

An Interview with
ROBERT EMMETT McDONALD
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Conducted by James Ross
on
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Charles Babbage Institute (Minneapolis, MN)

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Robert Emmett McDonald Interview
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Abstract

McDonald focuses on early computing activities at Remington Rand after discussing his own career: his undergraduate education in electrical engineering and business at the University of Minnesota and his graduate work at Iowa State and the University of Chicago; his years during the Second World War in the Navy; and his employment with Northwest and Braniff airlines before joining Remington Rand's computer operations in 1953. McDonald discusses at length the Remington Rand organization: business strategies, upper level management, marketing, allocation of resources, product development, and the decentralized nature of operations. The differences between commercial and government projects and the tensions between two divisions of the Remington Rand, Eckert-Mauchly and Engineering Research Associates, are also discussed. McDonald mentions the efforts of Charles Green of Sperry, who tried to integrate ERA into the Sperry-Rand organization after the Sperry merger with Remington Rand. He mentions the influence of outside consultants on Remington Rand and IBM, and the influence of ex-IBMer's on the Sperry Rand organization. He concludes by contrasting Remington Rand and IBM.

ROBERT EMMETT McDONALD INTERVIEW

DATE: 16 December 1982

INTERVIEWER: James Ross

LOCATION: Charles Babbage Institute (Minneapolis, MN)

ROSS: This is a tape recorded interview conducted with Robert Emmett McDonald at the Charles Babbage Institute on December 16, 1982.

ROSS: You were born in 1815 in Red Wing, Minnesota.

MCDONALD: 1915.

ROSS: 1915, yes. And did your family stay there during your high school and college years?

MCDONALD: No. When I was very young the family traveled a great deal. And when I was about to enter school I wound up - the family wound up - in a small village in Southern Minnesota about 10 miles from Red Wing. And it was my mother and myself, rather than my father who traveled and continued to travel.

ROSS: What was his occupation?

MCDONALD: He was a mining engineer, and deeply involved in lumber development and mining development.

ROSS: He may have known my grandfather; he was in that same business.

MCDONALD: Is that right.

ROSS: I'm doing my dissertation on that subject.

MCDONALD: Up in Northern Minnesota by any chance.

ROSS: Northern Minnesota and Upper Wisconsin.

MCDONALD: That's where he was quite involved.

ROSS: I'll look that up. My grandfather wrote a book on Lake Superior, Madeline Island.

MCDONALD: Sure.

ROSS: And your mother was occupied in the home or outside the home?

MCDONALD: In the home.

ROSS: In the home. Did you have brothers and sisters?

MCDONALD: I had one sister who died young.

ROSS: So she was not employed.

MCDONALD: No.

ROSS: Did you expect to go to college early in your schooling?

MCDONALD: Well, of course in grade school I guess didn't give it a thought. Certainly as soon as I got into Junior High and High School - I came to the Twin Cities when I was in fourth or fifth grade and then I entered a more

sophisticated public school system of course whereas my school in the rural area was a first grade through sixth grade; first grade on the left side of the building and sixth grade on the right.

ROSS: Can you date the time at which you anticipated going to college?

MCDONALD: Well I would say probably in Junior High school at some time. So that would have been, ah 6th 7th 8th grade probably sixth or seventh grade.

ROSS: Were you strong in the Sciences?

MCDONALD: Ah I liked the sciences, and the shops, and mathematics; yes very much in Junior High. Partially because I had very good teachers I suppose.

ROSS: Quickly you'll see why I'm asking you questions in these terms because you attended the University of Minnesota and received undergraduate degrees in two fields. A dual major in electrical engineering and business administration in 1940.

MCDONALD: Right.

ROSS: And my question is: Why a dual degree as an undergraduate?

MCDONALD: I was probably a year or two older than my contemporaries when I was in college and in my Junior, in my Freshman year, I think I began to realize that the pure technical was the less satisfying. In other words, the world of economics and business had been opened to me because of employment. And I felt that this combination at the University was just offered at that time and dual program would be something that I should at least select to go for at

that stage, and if I didn't want to I could always reduce my involvement in the business side; because the early years, the first and second years of college you were almost totally engineering.

ROSS: So you entered in the engineering school, and it was a program that they had to offer business administration as an adjunct...?

MCDONALD: Well the University offered it. In other words, they set up a system whereby if you elected at the end of your senior year, at the start of your sophomore year as I recall, if you elected to stay at the University for five years then they would sign - make course combinations available for you so that you could be enrolled in both the school of business as it was then called and the Institute of Technology - School of Engineering. And you would be mixing the courses more and more as you progressed and then at the end of the fifth year you would get the two degrees.

ROSS: That's very progressive at that time.

MCDONALD: It was, yes, excellent.

ROSS: My masters thesis was on the same sort of five year program instituted in Ames at Iowa State University, then Iowa State College, but it didn't include business administration; it was really the liberal arts, and especially languages for international relations that engineers would be involved in.

MCDONALD: Put this in the context of the depression years. In the depression years when I got out of high school, in '34 I guess it was, the depression was quite obvious to people my age at that time, and so the need for employment was as significant as a need and desire for an education; in other words employment when you got through.

ROSS: So what did you expect that education to qualify you to do?

MCDONALD: Something in the area of management. Not clearly thought through but rather than being a creative design engineer who would create things that I would wind up in the management side of technical activities. In other words I had to vent the interest in technical things. I was a radio amateur at that stage. And those things fascinated me and I enjoyed them but I also I guess I had the feeling that probably I might be better if I were on the business side.

ROSS: How common was it for people to take that kind of dual major?

MCDONALD: I would guess that there might have been in that group -- I think that this was probably the second or third year at the most that this combination had been offered -- I would guess that there might have been oh 30, 40 people involved in that combination during the time - at the time I made the decision.

ROSS: It would seem substantial number.

MCDONALD: Yes.

ROSS: Did you pursue that same sort of work in your post graduate work at the University of Chicago?

MCDONALD: At the University of Chicago I was only in the business school and the business field and there because my job at that point was in the field of personnel and that field did interest me. I was going for a masters degree in industrial relations.

ROSS: You were employed with Commonwealth Edison.

MCDONALD: Yes.

ROSS: How long did you keep... you kept that job until you enrolled....

MCDONALD: Until I went into the Navy.

ROSS: And you spent three years in the Navy?

MCDONALD: '43 through '46, right.

ROSS: And your job there was connected with...

