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Japan Report

(FOUO 45/81)

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POLITICAL AND SOCIOLOGICAL

MILITARY IMPLICATION OF U.S.-JAPAN JOINT COMMUNIQUE ANALYZED

Tokyo SEKAI in Japanese Jul 81 pp 194-197

[Article by Shiobara Jun: "Expanding Share in Military Role"]

[Text] "There is no military connotation involved. There is absolutely no mention of a military alliance in the joint communique," according to Prime Minister Suzuki. "It is impossible, ... it is nonsense, for there to be an alliance relationship which has no connection with the safeguarding of security," according to high officials of the Ministry of Foreign Affairs. A misunderstanding that should be termed absurd has surfaced within the government revolving around the interpretation of the words "Japan-U.S. Alliance" that were included for the first time in the joint communique from the Summit talks between Prime Minister Suzuki and President Reagan in May. A commotion surrounding the resignation of Foreign Minister Ito was added to the ruckus, and now the military substance that forms the crux of the controversy is becoming obscured.

This "misunderstanding" put an end to the unity of opinion within the government that Japan was limited to the military role it had in the past as spelled out in the Mutual U.S.-Japan Security Treaty, when Foreign Minister Ito stated in his reply "Just because the word 'alliance' was used does not mean that we are creating a new framework in Japan-U.S. relations or assigning a new military significance to them." This is nothing other than a revision which strongly reflects the domestic stance of Prime Minister Suzuki, who is doing his best to dilute the military tone of the summit that was bluntly expressed in the joint communique.

However, it is absolutely unpersuasive. The formulation of the original text of the joint communique was carried out under the initiative of the Ministry of Foreign Affairs that all along was pursuing the "position of a member of the Western nations." After the end of the Summit Conference, the officials of the Foreign Office praised themselves saying "at any rate, we wanted to establish clearly the consciousness of an 'alliance.' Compared to joint communiques prior to this, we really got what we wanted out of it." Their words also symbolize, in the tone of a declaration, that the two countries are "embarking on a new Japan-U.S. security system." One official of the Defense Agency who read the statement gave a sigh of admiration, openly expressing his favorable reaction to it, saying "The declaration concretely and more strongly than ever before calls for strengthening our country's defenses. Since the two heads of state have made such a clear commitment, the declaration itself would

be rendered meaningless as long as we do not increase our expenditures for defense." Such a reaction from the administrative level clarifies even more the basic nature of the declaration. The series of background explanations from the U.S. side coincide almost exactly with it.

The outstanding characteristics of the joint communique are found in the global position that is clearly expressed therein, i.e. (1) apprehension over the behavior of the Soviet Union towards the Third World as seen in the buildup of Soviet military strength and military intervention in Afghanistan, (2) agreement of opinion that the "resolute efforts" of the U.S. in the Middle East, especially towards the coastal nations are contributing to peace and stability in the area and that Japan is benefitting thereby, (3) the policy of cooperation in the event of Soviet intervention in Poland, evaluation of maintaining U.S. ground forces in Korea, and expression of anxiety about the unstable factors in Africa and parts of Central America. In other words, both Japan and the U.S. have confirmed their recognition of the fact that the Western countries are undergoing a threat from the Soviet Union on a worldwide scale and this forms the basis for their rationale for announcing a "Japan-U.S. Alliance" for the first time.

A Part of U.S. World Strategy

Two articles, that is the articles on defense, are independently formulated for the first time, based on the recognition mentioned above. Article Seven of the communique states "in dealing with these international challenges, [we] will make still greater efforts towards improving defenses, and the world economy, and economic cooperation towards the Third World (note the order of these items!)" while article Eight states "in defending Japan and securing peace and stability in the Far East, it is desirable to have a proper allocation of roles between the U.S. and Japan. Japan will improve her defense capabilities on her own territory, surrounding waters and airspace, and will make greater contributions towards reducing U.S. expenditures in maintaining forces in Japan."

Here there is no trace of Prime Minister Suzuki's stated basic position "In this visit to the U.S. I will make no concrete promises regarding defense efforts." We can say, however, that the definite position of the Prime Minister, whose escape route had been cut off, was naturally making itself apparent in the communique itself, referring in particular to the concrete discussions held in June at the administrative level and between the ministers of defense of the two countries.

In fact, the Prime Minister stated specifically, in answering questions at the National Press Club right after the talks "We will defend Japan's territory as a matter of course. We will protect the territorial waters to a distance offshore of several hundred nautical miles and the sea lanes to one thousand miles, as the domain of our self defense." One aspect of the "allocation of roles" in the communique was declared to be allocation of functions of patrol and attack vis a vis Soviet nuclear submarines in the north west Pacific west from Guam and north from the Philippines" which accords with the expectations of the U.S.

In this inquiry, the Prime Minister emphasized the desire for protection of the sea lanes, saying "guaranteeing the security of the routes of transport of raw materials from abroad is a life and death matter for Japan." In his talk with the party of reporters, he declared "In order for the U.S. to be able to swing to that region

(the Middle East) without anxiety for the future, they want Japan herself to resolutely take care of her own defense, so maybe this is what they meant by 'allocation.'" This series of statements specifically relegates Japan's defense to being a flank in U.S. world strategy. At the same time it reveals not only a confirmation of the preparation and strengthening of Japan-U.S. defense cooperation together with the defense capability Japan has developed of her own accord under the existing Security Treaty, but also discloses a position which directly and indirectly strengthens her commitment to the maritime communication routes to the Far East and the Middle East.

In that sense, despite the unified opinion of the government, which was conscious of the opinions of the opposition parties and of the public, it would not be a mistake to conclude that the course by which the Treaty is in the process of being transformed de facto into a more bilateral military alliance, has been disclosed through the communique. We can even venture to say that the course of events has progressed far beyond the points stated in the joint communique.

Take Okinawa, for example, which is now in its tenth year since being returned to Japan. In response for the rise in tensions in the Middle and Near East, the U.S. Marines and Air Force have been furnished with the most modern equipment, their range of operations extended from the Western Pacific to the Indian Ocean and the Middle East, and their functions as bases capable of responding to emergencies have been increased. The U.S. Third Marine Division, which is the only marine division stationed overseas, "can respond to any necessary situation from the Western Pacific to the Near East." (Commandant of the Marine Corps, General Barrow), and forms the nucleus of the Rapid Deployment Forces. In the joint U.S.-Korean maneuvers "Team Spirit 81" soldiers and aircraft from Okinawa participated in landing exercises, and the movement of ships outfitted for the exercises into the Naha Naval Base was obvious. The Air Force has completed its outfitting with seventeen of the latest F-15 EAGLES. Besides maintaining the most powerful air forces in the Pacific area, it covers the entire Far East with E3A airborne warning aircraft and SR71A tactical reconnaissance planes.

If we examine the activity of the U.S. military in Okinawa, it is clear, taking the end of the Carter administration as the starting point, that the U.S. military has begun, in terms of both its capability and mobility, to change its nature to something more extensive than watching over the Korean Peninsula and Indochina. In some sense, the limitations in the prior agreements of the Treaty have been approached including the limits in the article on the Far East, and the Treaty framework is being exceeded, i.e. the bilaterality in the Treaty is already changing in meaning. The maritime defense plan itself (i.e. "several hundred nautical miles offshore the coast, and a 1000 nautical mile air navigation zone") which Prime Minister Suzuki himself declared, had been established well beforehand on the military level with the U.S. forces as the MSDF's objective for providing for its defense capability. It is important to note that functional bilaterality had been presumed from the outset as a prerequisite to joint military action (source: MSDF staff person).

