



## **Oral History of David Bakalar**

Interviewed by:  
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**Hendrie:** Well, today we have with us David Bakalar, who has graciously agreed to do an interview for the computer history museum semiconductor special interest group. Thank you very much, David. I think what I'd like to start with is if you could tell us a little bit about your parents, your parents' background, where you grew up, your siblings, so we can get a little bit of an idea as to what the environment was that you grew up in as a child.

**Bakalar:** Sure. I'm really the first generation born in this country. My mother was born in Lithuania when Lithuania was part of Russia, and she had a child there and immigrated with the child and her husband to the United States in the early 1920s. She actually grew up in a little village called Motola, part of the Jewish pale that existed in Russia. And she told me stories about the First World War and the difficulties that she faced where the Germans and the Russians fought back and forth across the area that she lived in, so she was very happy to come to the United States. My father died in his early forties of a heart attack. At that point my brother was a teenager. He had to leave school after the eighth grade and help support the family. My mother ran a small store selling clothes in Lynn, Massachusetts. And I really had no background in science, the arts or anything else, but I was sort of a nerd. I wasn't much of an athlete and I went to Lynn Classical High School. I got interested in science, but I had never been anywhere. I'd never been to Cambridge, even. So I had a very, very poor background. My mother was essentially illiterate, and my brother had quit school, as I mentioned, in the eighth grade and worked with her in the store. The store at one point had a fire. My brother organized a fire sale and from that branched out into organizing fire sales for other people whose stores had burned down, and eventually he teamed up with another individual and they began to specialize in dealing with places that had had fires and then dealing with insurance companies and getting the best terms for the owner, and so he moved along, and then in a small way he was mildly prosperous. He had his own home, married and had children.

**Hendrie:** Excuse me. How much older was your bro--

**Bakalar:** He was 13 years older than I, so we were really not that close because of a large age difference and the fact that he wasn't around very much he was so busy trying to earn a living.

**Hendrie:** You were born in the United States. How old were you when your father died?

**Bakalar:** I was very young. I don't even remember when he died.

**Hendrie:** All right. Yeah, you don't really remember him.

**Bakalar:** I don't remember him at all. I have zero memory of him. My mother married a couple of times. They were really unhappy marriages.

**Hendrie:** This was after your father died.

**Bakalar:** After my father died, yeah.

**Hendrie:** What was your father's occupation?

**Bakalar:** My father had studied to be a rabbi in Russia but had turned against religion. He didn't really believe that it solved anything, and he never really quite adjusted to this country, so my mother really ran the store and so forth. Well, anyway, so I had essentially no support within the family and at Lynn Classical High School, which is a very, very good high school, probably the equivalent of Boston Latin in those days, there were some teachers who sort of became mentors to me. I'd been reading books on science and science fiction and settled with thinking and dreaming of applying to a place like maybe MIT or maybe Swiss Institute of Technology. I didn't know what I wanted to do. One of the teachers--

**Hendrie:** What was the teacher's name?

**Bakalar:** His name was Roland Gingras.

**Hendrie:** And what did he teach? What was his subject?

**Bakalar:** He taught-- I'm trying to remember. He didn't teach me anything, either. He taught English or something. But he had a deformed leg, and he was a very handsome man. He was a graduate of Harvard. And he said to me, "Why don't you apply to Harvard?" And I remembered, "What's Harvard?"

<laughter>

**Bakalar:** So he talked me into applying to Harvard as well as MIT.

**Hendrie:** Did you have any science teachers that particularly influenced you?

**Bakalar:** No, there was a- I took a physics course. I did okay. There was a chemistry teacher who was a veteran from the First World War who was not quite there. But overall the school was very, very good. Anyway, so I ended up applying to two places, and I had \$50 in the bank <laughs> because I had saved. I had been working nights in Open Air Theater as an usher. And so I managed to save a little bit of money, not much. I had \$50. I applied to Harvard and MIT. I got into MIT and they offered me a \$1,000 scholarship. Now the tuition at MIT back then was \$1,000, believe it or not. Now it's \$40,000.

<laughter>

**Bakalar:** And there was no way I could go. I hadn't heard from Harvard. Now in those days Harvard had a quota for Jewish students, and some of the people in school had heard they'd been accepted from Harvard. I heard nothing. And one day I was going to school and a friend of mine came up and he said, "Congratulations." I said, "What for?" He said, "You've got a scholarship to Harvard." And I hadn't heard anything.

**Hendrie:** How did he know?

**Bakalar:** I don't know. So I ran over to my house and there was a letter. Now the letter was a commuting scholarship. They gave me a study room at Leverett House, but I had to pay my tuition and it was a very modest amount, but I had to commute back and forth by bus from Lynn, Massachusetts to Harvard, which wasn't very easy. This opened up a whole new world for me. Anyway, I started immediately. I started that summer, and I was anxious to get in as much as I could because the war had started.

**Hendrie:** Do you remember what year this was, the summer of what year?

**Bakalar:** It was '42.

**Hendrie:** Summer of '42, okay.

**Bakalar:** Summer of '42. So I started commuting that summer and in roughly two years I had accomplished three years' worth of work. And then the government was no longer deferring students and I decided that the best thing for me to do was join the navy. I didn't like the idea of going into the army. <laughs> So, anyway, I left school having completed three years and joined the navy. The navy sent me to boot camp, which was quite an experience, and then they sent me-- I'll never forget. I was going to become an electronic technician, and so they had a different school set up to do that. And I will never forget one of those schools was located in Biloxi, Mississippi. And we went down there by train. It was the middle of the summer. Biloxi, Mississippi in the middle of the summer is almost impossible. The temperature is very high. The humidity is close to 100 percent if it isn't already raining. And I will never forget when the train pulled into Biloxi it was late in the afternoon and I looked out the window. And both sides of the tracks were lined with student sailors, and they had their hats out over their hearts.

**Hendrie:** Oh, no!

<laughter>

**Bakalar:** Oh, yes!

<laughter>

**Bakalar:** So this was the beginning.

**Hendrie:** There was a welcoming committee.

**Bakalar:** Yeah, the welcoming committee on both sides. You've reached the end of the world! And I'll never forget we had slide rules in those days. There were no computers or anything. The slide rules would stick the humidity was so high. It was my first exposure to the segregation in the south. I will never forget I had a day off and I went into Biloxi. And this was 70 years ago, but I remember it now as if it were yesterday walking along the sidewalk and on the opposite side there was a church and there was a banner in front of the church that read, "The brotherhood of man," and then I looked down and right next to me there was a drinking fountain that said, "For whites only." And I saw this sign and I saw the other sign and I said to myself, "Doesn't anyone see the contradiction between these two?" Okay? So that was my introduction to the south, and then we were shipped up to Chicago for finishing at Navy Pier, and there I had another experience. During the war there were elements in the United States that were opposed to the war, and one of these elements were of German background, German immigrants who had settled in the midwest, and there was a very active German American Bund there that actively opposed the war wearing swastika armband.

**Hendrie:** Oh, my goodness!

**Bakalar:** And they were having a meeting in Chicago so I had to go and take a look. And I look a little Jewish, so I walk into this place. I start getting all kinds of strange looks <laughs>, and they were singing these songs, which were-- and it was very much against Roosevelt and the war and so forth. Anyway, I survived that.

**Hendrie:** Oh, my goodness! Wow.

**Bakalar:** Then they shipped me off to San Francisco, and from there I was assigned to get on a battleship and be one of the people maintaining their radar. And they put me on an aircraft carrier and we went off. We stopped at Hawaii and--

**Hendrie:** So did you go on a battleship or an aircraft carrier?

**Bakalar:** Well, my battleship was somewhere in the Pacific.

**Hendrie:** Oh, and so you went to Hawaii.

**Bakalar:** I had to catch up with the battleship. So they put me on an aircraft carrier to get there, and then the aircraft carrier took me to a place called Ulithi. Ulithi was in the Caroline Islands. It was a huge natural harbor surrounded with coral reefs, and there were hundreds of American ships of all kinds, military ships, cargo ships there. And I got off the aircraft carrier and I was put there, and they thought that my battleship was in this harbor but they weren't sure. <laughs> So I remember-- this shows how ineffective the military were, and you wonder why we even won the war. And I remember that they got a number of us and put us on a smaller ship, and we went around in the harbor, "Has anyone seen..."

**Hendrie:** Looking for the battleship.

<laughter>

**Bakalar:** "Anyone see the battleship?" Well, the battleship wasn't there, so then I was transferred onto a cruiser to find the battleship. The battleship was cruising off the coast of Japan, and it was part of Taskforce 40.

**Hendrie:** Now what year is this? Where are we now in time?

**Bakalar:** This was maybe '45 [1945], around then.

**Hendrie:** Yes, okay.

**Bakalar:** And I was on this destroyer and we locate my battleship, and it's really rough water. They're bouncing next to each other, and the battleship is pretty calm and there were guys there. I could see guys with ice cream cones. In the meantime we're on this destroyer that's moving every which direction. And they shoot a line across and they put me in this thing to transfer me on. It's a captain's thing. And as we're going all the sudden the destroyer goes this way and I get dunked in the water <laughs>, and finally I get onto my battleship.

**Hendrie:** Oh, my goodness.

**Bakalar:** Okay. Now I'm on the battleship and we're cruising up and down the coast of Japan and we get word that the Japanese have agreed to surrender. Before that, I'm sorry. When we were on the Ulithi we learned that they had dropped an atomic bomb on Hiroshima. And now there was a delay. The Japanese were having trouble recognizing the fact that they had to surrender, which is why we dropped a second bomb in Nagasaki. So we were cruising up and down the coast and the word came that the Japanese had agreed to surrender. My battleship was next to the main battleship, the main battleship where the surrender where the surrender terms took place, the Tokyo Bay, was the Missouri. I was on the South Dakota, so I could see the surrender ceremonies in Tokyo Bay.

