Oral History of Alexander (Alex) Vladimir d'Arbeloff

Interviewed by:
Craig Addison

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Craig Addison: What led up to the formation of Teradyne? How did the idea start?

Alex d'Arbeloff: Well, all the early ideas were Nick DeWolf's. Nick and I knew each other at MIT, where we were in ROTC together. In ROTC class you were seated alphabetically, and I'm d'Arbeloff, he's DeWolf, so we were sitting next to each other and got to know each other. After graduation we went our separate ways. Nick worked at GE and at a semiconductor company called Transitron. That experience led him to want to start a company making test equipment. I had been in an equipment business and was interested in that area, and Nick and I spent the spring of 1960 talking about it and ended up starting a company that September. The original product ideas were all Nick's, because he knew that market, and the idea was that he would do the engineering and I would do the marketing.

Addison: When you went to university, did you study engineering?

d'Arbeloff: Yes, at MIT.

Addison: But Nick was kind of the engineering guy?

d'Arbeloff: In electronics, yes. I had studied mechanical engineering and had been involved in production and industrial engineering. Then I got into selling in the late '50s. So most of my experience was in the production and sales of various types of equipment. The last place I worked, just before Teradyne, I sold film processing equipment. Before that I was involved in the production and sales of high vacuum equipment.

Addison: So you said you did this for several years before Teradyne?

d'Arbeloff: Yes. I had a variety of jobs. I was kind of a rebel, and I got fired three times. Nick, on the other hand, had two jobs, at GE and Transitron. But he was also a rebel, so the two of us had that in common.

Addison: What was the reason you got fired three times?

d'Arbeloff: Well, I had a lot of ideas, but I didn't have a lot of patience or a lot of tact. Until I got into selling I really didn't think about learning how to read people, and I just kind of went off the runway. People just got tired of listening to me pushing my ideas.

Addison: During that period did you have any exposure to semiconductor industry?

d'Arbeloff: No.

Addison: The companies you worked for during that period, were any of them well-known companies?

d'Arbeloff: I started out in a company called Yale and Towne, which no longer exists. Then I went to Benrus Watch Company, which is also long gone, and then I worked for National Research, in high

vacuum, and then at Laboratory for Electronics, and then at Artisan Metal Products. None of these companies exist today.

Addison: LFE is in there. Later on they became a name in semiconductor equipment, plasma processing.

d'Arbeloff: Yes, that's right, many years later.

Addison: When you were at LFE, was it just laboratory equipment?

d'Arbeloff: It was mostly government electronics work.

Addison: Let's move on to Teradyne, into some specifics. What about the financing, how did you get that to start the company?

d'Arbeloff: Well, Teradyne was started with about $200,000 back in 1960. We raised the money from people that Nick DeWolf and I knew and then from American Research and Development, under General Doriot. We closed the deal in December of '60, and then we got started, renting some space in downtown Boston.

Addison: I would imagine at that stage there was no venture capital community to go to raise money.

d'Arbeloff: Well, American Research and Development was one of the earliest venture capital companies, and they backed us at the time.

Addison: When you went to ask them for money, what was your sales pitch?

d'Arbeloff: Well, our sales pitch was that we had a different approach to the design and manufacture of test equipment. We were going to remove from the equipment any components that might make it unreliable. We actually built a diode tester that I could pick up, at a time when diode testers were typically 6-foot-high rack panels full of stuff. Our tester was the first to use only semiconductors, no vacuum tubes. We used only sealed relays, and so on. I mean, we made a piece of very reliable equipment. We started with a diode tester and then moved to resistors and then to transistors a few years later and integrated circuits in the mid-60s.

Addison: Was that pretty radical at the time -- doing it all in semiconductors and not vacuum tubes?

d'Arbeloff: The transistor was invented in 1949, so we were founded only about 10 years after that. At the time, there were transistor radios, but instrumentation was still built with vacuum tubes, because transistors were not very good at the highe0r voltages. We found ways around that by using transformers and some clever techniques designed by Nick DeWolf. He had thought about these things when he was at Transitron, and when we started the company we started from scratch to build a very different breed of tester.

Addison: What was the competitive situation like then?

d'Arbeloff: There were about a half dozen companies making test equipment at the time. In addition, semiconductor manufacturers like Fairchild and Texas Instruments had their own in-house groups designing testers. Fairchild and TI actually sold their testers on the market. But we came in with a very different approach. You could just look at our equipment and see that it was different.

