Fairchild Oral History Panel: Discrete Semiconductor Products

Fairchild@50 (Panel Session # 3)

Participants:
Jim Diller
Bill Elder
Uli Hegel
Bill Kirkham

Moderated by:
George Wells

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George Wells: My name's George Wells. I came to Fairchild in 1969, right in the midst of the Hogan's Heroes, shall we say, subculture, at the time. It was difficult to be in that environment as a bystander, as someone watching a play unfold. It was a difficult time, but we got through that. I came to San Rafael, Wilf asked me to get my ass up to San Rafael and turn it around or shut it down. So I was up in San Rafael for a while, and then I made my way through various different divisions, collecting about 15 of them by the time I was finished. I ended up as executive vice president, working for Wilf, and left the company about a year and a half after the Schlumberger debacle. That's it in a nutshell. Let me just turn over now to Uli Hegel, who was with Fairchild for 38 years, one of the longest serving members, I believe, in the room. Maybe the longest serving member. Uli, why don't you tell us what you did when you came, when you came and what jobs you had when you were there.

Uli Hegel: I came to Fairchild in 1959, September 9, and hired into R&D as a forerunner to the preproduction days. My job was to join the preproduction line and help move the products into a production line. We went through two products like that, and then I went into Mil-Aero, and stayed in Mil-Aero for a pretty lengthy time. In '74, we had really major cost reduction programs, because of the gold prices going so high. Our product was gold plated. We had to devise a method of reducing the cost there. Beyond that, I stayed in the international operation serving the international plants, Hong Kong, Korea, Mexico, Brazil, so on and so forth. Then beyond that, the Schlumberger days were there, and then came National. I finally retired in '97.

Wells: Jim Diller.

Jim Diller: My name's Jim Diller. I joined Fairchild in 1963. My first assignment was as an engineering manager, product engineering manager, and I did that for several years. This was in the San Rafael diode plant. About two and a half years after I joined, I became the plant manager. So I was the plant manager at the diode plant until 1968. Then in 1968, I transferred to Hong Kong, and I was the Hong Kong plant manager for a year. Then I left in 1969.

Wells: Bill Elder.

Bill Elder: I'm Bill Elder. I joined Fairchild in January of 1970 as an industrial engineer, again in San Rafael. It seems we've got a San Rafael thread today, with quite a few of us. I just followed Jim by emails-- not emails then. It was telexes, and memos with his name on, so it became very familiar. I joined as an industrial engineer, and then moved into manufacturing and finished up at San Rafael in 1975 as a director of operations. During that time, George came in as a plant manager, and he turned the yield around quickly. The next thing we were looking at was doubling capacity. So that was my first real exposure to the semiconductor equipment industry which today is a $60 billion industry. So we were building cost reduction equipment for diodes, back in 1972 and '73 - pre-SEMI. And clearly, it's had an impact on me, because I finished up leaving Fairchild and going into the semiconductor equipment industry. I left San Rafael in 1975, and went to Palo Alto when the Consumer Products division was beginning. I was the initial director of operations under Greg Reyes, bringing the watches and clocks and all those great consumer products to the marketplace. And then I went to Hong Kong, not to the plant Jim was running, but to the consumer products plant that we'd set up in Tuen Mun, which was a new town on the outskirts of Hong Kong, in what they called the New Territories. I finished up living in the

New Territories and my boss thought I'd become native and become Chinese. I left Fairchild in 1979, so it was a great career, and just a great time in my life.

Wells: Bill Kirkham.