MCDONALD: In the navy? I was there in a position called field service, field engineering group but early was assigned to be involved in taking radar into the field, that's the very advanced radar into the field. So this is probably the second year of I was in the Navy that I was assigned to that specific project. Let me back up just a little bit. I was able to get a commission as an ensign. I thought it was going to be quite probable that I would be drafted if I didn't go in because I was no longer married and while I was.... and I was assigned to Harvard pre-radar school which was a school set up by the military -- Army, Navy, Marines -- to go to Harvard University for a cram course in the new technical field in the new advances of electrical, electronic engineering, electronics basically. In other words people who were engineering graduates in general were only on this work....you had to be an engineering graduate and primarily in the electrical field to be able to be assigned to that school. And that was a cram course which then prepared us to go on to MIT where we got into the classified work in radar and after I finished my cram course then I was assigned...I was offered a position to teach as a Navy officer at Harvard for awhile, which I did elect to take. And I taught there for, I don't really remember,...probably less than a year and then went on to MIT for the intense involvement in the radar training and then I was assigned to a very special project called project Cadillac which was the...

ROSS: That I've heard of.

MCDONALD: Yes, you've probably heard about that. That was for the basic for the invasion of Japan and it was very advanced system and being used today.

ROSS: Some other time I'd like to follow that up because there are some questions that don't involve the history of computing which would be interesting to talk about. How did you find your association with Academia. Have you been involved with it since?

MCDONALD: Not directly, no.

ROSS: Did you enjoy teaching?

MCDONALD: Very much.

ROSS: And you then followed that up, that war work up, by being employed between '46 and '53 with Northwest Airlines.

MCDONALD: Right.

ROSS: And Braniff.

MCDONALD: Right.

ROSS: What was the nature of that work?

MCDONALD: I was in the engineering department of Northwest Airlines in my first job and the purpose of that assignment as far as the company was concerned that I was working for they were buying a lot of the type airplanes, post World War II airplanes, that had a lot more electronics and more advanced electrical systems than they had had before and so they needed people who had technical training.

ROSS: How related was either those positions at Northwest or Braniff to information processing in general. Is it that kind of electronics you're really talking about...?

MCDONALD: It was not highly related in that it was electrical distribution systems and somewhat advanced electrical control systems and then electrical navigation which was moving into the field of electronics - automatic pilots, things of that nature.

ROSS: What pushed you towards joining Rem-Rand in '53, is that correct you joined in '53?

MCDONALD: Yes, in '53.

ROSS: What attracted you most? Was it the corporation as a whole?

MCDONALD: No it was a very simple thing. I had worked for Northwest for awhile, went to Mid-Continent Airlines which was a smaller company but I had a bigger job. Mid-Continent was purchased, it was a merger or acquisition, by Braniff Airways and then Braniff's Headquarters was in Dallas, Texas, and because of the merger they wanted to offer me the job of going down to Dallas to head up their engineering and maintenance functions for that airline, and I didn't want to go to Dallas.

ROSS: You wanted to stay...

MCDONALD: I wanted to stay in Minnesota. Primarily because at that time there was a drought in Texas and I thought my gosh am I going to go down there, someone who likes water. And so I then looked for a job and the individual who had brought me into Northwest Airlines at that time was then, and my former college professor Carl Swanson.

ROSS: Oh.

MCDONALD: ...was working for engineering research associates.

ROSS: That's correct. And he is another one of the men.

MCDONALD: Yes.

ROSS: ...we might interview.

MCDONALD: He was one of the great influences in my life.

ROSS: So he was a mathematics teacher of yours?

MCDONALD: When I went to school at the University he was a math teacher, yes. Electrical engineering by training, but a math teacher.

ROSS: So you took mathematics under him in the electrical engineering...or in the engineering department. There were two different systems of math or there were two departments; there was the department of mathematics...

MCDONALD: Yes. But we took our math in engineering school. He was one of the professors.

ROSS: Oh, that's good to learn. Remington Rand's Univac division, and of course ERA, produced computers before you joined.

MCDONALD: Yes.

ROSS: What was your impression of the work they had done prior to your entrance in RemRand's organization, between '46 when ERA was founded and '52?

MCDONALD: Well, I was fascinated and very impressed with the work that I saw in both organizations because I had developed quite a knowledge of pulse technology and the basic technology of the computer industry when I was in the advanced work of project cadillac.

ROSS: And were you aware of such things as products that they were offering?

MCDONALD: At the time that I interviewed for the position they told me about the products in ERA and their plans; I knew nothing particularly about Eckert Mauchly or the Remington Rand Organization. Other than I'd seen their products, of course, but I was interested in the fascination of another technological job where I would have a management position.

ROSS: And that position was...

MCDONALD: Head of manufacturing.

ROSS: Okay. Head of manufacturing; you kept that position until...

MCDONALD: Well, as the company progressed, the position was broadened to be head of that manufacturing and many of the engineering activities.

ROSS: I see, so that's where you were head of manufacturing as well as head of the defense division at the same time.

MCDONALD: My first job as head of the engineering, I mean the manufacturing, and then I gradually received additional duties as sort of an operations manager and for a period of time I was operations manager of St. Paul organization which embraced engineering manufacturing and other functions.

ROSS: I do have that down here, and then you became vice president of the defense division.

MCDONALD: Right.

ROSS: Okay. And that position lasted until '64, so this is a considerable period of time...

MCDONALD: Yes.

ROSS: ...that I tried to condense a little too quickly.

MCDONALD: Right.

ROSS: Which projects were you involved in particularly? And to what extent during that period?

MCDONALD: Well, I'd say three categories of projects. When I joined ERA they had just gotten into the field of communications, it was radio communications, and this was really their first product that was going into any significant scale of manufacturing. And I got deeply involved in that for manufacturing and then also involved in

providing manufacturing services for the projects that were done under engineering supervision and those projects included the 1100 series of scientific computer and a lot of classified projects.

ROSS: Government contract.

MCDONALD: Right.

ROSS: And that included all the way up through the 1107?

MCDONALD: Well, eventually of course...

ROSS: Eventually...

MCDONALD: ...the 1107 evolved.

ROSS: And who allocated resources during this period of time to those various projects? And how? Upon what decision...This is something in the literature this is very unclear to me.

MCDONALD: Right.

ROSS: We're still talking...I covered a period that includes the Sperry Rem-Rand merger but say prior to that.

MCDONALD: We can't get into that quite that fast.

ROSS: That's why I'm trying to make those two distinct periods.

MCDONALD: ERA of course has been recently purchased by the Remington company and it had been very, very heavily involved, almost totally, in non-commercial products. By that I mean products that were ...It had relatively little market for a product that was sold to other than government customers or military customers in the early stages. It was able to allocate resources against the magnitude, financial magnitude, of the product...of the projects, or contracts that they got from the government. In other words, they would get a contract from the Navy or the National Security Agency or from the Air Force to do a certain thing and that would have a scope of work and would have financing associated with it, almost all but not all cost plus fixed fee type of business.