Addison: What was the response; immediate acceptance?

d'Arbeloff: We started at the end of 1960. We finished our first piece of equipment in August of 1961, and we were profitable in the fourth quarter of 1962. And then we made money after that, actually very good money, in '63, '64 and through the rest of the 60s.

Addison: Was it difficult to sell to TI, Fairchild or IBM, who had their own internal groups?

d'Arbeloff: Very difficult. However, many of the semiconductor companies didn't have in-house capabilities, and we started selling to those people and then expanded beyond that.

Addison: Did you have a strong base here [in Boston] or were you selling to customers in Silicon Valley?

d'Arbeloff: We had customers in the Boston area, but we went to Silicon Valley almost immediately. We sent our representatives out there, and by 1963 we were in Europe. In 1967 we went to Japan. We really tried to be wherever there were semiconductor companies. One of the other important markets we considered at the time dealt with the incoming inspection of semiconductors. We decided fairly early to concentrate on the manufacturers, and that proved to be a wise decision.

Addison: Going back to around the 1960 period. The IC was invented at Fairchild and TI shortly before that, and you had the testing unit for transistors. When did it become apparent that this new integrated circuit would take over the market and then you would have to respond with test products?

d'Arbeloff: Integrated circuits became a factor in '64 and '65. We had decided that the best way to control the semiconductor tester was by computer, and we bought one of the first PDP-8's coming out of Digital Equipment and then developed the software to control it. At the time, that was quite a challenge because there was very, very little memory in the first PDP-8. I mean, today the amount of memory that was in the PDP-8 takes up a tiny fraction of one chip. But we were able to squeeze into that small memory the ability to control the tester and put in a test program. We started developing a computer-controlled transistor tester in '63 and had a system on the market in '64. Then we started working on an IC tester in 1965 and introduced the system in '67. With the success of that system Teradyne really took off.

Addison: What kind of technical challenge was there in moving from a transistor tester to an IC tester?

d'Arbeloff: Here again, we started with a very different approach to the problem. I don't know how technical we want to get, but we really developed all the basic system elements that later became standard parts of all IC testers. My partner, Nick DeWolf, did not want to spend time on patents, and in a way that's unfortunate, because he really invented the basics. Anyway, our IC tester was much smaller

and had a lot more capability than other systems, and it was computer-operated. We started selling it to customers around the Boston area, then went to Silicon Valley, and then expanded beyond that.

Addison: When things moved over to IC testing, did that change the competitive landscape a lot. Did a lot of companies drop out and new ones come in?

d'Arbeloff: At that time the companies really competing in that business were Fairchild and Texas Instruments and ourselves. A lot of the other companies that had been in the diode and transistor testing business kind of faded away. And as time passed there were some start-ups.

Addison: Were there many dedicated start up test companies like Teradyne?

d'Arbeloff: There were a number of them. I remember Macrodata. LTX spun out of Teradyne, but that was in the late '70s. And then in the '80s, of course, the Japanese became strong competitors.

Addison: You mentioned before that your partner didn't want to apply for patents. Was that because he didn't want to expose your technology to competitors?

d'Arbeloff: No, it wasn't that we didn't want to expose our technology. Nick thought that by working on patents we would be slowing down more important work. He would have to spend time on patents instead of engineering.

Addison: How quickly did the other companies identify your competitive advantages and try to match those?

d'Arbeloff: Actually, very slowly. We had years to exploit the ideas that we had because we were so aggressive in sales and marketing. I think the combination of really good technology and strong sales and marketing gave us some real advantages. We also worked on making sure we had reliable equipment, so we spent a lot of time on the manufacturing side.

Addison: On the manufacturing side, did you do everything in-house?

d'Arbeloff: Well, electronics is essentially assembly. We didn't make any of the components but, yes, we assembled in-house. We bought components and circuit boards and assembled the systems and then tested the systems to make sure they were working right. The other thing we did was to expand our ability to service the equipment worldwide, first across the United States, then in Europe and Asia. So by 1970 we were truly a worldwide company. Wherever semiconductors were made we were able to sell and service and support our equipment.

Addison: Can you talk about how you entered those markets. What was your approach in Europe?

d'Arbeloff: In Europe we started our own operation. We hired a fellow who went over there, and then he in turn hired representatives. And fairly early in our history we went direct in Europe. In fact we were direct in Europe before we were direct in the United States. Actually, Kulicke & Soffa represented us in Germany, and that relationship was helpful at the time.

Addison: Were there many competitors in Europe at that time?

d'Arbeloff: We never had a European competitor until many, many years later. There was no European competitor until the '80s.

Addison: Were your U.S. based competitors active in Europe?

d'Arbeloff: Yes. But we were among the first to go to Europe.