It is natural that these zones do not differ much from the "West from Guam, North from the Philippines" region the U.S. is pursuing to improve its antisubmarine warfare capability. The MSDF, regarding the statement about Japan's "back yard" stopped with the declaration, "we are grateful that the correctness of our concepts has been

confirmed through the Prime Minister's own words. It has given us the confidence to implement them aggressively." The policy of clarifying the defense zone with respect to the outside, and greatly heightening the ASW capability in this zone contains within it a tightrope walk between exercising a right to collective defense [beyond territorial waters] not allowed by the Constitution and defense-only policy. This is why Defense Agency officials over time have treated it so cautiously.

But this concept was brought into the open in one stroke through the Prime Minister's statement, and because it is referred to in the context of the swing of the 7th Fleet, the fact that it was confirmed without effort as the zone of "joint operations" caused the Maritime Self Defense Staff to dance with joy.

A Major Political Turning Point

The treatment from now on of the definitions in Article III of the "Guidelines for Japan-U.S. Defense Cooperation" also bear watching. This article states "in cases which have a major influence on Japan's security in situations in the Far East outside of Japan" it will research the utilization of Self Defense Force bases by U.S. forces, rear support and other matters of mutual convenience, but the Defense Agency from the past has pointed out "the U.S. has placed its greatest emphasis on researching rear support based on Article III more than on the plans for joint operations themselves." Regarding the plans for joint operations, some conclusions were already reached this March, so it is expected that pressure from the U.S. to further develop this research will build up. In such a case, as can be seen from the Joint Communique and from the Prime Minister's statement, not only will the "lifelines" be extended one step further out, but there is now no way that Japan's role vis-a-vis U.S. strategy cannot increase.

When we shift our attention to the allocation of expenditures, it must be pointed out that Japan's participation has already been disclosed as increasing in involvement, not merely in the improvement of living facilities for U.S. Forces related personnel, but also in the highly strategic area of fortifying the bases, as is symbolized by the fact that sums have been appropriated for construction of F-15 shelters at Kadena Air Base on Okinawa in this year's budget.

From these points, we can say that Japan's becoming deeply committed in the joint communique to U.S. world strategy is a major political change which, while within the framework of the same Security Treaty, ratifies the already de facto "bilateral relations" of the U.S. forces in Japan and the Self Defense Forces, and at the same time confers new military significance to future bilaterality.

At the same time, we cannot view lightly the military import of the communique on relations with other countries in Asia. Secretary of Defense Weinberger, in a speech on "U.S.-Korean Security Talks" given just before the U.S.-Japan Summit Talks, while referring to the security of the entire Pacific area including Korea, Australia and New Zealand, devoted most of it to the Japan issue, seeking (1) a marked strengthening of defensive power in the northwest Pacific and (2) taking appropriate measures on the basis of a firm resolve to assume economic responsibility, and severely criticized Japan's defense forces for "clearly not having attained the necessary level." The U.S.-Korea Security Conference had a very strong political tone to it and was held after a hiatus of one and one half years in order to deal with the "Northern

Threat" with a background of strengthening the Korean military forces by supplying them with F-16's, and delaying the withdrawal of U.S. forces. At the conference it is reported that the Koreans strongly demanded military assistance on a par with NATO. Consequently, the new Reagan government's framework for anti-Soviet strategy in Asia, which revolves around a U.S.-Japan-Korea axis, arises anew in the points touched on by Defense Secretary Weinberger in the issues of U.S.-Japan defense, which presuppose strengthening of U.S.-Korea military cooperation.

After the U.S.-Japan joint communique, Korean President Chun Tu-hwan emphasized again the necessity of strengthening and increasing Japan's defense capabilities. We can say that President Chun accurately interpreted the line of the U.S.-Japan joint communique and pressed for assigning a greater role to Japan in Asia.

The New York Times on May 12th proposed that Japan should join the ANZUS treaty, forming JANZUS, as a means by which she "could contribute to the peace and security of the entire Western Pacific at a minimal risk to herself." Japan is slated to participate on a larger scale than previously in the RIMPAC '82 naval exercises to be held off of Hawaii. The countries that will participate are ANZUS countries. The opposition parties have been closely following this, since Japan's participation in 1980 was "opening the path to the exercise of rights of collective self defense," and it is reported that the Korean Navy will also participate next year. Normalization of Japan-Korea relations will be on track with the holding of the periodic Japan-Korea joint cabinet ministers' meeting this fall.

Is our apprehension really groundless that the trend towards establishing a system of security among the nations of the Pacific centered around Japan is beginning to take shape under the powerful leadership of the Reagan government? (Some scholars, and ex-officials of the Ministry of Foreign Affairs are of the opinion that even the Constitution, which imposes the greatest restraints, can be interpreted as recognizing the right to collective security.)

The Defense Agency, which is attempting to achieve the defense standard defined in the framework of the defense plan through the next midterm operating estimate to 1987 (1981 Midterm Operating Estimate) took the joint communique as an opportunity to demand a two-digit rate of growth of defense expenditures in the impending 1982 budget, and is determined to break through the figure of 1 percent of the GNP that was established by the Cabinet. Deputy Director Hara of the Defense Agency has already extended himself with the surprise statement "inasmuch as the joint communique calls for even greater cooperation, there naturally is a line of common sense to follow." And Prime Minister Suzuki went out of bounds in his reply in the Diet, saying that the one percent figure would have to be reviewed in the future. Thus the situation inside of the country is undergoing changes inspite of very difficult financial conditions.

However, if we study the joint communique, not only in its bilateral sense of a commitment to the U.S. in the defense effort, but also as an indication of intentions towards the Pacific area, we can say that the fact that Prime Minister Suzuki's visit to the U.S. was likened to the "Third departure" after Perry's visit to Japan, the defeat in World War II and the Occupation, indicates the possibility of serious changes in government policy in the future.

6093
CSO: 4105/183

ECONOMIC

PETITION MOVEMENT FOR PRESERVATION OF POSTAL SAVINGS SYSTEM WIDELY SPREAD

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 2 Jul 81 p 2

[Text] While deliberations at "the talks on how a government enterprise should be in the finance field" (postal savings talks) progressed at a fast pace toward an August report, the "postal savings war" between the Ministry of Posts and Telecommunications and the private banking institutions started to spread even to the provinces. According to what those involved made public on the first, a movement to petition local government bodies for the "preservation of the postal savings system" has been activated in every region of the country. The contents of the petition are essentially: 1. centralized interest rates are adverse to depositors, and 2. a regional basis should be promoted through autonomous (investment and loan) operations. There has appeared the view (at the postal savings talks) that "isn't their aim to apply pressure on the postal savings talks?" In opposition to this, banking circles are mobilizing local banking institutions and counteracting this with a reverse petition. The postal savings war which has involved regional government bodies has become further bogged down.

With the August report near at hand, the postal savings talks have finished the hearing from the Ministry of Posts and Telecommunications, private banking institutions, the Ministry of Finance and the Bank of Japan, and are quickly bringing everything to a conclusion. In that, banking circles have presented a written opinion to the relevant institutions requesting that competitive conditions be made impartial by 1. correction of preferential treatment measures with respect to both goods and the tax system, and 2. abolition of the commission system's incentives, and the centralization of interest rates.

