



## **Oral History of Dennosuke (Dennis) Uchida**

Interviewed by:  
Craig Addison

Recorded: April 22, 2005



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CHM Reference number: X6196.2011

**Craig Addison:** Could we start off with you talking about your early career? Where you were educated and your first job in the industry?

**Dennosuke (Dennis) Uchida:** After I graduated from Kyoto University in 1958 I joined Sumitomo Corporation, one of the major Japanese general trading firms. The primary reason for choosing Sumitomo Corporation was that I wanted to be involved in overseas business so that I would have a chance to go abroad. Right after I joined Sumitomo I was assigned to the electrical department, although I majored in jurisprudence in the university. This determined my future business career, since I became in charge of the import and export business, which was mainly telecommunications equipment at that time. Among the imported products from the USA was semiconductor manufacturing related equipment such as dotter machine or cut off machine, which were used to improve the yield of transistors and diodes. The IC, invented by Dr. Jack Kilby of TI in 1958 was still not yet in the Japan market, it was only the so-called discrete devices like FET or diodes.

**Addison:** Do you remember the impact of the IC in Japan? Was it a big announcement, how did you find out about the IC?

**Uchida:** Japan at that time was very eager to learn from the United States, so when the IC was invented, Japan really wanted to learn everything related to the IC from the States.

**Addison:** After the period you just talked about, I believe you went to Burma. Can you talk about that a little bit?

**Uchida:** I was assigned to the Sumitomo Rangoon office in Burma from early January 1961 to mid 1962. Now, you know, it is renamed the city of Yangon, and Burma is called Myanmar. My main job was to assist the Burmese local firms who had the license agreement from Nippon Electric Company to manufacture transistorized radios. I was also involved in the import of telecommunication equipment from Japan for the communication network in Burma. When I got my entry visa from Burma, my title was "semi-electronics engineer". As I mentioned earlier, I majored jurisprudence in university and so they [Sumitomo] denoted my title as "semi-engineer". This is my first encounter with the word "semi", which is also SEMI. So I think I was destined to be involved with SEMI in my career afterwards [laughs].

**Addison:** So the Nippon Electric company was NEC, right?

**Uchida:** Yes, NEC is one of the major group companies of the Sumitomo Group.

**Addison:** And why was NEC manufacturing transistor radios in Burma? Was it because of lower labor costs?

**Uchida:** No, no, they [Burma] really wanted to manufacture by themselves. So at that time not only in Burma, but also in Philippines, in Thailand, in India, in Pakistan and in Egypt, NEC had contracts with the local firms to establish transistor radio manufacturing facilities. And NEC licensed manufacturing technologies to those local manufacturers.

**Addison:** So the manufacturing company was Burmese, but they licensed the process from NEC?

**Uchida:** That's right. They imported almost all the main parts from Japan and they assembled those components. The transistor radio was a big product at that time and instead of the plastic they used a Teak wood as covering case. Teak is very expensive wood but is abundant in Myanmar, [and] is mostly used for very expensive furniture.

**Addison:** What was your role during that period?

**Uchida:** My specific duty was to import quite a few items, not only electrical equipment but also buses, trucks, and construction equipment. And even the batteries we imported from Japan. I was also in charge of chemical products such as dye stuff. They use a lot of dye stuff, especially for ladies clothes.

**Addison:** So this particular assignment was fairly short...like a year and a half?

**Uchida:** Yes, that's right.

**Addison:** Can you talk about the next phase after that?

**Uchida:** After I came back from Burma I became in charge of the export business of mainly telecommunication equipment to Asian and Middle East countries. We primarily exported NEC's telecommunication equipment because NEC was one of the top manufacturers of those telecommunication systems in addition to a major Sumitomo group company. So we exported various telecommunication systems such as coaxial carrier systems, telephone exchanges to India and Pakistan, and very big scale microwave communication network systems to Iran and Indonesia and so on. And I also stayed in Kuwait for a while for the satellite earth station construction project.

**Addison:** By this stage the IC was in wider use. So it was this telecommunications equipment all based on integrated circuits or it was still transistors?

