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MICROELECTRONICS MISSION

TO JAPAN*

December 1 - 6, 1986

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ELECTRONIC INDUSTRIES ASSOCIATION OF JAPAN (EIAJ)
FEDERATION OF CANADIAN MANUFACTURERS IN JAPAN (FCMJ)
JAPAN INFORMATION PROCESSING DEVELOPMENT CENTER (JIPDC)
MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (MITI)
SEMICONDUCTOR EQUIPMENT ASSOCIATION OF JAPAN (SEAJ)
TOKYO CHAMBER OF COMMERCE AND INDUSTRY (TCCI)

INTRODUCTION TO THE MICROELECTRONICS MISSION AND REPORT

The electronics industry is expected to be the fastest growing industry in the world for the remainder of this century and well into the next. This growth will be fueled by the need for new electronic systems such as those used in integrated supercomputers and supermicrocomputer systems which incorporate advanced integrated circuits. The growth will be fed by the demand in consumer electronics, the development of computer graphics technology, the trend toward visual information and the advent of high-definition television and filmless cameras.

By the 1990s, the aerospace industry's need for speed and precision in image processing will spur development of new technologies like those involved in very fast image processing systems. There is, too, the work toward artificial intelligence, applications in expert systems, electronic translating machines and advanced robotics to keep the electronics boom operating through the 1990s and into the twenty-first century.

Microelectronics has a major role to play in this electronics industry growth, since the electronics boom wouldn't have been possible without the revolution that has occurred in semiconductor technology. This revolution is continuing. It offers ever-increasing growth prospects for microelectronics industries. Incorporated into electronics products that touch every area of daily life, microelectronics is a driving force in the electronics age.

For this mission report, microelectronics is defined as being concerned with activities in the design and production of semiconductors and hybrid integrated circuits (ICs), along with the equipment needed to design and manufacture microelectronics devices and products. As well, software and software applications are included since they are of central relevance to the microelectronics field.

In product terms, microelectronics incorporates a wide range of items: semiconductors, hybrid ICs, telecommunications devices, PCB, surface accoustical wave (SAW) devices, R.F. microwave, imagers, thick polymer film, computer systems, software (operating systems, education, intelligent systems), lasers, satellite communications equipment, light emitting diodes (LED) and liquid crystal devices (LCD), frequency halvers and doublers, etc. In the equipment manufacturing area, there are a number of areas of interest to Canada including etchers, coaters, solder/dipping equipment, ion-beam equipment, plasma etching, moulding equipment, ion implanters, photoengravers, etc.

At the present time, world electronics production is dominated by two nations - the United States (U.S.) and Japan. While Canada is not a major force in microelectronics by world standards, the industry has gained prominence as a significant contributor to North American technology, research and development. The industry in Canada has sales of about $215 million and employs some 3,000 people, exclusive of software and software applications workers.

The semiconductor segment of the Canadian industry has been the growth leader over the past six years and, according to economic indicators, has excellent growth potential for years to come. While not large, this part of microelectronics has an accepted capability in several key areas centred around telecommunications. It has, in fact, gained a world leadership role in a number of specialized market niches. An indication of its success is seen in its growth rate - one of the fastest of all Canadian industrial sectors, averaging over thirty per cent a year. This growth trend is expected to continue for two reasons: the industry's growth potential has brought a number of new companies into the field in the past three years; and the market segments being exploited (e.g., in telecommunications) have a particularly strong potential for growth, both within and outside Canada.

The Canadian hybrid IC field, although not having the phenomenal growth pattern of the semiconductor area, forms an important element of the microelectronics industry. It is essential to the continued development of the electronics and telecommunications industries. This part of the microelectronics industry is characterized structurally by the existence of a few medium-sized companies and a relatively large number of small companies. A great many of the hybrid lines of these smaller companies are associated with the larger companies. Hybrid IC companies are working to stay on top of international state-of-the-art technology to better serve Canadian and U.S. markets. This effort demands investment in both technology and manufacturing facilities, since the technology being used now is fairly standard and is dependent on materials readily available in the market. A number of companies, therefore, are working with new polymer materials that have significant advantages (e.g., low temperature processing capability) as well as with substrate materials that allow integration of mechanical and electronic components in a system.

The third part of this industry is the microelectronics equipment manufacturing sector. Activity here focuses on product development in the industrial automation, production systems and robotics areas - 3 key areas that directly affect future manufacturing efficiency in Canada. Present sales in this field amount to $30 million per year. About 90 per cent of production is exported. Less than 400 people now work in this sector, but growth potential is good. Of note are discussions among companies to promote cooperation in the development of next-generation products, particularly in robotics and manufacturing systems. This is an area where there are opportunities for entry by new companies.

Looking at microelectronics in total in Canada, it is clear that most companies are small, with sales of under $10 million. The exceptions are those few vertically-integrated, large companies like Northern Telecom and Mitel. The microelectronics industry is involved in a wide range of activities covering all major fields. This activity, however, doesn't translate into large production volumes. Most programs terminate at the prototype or very small pre-production stage. There are several reasons for this. First, the technology in use by companies may be incomplete or the product development stops at pioneer stages. Second, companies may lack funding to go into volume manufacturing. Third, developments are often associated with specific systems that may not be, or never were marketed. Finally, many Canadian companies assign components and sub-contract manufacturing activities.

In contrast to Canada's focus on specialization, nichemanship and small-scale development, Japan's activities in electronics and microelectronics are massive. Japan accounts for nearly half of the world production of electronics. While broad Japanese electronics industry data does not break out substantial information on microelectronics on the same basis as Canada's industry sectors, it is clear that these sectors are a significant element of the present and future Japanese situation in electronics.

The relationship between Japan and Canada in microelectronics has traditionally been one of vendor to customer. Canadian exports to Japan amount to less than five per cent of what Canada imports from Japan. The situation is the same in terms of investment by Japan in Canada. The prime form of Japanese electronics investment in Canada is in television factories taken over by Japanese firms.

Conditions, however, are changing. In 1985 a slowdown in the U.S. economy, combined with the rapid appreciation of the yen, had a significant negative effect on the Japanese electronics industry. Export-dependent sectors that had spectacular growth in 1984 were particularly hard hit. As the yen rose (and continues to rise) to record heights, industry earnings declined dramatically, despite good domestic demand increases. Demand in consumer electronics, the driving force behind electronics growth, edged-up only slightly, except in a few "hot product" areas. In the area of semiconductors and hybrids, production was down as exports declined in line with the increase in the value of the yen.

Japan has been forced by events to review its approach to international activity in the electronics and microelectronics areas. It has begun to expand its overseas contacts and activities to overcome the problems it faces with the new international order of economic affairs. Traditional relationships of vendor to customer are no longer adequate, with the result that new approaches and opportunities are being investigated that will frame the Japanese response in international electronics and microelectronics in the future. It is within this volatile context of change, opportunities and new potential that representatives of Canadian business and government undertook the first microelectronics mission to Japan.

This mission forms a part of the two-pronged government initiative to discover and take advantage of opportunities for cooperation between Canadian and Japanese companies in selected industrial sectors. In September, 1985, the Minister of Regional Industrial Expansion (DRIE) and the Minister of Japan's Ministry of International Trade and Industry signed an agreement for the promotion of industrial cooperation between the two nations. This agreement was aimed at encouraging joint ventures, licensing agreements, joint research and development and two-way investment. Of the nine sectors originally selected for possible cooperation, three were immediately agreed to. Microelectronics was one of the three - a clear indication of how important it is considered to be by the two countries.

The second element in the dual initiative is the Technology Awareness and Acquisition Project - Japan, or TAAP-Japan, of the Department of External Affairs (DEA). Its purpose is to have Canadian companies obtain first-hand experience and information about Japanese companies and institutions and the products, processes, practices and production technologies that are of immediate applicability in improving the competitive abilities of Canadian industries.

TAAP-Japan also aims to enhance business relationships and technology links between Canada and Japan in an effort to promote trade development. This project uses the mission approach through which industry experts visit Japanese companies and report their findings to Canadian industry through mission reports, seminars, briefing sessions and face-to-face meetings.

In the case of microelectronics, there are a number of potential areas for cooperation and development for companies in the two countries. Included in these are:

- technology development (production processes and product design), essential in upgrading Canada's microelectronics industry infrastructure;
- marketing agreements (both in Canada and in Japan)
- investment opportunities in Canada (from Japan) and vice-versa;
- software development, adaption and marketing, (particularly the use of Canadian software in Japan under license); and
- education to improve the skill base of companies in both countries, through company agreements, university projects and government-sponsored exchanges.

Each of these areas involves a great deal of potential. For example, in the technology area, there are Canadian companies that would be interested in Japanese activities in 1.5 micron complementary metal oxide semiconductors (CMOS), Gallium Arsenide (GaAs) technology, polymer thick film materials, surface mount technology, automated manufacturing technology, digital signal processing (DSP), telecommunications and communications components, design aids, software and software applications, bipolar technology, field effect transistor (FET) technology, etc.

With these and other specific areas of interest in mind, representatives from Canada visited dozens of companies and private sector and government institutions in Japan in the first week of December, 1986. This report presents their overall observations and their specific findings from each organization visited, along with any recommendations or conclusions they may have had. The report is designed to present the intelligence gathered by the mission in a form that is useful to industry and that outlines developments and opportunities where these occur.

The report itself has two main sections. First is an overview of the general characteristics and issues facing the Japanese microelectronics industry and what these might mean for opportunities between Japanese and Canadian businesses. The second section outlines the mission interests, findings, recommendations, individual company and government visits and mission membership. In addition to any general opportunities identified, the specific potential for joint ventures, licensing agreements, technology transfers, representation agreements, information exchanges, research and development (R&D) cooperation and other opportunities have been outlined in each of the write-ups for each company/organization visited by the mission.

SECTION I

OVERVIEW OF THE JAPANESE MICROELECTRONICS INDUSTRY

The Japanese Context

Over the past four decades the Japanese electronics industry has transformed itself from a group of small companies struggling to survive in the transistor business into a major contributor to Japan's national social and economic development. It has moved from insignificance to a point where it now contributes more to Japan's manufacturing than the country's automotive industry.