**Hendrie:** Oh, wow! Oh, that's pretty good.

**Bakalar:** Yeah, very exciting. So now the surrender takes place, and of course we had been taught during the war that the Japanese were fanatical people, that they were ready to die as long as they could kill an American, they're totally untrustworthy, et cetera. And now it came time to go ashore. I could have liberty to go ashore in Tokyo Bay. And of course there was a lot of apprehension because we weren't sure whether the surrender was a real surrender.

**Hendrie:** Yeah, they "surrendered," but there was going to be--

**Bakalar:** But they'll still kill you if they get a chance.

**Hendrie:** They'll still kill you, yes, like Iraq.

**Bakalar:** Yeah, okay. So now I get on this boat and the boat is bouncing up and down, and I could see on the dock-- oh, by the way they'd given us cartons of cigarettes to use for trading purposes when we got there. So I see a lot of Japanese still dressed in military uniform shouting and screaming. Their hands are waving, and I said, "Oh, God, this is- who knows what this is?"

**Hendrie:** Yes, what's going to happen?

**Bakalar:** And as we get close I could begin to hear them, "Cigaretto! Cigaretto! Cigaret..."

<laughter>

**Bakalar:** They wanted cigarettes, and that did a tremendous thing for me. I really learned at that moment to take what I read in the newspapers and what I hear in the press including the American newspapers and press with a big grain of salt, okay? So, anyway, so then the surrender turned out to be

real, and the navy transferred me to a cruiser and I was going to be part of the occupation of Japan, the navy occupation of Japan. And we had to go- we were going to be stationed in Kagoshima, which is the very bottom of Japan, the southern part of Japan. In order to get there we had to go through the Inland Sea. Now going through the Inland Sea the Japanese Navy, what was left of it, had been sheltered in the Inland Sea and had been destroyed, and so there were ships on their sides protruding above the water. We stopped at Hiroshima and I went ashore at Hiroshima and saw the situation at Hiroshima, okay? And I even saw part of a dead body there in Hiroshima. Now at this point I'm 19, 20 years old, if you can imagine the effect.

**Hendrie:** Yeah, the impact of these things.

**Bakalar:** And I'd never really been anywhere <laughs> before that, okay? So it really opened up my eyes big time. We then stopped at Nagasaki and finally got to Kagoshima. When we were in Kagoshima I remember that there was an island in the Kagoshima Bay called Sakurajima, and Sakurajima had a dead volcano on it. And we got the liberty- and I remember at some point we went over to this island. I remember climbing up the island and there was a crater like on the moon. And I remember the farmers growing little sweet tangerines that we bought. It was quite an experience. The volcano appeared to be dead, but a year after I got back to the states it erupted--

**Hendrie:** Oh, my goodness!

<laughter>

**Bakalar:** --and a lot of people were killed, so it wasn't totally dead. Anyway, so then I came back, and at this point I was a beneficiary of the GI Bill and got my bachelors in a year.

**Hendrie:** Yeah, talk to me about what you studied at Harvard.

**Bakalar:** I got my bachelors in '47. I was the class of '46. I was a year late because of two years in the navy. So it was in '47 was the year of my graduating even though I'd spent two years in the navy because I'd made up a year before.

**Hendrie:** Because you'd just taken courses straight through when you got there.

**Bakalar:** And then I stayed on--

**Hendrie:** Well, I want to know what you studied.



**Bakalar:** I majored in physics. And then I stayed on and got a masters in physics.

**Hendrie:** What field of physics?

**Bakalar:** There wasn't any one field. I didn't have to write a thesis.

**Hendrie:** You didn't concentrate in a particular field.

**Bakalar:** I didn't have to write a thesis. The one thing I remember very vividly is taking a course in x-ray analysis of crystals, and I learned how to use certain mathematical techniques and also the practicality of x-raying things to determine crystal structure.

**Hendrie:** Yes, from the diffraction patterns, yes.

**Bakalar:** Now, this was in '48. Never in my wildest dreams did I imagine in '53, which was only five years later that these techniques would be used to determine the crystal structure of DNA, which contains the code of life.

**Hendrie:** Oh, my God, yes.

**Bakalar:** This was only five years later. So we were concentrating on the simple crystals, but all the techniques that we were using were identical with what had to be done in terms of determining DNA. It was not in our mind at that point. I got interested in crystals and metallurgy and decided that I wanted to get into the more practical part of science rather than just pure physics, and I--

**Hendrie:** So you didn't have an ambition to go on and become a teacher or anything like that. What did you think you wanted to do?

**Bakalar:** I felt that there were a lot of brighter people than myself. I just felt I had to get into something more practical, and then I had this crystallography thing and I knew metals that were composed of crystals and so forth, so I applied to MIT and got into their physical metallurgy department as a physical metallurgist. The people at Harvard were unhappy with me that I left, okay?

**Hendrie:** That you went to MIT, yes, their rival down the river.

**Bakalar:** Yeah, Van Vleck was not happy, but I just felt that that was the proper direction for me. And so I went over to MIT where my work was supported by The Titanium Company of America, and I did my research using radioactive iron to determine the self-diffusion rates in iron. And there had been a real problem and people who had done work on this before had run into all kinds of results that flip-flopped. They weren't quite right. No one knew quite why. I found out why. The reason that the results varied was that iron has a Curie temperature. Iron essentially is a magnetic material, and as you change the temperature there's a point at which it loses its magnetic properties, and the loss of magnetic property-- magnetic property is obviously tied in with the bonding. And since the bonding becomes different with the change of the Curie temperature the diffusion rates become different.

**Hendrie:** Oh, yes.

**Bakalar:** It was that simple.

**Hendrie:** It was that simple. People weren't keeping track of the temperature at which they did these studies of diffusion rate.

**Bakalar:** They didn't tie it in with the Curie temperature. So that was my great contribution <laughs> to science. So, anyway, I got my doctorate--

**Hendrie:** Is there diffusion in solid iron?

**Bakalar:** Self-diffusion-- there are holes in any metal. We're missing atoms and iron atoms pop around. So when one wants to determine the rate around which iron will pop around, and the technique used was to plate radioactive iron on a flat iron surface. And then the iron atoms would diffuse when you heated to a high temperature. You take little sections out and dissolve them, and then measure their radioactivity, and based on the change of radioactivity you can determine the diffusion rate--

**Hendrie:** Oh, okay. Got it, okay. I get it.

**Bakalar:** --which is very important because it has a bearing in terms of when you make alloys. Some of them depend on diffusion rates. So I got my doctorate. At that point I didn't quite know what I wanted to do. There was a possibility of staying on at MIT. That didn't particularly appeal to me. At that point the Marshall Plan was in effect. This was now in '51. And under the Marshall Plan the United States did something, which was absolutely unprecedented in the history of the world. They took the defeated countries and they spent a huge amount of money to bring them up and to bring their economies to a higher level. They were really concerned that the communists would take over countries like Germany and France and England and Italy and so forth. This was under President Truman. The US decided to

provide technical know-how, and MIT was asked to organize a group that would have maybe about 30 meeting presidents of European companies come over, and under a technical leader and a business leader would tour the United States and visit different companies like US Steel, Aluminum Company of America and--

**Hendrie:** Yeah, I understand.

**Bakalar:** --Aluminum Company of America and so forth. And so I had a chance to get a temporary job for about six weeks as a technical advisor. Someone else was the business manager. We started out with about 40 top people from Europe and we toured around the United States. It was quite an experience. For example, we visited General Motors. We went to see where they were making Cadillacs, and we would meet the plant. We would have the latest equipment they were using, where you could get hold of this equipment and what the cost would be, and we'd come up with a program where these people then would likely go back and give presentations and get funded by the American government as well as technical support. That was so successful that they decided to organize a second group, and at that point I was the only person available, so I became not only the manager but the technical advisor and I had to arrange it all. I would call the head of US Steel, and at this point I think I'm 26 years old. I was offered a position -- I think I impressed this gentleman who was the head of Alcoa, and he wanted to hire me to be his top assistant. I think the fact I was coming from MIT made a huge difference. But I had heard about the development of a transistor at Bell Labs, and I just felt that that would be more interesting. So I turned him down and applied to Bell Labs and got a job working at Bell Labs.

**Hendrie:** So how long did you work with this Marshall Plan?

**Bakalar:** I worked-- it was six weeks and six weeks, three months.

**Hendrie:** Three months, okay, but it was another eye opener.

**Bakalar:** But it was an eye opener.

**Hendrie:** Another eye opener.

**Bakalar:** A tremendous eye opener because I was dealing with older men who had 10,000 people working in their facility, and I was telling them, "Gentleman, you wait here. We'll do this," <laughs> so it was a total different experience, command decision. Well, anyway, so I went to work for Bell Labs and I worked for about six--

**Hendrie:** So where did you get hired in Bell Labs?

**Bakalar:** I was hired at Murray Hill and I worked at--

**Hendrie:** You went to Murray Hill.

**Bakalar:** And I worked at...

**Hendrie:** What group were you in?

**Bakalar:** I worked down the corridor from Shockley. Shockley was right there, and I didn't report to Shockley. It was vague as to who I reported to. I got very friendly with the Chief Metallurgist, a guy called Bill Pfann, who developed ways of purifying germanium and silicon. And so for about six months I sort of was educating myself and fooling around. And then they decided that they were going to set up to produce transistors at Western Electric in Allentown, Pennsylvania, so I was put in charge of a group to try to phase in the production of the elementary transistors they had developed, and also do research on developing other types of transistors. RCA had come up with a different way of making transistors, and we tried to copy that.

