

An Interview with
ROBERT L. WESTBEE
OH 112

Conducted by Arthur Norberg
on
5 June 1986
North Oaks, MN

Charles Babbage Institute
The Center for the History of Information Processing
University of Minnesota, Minneapolis
Copyright, Charles Babbage Institute

Robert L. Westbee Interview
5 June 1986

Abstract

Westbee begins with a description of his early life and education. The focus of the interview is his work with magnetic storage at 3M. Topics include: the work of Bill Wetzel on magnetic tape at 3M, the work of Sid Rubens at Engineering Research Associates (ERA) on magnetic drums, and the interaction between 3M and ERA.

ROBERT L. WESTBEE INTERVIEW

DATE: 5 June 1986

INTERVIEWER: Arthur L. Norberg

LOCATION: North Oaks, MN

NORBERG: We're in the home of Mr. Robert L. Westbee, a retired employee of 3M Co., in Minnesota. Mr. Westbee, can I ask you to tell me a little something about your background: where you were born; what your parents did; what sort of early education you had?

WESTBEE: Well, I was born and raised down in a little town in southern Minnesota named Ballatin, southwestern Minnesota. When I graduated from high school I came up to the University, and took electrical engineering. I graduated just at the peak of the Depression. I stayed on for another year, because there wasn't really much else to do, and I got a master's degree. During the time I went to the University I worked for the telephone company evenings and nights. I paid my way through the University doing that.

NORBERG: Let me step back for a minute. What did your father do?

WESTBEE: My father died when I was a year and a half; he was a storekeeper. My mother married again, and my stepfather was an undertaker.

NORBERG: Did your mother maintain the store after your father died?

WESTBEE: No, no. The store was sold. He had two other children who went on to California: one became a dentist and the other became a teacher. They were about fifteen years older than we were. My father had been married before, and his wife had died seven or eight years before he married my mother.

NORBERG: What was the high school you attended like?

WESTBEE: It was a very good high school. It was a so-called consolidated high school. We had a very excellent

superintendent, his name was Almain. He came from a family of ministers and teachers, and was a graduate of Gustavus Adolphus. He later became a senator.

NORBERG: U.S. or State?

WESTBEE: State senator. It was a very good school. He was an excellent administrator, and a very good professor, you know, I mean he was a very good teacher.

NORBERG: Good in what sense? What type of courses were available?

WESTBEE: He was good in the sense that he understood people, and he understood especially people from local communities. He had been born, his father was a minister in a little town close by. One of his brothers was a minister, and one brother had the newspaper at Truman, Minnesota. They were very high class people.

NORBERG: What sort of courses were offered? Particularly say in the sciences and engineering? Anything?

WESTBEE: Well, we had algebra, higher algebra; but not at the grades where they have them now - they were in high school. I think we had geometry, I'm sure. That was one thing when I came to the University, coming out of a small school like that, it was relatively easy with the competition you had there, and when you got up to the University, of course, it was a lot tougher. And especially during the Depression years, because the engineering school figured they had enough engineers now and they didn't need any more. Of course a state university is, I suppose, by the very nature of it, endowment and everything, has to almost let everybody in, and they used the mathematics department as a weeding-out place. And to be frank, I had to take several courses over again. One fellow that we had flunked I think it was 28 out of 33 of us, and that same fellow ended up by teaching - there were three professors, one died, one got sick, and this guy ended up teaching all the classes. God, he was a rough fellow. But I don't know that it hurts you any, excepting that I would have appreciated having somebody teach me more than pound me on the head.

NORBERG: Did you have any physics or chemistry in the high school before you left?

WESTBEE: If I remember, we had some chemistry. Course it's so long ago, I can't really remember.

NORBERG: Okay. What year did you graduate from high school?

WESTBEE: '28. 1928.

NORBERG: '28. I can't help noticing *QST* sitting here on the table in front of us. Were you a radio ham then?

WESTBEE: No, no. I became a radio ham, oh, maybe 20 years ago.

NORBERG: So, '66 or so.

WESTBEE: Yes. Maybe '56 or so.

NORBERG: What made you decide to attend the University of Minnesota? What sort of things went into the decision to attend.

WESTBEE: Well, this...Oscar Almain, the superintendent, I asked him about going to Milwaukee School of Engineering, because I'd read about it in *Popular Mechanics*. All my life I'd been interested in experimenting with electrical things, fixing things, and so I'd seen that. He said, "If you're going to go away to school, why don't you go to the University?" And he gave me the name of a friend of his that had an electrical maintenance and repair shop over in Minneapolis, and I went up to see him. He sent me over to the telephone company - he'd heard they were hiring - and I worked that summer setting telephone poles down around Mankato. And then, when I got through that year, why, I came up here and got a job first waiting on tables at a fraternity house, and then went down to the

telephone company at around Christmas time, and got a job that I had until 1933. It was, you know, a good job in the evenings answering repair calls.