Electronics in Japan employs over 1.2 million people. There are some 18,000 electronics companies in Japan, 3,500 of which have more than 50 employees. There are 133 companies in the field that employ more than 1,000 people. Over 50 per cent of all production in electronics comes from these 133 companies; the 13,500 companies that employ less than 50 people account for less than 7 per cent of production.

Electronics accounts for more than 22 per cent of Japan's exports, a clear indication of the international orientation of the industry. Japan exports over $38 billion (U.S.) each year in electronics while it imports $4 billion. The United States is Japan's major export customer, receiving over 1.7 trillion yen worth of products. Japan imports only 4 billion yen worth of electronics from the U.S.

Japanese companies control some 350 electronics production facilities and companies around the world. Canada has 5 such companies - 3 in television production, 1 in electronic devices and 1 other - putting it on the same scale of Japanese involvement as Mexico, the Philippines, Spain and Australia.

Microelectronics forms a major part of the Japanese electronics industry. Approximately 10 per cent of the companies, employees, production, value added, research and development and exports in the electronics sector are in the microelectronics field. In 1985 semiconductors accounted for 2.5 trillion yen; 77 per cent of production was in ICs and 23 per cent in semiconductor discrete devices. In a total production that year of 9.5 billion units, 340 million were hybrid ICs while 9.179 billion were semiconductor ICs. Of this production, 64 per cent were for industrial use while 34 per cent went for consumer use. The major microelectronics export products are semiconductor devices and photo cells, silicon transistors, silicon diodes and unmounted semiconductor elements. ICs still enjoy healthy growth in spite of recent trade difficulties. Japan has a large trade surplus in this area.

total world production in semiconductors and related materials was $25 billion in 1986. By 1988 this area is forecast to grow to $37 billion and by 1990 it is estimated at $60 billion. Japan's stated goal is to become the largest supplier in the world in semiconductor and other microelectronics areas. At present, MITI predicts a 20 per cent growth rate in the semiconductor sector based principally on their use in VCRs, liquid crystal T.V., CAD/CAM, pseudo-digital T.V., foreign-language word processors, PBXs, video disks and other products.

There are five fundamental reasons why Japan's growth in electronics and microelectronics has been so impressive. First, Japan has successfully identified, acquired, applied and adapted technology from other countries through licensing agreements and technology transfer. Second, there is a unique cooperative arrangement in Japan between government, universities, banks and private companies which allows for the sharing of R&D, engineering and financial loads involved in developing advanced technology. This sharing is promoted as a result of the clear appreciation by all parties of the nation's aims and objectives for electronics and the methods by which they will be achieved. Japan has focused its resources on manufacturing excellence based on a thorough appreciation of the basics of the technology in use and available for use. Furthermore, it has clear plans to lead in innovation and development in many areas of new technology. The benefits from such an agreed-upon focus are compounded by the third factor - the existence of a relatively protected domestic market. This helps industry during the formative periods of technology and product development. Protection comes both from policies of government as well as from cultural, social and linguistic factors which make Japan's marketplace difficult for foreign companies to penetrate. The fourth factor is seen in industry's successful use of second-sourcing agreements for volume production of integrated circuits. Finally, there are direct financial benefits available in Japan to Japanese companies such as cheap loans for R&D and low/no interest loans for development of manufacturing facilities.

Despite the undoubted success of the electronics sector in Japan and the advantages enjoyed by business, this industry has seen extremely volatile times over the past two years. The basic culprit has been the rapid appreciation of the yen. The exchange rate appreciation from 1985 to 1986 had the effect of making the same item move in price from $1.00 to $1.41. This rate of appreciation has continued in 1987. While this would make a company with flat line sales appear to have grown over 40 per cent, in reality the "growth" rate in most cases was far less. In fact, many companies faced large production cutbacks.

Sales declined significantly in foreign markets for many of the major companies which then were forced to reduce prices to maintain their foreign market share. At the same time, these companies were forced to reduce prices in the domestic market to meet the threat posed by imported goods which were made considerably cheaper by the change in the value of the yen. In overall terms, Japanese companies received about 50 per cent less in yen for their exported products and faced significantly lower returns for goods sold at home. The net effect on electronics production was significant.

In value terms, production increased by only 5 per cent (to $74.3 billion). However, most of this increase came from the appreciation of the yen rather than production volume and sales increases.

In consumer electronics, production value was up 5.5 per cent (exports by 6 per cent). Industrial electronic equipment production value rose by 13.3 per cent to $28.8 billion. Exports increased by 10 per cent while imports increased by 7.7 per cent. Production of electronic application equipment moved up in value terms by 14.4 per cent, communication equipment by 12 per cent and electronic measuring instrumentation by 12.5 per cent.

In the category of electronic components and devices, production was down 1.4 per cent in spite of yen appreciation because of particularly poor performance in ICs caused by contraction in the U.S. market for semiconductors. Exports of ICs from Japan to the U.S. fell 41 per cent resulting in a total drop of 16.7 per cent in production in this area. Imports also plunged over 25 per cent. This trend continued in 1986 with a further semiconductor production decline of 6.5 per cent.

The volatility of the international market that resulted from the situation of the yen and the U.S. market condition is not the only problem facing the Japanese electronics industry. While Japan's heavy investment in state-of-the-art automated production facilities for standardized micro-electronics devices gave companies an excellent opportunity in the mass market of the early and mid 1980s, the change of economic conditions and increasing demand for specialized application materials means that Japanese companies are finding themselves with more and more excess production capacity in standardized fields and increasingly inappropriate production facilities to meet new demands. The industry is facing a time when it must begin to rethink its basic approach to manufacturing if it is to remain flexible enough to attain the world leadership in new technologies that is its goal.

In addition to these factors, there is a change in the electronics market profile. There are no new "hot" products like VCRs and personal computers that are set to fuel new growth in the industry. Electronics will grow over the next two to three decades, but it will be growth characterized by relatively steady increases, rather than spectacular booms.

Finally, under the new U.S. - Japan semiconductor arrangement, price monitoring is being applied to most Japanese semiconductor products entering the U.S. and the Japanese government has agreed to encourage the use of foreign-made products, help foreign producers sell in Japan, promote joint product development and provide access to patents that come from government-funded research. Many foreign companies and producing countries are now targetting Japan as a major market for microelectronics. As a result, it is difficult to foresee any large or immediate increase in Japanese microelectronics activities which could lead to spectacular growth in the industry.

Dealing with such problem areas and promoting continued growth in microelectronics and electronics are part of the cooperative focus and effort of government and industry in Japan. The development of new technology and new materials are at the centre of Japan's industrial strategy, and electronics and microelectronics are at the very centre of the development efforts. The strategic, economic and market forces that promote electronics are aided by the work of the government in its funding, policy, research and development projects. In turn, this lead is a catalyst for major industrial groups to take action - to commercialize developments that allow Japan to meet its industrial, social and economic goals.

Government and Microelectronics

The Japanese government's involvement in microelectronics is extensive. The industry, as a central component of high technology, is being supported by programs and activities from a number of ministries. Most initiatives to stimulate technology development and technology transfer are either directly or indirectly sponsored by government. Government's strongest roles include: supporting technology growth to help depressed regions of the country; lessening trade frictions; smoothing the way for Japanese exports; and providing a focus for industrial development in line with national economic, social and cultural objectives. Such roles help industry by reducing costs, promoting new product development/commercialization and focusing production on approaches which maximize productivity, quality and profitability.

The main player in government coordination and management efforts in electronics is MITI. It identifies the technological fields that are to be cultivated in the national interest. It promotes and supports research and development in these areas. It facilitates industrial cooperation and coordinates various activities such as major projects aimed at overcoming serious problems facing the Japanese industry. MITI attempts to isolate and have work carried out on issues of concern to the entire industry. Examples include the projects to develop superlattice devices, three-dimensional devices and fortified ICs for use under extreme operating conditions. A further example is seen in the SIGMA System Project which is aimed at problems identified in Japan's software situation. Among Sigma's objectives - increasing the rate of standardization in software products (from the present level of 10 per cent of the total software market) and training more software specialists.

MITI also exerts leverage through the use of soft or indirect means of guiding industrial development over the long term. It uses consensus formation to identify new directions and to bring in incremental policies with long implementation time frames. This means industry can invest safely in developments, market mechanisms can be stimulated effectively and the risk of uncertainty can be reduced. These directions and policies come about after long discussion with industry and, therefore, have industry support and commitment to action.

To complement the overall direction established, MITI directs specific initiatives in R&D (such as the Fifth Generation Computer Project and the Basic Technologies for Future Industries Project). It sets up centres and associations as part of its comprehensive effort to promote innovation, improve and increase access to government labs by industry and increase collaboration in projects between firms and between industry, universities and government.

MITI's Agency of Science and Technology (AIST) oversees the 16 research institutions and labs (including the Electrotechnical Laboratory) responsible for most of the major national research projects sponsored by government. In such programs its 2,600 researchers (with 600 engineers in microelectronics, 100 on software and 150 on devices) provide the research capacity to handle tough basic research questions and issues while universities and industry work together on R&D for technological applications using MITI's basic research. MITI is not involved in applications of technology. It presents its research results to universities and industry for their use.

Aside from such specific MITI R&D and industrial development projects, there are also more general policies which affect industry. There are policies to modernize and strengthen industry, upgrade/diversify technology, designate select industries for special attention, promote structural improvement/reform and promote innovation, independence and success in industries. These use tax incentives and financial assistance policies as well as numerous financial and other activities by government banks and promotion centres. Government also offers loan guarantees, loan investment certificates and tax concessions.

The Technopolis Plan is one example of how such policies and practices come together. This plan aims to introduce technologically-advanced industries into regional towns and to raise the level of technology used by existing industries. Technology serves as the nucleus of regional economic development. Electronics companies, not surprisingly, are a major element of the plan. Along with industry, universities are important in this development approach.

For example, the Hokkaido-area plan targets marine-related industries and those using natural resources (including electronics, mechatronics and biotechnology). Measures to be taken include the expansion of the Hakadate Industry Research Institute, establishment of the Hokkaido Prefectural Order of Industrial Technology, funding of promotion centres and financial assistance to small/medium-sized industry. The project shows the coordinated action by government, industry and educational institutions typical of industrial development projects in Japan.

In summary, government activities are focused, comprehensive, well planned and large scale. They aim at long term, agreed-upon objectives supported by industry and universities. Business accepts the government lead once policies are formulated and invests heavily in development projects and activities supported by policies since it recognizes that government support for specific technological efforts has considerable leverage.