Bill Kirkham: I'm Bill Kirkham. I joined Fairchild as a general manager at the San Rafael plant, having had a few years of experience with semiconductors before that. If you remember point contact diodes, and gold bond diodes, that was in the germanium era. My job at San Rafael was to get production up and to reduce cost. Diode operations were very competitive in those days and still are, I guess. My job was to try to come up with better equipment, better methods of handling diodes, so that we could speed up the equipment, and we did a pretty good job. Some of the fellas that worked on it, Frank Ellis, Ted Malcolm, developed some equipment, which gave us a hell of an advantage in terms of producing diodes. We had a magnetic handling set up, because the problem with diodes of course, is bent leads, and you always had a problem when you were trying to handle them. We set them up with magnetic systems so that we could handle thousands of them an hour, rather than 500 or 600. So that was the deal. I stayed with San Rafael until they decided to shut down Hong Kong. Then I went to Hong Kong for two years, took care of transferring the products from Hong Kong to the Philippines, and to Korea. Finally, they shut it down, I guess it was '84, was it, George? I'm trying to remember the date. About '84. I came back to the States and they didn't know what to do with me, so I took a leave of absence and rode my bike across the country. When I came back, they figured, well, maybe you'd make a good QA manager. So I got to be a QA manager for Fairchild for a while, not a job I particularly cared for, going to see customers and telling them why you're not delivering the quality product they would like. Finally, an opening came again at San Rafael, so I came back to San Rafael as general manager. I guess people started to think maybe this guy isn't the right people to come here. He just shut down Hong Kong and now he's coming to our plant. What comes next? Unfortunately, that's what happened. National Semiconductor decided to take over, so I was also then taking time, about a year, to shut down the San Rafael plant. Not a happy job, but one that we got done. I really enjoyed my time in Hong Kong, there's no question about that. It was a good place to work. There was always problems coming up, some things to solve. It was really enjoyable. Unfortunately, I haven't spent any time on diodes or transistors or IC since then, so I've lost track of what's going on in the industry.

Wells: I used to work for Bill in England when I was with ITT Semiconductor, and he was a great boss. He was always very athletic. He would ride his bike all over the place. We'd play golf together, so on and so forth. He always came to work with a bow tie, and I was telling him today, "Really disappointed, Bill. I wanted you in a bow tie today." And he said, "Well, where's your kilts?" Well, okay, we're even. But it occurred to me to that after hearing Bill Elder speak, if you learn nothing else today, at least you're going to learn how to listen with a Scottish accent. The next question I was going to ask the panel, and they suggested I might give my reasons too, was, what brought you to Fairchild? What was it about Fairchild that made you want to work there? It was really pretty simple for me. I was with ITT Semiconductors at one point in my career, working for Bill, and we did a one-way know-how agreement. That was a period when, this is 1963, '64. It was a period in which Fairchild was licensing its technology, and if you went along to that little lobby that Harry Sello was talking about, where the traitorous eight were sitting [in the photo], the licensees were gathered in there. As chief process engineer, reporting to Bill, it was my job to bring back the technology from California. I arrived the first day, and the place was loaded with these Japanese guys, running around with their cameras, you know, and they're four to a team. NEC had four guys. They weren't in the business then. And, you know, at one point in time, NEC became the largest manufacturer of semiconductors in the world, about 12, 15 years ago now. But there was me on my

lonesome, trying to pick up all this technology and it was phenomenal. I got a look at the R&D that was going on under Jim Early up in the Palo Alto labs, and I thought to myself, "You know, if I'm going to stay in this business -- and I loved it -- I've got to get to Fairchild one day. It is Mecca for a semiconductor guy." And so when Wilf made the call, three years after, and said, "We've just moved over from Motorola. I know you didn't want to go to Phoenix. What do you think about San Francisco?" And I said, "I'll be on the next plane." So that's how I came to join. It was a no brainer. How about you, Jim? What was it that attracted you to Fairchild?

Diller: In my case, I got out of graduate school in 1958, and went to work for a company called Transitron back in Boston, interestingly enough doing diodes, the same thing I ended up doing at Fairchild. It was really exciting. I was the first college kid they ever hired, and the company was really doing extremely well back in those days. It since has, as the older people in the room know, long since gone, but it was a very successful company. But it was clear to me, as I was working there, that all the action was here, that Fairchild was the absolute leader in technology, and if you wanted to be in this business -- and I was doing R&D at the time -- that's where you wanted to be. So I had this goal, really for several years prior to the time I joined in '63. What cemented the deal for me was, I got interviewed by Charlie Sporck and Fred Bialek back in Boston. First time I'd met those two guys, and I just said, "Boy, if this is the caliber of what I'm going to see out there," it took me about five minutes to make a decision. As George says, it was an absolute no brainer. I came out and ended up in San Rafael. I could have gone to either Mountain View or San Rafael, and I said to Charlie, "You pick the spot. It doesn't make any difference to me." That's how I ended up out here.

Wells: Bill, how about you?