NORBERG: So, it was really the superintendent who was influential in helping you to decide about the University of Minnesota. Now, you mentioned that you were interested in things electrical for some time.

WESTBEE: That's right.

NORBERG: How did this interest come about?

WESTBEE: Oh, I suppose by reading books and reading about Thomas Edison and people like that, you know. That's a hard question to answer. I don't know how you get interested in things - I suppose just by reading, and I used to buy books on electrical theory, and things like that.

NORBERG: Well, the other way to become interested is to be associated with someone who is also interested, like your stepfather, or the next door neighbor, or something like that.

WESTBEE: No, no, he wasn't interested.

NORBERG: So you came to the University, and you've mentioned the mathematics programs as somewhat difficult. How about the engineering?

WESTBEE: The engineering wasn't. I got pretty good grades in electrical engineering. I didn't have much trouble with the engineering part.

NORBERG: What were the options in engineering in 1930, when you came here?

WESTBEE: Well, there were two: there was power and there was communication. Dr. Hartig I became very friendly with after I graduated, but I had great admiration for him; you know the kind of thing where you kind of understand each other. He headed up the communications end of it. I thought he was an excellent professor, an excellent teacher.

NORBERG: Which side did you specialize in, power or communications?

WESTBEE: Communications.

NORBERG: As you were coming up on the end of your four years there, what sort of outlook was there?

WESTBEE: None. There were 80 in our class, and there wasn't anybody got a job. And I got laid off at the telephone company in the spring of the following year. I went on to take graduate work, graduate school, and then I got laid off. But I finished it up, got through in June. Then it was through Dr. Hartig that I got the job at the 3M company. They came over looking for somebody, and he suggested I go over and talk to them.

NORBERG: What sort of job were they interested in hiring someone for?

WESTBEE: Well, they were just starting electrostatic coating of sandpaper. They'd hired somebody, a fellow named Marchant from General Electric Company to put the equipment in, and he was a relatively secretive sort of fellow. So the people that ran the sandpaper laboratory, where they did the testing, couldn't find out much from him. So they hired me as a kind of a spy/assistant. I didn't find that out for about six-seven years. But anyway, I went over and worked with him in this electrostatic coating in the sandpaper end. Then about 1935, they were just getting started making, selling paper electrical tapes for coil winding, and the fellow that was doing the work in the laboratory wanted to go into central research, in more fundamental research. I was getting pretty disappointed in the sandpaper part of it, disillusioned or whatever you might say. So I'd gone down to Western Electric and got a job offer down there. But when I came back the vice-president of research, development, and manufacturing, Carlton, suggested

that I ought to try the electrical tape end of the business for a while, and then if I didn't like that I could always go down to another job someplace. So I did that.

NORBERG: What was involved in the electrical paper tape?

WESTBEE: In 1928, the company had made a masking tape, and it had an adhesive made of glue and glycerin, and this was used to mask cars when they painted the stripes on them and things like that. So people that made coils, and most of the coils at that time were made at Fort Wayne, I don't know why, but they just started making them, and they would make coils by winding a long strip on a pasteboard core, and wind maybe 20 coils at the same time, and then they'd take a piece of this masking tape and put it across to hold the wire where it started to hold the finished wire. Well, it turned out that this material was very corrosive, and in the early days of the tube radios there was pretty high DC voltage on those coils, like I don't know a hundred and fifty or something like that. So they'd corrode that little wire, that 48 wire off. So we started a program at 3M of trying to find that out. First, we thought it was the adhesive. It turned out that these fellows did some quite original work, and they found out that cellulosic material, the paper, would corrode under DC potential. So they made the tape with cellulose acetate cloth on paper. This led us into the business of electrical tape. We made four or five kinds for manufacturing, and we got into the plastic tape for home wiring and industrial wiring. So that's the way we got into that.

NORBERG: What part did you play in the development of that?

WESTBEE: Well, I started out working in the laboratory developing and carrying on the work that these other two men had done. And then, we were selling it through our salesmen that sold abrasives, and I made the statement to the sales place president, that I didn't think that was the way to do it. He said, if I was so smart then why didn't I try it. So, next thing I know I got a bag and a territory, and off I go down to live in New York and be a salesman. And I was a salesman for two or three years, and then I came back and built a sales force around the thing. So I mean, I just happened to be there when the streetcar went by, I guess.