ROSS: So the research that you did, or that the division did, during those early years was very task oriented?

MCDONALD: Very.

ROSS: Almost exclusively.

MCDONALD: At first yes, almost exclusively. But they were beginning to see that there was this outside market place and they would have to start doing some development under company funding in order to develop products that would be commercially acceptable.

ROSS: In other words RemRand had to commit itself one way or another to go... to provide pretty complete backing for commercial...entrance into the commercial market.

MCDONALD: I would say yes with some qualifications. I think Remington Rand looked at ERA as one of perhaps three legs of the stool. It was in the scientific field and it had a lot of capability and reputation -- good reputation in that field, but there were limitations -- limitations primarily in the area of peripheral devices. Remington Rand was very heavily committed to the commercial field and Eckert-Mauchly, Eckert Mauchly had virtually no government contracts as such and no research and development sponsored by the Military as such. And the third stool is

probably -- the third leg of that stool that I alluded to, was probably in the area of so called punched-card replacement equipment.

ROSS: More standard machine ... office machine(?).

MCDONALD: Now, that left -- that mode of operation, left quite a bit of latitude to Bill Norris who was the head of the engineering research organization in the Remington Rand division of the company and was a company at that time. And so he had a lot of latitude in allocating resources provided that he could show the company, Remington Rand, that when they were spending money to develop a commercial product that they kept financial records on that product that was being developed was progress against the problem. But to the degree that they could, and we could get our overheads underwritten and a lot of development underwritten by government contracts, fine. And of course we get an awful lot of that and then there was something that was never really understood or appreciated particularly and that was they got into this field of communications equipment which was high volume production and it was able to carry a lot of overhead and throw off a lot of cash flow and provide some profit, and if it hadn't been for that program ERA, I think, would have died. In other words, it was able, through that ancillary to do that and Sperry product project, to carry forward management.

ROSS: So, you considered enterprise you entered very exciting.

MCDONALD: Oh yes, excellent. It was exciting.

ROSS: That's interesting because that's not come out through the literature before.

MCDONALD: No. But these things are not generally known, I don't think, except by people such as Norris, and probably Carl Swanson who was deeply involved in this part of it. But many of the computer people who were in ERA really were not deeply involved in this...this aspect of the business problem.

ROSS: Were decisions made to redirect...Let me put this differently. The literature speaks of a very decentralized form of organization in Remington Rand at that time...that the Philadelphia people and the St. Paul people and business machines producers as well as the Norwalk people were very, very distinct groups in and of themselves.

MCDONALD: Yes. I think to understand this one has to understand Remington Rand a bit and if I may can I go into this?

ROSS: Very definitely.

MCDONALD: One has to recognize that James H. Rand was a promoter, an entrepreneur of a type, who developed a business entity by buying small companies and not by developing products as such. Sure they did some development, but Remington Rand was at this stage of the game a combination of the purchase and...of many different companies. Steel, Cardex, and that kind of typewriters and so on and so on. So that the structure of the organization that resulted from that type of a background was one of manufacturing a lot of products but not spending a lot of money, or any significant amount of money, developing new products. And as World War II came to end James H. Rand and some of the more intelligent people around him could see the tremendous developments technologically that had been made during the war and that those developments were going to have a great impact upon companies in the future who were in this type of business. And so they hired Leslie Groves, who was the general in charge of the Manhattan Project and had been a man who they thought of as a guy who had directed large development programs.

ROSS: Indeed he had!

MCDONALD: And rather quickly they realized that no way were they going to be able to develop these products in the future that the technology was going to make possible in a time without accusations. So that's when they went to Eckert-Mauchly and picked them up and that's when they went to ERA to pick them up that that's when they gave

Leslie Groves the job of running the advanced development laboratory in Norwalk, Connecticut. Okay, with that background, the management of Remington Rand was dealing with Eckert-Mauchly in computers for the business application. [Eckert-Mauchly were] very articulate people, relatively close geographically to New York City and headquarters. They also had this company in St. Paul, ERA, that was generating good revenue and equally good profits in a somewhat different field, scientific computation, which the Remington Rand management had virtually no feel for. So the nature of the situation tended toward a rather decentralized operation. I think that most of the people...most of the literature would be written from the aspect of the wormseye view...

ROSS: Exactly.

MCDONALD: ...rather than the top view. I think that the top Remington people were striving valiantly trying to centralize it but didn't know how to accomplish it. Because, who did they have? They had their executives who were market and it was marketing across the board and manufacturing, it was manufacturing across the board and they had this strange new technology that they really weren't familiar with and they were backing into that problem with engineering questions: how to allocate resources to the Eckert-Mauchly group for its future; for the research lab at Norwalk; and then what to do with this thing [ERA] out here [St. Paul].

ROSS: Let me ask you a question, and I'd like a return to this. I'll probably ask you again when we talk about industry wide issues. Did already established operating machine...office machine producers have anything going for them, that new entrants like Remington Rand maybe (I'd classify as a machine office machinery company) from what you said, that's a little shortsighted, they were much more. Did they have anything going for them that other companies didn't have?

MCDONALD: Well, of course they had a good name in the market place and they had a big marketing organization in place for their type of products which were business equipment and business systems, as contrasted with others than IBM. In other words, Honeywell had nothing, however it was Raytheon at that stage, had nothing, and...

ROSS: Yes. Their fight to establish a commercial market was a lot more difficult.

MCDONALD: Yes. I don't know that I really got the...

ROSS: You've answered it a little bit. It's a little bit confused because I stated...I was going to ask you a question in either or terms and it doesn't...it no longer applies. Why don't we come back to it again later, but I can just reiterate that my impression from what you had said just a moment ago was that though Remington Rand higher-ups tried to centralized the organization it may not have been essential from the...at the very beginning to do so, in fact to have centralized it may have hurt them.

MCDONALD: I think it might have totally ruined them.

ROSS: Okay.

MCDONALD: They didn't have the capability of managing it from a total centralized viewpoint, and I think probably some of us recognized that, if nothing other than intuitively.

ROSS: Are there documents that we could approach that could help us decide a matter like that?

MCDONALD: No. Because that would have been highly confidential interoffice correspondence, some of which I have seen and I think most of which has been thrown away.

ROSS: What about people? This is an interest...Let me interrupt for just a second. This is interesting because the literature of course argues differently -- that from the start that Rem-Rand didn't know what it was doing.