This is based on the judgment that because the postal savings balance broke the 60 trillion yen mark and at the end of the last fiscal year its share amounted to 29.5 percent, and postal savings accounted for 1.2 trillion yen out of the increase in January through March individual deposits totalling 1.45 trillion yen, "the postal savings increase is not a temporary shift at a time when the green card problem has come to the forefront, but is a long term structure." (Zenkoku Ginko Kyokai Rengo-kai. Federation of Bankers' Associations of Japan)

Against this appeal strategy by the banking institutions, the petition movement aimed at preserving the postal savings is coming one after another in all regions, and according to those involved, it is said that "there are indications that it is being systematically carried out by mobilizing the postmasters of private post offices, their OB's (old boys) and local leaders." A written petition sent out to all the cities, towns and villages had almost an identical content; concretely, the essential parts are: 1. the role of postal savings as the ordinary person's banking has increased and centralization of interest rates would not be profitable for the depositors; 2. the postal savings funds are already being returned to the regions through financial investments and loans, and returning funds to local areas will improve further by autonomous (investment and loan) operations; and 3. preserving the present system will contribute to the nation's welfare.

A written petition has already been sent out to quite a few local government bodies in the Kyushu and Chukyo districts and part of it is even being deliberated; and the private banking institutions are countering this by starting a reverse petition requesting "a decision after hearing the postal savings talks." The postal savings war has become further heated.

9400
CSO: 4105/204

SCIENCE AND TECHNOLOGY

BIG FOUR SEMICONDUCTOR MAKERS STRENGTHEN FACTORIES IN U.S.

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 962, 7 Jul 81 p 9

[Text]

Japan's four largest semiconductor manufacturers — Nippon Electric Co. (NEC), Hitachi, Ltd., Fujitsu Limited and Toshiba Corp. — are strengthening their production plants in the U.S. to cope with the coming "VLSI (very large-scale integrated circuit) era."

These American plants so far had been inferior to their Japanese counterparts in capacity and other standards. In a sense, they had been only a "symbol" to impress the Americans that Japanese semiconductor makers are operating in the U.S. and to avoid possible frictions over semiconductor trade.

Recently, however, these Japanese companies have become more aggressive in doing business in the U.S. They are now trying to make their American production plants more profitable.

NEC, the largest semiconductor maker, announced late June that it would build an integrated IC manufacturing plant in Roseville, Calif., some 180 kilometers northeast of San Francisco. It will be NEC's second IC plant in the U.S., following that in Mountain View, Calif. operated by Electronic Arrays, Inc. which NEC took over in December, 1978.

NEC will build a factory building with a floor space of 13,000 square meters on a 295,000-square meter tract during the current fiscal year. The land and building will cost some ¥5 billion. The company will install ¥15 billion worth of VLSI manufacturing facilities in the Roseville plant to start operation in the first half (April-September) of fiscal 1983.

According to the NEC plan, the Roseville plant will be producing ¥35 billion worth yearly of 64-kilobit dynamic random access memory chips, read-only memory chips, microcomputers and industrial/household custom-designed LSIs in fiscal 1985. The Roseville plant will have a payroll of about 600 in the year.

NEC Electronics USA, Inc., a wholly-owned subsidiary in Sunnyvale, Calif., will operate the Roseville plant.

Earlier than the Roseville plant's scheduled operation, Electronic Arrays is expected to start production of 64K dynamic RAMs in order not to stimulate American semiconductor makers. This is because in the coming two years before the scheduled operation of the Roseville plant in fiscal 1983 Japan will become the production center for 64Ks and their shipments to the U.S. market are expected to mount. (Refer JEJ-June 30 issue.)

Fujitsu has completed construction of a semiconductor plant in San Diego, Calif. The $20 million (¥4 billion) plant started operation in early June with payroll of about 150. The number of employees will be boosted to 400 in three years.

The San Diego plant, having a total floor space of 7,000 square meters, will produce 500,000-600,000 16K RAM chips monthly in the initial stage.

The plant is the production division of Fujitsu Microelectronics Inc., a San Diego wholly-owned subsidiary. It has the marketing division headquartered in Santa Clara, Calif.

Toshiba has completed the second expansion program of its semiconductor plant in Sunnyvale. The plant which Toshiba bought in 1980 from Mansei Kogyo Co., a Kawa-

guchi (Saitama)-based cigaret lighter maker, has started manufacturing 16K static RAM chips. The Sunnyvale plant, operated by Toshiba Semiconductor (USA) Inc., will be further expanded to produce more sophisticated products.

Hitachi is now strengthening its IC manufacturing plant in Dallas, Texas. The Dallas plant, operated by Hitachi Semiconductor (America) Inc., is no longer a "show window" factory.

Against the backdrop of these aggressive moves of Japanese semiconductor makers is their plan to market Japanese-made 64K dynamic RAM chips in the U.S. from next year. Unless they have plants capable of producing such highly-sophisticated products, a rekindling of the Japan-U.S. semiconductor trade friction seems unavoidable. Within a few years, these large Japanese semiconductor makers plan to ready their American plants to produce 64Ks to skirt possible trade frictions.

CSO: 4120/283

SCIENCE AND TECHNOLOGY

ROBOT ARM-HAND FEELS, JUDGES OBJECT'S WEIGHT

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 962, 7 Jul 81 p 17

[Text] A robot arm-and-hand set equal to a human being in working to pick and carry any object up to 10 kilograms (22 pounds) in weight by feeling, adjusting, weighing and gathering strength has been jointly developed by researchers of a governmental laboratory and a national university.

According to the Mechanical Engineering Laboratory, Agency of Industrial Science and Technology, Ministry of International Trade & Industry, and the Engineering Faculty of Nagoya University, the new extraordinarily sensitive and capable robot limb has been perfected at laboratory level by a joint research team of the laboratory and the university faculty. The university researchers were led by Prof. Minoru Ueda.

The new device yet to be improved for ultimate practical application is relatively easy to design and produce, and, best of all, inexpensive to build and energy-saving, to promise high industrial applicability in the nearest future, according to the lab and faculty.

They described the new robot limb as consisting of a pair of wide long "fingers" and a long "arm." The "fingers" can open up to 3.9 inches in grasping width. Chiefly designed for picking up and hauling round or cylindrical objects, the set is smart enough to feel and weigh anything its "fingers" have grasped. If it has caught hold of a cylindrical or any long object in a wrong way, that is, not at a direct angle to each side, four long leaf springs, each with an electronic sensor, attached to the whole length of the two "fingers," to feel the object detect the error through the sensors because they do not receive equal spring-push feels. A central electronic control section in the arm getting the message from the sensors orders the fingers to adjust its hold.

The sensors also tell the control section how heavy the object is from how the leaf springs is compressed as the "fingers" try to lift the object and the control section orders a pair of 1.5-watt direct-current electric motor in the "arm" to put out enough power to work the "fingers." Four strain meters (gauges) built into the "arm" determine the weight of the object as it is lifted to bend the arm out of its normal pose.