NORBERG: And how successful was that sales program that you developed?

WESTBEE: Well, we started...when I went down there we had \$18,000 worth of business in this territory and I can't remember what we had when I got back, but when I retired we had 20% of the total business in the company, which was about, maybe pretty close to a billion dollars.

NORBERG: When you say 20%, is that in the country or the company?

WESTBEE: Of the company.

NORBERG: Of the company?

WESTBEE: Twenty percent of the business of the company was in our group. So we turned out to be very successful, as far as that goes.

NORBERG: Did you like sales?

WESTBEE: Well, I liked the kind of selling I was doing. I guess I wouldn't have been a very good salesman for apples or shoe polish, but I liked to sell the technical products. You were talking to your own kind of people, people like engineers at Western Electric, and General Electric. They were our big customers, and people like Alkstads (?) and...so I guess it was all right. I wouldn't have said I was a salesman though.

NORBERG: How long did you stay at that task within 3M?

WESTBEE: Well, I started out as a salesman. I was a salesman for three years, and then I was a sales manager for maybe ten years, and then I was a general manager, and then a vice-president, division vice-president, group vice-president. So I was on that same job, outside of the three years I worked in the sandpaper division, the whole forty

years of my existence over there.

NORBERG: Then what was your connection with magnetic recording?

WESTBEE: Well, we started making magnetic recording tape because Brush had brought back, a fellow named Begun, had brought back a recorder, a Magnetophone from Germany, and had made this recorder. The only tape they had was some that they'd gotten with the Magnetophone, and this was a tape that had the iron oxide all the way through the film, not coated on it. It was all the way through. So they sent us some black oxide and wondered if we could coat that on some film for them. So we did this and sent it back. It happened that Dr. Wetzel, who was in our central research division and some of the other people, had done quite a little work on magnetics during the war, degaussing ships and things of that kind. So we started a program of trying to determine a better oxide than this black oxide. Black oxide had a lot of memory and things undesirable characteristics. It was kind of a blocky oxide, whereas the one we developed was circular I think you call it. It was this long and thin. So in our development group, we did quite a lot of work on the thing. But it was put in our division because we had electrical products and the people to do it. So they decided that they could place it with us.

NORBERG: What was your role in this? If you were now on the sales force?

WESTBEE: No, by this time I was a general manager. This would be like 1950. I was the general manager of the electrical products division.

NORBERG: So, how closely did you work with Wetzel and Herr and those people?

WESTBEE: They worked for me. Then when I became group vice-president, Bill Wetzel became the division vice-president, and a fellow named Holton was vice-president of the electrical products division.

NORBERG: Well, in connection with their work on magnetic tape, what sort of decisions did you have to make for

the company? Do you remember any of those? For example, did it ever come up that maybe 3M shouldn't be in the business of making this magnetic tape? What is magnetic tape after all? What's the market for it?

WESTBEE: Well, sure. It was one of the big things, there was a lot of people that thought you couldn't make any money by making something that could be used over and over and over again, because the old philosophy...

[INTERRUPTION]

NORBERG: We were talking about the discussions inside the company with respect to making products that people could use over and...

WESTBEE: And one of the biggest jobs that we had, a fellow named Roy Gavin and I had a job of trying to get somebody to make them a recorder, because the only one making one was Brush, and they weren't really doing a very good job. So Roy and I took these Brush recorders, and we spent months trying to get people to make recorders. A lot of people tried, and there weren't any of them very successful until Revere finally got into it. They'd make cameras and they had a lot of expertise in mechanical stuff. So they really made the best, the first one that really worked very well.

NORBERG: What was wrong with the Brush recorder that it wasn't satisfactory.

WESTBEE: Well, you know, it's a long time ago, but one thing, it ran very, it ran seven and a half inches, or fifteen I can't remember, seven and a half I guess, and then it rewound at about ten times that fast, and it had metal reels... But I think when you ask that question, it's a hard one to answer. But I think Brush's problem was that they didn't really understand the retail business. They were more in industrial business. And I think that we just thought that if we were ever going to sell any tape to amount to anything we had to have more than one person involved in it. And there was quite a little resistance to 3M being in that kind of business. You know how things get started and people repeat things? Well we had a saying out there that we'd never made any money by selling machinery. I don't think

that was true, but when you get enough people saying that, you know. We didn't really ever have a belly to get into it. Later on, in 1956, we bought a little small company that made recorders for the National Security [Agency] and other places. Mincom, and so we did finally end up in that business. We ended up by buying Revere, too, before we were through. I don't know if I'm making myself very clear.