MCDONALD: Oh, no I don't think that's at all correct.

ROSS: No I don't either and in fact that's why we decided to some of the interviews we have. Are there people beyond yourself that we could interview?

MCDONALD: In that area?

ROSS: On very closed topic like that.

MCDONALD: Not very many. There might be a man by the name of...I mean Burt Oakly is alive and Burt Oakly came from the Sperry side as I recall but he was in a staff position that was living a lot of this stuff in New York. He is in Alagenda, Florida. B.T. Oakly, Burt T. Oakly.

ROSS: Okay. And he was with Sperry Gyroscope?

MCDONALD: That's not completely clear to me now. I don't remember where Burt Oakly really came from, but I think it was from the Sperry side rather than, yes, on the Sperry side rather than on the Remington side.

ROSS: Okay. That's a good suggestion.

MCDONALD: There are, of course, people who are very interesting in the background, Art Draper.

ROSS: I have his name.

MCDONALD: You have his name. Another fellow by the name of Phil Vincent. Those two men were Remington Rand people; they were close to James H. Rand and, as a matter of fact they have some very fascinating stories to talk about how Rand got into some of this computer business.

ROSS: We'll follow this up a little bit later, especially in terms of the later period. So, to go back to the allocation of resources.....

MCDONALD: Right.

ROSS: It's an interesting question considering how decentralized the organization was.

MCDONALD: And so what you had were some very strong minded people, firmly believing that what they were recommending was the best thing for the company, each with its divisional or geographical orientation in the early days. I mean, ERA and Norris and his people were obviously in these fighting for financial resources, as was the leadership down at Eckert-Mauchly which was a little harder to pinpoint as to what the real leadership was at that stage from a business standpoint.

ROSS: Was there tension in the organization between those two groups?

MCDONALD: Oh, sure.

ROSS: Of what nature and over what type of....?

MCDONALD: Basically, competing for resources and intense beliefs in a specific technological approach versus a different technological approach to the marketplace.

ROSS: Between scientific and commercial or...?

MCDONALD: No, not that so much as in the types of circuitry that would be used, circuitry between these two organizations, as time went on, that you'd probably have a cost structure that would be considerably different than if you could come up with some standardization that could be used in both types of machines. And of course those two organizations didn't believe that at all.

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MCDONALD: [This had to do with] more than personalities because they were (and I'm speaking to Norris now and some of the people around him)...they were more knowledgeable about the business aspects of these technologies. In other words, they were able to, understand them and in their own minds, translate many of the technical problems, technical approaches with the probable manufacturing problems and realities and also have things of that technical nature might work in the customers bonus in their own minds, and in their communications with top management of the company, present this type of thing with its economic aspects as well. So they were giving a more balanced management viewpoint than was the case when the top Remington management was dealing with the intense technologist, so to speak, at Eckert-Mauchly. So, the top Remington management people had to try and do the intellectual manipulations and analysis at their level from the inputs they were getting from the Eckert-Mauchly group as contrasted with a lot of that being done by the management people in ERA. They could better understand what the management people at ERA were saying. They felt nervous. They didn't have the capability of making these intellectual analyses when they were dealing with the other group. And of course history has shown that too often the Eckert-Mauchly group had required much more money than they originally estimated or much more time than they had originally indicated would be required. So they had that creditability problem and there was recognition on the management part that there was a great future potential there. And I guess we were possibly talking...maybe we already did get into the recording...I guess we did...the question about highly decentralized versus centralized.

ROSS: Well, I was just going to push you again toward that. Would you say then that the Eckert-Mauchly group were hurt more by decentralized forms of organization than the St. Paul group? It seems they worked under it beautifully from what you have said.

MCDONALD: I don't know if I can use the word hurt. While they were highly de... while they were decentralized in St. Paul was decentralized they also had a geographic advantage of easier communication. To go back to that period of time, the management of Remington Rand was at Rock Ledge which was north of New York City: about a hour and a half by train out of New York City. But New York city was only an hour and a half to two hours from Philadelphia, so that it was quite easy for the management people of Remington Rand to go to Philadelphia for a meeting or to have as many Philadelphia people, if they wanted more than one, to come to Norwalk or to Rock Ledge for discussion. So there was ...that has its pluses and its minuses. The top Remington management people who were somewhat technically oriented could be talking to the technical people at Eckert-Mauchly and the top people at Remington Rand who were manufacturing oriented could talk with those who had some manufacturing orientation at Eckert-Mauchly directly. That was more difficult to do with the St. Paul group because it was a day and a half to come to St. Paul, so to speak, from New York, unless you flew, and there were those who did not like to fly and I, of course, have learned from my experience as I've looked at some of the problems the Univac has had, if you have a plant in a location of a country, I am diverging now a little bit, that it is not easy for management people at headquarters to get to it it can get into trouble more quickly or it can get ignored more quickly. And it is easy to get on a airplane and be in the headquarters city, let's say, of St. Paul that night for meetings the next day and for management to be back in their home the next night type of thing. So I guess that had some effect...

ROSS: Let me push you ahead in time just a bit and ask you what changed with the Sperry merger?

MCDONALD: Well when Remington merged with Sperry, Sperry was quite clearly manned with many top level management executive personnel quite knowledgeable about technology, see they had the experience in the automatic pilot and radar work and micro wave work from World War II and they were quite knowledgeable in

managing technology for their time. And there was a very, very, terribly significant thing that happened at the situation where...when the Sperry people finally realized they had..Sperry management had to grab a hold of us and Remington wasn't doing a satisfactory job. They then assigned the management of computer activities, not a formal organization chart or anything like that, but to an executive by the name of Green.

ROSS: Charles Green.

MCDONALD: Yes. And Norris reported to Green and things looked very good until Green became very ill and died. So there was another problem.

ROSS: Very quickly.

MCDONALD: Yes. And that was a very sad thing because that might have made it work a lot quicker and more effectively than otherwise occurred.

ROSS: Let's talk about that a little bit. Green had been appointed by not Vickers but...Let me look it up...Kenneth Herman.

MCDONALD: Yes.

ROSS: To actually make a study of the Rand - Remington Rand group and find out why it wasn't working as satisfactory as it might he came back with a very negative report as I understand it. And some positive proposals as well, I assume. Did you ever see a document like that or...

MCDONALD: No. I didn't see Green's report.

ROSS: But were you aware that it existed?

MCDONALD: Oh yes. Well I was aware that Green existed and I was aware of the significance of his looking in and I think there was a general feeling on the part of the people in ERA that this was a bright hope, a light -- a positive light.