Addison: The customers in Europe, did they have different demands than U.S. customers, a cultural change?

d'Arbeloff: Obviously, you had to adapt to the language and the other cultures and so forth, but the answer is pretty much no. They bought the equipment that other people bought. Also, American device manufacturers were setting up in Europe, so they were customers as well.

Addison: What about Japan?

d'Arbeloff: We hired a distributor in Japan in 1967. They set up a separate group to represent Teradyne, and five years later we offered to buy that group, and we worked it out so that we ended up having our own company in '72. At the time, though, the Japanese restricted what you could do. You couldn't manufacture; you could only sell and service. But years later we did set up a factory in Japan.

Addison: How important was the Japanese market to you? Everybody says it was a very difficult market to get into.

d'Arbeloff: Yes, it was difficult, but as it turned out, we were there early. Later on there were strong competitors, but we felt we had to hang in for two reasons. One, there was a market, and two, by competing with the Japanese in Japan we made it harder for them to compete with us here. They had to spend more money defending themselves in their own market.

Addison: How did the Japanese competitors come about; were they in-house operations of device makers?

d'Arbeloff: Actually, the strongest Japanese competitor, a company now called Advantest, started out as Takeda Riken. Mr. Takeda [the founder] actually visited us when we were in the loft in downtown Boston. How he found us I have no idea, but he did find us. He was in the instrumentation business, and we had no idea what he wanted. But obviously he had heard that we were making automatic test equipment, and he wanted to get into that business. And he built a very strong company. But there were others, including Ando, which was financed by NEC. Advantest was later financed by Fujitsu. In Japan there were instrument companies that received backing from semiconductor companies, who chose that route instead of starting in-house test groups. There were some in-house groups as well, but generally the stronger companies evolved from instrumentation companies.

Addison: When Takeda-san came to visit you, his company did not exist?

d'Arbeloff: He already had a company making instruments, competing with H-P and Tektronix.

Addison: Was he coming to you to talk about a partnership or just checking out the competition?

d'Arbeloff: Who knows? We had a tough time communicating the day he came. We didn't know who he was. Here was a hint that there was something going on in Japan, but we were in the loft with maybe 25 or 30 people, and Japan was not high on our priority list at the time. But they woke us up. Actually, somebody from Sony came before Mr. Takeda, saying that they needed some equipment. So Sony was our first customer, their semiconductor division in Japan, even before we had hired a distributor.

Addison: What is your view on the development of the testing technology in Japan?

d'Arbeloff: I think the Japan tester manufacturers followed their memory manufacturers, and their strongest position has always been in making testers for memories. For years we also made testers for memories and competed with them. But we had stronger positions in logic, analog, and mixed-signal testers.

Addison: Going back to the development of Teradyne itself, you went public at one stage, can you talk about that?

d'Arbeloff: We went public in 1970, actually three months before the market crashed. We were one of the last companies through the gate. We had been growing very, very rapidly through the '60s, almost doubling every year, and then came the recession of 1970. For three months starting in mid ‘70 we didn't get a single order. It was really a shock, the first of the cyclical downturns. We had recessions in '71, '75 and ‘81, so we learned that the semiconductor industry would be cyclical, especially for equipment. We lost money in '71, but then growth resumed in '72. Things were OK again until 1975.

Addison: What are some of the differences in what the company was like in the '60s versus the '70s?

d'Arbeloff: Well, the '60's were a great time. It was a time of great optimism, it was the time of rapid growth of the industry. We only saw things going up, and it was a great time to have started a business. The '70s, on the other hand, were very different. The semiconductor industry was still growing very fast, but there were those cyclical downturns. The '70's were a much tougher time to be in the business. It wasn't until '82 that things started to go up again.

Addison: Maybe we can talk about SEMI since we are in the ‘70s period. What are your recollections about the formation of SEMI?

d'Arbeloff: The first SEMI trade show was in Silicon Valley, and I remember it well. Fred Kulicke had argued that we should have our own show for semiconductor equipment instead of being a small part of the IEEE show. If I remember right, 11 companies were in that first SEMI show, and we were one of them. It was a concept that I thought made a lot of sense, and obviously that was the beginning of a great run.

Addison: Prior to the formation of SEMI, there was a meeting in Palo Alto, California, to discuss the formation of a trade show. Did you attend that meeting?

d'Arbeloff: I don't think so. I think we sent our West Coast Manager, a fellow by the name of Dick Bailey, but I did attend the first show.