NORBERG: Oh, yes you are - that's not the problem: I'm trying to make sure that we sort it out as we go along. It seems to me that in the case of 3M's decision to go with something like magnetic tape, if we assume for the moment that there is a machine to use it on, whether it's Brush or Revere or whatever, then the decision seems clear. But what you're suggesting to me is that when the decision was being made, as to whether 3M should manufacture magnetic recording tape, that there wasn't even a good machine to use with it? Is that a correct interpretation?

WESTBEE: Sure. Well, you know, it's funny, Mr. McKnight had a real feeling that magnetic recording was going to be a big thing, and he kept after us, encouraging us to do this. Of course, one of the things 3M knew how to do was coat things. Our whole existence pretty near was making things by taking wide webs of paper or plastic, with sandpaper you know, or abrasive cloth, or pressure sensitive tape, or so-called scotch tape. All those things were always made that way. One time he said that this was the only thing we'd ever gotten into where we didn't have to buy any new machinery. Well that turned out to be the biggest laugh of all times, because it wasn't over two or three months before we found out we had to have different, completely different coating equipment to put the kind of... The first time we made it we coated it on a cellophane film, and then laminated it to an acetate film and peeled the other off in order to get a real flat surface. Then later we learned how to do it, you coat it by rotogravure press. But it was natural for us to make tape, you know. After all, that was about the easiest thing we could do. We had to unlearn a lot of things, like you couldn't cut holes in it like we did when we made sandpaper to get samples out of it, because people didn't like their tape cut in two. They didn't mind it when they cut it in two for editing, but they didn't want it cut in two when you did it.

NORBERG: You mentioned Mr. McKnight now a couple of times. What was your association with McKnight?

WESTBEE: Well he was president, chairman of the board, and I was vice-president in charge of these electrical products. I worked for him after I got to be a general manager.

NORBERG: Now, would you report directly to McKnight as general manager?

WESTBEE: Yes.

NORBERG: So, there was reasonably, daily contact then?

WESTBEE: Yes. And while he was extremely interested in magnetic tape, we'd have meetings every few days, because he'd...well, I'll tell you a kind of story that...there was...the man that was president of Monsanto was Queeny, his name was. He was chairman of the board. We got a call from him, Mr. McKnight did, that he wanted to come up and talk about magnetic tape, so we have a couple of sessions wondering whether he wants to buy the magnetic tape from us, whether he wants to buy the company, what happens. So I go down to the airport and pick him up and then get out to the office, and Mr. McKnight and Queeny spar around for a little while asking about mutual acquaintances. It finally turns out that Queeny is a great expert on recording and photographing ducks and geese, and he wants to get some help on how to record duck calls. So, what I mean this is the kind of thing that there wouldn't be a day go by but what somebody wouldn't be interested in magnetic recording. Whether it was RCA...McKnight got to know General Sarnof, through their, I guess, they lived fairly close together down in Florida. So we spent some time with him down on Mr. McKnight's boat, and we made private label tape for them. Then we got involved with IBM, because they started in the recording, or in the computer business, and they started making their own tape. Tom Watson decided that somebody else ought to do it. So he came out here and he and McKnight and the rest of us sat down and we made the recording tape for him and they tested it and sent it back. And we did that for ten years on just a handshake business. So every day there would be something. And because McKnight was interested, why that made it easier for the rest of us, because you know, if somebody got to arguing about whether you ought to be in the business, you could tell him to go talk with the fellow upstairs.

NORBERG: Well now, when you mention things like Monsanto and RCA and IBM all in the same series of breaths, that suggests that we're conflating maybe six or seven years worth of development activity, because I would think that the tape necessary for IBM, which was really data tape as opposed to audio, which Monsanto, the president of Monsanto, was interested in, and RCA was interested in, at least in the beginning, there would be a difference between let me say the quality of the tape necessary for the two purposes, audio versus data. Now, how did 3M learn that there were such differences, and who participated in uncovering them?

WESTBEE: Well, as I say, just to use that IBM as an example, and I can't remember what year that was, but it was around 1950, young Tom he was called, to differentiate him from his father, came out here, and he said if we would make the tape, they would set up a testing facility close by, and they would test the tape and return that part of it that didn't pass their test, and we could use it for something else. So we made the tape. We had a brand new plant out at Hutchinson. We made the tape; we hauled it in to Minneapolis; we'd haul in ten thousand rolls, and bill them for it. At first maybe they'd send nine thousand of them back, and pretty soon we got so they were keeping half of them, and they were keeping, towards the end they were keeping maybe 85, 90% of them. But that's the way we learned, by them telling us what the dropouts were and what the problems were. And then, of course, at that time Ampex started to make the delayed broadcast recorders for Bing Crosby. In the same way, they had a couple of rolls of tape...