**Uchida:** Still transistors primarily, transistors and diodes.

**Addison:** Was there a particular reason why NEC was very strong in telecommunications?

**Uchida:** I think they saw the importance of export business and also they thought those Asian and Middle East countries were really in need of those communication infrastructures. And they put major force into those markets. NEC had quite a big export group in their organization.

**Addison:** Now after your experience in the Middle East and the Asian countries, then I believe you went to New York for Sumitomo?

**Uchida:** In early 1969 I was assigned to the Sumitomo New York office. I stayed in New York up to the middle of 1978...quite a long time. During this time I was in charge of the electrical and electronic business of Sumitomo New York. And this business included not only import of communication equipment and consumer products, such as telephone exchanges (PABX), color TV, tape recorders, but also I was

in charge of the export business for American-made equipment. And one of the major export items from the United States to Japan was the equipment from GCA Corporation. The main products were the so-called photomask repeater, pattern generator and pattern compiler. The pattern compiler is the forerunner of EDA equipment. It was a little bit too early. At that time GCA was also manufacturing ion implanter and sputtering machines, although that business was not so successful. Sumitomo was the distributor in Japan [for GCA], and that distributorship agreement was signed in the year of 1967.

**Addison:** Do you know the story behind how Sumitomo became connected with GCA?

**Uchida:** Yes. There is a history. There was a very famous person, Dr. Hiroe Osafune in NEC. He was the top executive in charge of the semiconductor business in NEC. When Dr. Osafune traveled to the United States to find out about equipment or materials for semiconductor manufacturing he came to know about GCA. At that time GCA's name was not the main one used. They used David W. Mann Company [a subsidiary of GCA]. And Osafune-san, as one of the Sumitomo group company representatives, introduced this company to Sumitomo Corporation. He suggested, "How about getting the distributorship of this new company, this company may grow because the semiconductor business will grow big very soon." That's what Osafune-san told us. So Sumitomo tried hard to get this distributorship in Japan.

**Addison:** This jumps ahead a little bit to SEMI, but SEMI was formed in 1970 and there was SEMICON East in the early '70s. Did you have any involvement in SEMICON East?

**Uchida:** Oh yes, I attended SEMICON East. And I also was coming to the west coast to attend SEMICON West every year which was held in San Mateo at that time.

**Addison:** So you were an exhibitor at the show?

**Uchida:** GCA was an exhibitor at SEMICON West, but Sumitomo was supporting. Quite a few customers came from Japan to visit SEMICON West. And I was mainly in charge of introducing the GCA equipment to all those visitors from Japan.

**Addison:** During that period from '69 to '78 when you were exporting the equipment to Japan, what kind of developments were happening in the semiconductor industry in Japan?

**Uchida:** During this time the Japanese semiconductor industry kept growing very rapidly. In 1976, I remember, the VLSI R&D Consortium was formed in Japan and it continued up to 1980, so it ran for five years. This consortium contributed greatly to the development of the semiconductor industry in Japan.

**Addison:** Did you notice a surge in the sales of the equipment after the VLSI project was announced?

**Uchida:** The stepper was actually developed at GCA, I think, in the year 1976 to '77. The stepper was a kind of an extension of the photo repeater, adding the alignment features to the photo repeater. And in 1977 the stepper was first introduced into real production and I think IBM at that time was the first user of the GCA steppers. But right after that introduction in the United States, Japanese device manufacturers like Fujitsu, NEC, and Hitachi bought GCA steppers. So I think the first stepper machine in Japan was installed maybe in early 1978.

**Addison:** Was it a hard sell? Did the companies realize the advantage of the stepper?

**Uchida:** At that time the memory chips being produced were still 16K to 64K DRAM. So the contact aligner, proximity aligner, and the projection aligner were the main lithographic systems. The stepper is a step-by-step process so the throughput was not so good. So yield was the very important sales feature, but up to the 64K DRAM fairly good yield could be realized even by using those conventional aligners. So it was hard for us to sell steppers in the initial stage because they said throughput is not good enough. But after the 64K DRAM, yield became more important and throughput [of the stepper] was very much improved. After the 256K DRAM the stepper became the main tool as the exposure system.