**Hendrie:** Now, was this still an era of point-contact transistors?

**Bakalar:** Pardon?

**Hendrie:** Was this still an era of point-contact transistors, or had the junction transistor been invented yet?

**Bakalar:** Well, point-contact was in between. They were making point-contact, they were making junctions, and so they weren't quite sure. We hadn't got into diffusion transistors yet. That was in the future. And about that time Bell Labs decided that this thing was going to be much too big for them to hold tightly within the Western Electric system, and they decided that they would license this out to companies all over the world, that they would charge a royalty, but they would ask each company to give \$50,000 advance on royalties. And these companies could come to Bell Labs and attend a series of lectures and demonstrations, and they could bring as many people as they wanted. And I remember most companies brought one or two people. Some of the Japanese companies like Sony brought 12 people, and they were talking of making transistor radios. And so we gave lectures. And then after the lectures some of these companies hired people from Bell Labs. Gordon Teal, for example, was hired by Texas Instruments, and so some people began leaving Bell Labs.

**Hendrie:** Oh, really? Oh, okay.

**Bakalar:** At this point I was 28 years old. I saw people leaving. I had no financial obligations of any kind, and I decide...

**Hendrie:** Now, were you married yet?

**Bakalar:** Pardon?

**Hendrie:** Had you gotten married yet?

**Bakalar:** I was not married, not married, I was single, and so I decided, gee, they're all leaving. This is going to be a big thing. What have I got to lose? Let me try to do something different. And so I decided I would go out and try to start a company. I had no idea what I was going to make, but it would be some semiconductor. If all these people are ready to pay \$50,000 advance, and if the Japanese are bringing 12 engineers this is obviously going to be a big opportunity.

**Hendrie:** There are a lot of people that think this is important, yes.

**Bakalar:** Yeah, and this guy has left, and another guy has left, and so I said, well, let me give it a crack. And so I resigned from Bell Labs. I had to find some way to finance the thing. I had practically no money. And I began looking around. I heard some guy had written a master's thesis at Harvard Business School about the big future in semiconductors, and I knew that his father was a very wealthy man. And so I contacted this guy with the idea that maybe...

**Hendrie:** Who know who this was? Do you remember?

**Bakalar:** I forgot his name. And then maybe we could become partners, and he liked the idea, but then his father offered him a year in Europe all expenses paid. He decided not to go along. While this was going on my brother knew about it, and finally he came to me and said, "Look, why don't we start something together?" Now, I had not been close to my brother at all.

**Hendrie:** What had your brother been doing up to now? Where was he at this point?

**Bakalar:** He had gone beyond the fire sales and had become a distributor for a company that made thick cork products that we used in the making of shoes, and so he was a distributor, basically, selling this product to different shoe companies.

**Hendrie:** Yes, and there were lots of them in New England.

**Bakalar:** There were lots of them, because Lynn was one of the centers of shoe manufacture. And so I said okay. So at this point he had a place in East Boston where he had his warehouse, and we cleared a little bit of space smaller than this room we're in now, and I began looking around. I bumped into this MIT graduate who was an electronic major with a bachelor's who was a very, very smart guy, and I talked him into joining me.

**Hendrie:** Now, who was this?

**Bakalar:** His name was Nick DeWolf.

**Hendrie:** Nick DeWolf?

**Bakalar:** Yeah.

**Hendrie:** Oh my goodness!

**Bakalar:** Did you know Nick DeWolf?

**Hendrie:** I know all about Nick DeWolf, because I knew Alex d'Arbeloff very well.

**Bakalar:** Oh, okay. Well, we'll come to that in a minute.

**Hendrie:** Yes, that's interesting.

**Bakalar:** We'll come to that in a minute.

**Hendrie:** Yeah, okay.

**Bakalar:** So Nick was young and he had no responsibilities.

**Hendrie:** And he was just graduated.

**Bakalar:** Just graduating. I talked him into joining me. So then the problem was, well what the heck do I make? There is no market for transistors. We needed something we could sell. The only market that existed was point-contact diodes that were used in television sets. But I had no idea. Well, I knew the point-contact is unreliable, and I knew that at Bell they had used doped gold wire to bond into germanium to make a contact where they were making some of their germanium transistors, but it was really not much of anything.

**Hendrie:** Yeah, but you knew that somebody had tried this.

**Bakalar:** So I decided, hell, I could change this, and make a diode with a high voltage. The Bell Lab stuff was all low voltage stuff just to make a good contact. And so we began fooling around. I began fooling around, and I developed gold-bonded diodes. I had to encapsulate them. So I come up with a plastic tube with a metal part that went in each end.

**Hendrie:** Yeah, yeah. You have to figure out if you're going to make it...

**Bakalar:** And then we had to fill them with something.

**Hendrie:** It isn't just doing the semiconductor part. You have to do all the rest.

**Bakalar:** Yeah, and then we had to fill them with something to protect them, so some glue. And so we came up with this product. I had no idea where, or what, or how. And there was *Electronic Magazine*, and I decided to give it a shot, advertise it. Sure enough, I got a phone call. An elementary computer had been designed for planes based on diodes, point-contact diodes, in Indianapolis, Indiana, a Naval plant in Indianapolis, and they had a...

**Hendrie:** This was a government?

**Bakalar:** This was a government plant, but they had two other main suppliers, one of which was Emerson. I forgot the other one, Emerson Electric. And they were producing these computers, and they were having all kinds of reliability problems, because the basic point-contacts were unstable.

**Hendrie:** Do you know what they were using? Were these for the active elements in these computers? Were they transistors?

**Bakalar:** They were not transistors.

**Hendrie:** They were tubes.

**Bakalar:** They had tubes, and they had...

**Hendrie:** Had these point-contact diodes.

**Bakalar:** They had these point-contact diodes.

**Hendrie:** So they were doing diode logic with tube amplifiers, yes, absolutely. I realize that was used before transistors.

**Bakalar:** So they began using our diodes, and they loved the diodes. Okay, so all of a sudden, wow, we were getting all kinds of business. Now I'm there calling on the people, and they showed me these big power tubes that were giving all trouble. They were also taking up space and were heavy. And at that point we were producing silicon, and I felt we could replace these with a silicon rectifier.

**Hendrie:** Ah, yes.

**Bakalar:** So we developed the first silicon power rectifiers, and we were charging \$30 apiece for them. Customers were happy, because they were paying much more than that for their tubes.

**Hendrie:** And the tubes were big and hot.

**Bakalar:** The tubes were big and they would burn out. So this was gangbusters. We really took off.

**Hendrie:** Now, how long after you had developed the gold-bonded diode did you do the silicon, because you clearly when you were in the corner of this warehouse, I mean, you weren't going to do two things. You were lucky to get one thing to work.



**Bakalar:** Well, now we were making rectifiers. We found an abandoned bakery plant in Melrose Massachusetts that we moved into, converted, and began making these things.

**Hendrie:** Now, I want to roll back. Did you need a license from Bell Labs to make these diodes or not?

**Bakalar:** Well, I didn't think I needed a license, but it turned out I did. I had problems with Bell Labs, and I finally resolved them by taking out a license.

**Hendrie:** So you didn't have to come up with \$50,000 just to start.

**Bakalar:** I don't remember what we... No, no, I don't think we paid them in advance. Well, we paid them for the use that we had had from the very beginning, a royalty.

**Hendrie:** Yeah, but backwards when you realized, "Oops, we do have to have..."

**Bakalar:** Yeah, so anyway we resolved the thing with Bell Labs. Remember, what did I know about these things? I was just starting from scratch.

**Hendrie:** Yeah, you're a kid.

**Bakalar:** So, anyway, so we took care of that, and then we started making silicon transistors. These were grown, and we developed some business there. The question is do we want to make germanium transistors. We decided not to.

**Hendrie:** Why did you decide that?

**Bakalar:** It was not an easy decision. We had limited resources. It was either one or the other. We couldn't afford to do both. I thought that silicon had better temperature capabilities, and it was earlier in the game.

**Hendrie:** You had the idea for the gold-bonded...

**Bakalar:** Yeah, I did, yeah.

**Hendrie:** That was your idea.

**Bakalar:** And also the rectifier, the silicon rectifier.

**Hendrie:** And that was your idea too?

**Bakalar:** Yeah, I got that by dealing with a customer and seeing that they had a problem.

**Hendrie:** And so you just said, "Okay, well we ought to be able to make rectifiers out of silicon." I mean, you knew how to make a diode. A rectifier is sort of-- it's just a high powered...

**Bakalar:** And then I went and I got government contracts.

**Hendrie:** It's just a high-powdered diode, I mean, it's fundamentally, you know?

**Bakalar:** Yeah. You have to draw the heat off, obviously.

**Hendrie:** Yes, it's a heat dissipation problem. Little logic diodes aren't.

**Bakalar:** Anyway, so...

**Hendrie:** Now, I'm interested in time span here. After you got started in the warehouse, how long was it until you were ready to think about a second product? I understand it was your idea, but was that six months, or a year, or two years, or?

**Bakalar:** It's in that range of a few years.

**Hendrie:** Yeah, it wasn't like immediately. You had to get started.

**Bakalar:** No, it wasn't immediately.

**Hendrie:** Yeah, you had to sell what you had first.

**Bakalar:** We didn't have enough people. We didn't have enough money. We could only take one thing at a time, okay?

**Hendrie:** Yeah, okay. What was Nick DeWolf, what was his role at this point?

**Bakalar:** Nick DeWolf helped design the electronic equipment, and the testing equipment, and draw up the specifications. He was terrific, and he was very good interfacing with customer engineers as well.

**Hendrie:** Yeah, you knew how to make the semiconductor, but you didn't know anything about the application of these things.