CSO: 4120/283

SCIENCE AND TECHNOLOGY

CORPORATIONS PUSH DEVELOPMENT OF BIOTECHNOLOGY INDUSTRY

Green Cross Corporation

Tokyo NIHON KOGYO SHIMBUN in Japanese 1 May 81 p 19

[Text] On the 30th [April], the Green Cross Corporation (H. Ishigaki, president) disclosed that a "Center for Genetic Engineering" has been established in the Central Research Laboratory of the firm located at Nakadori, Miyakojima, Miyakojima-ku, Osaka, in order to engage in a full-scale commercialization of pharmaceuticals using genetic engineering. The plan is to assign initially about 15 staff members and to spur the production of human serum albumin and interferon (IFN) by genetic engineering techniques imported from the United States using the P-II experimental facility to be constructed at the center in the near future. Furthermore, they plan to move the above center to the Osadano plant (Fukuchiyama, Kyoto Prefecture) in about 1 year at the earliest to substantiate and strengthen the center. Thus, the firm's commercialization of genetic engineering is expected to develop rapidly, pivoting around the Center for Genetic Engineering.

In order to produce pharmaceuticals by genetic engineering, the firm signed a technical agreement with Collaborative Research Incorporated (CRI) in the United States for IFN, and one with Genex Corp. also in the United States for the human serum albumin, and is advancing studies for their respective mass production. In particular, they have decided to begin specific research such as on IFN production using a variant strain of yeast expected to arrive soon from CRI. This has led to the establishment of a structure to work full-scale on genetic engineering.

The Center for Genetic Engineering established in the Central Research Laboratory is staffed by 15 members chosen from the research staff of the firm, and the managing director, T. Suyama became the director. Concurrent with the establishment of the center, a P-III level experimental facility required for genetic engineering research is under construction at a cost of approximately 300 million yen. In so doing, they plan to consolidate the structure in both aspects of hard and software for research by this summer and pitch their full force into the commercialization of genetic engineering beginning with the technical imports from the two U.S. firms. In addition, while the firm has great expectations for the prospects of genetic engineering techniques in the future, the present location in the Central Research Laboratory has little room to expand. Thus, they are examining plans for scale expansion by moving the center to the firm's Osadano plant where the major plant is located. By doing so, they plan to undertake genetic

engineering work by establishing their independent technology in the near future, thus shifting away from the current approach for genetic engineering centered around the technical importation.

Kanegafuchi Chemical Industry Co

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 7 May 81 p 9

[Text] Kanegafuchi Chemical Industry Co completed a "P3" level genetic manipulation facility in their Takasago plant (Hyogo Prefecture) and will begin research and development in the biotechnology field and commercialization of independent merchandise in early June. Among the private firms, only a few have research facilities of "P3" level that can completely contain wastes and contaminants. In addition, having the expertise in fermentation technology, which is considered indispensable in biotechnology, the full-scale undertaking of Kanegafuchi Chemical in this field is likely to attract attention.

The genetic manipulation facility of the Kanegafuchi Chemical was newly constructed in the biochemical research laboratory of the Takasago plant at an expense of approximately 700 million yen. The firm merits many achievements in fermentation technology such as yeast for manufacturing bread and ribonucleoprotein. The main body for that research and development is the biochemical research laboratory staffed with approximately 100 people. For genetic manipulation, about 10 staff members from the laboratory will comprise a research team and operate the program. They believe that they are capable of manipulation using their own technologies which have already been accumulated.

The firm's target for commercialization by genetic manipulation is the field of pharmaceuticals such as insulin used for the treatment of diabetes, somatostatin for treating dwarfism, and interferon used as antineoplastics or for treating viral diseases. As for interferon and insulin, Takeda Chemical Industries and Green Cross have already taken the "lead" through technical importation from Euro-American countries. Therefore, Kanegafuchi Chemical is aware that "only a unique product based on their own technology can be competitive" (managing director, T. Tachi), and intends to use a strategy of developing and commercializing independent products by incorporating their favorite fermentation technology [with genetic manipulation].

The pharmaceutical division of the company has been working with intermediates for synthetic penicillins, primary products for cardiac drugs, etc. but has not manufactured finished drugs. Once gaining a prospect for the commercialization of unique products by genetic manipulation, they plan to venture into drug manufacturing in the future through trade agreements with prominent Euro-American and Japanese drug manufacturers.

On the other hand, in the field of food products, they plan to strive for commercialization of yeast with stronger fermentation power and special amino acids for wider usage by genetic manipulation.

Toyo Rubber Chemical Industry Co

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 11 May 81 p 1

[Text] Based on the fixed enzyme technique which they successfully developed, Toyo Rubber Chemical Industry has decided to actively promote the field of biotechnology which is currently in the limelight as a future technology. In specific terms, their goal is practicalization in the fields of food and drugs, where the above technique can be freely used through collaborative agreements with other manufacturers, to establish the biotechnology division to grow as a big column in the nontire division. Currently, participation in biotechnology continues from a wide range of businesses such as chemicals, foods, pharmaceuticals, synthetic fibers, etc., but this is the first announcement of participation from the rubber tire industry.

Under the guidance of Prof S. Fukui (industrial chemistry) of the Faculty of Engineering, Kyoto University, Toyo Rubber Chemical Industry established a fixed enzyme technique in which enzymes are sealed in a hydrophilic polyurethane resin. At present, three methods of enzyme fixation are cited: a cross-linkage method in which enzymes are bound to each other with a cross-linking agent such as glutaraldehyde; a carrier-binding method in which enzymes are linked to an ion exchange resin or glass beads; and enveloping method in which enzymes are wrapped in a collagen film or gelform synthetic macromolecules. The fixation technique used by Toyo Rubber is equivalent to the enveloping method.

The method of fixation is very simple: an aqueous solution containing an enzyme is added to a urethane prepolymer having a terminal isocyanate group for reaction solidification, and no special apparatus except a stirrer for mixing is needed. Other special features are that (1) the polyurethane resin in which the enzyme is sealed can be molded freely into forms ranging from foam to film resulting in a wide range of application; (2) in an experiment in which an enzyme, invertase, was used, the enzyme activity showed a high maintenance rate of 40-70 percent resulting in a long reaction time; and (3) compound enzymes can be fixed; etc., etc.... Simple handling in general is the unique technical characteristic.

The firm began with research and development of the enzyme fixation technique as one of the utility developments of the hydrophilic polyurethane resin which was developed as a soil improving agent beginning around 1974. An enzyme is a biological catalyst that can efficiently hydrolyze proteins and produce amino acids in the human body at normal temperature and under normal pressure. And, fixation technology is a major technique in biotechnology along with recombinant DNA, cell fusion, and mass cell culture. It has the potential to greatly change the petrochemical processes of organic synthesis carried out at a high temperature under high pressure.

In practical application, the firm is considering (1) supplying technology, (2) commercially distributing the film-form products, and (3) handling the finished products at their own firm, etc. Initially, the focus will be in the food area such as an application to alcohol fermentation, and the pharmaceutical area such as diagnostics and testing reagents, etc. They plan to begin production for practical use as soon as possible through collaborative agreements with other

manufacturers in these fields. By doing so, they will nurture the field of biotechnology as a major column in the non-tire sector that includes chemical products which currently holds a little more than 30 percent.

Biotechnology that applies biological functions in industry is expected to reach a market scale of 3-4 trillion yen in Japan by the latter 1980's, and the trend for practical application is active not only in Japan but in the Euro-American countries as well. MITI is proceeding with preparations for starting a new system to back up research and development of this field from 1981.