**Addison:** I've heard that the stepper was very expensive when it was first introduced. Did the customers complain that it cost too much?

**Uchida:** Again, this is a matter of how effectively they can use it, an ROI issue. When they found out the stepper is really useful and also the throughput improved and the yield is very good compared to the conventional lithographic systems, the price became accepted. Of course, you know, if less expensive, the easier it is for us to sell. But anyway, price was not too big an issue.

**Addison:** Besides the stepper, was there other American-made semiconductor equipment that was quite popular in Japan during that time?

**Uchida:** Yes, there were quite a few. GCA's wafer tracks were also in big demand in Japan. The projection aligner of Perkin-Elmer was a very hot product. And of course various kinds of American-made testers, furnaces, implanters, probers etc. were there because at that time almost all major semiconductor-manufacturing equipment was still being imported from the States.

**Addison:** What about other products from GCA? You said the ion implanter and the sputtering system didn't really succeed. Did you try to export those to Japan?

**Uchida:** Yes, we talked about exporting [those systems] to the Japan market, but it was not successful. A couple of ion implanters were sold to the Japanese market, but that's all.

**Addison:** During this period can you talk about the competition in Japan? Did Japanese companies develop similar equipment?

**Uchida:** Again, coming back to the VLSI Consortium, this was initially aimed at developing super LSI. But it turned out that the consortium really contributed to the development of manufacturing and testing equipment. And so through the effort of this consortium, which was participated in by major Japanese device manufacturers, as well as Japanese equipment manufacturers, I think the Japanese equipment industry really advanced.

**Addison:** I've heard some stories about reverse engineering. That Nikon was asked to look at the GCA stepper and they produced something similar and Canon looked at the Perkin-Elmer projection aligner. Was there that kind of a plan to copy what the U.S. had done?

**Uchida:** No, I don't think they tried to copy. But of course Nikon has been a prime manufacturer of the lens for lithography systems. And Canon was also in the business of optics. They had the high precision technology too. Of course, that [type of American] equipment was already in Japan, so they may have learned quite a bit from the U.S. equipment. But anyway, the consortium tried very hard to develop its own indigenous equipment from Japan.

**Addison:** So the strength for Japan, or Nikon and Canon, were the lenses, right?

**Uchida:** Yes, primary strength was the lens. But also in Japan those equipment companies has quite a close relationship with device manufacturers. They could get very good advice from the device manufacturers. I think that contributed to the development of the equipment.

**Addison:** Did Nikon and Canon very quickly become competitors and did that give GCA some problems?

**Uchida:** I think up to, maybe 1982 or '83, GCA was the dominant stepper manufacturer. Then Nikon and later on Canon came into this market. I think at one time GCA occupied more than 90 percent of the market share of the stepper.

**Addison:** What is your view as to why Nikon and Canon caught up to GCA and GCA lost market share?

**Uchida:** I think the main reason is, again, the lens, because GCA imported its lens from Carl Zeiss in Germany. And this was almost the sole supplier of the lens for GCA until GCA bought the Tropel division from Coherent. And when the manufacturing quantity is not big, they could get enough lenses from Carl Zeiss, but when the mass production of the stepper itself became a necessity then the so-called lens uniformity becomes very important. And GCA had difficulty in getting good uniform quality lenses in quantity, at a very constant level.

**Addison:** You said that you went back to Japan in 1978. Why did you move back to Japan at the time?

**Uchida:** There are usually standard periods of time for overseas duty, around five to seven years. So I stayed quite enough and that's why I came back to Japan.

**Addison:** When you went back, can you describe the status of the Japanese semiconductor industry? Was there huge progress made during that period?

**Uchida:** Oh yes, I think that time was the real progress period of the Japanese semiconductor industry. So that's why Sumitomo Corporation also decided to have a kind of dedicated subsidiary in 1980, which I became involved in...called Sumisho Electronic Systems Inc.

