that's where they're going to celebrate Christmas, boy you're going to see a real something." I said, "Gee you know, if I'm getting as far as Rome why don't I go to Israel and spend New Year's. So I laid out my trip to go do this, and a bigger letdown you would not find in going to Rome to celebrate Christmas. There were no decorations. I expected to see a massive mass -- it was held in some faraway church somewhere where they erected some grandstands. I attended mass the following morning. I was no where near as impressed as I expected to be.

Then I went to Israel where I wandered around visiting people that I knew of or knew through my contacts with Israeli universities (I've been involved with five of the seven very deeply, went to visit one after the other). Suddenly the idea occurred to me that what this country really ought to do is to combine the research resources of these universities into one marketing company that would go to the United States and other countries of the world and offer to do research. Great idea. Whenever I mentioned this idea as I went from place to place, it didn't take anybody very long to say, "Great, why don't you head this up for us." I said, "Wait a minute fellows, I just started a company six months ago. I'm not going to walk out on that company. I've got obligations there." They thought I could do this in my spare time, but I felt that it was not a spare-time job. It should have been done. Had I not had other commitments, I might have been willing to undertake it. I'm reasonably sure that if guided properly it would have been a success. I am now talking `57. I had my plate full. I was working 80 hours a week, so . . .

BRUEMMER: In the archives profession there are activities that border directly on politics and cultural perspectives, and issues like access to information can be viewed very differently even between the United Kingdom and the United States. In many respects I can see where in IFIP you're dealing more or less in a common language in terms of technology and invention, but it can be awfully frustrating dealing with colleagues from different cultures with

different assumptions.

AUERBACH: It was.

BRUEMMER: Did that ever get close to daunting you in IFIP?

AUERBACH: I have a high tolerance for that kind of thing and a very great deal of patience.

TAPE 7/SIDE 1

AUERBACH: My secretary and closest colleague during these formative periods of IFIP was Ambrose Speiser, IBM Switzerland. Ambrose was a brilliant guy and a superb colleague in every way. His tolerance for some of the nonsense that you've identified was nowhere near as great as mine, and he used to smoke cigars and on one occasion Adrian van Wijngaarden stood up and made some kind of a proposal to do something and it annoyed Ambrose so much that he bit right through the cigar [laughs]. Ambrose got pretty annoyed with some of these people more frequently than I did. There were a couple of people who were problems over the years. They had some good ideas. They had some off-the-wall ideas. Some of them were patient and more understanding than others to permit the differences of ideas and not allow them to get their way. I would say that the two bad boys in the group always wound up to be Wilkes and van Wijngaarden who were very close friends and would try and gang up on a number of us, never successfully. I would not say the Russian delegate was difficult; he was always under orders as to what position he was to take and sometimes they were awkward and difficult to deal with. Aside from that I would say that there were very, very few cantankerous or truly difficult people or issues. As I look back I guess the one that was the most upsetting was when I came up with the idea that we needed a supplementary source of income in addition to the dues that each of our societies was paying to IFIP. I proposed that we have a 5% royalty paid to IFIP on all of the publications that IFIP published. Well, a number of people went through the roof on that one. Going to increase the prices to all of our people by 5%! I said, you know if anybody can afford \$195 or \$190 for proceedings,

they also can afford \$200. Most of the companies are paying for this anyhow. I did have some difficulty in convincing the council and the general assembly about that idea. I was not willing to give in on it. It has proven to be a smashing source of income for IFIP for the last 30 years. Really, a good idea. It paid off.

BRUEMMER: You mention and document quite well that your pride at keeping the finances in tone early . . .

AUERBACH: Yes. You have to understand that most of these people were university professors and my experience with university professors is that they may be great teachers and great researchers but I'm not sure they can balance their own checkbook. So I was aware right from the outset that we had to set this operation so that it was financially independent of all of the companies and the associations that were members, and had an additional source of income. The monies that we gained from a conference were very significant, but the monies stayed in IFIP. I was not a part of the group that structured the financial basis for AFIPS, but I will tell you I would have never gone along with the crazy asinine ideas that they eventually developed. The greed of the three founding societies that formed AFIPS was intolerable. I don't know if you are aware that they all split the bounty that came from a congress. They basically wrote the death knell for AFIPS when they founded AFIPS as far as I'm concerned. It was done out at the Rand Corporation. I was not at that meeting. But it was not a good idea, obviously. It was a source of endless problems for them. They could have said that they would consider anything above a certain base amount of money as surplus and distribute that to the membership, but to drain their resources almost annually, it didn't make any business sense at all.