The total government effort is aimed at ensuring that the necessary government/industry infrastructure is in place to meet Japan's national electronics objectives.

Industry and Microelectronics

The Japanese microelectronics industry is well established and well situated, both domestically and internationally, in terms of its products and the technological capabilities needed to foster continued development and growth. As noted before, while there are many companies in the electronics/ microelectronics fields, more than half of the production comes from fewer than 135 large corporations.

These major companies have a number of characteristics that affect how they do business and how foreign companies must do business with them. All are divisions of large, systems-oriented companies that have highly diversified interests covering several product fields. None are exclusively involved in microelectronics. In their microelectronics activities, the average product profile for ICs has 22 per cent in MOS memory, 35 per cent in other MOS, 9 per cent in bipolar digital areas and the remainder in bipolar linear. These companies use new technology to diversify, to apply existing capabilities to increase the value-added of their products, to improve product profitability and to develop new products or businesses.

Typically, these large companies are vertically integrated - a factor which allows them to invest heavily in microelectronics production, plants, facilities, R&D and product innovation even during economic down-turns. The ratio of vertically-integrated producers to pure merchants is overwhelmingly high. As a result, Japan has many firms that can invest heavily in the long-term future of microelectronics even when present sales are poor, since they can amortize the investment over the vertically-integrated group of products.

Apart from the normal concern for economic health in the short term, Japanese corporations tend to look more to long term profitability and market share than their North American counterparts. Their commitment to microelectronics activities is long term and is based on recognition that microelectronics will ensure the completeness of their business activities in other fields.

A presence in microelectronics allows companies to increase their self-reliance. They can produce diverse product lines across a number of fields such as general electrical goods, consumer goods, appliances, computers and communication devices while enjoying security of supply in essential components, facilities, materials and technology. Microelectronics offers companies a means to diversify products or change business to tap new growth potentials.

The picture of large corporations that emerges is one of companies employing the three Ss of success - large size, vertically-integrated structure and aggressive development strategy. Size is seen as essential since large companies have or can gain access to the huge amounts of funding needed in capital-intensive businesses like microelectronics. The synergism created by the vertically-integrated corporate structure is held as essential to surviving in the new-technology marketplace. Without this structure there would be less R&D, smaller new investment, reduced product advantage and decreased capacity to introduce full-fledged product lines into the market seemingly overnight. Finally, these companies employ an aggressive strategy of world-wide coverage in given commodities (such as semiconductors and custom or semi-custom microelectronics products) that can foster the above-average growth needed to combat difficulties in the market place such as unexpected changes in currency values or market slumps.

In addition to these giant multi-national corporations, Japan has thousands of small and medium-sized companies engaged in high technology fields. The relationship that exists between the large companies and the smaller player is often one of "mother" company to sub-contractor. For example, 66 per cent of manufacturers in Japan are sub-contractors; 85 per cent of assemblers supply the top 8 companies. As well, to secure supplies, large corporations often invest in strategic small companies.

While there may be positive points in this situation for both parties, there are also drawbacks. Small operations often come to depend on one big company for their survival. At the same time, the intense competition in Japan creates great pressure on the large companies to cut costs, increase quality and introduce innovations. The impetus for change comes from the large corporations, but because of their large size and their maturing structures, they are often less flexible and less capable of meeting the need for change. Accordingly, they increase pressure on sub-contractors to meet new demands and reduce prices. Continued technological innovation by small and medium-sized companies is becoming more and more important to the health of the large firms, a situation recognized by both government and industry. Both have in place policies to encourage diversification and independence by small and medium-scale firms as a key to Japan's successful attainment of its goals in technological innovation and change in new technology and new materials fields.

Also important in the total industrial picture are the roles of associations and universities in Japan. Universities are important in two primary ways: they supply the trained engineers, researchers and other high-talent personnel needed by government, industry and the universities themselves; and they participate in microelectronics research and development, both in terms of meeting national R&D objectives and in specific commercialization projects and cooperative research with industry.

There are several associations in Japan involved with electronics and microelectronics. These associations are powerful. They maintain close ties with government. In fact, government, universities and industry are often all members of the same association. In fact, current or retired government officials often sit on the boards of directors of such associations.

Associations have representatives from nearly all companies in a given field. They serve as a platform for developing consensus in industry and have substantial influence when government comes to form policies. Other roles for associations include gathering and publishing statistics on the industry, conducting surveys, making forecasts and long-range predictions on the industry, acting as a contact point for industry joint ventures and cooperation, and assisting members with international dealings.

In the electronics field, the major associations include the Electronic Industries Association of Japan (see the mission visits material for details), the Communication Industries Association of Japan (which focuses on telecommunications) and the Japan Electronic Industries Development Association (with its focus on computers, computer-related hardware and other related areas). In software there are two main associations: the Japan Information Processing Development Center with its close government connections and focus on software distribution and promotion (see the mission visits section for details) and the Japan Software Industry Association, with its concern for R&D in software.

Implications for Canadian Industry

While this overview of the Japanese situation in microelectronics is brief, general and highly simplified, it does demonstrate a number of characteristics relevant to Canadian companies wishing to be involved in business with Japanese companies.

Japan's government, finance and industry organizations are committed to pursuing a long-term, coordinated course of action in electronics that is to see Japan become the world leader in this area. The effort is focussed, organized and national in scope. It is supported by all parties as a fundamental component of Japan's national industrial strategy.

Accordingly, there are difficulties facing foreigners who wish to do business in Japan in microelectronics. There is a clear tendency for Japanese companies to want to build on their existing strengths. They want to develop their own technology and sell the products of that technology. These companies have shown a preference for acquiring technology they can use in an unencumbered manner. They sell technology only in ways that protect or improve their competitive position (such as by gaining an equity position, improving market access through negotiations or limiting a competitor's access to the market). There is little likelihood they will sell anything but the already well-established technology to overseas buyers. Accordingly, such business relationships as licensing of new technology (which actually acquire Japanese technology or processes) are likely to be limited.

There are other barriers created by the Japanese context. Current trade frictions between Japan and the U.S. have brought about a sharp focus on the U.S. by Japan in microelectronics. Japanese companies are investing heavily in the U.S. to reduce trade surpluses and overcome trade problems. Equally, Japan's market has become a focus for all major producing countries, increasing the competition to be dealt with there. At the same time, Japanese companies are trying to cultivate domestic demand and are moving to base more of their future in their home market to reduce the impacts of the international situation on their corporate profit pictures - a factor that increases the difficulties of foreign companies in penetrating the market. Also important is the fact that small-scale manufacturers are being squeezed hard by major producers as they try to hold their market share in the face of tougher competition. Yet, it is these small-scale, innovative producers that offer the best prospects to foreign companies attempting to move into the Japanese market.

Adding to the barriers is the mismatch in economies and corporate scale between Canada and Japan in microelectronics. The difference is significant: Canada's total electronics industry output is less than the output of Japan's seven largest electronics companies (which also happen to be among the top ten in the world). Put another way, Canada's total output in electronics for one year is equal to four days production by Japan's electronics industry. This mismatch

leads to a situation where many Japanese companies are unaware of Canadian companies and their capabilities or of the advantages held by Canada for Japanese investment (such as a skilled labour force, an advantageous location for trade with the U.S., abundant power and excellent raw materials).

Finally, there are the numerous barriers that exist because of the differences in business practices. There are differences in commitment timeframes (short versus long-term perspectives and outlook), and the mismatch of resources available to Canadian versus Japanese companies to undertake projects. Japanese companies often work to schedules that demand long-term commitment by senior management and working-level resources, something often difficult for Canadian companies to meet given the costly nature of doing business in Japan over the long term. There are cultural differences, distance, language barries, the need to have a continued presence in the country to stay the course of negotiations and all the other difficulties of doing business in another nation located an ocean away.

In contrast to these traditional barriers, there are now a number of positive developments that make opportunities for ventures and better business relationships much greater than in the past. To begin, there is recognition by the Japanese government that it must open its marketplace and encourage increases in investments in other countries if it is to continue to have good international economic relationships. Japanese companies are actively investing around the world to reduce Japan's trade surplus and Canada can be effectively promoted as a target for such investment. As well, Japan is moving to promote the involvement of foreign companies, as noted previously. Selling foreign technology and goods in Japan is being made easier. Networks are being put in place involving government, associations and trading houses to identify technology and products of potential use and assist negotiations and promotion of foreign companies. Further, under the continuing pressure on the yen and the home market, many Japanese companies are investing heavily in future-oriented strategies to improve yields and develop leading-edge devices. It is precisely in these future-oriented, specialized applications of advanced technology that Canadian companies practicing nichemanship have gained an international reputation and are able to compete effectively.

While there are obvious limitations to doing business with Japanese firms, the barriers are neither comprehensive nor insurmountable. Opportunities exist for Canadian companies to do business with Japanese firms and for Canadian industry to improve its situation by taking advantage of the changing Japanese business context.

Opportunities exist, as well, under cooperative arrangements made through programs such as TAAP - Japan and the MITI-DRIE accord, in specific areas that would benefit each industry segment. For microelectronics these include opportunities to upgrade the Canadian microelectronics industry's technical infrastructure and base; develop export markets for products; improve access to Japanese microelectronics manufacturing equipment; facilitate Japanese investment in Candada that will strengthen Canada's high technology manufacturing base; and broaden Canadian companies' market access in Japan. The next section of this report outlines some of the specific opportunities to be found with select companies in Japan as well as the findings and conclusions of the mission members concerning the overall mission.

SECTION II:

THE MISSION ACTIVITIES

The December, 1986 mission included seven representatives from private sector companies, one representative from an industry association, one officer from a Canadian government department and staff from the Canadian embassy in Japan. The primary aim of the mission was to sensitize the Canadian microelectronics industry to developments in the Japanese industry and their potential impact on the Canadian situation and to identify opportunities for joint ventures, licensing agreements, two-way investments and other forms of business development and cooperation between the two countries. The mission visited nearly thirty companies and institutions over its six day schedule.