**Addison:** Did you go back to set up that subsidiary or that happened after you went back?

**Uchida:** No, after I went back to Japan I again became in charge of the telecommunication equipment export business to Latin America and European countries. So I made quite a few trips to those countries. But because of the rapid growth of the semiconductor industry in Japan, as I mentioned, Sumitomo decided to establish a subsidiary company named Sumisho Electronic Systems Inc. And Sumitomo

requested me to establish this company because I was involved in this equipment business for quite some time during my stay in the New York office.

**Addison:** How did you identify what companies or what products to distribute? Was it just that U.S. companies would contact you, or you would go and visit the SEMICON shows?

**Uchida:** Yes, that's right, various ways. So we tried to find good suppliers from the States or sometimes the U.S. suppliers came to Sumitomo to be represented by Sumisho Electronic Systems.

**Addison:** Did you try to pick equipment that was not available from Japanese companies, so there was less competition?

**Uchida:** Sumitomo Corporation was of course involved in the domestic business, and Sumisho Electronic Systems handled also domestic [Japanese made] products, but not semiconductor manufacturing equipment. That equipment was mainly from the States. But we handled new products just coming out to the market, such as the "all-in-one PC", the copying blackboard from OKI Electric or data printers from Sharp and so on. So we handled quite a few [types of] equipment and products. But still the main products were semiconductor manufacturing equipment, which we were importing from the States.

**Addison:** Of the companies that you represented at Sumisho Electronic Systems, were there any that you thought had outstanding products or technologies, any particular products that were really revolutionary?

**Uchida:** I think one of the products which was very well accepted in Japan was from Prometrix, which produced the so-called Litho Map, which was the critical dimension measuring system. And also they were producing the so-called Omni-map, which was the measuring equipment for ion dose quantities. And as you may know, Prometrix was bought out by Tencor and Tencor merged with KLA. So I think Prometrix is now a part of KLA-Tencor. We also handled Anicon CVD equipment and this was quite a unique CVD system and some people thought this might be very revolutionary. But because of some technical difficulty it didn't turn out to be a real successful product. However at one time everyone thought this might be a revolutionary product.

**Addison:** So what happened to Anicon?

**Uchida:** Anicon was bought out by SVG [Silicon Valley Group].

**Addison:** What was the view of the Japanese device makers about the U.S. equipment? Did they think it was reliable or did they prefer to buy from Japanese suppliers?

**Uchida:** The difficulty of imported equipment was primarily the after sales service or maintenance, including the installation itself. When only imported equipment was available [from the U.S.], they have to buy. But when the competitive company is coming up in Japan, the real competition was in the areas of after sales service and maintenance. In that sense Japanese manufacturers had a big advantage.

**Addison:** So it was quite difficult for you to sell U.S. equipment?

**Uchida:** It gradually became difficult to sell against those Japanese equipment manufacturers who had the real good capability for after sales service and maintenance. And also they could have quite a good relationship with those Japanese device engineers. They could talk of course in Japanese, so they could get a lot of good advice from Japanese device manufacturers.

**Addison:** Was Tokyo Electron a competitor at that stage, a major competitor to Sumisho Electronic System?

**Uchida:** No. Not with Tokyo Electron. At one time Tokyo Electron tried to come into the stepper business but they couldn't succeed. I think the only major part of the equipment business which Tokyo Electron still does not have is in the lithography system area. Of course, the coater and developer is their main business, but they still do not have the real exposure system.

**Addison:** As I understand it Tokyo Electron started out with a similar business model of importing U.S. equipment and then later they developed their own.

**Uchida:** Yes. They started to manufacture in Japan first under a licensing agreement or joint venture. But later on Tokyo Electron became the genuine manufacturer of all the equipment, which helped their growth tremendously.

**Addison:** You talked about joint ventures. Did Sumisho Electronic or Sumitomo move into any joint ventures?

**Uchida:** Sumitomo Corporation thought that maintenance or service administration was very important...however, Sumisho Electronic, which is primarily a sales and marketing organization couldn't meet those requirement. That's why Sumitomo decided to establish a joint venture corporation with GCA on a 50/50 basis. That was Sumitomo GCA Corporation. We called it SGCA. I was involved very much in the establishment of this joint venture. And while I was still president of Sumisho Electronic Systems I also became a director of Sumitomo GCA Corporation.