BRUEMMER: You were also involved early on in the terminology glossary. Simply a good idea that somebody ought to do?

AUERBACH: Yes, particularly on an international basis. We structured a very neat way of presenting the information. It was a very good project, a successful project, and when it was completed we terminated the technical committee. It was good and it worked out very well. I personally was very interested in this project so I participated

as a member of this committee. It had definitions, words we thought best described that definition, and if you couldn't figure it out at least there was a number that would cross reference you to the subject. A good project that worked well. I think Tutell from England did the book. He had a great deal of patience and did a good job.

BRUEMMER: What about the other glossaries under production by other groups?

AUERBACH: We were fully aware of them. There was no competition. They were glossaries, and the goal for the IFIP publication was to create something that could be used to translate works about computing into other languages, and then you could put multiple languages under each title . . .

BRUEMMER: Still with a cross reference?

AUERBACH: . . . and then you cross referenced it and this would enable you to translate what it meant.

BRUEMMER: Was English really de facto standard language for IFIP? Did you have language difficulties?

AUERBACH: English was the language that most of us used but French was the language of UNESCO. The French representatives always insisted on speaking French and having their words translated. I came home and got a tutor and studied French, and so by the end of the first year when people posed questions to me in French, I could translate 80-plus percent of it so I could start to think of the answer before the translation came so I got a leg up. English and French were the languages that were spoken. The Russians spoke English.

BRUEMMER: Anything you'd change about your tenure as president in IFIP?

AUERBACH: Oh, I think IFIP has gone on to change, to evolve, to mature, into a slightly different organization. They've done some hard thinking about what they want it to be and how it should operate. Here's their latest

financials and you can see the level of detail at which records are kept so we know in great detail what things cost, what the budget is, whether we are above and beyond the budget. I am not sure I agree with the reason they went from every three years to every two years. Europeans will always complain that if we have a meeting in the Far East and then we have a meeting in North America, they go without a meeting for nine years, or six years, and they thought that this was wrong. They needed to have greater frequency of meetings in the European continent, and this has always been a complaint. They then set up an independent organization to hold European conferences when IFIP had conferences that were somewhere else in the world. Our European friends have been doing this from the beginning. Can you change it? No. So they went to every two years. I think they're going to find it a burden. It's tough enough to organize one of these every three years in a faraway country, wherever it happens to be, and putting together an international program. To do it every two years -- I'm glad that there are younger and more ambitious souls out there that are more interested in doing this than I.

BRUEMMER: Anything to add to IFIP?

AUERBACH: I think that it's going very well. They are thinking through their mission. They modify it from time to time. They have a very competent group of representatives. I think the complaint that I have heard is that the representatives to IFIP are not of the national stature that they were 20 years ago. They are a tier below some of the more senior people from each country. I don't have the list of them, but if you go down the list of current representatives you will not recognize names that would jump out at you and say, oh, of course, he's from Italy, he's from . . . you wouldn't. They're not leaders in the industry.

BRUEMMER: Of course the industry is a lot bigger now.

AUERBACH: Yes, and by the way I don't find that as a problem. You don't need them. Yes, in the early days we needed a van Wijngaarden, we needed a Ghizzetti, we needed a Santesmases, we needed a Wilkes. We needed those people who were nationally recognized within their country as among the top tier people in the industry. Whether

they were from universities or from industry, they were known. That's what enabled us in the early days to create IFIP as effectively and quickly as we did. Today you don't need that and they don't have them. That's a complaint. Sendov complains about this bitterly. He says "I'm not dealing with equals."

There was also a very fundamental difference in what we expected of professionals in IFIP versus what they wanted from AFIPS. IFIP made it very clear from the outset that we were predominately a volunteer organization where the volunteers were going to carry the burden of getting things done, and that the office was a supportive function -- we always called it a secretariat consisting of possibly 2-1/2 or three people. The issue has always come up as to whether we should expand it is always voted down. AFIPS on the other hand set up their staff offices in a very different way. They undertook to do exhibits. They hired an exhibit manager and staff. They had an office, pretty fancy salary, and a lot of other stuff. It was a very different concept about how to operate a professional organization and what the role of volunteers and participants were versus the staff that you hire. In hindsight AFIPS did not control their costs. They let the size of the staff get out of hand. They let their costs get out of hand and the minute they had a downturn in the economy they got hurt pretty badly.