Mochida Pharmaceutical Co, Ltd

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 22 May 81 p 9

[Text] Mochida Pharmaceutical recently completed a production facility for interferon (virus-inhibiting factor) within the Shizuoka factory (Fujieda city, Shizuoka Prefecture), and has begun production. It is the so-called interferon-β (fibroblasts) under a collaborative agreement with G. D. Searle of the United States, and the monthly production capacity is reported to be 4 billion units. Interferon-β has been produced thus far by Toyo Rayon at a monthly rate of 3-4 billion units.

According to Mochida, the newly operating facility had been initially planned for a monthly production of 3 billion units. However, since they subsequently succeeded in discovering cells with a better production efficiency, they were able to increase the capability. The company plans to produce initially about 2 billion units per month, conduct animal experiments to confirm safety, etc., and begin clinical trials by administering it to humans by about fall.

The company signed a collaborative agreement in April with Ringen Biological Chemical Research Laboratory (Main office in Okayama), and have decided to begin tests for the practical use of interferon-α produced by Ringen.

Meiji Seika Kaisha, Ltd

Tokyo NIHON KEIZAI SHIMBUN in Japanese 29 May 81 p 7

[Text] A major antibiotic manufacturer, Meiji Seika disclosed on the 28th their plan to commercialize as a pharmaceutical a new type of interferon (virus-inhibiting factor) produced by the amnion that envelopes a human fetus. At present, it is being developed with the cooperation of Professor F. Taguchi of Kitasato University who is studying amnionic interferon, and they plan to begin clinical trials by next year. This is the first time Meiji Seika disclosed their specific plans for marketing interferon. The firm will now join the on-going worldwide competition for interferon development based on a new type of interferon other firms have not touched.

Amnionic interferon is extracted from the cells of the amnion which is discharged along with the fetus at the time of delivery. According to the test results thus far, there is a good chance that it is a new type of interferon with a different structure from interferon-α (leukocytes), interferon-β (fibroblastoid cells), etc. for which pharmaceutical manufacturers of various countries including Japan are striving for commercialization.

According to Professor Taguchi of Kitasato University who presented a paper on the 27th at the "40th virus-inhibiting factor study group" held in Tokyo, the amnionic interferon was found to be especially effective for human dermal cells. In addition to a virus-inhibiting effect which is the characteristic of interferon known thus far, it was found to be effective against virus-infected cells as well.

Meiji Seika plans to build urgently a production facility in a scale of several trillion units per month needed for various tests. Initially, necessary quantities will be secured by mass cultivation of amnionic cells, but they are also studying the mass production means of the so-called gene splicing technique for the future in which a gene for making amnionic interferon will be spliced into a fast-growing bacterium such as E. coli.

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SCIENCE AND TECHNOLOGY

SEMICONDUCTOR INDUSTRY ACTIVITIES IN 1980, 1981 DISCUSSED

Sales in FY 80

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 11 Apr 81 p 5

[Text] Reflecting the steady increase in domestic and foreign demand, the gross sales for the period ending March 1981 of the semiconductor industry's "big three" -- Nippon Electric Co Ltd [NEC], Hitachi Ltd, and Tokyo Shibaura Electric Co Ltd [Toshiba]--appear to be headed toward a record increase of 30 to 50 percent over the previous period. The industry's leader, NEC, will be Japan's first maker to record 200 billion yen, while Hitachi and Toshiba will earn 165 and 150 billion yen, respectively. While their sales do not match that of the world's largest maker, Texas Instruments Inc [TI] of the United States (estimated sales of semiconductors only, about 300 billion yen), the sales of Japan's three largest makers have reached the top world level due to the rapid growth in the past several years.

Reaching the Top World Level

At present NEC, Hitachi and Toshiba are settling the 1980 accounts, but as far as the semiconductor division is concerned, it appears certain that sales will reach the originally planned goals.

First, as for NEC, in spite of the big decrease in production of the 16 kilo-bit RAM's [random accessory memory] used in the main memory unit of computers, sales will reach 222 billion yen, a 40-percent increase over the preceding period. To replace the 16 kilo-bit RAM's, production of the CMOS [complementary metal oxide semiconductors] and the bipolar-structured microcomputers was increased, which more than offset the decrease in the 16 kilo-bit RAM's.

The industry's third ranking Toshiba concentrated on increasing production of discrete components (single semiconductor chips), for which demand is rapidly increasing, and microcomputers, and as a result sales are expected to total 150 billion yen, a 50-percent increase over the previous period. Partly because the company's production of IC memory units was comparatively small previously, the company was not affected too adversely by the worldwide market depression in 16 kilo-bit RAM's.

Because last year Hitachi altered part of the semiconductor production setup and also stressed the production of the 64 kilo-bit RAM's, the "next-generation strategic product," sales did not increase as much as NEC's or Toshiba's, and will probably amount to 165 billion yen, a 27-percent increase over the previous period.

As a result, the order of sales ranking of Japan's three largest semiconductor makers remains the same, i.e., NEC, Hitachi and Toshiba, but on a worldwide scale, they appear to have entered the top group. While the TI company unquestionably holds the "No 1" world position, the Japanese makers are close behind other large manufacturers which trail TI, such as Motorola Inc, Fairchild Industries Inc, and Intel Corp (all U.S. companies). In particular, NEC might occupy the "No 2" world position if there is no drastic yen depreciation in the future.

FY 81 Investment

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 21 Apr 81 p 14

[Text] The semiconductor industry's FY 81 plans (partly calendar year plans) for investment in plant and equipment have been finalized. The total for the nine companies amounts to 172.3 billion yen, an increase of 5.7 billion yen over the record-breaking FY 80 investment of 156.9 billion [as published], continuing the high level this year. However, due to the U.S. business stagnation, this year was considered a bad one in the "silicon cycle," a recurring course of market fluctuations peculiar to the semiconductor industry, and especially during the first half of the year the firms took a wait-and-see attitude. Thus, the growth rate showed an average increase of about 10 percent, which is lower than in normal years. However, since the previous year started at an exceptionally high level and since adjusted increases were made one after another, it must be said that the firms are aggressive. Furthermore, an upturn in business recovery is forecast for the latter half of this year, and with the arrival of the age of VLSI (very large scale integration), many expensive manufacturing facilities are expected to become necessary. Therefore, it is inevitable that adjustments for large increases will have to be made again this year. When plant and equipment investments of domestic producers, such as Sony Corporation (over 10 billion yen), Fuji Electric Co Ltd (over 3 billion yen), TI, Nihon IBM, etc, and medium enterprises as well as foreign capital firms are included, Japan's total is certain to reach the 200-billion-yen mark.