Elder: I came to the United States in 1968, and I was a management consultant in San Francisco, working right downtown in Montgomery Street. But everything I would read in the papers about what was happening down in the Valley, was all about semiconductors. It was all about Fairchild Semiconductor. And these startups that were coming around, called Intel and National Semiconductor, and just causing trouble in the Valley with the big brother. So as I targeted getting into the semiconductor industry, and I met with this head hunter, and finished up getting an interview with Fairchild, and then briefly with Intel. And when I looked at Intel, in those days, boy, me coming in knowing nothing about semiconductors, I'd better go to the big guy and try and get trained and get good management experience. So I picked Fairchild based on, hopefully they'll train me, they'll educate me, and that's just exactly what they did. I just got into tremendous management training programs on what was going on in the industry, and what was happening, and been in it ever since.

Wells: Uli, what was it that got you here?

Hegel: Well, I graduated in '58, '59 timeframe, with an aviation aeronautical degree, with a commercial pilot's license. My intent was to fly with Pan-Am. I had three languages, so it's no problem, but the airlines were not hiring at all. There was nothing going on, no jobs. California was hiring, so I came out to California. Knocking on doors, I was at Ampex, and the guy said, "I don't have anything for you, but there's this small company over there. They're making transistors. They're supposed to replace these tubes. Why don't you knock on their door? Maybe they might need somebody." So that's how I came to Fairchild. I got hired and eager to work, do anything, and stayed with Fairchild all this time.

Wells: Bill?

Kirkham: Well, at the time, I was working for one of Fairchild's competitors in diodes, ITT. So we were making progress in terms of coming up with lower costs. George gave me a call, and I figured, if George is there, we worked together well in England, that's a place I've got to go. So that's where I went.

Wells: Now let me ask this. I've thought about this long and hard myself, because the panel insisted I answer my own questions as well. The question was "What was the most exciting time? What was the time when each of you got up in the morning and couldn't wait to get to work?" If you've never experienced that, you've really missed something. It happened to me on a number of occasions, but I have to say that in the Fairchild scene, for me, it was the San Rafael diode plant. It was for me personally a phenomenal growth experience. It was also, after many years of thinking about it and being told about it, a very important plant for the Valley. Let me explain that. When I arrived, within about two months, there were union cards going around, and we took a straw poll. The poll showed that 75 percent of the employees in that San Rafael plant -- 51 percent were minorities, by the way -- 75 percent of those people would vote for the union. When Wilf sent me up there, I said, "Wilf, you're sending me up here to run a plant. I've never run a plant before." He said, "George, nobody has ever run a plant before until they run their first plant. Just get your ass up there, get it profitable or shut the damn thing down." Well, there was no way I was going to shut it down. That was not an option. So I'm up there, and I'm faced with this union threat, and it was remarkable, it was really remarkable. We had to work our tails off, and of course, the National Labor Relations Board doesn't allow you to make any promises about raising wages or making conditions better. It had to be a personal effort on my part, and the part of my staff, and they rose to it. That straw poll went from 75 percent, down to 65, down to 55, and suddenly, we had a chance. And on the day of the election, which we won by six votes -- Six votes, about 250 people in the plant, six votes-- we turned back the union. That very same day, that factory shipped more diodes than in its entire history at Fairchild, which was a measure of the people who were working there. They really did know where their bread was buttered. We kept that plant from going union. Now at the time, it was a wonderful thing. Shortly after that, we had a bomb threat. That was fun. Somebody called me in the middle of the night and said, "Mr. Wells, I'm the guard down at the plant. There's a bomb threat. "What the hell? Nobody ever trained me how to deal with a bomb threat." So I went down, took all the people that were in the plant out to pizza and we had a great old time while the police combed the place and we went back to work later on, and did the second shift. Another wonderful thing that happened, that factory was the first plant to use a laser in semiconductors, an amazing new technique for scribing and breaking a wafer. A wafer of diodes has many, many buttons, which represent one of the electrodes on the diode. But the problem was, the buttons were so big, that you couldn't get a scribing tool down there unless the buttons were 15 mils apart. Using the laser, we were able to reduce the die size to 10 by 10 from 15 by 15 mils, and thereby, silicon costs, by 125 percent. Huge cost saving, and it sent the diode division, by now -- it was only a product line before. It was given divisional status and we took the diode plant to become the highest profit making plant within the Fairchild divisional setup. Just a wonderful thing. As a result of that, I got my VP stripes and then took over transistor division and then linear and then digital and then so on and so forth. So for me, I have to look at that and say, that personally was a phenomenal growth spurt for me, but more importantly, as has been pointed out to me before, if that plant had fallen, Fairchild would have become vulnerable, and potentially, the Valley would have been unionized within a few years. So it had far reaching effect. Now, Jim, what was your most exciting time?