**Bakalar:** That is correct, absolutely correct.

**Hendrie:** Okay and Nick understood all of that.

**Bakalar:** Absolutely correct. So anyway, and of course then we hired other people. I had trouble getting engineers, because who knew us? I began advertising in England, and Holland, and France for English speaking engineers that I would bring over.

**Hendrie:** Where did you get that idea?

**Bakalar:** I don't know.

**Hendrie:** You just came up with it?

**Bakalar:** I came up with it, yeah. And so I would fly over to England, and Holland, and France, hire people and bring them over. And so that gave us some more people. So we began making silicon transistors. About that time, after we built up a certain amount-- oh, and Texas Instrument, now I'm trying to think when that occurred. Texas Instrument had gone public, and I felt, gee, maybe this was a time when we could do that too. It would not only give us exposure, but a certain prestige and everything else. And so I hired a Harvard professor to approach-- I knew nothing about what you do in going public, so I hired a Harvard professor from the Business School to approach some of the possible people that we would deal with if we went public.

**Hendrie:** Who was that, do you remember his name?

**Bakalar:** I don't remember his name at this point. I'm bad on names.

**Hendrie:** I understand. I'm bad on names, too.

**Bakalar:** I mean this was like 50 years ago. It'll come to me at some point. Anyway, so he came up with Merrill Lynch. We used Merrill Lynch. We went public, so at that point we were a public company. It opened a whole new avenue. At this point I think I was 33 years old. So I had started this when I was 28, so it's five years later.

**Hendrie:** So how many people were there in the company at this time? Obviously the production...

**Bakalar:** There were thousands. There were thousands.

**Hendrie:** Yeah, because you had all the production workers.

**Bakalar:** Yeah, all the production workers. There were thousands of people at this point.

**Hendrie:** Wow! Tell me about the role of your brother in the first five years.

**Bakalar:** My brother really provided the business know how. At some point we decided to acquire some companies, and he got very energetic with that. So we acquired a connector company, besides making semiconductors, making cable connectors. We acquired a cable company making cable products. Anyway, we also a year later had a second issue.

**Hendrie:** I know you came out in '59. I looked that up.

**Bakalar:** Yeah, we came out in '58 and '59.

**Hendrie:** Oh, the first one was in '58?

**Bakalar:** I think it was '58, either '58 or '59 and then one year later we had a second issue. At that point I had tried to take care of some of our key people, including Nick DeWolf, with stock options, but they were not happy with what had been happening with our stock. And so I said to them, "Well, you see what we have done. Why don't you try doing the same thing, and I'll support you in any way you can?" Nick had met Alex d'Arbeloff, and we had developed some special test equipment, and Nick decided to leave, join Alex and start their own company.

**Hendrie:** Teradyne, yep.

**Bakalar:** And they hired the key people that worked for me who were making the test equipment, designing the test equipment. I felt at that point, well, Nick had really helped us, good luck to you, and so I gave him an order for the-- I thought it was the first test equipment, but I think it was the second according to what happened, so he left under very good terms.

**Hendrie:** Okay, that's good.

**Bakalar:** I gave him an order.

**Hendrie:** Yeah, that's very good. You were very supportive.

**Bakalar:** Well, you know, Nick was great to us, and I was very grateful to him, and let him do what I had done, so.

**Hendrie:** Yes, you'd suddenly become very wealthy in five years, boom.

**Bakalar:** I was never really focused on building a great company. I come from extreme poverty. My driving force was not to be poor, and all of a sudden that was no longer a problem. So I did what I could, but it wasn't the same as when I was poor, okay? So I stayed with the company until I was 60, and at that point we had our ups and downs, and I basically sold some of the companies. I left the company. My brother's son took over, and eventually the company either sold everything off, or discontinued operations and vanished. I was 60, and that was my main career with Transitron.

**Hendrie:** Now, could I spend a little bit more time on Transitron?

**Bakalar:** Sure.

**Hendrie:** One of the things I noticed was that you had a pension for hiring people that were really able people. Talk to me about it. Some of the people you hired from Europe like Pierre Lamond, and Wilf Corrigan, well, I don't know where Wilf-- but Les Vadasz. I mean, they clearly were very talented, because after they left you they went on. They just didn't disappear into the woodwork. They made major contributions. Talk to me about that and how you figured out-- do you have any stories about particular people that you remember, and why you said-- because they were clearly very young at the time you hired them. How did you figure out which people were really good?

**Bakalar:** Well, obviously I had all kinds of people answering my ads, and so I really focused on what I thought were the best ones. I didn't want to-- and this was probably a mistake on my part, by keep

people working for me that I didn't feel were happy working for me. When I brought people over I didn't say that they had to work for me for five years or something like that. I said, "We spent so much to bring you over. Work for me for one year and after that if you're not happy, whatever, you do whatever you want." At a certain point we were falling behind technologically speaking, and I knew it, and I tried to hire people to catch up, for example, making integrated circuits.

**Hendrie:** Yeah, you hired Tom Longo, right?

**Bakalar:** Hired who?

**Hendrie:** Tom Longo?

**Bakalar:** Oh, yeah. And I hired these people, and they just didn't have it. They weren't able to put it together. My mistake was in not moving the operation to California out to Silicon Valley. When I found people in Silicon Valley that could have done it they didn't want to move east to Massachusetts, and so I hired people that were here already that really didn't have either the total expertise, and drive, and they couldn't deliver. Now that I have the advantage of hindsight I really should have moved the operation over to California. I could have, at some point, maybe hired some of the people even started at Intel, and I just, with the advantage of hindsight, didn't do it because I thought I could get people here, and it turned out that they weren't that capable, didn't have that kind of experience.

**Hendrie:** Well, some of the people you hired in Europe they certainly were capable.

**Bakalar:** Maybe they were capable, but they didn't have that exposure here. They got that exposure when they moved to California.

**Hendrie:** Yes, exactly.

**Bakalar:** So that was the difference.

**Hendrie:** Yes, their native ability was there, but...

**Bakalar:** Their ability was there, but they didn't have the experience, the exposure experience. So that was a great failure on my part as I look back on it, but on the other hand that was my life. I'm not going to cry about it. I had a wonderful...

**Hendrie:** Hey, you did very well, exactly.

**Bakalar:** I had a wonderful run, and I think I made a contribution not only in terms of what we did, but the people that we introduced into the field. For example, d'Arbeloff and his company were a direct copy of equipment that we had made, and they built on it, and good luck to them.

**Hendrie:** Built a great company.

**Bakalar:** I was very happy that they did that. Nick eventually left them also, because Nick wanted to be free. And he got a motorcycle and he was motorcycling around in Bali, doing all kind of things like that. I could understand that, because he was a free spirit before Transitron. So anyways, so that was the first part of my life, and now for 29 years I've had another part.

**Hendrie:** Yes, very good. All right, let's take a break right now.

**Bakalar:** Whatever you want.

**Hendrie:** And then we'll move forward. Okay. All right, we're back on. I'd like to just spend a little bit more time going back over the period that we sort of roared through, roared through Transitron. During the very earliest years what were the most difficult issues that came up, problems that you remember, either business problems like not enough cash, or technical problems? What comes to mind?

**Bakalar:** What comes to mind is that I really didn't have enough technical people, and it was very difficult to get people, because we were just starting out. We didn't have a huge facility. We didn't have a great reputation. Many of the people we tried to get were married, and they weren't about to risk their livelihood no matter what the incentive might be. They didn't quite believe it. They didn't have faith in the young company. And so we really had to do with limited means in terms of personnel, and there were things that I would have like to have done that I couldn't do. We had to focus, and that was one of the major problems I remember. In terms of money, my brother had saved enough so while things were tight that was not really the defining factor at all.

**Hendrie:** So you had enough, yeah, you had enough cash.

**Bakalar:** Yeah. We had a few hundred thousand dollars.

**Hendrie:** You essentially had a brother who a venture capitalist and in the company in some sense.

**Bakalar:** Well, not in today's terms. He had a few hundred thousands dollars, and that was it. So in terms of what we were spending it was just a few people. We were able to do that. One couldn't start that way today, let's put it that way.

**Hendrie:** Yes, absolutely. Were your earliest customers military for the diodes? I mean, the diode and then the rectifier, those were the two things that propelled you to be a big company.

**Bakalar:** The gold-bonded diode was the first product. We began selling those at I don't remember the exact price, two dollars apiece. Eventually not that many years later they were being sold for five and ten cents apiece. Okay, so you could see the terrific difference in the pricing. So, that became a, almost overnight, a real big income producer, the very profitable. And then the silicon-powered rectifier we were the only people in the world making them. Some of the people, now, in software, producing software, where they have no competition, it's quite a similar kind of thing. So I really can understand what they go through with their new products. But these kept us going for two or three years. At our peak Transitron employed 10,000 people.

**Hendrie:** Really?

**Bakalar:** Yeah.

**Hendrie:** Wow!

**Bakalar:** But they were all essentially...

**Hendrie:** Yes, they weren't in research.

**Bakalar:** They weren't in research, no.

**Hendrie:** Or in engineering.

**Bakalar:** And it was done with a fairly limited number of people, far more limited than I wanted, but just because of my limitations in getting people and building up a reputation, and so those were the circumstances.

**Hendrie:** What was the peak year of sales? How big a company did it eventually grow to?



**Bakalar:** Transitron?

**Hendrie:** Yeah, Transitron.

**Bakalar:** I think we did a hundred million a year, roughly. A hundred million a year back then...

**Hendrie:** That's a lot, exactly.

**Bakalar:** It was big, and we overcame some big companies that were making competitive products, because we had a superior product. When eventually we ran into difficulty is because people on the West Coast had made superior products. I knew it, and I tried every which way to leapfrog their products, but we just didn't have the knowhow in our area. I hired the best people I could get in our area, but they didn't have it. As I said before, my great mistake was not going to Silicon Valley. If Noah doesn't come to the mountain then move the mountain.