TAPE 1/SIDE 2

WESTBEE: ...that Jack Mullin had brought back from Germany when he was over there in that so-called Signal Corps. And Ampex built a machine, and then they found out that they had to have more tape. So we developed a tape that worked on their machine. It had black oxide. It was a peculiar tape, but they didn't have enough bias to use our regular tape. But it was pretty easy in those days to, where we had control of the oxide, control of the coating and everything, to almost tailor, if you knew what the fellow wanted, you could almost tailor a tape. You'd find lots of problems too. You'd find tape would stick and tape would do this you know, and slide over the heads, and do funny things, but it was a case of learning, you know, learning by doing that. I can't think what year it was that we made that first tape for...but it's all about the same time when we...I think the IBM thing might have come a little bit later.

NORBERG: 1950 sounds about right to me. The Ampex would have been a couple years earlier. I interviewed Alexander Poniatoff some years ago before he died. And he told me...

WESTBEE: So he has died?

NORBERG: Oh yes. He was 89 when I interviewed him, and that was ten years ago.

WESTBEE: I got to know him quite well then, in those early days.

NORBERG: Yes, and we discussed the interaction between 3M and Ampex in those early years for Ampex. In connection with the development work in selecting different coatings and experimenting with them and so on, do you have any recollection of how things were decided. Did you ever talk to Wetzel, say, about what sort of development was going to be done during the course of a given period, or was this customarily customer driven, as you've just suggested?

WESTBEE: I don't know how to answer that. We weren't that big. We probably, I don't know how many people we had in the laboratories, I suppose fifty or a hundred or something. I had the two divisions, the electrical products and the magnetic products. Well Wetzel and I would talk every day, but I think that most of the research at 3M was customer driven. I think that that's one thing that 3M was pretty good at, they let the technical people get out in the sales, and they let the sales people get to talk to the technical people. Most of the products that came out came out because somebody said, well, you know, if you could do this or do that, it would work a hell of a lot better.

NORBERG: Do you remember any associations with ERA?

WESTBEE: The only thing I can remember with ERA was that there was a fellow over there named Sid Rubens, and he was making a magnetic drum. I suppose it'd be the equivalent of like the floppy disk or the hard disk is nowadays.

But this was a big drum, had a lot of multiple heads on it, and he wanted some oxide to put on that drum. And I remember Bill Wetzel and Sid Rubens apparently were pretty good friends, I don't know whether they'd gone to school together or what, but Bill smuggled some of it over to him. I know the patent lawyers were mad at him for that, because they were getting patents on this particular oxide. But that's the only thing I can remember about that. After it became Control Data, of course, why we had quite a little bit to do with making tape for them over the years.

NORBERG: Well, as I understand the situation in connection with the coating, at first just tape was being supplied, and Sid was cementing the tape onto the drum, and then they were statically recording, but dynamically reading the information using Brush heads that they had been buying. Now, that was found to be unsatisfactory, because first of all tape didn't always stay cemented to the drum. Secondly, there were differences in level above the surface of the drum and that interfered with the heads and so on. And that's when Sid asked, apparently - this is what Sid told me himself - he asked for some sort of coating so he could coat the drum, and initially was refused. And the reasons given were that such things had been given to other places before and they were getting out into other hands, into the hands of competitors and so on, and that was not a good thing for 3M. 3M...

WESTBEE: Well, we never did. We had a pretty strong patent position in pressure sensitive tapes and in sandpaper, and we never sold any of the adhesives. Well that's kind of an exaggeration, too, because we had a big adhesive division that sold adhesives for car assemblies and windshield sealers. But we wouldn't sell the adhesives that we used in making pressure sensitive tapes to anybody. We thought that was ours.

NORBERG: Was that a policy so as not to get them to be producing tape, which would then be sold in competition with 3M?

WESTBEE: Yes, yes. You see we had patents, strong patents on it. We'd show sell anybody at the drop of a hat that started making pressure sensitive tape or transparent tape. We had quite a few suits, with Johnson and Johnson, and other people.

NORBERG: But then people relented on giving ERA the oxide.

WESTBEE: I don't know if anybody really relented, or if Bill just slipped it over to Sid when nobody was looking. That's the way I kind of remember it. Maybe Sid thought we'd relented, but I don't think that, I don't think any of those patent attorneys would have. If they knew Bill was doing that they'd have killed him.