Diller: Well, let me just make a comment on the union part first, which was not my exciting thing. But the five years I was in that plant, we went through three elections, two while I was the plant manager, and

one when Fred Bialek was the plant manager. I'll tell you, they are trying events because George is absolutely right if we had lost, it would have been catastrophic, but we won all three. But for me, I think being there in the mid '60s, like I said, I joined in 1963. It was probably in my entire career -- and I spent over 40 years in the semiconductor business -- the most exciting time I've ever seen. You get up in the morning, you couldn't wait to get to work. And the reason for that, and I've told my son this -- my son spent 20 years in the business as well -- you had to be there to see it, [all] that talent under one roof, I don't mean the San Rafael roof, but the Fairchild roof, was just hard to believe. Bob Noyce was running it. Charlie Sporck was running lots of operations. Jerry Sanders was there. Gordon [Moore], and Andy Grove, was an engineer at R&D when I first joined as section head. You look around that group of people, in my view, both before and since, I have never seen that collection of talent. It was just one of those perfect storms, almost, when everything came together and it was just an absolute thrill to get up in the morning. That's my recollection in that mid '60s, '63, until things started going south in '67.

Wells: Bill Kirkham, what do you think was your most exciting time at Fairchild?

Kirkham: Well, I guess part of the problem, just to follow up what George said, we had three elections in the time I was there. We managed to beat the union in each one. I think the key was, from my standpoint anyway, getting out on the floor and talking to the people, so they knew what we were doing, why we were doing it. If there was a question came up, fine. Tell me what the problem is. I'll talk to the foreman, he'll get back to you and let you know what the decision is. But I felt it was important, and we set up with personnel so that I would have a coffee morning with employees, probably once or twice a month. And we sent out invitations to maybe a dozen of the employees, have them come in and sit down with me, have some coffee and doughnuts, and tell me what they thought their problems were. And it gave me an opportunity then to tell them why we were doing the things we were doing, and what the result would be if we didn't. So when they had a problem with the foreman, they'd tell me, "Oh yeah, the foreman is doing this, that or the other." I said, "Well, the reason he's doing that is because I told him to do it." So they knew where the thing was coming from, they knew it wasn't the foreman's problem. It seemed like over a period of time, that did the trick. So we had three elections and beat them three times, and I thought that was real good for Fairchild.

Wells: Thanks, Bill. Bill Elder, what have you got for us?

Elder: I think the most exciting time for me was Hong Kong. I'd gone through five years of personal growth in San Rafael, and went from being an engineer to running a full operation, and then went into consumer products. Although this is a discrete panel, I think I'm allowed to talk a little bit about consumer products. They were dynamic times. In 1975, '76, we went into the watch and the clock business. We were building this great Fairchild watch at $299.95. And 18 months later, here we are, fighting at $19.99 and still trying to make a profit. And going into Hong Kong in that time George had decided we should build a factory out in the boonies, right in the middle of nowhere. It was the middle of nowhere when we first started. I even built a soccer field and called it Wells Field. And this was for the Fairchild soccer team in Hong Kong, of which I became the captain, and the center forward and striker. We played a few games there. I don't think George ever got to play, because by the time he did come back to visit, it was totally surrounded by other buildings. I was on the town council. I was involved in building the factory. By the time I left, we had 1,300 people. But the thing that was striking was how quickly a market could change, and how rapidly you had to be changing both a manufacturing process and a cost of ownership. That experience stayed with me the rest of my life, because it really forced me then into the

semiconductor equipment industry, where I finished up starting my own company, and then went into the semiconductor equipment market. But I never forgot the lesson I learned in sales and marketing dynamics. Anybody that knows the semiconductor equipment industry today, that's it in a nutshell. You go through the peaks and valleys and the troughs, but they were the exciting days.

Wells: How about you, Uli? In 38 years, there had to be quite a few exciting times.