**Addison:** Did the joint venture actually manufacture in Japan or was it just sales and service?

**Uchida:** Not equipment manufacturing, but we tried to make available some components or features in Japan. We could find some capable vendors for those components. SGCA also did R&D to some extent which we did under the cooperation of those vendors. For instance, Sumitomo GCA developed an "i-line" lens in Japan in cooperation with Olympus.

**Addison:** Was that the first "i-line" lens?

**Uchida:** Yes, at that time. Of course GCA developed their own "i-line" lens with Carl Zeiss. But at the same time we tried to develop a Japanese "i-line" lens so we got together with Olympus who was not manufacturing a stepper. And we succeeded in developing an "i-line" lens totally made in Japan. So SGCA's "i-line" steppers supplied to Japanese device manufacturers used the "i-line" lens made by Olympus. And we also exported this Olympus "i-line" lens in some quantity to the United States.



**Addison:** You say in some notes here that you resigned from Sumisho Electronic Systems in 1987.

**Uchida:** Yes.

**Addison:** Can you talk about how that came about, the reason, and then what you did afterwards?

**Uchida:** I was called back by Sumitomo headquarters to be in charge of the electrical and electronics department as general manager. And this headquarters department was in charge of those subsidiaries including Sumisho Electronic Systems and also Sumitomo GCA. So I became in charge of supervising those subsidiaries too. But because of the market situation and Sumitomo GCA was not doing well, they instructed me to go back to Sumitomo GCA to improve the company's operation. So I went back to Sumitomo GCA in 1988 but at that time already GCA's position in the market had really deteriorated and the company was almost in the final stage of withdrawing from the Japanese market.

**Addison:** You later became the president of General Signal Japan. How did that come about?

**Uchida:** GCA was in trouble, so GCA wanted to join with another company or to be acquired or merged. And there were quite a few candidates for this. But finally General Signal bought GCA. At that time General Signal had the so-called General Signal Company Limited in Japan. And when this buying of GCA by General Signal occurred, Sumitomo decided to withdraw from this joint venture completely. So the capital which Sumitomo shared with GCA, which was 50 percent, was completely bought out by General Signal after two years. So I was pondering about whether to go back to Sumitomo or to stay with this operation. I decided to stay...so I became in charge of General Signal's operation in Japan. Then we changed the name from General Signal KK to General Signal Japan.

**Addison:** Was the presence in Japan of the General Signal products very strong?

**Uchida:** At that time not so strong in Japan. Although they owned major equipment companies in the United States, each of them were called a "Unit of General Signal". Those independent entities included Ultratech, a 1X stepper company, Drytech, an etcher company, Kayex, a silicon puller company, Electroglas, a prober company and so on.

**Addison:** How long were you with General Signal Japan?

**Uchida:** I joined General Signal in 1989, but in late 1992 very suddenly General Signal headquarters decided to divest all of its semiconductor equipment businesses. It was truly a big surprise because we were just starting to construct new facilities for General Signal Japan which would have high grade clean rooms, demo-facilities and so on. So this announcement was really a big shock for us. But anyway a decision is a decision. I had to dissolve the operation in Japan, so I started to close the GS Japan operation. Since we supplied equipment to many customers in Japan, it was not possible just to shut down. What about the maintenance of the systems installed? How to continue spare parts supply? What is our legal obligation to keep that equipment in operation? And so on. And those [issues] became quite a big task for us.

So for instance, for GCA steppers, we arranged a kind of engineer buyout scheme and we established a new company called SOL. We established another engineer buyout company for GCA wafer tracks and SGCA's indigenous equipment company called Lithotech Japan. On the other hand, in the United States many of the General Signal units became independent. Electroglas became independent and Neal Bonke became the president. GS sold Ultratech to Arthur Zafiropoulo who became the president of the company. And Kayex became independent. Tropel also became independent, bought out by Dr. John Bruning. So there were quite a few management buyouts. We established Electroglas Japan and those people who were engaged in the Electroglas business were transferred to this new company. Drytek was bought by Lam Research, so our people who were engaged in the Drytek business were transferred to Lam Research Japan. Ultratech became represented by Innotech Japan who absorbed the people in charge of Ultratech businesses at General Signal Japan, but later on Ultratech established their own Ultratech KK in Japan.