NORBERG: But in fact it seemed that when the coating was supplied to ERA, it was put in an emulsion or some sort of dispersion, such that it could not be used for the production of tape, it could only be adhered to that drum.

WESTBEE: Well, maybe, but I don't remember that. But I remember that Sid wanted Bill to give him that adhesive, but Bill couldn't. He had to kind of take that out the back door, because... Well, what he told Sid and what he was telling the patent people I think were three different things.

NORBERG: But you don't recall any other contacts with ERA except Wetzel, Herr and...

WESTBEE: No, no.

NORBERG: How about with other companies? What was the association with Brush Development?

WESTBEE: I can't remember too much after... We made tape for them for awhile, under their label, and I don't... They kind of fell by the wayside. Their machine really didn't work as well as some of the like Revere and some of those people that...they just kind of went out of the business.

NORBERG: But before they went out of the business of producing recording machines, they were able to supply a large number of heads to other people for use in their own either development...

WESTBEE: I think so. I think they were, you know they made oscillographs, and I can't remember, but they were

largely manufacturers of instruments and instrumentation. I don't think that they probably thought very much of being in the recording machine business. Funny thing, I just don't have a clear recollection of that at all. Maybe you know something more about it than I do.

NORBERG: Well, I'm sorry to say I only know what I've read in the published literature of that time. Begun put out a book, for example, on magnetic recording, in which he talks a lot about Brush recorders and head development and the theory behind it and so on. It turns out that one of the better set of heads that were developed were done by Robert Herr at 3M, when ferrite material became available in the early fifties from Philips. And when that came on the market, then there really wasn't very much competition from anything like Brush recorders. But Brush was very significant I think in the period from about '43 to about '47 or so. They spearheaded most of the development that other people picked up.

WESTBEE: You know, I was going to tell you, and I'll do it before I forget there was a fellow named Charlie Alden who has written up...he's one of those who worked in magnetic tape for many years but he's in retirement now, but he's spent some of his retirement writing up a history of magnetic recording. And he'd be a very interesting fellow to talk to, because he's very, very lucid, if that's the right word, and articulate.

NORBERG: How's the name spelled?

WESTBEE: ALDEN.

NORBERG: Is he local?

WESTBEE: Yes. He lives over by where I do. I could look up his address for you.

NORBERG: Yes, I'll ask you to do that before I leave. How did this develop in 3M then? Here we've talked about providing tape to other companies like Ampex and IBM and so on. You mentioned that in roughly 1950 or so that

this tape was bringing in 20% of the company's gross revenue.

WESTBEE: No, 1970. I'm talking about...what I said was that when I retired in 1974, the electrical products group, which consisted of electrical products, magnetic products and the other divisions, it represented 20% of the company's sales.

NORBERG: I see. I didn't catch the 1974. What was it like then in 1950? What was the electrical products division able to contribute to the company's revenue then?

WESTBEE: Oh, I don't know offhand. I would suppose maybe ten percent or something like that.

NORBERG: Do you have any guess as to how much research and development, what the balance of funds contributed to research and development in magnetic recording versus other development around the company?

WESTBEE: Well, I would think that as a percentage of sales it would have been about the same, because they tended to try to keep us all at about the same percentage of sales.

NORBERG: So roughly 10%.

WESTBEE: No, no, around 5%.

NORBERG: 5%?

WESTBEE: Yes, around 5% of the total of sales. But these were big profit makers in the early days when we had pretty near a monopoly on it. We made a very good profit. That was true of all of our electrical tapes, too.

NORBERG: Now, let me get something else clear while we're talking about this. You became general manager of the

electrical products division. Then you mentioned you became vice-president. Was that also of the electrical products area, or were several things then combined?

WESTBEE: Well, in 1953 we bought a company that made insulating varnish cambric and insulating materials, and so-called spaghetti tubing and things like that. And we also bought a ceramics company down in Chattanooga. And that's when I became vice-president, these four divisions were in our so-called group.

NORBERG: Was that still labelled the electrical products group?

WESTBEE: Yes.

NORBERG: So the ceramics were being used for some sort of electrical products.

WESTBEE: Yes, yes, that's what it was. These were electrical ceramics. They weren't standoff insulators, but they were like the kind of things that you wind coils on, or that you make capacitors out of, that sort of thing.

NORBERG: How was the company growing at that time? 10% a year? And I mean now in terms of personnel?

WESTBEE: In terms of personnel? I'd say maybe closer to 15%.

NORBERG: 15%? And was magnetic recording growing at the same rate?

WESTBEE: Yes. Well, magnetic recording was growing at probably the two fastest, well, electrical products, magnetic recording and the so-called thermofax or duplicating products were the fastest growing part of the company at that time.