ROSS: So people like you and Norris were very favorably disposed to cooperate with him...

MCDONALD: Yes.

ROSS: ...his proposals.

MCDONALD: Right.

ROSS: I took that...

ROSS: Is that often the case; when an outsider -- see, what you been telling me really is that the ERA group was pretty well off on its own to a large degree and able to work that way, yet communicate very well, and you're saying communicate with up -- high management in the Remington Rand group and you're saying this also existed as well when Sperry took over the organization.

MCDONALD: Yes. I don't know if I left or should have given the impression that they were able to communicate quite well with the Remington Rand management. I'm not too sure that would have been an accurate assessment of the situation. Because -- in fact I don't think it was true that ERA management people were able to have a highly effective communication with the top Remington Rand management.

ROSS: Any instances you recall? We're going back again aren't we?

MCDONALD: Okay.

ROSS: Over products or customers or management market share philosophies? What kinds of concerns might they have had trouble communicating?

MCDONALD: I think there was a burning desire for autonomy -- a high degree of autonomy on the part of ERA group, primarily Norris, and there was a burning desire on the part of the Remington Rand management to get in there and play a significant role in the development of what was going on out there. Okay -- in other words the management -- the manufacturing executives of Remington Rand had a burning desire to see that their factory participated in the manufacturing of these computer products. There was a feeling on the part of the ERA people that they were rather inept -- my god if we let them in they'll screw it up. And I don't think this was so true in the marketing area. Bear in mind pretty much in the time when ERA was very heavily in the scientific applications and the Remington Rand people and their marketing organization had virtually no experience in marketing to the scientific or the technical community, so that wasn't so competitive.

ROSS: That gives me a better perspective.

MCDONALD: Yes. And of course as we get on in some point I think the lesson of all this is that it behooved the top management of Remington to sit back and try and analyze what the heck was all this about, what are their problems how do we do a better job of communicating, and to have been more expert in dealing with highly motivated, very capable technical people in the field that they really didn't understand and there's nothing wrong with that if you don't understand...

ROSS: No.

MCDONALD: ...you just have to understand then, how you deal with that kind of people?

ROSS: How do you deal with them?

MCDONALD: You spend a lot of time with them. You go to their premises. You bring them to you when you're not on that premises when you're going to discuss controversial problems, in resource allocations for example, and you listen carefully to their viewpoints. In other words they must understand that they have an opportunity to participate in the decision making. I think when you're dealing with one of the so called classical business executive, technically oriented in his field -- in the field of advanced technology, to make a buck out of it.

ROSS: Okay, so you found yourself with an advantage.

MCDONALD: Yes, I think I did.

ROSS: And the question I was going to ask -- well I will ask again on a more general sense, but engineers as managers were a possible resolution to this problem. Would you agree with that?

MCDONALD: Yes.

ROSS: How new a group a people were they? Are they something you would say came into business primarily through the electronics or computer business or would you...?

MCDONALD: No I think they came into being through dealing with the government. Because if you look back at the development, I got into some of it in World War II, the advanced technological people were developing very advanced systems and the military was buying this stuff. The military staff itself was made up of reasonably knowledgeable technological people who were drafting or signing off systems. But you were dealing with the

customer. In other words there was a customer interface relationship where the Navy or whatever the military arm was, was buying technology from industry and it had a time schedule and it had a cost projection and there was a chain of communications. There were engineering people generally in the industry providing these products or doing the leadership project management and soon in the so called commercial companies that were involved in military development. But they were being faced by their contemporary in the services -- their counterpart in the services and having these schedules and having these costs as well as having to get technological advances, and that made managers out of a lot of them.

ROSS: So what you have said is that some were trained in educational situations like you but there was also on-the-job training.

MCDONALD: Oh I think the on the job training was more important than academic training.

ROSS: Okay, did you find that as well in terms of...in corporations like Remington Rand and Sperry that they had been trained in house -- was it ever organized? It wasn't all happenstance.

MCDONALD: Well, it was organized but it wasn't called a training program or they didn't say they were going to send you to training school. I'll give you an example. The Navy wants to talk about the status of our project and we're going to go down and make a presentation to them. They asked us to explain to them why we are behind schedule or why we have got a cost overrun, and that was one of the finest forms of education. Because basically your customers wanted you to be successful you see.

ROSS: Good point.

MCDONALD: Yes.

ROSS: That's right. Okay. Let's go back to what did or did not change after Remington -- Remington Rand was acquired by Sperry. Did classes of customers, products...certainly market share had already changed -- market share had diminished.

MCDONALD: Yes.

ROSS: In terms of commercial computers.

MCDONALD: Yes. I don't know whether it had diminished I guess it would be IBM..

ROSS: Yes. I think...

MCDONALD: I guess that would be true.

ROSS: Well no, no, no it hadn't really.

MCDONALD: I really wondered because you see first you have to sort of take the market sectors...actually at that stage of the game Remington Rand had shipped more largescale non tabulating type...They had shipped more computers than IBM had.

ROSS: You're definitely correct. I had my dates wrong. The Sperry merger was 55?

MCDONALD: I think so.

ROSS: I'm much too early.

MCDONALD: Yes, it was '54 or '55 something like that.

ROSS: What about, what about classes of customers and products, any change?

MCDONALD: Let's see how do I answer this.

ROSS: I'm going backwards, I know management philosophy changed, and I'm going to ask you about that.

MCDONALD: Right, there was a change in management philosophy, of course, but also there was a development going on all the time these problems were in existence. There were successes and ...

ROSS: Oh, yes.

MCDONALD: ...ERA was selling products.

ROSS: That goes almost without...

MCDONALD: And so was Eckert Mauchly selling products. Now the question whether they were being profitable at that stage of the game or could have been possibly sooner was another question.

ROSS: Something I thought we might reserve for a more -- less objective session.

MCDONALD: But I think that after the Sperry merger -- the Sperry Remington merger had taken place and at a period of gestation to put that together at the very top took about a year had transpired, and the Sperry management was then getting closer into the computer area that there was a greater understanding developing at the top corporate management at a rapid rate, and that was due to many reasons. Harry Vickers himself was interested and took his top

executives with him when he came out here. Harry Vickers understood technology; he was a ham and also a creative engineer and had had a great deal of experience dealing with the Sperry people in that business of war so you know a whole new cadre of top executive management was coming into place.

ROSS: It is my impression that the Sperry corporation also had that kind of top management.

MCDONALD: Yes, it did. Sperry-Gyro.

ROSS: So something totally new for the Rem Rand people -- there hadn't been as many technically oriented or literate people...