Semiconductor Industry's Plans for This Fiscal Year

Table 1. Plant and Equipment Investments of Semiconductor Divisions of Main Enterprises (Unit: 100 million yen)

	FY 79 Results	FY 80 Initial Plans	FY 80 Adjusted Plans	FY 81 Plans
Nippon Electric Co Ltd	270	300	320	350
Hitachi Ltd	150	200	230	280
Tokyo Shibaura Electric Co Ltd	100	100	130	50
Fujitsu Ltd	160	220	270	270
Mitsubishi Electric Corp	80	100	100	130
Matsushita Electronics Corp	110	170	220	220
Tokyo Sanyo Electric Co Ltd	43	80	80	110
Sharp Corp	88	33	85	72
Oki Electric Industry Co Ltd	55	120	134	141
TOTAL	1,056	1,323	1,569	1,723

Highlights of plant and equipment investment plans for the various semiconductor firms are as follows [same order as above table]:

[NEC] Because the semiconductor business is in a recession in the United States, the firm will start with a goal of about 35 billion yen, an increase of 10 percent over the previous year's allocation, and will reassess the plan every 3 months. The biggest item is for the production increase of Yamagata NEC's civilian-use LSI, and 6 billion yen, or half of this year's overall plan, will be invested [as published]. Plan for Akita NEC is limited to land purchase. Construction costs of an integrated plant, which includes the diffusion process, in Scotland are expected to come to a sizable figure. However, most of the investments are slated for the renovation of the semiconductor manufacturing apparatus, which reportedly will become obsolete in 3 years. As for projects, last year's investments, which included construction of Kyushu NEC's No 6 diffusion and Kumamoto NEC, were larger.

[Hitachi] Of the 34 billion yen for communications and electronics equipment, 28 billion yen will be allocated to the semiconductor division, an increase of 5 billion yen over the estimated investments for FY 80. Work was started in FY 79 to make the Musashi plant into a development center for advanced devices, including the 64-k [RAM's], while the Takasaki plant was turned into a bipolar plant and the Kofu branch plant into a mass production factory for MOS [metal oxide semiconductors]. Since this divisional production setup involving the three plants was completed in FY 80, the main expenses for FY 81 will be the servicing of the Musashi plant and installation of equipment to increase production at the Takasaki and Kofu plants.

[Toshiba] Plans call for approximately 15 billion yen (order base), mainly for the expansion of memory unit divisions, such as the 64 KDRAM (64 kilo-bit dynamic RAM], 16 KSRAM [16 kilo-bit static RAM] and mask ROM [read only memory]. New equipment will be installed, with plans to increase production, at the Oita VLSI plant, the northern Kyushu bipolar plant, the Himeji civilian-use transistor plant and the Kawasaki developmental division.

[Fujitsu] Investment plans are for 27 billion yen, the same as last year, with expenses mainly for plant facilities and equipment for the second-phase construction (continuous operation) of the Iwate plant, completion of which is planned for this year with operations to start at the beginning of next year. Facilities will be augmented at the Kawasaki and Aizu plants.

[Mitsubishi] To increase IC [integrated circuit] production at Kumamoto and to strengthen production of single semiconductor chips, 13 billion yen are earmarked, an increase of 30 percent over last year. Specifically, 5 billion yen will be spent, the same as last year, to expand the "C" wing of Kumamoto No 2 plant for production of the 64-k RAM's, 4.5 billion yen for increased production of IC's in other than the "C" wing, and about 15. billion yen for land purchase of the Saijo plant, the construction of which was decided upon recently. The remaining 2 billion yen will be spent for development and increased production of single semiconductor chips, gallium arsenide, SIT and power semiconductors.

[Matsushita] Last year the firm made adjusted increases of 4 billion [sic] yen during the fiscal year and ranked fourth in the industry with investments of 22 billion yen, and the same amount is planned for this year. The main investments are 13 billion yen to the Arai plant, 3 billion yen to the Okayama plant and 3 billion yen to the Nagaoka plant. Through these investments, IC production will be increased 66

percent to 45 million individual sets per month, production of single semiconductor chips will be doubled to over 400 million units per month, and production of microcomputers will also be doubled.

[Sanyo] The allocated amount is 11 billion yen, an increase of 3 billion yen over last year. Costs for production facilities of the new LSI plant completed in November 1980 will take up about 60 percent of the investments. The remainder will be used to construct and automate a new assembly line at the Ashikaga branch, since the main plant is operating at full capacity. With the addition, the company's production ratio of bipolar to MOSIC [MOS integrated circuits] will change from the past 9-to-1 to 8-to-2.

[Sharp] The sum of 7.2 billion yen (cumulative investment total is 20.5 billion yen) is slated to expand facilities of the Tenri No 3 plant, which was completed in the summer of last year. Production of LSI will be increased 50 percent to 6 million units per month and IC will be increased 40 percent to 3.5 million units per month.

[Oki] Of the firm's total investments of 24.3 billion yen, 50 percent plus or 14.1 billion yen are earmarked for semiconductors, showing the company's exceptional interest in this product. Of the 14.1 billion yen, 7 billion yen will be invested in facilities of Miyazaki Oki Electric, a 64-k RAM mass production plant which will begin operating this summer. The remainder will be invested in R&D facilities for next-generation VLSI at the Hachioji plant, from which modern equipment was taken and transferred to Miyazaki.

FY 81 Projected Production

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 19 May 81 p 13

[Text] The projected production (sales) for the semiconductor industry in FY 81 (partly calendar year) has been announced. The total production of the nine main companies, led by Nippon Electric Co Ltd, is expected to amount to about 1.09 trillion yen, a 27-percent increase over the previous year, and it is certain that semiconductors will become a "trillion yen industry." The industry's peculiar feature this year is its confusion, reflected by the statistics, that on the one hand while it is taking a very cautious approach because it cannot count on exports due to the semiconductor recession in the United States, particularly the anticipated zero growth of MOSIC's, on the other hand it has an aggressive outlook because domestic demand remains strong. Specifically, the three big makers, namely, NEC, Hitachi Ltd and Tokyo Shibaura Electric Co Ltd, are planning a conservative increase of about 20 percent, while manufacturers ranking fourth and below, led by Matsushita Electronics Corp, are planning increases of 30 to 60 percent.

Cautious but Aggressive

[EIAJ] From the FY 81 projected production figures compiled late last year by the Electronics Industries Association of Japan it was possible to predict that sometime this year the semiconductor industry would enter the trillion yen industry group. When the FY 81 production plans of the nine main firms were compiled, it became certain that the trillion yen mark would be exceeded by the nine companies alone.

The EIAJ's prediction was based on a survey made late last year of the plans of various companies. Subsequently, as the U.S. recession gradually worsened, some in the industry had doubts about reaching the 1 trillion yen level and believed that the forecast of a 22 percent increase was overly optimistic. However, the production plans of the various firms became much more aggressive for the following reasons: 1) The Japanese market remains strong and considerable increases in demand can be anticipated for memories, microcomputers, VTR's [video tape recorders], small signal transistors for video discs, etc, and 2) In the U.S. market, inventory adjustments were completed between January and March, and starting in April, though gradual, there was a favorable turn toward increased demand and the outlook became hopeful that somehow zero growth would be avoided.

The main points of the various companies' production plans are given below.

Table 1. Production (Sales) Plans of Semiconductor Divisions of Main Enterprises
(Unit: 100 million yen)

	FY 80 Estimated Results	FY 81 Plans	Growth Rate (percent)	FY 81 Plant & Eqpt Investments
Nippon Electric Co Ltd	2,180	2,650	21	350
Hitachi Ltd	1,650	2,060	25	280
Tokyo Shibaura Electric Co Ltd	1,500	1,800	20	150
Matsushita Electronics Corp	800	1,200	50	220
Fujitsu Ltd	*640	850	33	270
Mitsubishi Electric Corp	610	800	31	130
Sharp Corp	473	*600	20	100
Tokyo Sanyo Electric Co Ltd	430	560	30	110
Oki Electric Industry Co Ltd	310	**410	60	141
TOTAL	8,593	10,930	27	1,751

*Since Fujitsu and Sharp announce the total sales of electronics products and do not give the production statistics of the IC/semiconductor divisions separately, these figures are estimates by NIKKAN KOGYO.
**Since Oki Electric publicly announces only the amount of external sales of electronic devices, this figure is NIKKAN KOGYO's estimate of Oki's production, including items for company use.