Individual mission members brought to bear a wide range of expertise and interests in automated manufacturing equipment, software systems and applications, IC technology, electronic systems, microwave technology and other areas in the microelectronics industry. The specific mission objectives of various mission members included:

- determining if Japanese companies have an interest in licensing particular technology in various microelectronics fields;
- evaluating the production capacity of Japanese companies in fabricating semiconductors, wafers and other microelectronic devices and materials;
- investigating the level of interest of companies for joint ventures, R&D and joint product development;
- establishing communication links with Japanese companies and associations;
- assessing the environment of the industry and the technology in the industry in Japan;
- establishing awareness of, and tangible contacts between Japanese and Canadian microelectronics people;
- opening new avenues for bilateral trade in microelectronics;
- comparing production and manufacturing techniques of the two countries;
- investigating new technology and assessing research going on in such areas as surface-mount technology in high production environments and polymer thick film technology;

- exploring opportunities available for Canadian companies to sell systems software and software development services to Japan;

- identifying companies with substantial capability in production and manufacturing that would be interested in expanding their product bases through licensing of unique Canadian technology/patents and in applying the resources needed to take products from a developmental base into full-scale production and world-wide marketing; and

- identifying, with Japanese companies, any specific needs they have for products that could be supplied by Canadian companies.

Mission Findings and Conclusions

In overall terms, mission members reported that the mission had met their objectives in technology assessment, intelligence gathering and identification of opportunities for the Canadian industry. In addition, they identified a number of significant elements about the Japanese industry that are important to gaining an effective understanding of that market. In terms of potential for business development, specific technologies, products and opportunities were identified by misssion members and are detailed in the company visits reports attached to this section of the mission report. Numerous specific leads and opportunities were identified that offer good potential for Canadian companies.

Mission members agreed that Japanese industry captains are coming to face the need to open domestic markets to foreign companies. As well, they are beginning to recognize a growing need to restructure their industry.

Discussions with several business people indicated that Japanese manufacturing facilities were built for standardized production and have a capacity far in excess of domestic demand. This has meant that there is now a good deal of idle capacity in plants since the international market is going through a downturn. Facilities are tooled for large, standard device production lots. However, the domestic and international markets are now saturated with such mass produced materials. To compete and create more demand through new or spin-off markets, the Japanese are coming more and more to the realization that they will have to adjust their basic manufacturing environment to economically handle considerably smaller production lots of each particular product variety.

This poses a considerable challenge for most Japanese companies. Most of their manufacturing systems are basically "hard" tooling that requires considerable resources to allow it to accommodate product variations. In fact, one electronics company (Futaba Corporation) has recognized this fact and now has a large and very profitable re-tooling operation and claims to be prominent in this field in Japan.

There is also confimation of this new direction and demand in microelectronics for smaller, more varied production when we look at the telecommunication product situation. Typically, 50 to 150 different PCB sub-assemblies must be produced in small lots to assemble a complete telecommunications exchange unit. Such a requirement doesn't fit with the present Japanese manufacturing environment and industrial psychology which refuses to accept re-tooling (set-up) downtime of any consequence. Re-tooling is now seen as being in the same category as machine breakdown.

The only way around this structural dilemma is to introduce software-bound flexibility - an area now a prime target of Japan's advanced thinkers. A good deal of the hard-wired, integrated machinery, however, will have to be proclaimed as obsolete since it doesn't fit in with the demands for greater flexibility. The structural problem is an enormous one, and as yet is not well-recognized as such by business leaders in Japan. However, it is only a matter of time before attitudes will change in Japan to respond to hard financial realities and come to recognize that the restructuring cannot be avoided. Canada could be well served by situating itself in the area of flexible manufacturing systems.

In the software field, mission members noted that there is a huge potential market, although it may be a difficult one for Canadian companies to reach. At present, only ten per cent of Japanese software needs are met through packaged software. Ninety per cent is met through custom software. This compares with a fifty-fifty split in most other markets. Very little software is imported because of language difficulties and the need to convert it to Japanese character sets. As well, the market is made more difficult since no single system dominates in Japan as the IBM PC does in the U.S. Further, the Japanese build their own software to enforce their strict quality control standards. Finally, Japan's employment practices emphasize internal development before use of outside vendors. This may not be efficient, but it does much to preserve the social fabric of Japan, not to mention jobs for many.

Industry and government are coming to realize that changes are required in the software situation, precisely the reason for the Sigma Program mentioned earlier. There is a push to move to packaged software to gain its inherent efficiencies. Government is promoting the use of standardized software environments to lower costs, a push that will open doors to imported software. There is, as well, the rapid rise of the yen which makes the use of imported software more attractive.

The pace of change in Japan and the varied pressures for change work both to create problems and to open new opportunities for foreign companies. Firms must recognize the usual barriers and problems of distance, language, culture and business practices. Equally, however, they must recognize that new opportunities like those in software and manufacturing equipment exist and may be successfully exploited. Small companies need not be equated with poor performance or lack of capability - they can and do produce world class products. Canadian companies can be competitive in Japan, despite their smaller size and limited resource picture.

The companies of most interest to foreigners are, of course, the multinational, multi-billion dollar, system-driven giant corporations that have product lines ranging from personal computers to consumer electronics. They often supply their own components internally. To them, in many cases, Canada is an unknown quantity or is seen as a distributor of system-level products. Canada is often overlooked as a source of technology or is overshadowed by the close proximity of the U.S. and its fascination for Japanese producers. Japanese companies often don't understand the trade advantages Canada may offer or its unique position vis-a-vis the U.S.

The development of a Canadian presence in Japan, and in the minds of Japanese business people, while a long-term proposition, will do much to overcome such information-based problems. Mission members felt that many business relationships could be effectively developed in the microelectronics field. They made a number of recommendations as a result of this mission. Included in these recommendations:

- that government should continue the assistance provided by such vehicles as these cooperative missions since such assistance is often essential in helping Canadian companies overcome the difficulties posed by differences in size, scale, orientation and focus of Japanese companies;

- that government should increase information exchanges to increase understanding of cultural, social and economic factors in Japan, the business practices of Japanese companies, the industrial situation and the situation of individual companies of potential interest to Canadian firms;

- that a reciprocal program of information exchanges be developed including such activities as cultural exchanges and promotional activities; and

- that missions be supplemented by other activities aimed at encouraging companies to test and gain access to Japanese markets (e.g., trade show participation).

In a more specific, mission-related vein, one member recommended that future missions include at least one representative from a large Canadian company already known to Japanese companies. This could help promote Japanese interest and open doors that might otherwise stay closed. As well, another member recommended that missions either be lengthened to allow for more than one meeting with companies or that return missions be planned so that cooperative relationships have an opportunity to develop. This recommendation was made in recognition of the need, in dealing with Japanese business people, to establish a human relationship to complement/encourage the development of business relations. Finally, in recognition of the desire of Japanese business to have full, detailed information on visiting companies, one mission member recommended that the elements for information packages established by this mission be kept in place in future microelectronics missions. Among the elements of information included are: company name, size, products/activities; specifications of products, contact person, major interests in visiting Japan, etc. In turn, such information should be made available to mission members on Japanese organizations to be visited so that discussions can be efficient and productive.

In conclusion, mission members were unanimous in saying that the mission could contribute significantly to the development of positive business relationships with Japanese companies. Given favourable negotiations, encouragement by government and focused preparation by Canadian firms there are good opportunities in Japan for Canadian microelectronic companies and good opportunities for business relationships to develop between the two nations. Specific findings and opportunities are outlined in the individual company visits outlined next.

COMPANY VISITS

ANRITSU ELECTRIC CO., LTD.

Contacts

Mr. Iwabuchi

10-27 Minami-azabu 5-chome, Minato-ku, Tokyo 106
(03) 446-1111

Products/Technology

This firm's major business lines include electronic measuring instruments, terminal equipment, transmission and switching equipment, data processing equipment, radio products and industrial automation systems. With nearly 3,000 employees and sales of 65 billion yen, this large corporation has offices, subsidiaries and overseas representatives in Asia, North America, Central and South America and Europe. It has a Canadian representative for measuring instruments (Atelco Inc.).

Among the company's specific products are: electronic measuring instruments for carrier transmission systems, radio communications, microwave relay systems, digital transmission systems and optical fiber communications; terminal equipment such as telephones, miniature relays and hybrid ICs; transmission and switching equipment such as exchanges and telemeter control systems; data processing equipment including CRT displays, magnetic tape drives and telephone terminals; radio equipment in marine and land communications systems, INMARSAT ship terminals and marine radio equipment; and industrial automation system elements such as turret punch presses, electronic micrometers, automatic weigher/checkers and laser applied precise measuring systems.

The company showed some interest in looking at Canadian high frequency products. They are working on a microwave synthesizer and expressed interest in a microwave frequency halver available in Canada. Mission members felt that while Anritsu would be interested in simple buy/sell relationships and ventures, it would not be interested in such activities as licensing and co-production.

ASAHI CHEMICAL RESEARCH LABORATORY

Contacts

Isao Morooka Technical Director

251 Suwa-cho, Hachioji, Tokyo 193
(0426) 51-5131

Products/Technology

Asahi Chemical Research Laboratory is a young organization that carries out research and development in the field of electronic materials. It has had interests in the manufacturing and marketing of a variety of materials related to printed circuit boards and has plans to expand its interests to development of electronic materials as a whole. Its main product lines are chemicals for printed circuit boards, pastes for polymer thick film circuits, tungsten pastes for alumina ceramics, epoxy resin pastes, polyimide heat-resistant pastes, soldering machines, reflow machine equipment for soldering and radiation machinery for photo solder masks.

In addition to expanding its product areas, Asahi intends to carry on basic studies on the physical properties of materials for electronic circuits to respond to the development of high density integration in microelectronics. It will look to outside researchers and scientists in Japan and abroad in these activities. As well, it is promoting technical cooperation with leading petrochemical and chemical enterprises to develop new electronic materials.

Asahi has subsidiaries in Taiwan and Singapore as well as sales agents in Europe (France, Italy and Spain) and the United States. Its overall marketing strategy has been one of establishing new products first in Japan and then marketing in overseas areas. It will develop its overseas marketing capability more actively in future as its products get established. It hopes to undertake joint development work with non-Japanese partners in future as it develops the resources needed to carry on such work. At present, it lacks the needed resources for such work and will not undertake such activities until its sales are better established internationally.

DAIICHI SEIYAKU CO., LTD.