Hegel: Yeah, well, that's the problem, picking one. But there is one that really made a mark for Fairchild. In '73, '74, I was running the Sandia lab, after flying at that time. I don't think Bendix was in there at that time. But it was the Sandia line, and was down there. George came down and said, "You know, we've got a real problem. We've got to reduce costs in this TO-5 header. We've got to get rid of gold. And not only that, we've got to get out of the glass-seal package to a glass-compression package, which is a TO-39. We've got to get rid of the gold, so we've got to be able to do a eutectic die attach and bond to the posts, all nickel, and be able to seal." So we proceeded with trying to figure out how to do a eutectic die attach. First try was a germanium doped gold pre-form. Beautiful. We could even lower the temperature, except we had another diode in there. So that had to be scratched. Back to gold again. We knew we were die-attaching with a 2 percent gold pre-form, by tiny scrub and scrub, just to get the flow going, everything crystallized. Too much silicon in there. So I played with the pre-form doping level and found out that if I go down to a 1.6 percent silicon-doped pre-form and when you were die attaching you gave it give scrubs and you sucked enough silicon out to get to 2 percent. Beautiful die attach and strong. We also had to devise a bell jar to die attach in total nitrogen. We were not able to accept any backwash of oxygen in there. So we made a little bell jar with a little hole in there. The operator could go in there with their tweezers, and tchk, tchk, put the pre-form down, put the die in there, pop out the part. And that increased the UPH too, because they were not allowed to do more than five scrubs, three to five scrubs. The process was very narrow. Next step was to do the wire bonding. We had problems with sticking on the posts from time to time. We found that one header supplier worked beautifully. So start digging into that, why is that one working, when the other one is not working? We found out that they were doing a cleaning process to not only remove the oxide, but the little glass migration beads that had gone to the post were also removed. So we weren't bonding on glass beads, so we had a nice, strong bond there. Then came the sealing part. And with gold, we had no problem. Our welders could run and run and run, but this way, we had to redress the electrodes. Every 1,000 hits, we had to redress the electrode, so our process was very, very narrow, but we had a process. It turns out that that process saved us over $1 million a month in gold. George sent me to Hong Kong to set up the process and says, "While you're there, why don't you set the process up in Korea?" So I was hopping back and forth between those two plants and we got the process established, and we ran that for five years, almost? Something like that, yeah?

Wells: Yeah, exciting times. I remember all of that. That was half of the problem, the P&L problem the transistor division solved when we solved the gold issue, $1 million a month in gold savings, just by taking gold off the headers. Leaving it where it was required, but taking it off the rest of the part. Fabulous. And Uli did that.

Hegel: Aluminum.

Wells: Aluminum, by then, yeah. Used to be gold, the old ones used to be gold.

Hegel: But with having an SEM capability, we were able to do the analysis and understand why it was working or not working. So they gave us the avenue to progress beyond that.

Wells: I always used to start my talks with a joke to loosen up the audience, but since this is the discrete panel, I won't do that. I will tell you one joke, one amusing incident, and then I'm going to ask these guys to share one. It was at the time, when I first arrived at Fairchild, this was really a funny story, I think. I was very nervous -- a Brit -- an immigrant coming in, and this is my first big sales meeting. We used to have a session every morning, and every morning, the people organizing the room would have what they called an eye opener. I don't know if you've seen the movie Godzilla, where you have this little bird chirping around, and suddenly, there's a bloody big foot comes down and squishes it. The sales guys had been drinking, right, so they're sitting there with their eyes drooping and "Whoa!" so that's why it's called the eye opener. If you've seen the movie Bullitt and you've seen the chase through San Francisco, we did that one. And then on Friday, something really interesting happened. I don't know if any of you in the room remember a fellow called Jeff Winkler? Do you remember Jeff Winkler? Yeah. He ran the hybrid division. It was called the hybrid division that later became the automotive division, because we made GM hybrids. On the Friday, we were all sitting there, and Wilf walks into the room. He says, "Hey, everybody here. Oh boy, I'm late. What's the eye opener this morning?" And Jeff Winkler got up, and he said, "It's you, Wilf. Your fly's open." And, you know, I thought about this, and I never saw Jeff Winkler again. I don't know where the hell he went.

<laughter>

Wells: I thought that was a hoot. Any of you got a funny story to tell? Otherwise we'll open it up to questions.