[NEC] This year's semiconductor plans (including company use) of the largest maker, NEC, call for integrated circuits worth 190 billion yen, an increase of 24 percent over the previous year, and single semiconductor elements worth 75 billion yen, an increase of 16 percent, for a total of 265 billion yen, a 21-percent increase. Incidentally, the FY 80 production total of IC/semiconductor elements was 218 billion yen, an increase of 36 percent over the preceding year. "We do not anticipate the market demand will increase this year as much as last year, but still, our 21-percent increase is 1 percent higher than the prediction of the U.S. survey firm. In short, we are cautious but aggressive". (statement by Atsuyoshi Ouchi, NEC vice president).

[Hitachi] Hitachi, which is pursuing NEC and striving to regain the position of top maker, believes that the semiconductor strategy is has publicized has finally begun to pay off in full. Its aggressive outlook is shown in the following statement by

Sutezo Hata, managing director: "Although slightly less than the 27 percent increase in last year's production, we are expecting sales of over 200 billion yen, a 25-percent increase." The bipolar division is in especially good shape and a substantial growth rate is expected for production of computer-use, high-speed digital employing 3-micron technology, and linear IC's for VTR, TV and audio equipment. New memory products, such as the 64-k dynamic RAM's, 16-k static RAM's, 32-k EPROM's, etc, in the MOS division are selling favorably and contributing to the company's earnings. Sales of microcomputers are also good. Production of single semiconductors is overtasked but except for giving it priority, there are no plans to expand production. If limited to IC's, the growth rate is expected to exceed 30 percent.

[Toshiba] Like Hitachi, the company's semiconductor strategy is proceeding smoothly. At first, with the aim of tightening up the company's operation, a conservative announcement was made by Teruyuki Mishijima, managing director, that "this year's goal will be 160 billion yen." Recently, however, because the various divisions are doing well, the attitude changed to an aggressive one that an increase of 20 percent was certain. The reasons are that various products of the memory division, which was considered weak, are selling well, with the 16-k static RAM's leading the Japanese and U.S. industries, production of dynamic RAM's, ROM's, etc increasing, and the highly profitable CMOS products keeping up the good pace. Production of discrete components is also good because of its association with VTR. In other words, the weak spots have disappeared.

[Mitsubishi] Originally, sales of 75 billion yen were forecast, but recently the figure was adjusted upward to 80 billion yen. Sales of linear IC's for TV, VTR and audio-use are excellent. In addition, MOS memory production will contribute substantially with the monthly production of 64-k memories at Kumamoto No 2 plant reaching 100,000 units in July, and 200,000 units per month by year's end.

[Fujitsu] FY 80 sales of the electronics division were approximately 80 billion yen, of which about 80 percent or 64 billion yen, were IC products. This year production of 64-k memories have already reached 150,000 to 200,000 units per month, and if there is a demand, production can be increased at any time. It seems that 64-k memories will replace the 16-k memories as the principal product. Together with Hitachi, Fujitsu is also strong on EPROM production. Substantial increases in production of microcomputers and gate alleys are also expected. Sales of over 85 billion yen, an increase of 33 percent over the previous year, are expected.

[Matsushita] In FY 80, production of IC's for VTR, TV and audio-use and industrial IC's was favorable and sales recorded 80 billion yen, an increase of 62 percent over the preceding year. Production will continue to be good this fiscal year, with a 50-percent increase to 120 billion yen anticipated. Production will approach that of the three big makers. IC production is expected to increase by 60 percent to the 63-67 billion yen range and semiconductor elements by 40 percent to 50 billion yen. Regarding products, bipolar IC's will reach an annual production of 36 million units and MOSIC's, 9 million units. Semiconductor elements will reach a monthly production of 402 million units and microcomputers, 2 million units.

[Sharp] Sales of the electronics products business division include, in addition to IC's and semiconductors, display components such as printed circuits, clock module liquid crystals, etc. The company has not revealed its projected sales plan, but an increase of at least 20 percent or more can be expected for FY 81.

[Sanyo] Since the demand for the company's audio-use thick film IC's, which is said to occupy 70 percent of the world market, continues to be strong, production will be further increased. With the completion of the new MOS plant, production of microcomputers and memories will be doubled. The goal is sales of 46 billion yen, an increase of 30 percent plus over the preceding year.

[Oki] This fiscal year's plan for external sales of the semiconductor division, which include electronics devices other than semiconductors, calls for an increase of 60 percent over the previous year, or a sum of 35 billion yen. The company has not revealed production goals for semiconductors including those for company use. A large increase of 60 percent is forecast because the custom LSI division is doing well and the new Miyazaki plant will start full operation in August with production of VLSI, such as 64-k dynamic RAM's and 16-k static RAM's, reaching a monthly production of 300,000 units. Increased production will be reflected in the company's record beginning this fall.

Japan-U.S. Competition

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 19 May 81 p 1

[Text] In anticipation of the demand of the semiconductor industry, which is about to enter the VLSI age, various producers of semiconductor manufacturing facilities simultaneously started the sale of specialized VLSI equipment. The U.S.-Japan joint company Nichiden Anelba (main offices in Fuchu city, Tokyo) and Applied Materials Japan, a Japanese corporation of the U.S. AMT company, began to receive, one after the other, orders for the newest etching equipment, followed by C. Itoh & Co Ltd. which began to import and sell light-emitting apparatus of the U.S. Optimetrix company. Big U.S. makers, such as GCA Corp and Perkin-Elmer Corp, and Japanese companies, such as Canon Inc and Nippon Kogaku KK, are also getting into full gear and the competition is becoming intense between Japanese and U.S. makers for a share of the rapidly expanding Japanese semiconductor manufacturing equipment market.

Table 1. Main Semiconductor manufacturing equipment makers engaged in sales of VLSI Equipment.

Maker	Sales Outlet	Products
Nichiden Anelba	Nichiden Anelba	Reactive ion dry etching apparatus
AMT	Applied Materials Japan	Plasma etching apparatus
Perkin-Elmer Corp	Kanemitsu Semiconductor	Light-emitting apparatus, etching apparatus (planning stage)
GCA	Sumitomo Shoji Kaisha Ltd	Light-emitting apparatus, etching apparatus (planning stage)
Optimetrix	C. Itoh & Co Ltd	Miniature light-emitting apparatus
Canon Inc	Canon Inc	Mask aligners
Nippon Kogaku KK	Nippon Kogaku KK	Light-emitting apparatus

Note: AMT, Perkin-Elmer Corp, GCA and Optimetrix are U.S. companies

Japan's semiconductor industry, which is expected to enter the VLSI age in a year or two, is planning plant and equipment investments of over 200 billion yen, for the industry as a whole, in FY 81. Construction of plants specializing in VLSI is proceeding at a rapid pace.