NORBERG: Where was most of the development going on? Was it in...

WESTBEE: We each had our separate laboratories.

NORBERG: Yes. I guess I was still sticking with the magnetic recording and trying to understand where the development was being placed. Was it in better tape? Was it in machinery for production of tape? Was it in machinery to use the tape? And how did that change over time?

WESTBEE: Well, I don't know that I quite understand how to answer that. I suppose it was going on in all those places. There was a lot of work being done on oxides and manufacturing of oxides. A lot of work was being done on trying to develop superior performance tapes. There was work done on adhesive, or the coating materials, slipping, you know, lubrication. There was work, there was a lot of test work in the laboratories, you know, we had one of pretty near every kind of machine you can imagine to test a tape on, to see what a customer's problems would be. Have I answered what you're asking?

NORBERG: Yes. Where did these testing machines come from? Did you buy them outside or develop them yourself?

WESTBEE: No, no. Well, some we developed ourselves, but lots of them we just, for example, we had several Ampex recorders, the audible range. Then when we got into video tape, we would buy the video recorders, depending on whose they were. IBM furnished us with a whole set of test equipment after they shut down their testing laboratory, and we bought the equipment from them and set it up out at Hutchinson.

NORBERG: Was most of that equipment commercially available for other purposes?

WESTBEE: Not the IBM, that was special equipment. But the Ampex recorders, we bought standard off the shelf recorders, or Sony recorders.

NORBERG: What sort of quality control was involved in these? You know, we talked about IBM simply testing the devices, testing the tape that is, to see how they'd performed what were the type of measurements to be made?

WESTBEE: Well, for example, with the Ampex we wanted to be sure that the tapes would run on the, you know that they wouldn't block, that they wouldn't stick, that they didn't have any dropouts with the video so that you wouldn't see that thing going across the screen.

NORBERG: So once you get some sort of audible response, or not an audible response, but a radio frequency response, you understand whether there are drop-offs or not.

WESTBEE: Now just kind of coincidentally, we developed some things like a dropout compensator, where you'd get a memory in it, and if it came to a place where there was a dropout, you could go back, it went back, and picked up previous and put it in there. Do I make myself clear?

NORBERG: No, I don't understand what you mean by "the previous and put it in there."

WESTBEE: Well, the picture consisted of a lot of similar pulses. So as you went along the memory said what had been seen previously, so if there was a dropout, this filled in.

NORBERG: Yes, yes, I know what you mean now. It would just pick up the previous signal and insert it there and keep going along the tape. But that's something you find out after you're already using it, as opposed to during a quality control process.

WESTBEE: Yes. Well this was a machine that we sold to the NBCs and CBSs and people like that that helped make the tape work better.

NORBERG: And had that machinery been developed in 3M?

WESTBEE: Yes. It was developed by them - a fellow that just retired.

NORBERG: This sounds like a very interesting part of the story. The decision to get into video tape - how was that made within 3M? Was that also customer driven in the same way the other ones had been?

WESTBEE: Oh yes, sure.

NORBERG: Who was the customer doing the driving? Because by that time Ampex was already in their own business of producing tape.

WESTBEE: Well, but really, they weren't. They got into the business but they still depended on us for most of their tape that they used. We made tape for Ampex for years and years. And of course with Sony, they made their own tape. But then, you know, if there was machines out there, maybe Sony was trying to sell tape for their machines, maybe Ampex was trying to sell tape for their machines, and RCA was trying to sell tape, but so were we. And the same thing for...we had this arrangement with IBM, we sold a tape to them and they were the exclusive sales agent for their tape, but then when our people, once IBM decided they were going to make tape then our people would try to sell tape, you know, to the banks and places like that. Burroughs, you know, they were... if the salesman was around and he saw this big customer with all this tape usage, the insurance company, why of course he was very interested in getting that business.

NORBERG: That makes sense. What about the video now? How would you get into the video business?

WESTBEE: Well, I suppose the same way we got into everything else. Business was there and we made tape to work on the machines.

NORBERG: So the video recorders would have had to have been developed by that time in order to be able to decide

whether there was going to be a market. Did 3M have a policy of not entering a market until it was established.

WESTBEE: I don't think so.

NORBERG: You wouldn't say that's the case with magnetic recording tape...

WESTBEE: We tried, just as a kind of a recollection, we tried to make a video recorder. This fellow Mullins was out there in our Mincom plant, and we were trying to record, oh, just multiple tracks on a wide tape. And Ampex had worked on this revolving head, and not been able to make it work. And this fellow Goldberg just decided it was really close to working, and he got that thing to work all by himself, and it's kind of forgotten. But they demonstrated that at the NAB show, and I remember calling up the president of, Ingdahl, the president, he was later I think president of RCA, but at this time he was head of their research and development, and he said "well, that'll never work. We've tried that many times," but they made it work.