Contacts

Mr. Tokuda — Manager,
Production Control Department

(03) 272-0811

Products/Technology

Daiichi is a large pharmaceutical company with significant interests in the use of automated equipment and manufacturing control equipment for its pharmaceutical activities. It now uses both NEC and Burroughs computers and indicated interest in demonstrations by others for system applications in pharmaceuticals.

There are problems to be overcome in the use of software and systems from outside Japan (such as in the use/handling of Japanese and Chinese character sets and dealing with system conversion problems) but Daiichi has indicated these problems do not mean that outside equipment is eliminated from contention.

The pharmaceutical market in Japan has some unique features to be dealt with in systems work: cycle times are much shorter than in the U.S.; paperwork problems are similar to North America; plants run 24 hours a day, 7 days a week; manufacturing is done to order rather than by forecasting/inventory approaches; etc. The industry has been automating for over 20 years, particularly in raw chemical manufacture and formulation aspects of production. Computers have been used for about 10 years; software is now outdated in many cases.

There are good opportunities for automation of pharmaceuticals work, particularly now that the Japanese government's reimbursement for drug companies has been reduced by 50 per cent, thereby increasing pressure on all drug companies to reduce costs.

At present there is widespread use of computers (PCs) for process control. There is also a mixture of automated and non-automated production lines. Daiichi, like other pharmaceutical companies, is interested in pharmaceutical applications of computerized production and inventory control systems and the use of automated equipment and computer systems in the raw chemical manufacturing phases of production.

DAINIPPON INK AND CHEMICAL CO., LTD

Contacts

Mr. Ichikawa	Manager, Applied Pigment Sales Department

(03) 272-4511

Products/Technology

Discussions with this company centred solely on polymer materials in application to polymer thick film technology. Dainippon conducts extensive research on these materials and supplies them to the electronics industry throughout Japan and around the world. Dainippon is interested in supplying materials in Canada. Samples of materials are available from the company.

FUTABA CORPORATION

Contacts

Mr. Harada	Managing Director Electronic Components Division
Mr. Nakamura	Director, Display Plant
Mr. Kawasaki	Manager, Engineering Department Display Plant, Mobara

629 Oshiba, Mobara-shi, Chiba-ken
(0475) 24-1111

Products/Technology

Futaba Corporation is a large company with some 6,000 employees and annual sales in excess of 75 billion yen. Its Electronics Components Division manufactures 50 per cent of the world's vacuum flourescent displays (VFD). It also manufactures computer keyboards.

The VFD technology in use in Futaba is very advanced. The company's latest design is the front luminous vacuum fluorescent display which employs thin film technology. The company also has developed a flat VFD capable of displaying high resolution graphics. This development is seen by the company as having portable computer applications. The use of VFD in automobile applications is also seen by Futaba as a growing product area.

In other areas, Futaba is involved with the development and manufacture of machine tools, dies and mold bases. It also produces radio control equipment and pulse scale digital readout systems. The corporation also has a research and development centre tasked with advanced technology research and development of new products. This centre works in conjunction with the engineering departments in each plant which are responsible for applied work such as developing manufacturing systems, production plants and equipment. This approach seems to be working well. The automation in the keyboard and tooling departments was impressive. The equipment was high volume and was outfitted with special tooling that was produced in-house, emphasizing Futaba's self-reliance. The keyboard line uses a battery of pre-loaded, single function machines provided with fault sensors (e.g., limit switches) and signal lights. Operators are used basically to correct "fail" conditions and restart machines on "red lights". Machines were configured in mutually independent groups to prevent the spread of downtime across the entire line. The degree of automation permits one shift resourcing for three shift machinery operation. Preventative maintenance programs are in place. The electronics assembly operation did use some imported equipment from the U.S. (e.g., inserters and sequencers). Of note, however, was the fact that the plants were running well below their capacity.

Futaba's overall objective is development and application of its own technologies. It is looking now to expand production and increase sales overseas, while building a world-wide service network to support sales. It has subsidiaries in the United States, Hong Kong and Germany. None of the North American companies, however, are involved in manufacturing, even though 40 per cent of the company's products are manufactured outside Japan.

GENERAL RESEARCH OF ELECTRONICS, INC. (G.R.E.)

Contact

No. 2-15, Roppongi 6-chome, Minatu-ku, Tokyo 106
(03) 404-3636

Products/Technology

G.R.E. is a company with some 300 employees that has as its main business area computer networking and point-to-point communications. It designs, develops, manufactures and sells VHF, UHF/FM fixed, desk top, mobile, hand held and marine transceivers; HF/SSB, AM, FM fixed desk top, mobile, hand held and marine transceivers; communications receivers (programmable scanning receivers); automatic direction finders and depth sounders; data console unit and data terminal equipment; CATV, DBS (satellite receiver) and video equipment; cordless telephones; and measuring equipment such as vibration equipment, modulation analyzers, network analyzers, field strength meters/antennas, syncroscopes, gene-scopes, signal generators, distortion analyzers, etc. It is also in the production machine equipment business including such items as radial lead component automatic axial insertion systems, a flexible automatic chip component mounting system, glue curing ovens, line conveyors and slant conveyors. Much of its manufacturing is carried out by subcontract. Products often end up as components in systems for corporations like Anritsu, Tescon, Sony-Tektronix, Matsushita Communication, Singer, Motorola, Toshiba, DEC, IBM, Tandy, Apple, Hewlett Packard and NEC.

The company has subsidiaries and agents in the U.S., both for sales and manufacture of its products and has a window on the China market through its subsidiary Japamoy Development Co., Ltd. It has several U.S. customers established. It looks to overseas markets and foreign companies as an original equipment manufacturer for them and to identify technology/products which it might be able to use. There are a number of companies in Canada that have similar technologies and products to those of G.R.E. A natural teaming relationship would appear to be possible with this company.

HAKUTO CORPORATION

Contacts

Mr. S. Tokayam	President
Mr. K. Nishida	Executive Vice President & General Manager
Mr. T. Terashi	Director, Systems Development Center
Mr. K Moriki	Sales Manager, Automation Equipment Division
Mr. H. Kitabara	Sales Engineer, Universal Section, Automation

1 - 13 Shinjuku 1 - Chome, Shinjuku-ku, Tokyo
(03) 341-2611

Products/Technology

This company was founded in the early '50s to function as an importer/exporter of instruments, production equipment and components for the electronics industry. Hakuto is comprised of 8 companies that concentrate on the import of advanced materials, equipment and systems related to electronics. As such, the company would be of interest to Canadian companies now involved in advanced electronics/ microelectronics that are looking to tap the market in Japan. Hakuto is not actively involved in software vending although it will look at such products to see if they fit Hakuto business lines. The firm does see problems with imported software given obstacles presented by the Japanese language and difficulties in writing specifications for software. This company was perceived by mission members as having a good reputation in dealings with overseas firms and as such was seen as a good potential contact for Canadian companies.

INTERNATIONAL SYSTEMS TECHNOLOGY CO., LTD. (IST)

Contacts

Mr. A. Nomura	Managing Director
Mr. K. Sato	General Manager, Planning and Development
Mr. N. Kaneko	Deputy General Manager, Marketing
Mr. P. Manina	Marketing
Mr. U. Shin	Marketing
Mr. A. Ruocco	Manager, Strategic Development Far East Area, (Olivetti)

(03) 741-1211

Products/Technology

IST is a new company founded in 1986 by Olivetti (Italy) in Japan. Its mandate is to develop, purchase or modify computer software for resale in the Japanese market.

The company is very interested in general application packaged software rather than very specialized or customized limited market software systems such as those used for automated production, insertion, sorting, etc. It sees the Japanese market in these areas as being already well-served by Japanese hardware and software products.

IST sees the UNIX market as growing in Japan, particularly in the realm of development tools. The question of "Japanization" of software has yet to be resolved as it must be if there is to be any great penetration of the huge potential market offered by Japan. In addition, the company sees difficulties in supplying software for the Japanese market simply because of the lack of a "standard" system on which to base development. Software must be applicable to a wide range of systems that are popular in Japan since the market is not dominated by one or two main players as in North America.

KYOCERA CORPORATION

Contacts

Mr. K. Odagawa	Executive Director, LSI Design, Corporate Divsion
Mr. S. Nosaka	Director & Deputy General Manager, Corporate Planning Division
Mr. A. Ohba	Manager, Corporate Development Group

5-22 Kitainoue-cho, Hiyashino, Yamashinu-ku, Kyoto 607
(075) 592-3851

Products/Technology

With sales near 300 billion yen a year, Kyocera is a large company with extensive interest in the electronics area. Near 4 per cent of its business is in ceramic materials for the electronics industry (alumina substrates, semi-fixed potentiometer bases, substrates for resistors, cathode holders and multiform glass). Some 33 per cent of its business is in semiconductor parts (multilayer packages, Cerdip cups and bases, special packages, chip carriers, mother boards, ceramic printed circuit boards, magnetron parts, power transistor stems, SCR housing, etc.). The semiconductor division is expanding with the formation of an LSI division interested in application-specific integrated circuits (ASIC). Kyocera's technology is currently at the level of 1.5 microns, double metal. The company is interested in pursuing futher ventures in ASIC with other companies, including foreign organizations.

About 20 per cent of Kyocera's sales come from electronic components including quartz oscillators, chip capacitors, trimmer capacitors, hybrid substrates, silicon on sapphire, ceramic filters, oscillators, piezoelectric ceramic buzzer elements, etc. Kyocera also produces consumer goods, optical and precision instruments, industrial ceramics and other products.

This company spent over 6 billion yen on R&D in 1986. Of interest, the development of an IBM AT compatible, a lap-top computer, a new MSX Computer II and a 3.5 inch, 20 megabyte hard disk (developed jointly with LaPine Technology in the U.S.)

Kyocera has several subsidiaries in the U.S., South America, Asia and Europe. Most electronics activities in the U.S. are marketing based rather than manufacturing concerns. Manufacturing overseas centres on cameras, ceramics, cutting tools and similar products.

Kyocera has shown interest in the past in developing new technology/products with other companies as noted in the ASIC area and the computer peripherals field.