Addison: Can you tell me about your involvement with SEMI over the years?

d'Arbeloff: One of the people that worked for me, Fred Van Veen, was on the board of SEMI for years and Fred was also the Master of Ceremonies at many of the SEMI events. He was a great Master of Ceremonies -- amusing, fun. So Fred really represented Teradyne on the board and did a wonderful job.

Addison: As a test company, were there any specific issues in the standards area? I have talked to silicon people and they say SEMI did a great job in standardizing the silicon specs. What about the test side?

d'Arbeloff: We were at the other end of the scale. There was much less SEMI involvement on the test side than there was on the front-end side, at least in the early days. So our involvement with SEMI was principally through the trade shows, which we attended not only in Silicon Valley, but in Boston, Texas, Europe and Asia. We attended all of those.

Addison: So moving up to the 1980s, what was the situation with Teradyne and what were the challenges in that decade?

d'Arbeloff: The first part of the '80s was kind of a continuation of the '70s. The beginning of the '80s were great. Then there was a recession in '85, and the last half of the '80s was a very tough period, when, even though the industry worldwide was growing, the American industry wasn't. There was some doubt about whether the U.S. semiconductor industry could survive. Teradyne, meanwhile, with a relatively small market share in Japan, was really struggling. It was a time of crisis, for our industry, our country, and our company. So I went to our board and posed a question: Do you think America will go out of the semiconductor business? Which would mean that it would go out of electronics, which would mean that America would be out of the largest industry in the world, if you take all its branches of consumer, military, telecommunications, computer etc. Put that way, the answer was simple: We had to stay the course. The industry came to the same conclusion, and SEMATECH was formed in '87 to help save the United States semiconductor industry. I was involved in that, because SEMATECH included an equipment group. Scott Kulicke was the first chairman of that group, and I was probably the third chairman, and I served on the SEMATECH board. But it was a rough period. We [Teradyne] lost money for five years, '86 to '90, and that was quite a challenge. But we all hung in there, and the United States and Teradyne did come back because we kept investing. The '90s were a great, great era for Teradyne.

Addison: So in the 80's there really was a feeling that maybe America would get out of the semiconductor industry?

d'Arbeloff: That's right. It was a struggle. In 1987 Intel was losing so much money that they were bailed out by IBM. People forget that.

Addison: At SEMI-SEMATECH did you have anything to do with Bob Noyce?

d'Arbeloff: Oh, yes. I had known Bob way back when he was at Fairchild and later at Intel. Then he moved to Austin for SEMATECH. Bob provided I think some excellent leadership. SEMATECH quickly decided that they should support the equipment business because the equipment was the key to the recovery of the American industry. What they did at SEMATECH was first to look at the equipment and find ways to support the American industry, and second to think about how to make that equipment more useful. The Japanese were obviously using the same equipment but more effectively. Their yields were almost twice as high, for instance. Anyway, the U.S, industry got out of denial and went to work and cleaned up the fabs and made better use of the equipment, and the American semiconductor industry became competitive.

Addison: What was your relationship with Intel?

d'Arbeloff: Intel was a good customer. They were founded in '68 and were a good customer in the '70's and the '80s. They were the biggest factor in the revival of Teradyne in the IC test business at that time.

Addison: Did Intel buy a lot of equipment from Advantest?

d'Arbeloff: I don't think so, not in that era.

Addison: Just to wrap up, are there any high points that really stand out during your career? Anything you are really proud of?

d'Arbeloff: Founding the company and building it in the '60s was obviously very exciting. At the end of the '60s, my partner started to feel that he didn't want to continue running the organization. He left in '71, and I was very fortunate to hire two extremely talented people, Jim Prestridge and Owen Robbins, who helped me take the company to the next levels. And of course it was satisfying to steer Teradyne through the '80s, getting the support of our board, and seeing the recovery in the 90's, when Teradyne became a billion-dollar company.

Addison: What is your involvement today, if any?

d'Arbeloff: I retired in '97 as CEO, left the board in 2000, and have no involvement today. I'm on the boards of five companies, mostly small start-ups, plus one public company. Then I teach at MIT. Actually, I became Chairman of the Trustees at MIT in '97, and held that post for six years. I'm also chairman of the Whitehead Institute, a biological research institute.

Addison: What do you teach at MIT?

d'Arbeloff: I teach business at the Sloan School, MIT's Business School. I've taught courses in innovation. I also have a course where I just have conversations with groups of students from a practical standpoint and talk about some of the things I've learned in practice.

Addison: Thanks very much, Alex. It's been very interesting.

d'Arbeloff: Thank you.

END OF INTERVIEW