Diller: I've got a couple of real questions. When I joined in 1963, the diode business was obviously very competitive, and very cost sensitive. For those of you who know, Fred Bialek was the plant manager. If you ever wanted to squeeze the nickel hard enough, Fred was the toughest guy in the world who could do that. I'll never forget my first day on the job. Back in those days, we didn't have computers, we didn't have printers. We basically had Xerox machines. And the Xerox machine, if you wanted a copy, sat right outside Fred's office. My first day on the job, I come walking up to the Xerox machine, I lift up the cover, and there's this scowling picture like this, 8 by 10, with a big cigar in his mouth, a picture of Fred saying, "Do you really need this copy?"

<laughter>

Diller: And it worked. It just created a culture in the entire plant. I'll tell you one other one, real quick. I mentioned that I ran the Hong Kong plant, so our family moved to Hong Kong in 1968. We had about 6,000 people in that plant. Because I was the plant manager, we had all these young engineers, and every time one of them would get married, guess who got invited to the wedding? My wife and I. Now we had come from Rhode Island before we came out here, and Boston, and Chinese food -- I know this is hard to believe, but Chinese food back in 1968 was something I didn't know anything about. I'd never had any Chinese food. I basically just didn't grow up on Chinese food and I had no idea what it was. We go to our first wedding. As you know, the Chinese, they have big banquets with 12 courses. The first or second course, they bring you this little bowl. And then this little bowl, there's something sticking out like

this. Just very thin, like stirring around in there, and it's a chicken foot. And my wife and I took one look at it, "What are we supposed to do with this? Do we eat this? What do we do with it?" Anyway, we gutted through, and many, many wedding ceremonies later, the chicken feet were fairly normal, but I'll tell you for the first time ever that was quite an experience.

Wells: Anybody else got a story they want to tell, an amusing story?

Elder: I've got one, again, consumer products related, but I think it's quite funny. Greg Reyes, who ran consumer, was the VP of the division. Him, myself and Jim Stafford -- I don't know if Jim's here, but Jim was the vice president of purchasing. We're still selling $199 watches, and it's still called the Fairchild brand. Timeband and the others were in the future. But we're off to Switzerland, and you go to these case manufacturers. You go to these beautiful pastoral settings, a nice little plant right in the middle of cows grazing and it's a beautiful, tranquil scene. You go into these pristine factories, and the machines are just clonking along. Everything's in control, and quality control. You leave impressed. And then you go and you have a nice dinner in this medieval castle, and by the time you leave, you're feeling pretty damn good. It's been a great trip and you've made all the deals with the watches you need to keep production going. And then we're going to Hong Kong, because now we're going to go look at the cost reduction program. And as we're leaving Zurich, I can always remember Greg Reyes looking down and saying, "Bye-bye, Switzerland. We're going to wipe you off the map," and off we go to Hong Kong. We get to Hong Kong and we go to the tenth floor of a 20-story building, and here's this little watch factory, right in the middle of the building. We look for Jimmy Chan. Jimmy Chan's the managing director and that's who we're having the meeting with. Jimmy comes out, and he's got a sweatshirt on, shorts, flip flops. "Me Jimmy Chan, me Jimmy Chan." So we take the tour. I'm to check out the capacity, and make sure the NC machines are working. We're walking through, and all of a sudden, this rat runs right across in front of us, and I jump back. I say, "That's a rat!" Jimmy Chan just looks, and says, "Don't worry. The cats take care of the rats." Oh, okay, that's good to know. So we continue the tour, but by then, my coat's buttoned up, and I couldn't care less about the capacity. I'm more worried about myself. And then we get out the factory, go back down on the street. In Hong Kong, in June, it's pretty damn hot and the sweat's pouring out of us, because there's no air conditioning in this factory on the tenth floor. And as we're standing outside talking, in those days, I had a lot of black hair, and it was quite thick. I feel something trickling down my head and I think it's a piece of sweat. I go scratch it, and I feel this big clump in my hair. I say, "What the hell is that?" I pick it out. Here's the biggest cockroach I've ever seen in my life. "Agh!" I couldn't get back to the hotel fast enough to get a shower and get cleaned up. That was my funny story.

Diller: I was there in '68. You should have seen it then.

Wells: Uli, you're the old guy. Tell us. Do you know why we had a plant in San Rafael?

Diller: I don't.

Hegel: Wasn't the plant started in the bowling alley?