KYORITSU CORPORATION

Products/Technology

Kyoritsu is a medium-sized company with interests in radio frequency systems (below 2 GHz) such as radio receivers and navigation receivers. The company appears very interested in acquiring new technologies and in expanding its product line to include higher frequencies. It would consider licensing technology for such an expansion. It appears worthwhile for Canadian companies to investigate this company further to determine the extent, seriousness and product/technology base of any Kyoritsu expansion and whether Canadian companies could have a role to play with the firm in that expansion.

MICRO SOFTWARE ASSOCIATES (MSA)

Contacts

Mr. J. Okada	President
Mr. H. Oki	Director & General Manager, Sales
Mr. S. Yamato	Director, Finance and Administration

(03) 486-1411

Products/Technology

MSA is already in the business of distributing software from other countries in Japan, including software from at least one Canadian company. It converts products for the Japanese language market, including translation of manuals.

MSA is interested in distributing other software products from Canada. The company claims to have good contacts with Japanese computer companies and can use these contacts to jointly bid custom software development jobs with Canadian companies. In this way, MSA can use software expertise from Canadian companies while it handles translation, market penetration and relations with Japanese companies that Canadian companies might otherwise be unable to handle.

In general, mission members responsible for this visit found the company to be very interested in Canadian software for distribution in Japan.

MITSUBISHI ELECTRIC CORPORATION

Contacts

2-2-3 Marunouchi, Chiyoda-ku, Tokyo 100
(03) 218-2111

Products/Technology

Mitsubishi is one of the giant electronics multinationals in Japan. It has over 50,000 employees and sales in excess of 2 trillion yen in semiconductors alone. Its main electronic products include semiconductors, ICs, diodes, hybrid ICs, satellite systems and rectifiers. It has 10 plants producing semiconductors: Fukuoka (full process bipolar ICs and discrete devices); Nadoaichi Electronic Co., (MOS ICs); Isahaya Electronic Services (finishing); Kita Itami Works (R&D and trials of VLSI); Kumamoto Works (64K DRAM, 256K DRAM, microcomputers, EPROM and Mask ROM); Nansui Electric Co., Ltd. (finishing process and memory); Saijo Factory (full production process for MOS ICs, 64K DRAM and 256K DRAM); Kochi Factory (full process for microcomputers - 4K, 8K and 16K); Otsu Electronics Co., Ltd. (MOS ICs); and Kanebo Kikuchi Electronic Co., Ltd. (testing of ICs and LSI).

After a peak of investment in R&D and new products and facilities of 70 billion yen in 1984, Mitsubishi has cut back its investment to about half that amount. Investments are now targetted on expansion of microprocessors and MOS memories (256K DRAMs). As well, it has plans to strengthen its ASIC activities with investments in Japan and German design centres.

Mitsubishi's sales, assembly and customer support operations are found around the globe. It has a long-time strategy of technology transfer and joint-venture investments. It has one plant in Canada producting colour television sets, CRTs and displays. As well as such direct manufacturing, Mitsubishi makes its technology available through a variety of licensing agreements for manufacture. In discussions with mission representatives, the company's interest in licensing and joint ventures was reiterated. The firm is also a focal point of many enquiries received from foreign companies because of its situation in international trade. In addition to taking on a direct relationship with Mitsubishi, the company can often advise firms of potential three-way partnerships involving itself and other Japanese companies with Canadian firms.

NEC CORPORATION

Contacts

Mr. T. Ito	Director, Human Resources Fuchu Plant
Mr. Y Ohno	Supervisor, First Engineering Department, Computer Engineering Division
Mr. Y Kado	Supervisor, Postal Systems Engineering Dept. Industrial Automation Division
Mr. M. Ishimoto	North American Business Development and Coordination Division

33-1 Shiba 5-Chome, Minatu-ku, Tokyo 100
(03) 454-1111

Products/Technology

NEC's sales of over $13 billion (U.S.) encompass over 15,000 different products in communications systems and equipment, computers and industrial electronics systems, electronic systems and home electronics. Its basic approach is one of integrating computers and communications needs at all product levels. It sells in more than 140 countries and has 49 consolidated subsidiaries, 12 of which are located in the U.S., Europe and Asia.

Communications accounts for 32 per cent of sales ($4.2 billion) and involves trunk line systems, fiber optics, microwave, satellite systems and business systems (including digital PBXs). Computers and industrial electronic systems account for 36 per cent ($4.8 billion) and involve mainframe and personal computers and various office automation terminals. In electronic devices ($2.5 billion), NEC stands as the number one semiconductor producer in the world. Its products include 32-bit CMOS, microprocessors, an array of semi-customized devices, standard cell ICs, VLSI memories and other devices such as multilayer piezoelectric ceramic actuators suitable for applications in micromechatronics (robots, cameras and VTRs).

NEC's R&D information shows it to be involved in research in such fields as AlInAs/GaInAs FET (field effect transistors of aluminum indium arsenide and gallium indium arsenide); stable, high sensitivity frequency-shift keying (FSK); optical heterodyne detection transmission systems; CL expert systems development tools; cooperative, high-performance, sequential interface (CHI) machines; wiring design expert systems (WIREX VSLI); and automatic program generation systems using AI technology.

Mission members were given the opportunity to tour NEC's Fuchu Plant which produces IP, communication, IA and medical devices. The tour centred on the supercomputer and automated letter sorting equipment facilities. As with many production facilities in Japan, this one was developed by adapting an older factory to meet the production requirements seen with the new high technology products. This upgrading of facilities for the manufacture of high tech items usually exceeds the cost of constructing a new building shell, but is cheaper than building an entirely new facility.

It was impossible for mission members to determine whether any loss of quality or efficiency results from such an upgrading approach. The automated testing seen in the plant appeared to have a lot of engineering involvement - there was no evidence of automated testing routines, at least not in the operations observed by the mission. However, members only saw a small part of the operations. In general, the technology in use was not impressive, nor were the production processes as seen in the tour.

NIPPON GAKKI CO., LTD. (YAMAHA)

Contacts

Mr. K Ishimara	Director and General Manager, Electronics Group
Mr. H. Kita	Manager, Sales Department Semiconductor Division

10-1, Nakazawi-cho, Hamamatsu 430
(0534) 65-1111

Products/Technology

The Nippon Gakki Co., Ltd, more popularly known as the Yamaha Group, is a diversified corporation with interests ranging from the manufacture and sale of music instruments to the manufacture and sale of motorcycles and personal computers. Aside from the activities of the Yamaha Motor Co., most of the production and manufacturing is centred in the Nippon Gakki Co., Ltd, Hamamatsu.

This company of over 11,000 people manufactures musical instruments, audio products, sporting goods, household goods, alloys, etc. It has a number of plants in Japan that are engaged in the production of goods of interest in microelectronics. Products here include electronic components (LSIs), personal computers, electronic instruments, sound equipment, etc. It is also involved in the production and sale of semiconductors (20 billion yen in 1986, with 1 billion yen in outside sales). LSIs for compact disk players take 50 per cent of the production. As well, there is a focus on semiconductors for computer video interface devices and LSIs for signal handling and sound generators. Standard cells account for another 10 per cent of production in the semiconductor area.

At present the company is interested in acquiring signal processing components and CMOS. As well, it expressed an interest in supplying fabricated wafers to companies in Canada.

The company has offices in Canada at Yamaha Canada Music Ltd., in Scarborough.

RICOH CO., LTD.

Contacts

Mr. K. Nomura — Manager, Process Engineering
Manufacturing Department
Electronic Devices Division

Mr. M. Saimen — Manager, Marketing Department
Electronic Devices Division

13 - 1, Himemuro-cho, Ikeda, Osaka 563
(0727) 53-1111

Products/Technology

With sales of $2.5 billion (U.S.) and over 26,000 employees, Ricoh is a large, diversified company with interests crossing a number of fields. Its main products are copiers, laser printers, optical equipment, facsimile equipment, personal computers and small business computers, word processing equipment and semiconductors.

In the semiconductor area it is involved in: IC wafers; custom LSPs; SRAM, DRAM, EPROM and Mask ROM; logics (EPL, custom gate arrays, standard cells); microprocessors (8 bit MPU, peripheral ICs); and other areas such as BI-CMOS ICs and IC thick films. Ricoh has just completed development of new semiconductor facilities to support systems sales and external markets. Its semicoductor sales top 30 billion yen a year.

Ricoh has a number of subsidiaries and offices around the world, including one in Ottawa, to market its products and undertake production and R&D. It has a history of participating in joint ventures and projects with other companies such as its activities with AT&T in personal computers.

The company has expressed particular interest in telecommunications-oriented products as a possible area for cooperation with Canadian companies. As well, design rules used by Ricoh for a number of processes (e.g., n-well, 2 and 1.5 micron) are to be exchanged with the Canadian Semiconductor Design Association. Ricoh has the capability and interest to fabricate wafers for companies and could act as a wafer foundry for Canadian companies.

SANKYO PHARMACEUTICALS

Contacts

Mr. Ohtsuka — General Manager, Production Department

(03) 562-0411

Products/Technology

As noted previously in the notes on Daiichi Seyaku Co., Ltd., the situation in software development and sales in the Japanese pharmaceutical industry is promising for foreign companies. There are over 2,000 drug companies in Japan and computers and automation have been part of the industry for the past decade. The timing for a system and software changeover by many of these companies is excellent.

Sankyo has expressed interest in just such a changeover. However, like many other companies it is interested only in approaches meeting certain conditions. First, systems must be integrated - that is, both software and hardware form an integrated production/control system for automation purposes. Second, it must be capable of recording pharmaceutical production data on paper, as required by Japan's Ministry of Welfare, a drawback to paperless automation. Accordingly, it must be capable of operating with Japanese character sets and of meeting all standard documentation requirements. If these conditions are met, then Sankyo, like others, would be interested in acquiring a new system.

SEIKO EPSON CORPORATION

Contacts

Mr. M. Yamada — Manager, Customer Support Silicon Foundry Project

Mr. S. Saka — IC Sales Department International Sales Division

3 - 5, Owa 3-chome, Suwa-shi, Nagano-ken, 392
(0266) 52-3131

Products/Technology

Seiko Epson was founded in 1985 through the merger of Sawa Seikosha Co., Ltd. and Epson Corporation. It is an integrated manufacturer in micro-mechatronics, with R&D, manufacturing and sales of computers and related items (PCs, portables and small business computers, printers, etc.) It also produces a number of other items such as watches, spectacle lenses, engineering plastics, LCD portable TVs, electric shavers, electronic devices and semiconductors (including CMOS, LSIs for memories, microcomputers, melody ICs, ICs for telecommunications, gate arrays, etc.). The company has sales near the 300 billion yen mark and has representative offices and associated companies in the U.S., U.K., West Germany, France, Asia, Australia and China.