**Addison:** After General Signal was dismantled or closed down, how did you become involved with SEMI?

**Uchida:** Ever since we established Sumisho Electronic Systems Inc in 1980, I became involved in SEMI activities in Japan. From the early '80s I became one of the SEMICON Japan show advisory committee members. And when I moved to Sumitomo GCA Corporation in 1988, I also became one of the ITPC advisory committee members. And after SEMI Japan was established in 1985, I was more involved in those SEMI activities. So I got to know Bill Reed very well, who was the president of SEMI in those years.

**Addison:** Did Bill Reed offer you the job of SEMI Japan president?

**Uchida:** Yes.

**Addison:** Were you surprised?

**Uchida:** Yes. When I was president of General Signal Japan, of course there was no such talk. But when Bill Reed and some of the Japanese [SEMI] directors like Takayama-san found out I was in charge of closing down General Signal operations in Japan, they started to consider me as one of the candidates for president of SEMI Japan. I was thinking [about it] and I thought I may be able to contribute at least to some extent to the SEMI operation and so I accepted this offer.

**Addison:** I wanted to ask you about the silicon cycles in Japan. Did Japan have the cycles the same as the U.S. during the '70s and '80s?

**Uchida:** Yes.

**Addison:** What was your experience of how the Japanese industry adapted to the violent ups and downs?

**Uchida:** It was always a big problem for the semiconductor industry. However in Japan those device manufacturers like NEC, Hitachi, Toshiba, Mitsubishi, Fujitsu and Matsushita are not only in the semiconductor business but also in the very versatile electronic and electrical equipment, consumer product, and heavy electrical machine businesses. Matsushita has consumer products, NEC has communications, Hitachi has heavy electrical machines and consumer products. So they were relatively

strong against those cycles because they could compensate with their other businesses. But in the United States, most of the semiconductor manufacturers are solely involved in the silicon device business and this pattern is mostly the same with the equipment manufacturers. The silicon cycle impact to those dedicated manufacturers in the States is much more severe than the impact to those versatile operations of the Japanese manufacturers. However, if we talk about just the semiconductor division of NEC or Hitachi or Mitsubishi, they really suffered seriously from those silicon cycles, just like U.S. manufacturers.

**Addison:** What about the trade friction between the U.S. and Japan during the 1980s. What is your view on how that came about and how that was solved?

**Uchida:** I think trade friction came out because the Japanese manufacturers' capital investment kept growing and the market share was overtaking that of the U.S. They could do that because they are more able to endure against the silicon cycles. Capital investment is the key element of device manufacturing, and especially memory production in Japan became very successful. I remember at one time, 80 or 90 percent of the world market share of DRAM was occupied by Japanese memory manufacturers. Intel stopped manufacturing memory chips, instead focusing on the microprocessor which was a tremendous success later on. But at that time it was a very blunt move forced by the success of Japanese memory manufacturers. Many other U.S. manufacturers also retired from the memory business except TI and Micron. Later TI also retired from memory and concentrated on the digital signal processor which also became a big success. Motorola and quite a few device manufacturers stopped manufacturing memories.

And that became a real issue. There were a number of talks between both countries not only in the industries but more seriously between the U.S. government and the Japanese government. The SIA sued Japan...based on the U.S. Trade Act Article 301 on dumping. Then finally the U.S.-Japan Semiconductor Trade Agreement was signed in 1986. In the agreement there was a clause that Japan must import more than 20 percent of their consumption of those chips from the United States. Nowadays we are far over 20 percent that we import from the States but at that time I think maybe around 10 percent was imported from the United States. The world semiconductor industry really changed beyond our imagination.

**Addison:** OK Dennis, that probably wraps up the interview. Thank you very much.

**Uchida:** Thank you very much, Craig.

END OF INTERVIEW