**Hendrie:** Move the mountain, exactly.

**Bakalar:** I should have done that, and that I didn't do.

**Hendrie:** Were there any other semiconductor companies in the Boston area? Clevite made...

**Bakalar:** There was Clevite.

**Hendrie:** Don't they make diodes.

**Bakalar:** Yeah, yeah, and there were others besides Clevite.

**Hendrie:** Really.

**Bakalar:** Yeah, and Sylvania made them.

**Hendrie:** I thought Sylvania made transistors here.

**Bakalar:** They made diodes too at that point.

**Hendrie:** They made...

**Bakalar:** Then there was another one. I forgot the name. There were two or three competitors and we managed to overcome them easily.

**Hendrie:** Yes.

**Bakalar:** And, with a better product basically.

**Hendrie:** Yeah, a better product can win.

**Bakalar:** Yeah, I've heard that.

**Hendrie:** Yeah, well it's interesting.

**Bakalar:** That's what ultimately led to the end of Transitron, the fact that we didn't have a better product anymore even though we knew it and we tried every which way to get it. And, we tried to bypass the fact through acquisitions of other products as well.

**Hendrie:** Yeah, yeah to go and have other things so you weren't dependent...

**Bakalar:** Yeah.

**Hendrie:** ...totally on your semiconductor. Do you remember what you had say Les Vadász working on when you hired him? Did you do the hiring or did somebody else do the hiring of people?

**Bakalar:** I did the hiring.

**Hendrie:** You did the hiring, yeah, okay.

**Bakalar:** Of who? Who was working?

**Hendrie:** Well, Les Vadász.

**Bakalar:** Who?

**Hendrie:** Les Vadász. He worked at Transitron for awhile and he then went on and was one of the founders of Intel.

**Bakalar:** I may not have hired him. I may not have hired him.

**Hendrie:** Yeah, okay.

**Bakalar:** Because I don't remember him.

**Hendrie:** You don't remember him, yeah.

**Bakalar:** No, he didn't have a top position.

**Hendrie:** Okay. What about Pierre Lamond?

**Bakalar:** Oh, I hired Pierre.

**Hendrie:** Yeah.

**Bakalar:** I hired Pierre in France.

**Hendrie:** Yeah, so what did you have him do?

**Bakalar:** I just...

**Hendrie:** You may not remember.

**Bakalar:** I don't really remember what he did okay. I don't remember.

**Hendrie:** All right. Do you remember what Wilf Corrigan did when he worked at Transitron?

**Bakalar:** No.

**Hendrie:** It's amazing the list of people who worked at Transitron.

**Bakalar:** Yeah, I don't really remember exactly what he did.

**Hendrie:** All right, well you had a very good hiring scheme at least for people...

**Bakalar:** Well, let me put it this way. I basically hired most of these people, but that doesn't mean I remember him now. This is how many years later.

**Hendrie:** Yeah, 50 years later.

**Bakalar:** Fifty years later.

**Hendrie:** I don't remember the people I worked with.

**Bakalar:** I'm lucky to remember my own name after 50 years.

**Hendrie:** Fifty years, okay. All right, well that's fine. Do you remember sort of how you handled stock options? It was very early in the age of incentivizing employees with stock options, but you mentioned at some point today that you did have them. Do you remember?

**Bakalar:** We had stock options, they should've been bigger. I know at some point our stock went down and at that point I issued new options to take that into account.

**Hendrie:** Yeah.

**Bakalar:** I think whether I did enough on that I don't know. I don't know. All I know is that I don't think any of these people left Transitron under hard feelings. In other words, when Nick DeWolf left, they really took all the plans for our-- and I could've really gone after them on that.

**Hendrie:** Right, yeah.

**Bakalar:** ...but I felt this guy's really helped the company. If he can do it on his own I'm going to help him any way I can and that was it.

**Hendrie:** What sort of organization-- how did you organize the company as it was growing? Obviously, when it was just a few people certainly all the engineers worked for you, but did you end up having a Chief Engineer?

**Bakalar:** I had a Chief Research Engineer, Gunther Rudenberg and he was very theoretical.

**Hendrie:** Okay.

**Bakalar:** I think with the advantage of hindsight I really should've moved at least the research onto the west coast and hired people there. I didn't do that and that was, I think, a big mistake.

**Hendrie:** Okay.

**Bakalar:** But, that's the advantage of hindsight.

**Hendrie:** Yeah, yeah, oh yeah. There's a long list of things if I'd only done blank.

**Bakalar:** Oh, yeah, I can give you a lot more.

**Hendrie:** Yeah, all right. Clearly you were able-- certainly the stock had went up and then after your ITO came down a lot.

**Bakalar:** I think in retrospect, my background essentially was in materials. Our two products the gold bonded diode and the rectifier were easily within my domain and when we got into designing transistors, which involved the use of circuitry and so forth, I had no background in that whatsoever. I think Nick had that kind of background, but he certainly was not a product planner/manager kind of person and I think in retrospect I should've had someone in charge of all that. I didn't really.

**Hendrie:** Okay.

**Bakalar:** That would be good enough to deal with the evolvement of these products, how they would improve.

**Hendrie:** Yeah, yeah understanding what was going on.

**Bakalar:** Yeah.

**Hendrie:** Understanding the physics and what?

**Bakalar:** Understanding the circuitry and the advantage.

**Hendrie:** The circuitry.

**Bakalar:** Yeah, we really didn't-- I didn't understand the circuitry and I had a little knowledge, but not enough, and in retrospect Nick was very good at talking to engineers. Nick was very good at designing test equipment, but we really didn't have someone in a broader context there were these product developments and although I tried to get people, but they just weren't good enough.

**Hendrie:** Yeah, yeah. You would find somebody, but they didn't measure up.

**Bakalar:** Yeah, and once you're behind you can't afford to hire someone and not have him measure up because then you're behind a second time and then it's gonzo, so that was the situation.

**Hendrie:** Yeah, okay. Well, you clearly had very high standards for people. You found Nick, you picked him and he certainly was talented and you hired a bunch of others.

**Bakalar:** Well, there is also a certain amount of luck too involved.

**Hendrie:** There is.

**Bakalar:** There's a certain amount of luck because you never really know what someone is like until they're confronting a practical problem and dealing with, and so there is a big element of luck involved. Thank you for the compliment, but I think I was also very lucky in terms of some of these people.

**Hendrie:** Okay, all right. We'll move on to your second career.

**Bakalar:** Okay.

**Hendrie:** All right?

**Bakalar:** Okay.

**Hendrie:** When did you retire from Transitron?

**Bakalar:** I was 60, I'm now 89. That's 29 years ago.

**Hendrie:** Okay, all right, about I'm thinking 1984 or something like that.

**Bakalar:** Yes.

**Hendrie:** Okay. And so, what did you decide to do? You were only 60, what did you want to do when you retired?

**Bakalar:** Well, I had gotten interested in art even while I was working at Transitron, primarily as a collector. I really had no training or background in it, but I liked looking at paintings. I thought they were quite beautiful and I began buying some objects and I had developed some confidence that I had a response to artistic objects that had some merit. For the last few years I did a little bit of painting in the kitchen. When I retired, my wife thought that it would be a good idea if we had a photograph taken together. I had purchased an outdoor sculpture from a pop sculptor, a very famous pop sculptor called George Segal; I don't know whether you're familiar with George's work.

**Hendrie:** No, I'm not.

**Bakalar:** George's sculptures are distinguished by the fact that he has individuals, they're all in white, the bronze is all white, and he has them portrayed against a pedestrian object, like they might be seated in the chair, so you'd see like a white ghost seated on a chair. I mean the idea behind all this is an artistic bout or the transitory nature of human existence compared to the longer term existence of inanimate objects. So, I had just bought this thing by Segal and I said, "Well it might be fun to have Segal do you and me." So, she said "Oh, he wouldn't do that." I said, "Well, look I just bought one of his objects; that commands a certain amount of attention." So, I said, "Let me call him." And, I had come up with how I wanted it done. I had seen a Segal where there were three individuals seated on long benches back-to-back, two on one side, one on another, and I didn't quite think it worked well enough, even though it was a George Segal, because my feeling was not only do you want to see the thing front and back, but you want something that will turn the viewer around so he'll walk around the piece and have surprises as he moves around. So, I called him and I described-- he took the call, he knew who I was. I said, "Look, would

you be interested in doing my wife and myself?" He said, "I don't think so." That was the first response. I said, "Well, let me tell you what I have in mind," and I described how I would be one side of the bench, she'd be on the other side, our bodies would be turned to each other, the arms would be crossed. I wanted to show the rapport between a man and a woman and I wanted to shorten the benches and lead the viewer around the piece. God bless George, he said, "I like the idea." So, we ended up in his studio and the way he operates is he wraps you in Johnson & Johnson Band-Aids and before they completely harden he takes them off and then uses those as a mold for his castings.

**Hendrie:** Okay.

**Bakalar:** When the piece was done, he was very excited and he said, "It's one of my best pieces." And, that's when I said to him, "George, if I can design one of your best pieces, I don't need you anymore. I'm going to become a sculptor" and that's how it started.

**Hendrie:** Wow.

**Bakalar:** He became a very good friend. I had a show in New York and he came. He's deceased now, but an interesting story-- one interesting story. Are you interested in stories?