BRUEMMER: Terminally.

AUERBACH: Yes.

BRUEMMER: Well, let me follow that comment up. AFIPS has always seemed to be one strange professional organization. It was an amalgam of existing organizations, and in that respect its only trump card or its main trump card was the National Computing Conferences for which everyone was feeding. Nobody wanted to see NCC die because they were making so much money off it, and it seemed to me almost a fundamental flaw with the organization that here you have an assemblage of professional organizations with demands on the staff that required a fairly hefty staff at a central location. It was a prescription for what happened to come to pass. I've never really looked closely at the discussion about the formation of AFIPS. I'm not entirely sure why that amalgam of people decided to go with

that federation.

AUERBACH: Because they all represented their professional societies first and AFIPS second, rather than the reverse. What we made very clear when people came to IFIP meeting was, "Take off your national hat, you're now sitting here as a member of the IFIP council and have to do what's in the best interest of IFIP and the general assembly." It's attitudinal. You've got to be very careful as to who your principal responsibility rests when you arrive at a general assembly meeting.

BRUEMMER: Among many people there was this equal missionary zeal for AFIPS and . . .

AUERBACH: They all had their hands in the till. It's unfortunate. Next subject.

BRUEMMER: Let's turn to the third of the triumvirate -- the philanthropic activities -- this is one area I'm completely ill equipped to question so I hope you will lead me in it.

AUERBACH: Members of my family have always been actively involved in philanthropy whether it was the creation of a synagogue when I was a child, to my mother's organizing the first chapter of ADASA in south Jersey. At the age of 17 I was already involved with the Allied Jewish Appeal locally. By the time I had graduated from college and came home, I decided I was interested in what was happening in Israel and found out that there was a Hebrew Institute of Technology, or Technion, in Haifa and I got to know who the players were in New York. I, with another gentlemen, formed the first chapter outside of New York of the Technion here in Philadelphia and developed that with membership, activities, meetings, and fundraising. Through my computer activity I got deeply involved with the Weizmann Institute, Hebrew University, Tel Aviv University, and most recently with Ben Gurion University. So I've been involved primarily on the educational side with five of the seven universities in Israel, with Drexel University locally, where I've just stepped down as vice-chairman of their board, and at the University of Pennsylvania, where I served as a senior fellow at one of their research centers and also a member of the board of overseers of their

engineering school. So I'm very involved in the educational area through universities, high schools, special day schools, within Israel and the United States. I'm basically the founder of three of the advisory councils that Drexel has put together, and have been involved in philanthropic causes as I indicated from the time I was 17. We have in Philadelphia an organization called the Jewish Federation of Greater Philadelphia. I have served as chairman of many of their different committees, most recently as the chair of their strategic planning committee, and did a very intense study and identified solutions and procedures for how to completely reorganize the central body of the local Jewish federation. I have a subcommittee concerned with the implementation of the decisions that the board made while the committee goes on to the next set of issues. I think all told there are either nine or ten working groups that I and another associate manage to see to it that they all get their jobs done. All of this is brought before the cabinet, the executive committee, and the board for final approval and implementation.

BRUEMMER: It sounds like an extension of your business.

AUERBACH: That one I'm spending a lot of time on. Yes. It's been thoroughly enjoyable. I still have much yet to do with them to bring about the implementation of the decisions. Obviously that's more difficult than figuring out what it is that you should do, how to do it. But we're making headway, major changes.

TAPE 7/SIDE 2

AUERBACH: When I sold my company and before we liquidated it, we created the Auerbach Family Foundation, which we then funded. One of Sandy's three-quarter time jobs is just administering all of the activities that are associated with it. So philanthropically I have been involved, and I guess I still am vice-chair of the board of Ben Gurion University. I was until last May at vice-president of the local federation at Drexel University, all with line responsibilities to get certain things done, and I find it very fulfilling.

BRUEMMER: And I assume your enjoyment of this is more in terms of active involvement in the organizations that

you wish to deal with rather than outright donations.

AUERBACH: Yes. That's true. Also it has extended our circle of friends to some very, very interesting people that Carol and I thoroughly enjoy. We have a common cause, common issues. None of these are simplistic issues in today's environment, and we have been very fortunate to work with some very exciting people who are hard thinkers.