MCDONALD: That's true. You must also recognize the Sperry group in the technology field did not have a great deal of experience in fixed-pricing a product that was designed -- that was developed, and designed and manufactured for hoped-for markets. Sperry was still coupled pretty closely in its commercial activities to the big buyer, the government, or Boeing and there was an entirely different ball game as far as pricing and financing, and we haven't gotten into the leasing now versus outright sales, which was a whole different thing.

ROSS: We will. What you're, what you're saying is something that I've -- that I've seen. Sperry did very quickly make a commitment to some new management people they brought in from the outside.

MCDONALD: Right.

ROSS: [In effect they were saying:] "We'll make the change."

MCDONALD: Right. Right.

ROSS: Okay, now that's very foresightful.

MCDONALD: Yes.

ROSS: In other words: "We're willing to take the risk."

MCDONALD: Right. And that was great.

ROSS: Who implemented plans like that -- who devised management philosophy? Let me ask you if I'm correct in assuming...it was my impression it was at least in part Kenneth Herman.

MCDONALD: Yes. Well Herman was really Vicker's right hand man. And Herman had enough -- he was a businessman, and he had enough experience with technical functions and technical businesses, to be able to understand all of these things and he was a warm personality so he was easy to communicate with. In other words he was out talking with people and so he was the one who was really the key...he was a key implementer and I think probably broader himself I guess than his boss. He was broader than Herman in that sense.

ROSS: And he...

MCDONALD: Broader than Vickers.

ROSS: Right. And he as the president of Remington Rand certainly had the leverage to do it.

MCDONALD: Sure.

ROSS: And still at this point we were at a very decentralized form of organization.

MCDONALD: Yes, Right. Right.

ROSS: So he did find himself in a position to implement changes that...

MCDONALD: Right.

ROSS: Okay. Did -- now he would be coming head to head with some other pretty forceful personalities such as Norris. Not head to head, not in competitive form...

MCDONALD: No.

ROSS: ... but were they in concert?

MCDONALD: Yes I think they were, very much so. As a matter of fact there was a dramatic little incident that occurred here when they visited us for the first time. And it sort of caught me because I was at that time operations manager for St. Paul. When the visitors came I sort of had the responsibility of putting on the dog and pony show and also telling the photographers they should get these pictures and so on and old Harry Vickers took me aside at one point and said why did you call those fellows and have their pictures taken; why didn't you have Herman in it, and I didn't know what the hell he was talking about. But Herman had been assigned to that stage of the game to be responsible for all of it. So there were a lot of changes going on.

ROSS: This comes from secondary sources, so I'm asking you really, decided after you got Green's report and Green died to look outside the company -- this is Herman...

MCDONALD: Yes.

ROSS: ...to find managers for the St. Paul -- well for the Univac division as a whole.

MCDONALD: Right.

ROSS: And he chose a Dastrom...

MCDONALD: A what?

ROSS: A Dastrom executive, Biddey -- D. L. Biddey.

MCDONALD: He was an IBM man.

ROSS: Oh, he was.

MCDONALD: Oh, yes he was a very hot IBM man.

ROSS: Well that shoots us right in...

TAPE 2/SIDE 1

MCDONALD: James H. Rand, of course, was moving away from the business and they called in Marcel Rand to sort of run it. I think Marcel was James H.'s son or cousin, I'm not too sure which of those, and he ran the Univac organization for awhile, and they went to Bell labs and brought in Thorton Price(?) to run the engineering and manufacturing functions because they really had no managers or executives in Remington Rand. Then there was sort of, the organizational -- well that was at the time when Norris left when Price came in, so that would have been after

the Sperry merger. But it was during a period of time when probably, a period of time when the gestation of the Sperry Remington merger where obviously Sperry was not getting into the Univac thing, and there was no Univac thing, of course, at that stage of the game, but there were obviously problems of getting on top of the Remington relationship with MacArthur as chairman and...

ROSS: That's right I'd forgotten about that, that's hard to forget about.

MCDONALD: Yes, well MacArthur was very significant in terms of his contribution to the Univac image, or the computer company in Japan.

ROSS: Yes, that's something I'm not as well prepared to talk about but we need to reserve it for later. And I guess I copped out because you weren't involved primarily in the foreign side of it. We need to definitely get suggestions from you on who we might interview to expand our project beyond the United States. These are multi-divisional, international corporations and...

MCDONALD: Well I was quite heavily involved in the international activities.

ROSS: Oh, I'm sorry I didn't realize that.

MCDONALD: Yes. As soon as -- well that's true I didn't get into that until I was president of the company. I got into it then because it was great -- a lot of trouble, so I spent a lot of time digging out what was going on in the international field.

ROSS: Well we do need to turn to that.

MCDONALD: Well it didn't take me long to figure out that we were making progress at that point domestically and we were beginning to make money but as we got into the international field I could see we were going to lose it faster than we could make money on the domestic field. And that it called for some very dramatic changes in the international field.

ROSS: Oh good. Well that certainly provides a whole, another area...

MCDONALD: You see we had Remington Rand management people in the international field marketing and pricing and making decisions and commitments in this new technology and they were using...It was one thing to sell typewriters and office systems that way internationally and make them; a lot of that manufacturing went on overseas. Now it was a whole new ballgame.

ROSS: Let's turn to that another session. I do want to go back and pick up where we left off with D. L. Biddey. Is that who we were...?

MCDONALD: Dause Biddey...

ROSS: Dause Biddey.

MCDONALD: ...was brought in to head up the whole Remington Univac activity I would have to...I don't remember whether Remington Rand, all of its offices, I guess all of its office machines and everything were under him also.

ROSS: That's what I gathered.

MCDONALD: But Biddey was a very capable executive in IBM from the marketing accomplishments he'd won. Now it is quite possible that Dause had left IBM and gone onto something like Dastrom or something like that as a very short interim.

ROSS: I had read that...

MCDONALD: ...and was pulled in by Sperry.

ROSS: Yes, he was planning to take over Dastrom...

MCDONALD: Okay.

ROSS: ...and turned that position down because Herman had not been -- this is a subject that I really wanted to turn to -- two of them, in terms of personnel. Herman had not been able to find a manager within the Remington Rand system or organization so he went outside and he did so at the advice of a management placement firm called Ward-Howard Associates. And that's an intriguing thing. It seems that very major changes in the computer industry, not only in Sperry Rand but in IBM as well, were suggested from the outside by consulting firms. Were Ward Howell and Associates used frequently?

MCDONALD: Yes.

ROSS: Okay, so this is the side again of the computer industry...