**Hendrie:** Yes, oh I love stories.

**Bakalar:** Do you remember what happened at Kent State way back?

**Hendrie:** Yes.

**Bakalar:** Where a student was killed. The students were protesting the Vietnam War.

**Hendrie:** Right.

**Bakalar:** And, the administration wanted to reconcile with the students and they thought well maybe we can get a pop sculptor like Segal to create a sculpture that will help reconcile the administration, so they commissioned him to make a sculpture. He came up with a sculpture of Abraham and Isaac, not in white, but in bronze, and he picked the moment when Abraham has a dagger in his hand and he's about to kill his son as an offering to the Almighty. The moment before Jehovah says to him "You don't have to kill your young to show your reverence." The kid is looking up at his father and his eyes are dead. He's already given up all hope. Well, you can imagine what the people at Kent State, the administration at Kent



State felt when they saw this thing because it was saying to the administration you don't have to kill your students if they disagree with you. <laughs> So, they turned down the sculpture, refused to take it.

**Hendrie:** Yeah.

**Bakalar:** Segal, then found someone who bought it and donated it to Princeton and it's now on the Princeton campus and after he finished with us he took us over and showed us the sculpture.

**Hendrie:** Oh my goodness, wow. That's a great story.

**Bakalar:** Yeah, so that's how I got started okay. And, some interesting things have come out of it. First of all, I didn't know what I wanted to say. I didn't know what I was all about. I knew that I had a scientific background. I wanted to somehow whether to use that, but I didn't want to use it in a way you use it in science. As you well know, in science, you examine certain facts. You try to come up with a theory that will explain these facts and then you test this theory, run experiments to see if they could predict the results consistent with the theory and consistent with the facts. If that is the case, then you say well this theory has merit, I'll check it another way, and eventually it becomes the explanation for what's going on. That's the scientific method.

**Hendrie:** Right.

**Bakalar:** The artistic method, even though I'm influenced by scientific ideas, is to use these ideas, but to try to mask my expression of these ideas, and not to come up with something that someone looks at it and says oh I know what it is, but to create ambiguity and to have many different meanings and not to teach anything, but to get people hooked and worried does it say this, does it say that. Maybe a year later, they decide that it says something else that they never realized. At that point, you've got a good art object.

**Hendrie:** Mm-hmm.

**Bakalar:** So, I spent a year making little molds and taking figures and spinning them and twisting them to try to establish a vocabulary for myself, and then I began making sculptures.

**Hendrie:** Wow, okay, very good.

**Bakalar:** Okay.

**Hendrie:** Yeah, so did you have any particular themes that you wanted or where did the ideas come from?

**Bakalar:** Well, I have been sort of fascinated by the work that was going on in terms of microbiology, the fact that people, physicians and researchers no longer are just trying things out and seeing if they work, but to trying to establish why they worked or why they didn't work on a molecular basis. So, I early on got involved with what I call my helical figures. As you well know, we've got trillions and trillions of cells in our body each one of which has a controlling blueprint. This DNA blueprint is in the form of a double helix. So, we're controlled to a magic extent, by an inherited blueprint. These particular sculptures involve human figures imprisoned in a single double helix, so I'm abstracting the trillions into a single imprisoning element. And, the figures in many cases are put into situations of tension and uncertainty because obviously even though we have a blueprint life is uncertain. One of my large ones is at Nike Corporate Headquarters outside in their gardens. So, that was a very successful series.

**Hendrie:** So, you're still doing it.

**Bakalar:** Yeah, and then again I did some painting and I've done a fair amount of work with photography. I basically work with Photoshop and my photographs are all tremendously manipulated to give you surreal illusions because life is surreal. As a matter of fact, a lot of the later stuff I'm doing in the sculpture involves stainless steel mirrors because I make the ambiguity of the reflections. If it's done right, you don't know where the mirror is and where the object is, and is it behind me, is it in front of me, am I looking through it, and the idea creates uncertainty. And, I think that's very good. Okay, so, I've been doing that sort of thing.

**Hendrie:** All right.

**Bakalar:** And also, in one of my crazy moments I decide to make a movie, so I also made a movie, which was quite an experience in itself. That took five years. What?

**Hendrie:** Okay, tell me a little bit about the movie. What was it? What was your idea?

**Bakalar:** Well, I had seen-- well first of all it came at a point where I was sort of at a low point in terms of sculpture and the conventional things. I love the movies. I feel that the movies have been the most important art form and I might even say transformed the world, at least they show the good and the bad part of everything else, which is all to the good. I had seen a movie called *American Beauty* that showed the disintegration of the American family. Maybe you've seen it.

**Hendrie:** Yeah.

**Bakalar:** And, I didn't like what it showed. I thought that there are all kinds of families struggling and have a sense of cohesion and I wanted to show something like that. I have a place on the Cape and so I've been exposed to a lot of the Portuguese in areas like New Bedford and Fall River and I thought that they're essentially blue collar people, but for the most part a strong sense of family values, and I thought well maybe I'd make a movie about people of Portuguese background. And, I decided to write a script. I'd never written a script. I didn't even know that there's a format to write a script. If you follow the format one page becomes roughly one minute of a movie.

**Hendrie:** Okay.

**Bakalar:** And, normally one movie is more than about an hour and 45-50 minutes, otherwise no matter how good the movie is people get bored. I started writing this script and I was just typing away creating these characters. I mean normally you make a list of the characters, you write something about each character and then you try to weave them into a story. Okay, so I was just slogging away doing it. Anyway, I had something and then I decided it really wasn't good enough and I managed to find these two brothers who wrote scripts and so I hired them to work with me and the three of us worked on putting together a script. Then, of course, my problem was how do I get a director, I certainly couldn't direct a movie. I ended up going to one of these places where you could rent films and taking a lot of films of the kind of movies that I wanted mine to be and looking who the directors were.

**Hendrie:** Okay.

**Bakalar:** Eventually, I managed to get a director, okay.

**Hendrie:** Okay.

**Bakalar:** So, then the script wasn't that good and it had to be rewritten. We had to hire actors, so we had tryouts in New York where we had there different scenes. One scene where the person is happy, another scene where there is a problem, and the third where she gets very excited, shouting all over the place, just to test their range.

**Hendrie:** Right.

**Bakalar:** There is a young girl in the play and we were grading these people and suddenly this young girl comes in and she wasn't on the list, but she began. She was brought in by her mother. She wasn't on the list. She heard about the tryouts at the last minute.

**Hendrie:** Just came.

**Bakalar:** She was so good that we decided she was it for the young girl. Later on I learned she was only 15 years old, which is a real problem because when you shoot a movie you want to shoot as many hours a day as you can to minimize your cost, but she was so good we decided to stick with her. Anyway, there were all kinds of problems I won't bore you with. We make the movie and at that point we didn't have any stars. We had a big opening in Los Angeles.

**Hendrie:** You were able to do that, yes, okay.

**Bakalar:** What?

**Hendrie:** To have an opening in Los Angeles.

**Bakalar:** Yeah, yeah. Well I financed the movie. That's why we were able to do it.

**Hendrie:** Finance an opening.

**Bakalar:** I could finance an opening, exactly. The movie came out. It got two thumbs up by Roeper and Ebert, had wonderful music. It was a really good movie. The only problem was it didn't have big time stars and it didn't have the luck and the craziness. For example, if one of our stars had committed suicide on the day of the release the movie would've been a great financial success. It's that kind of a fickle, crazy business.

**Hendrie:** Yeah.

**Bakalar:** But, anyway it did get two thumbs up. I eventually sold it to Columbia Tristar. Now, an interesting thing that young girl had sung at the Metropolitan Opera Chorus. She didn't sing in our movie. When the movie was finished, before it had been released, we got a call from London from the director of a movie that Andrew Lloyd Webber was planning to make called *Phantom of the Opera* and our little girl had gone there and wanted to play the lead role in that movie. They thought that her voice was terrific, but they didn't know whether she could act.

**Hendrie:** Oh.

**Bakalar:** And, we said we'll send you, at this point it was tape, we'll send you a tape. She's terrific. They got the tape. Andrew Lloyd Webber flew over. Now, I had paid her practically nothing because she had no experience. He paid her one million dollars. So, she went from practically nothing to one million dollars to make *Phantom of the Opera*. Now, *Phantom of the Opera* was not a very successful movie. It bombed out. It was much more suitable for a stage than the movie. So, that's kind of an interesting. <laughs>

**Hendrie:** So, what was the name of your movie?

**Bakalar:** *Passionada*.

**Hendrie:** *Passionada*.

**Bakalar:** It means to love in Portuguese.

**Hendrie:** Okay.

**Bakalar:** And, it's really the story of this woman who's very beautiful. She's a widow. She's grieving for her husband who died at sea, was a fisherman, seven years ago. She sings, she works at a clothing factory in New Bedford, and by the way, I've learned a lot about New Bedford's clothing factories. They make all the women's expensive clothing that they tell you are sewn in Italy; they're sewn in New Bedford.

**Hendrie:** Really?

**Bakalar:** Yeah, Giorgio Armani, for example. Anyway, she works at this clothing factory and she's still grieving for her husband after seven years. This guy comes into town. He's an English gambler and he's a failure. A couple of his friends who were successful gamblers are retired in New Bedford and he happens to see this Portuguese widow performing and he gets the hots for her. He goes after her and she turns him down, absolutely, she won't even give him the right time. The little girl has picked up-- rides a motorcycle and has picked up the habit of going over to the gambling casino at Mohegan Sun in Connecticut and she bumps into the gambler there and one thing leads to another. She wants him to teach her to count cards and if he teaches her to count she'll introduce him to her mother. I won't tell you the whole story, it goes on and on, but it's a love story and has a happy ending.