BRUEMMER: So, much akin to your AFIPS participation. It's just fun to deal with these people.

AUERBACH: Yes. You can see the parallel and I have been very, very blessed by being able to participate in both professional society work and philanthropic work in addition to business life.

BRUEMMER: Has that dominated your time in the last five years or so, philanthropic work?

AUERBACH: The last two years. It's always been active. It's been dominant in the last two years since I've chaired this strategic planning committee.

BRUEMMER: How would you like your family to continue that work?

AUERBACH: I have gotten my wife deeply involved in the work of Federation. She's also a senior fellow at the University of Pennsylvania. My wife and children are trustees of the Foundation. I have established an advisory council with two outside members to further guide them in some of the things we're doing. We meet a couple times a year to discuss basic philosophy and direction of what we want to accomplish and what we want to fund.

BRUEMMER: And can you describe the basis of the philosophy?

AUERBACH: Oh, yes. The Foundation is basically interested in funding education, educational activities, medical

research, and seed money for some particularly interesting social activities locally. The causes are predominately those in the United States and in Israel. We fund on an annual basis bone marrow research at Childrens' Hospital and similar projects. We're not interested in brick and mortar. If organizations can count on a certain amount of money every year, it does not have to be big money. [It is more effective to] continue to fund things on an annual basis where you can say, "Hey you know, there's another 5 or 10 thousand dollars that I can put my hands on to do something that I couldn't have done without it and it's nice to have," rather than saying, "You know, here's \$100,000 for a building and by the way you better worry about the maintenance." I have a rule. If you're going to put any money in a building, 20% of the money has to go for perpetual maintenance otherwise the building goes to hell in a hand basket. Anything further that you want me to amplify?

BRUEMMER: No, but as long as we're getting into more personal issues there was this question I wanted to ask who you felt were the most influential on your life. You've mentioned a few in passing.

AUERBACH: That's easy. I've had four parents. My natural parents died when I was 14 years old. I was raised after that by my mother's brother and sister who at a later date adopted me. So both legally and actually I've had four parents. There's no question that they were the dominant influence in shaping lots of my attitudes, ethics, and culture. Professionally I have been blessed with a mentor by the name of Charles Weill who was a professor at the Moore School of Electrical Engineering at the University of Pennsylvania. He was the CEO of International Resistance Corporation and a local printing company. Weill was an invaluable advisor to me professionally before I took any step, and when I went into business he was one of the investors. I met with him every six months to discuss what I was doing, what I should be doing, some issues I should be addressing that I may not have been addressing. He was tremendously influential. And finally, and not the least important but the most recent is Carol, my wife. She has been extremely influential in changing my attitude about a lot of things in life.

BRUEMMER: Let me turn back a little bit to computing, since you've accumulated this store of knowledge. It's always dangerous to make predictions about the future in computing. If anything, we have documented at CBI it's

that it's probably not a good thing to predict anything in technology. But there seems to be some limit to growth in this particular field. Developers are already beginning to come up against basic physical obstructions like the size of the atom, the speed of light, and it seems to me we can no longer count on this escalating technology. What do you see in the next 20 years or so.

AUERBACH: On that subject, Bruce, you may be interested in looking up some papers that were presented a few years ago at the National Academy of Engineering annual meeting where we had papers presented as to the limits that we will run into from a pure physics point of view. You can't slice atoms in half and make them work. They really did a very, very thorough study of what's the theoretical limit that we can go in some of these areas. You just properly identified that there are limits as to what we can do. We may have to go, if it's feasible, to photon computers instead of electronic computers. I think the question somebody has to ask is, is it necessary? You know, if I had a machine ten times as powerful as the one I have, how much more could I do? Yes, we do have the need for big, big powerful machines to solve some weather problems and some atomic energy problems and things like that, but most PCs that are being used today in industry, I would doubt that half the people use half the capacity of the machine. I doubt it. You reach the point where you say, if I had double the memory it would be faster so I would not have to wait three seconds for the machine to respond, it would respond in one second. What else do I gain by that? I think that we're going to see progress in software rather than just making machines go faster and smaller and cheaper. Sure, they're nice things to gain. I agree with your observation that there's going to be a limit and I'm not sure that it's going to make any difference. The PC has so revolutionized the world, the chip now in use performs so many different functions, I think that the chip is going to become more of a powerful force for not the "PC makers" but the "chip makers" as applied to devices that will help control things. Yes, I could see significant improvement in that area over the next 20-30-40 years.