According to published data, the company has plans to produce a new line of memories, a telecommunication IC and peripheral, a new series of gate arrays, and a new line of IC cards and module products.

The company has commitments to several west coast U.S.-based companies including a subsidiary involved in the distribution of its semiconductor components - SMOS Systems Inc. (U.S.A.). Companies interested in dealing with Seiko Epson usually work through such subsidiaries.

SHIN-ETSU HANDOTAI CO., LTD. (SEH)

Contacts

Mr. M. Yoshida	Manager, Automated Systems Dept. Semiconductor Production Equipment
Mr. Y. Koizumi	Sr. Assistant Manager, International Marketing and Operations
Mr. Y. Nakamura	International Marketing and Operations

4 - 2, Marunouchi 1-chome, Chiyoda-ku, Tokyo
(03) 214-1831

Products/Technology

SEH is Japan's leading manufacturer of high purity silicon single crystals and simiconductor silicon wafer products, including polished and epitaxial wafers. It is, in fact, the world's largest supplier of silicon wafers. It is also involved in the production of fallium phosphide crystal and gallium arsenide single crystals. It has extensive R&D activities which at present focus on: minute defects in single crystal; the relationship between oxygen concentration and device characteristics; effects of intrinsic and extrinsic gettering; analysis of surface impurities; super high degree flatness and superior polish characteristics; FZ tough crystal; diffusion and oxidization technology; and the relationship between heat treatment and crystal quality. SEH has subsidiaries in manufacturing and sales of wafers in the U.S., Europe, Japan and Asia. It is involved only in the manufacture and processing or raw wafers and is not involved with the fabrication of wafers for components.

SOGO ELECTRONICS

Products/Technology

Sogo Electronics already acts as a manufacturing and sales representative in Japan for a Canadian company. It suggested it would be interested in manufacturing products for the Japanese market on a co-production basis within its manufacturing capabilities. It expressed particular interest in manufacturing a frequency halver on behalf of one Canadian company.

TAKEDA CHEMICAL INDUSTRIES CO., LTD.

Contacts

Mr. Noguchi Public Affairs Department

(03) 278-2111

Products/Technology

Like Sankyo and Daiichi Seiyaku mentioned previously, this company is heavily involved in the pharmaceuticals business. Like the others it is interested in moving to a new production control system using more modern software and hardware. The company now uses NEC and IBM computers in its processes.

Representatives expressed the same concerns as other companies that anyone interested in supplying systems and software be prepared to deal with documentation requirements governed by "good manufacturing practice" rules similar to those put out by the U.S. Food and Drug Administration. As well, Japanization requirements must be met by the software. In overall terms, this visit, like others to similar companies, demonstrated that there is good potential in this industry for software from Canada, given an awareness and a capability to deal with the unique needs created by the Japanese context.

TDK CORPORATION

Contacts

1 - 13 - 1, Nihonbashi, Chuo-ku, Tokyo 103
(03) 278-5111

Products/Technology

TDK activities can be classified into three broad categories: ferrite products - cores, magnets and related products; ceramic materials - ceramic capacitors, piezoelectric materials and other ceramics; and magnetic recording materials - video and audio tapes as well as floppy disks. Among specific product lines of interest: automatic assembly and insertion systems; magnetic heads for video and audio; computer heads; switching power supplies; multilayer chip capacitors; digital technology devices; optical disks; sensors, magnets, coils and ceramic components. The company is heavily integrated from basic materials and R&D through recording media, electronics materials and components, production and marketing. Its sales are in the order of 400 billion yen/year. It has offices and facilities in the U.S., Europe, Taiwan, Mexico, Australia and Hong Kong.

Mission members were given the opportunity to tour TDK's Narita Factory which produces ferrite products, switching power supply packs and metal magnets. In the ferrite and magnets sections the degree of automation was extensive and showed the highest amount of manufacturing systems integration seen on the mission. The materials handling process was almost totally automated. In the electronics assembly section (power supply and switching devices), the environment was similar to Canadian standards. Automated equipment was older generation than the assembly equipment the company sells in the external market, perhaps because of insufficient cost/benefit to be realized from upgrading a manufacturing line that is running well.

In this factory, 320 people were employed in ferrite products work (sales of $70 million U.S./year), 460 in power electronics ($120 million U.S./year) and 130 in metal magnets ($30 million U.S./year).

Given that TDK has facilities in North America already and that the increasing value of the yen is cutting into business, there appears to be little opportunity for ventures with Canada at this time.

TOSHIBA CORPORATION

Products/Technology

Toshiba divides its major activities into five main business sectors: industrial electronics, electronic components; consumer products; heavy electric equipment and materials; and machinery and other products. It has over 2 dozen factories, 22 branch offices, 32 sales offices, an R&D centre, a manufacturing equipment lab and 50 overseas subsidiaries. Its sales are over 13 trillion yen, with 4.3 billion yen in semiconductors alone in 1986.

Toshiba has undertaken extensive development of systems technology for use in a very broad area - ICs, LSIs, office automation, information and communications, space development, defense, medical electronics systems, audio-video systems, home electronics, energy, factory automation, new components, materials and the software industry - to name a few.

Over 70,000 employees are active in Toshiba's main product areas. In industrial electronics activities include: computers, data processing systems, electronic cash registers, PBX, automated tellers, ultrasonic diagnostic equipment, radar, TV and radio broadcasting equipment and satellite communication systems. In electronic components, Toshiba products include: VLSI memories, GaAs LSIs, logic ICs, microprocessors, gate arrays, transistors, diodes, LEDs, thyristers, photocouplers, electronic tubes, semiconductor-lasers, image sensors, optoelectronics, LCDs, solar batteries and printed circuit boards.

Toshiba allocates over 5 per cent of its sales revenues to R&D. It has a long track record of successful independent product development, but also works with other companies in co-development ventures. To demonstrate some of the topics of R&D in Toshiba, the company is working with: a process using electron beam exposure technology for forming 0.25 u m patterns (used, for example, in patterns for memeory of up to 64 megabytes); a very high speed gate array and a multiplication LSI chip using the CMOS-SOS technique; high output GaAs FET for microwave communication (20 w-output class FET providing output twice that of present GaAs FET); a 32-bit image processor LSI with a fastest processing time of 50n seconds; and a hetero-function-type bipolar transistor (HBT) (produces a trial IC with 97 transistors integrated on a 0.35 mm x 2.5mm rectangular GaAs chip).

Some mission members visited the Komaku plant where, among other things, Toshiba's work in electonic warfare is carried out. Discussions centred on frequency halvers and digital R.F. memory for Japanese defense electronics applications. Toshiba representatives demonstrated a high level of interest and knowledge in these areas, but gave no clear indication of their need or program potential for Canadian companies.

More generally, Toshiba didn't indicate any specific areas they would be interested in for licensing, technology transfer, joint ventures or other relationships with foreign companies.

OTHER VISITS

ELECTRONIC INDUSTRIES ASSOCIATION OF JAPAN (EIAJ)

Contacts

Mr. M. Hinata	Director, International Department
Mr. M. Nishi	Director, Electronic Components Department
Mr. H. Suzuki	International Department

2-2, 3-chome, Marunouchi, Chiyoda-ku, Tokyo 100
(03) 213-1071

Activities

The EIAJ was founded in 1948 with the sound development of the Japanese electronics industry as its main objective. It presently has 600 members (500 full and 100 associate) covering some of the largest electronics companies in Japan. Full membership is granted to companies manufacturing electronics and to electronics trade organizations. Associate status is granted to other material manufacturers and distribution companies. Foreign companies can join - over 20 now have memberships. EIAJ has offices in New York and Europe, as well as Japan, and employs more than 100 people.

The organization has over 200 standing committees involved in everything from R&D to establishing standards and providing the industry and others with information, opinions, analysis and other materials. As well, EIAJ has work in creating new markets both domestically and overseas and in responding to trade problems encountered by the industry.

The main product groups covered by EIAJ in its work include: consumer electronics; electronic components and devices (semiconductors, ICs, laser sensors, printed circuit boards, etc.); and industrial electronic equipment.

In discussions with EIAJ representatives, a number of important trends were identified in the electronics industry in Japan. These included:

- an emerging push by large-scale manufacturers away from assembly facilities toward more emphasis on software and systems and the manufacture of key components;

- a move to manufacture and assemble complete units and modules as compared with base elements;

- continuation of strong vertical integration of the market as witnessed by emphasis by companies producing home entertainment equipment or selling total integrated systems;

- more emphasis by materials suppliers on electronic materials and component manufacturing;

- a greater focus on miniaturization as demonstrated by an expected 50 per cent increase in sales of chip capacitors (1986 figures) for surface mount technology and an anticipated 30 per cent increase for 1987;

- increased investment in the development of new components; and

- serious plans by members to move more manufacturing capability to the U.S., Mexico, Canada and Europe.

In the case of the last item of investment abroad, EIAJ indicated that decisions are dependent on the size of the market and whether automated equipment can be bought and serviced. Most companies feel that Japan is still the best place to purchase automated equipment. Nonetheless, cooperation and investment outside Japan are seen as vital. The emphasis is being placed on the transfer of low technology product manufacturing to countries with lower unit labour costs, while Japanese companies will retain the more advanced technology items with their higher engineering content and lower labour cost element. Further, EIAJ emphasized that those countries that cannot supply advanced components for advanced products will lose out economically.

It was not clear from this meeting how much practical help EIAJ could provide for Canadian companies in Japan or if it can encourage Japanese investment in Canada. However, this association will be important in Canadian efforts to disseminate a positive outlook about Canada and Canadian electronics capability to major Japanese electronics firms.