**Hendrie:** Okay.

**Bakalar:** You'll cry at the end with happiness.

**Hendrie:** Oh, is that it.

**Bakalar:** So, that's the movie.

**Hendrie:** Wow.

**Bakalar:** It took five years.

**Hendrie:** It took five years.

**Bakalar:** Yeah.

**Hendrie:** Okay.

**Bakalar:** I learned a lot.

**Hendrie:** From the original idea.

**Bakalar:** If I were a very young person starting over again, I think I would seriously consider that because the movies have such an enormous impact on life.

**Hendrie:** Yeah.

**Bakalar:** When you look at the way they've homogenized America to a certain extent. I mean some of it is bad, some is good, but ultimately it makes it difficult for bad people to hide being bad.

**Hendrie:** Yeah.

**Bakalar:** So, I think it's a great art form, the greatest and most important and the most difficult of all art forms because you depend so much on other people.

**Hendrie:** Right, yeah.

**Bakalar:** Many of whom are super neurotic.

**Hendrie:** Yeah.

**Bakalar:** <laughs>

**Hendrie:** That's fascinating. Now you were able to end up as you said with your objective obtained of not being poor anymore, having a significant amount of money. Could you tell us a little bit-- and I read that you've been reasonably philanthropic. Could you talk a little bit about the philanthropic direction, the places that you found interesting and wanted to support?

**Bakalar:** Well, we've given funds and also art to a number of places. For example, and I'm not too happy about this, but I'll just mention it. At some point I felt very indebted to Harvard and I ended up-- it isn't what I intended to. Originally I was going to give them much more, but I won't bore you with the details. I ended up giving them a three-piece Henry Moore sculpture 13 feet long. This was a real big deal. And the reason I'm not too happy about it at this late stage is years go by, I happen to go past the sculpture and--

**Hendrie:** Where is it?

**Bakalar:** The sculpture is on Quincy Street. You know where Fogg is. It's across the street from Fogg if you walk down. Before you get to the next street it's right there.

**Hendrie:** It's in Harvard Yard then?

**Bakalar:** It's in the Yard.

**Hendrie:** It's in the Yard sort of across from the Fogg.

**Bakalar:** Yeah, it's in the Yard. And I found that the sculpture had been clothed. They put clothes on it.

**Hendrie:** Okay.

**Bakalar:** And I said, "Clothes on the Henry Moore? Why are you- why are you putting fabric covering on, tailor-made- the fabric- the clothes?" And they said, "Well, you know, when- during the winter it snows and we get uh.. uh.. we- we- we put dirt out.. so that we won't get ice on the snow, and students will walk on it and then they will attempt to climb on the sculpture, and when they climb on the sculpture that scratches the patination. And we put clothes on it in order to protect the sculpture." And I said, "Look. I

gave you this sculpture because I wanted students to see it. Students are there during the winter, and when you put clothes on it they don't see the sculpture. And I think if someone's going to Harvard if you just put a little sign that explains what it is or if you put a tiny little fence one foot high to discourage them from climbing plus a notification that they shouldn't climb because th- they're damaging it..."

**Hendrie:** It sends a message, yes.

**Bakalar:** Does that make sense?

**Hendrie:** Yes.

**Bakalar:** Not to the administration. <laughs> It got nowhere, and I just gave up. So I'm not happy about that, okay? <laughs> But we've given galleries-- I gave a gallery to Mass College of Art. I've given a gallery to-- MIT has a gallery. My wife has been very active in mental health. She is a social worker, so she steered me into that. There have been a number of different charities, mostly local. And I've also donated a lot of sculptures to these places, so I've got a lot of sculptures all over, a lot of which has been donated to people.

**Hendrie:** All right, well, if you're going to do big sculptures--

**Bakalar:** What's that?

**Hendrie:** If you're going to do large sculptures, which I've noticed just looking at your website this is sort of what you tend to do, that's wonderful to donate them.

**Bakalar:** Yeah, these things happen by chance. I've never really made a program of it, but I've had people contact me that heard about it, and before it's over they end up with one, two or even more sculptures. So I think there are now maybe about 35 sculptures at various places. Some of them have been sold. Many have been given. And it depends on happenstance. I haven't gone looking but they're out there.

**Hendrie:** Yeah, okay. Well, it sounds like you had a very diversified career after Transatron. You didn't just sit and--

**Bakalar:** Well, it's been fun. You know, you get involved in a big business and there are always problems, not only the problems of technological change but you've got people coming and going and the roof leaking and a machine breaking, all kinds of things. The art world has been different. It's a different



pace. I really think- fortunately I'm able to afford it, but I think it's really been a very positive element in terms of my afterlife beyond the technological career.

**Hendrie:** Well, you've clearly enjoyed it, and if you're doing something that you look forward to doing that's pretty good.

**Bakalar:** And you can set your own pace. You're not worried that someone else is out there to beat you down if you don't beat them to it. You know, in a word the technological field is like war. You see what's happening now and all these things have a lifespan. None of them are forever. Even places like Microsoft now. You can begin to see how eventually the mobile revolution is gradually beginning to erode their base, and all of these things that create huge premiums. You could even begin to see the thing in Apple where Apple now is forced to sell things because they have a gold color, okay? So you can begin to see the beginning of the erosion of the technological advantages. Eventually it becomes routine, okay? I mean what is more elaborate than being able to print papers and deliver millions of them all over, but right now it's considered a nothing thing, and the same thing's going to happen with all these things now that are basically high-tech. The high-tech becomes non-high-tech in maybe 10 years. So there's a run for all these companies, but sooner or later-- a lot of people know it and they've rode it out, and a lot of people can enjoy it because it's much cheaper, it's much better and it moves on to something else. And that something else now in my opinion is concerned with understanding the human body and how to make life better for the average person. I think that world, the inner world, is infinitely more important than worrying about getting someone on a phone.

**Hendrie:** So if one of your children was just in high school and they were interested in a technical or scientific- they had a scientific as opposed to, say, an artistic bent, what field would you advise them to go into?

**Bakalar:** I'd advise them to go into something where they look forward to the next day. In other words they've got to be very happy and engaged in what they're doing, and the monetary aspect is-- if you don't have it, obviously, it's very important. But at a certain point, and it isn't that much, it becomes secondary. The important thing is to feel that you're leading a happy, useful life and you look forward to your days doing that. That's what I would advise them. What would you advise your kids?

**Hendrie:** I couldn't say it better. Do something you really enjoy because the things you enjoy you're probably good at. We don't enjoy doing things we're not very good at, and something where you look forward to going to work as opposed to, "Can't wait to go ho- can't wait to, you know, get out of work."

**Bakalar:** I'll tell you a good example of enjoying what you're doing. One of the main figures in creating the high-tech revolution was Shockley. Shockley got the Nobel Prize, shared the Nobel Prize, for discovering the transistor, inventing the transistor. Shockley was one of the most unhappy people that

you can possibly imagine. I had a conversation with him. This is after I had made a lot of money going public, and we were just talking. I forgot the circumstances under which we met. And he had tried to start some semiconductor companies on the west coast, and he was so difficult to work with that the people that he managed to hire left, and eventually they ended up with starting Intel.

**Hendrie:** Yes, but Fairchild first, right?

**Bakalar:** That's why I used the word eventually. They went to Fairchild. And so we were talking and I said, "You know," I said, "You are the luckiest person in the world. A lot of people get Nobel Prizes, but what you came up with is something that's gonna change the life of just about every person on our planet in a meaningful way eventually. I can't think of any greater satisfaction than that." And I said, "I went into business because I didn't think I was as smart as you are and I could never do anything like that," but I said, "I really envy, you know, what you've been able to accomplish here." He said to me, "You can take that and shove it up your ass." He said, "It doesn't mean anything. I'd rather have the money."

**Hendrie:** Really?

**Bakalar:** Yeah. Now this is Shockley-- you know, his personal life was a disaster, I think. Either his wife or one of his kids committed suicide, and then eventually he came up with this theory that blacks were inferior.

**Hendrie:** Now I did not know that part.

**Bakalar:** Oh, yeah. He came up with the theory that blacks were inferior genetically because of the statistics, and he ended up in sort of disgra-- it's the same thing that happened to Watson. The same thing happened to Watson. Watson came up with this theory years after he had helped discover the structure of DNA that blacks were inherently inferior, and it created such a fuss that they kicked him off the institute where he was, and he's been retired since then. But, anyway, this was Shockley. So the only reason I'm telling you this story is we're mentioning you should be happy what you're doing. This was a guy who was not a happy guy and yet look at the enormous contribution he made to the world. How can you account for people-- you can't account for it.

**Hendrie:** Well, how can you account for people's, yes, feelings about things and inability to see that and take any pleasure from it?

**Bakalar:** Now that was a tough answer.

**Hendrie:** <laughs> Right. That's a very tough answer.

**Bakalar:** So, anyway, so that would be my advice. Oh, by the way, one of the interesting things in this art thing. Again, I've sort of stayed away from the marketing thing because the marketing is really not fun. You're pushing something. And it's really important in art because there's so much art out there that is not very good and the amount of it is being pushed like crazy. You look at some of the stuff that's going on now and it's just-- I don't think it'll stand. It's almost like the tulip craze in Holland where people were going crazy over individual tulips and eventually you couldn't give them away just because they're different-- anyway, at one point I got-- this was early on, maybe about five years into my sculpture career, I got very friendly with this guy whose company moved sculptures around from one place to another. And I notice that you were in St. Petersburg, that you did something in St. Petersburg with interviewing people that were very influential in the Russian semiconductor business.