BRUEMMER: As a self-admitted technologist as opposed to a theoretician, do you have any hope that computers will do anything relating to artificial intelligence that some people think might occur?

AUERBACH: First I have great difficulty because people have so many different meanings for the word "artificial intelligence." When we say we're going to accomplish great things, we have to be very careful what we mean by artificial intelligence and you and I have not defined what we mean by that as a term. There could be great progress in that area, but I think you're going to see far greater progress in the number of new areas where a computer chip is imbedded into a product. We have a number of portable telephones, the most recent one is this one right here. It is so far superior to any of the things that we bought three years ago that one could hardly believe that this is just three years later. I don't know what it has in it that makes it work the way it does, but it just drives the others right off the market as far as I'm concerned. If I went back and looked at those companies that manufactured these products that I bought three years ago, I'm sure that they've grossly improved them so that they are competitive. The progress has been outstanding in something as standard as a remote telephone. I'm sorry, you were going to define artificial intelligence.

BRUEMMER: My own simplistic definition is a computer able to infer, that is take data, synthesize it and make decision based on inference. And I've not seen any explanation of artificial intelligence that meets that criteria.

AUERBACH: Okay. Will I see progress there? Absolutely. All we have to do is define what the rules are for decision making. Well, we teach our children the rules for decision making as kids. Don't touch a hot stove, you're going to burn your fingers. That's a rule. We have a 21-year old daughter and all kinds of discussions come up now as to how she should go about deciding what to do about her future, her career, this -that-the other thing. These are rules that we try to teach our kids so that they follow some kind of pattern -- I won't even call it logic -- a pattern that we think is appropriate or correct. We have to define what is the pattern we expect the machine to follow in deducing conclusions or next steps. Not tough to do at all.

BRUEMMER: Not insofar as it is captured in a decision tree if you can define the rules. On the other hand you're imparting more to your daughter than just a decision tree. She also has the ability to act on that and modify it and pick up things, an ability to look at things and just infer that something's wrong. Regardless of how it got there,

there's been some subtle cognition that you yourself have developed. Much more complex. It involves learning rather than just following a routine decision tree.

AUERBACH: I think we will see significant progress here. It may take the next generation of people to do that. I have a wild theory that says that those people who invent or create or are involved in the very early work of a new field are rarely the ones that extend it to where it can eventually go. All of those in my generation who were involved in the very early days of computers who built things with vacuum tubes and single transistors and things like this, are not the people who are going to extend the computer as to where it will eventually go. That's being done by the kids today. We have developed mindsets as to what it can and can't do because where we have come from and how we have evolved with the computer. The computer was deified. My God, look at what it can do! And you have this room filled with vacuum tubes and this is a fantastic device, and you take today that same room filled with vacuum tubes and compare it to machines sitting on a desktop with five times the power and ten times or a hundred times the memory and these kids think, naturally, of course, what are we going to do next? I think we need another generation in artificial intelligence. I think that the Minskys and that whole crowd that introduced the idea have carried it to a point. I am not sure that they are the ones that are going to take us to the next step. It's going to be their kids.

BRUEMMER: Based on what you've said today and yesterday I think I know how you'll answer this question, but let me ask it anyway. Will you miss witnessing events in the future? Are there specific computer technologies that you really wish you were around to witness?

AUERBACH: No. No, I think that they're for the future to grapple with and to deal with and to evolve. I've had my day in the sun. Do I want to watch and see it? Yes, it would be nice, but being realistic it's not important. I'm more interested in what my granddaughter is going to do, grandkids are going to do with computers in bio-technology and bio-physics, etc. than my having to see it. Who would have ever dreamt that when I went through college that there would be a PC like this? I can only tell you that when the PC evolved in the garage, most of the people who were involved in forecasting computer technology missed that step -- missed it completely. I among them. We did not

fully appreciate that a PC would evolve the way it did. We went from the mainframe computers to the mini-computers and there was a step to be taken, but not the PC. The PC was a *giant* leap. Very, very few forecasters correctly identified the PC.

BRUEMMER: Most of the mainframe companies.

AUERBACH: Yes. The futurists, all of them, did not see that coming down the road.

BRUEMMER: Anything else you want to add?

AUERBACH: [Laughs]. It was as if you'd been training me. No. I think that you have done a superb job.

END OF INTERVIEW