MCDONALD: I don't know that they were used at all before the Sperry came into that.

ROSS: Did you employ -- now they're, they're a management placement firm.

MCDONALD: Oh yes.

ROSS: Okay.

MCDONALD: I used them myself.

ROSS: There are engineering consultants, marketing consultants, did you ever use any of those?

MCDONALD: Oh we had a lot of consultants, yes. I am trying to think of the various consulting organizations...But we had a lot of consultants assigned to us over the years.

ROSS: Yes this something that no one to my knowledge in the historical literature has investigated; it would be interesting to find out because it really does show you the origin and nature of causation in the industry. There's a lot of design going on there. We'll follow that up again too...

MCDONALD: One of the things the consulting thing did was it shortened the lines of communication to top executive management. In other words, they were able to talk to people and get a feel for it and then it didn't get filtered and biased and so on as it went up the communication organization chart. These people, to the degree they were able to -- to the degree they were able to assess the situation, were able to communicate problems and possible answers. Which I guess has turned out to be about the only benefit service and consulting can perform.

ROSS: That brings up an interesting topic. Do you feel that over time -- as time progressed, the computer industry became more like other industry? Do you see where I'm heading...

MCDONALD: I think possibly I do. Yes it did from this aspect -- that it had to earn a return on its investment and the emphasis had to be on the return on its investment, whereas in the very early stages it was not too difficult after World War II to get a few financial channels and you take the entrepreneurial organizations, so that it's even true with CDC when it started, there were people and organizations that would find you and that would permit you as an

organization to develop to a certain size, but now where you to go farther branch out, you had to take more risk, you had to make more investment decisions and now it was a whole new ballgame of executive decision making is what I call it -- analyzing the risk, bounding the risks, making decisions and you were always -- the computer industry sort of competing, in this management decision making resource allocation, with IBM. IBM never did, in the early days, go forward technologically very rapidly, but they were excellent business managers of decision making at the top, and what we found out very early was if a man came from IBM he was not a good, in general, broad executive because he was in a very highly structured environment. We had a lot of IBM men come into the company over the years and they weren't able to perform because they were very good in a very narrow field...But I'm digressing.

ROSS: No, not at all. That was my next question. Because it works out that Biddey was -- what you're saying, was an IBM man.

MCDONALD: Yes he was one of the ...

ROSS: He brought a lot of...

MCDONALD: ...broad IBMers, but he brought in Jay Schnackel, he brought in Gordon Smith and they brought in another fellow, I forget his name now, who was in charge of product management and things of that nature.

ROSS: Those were two I wanted to ask you about. You might be able to work up some material for the interview on those personalities. There was a lot of disagreement between the ex-IBMer and the RemRand or Sperry people on a number of management decisions...

MCDONALD: Yes, I'm sure there were.

ROSS: ...any instances that you recall. I'm asking you this...Right after the merger...Let me ask you about one that I'm familiar with. Vickers had a policy of not contracting for sale of the device, of the computer, before it had been made and tested, it had to be on line.

MCDONALD: Vickers.

ROSS: Vickers.

MCDONALD: Oh yes, sure.

ROSS: Okay. That policy didn't endure.

MCDONALD: It wasn't even applicable to the computer industry.

ROSS: Okay. That's what I...Well alright, but he impressed that on the corporation for awhile.

MCDONALD: Who?

ROSS: Vickers did. And...

MCDONALD: Old man Harry Vickers. Oh, sure but...

ROSS: The ex-IBMer, and you it appears, weren't accepting of that.

MCDONALD: Well, we worked toward that goal and many of the early problems that we experienced and the losses that we generated were because we did not follow that philosophy, but had we followed the philosophy there would

not have been enough financial resources allocated and enough time for us to have grown at the speed that we did.

And when I say us that would be true as us and...

ROSS: Anyone...

MCDONALD: ...all of us.

ROSS: For a number of reasons, one of which was obsolescence. What else?

MCDONALD: It was a ... well, there were enough in the field at that stage of the game who would take the gamble.

ROSS: Your talking about the late '50s early '60s.

MCDONALD: Right. Who would take the gamble and make financial commitments to a customer on a fixed price basis that they could development something, produce it, and install it in a certain time frame and they would make those commitments when they really hadn't designed the product. And this was going on during a period of time when the technology was changing very, very rapidly and so the timing of making those kinds of commitments became terribly crucial and you could see that after it was over but you couldn't see it at the time and this was the story of the File Computer, for example: File Computer 1 and of File Computer 2.

ROSS: For Univac.

MCDONALD: For Univac. So if let's say Univac, as it existed at that time, had said no we will not do that, we're going to develop it first they wouldn't have had a market, the competition would have moved ahead us. And of

course companies folded, financially folded or were actually bought out by others because they had done these sorts of things.

ROSS: Eckert-Mauchly, as early as they were purchased by Remington Rand, really had faced that situation.

MCDONALD: Yes, yes. There was an attempt at Eckert-Mauchly to follow that philosophy but you see there was nobody above them that could penetrate and assess; did they know what they were doing and yes they could produce this thing. They, in the engineering organizations, fully believed that they could do it, and one of the big difficulties there was the organization never, or in executive management analysis or thinking, never separated the development people and commitments from the engineering people and commitments. In other words, it was the development people who would have put it into manufacturing and of course a lot of the stuff could never be done. And it wasn't until you began to, organizationally at least, look at those two different phases and you may not have had enough body resources so that you put some guys in development and some in engineering. You would like doing that to some degree. But quite often you would have to look at the problem of commitment -- will this device...is it reproducible at the factory and is it going to be reproducible at a price and will the reliability so it will work when the customer bought it?

ROSS: Yes. The risks were definitely higher in commercial...

MCDONALD: Yes.

ROSS: ...commercial field. You didn't have the luxury that...

MCDONALD: And of course when you were dealing with the military or the defense organization it was somewhat different.

ROSS: That's what I was intending.

MCDONALD: Yes. Because you see you had more resources -- more financial resources, to work with, and you could do more things in duplicate.

ROSS: So to recap, you're arguing that while it was a viable philosophy, not to sell before you produced, it was impossible to meet, it was too high of standard at this point.

MCDONALD: Sure, sure.

ROSS: Who would you say was responsible for turning around that situation in Sperry Rand.

MCDONALD: The situation of...

ROSS: It's my understanding that that philosophy did not endure. Are you arguing that it didn't endure because it was an impossibility or that someone actually designed it out of the program.