NORBERG: Goldberg, or Ginsberg?

WESTBEE: Ginsberg, not Goldberg.

NORBERG: Charles Ginsburg. So did you people see that performance at the Broadcasting Show?

WESTBEE: Yes, yes.

NORBERG: Had you already been thinking about video at that point?

WESTBEE: Yes. We had a pretty good sized video program ourselves, and we couldn't make it work. Because we were trying to do it at a straight run through the thing.

NORBERG: I don't know what you mean by "straight run through the thing."

WESTBEE: Well, instead of having revolving heads this way on the tape you know, we had just multiple heads where we would pass the tape right by the head in a straight line.

NORBERG: Its like the audio recording, trying to do the same thing?

WESTBEE: Yes, just like the audio. At that time we were making multiple head recorders for the National Security [Agency], and the CIA, and people like that.

NORBERG: Were you aware of the work going on at other places like CBS, as well as at Ampex?

WESTBEE: Yes.

NORBERG: Any association with those people? Providing them with tape say.

WESTBEE: I don't remember. We have pretty close association with CBS, because we had a research project with them on developing a player, an audible range player. We stacked the tapes up and so forth.

NORBERG: One last question. I've mentioned Wetzel and Herr and yourself, McKnight came into the conversation. Which other people do you feel were significant over that period from '45 to '60, in terms of development of various kinds of magnetic recording materials at 3M?

WESTBEE: Well, Bob von Behren of course.

NORBERG: What role did he play?

WESTBEE: He was head of the laboratory. After Wetzel got to be the general manager, why then he became the head of the laboratory. Then he went on to develop a small instrumentation recorder that is used to record data. It's very successful now, about a million dollar business, well more than a million dollar business, much more than that. One of the fellows retired, and I went out to a retirement party, and I'm trying to think how much he said, maybe he said they had a hundred million, that would make more sense, a hundred million dollars.

NORBERG: Okay. Who else besides von Behren.

WESTBEE: I suppose there's lots and lots of people, but I don't know anybody else I can think of.

NORBERG: That suggests it was a relatively small group then that was doing this, and that we've really hit all of them. Was there anybody in between you and McKnight?

WESTBEE: Well, the next fellow that was president after McKnight was Dick Carlton. He died in 1952. He was a technical man, who had been vice-president of research and manufacturing. And then the next president was Butow, and I worked for him directly then.

NORBERG: Okay, but those were people who succeeded McKnight, and I was interested in a hierarchical relationship during the time McKnight was there. But there was no one else between you and McKnight? You reported directly to McKnight?

WESTBEE: Well, it, I think that, yes, after McKnight Carlton, and then of course I reported to Carlton, he was president, and then Butow was the next president, I reported to him.

NORBERG: I'm still looking at the hierarchy, and when McKnight was head of the company.

WESTBEE: Yes, yes.

NORBERG: There was no one in between you and McKnight?

WESTBEE: No.

NORBERG: Okay. That's what I wanted to get settled. Does the name Lueck mean anything to you?

WESTBEE: Yes, yes, sure.

NORBERG: What does it mean?

WESTBEE: Well, his father and I were good friends, and Larry worked for me, and worked for Wetzel. Then he left and went to some Japanese company as I remember it.

NORBERG: Had he any role in the development of magnetic recording at 3M that you remember?

WESTBEE: Oh, he left so long ago that... I think he did some development work, but I can't remember what it was. He writes a paper now I believe, and I read something about it in that paper... out of Chicago? One of those newsletters.

NORBERG: Oh, could be. Invariably of course in an interview of this kind, I come in with my own questions, and the things that I think are important, at least the things that are important to me to know, what are some of the things that I missed, that you would consider important in the development of 3M in the years you were there?

WESTBEE: Well, I think you've covered it. When your secretary called up I thought that it wouldn't take very long for me to tell you all I knew about this...

NORBERG: But we've been going a long time!

WESTBEE: You know I've been retired fourteen years now and lots of this stuff happened in the early '50s and '60s, and one thing leads you to think of something else. There are a lot of funny stories, of course, too, you know, that you think about over the years and...but I think we've covered most of it...if you think of anything else. I tell you this fellow Alden would be a good fellow to...

NORBERG: If you would give me his address, I'd appreciate it.

WESTBEE: Yes, we spent a great deal of time putting this together and...

END OF INTERVIEW