**Hendrie:** Oh, yes, yes, we did. Yes, absolutely.

**Bakalar:** Okay. The reason I mention that is I'm coming to St. Petersburg. And this guy said, "Look. Uh.. we've moved some art around in Russia. My company's moved art around in Russia and I've gotten to know this young professor in St. Petersburg. Why don't you take some photographs of some of your sculpture when you go over there and show it to him? Maybe the- you'll meet this..." and I'm like, "All right, I'll do it." So I end up in St. Peters-- we were going to Russia, anyway. Never been there. And, again, my mother had come from part of Russia, Lithuania, so it's just like-- anyway, this professor looks at the photographs and he says, "Can you lend me these for an hour?" I said, "Yeah." So he takes them and he goes off. He comes back and he says, "How would you like a one-man show at the ethnographic museum here in St. Petersburg?" I said, "You haven't shown any Americans since the revolu- Russian revolution." He said, "That's right, but now we have a new government and we want to open it up to the Americans. And one way is to have an exhibit." So they take me over to the space and the space is in this old palace. Half the palace is the Oceanographic Institute and the other half is the Russian Museum. The Russian Museum and the Hermitage are the two main museums in St. Petersburg.

**Hendrie:** Yes, I've been to the Hermitage but I've never been to this other one.

**Bakalar:** So I look at the space, parquet floors, high ceilings, windows like these over here, and I said, "Sure." So we organized this show. The show consisted of these figures I spoke to you about. And if you have a show in Boston or New York the odds are 100 to 1 it doesn't even get reviewed. Here there was a TV program called "A Thousand Minutes," which was almost like "60 Minutes" here. And it was on primetime, and they came down and they photographed me for this show. And the next thing I know I'm on primetime Russian television for 15 minutes. They're going through the show; they're showing all the sculptures. There's one young Russian guy who is the famous Russian jazz pianist, and he's looking at the helical sculptures, and they remind him of piano keys, and he is going gaga over—them.

**Hendrie:** You never even thought about that.

**Bakalar:** <laughs> And it becomes a real big deal. So I have that show. So now a year goes by and I'm contacted. And they say, "We're from the Russian Museum. We were very impressed with the show. How would you like a one-man show of some other of your work?" So that's the other half of the museum, so <laughs> this leads to some really funny stories. So I said, "Sure," so I go over there and I meet director Nadia Petrova, whose boyfriend is a curator but he's German and she's his mistress. It gets very complicated.

<laughter>

**Hendrie:** Yeah, okay.

**Bakalar:** And we have the show. The show gets a big write-up. The American consul is there at a dinner and the Russians are proud that they have influenced a young American whose parents came from Russia. You know, they're beating their drums like crazy, okay? <laughs> And the whole thing is really a lot of fun. So then they want me to give a talk, and they say to me, "The talk can only be 15 minutes because we have other speakers, and the- the people that are there for the most part don't know English, so we will provide a translator for you." So I prepare a talk and I'm saying this, and the translator is not so good. He's hesitating. And blah, blah, blah, blah, blah, blah, and I'm looking at my watch, 15 minutes go by, 20 minutes go by, and finally the translator finished after half an hour instead of 15 minutes. And the young professor comes up to me and he says, "We have a real problem." He says, "There were other people due to give a talk, but because this thing took the translator- and it took much longer than he should have, these other people are not go- gonna give a talk, and they're saying, 'Who is this rich American? Who does he think he is taking up the time that we were supposed to have?'" So I had an international problem. But there was a dollar store nearby.

**Hendrie:** <laughs> A dollar store?

**Bakalar:** You could buy things for dollars.

**Hendrie:** Oh, a dollar store, not the--

**Bakalar:** So I take out a \$100 bill and I asked, "How many people are discombobulated?" He said, "There were only two people that were really unhappy because they cancelled their talks." I said, "Go and buy two bottles of very fine scotch." So he goes there and he comes back while we're still talking, and I said, "Could I get the translator over here?" I said, "Look, I understand there was a misunderstanding, and- and- and I want to show you a sign of American Russian friendship, and to the

two speakers who couldn't come we want to present a- a very minor token of our esteem..." They look at the scotch <laughs> and all of the sudden big smiles.

<laughter>

**Hendrie:** They're not upset anymore at all.

**Bakalar:** That was it, their friendship.

**Hendrie:** Oh, that is so cool!

**Bakalar:** Funny, isn't it?

**Hendrie:** Yes, that is great! Well, that was a great idea.

**Bakalar:** Anyway, so that was Russia. I really enjoyed St. Petersburg. Did you enjoy it?

**Hendrie:** Yes, yes. I loved it. We went, though, when it was still Brezhnev in charge during the communist era to St. Petersburg. That was very interesting.

**Bakalar:** Well, it was so sad because when we went to Russia they had just broken up, and we had this woman guide who-- I'm getting confused because I made a couple trips. The first trip I made was when it was still under Brezhnev.

**Hendrie:** Gorbachev?

**Bakalar:** This was before that.

**Hendrie:** Yes, okay.

**Bakalar:** And I had this woman guide who was interested in art and she was very, very nice. She had majored in art. And I said, "I would like to send you a- uh.. an art book." I had just come from Holland, and I said, "I've seen this wonderful show by a former Russian who had left Russia. His name was Chagall," and she said, "Chagall, who is he?" She didn't know who Chagall was. And I said, "Well, he left your country and- and he's- he's become very successful outside Russia. I would be very happy to send

you a book about him with photographs of his work when I get back home, but should I do it? I don't want to get you in trouble." And she said, "N- no. Don't send me the book." She said, "Let me tell you. I became very friendly with an English student when he was here. He sent me a book on artists, and when the book arrived all of the photographs had been cut and censored of the- of the book." Okay, so this was before, okay? But, anyways, on the second trip we were met by this woman whose hair was very disheveled. She was going to show us around, and she said to me she was very unhappy. She said, "We were communists and we believed we were making a better world. We were all poor together. Now we know that they lied to us and we were going nowhere."

**Hendrie:** Wow, okay. Oh, my goodness. All right. That's very interesting, yes.

**Bakalar:** Yeah, we saw all that. So, anyway, there was another thing. The Russian Museum, I was unhappy with them at the end because they were going to set me up to a lot of exhibits all over Europe and the boyfriend of the coordinator had screwed things up. He had given me one date and given the museums another date. He had given me a date a month later than the museum. <laughs> So I get a call from the museum, "where is your stuff?" And I said, "It's not due for another month," and it turned out he had screwed everything up, okay? But they wanted-- one of my sculptures I did a king and queen. They wanted me to give it to them, which they were going to put in front of the Russian Museum and facing Pushkin Square. And I didn't give it to them. I thought it was better in an American place. That piece is now in front of Longy School of Music here in Cambridge.

**Hendrie:** Oh, wow. Okay, okay.

**Bakalar:** So I found a better home for it.

**Hendrie:** You found a better home, yes.

**Bakalar:** Well, for me it's a better home.

**Hendrie:** Well, yes, for you, but that would have been a pretty prestigious place.

**Bakalar:** Well, I wasn't thinking that way. I was thinking, you know--

**Hendrie:** "I want to go see it. I want some other people to be able to see it," that you know. They're your friends.

**Bakalar:** Well, I can see it, yeah.

**Hendrie:** You could go see it. All right, very good.

**Bakalar:** Okay. Anything else you want to ask me?

**Hendrie:** One thing. I saw some reference when I was reading about you that at Transitron even at some point thought about getting into the microprocessor market. Was that ever a thought that went through your mind?

**Bakalar:** We made integrated circuits. When I left we had seven of them on a chip. <laughs> Now there may be seven billion of them on a chip. Okay, so it was very preliminary. At one point I tried to make something with a printer that would be a small computer with a printer, and I had all kinds of problems mechanically getting the printer to work, so eventually we dropped that. But I was trying to get into a device rather than a component field, and it would've been a small computer that would've printed out everything that was going on. And I just couldn't get the printer to work properly, so that didn't work out.

**Hendrie:** That didn't work out.

**Bakalar:** But that's probably what you're referring to.

**Hendrie:** Exactly. Another thing I noticed that you had mentioned that you did eventually take out a license with Bell, and also there was some dispute with Hughes about your diodes.

**Bakalar:** Yes, there was a dispute with--

**Hendrie:** What's that story?

**Bakalar:** Well, it was similar to Bell. Hughes was making a point contact diode in a glass package. The glass package had advantages in size, and it was probably better in terms of hermetic seal. I tried to make it for gold-bonded diodes. I'm trying to remember the details. At some point Hughes felt that we had to pay the royalties. We went to court. The court ruled that we did owe them royalties and we paid them royalties, and that was the end of the matter.

**Hendrie:** Okay, all right. Yeah, it was just you had decided that the glass package was a good idea because I remember when I used your diodes--

**Bakalar:** Yeah, I thought the glass package was--

**Hendrie:** --a little bit better--

**Bakalar:** I thought the glass package was good, and I thought that we would have a gold-bonded diode, which would give us advantage of the point contact. I didn't know that the patents were really valid or good, and so I decided to go ahead and then deal with that problem when we had to deal with it. And when the problem came up then we negotiated and paid them.

**Hendrie:** You dealt with it. Yeah, okay. All right. Well, I think that sort of wraps up I think the questions that I had. I want to thank you very much for taking the time to go and do this, and the Computer History Museum thanks you, too.

**Bakalar:** Thank you very much. I've enjoyed it.

**Hendrie:** Good.

**Bakalar:** Now I want to show you around a little bit some of the things I had in mind.

**Hendrie:** Yes, okay.

END OF INTERVIEW





**Transitron Electronic Coproation Team Meeting.** Massachusetts, ca. 1950.  
Image courtesy of the Nick DeWolf Photo Archive



**Transitron Building, Melrose Intersection.** Melrose, Massachusetts, ca. 1950.  
Image courtesy of the Nick DeWolf Photo Archive



**Transitron Booth at the Western Electronic Show and Convention.** Cow Palace, San Francisco, California, 1957. Image courtesy of the Nick DeWolf Photo Archive