MCDONALD: That became an objective and the decision making...Well this philosophy as expressed by Vickers, in oversimplified form, was put in the organization as a set of objectives. So then there were executive people in an hierarchy who recognized to the degree to which you couldn't do it to perfection and those who knew you had to do it to perfection and so you had those gradations of analysis and decision making in the organization and you then had more communication let's say between someone who said yes I think I can do it and the marketing man who was going to make the commitment to the customers: this is what we will offer to you. And you had a better understanding of the vagaries of the situation, of the difficulties that might be there but of course the marketing man who sold wasn't going to go to the customer with the question as to whether he was going to be able to deliver it; it was a fixed price and that he had to live with, but where they had the real trouble was they couldn't make the delivery schedules. And so now your question is: Who changed that? It was not an abrupt change but it was a gradual change so it was injected by the Vickers, I mean the Sperry organization when it came into power and position. I

think that the Remington people understood this as a desirability but they didn't recognize the tremendous vagaries in the technology, if I may put it that way. In other words, they could say, yes, from their experience, we could put together a typewriter which has these features or we could put together an electro-mechanical card punch reader type of thing that had these two features but they were dealing with already developed mechanical types -- electro-mechanical types, of concepts and machines and their technology wasn't changing that fast, where as over in the electronic industries advances were occurring very fast.

ROSS: So either you took the very definite risk of projecting yourself beyond your abilities and offered the product that you would be held to, but that's a very, very risky -- very uncharacteristic of American industry. That's a risk situation most people...

MCDONALD: I would say, uncharacteristic of pre World War II American industry but it became characteristic a lot of American industry after World War II.

ROSS: But a very high risk technological situation.

MCDONALD: Oh you bet, you bet.

ROSS: How do...most people are unwilling to live in that kind of world, how else can you control a situation like that? You can work internally as we've been talking about doing it -- through organization and planning. Can you do anything else? It's a terrible leading question.

MCDONALD: Yes, it must be.

ROSS: James Birkenstock...

MCDONALD: Yes.

ROSS: ...from IBM talks in an CBI interview about a couple of the mechanisms IBM used, and I'd just like to get your reactions to them. Stated very simply, IBM decided not to...well, they were patenting so heavily that the attorney's couldn't keep up with the technical side. The technological change, the pace, was very, very quickening and in order to continue doing very broad based research in electronics they decided to publish rather than patent many of their findings, to use copyright laws to protect those ideas rather than patents. Okay, so they patented task oriented research. The broad and general nature stuff they would in essence make public through another vehicle that they could control. And Birkenstock very deliberately calls that a mechanism by which they would control the rate of technological change. And what he means is that they were enabling themselves to conduct very broad and general research by which they could control the field -- they could respond to their competitors. If their competitors came up with something, they were very likely to have a controlling patent on an aspect of it. Do you see where I'm going?

MCDONALD: Yes.

ROSS: Rather than take...

MCDONALD: Somewhat. I think he's being a typical IBMer.

ROSS: Okay, it's a very involved discussion that he had and maybe I should have you take a look at it, but he, in essence is saying that IBM was able to control the rate of technological change. What this is...

MCDONALD: He wasn't able -- they were not able, to control the rate of change in technology. I'm going to say this from what you have told me. I don't think they were able to control the rate of change of technology. I think that is what you said now.

ROSS: Yes, well I did and it's not what he said but what I...

MCDONALD: Yes, well okay. They were, through that device, building a protection, or hoping to build a protection, against others who were moving forward in the field very rapidly technologically. And they probably thought that they had to do this because...What they were really doing was, they were looking at their ability in the market place to control introduction to the marketplace of technological change.

ROSS: That's a much better way of stating exactly what the principle was.

MCDONALD: And in the Remington Rand computer organizations the significance of patenting varied. In the St. Paul organization it was hard to get patents because the engineers didn't want to take the time to prepare the necessary paperwork for the patent disclosure which would start wheels of motion for patent applications. And to a large extent they had that feeling because they were pressed for time and they didn't want to take time out to do that sort of thing. They wanted to get the job done. I think there was a greater attention being paid in the Eckert Mauchly organization to taking the time for filling a patent and, therefore, developing the necessary information and also probably greater recognition given to the individuals who received patents in that organization. Now part of this was true because in the St. Paul organization was working on defense programs and a lot of the stuff would go to the government either way so that there wasn't the same kind of motivation.

ROSS: And Eckert Mauchly had a good reason to protect themselves.

MCDONALD: Yes. Well we. I think that this is the way that we looked at it (in St. Paul).

ROSS: I wanted to turn the question around. I was leading into a much bigger area and that is: Who were your principle competitors and what and how did you know about them? What did you know about them and how did you know? You can define this in any period of time that you'd like.

MCDONALD: Well, of course, IBM was a logical competitor and Burroughs was at times in that picture to a degree the...,I forget now what the predecessor of the Honeywell group was. It was Raytheon but it didn't seem that we met them in the competitive market very much.

ROSS: Well the computers were...

MCDONALD: Delco was in there too to a certain degree as a competitor but I think probably we were focusing primarily on IBM

ROSS: And how did you view your competitors...

MCDONALD: Well, I think...

ROSS: ...from what perspective.

MCDONALD: ...I think that we viewed them from this aspect: that technologically they did not seem to be very well advanced and we thought we could beat them technologically regularly. We did realize that they..had more people who seemed better in the marketing organization, in sheer numbers, who could sell (I'll just use that term "sell") the product and they were backed up by more executives in the hierarchy selling into the customer world. In other words, I guess that I would say that at that stage of the game the IBM executive group was better coordinated in selling this new stuff that they were willing to produce and they sort of moved ahead gradually. Then every once in awhile IBM obviously became very concerned over what the Univac organization was putting out and they went like hell to catch up with us and in the interim until they could catch up they would ask questions as to whether the Univac I was going to be a viable product and whether they could stay with it. And, of course, this went on in the LARK program. I don't know if I have helped you much in that area.

ROSS: You have; not so much about how you knew it but from what perspective did you look at them. And clearly you've indicated that your primary competitor was IBM.

MCDONALD: Right.

ROSS: Let's see.

[BREAK]

MCDONALD: I was talking with a high degree of knowledge at that stage of the game more about ERA and its customer-base and the Eckert Mauchly and its customer-base, so I'm not too good at being able to paint a picture of what the corporate management, which was full of very competent marketing people in Remington Rand, what their analysis of the competitive situation was, but I am pretty sure that is the top marketing executive way they looked at it. Howard Widows was the top marketing executive at Remington Rand and responsible for all of the commercial customers, I have that feeling.

[BREAK]

MCDONALD: In other words, you learn as you get higher in the organization what the concerns were back three years ago, and so on.

END OF INTERVIEW