Elder: Well it finished up as a bowling alley too. I know that. Maybe it went full circle.

Wells: I can only assume it was because of a labor issue. I can only assume that but I don't know. I don't know why they put a plant there. I didn't get to Fairchild till '69. That was a long time before, and I don't know the history.

<inaudible audience comment>

Wells: What he's talking about, by the way, is very interesting. When the diodes are built, we put a silver button on top. That was one of the electrodes. And then one of the biggest problems of semiconductor devices is current leakage. So we put a reverse voltage on it, like say 30 or 40 volts, and the diodes that couldn't handle 30 or 40 volts, those silver buttons would de-plate, so they would disappear. In the old days, we'd scribe and break the wafer, so we had single die, some with buttons and some without. The good ones were the ones with the buttons, and the bad ones were the ones that didn't have buttons. Girls would sit there and separate them with tweezers. Bromaform was a liquid that they came up with, which had a specific gravity that was such that the die with the buttons on fell to the bottom and the ones with no silver on them stayed on top. So you just whisked these off, slung them away, took the good die out and cleaned them up and they were ready for production. And we're talking about wafers that had as many as 4,000 or 5,000 die on a wafer. [An operation involving] little pieces of silicon that had to be separated by hand was transformed into this phenomenal thing that took about 10 minutes, instead of five hours. It was amazing, amazing stuff. A great idea. I wish I knew who'd come up with that. Any more?

<inaudible audience comment>

Diller: If it's the problem I remember, we were molding diodes into assemblies of either four or eight at a time. I was not the plant manager at the time. I think Fred Bialek was. That was a crisis beyond belief. We were working 24 hours a day, seven days a week to fix it. We finally solved it. It was a molding compound problem that was a mismatch and it was cracking things. Yeah, I remember that. That was a very huge crisis.

<inaudible audience comment>

Wells: The question was, what was the length of the work week back in those early days when we were fighting the union, and what did we think the impact would have been, had the union been successful in San Rafael? Is that the question? Did I get it right? Okay.

Diller: As I mentioned earlier, I went through three of those union fights. We don't know for sure, but clearly, the danger was that if San Rafael got unionized, that it would spread to Mountain View, which was a far greater population than we had in San Rafael. And if it spread to Mountain View, it could spread beyond Fairchild, and clearly unionize the Valley. So we were just very frightened of that happening. That's why so much energy went into it. As far as the work week back when I was there in the '60s, the hourly week was pretty much the same as it is now, but I think in engineering and management we were working 60 hour weeks and we were working Saturdays. Saturday morning was absolutely normal. You didn't even think of not coming to work Saturday morning, right guys?

Hegel: Yeah, it was 10 to 14 hours a day and Saturdays, three-quarter day, let's say. If you didn't finish it, you worked until it was finished.

Wells: I think what a lot of people don't realize is that Fairchild was the Valley in those days. There was no Silicon Valley in those days, by the way. That was a name given much later by Don Hoefler, who wrote the *Microelectronic News*, which was a gossip sheet for the Valley. But he christened it Silicon Valley many years later. [Editor's note: In 1971] But at that time, Fairchild was the biggest semiconductor employer in the Valley. A major employer, and so it was important that the union penetrate Fairchild if it was going to penetrate the Valley, and they saw San Rafael as the weak spot. Yes?

<inaudible audience comment>

Wells: The Ford voltage regulator. I remember one for GM, but I don't remember Ford.

<inaudible audience comment>

Wells: Yes, yes. It was a metallurgical issue. Plus the basic design of the power device, which if anybody knows anything about power devices, on the emitter, that you want as much emitter periphery on your device as possible, so that you used a sort of a wiggly outline for the emitter. That way, you spread the current per unit length, you cut it down. So you had much less heat being generated in one given spot. That's how we did that. The metallurgy had to be changed as well.

<inaudible audience comment>

Diller: I'm not sure I understand. You mean, start a business in terms of an entrepreneurial environment? Because what was started over there were primarily US companies going over, and these were assembly operations. So it was sponsored by and financed by the American companies. Back then, there was not the entrepreneurial spirit that exists here today.

Wells: Hong Kong, Fairchild was the first big company in Hong Kong by the way, one of the first. Okay, thanks very much for your attention. Bye-bye.

END OF INTERVIEW