FEDERATION OF CANADIAN MANUFACTURERS IN JAPAN (FCMJ)

Contacts

Mr. M.W. Anderson Director

Mr. B.R. Davis Marketing Development

3-50 Minami, Azabu, 5-chome, Minatu-ku, Tokyo 106
(03) 473-2265

In Canada - 1 Young St., Suite 1400, Toronto, Ontario
(416) 363-7261 (Mr. J. Laurent Thibault)

Activities

FCMJ was opened in May, 1984 as a private sector, non-profit organization with a mandate of providing a business presence in Japan for its Canadian members. FCMJ activities include: research and advisory services on specific Japanese markets; identification of marketing channels for members' products; assistance with selection of a Japanese agent (if approriate); aid in negotiating sales and contracts; advice on marketing and advertising; and other services. Total membership is limited to 25 companies. Memberships cost $30,000/year (for 100 hours of FCMJ services) or $17,000 per year for 50 hours of services. The Canadian government supports the office under the Program for Export Market Development (PEMD): members may apply for a 50 per cent reduction in the cost of their membership under PEMD.

As mission members recognized, companies wishing to establish themselves must have some form of representative in the country. To maintain a dedicated office and representative in Tokyo has an estimated cost of between $250,000 and $400,000/year. For some companies, therefore, an association may provide a way to gain needed presence in the country without having to move to a full-time office. FCMJ has a general mandate and personnel experienced in Japanese business practice. Their services might complement those available from representatives with specialized experience in the electronics field.

JAPAN INFORMATION PROCESSING DEVELOPMENT CENTER

Japan Information Technology Engineers Examination Center (JITEC)

Contacts

Mr. M. Nakayashiki	Executive Director, Institute of Information Technology
Mr. H. Hakagawa	Deputy General Manager, JITEC

Activities

There are about 2,000 information technology engineers in Japan as compared with 10 times that number in the United States. This shortfall of highly specialized talent has been long recognized in Japan. In 1969, MITI established the Information Technology Engineers Equivalency Examination System operated under JITEC, in part to deal with Japan's need for qualified engineers in the information technology field.

The system was designed to enhance IP technology capability by providing goals and incentives to IP engineers and programmers, to aid in establishing standard IP-related educational programs by defining skill levels required, and to provide computer users with objective criteria that would be useful in hiring IP personnel. The examination system certifies, in effect, that individuals who pass possess capabilities equivalent to defined levels of skills and capabilities in each certification category - programmer, senior programmer and system engineer.

Since its beginning, 1,150,000 people have taken the exams; 170,000 have passed. Some 350,000 examinations are scheduled for 1987. The rapid growth in the number taking examinations is due, in part, to the preference of some employers for those holding JITEC certification. As well, some companies offer salary incentives to those who pass the exams.

JITEC has eight regional offices plus its Tokyo headquarters. Its annual budget is close to one billion yen. It offers examinations throughout Japan each year.

In the systems engineer category, the six hour examination tests IP system design skills and knowledge of hardware, software and related knowledge, through short answer, multiple choice and fill-in-the-blank questions. The senior programmer five hour examination tests program design skills, program preparation skills and hardware, software and related knowledge. The programmer examination looks at program preparation, software, hardware and related knowledge. The programming languages used in the exams are Assembler (CAP-X), Fortran, Cobal and PL/I. MITI is also thinking of making an enhanced version of BASIC into a Japanese industrial standard. If this happens, then this language would be included in JITEC tests in future. Furthermore, JITEC is looking to include higher grades of certification in future.

Examinations now are aimed at a knowledge of large computers. No test for microcomputers has yet been devised. The emphasis in tests designed for the higher certification grades (e.g., systems engineers) is on business applications. In general, testing is aimed very much at standardization in the quality of engineering - that the basics be well known. The ability to innovate/develop new approaches is not tested in the present examinations.

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

Contacts

Mr. M. Watanabe	Director, Americas - Oceana Division
Mr. K. Sato	Americas - Oceana Division
Mr. Y. Honda	Director, Electronic Equipment Division
Mr. T. Matsui	Assistant Director, Electronics Equipment Division
Mr. N. Kohno	Information Processing Promotion Division

Activities

MITI presented information on the electronics industry in Japan to provide mission members with an overview of the situation of the industry. The information demonstrated the fluctuations in IC production over the past 3 years. ICs were up 170 per cent in 1984, down 7 per cent in 1985 and down 16 per cent more in the first half of 1986 (on a dollar value basis). 1985 exports of ICs were 580 billion yen while 1985 imports were 165 billion yen. Canada, according to MITI figures, exports 2.2 billion yen worth of ICs to Japan and imports 1 billion yen of ICs each year (a figure that might be nominally correct since most Japanese ICs imported to Canada come via the U.S.A.) In addition, MITI pointed out that Japanese IC manufacturers are unwilling to invest abroad because of present overcapacity in the industry.

In the Information Processing industry in Japan, there are some 160,000 employees working in over 2,250 companies. Sales in this segment have grown at approximately 20 per cent per year and reached 1.5 trillion yen in 1985.

In software, sales in 1985 amounted to 66 billion yen - an increase of 28.4 per cent over the previous year. There is little import or export in this area because of language barriers and the predominance of custom software.

The software industry in Japan is experiencing difficulties, principally because of the lack of software engineers. MITI is trying to address this situation with a three-pronged effort:

- the SIGMA Project - a 2.5 billion yen, 5 year project begun in 1985 that is aimed at improving productivity (a project in which foreign engineers may participate);

- increasing the ratio of standard to customized software packages; and

- training experts (such as through JITEC).

The Information Technology Promotion Association (IPA) is responsible for SIGMA and product ratio activities. There are 8 foreign companies in IPA. As well, there is a program underway through JIPDC to develop CAI systems.

MITI can provide Japanese companies with information about the type of support they might expect when investing in Canada.

SEMICONDUCTOR EQUIPMENT ASSOCIATION OF JAPAN (SEAJ)

Contacts

Mr. S. Yoshida	Executive Director,
Mr. Y. Hamazaki	Director, General Affairs
Mr. Y. Nagayama	General Manager, General Affairs Department
Mr. H. Mitsubashi	Director, Administration Department

Activities

SEAJ was begun in 1983 to promote the interests of semiconductor equipment manufacturers. It has over 200 members. The association has 4 main activities: research and development (including industry forecasting and research on technical evaluation and standardization); public relations; contacts (lobbying) with government; and international exchanges of information (technology and markets) and interface with associations in other countries.

Discussion with SEAJ indicated that Japanese companies look to foreign companies primarily for partnerships. In this light, for Canadian companies to sell in Japan, the most promising routes are through joint ventures and direct partnerships. Companies can talk to SEAJ for potential contacts among its members.

SEAJ also indicated that there is an Industry Technology Information Association that aids the transfer of technology from government laboratories to industrial product applications. Japanese companies take advantage of such transfer potentials by working closely with government labs and potential customers to define and meet their needs. Alternately, industry designs its own equipment and manufactures it, using leads from government research.

SEAJ could provide general assistance to Canadian manufacturers. However, the Semiconductor Equipment and Material Institute (SEMI), based in the U.S., may be a better source of information for semiconductor equipment manufacturers.

TOKYO CHAMBER OF COMMERCE AND INDUSTRY (TCCI)

Contacts

Mr. H. Tsuruzono	General Manager, Industry and Economy Department
Mr. T. Sakuragi	Deputy Manager, Industry and Economy Department
Mr. S. Harada	Manager
Mr. M. Takeshita	Manager, Medium and Small Scale Industry Section

Activities

The TCCI gave mission members a presentation on the industrial situation and structure in Tokyo. TCCI has a membership of some 50,000 small and medium sized companies. Its main responsibility is to help such businesses establish needed business contacts. In this regard, TCCI feels that international cooperation is essential. Tokyo is becoming an international finance centre and there is a growing movement toward service industries and research and development facilities in the city. As well, the number of small factories is increasing as labour costs escalate, automation increases, land costs rise, large companies employ more sub-contractors, the product market becomes more specialized and diversified, greater emphasis is placed on advanced technology and high quality parts, and just-in-time production spreads.

In the Tokyo area, service industries account for 45 per cent of economic output, 38 per cent of the workforce and 31 per cent of the office space. Seventy per cent of TCCI members are in the service sector, with the remainder being in the primary sector. The secondary industry in Tokyo revolves around precision equipment, publishing and leather processing.

Industry in Tokyo has to deal with high cost-land. Prices have soared almost out of control. In the Ginza area land prices run more than $190,000 per square meter, while in Minato-ku they are between $57,000 and $95,000/square meter.

TCCI representatives made a number of suggestions for improving communications between Canada and Japan, including: promoting economic missions; increasing information exchanges; developing information packages for dissemination in Japan; and using TCCI to pass on enquiries from Canadian companies and convey the specific needs of small companies to potentially interested partners in Japan. Mission members felt that because of the nature of TCCI membership and its expressed willingness to cooperate and provide assistance in improving links between companies in the two countries, Canadian companies should cultivate a relationship with TCCI appropriate to their needs.

SEMICON 86 JAPAN (DEC. 4 - 6, 1986)

SEMICON 86 was a semiconductor technology show produced by Marcom International Inc. and sponsored by SEMI. Support was also made available from the U.S. Embassy for this three day event.

The show featured some 900 companies in nearly 2,000 booths displaying the latest in semiconductor advanced products. Canada also had a booth at this show with materials from the Canadian industry on display. Among the materials on display from all companies were: wafer fabrication equipment; wafer process equipment; mask-making equipment; mask/wafer testers; assembly elements; IC/LSI testers; parts and accessories (for everything from clean rooms to packaging materials); materials (gas/photo resist, mask materials and wafer materials); and other equipment such as cryopumps.

SEMI, the show sponsor, is an association with 1,200 corporate and 600 individual members, that was set up in 1970 to organize and manage equipment and materials trade shows that would attract manufacturers of semiconductors. It is now an international trade association offering many services to members around the world. Its headquarters is in Mountain View California - (415) 964-5111.

Similar displays and conferences will be held in Osaka (June '87) and in Seoul Korea (November '87).

MEMBERS OF THE MISSION

Dr. Alan Aitken
President,
Canadian Semiconductor Design Association

Mr. Adam Chowaniec
President,
Calmos Systems Inc.

Mr. Ken Garside
Marketing Manager,
Litton Systems Canada Ltd.

Mr. Frank Simek
Chief Executive Officer
Dareba Enterprises Ltd.

Mr. Peter Teeson
Director,
Marketing and Sales, Asia Region,
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Mr. Michael D. Tilson,
President,
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