For VLSI, led by the 64-k RAM's (instantaneous write-in/read-out memory), because over 100,000 transistors are integrated on a small silicon chip no larger than several mm square, the minimum channel width of the circuit is about 3 microns. For LSI of the 16-k RAM category, about 5 microns are tolerable. Therefore, for the VLSI manufacturing line, specialized equipment capable of precise and minute processing, which cannot be compared with previous types of equipment, becomes necessary.

In response to the demand of the semiconductor industry, makers of semiconductor manufacturing equipment began developing specialized VLSI equipment and the results are beginning to appear successively.

First, Nichiden Anelba which is a joint company of NEC and the U.S. Varian Associates, succeeded in developing the "ILD-4002," a reactive ion dry etching apparatus which can etch in 3-micron channels, circuit patterns printed on silicon wafers. Orders are being taken for this "world's first VLSI etching apparatus of practical usage" (statement by Toru Inouye, managing director).

Through its Japanese affiliate, AMT has also begun the sale of the "AME-8100" series which are plasma etching apparatus for VLSI-use. To develop this newest type of equipment, AMT is said to have scouted for technologists in the United States at Bell Laboratories and Intel Corp, a large semiconductor maker, and spent 1 billion yen for development costs.

GCA Corp and Perkin-Elmer Corp, which with AMT rank the "big three U.S. semiconductor manufacturing equipment makers," are planning to sell on the Japanese market VLSI-use etching apparatus through their respective Japanese agents, Sumitomo Shoji Kaisha Ltd and Kanemitsu Semiconductor (main office, Tokyo).

In the field of light-emitting apparatus to print circuit patterns on silicon wafers, GCA Corp had the monopoly with its Stepper-DSW, but the Optimetrix company, through C. Itoh & Co Ltd began the sale of its new type of equipment. Also, the Japanese firms of Canon Inc and Nippon Kogaku KK have announced plans for the construction of specialized plants to manufacture VLSI-use equipment and have revealed their interest in fully participating in this industrial area.

At present the Japanese semiconductor manufacturing equipment market is reportedly 140 billion yen a year, but with the arrival of the VLSI age, an annual increase of 20 to 30 percent is anticipated. Established makers have begun the race to get a bigger share of this rapidly growing market.

Development of Semiconductor Sensor

Tokyo DENKI SHIMBUN in Japanese 23 May 81 p 3

[Text] The Ministry of International Trade and Industry [MITI] wants to encourage the technological development of semiconductor sensors (detectors), comparable to the five sensory organs of human beings, and has decided to establish a sensory

development assistance fund during the coming fiscal year. One of the aims is to greatly advance the development of element technology which is associated with electronics "brains" such as memories and logic elements. Other underlying factors are the tendency of sensory technology development to lag behind, the difficulty of systematic development because of the wide applications, and the desirability being felt recently for sensory R&D on capability to detect subtle chemical compounds in smell and taste. To place sensory development on its proper course, the MITI plans to establish a committee composed of various maker representatives which can widely grasp the needs of different industrial sectors and serve as a forum to exchange views.

Provide "Five Senses" Capability to Advance "Brains"

Sensors which can detect various types of physical properties from controlled objects and transform them into electrical signals are comparable to the five human sensory organs. Light sensors are compared with the human sense of sight, gas sensors with the sense of smell, pressure and temperature sensors with the sense of touch, sound wave sensors with the sense of hearing and chemical sensors with the sense of taste.

Full application of semiconductor technology to sensors has only begun, and it has been pointed out that compared with the progress of IC and LSI memory and logic element technologies, it is relatively backward.

However, the number of patent applications related to sensors has increased rapidly in recent days, and because of their wide applications, there is an increasing recognition of the need to promote their technological development.

The MITI recognized that it was indispensable to develop biochemical sensory elements to detect minute harmful substances or to prevent gas explosions and had originally planned to include in the "technological R&D plan for the next-generation industrial base" to be newly established in FY 81 the development of a type of sensory or new functional element, together with a super structure element, a three dimensional circuit element and an environment reinforcement. However, at the start of the plan, the Finance Ministry objected to inclusion of a biochemical sensory element among the developmental items, and ultimately it had to be dropped.

Because of these events, the MITI reconsidered the necessity to promote technological development and future needs of sensories, in general, and concluded that: 1) it is desirable to develop sensories which are the same as or closely resemble human senses; 2) there is an urgent need for such sensory development but at this stage there is no provision for systematic development; and 3) with the existing sensory technology, it is either impossible to detect molecules in smell or taste or it would require a long period of time. Thus, the MITI judged that sensory development was needed and that the establishment of backup measures for technological development by nongovernmental bodies was an urgent task.

At present, the MITI considers it desirable to set up the sensory development assistance fund in the next fiscal year, but since there are indications of fund cuts in the second round of budget adjustments, it must be flexible in its thinking and plan for alternate measures. After obtaining adequate information on which specific industries and enterprises have interest in sensory development, the MITI plans to organize a committee made up of representatives from the concerned makers and to reflect in its policies the viewpoints that are presented in the meetings.

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SCIENCE AND TECHNOLOGY

INTRODUCTION OF ROBOTS INTO AUTOMOBILE INDUSTRY CONTINUES

Parts Industry

Tokyo NIHON KOGYO SHIMBUN in Japanese 10 Jun 81 p 8

[Text] The introduction of robots into the automobile parts industry has been a steady process. Operational expenses continue to increase for the auto parts industry due to the facelifting of the production lines necessitated by the acceleration of the new car model development and the rapid design changes associated with this trend. To cope with this, each parts maker has introduced "unhumanized" robots in each production process and is making all-out efforts to absorb the cost increase inflicted by the design changes, indicating the emergency of a movement in the parts industry in connection with the introduction of robots to the auto industry.

Pressed by intensified domestic auto sales competition, all companies in the auto industry are engaged in an exhaustive battle to gain a share of the market by introducing new models. The conventional model change cycle, known to be once every 4 years, is likely to be gradually speeded up because of this.

The parts makers are pressed to produce parts at a pace that can accommodate the speed of the development of finished cars as seen now, and furthermore they are required to have a parts production line for each car model in order to deal with the diversification of the car model structure by the makers. The conventional lines cannot handle this need, and it is a fact that the cost of production has gone up.

In these circumstances, recently, robots which can cope with the diversification have begun to be introduced to each production line in conjunction with the equipment renewal.

The Koito Manufacturing Co, which is troubled by the cost increase due to the increase in the variety of headlamps, has decided to begin the automation of its entire manufacturing process by introducing robots to the lamp assembly process, which is an addition being constructed in the Shizuoka plant. Also, a great number of robots have already been introduced to the signal light factory in the Haibara plant, and the assembly process has been more extensively automated than in the past. Likewise, Tokiko has introduced welding robots it developed and distributed to the production line of its major product, shock absorbers, and is achieving good results due to equipment procured from within.

Another example is the Japan Oil Seal Industry, which is also changing outdated equipment to robots one after another to cope with the variety and mass production of oil seals.

On the other hand, Riken (Institute of Physical and Chemical Research), the largest piston ring maker, has successively introduced virtually manless automated processing lines to the Kashiwazaki plant (Niigata Prefecture) for improvement of the work precision and the mass production of its piston rings.

All these companies are promoting the development of robots within their companies to alleviate the burden of equipment expenses, and the activities in the parts industry draw attention even from the aspect of manufacturing production equipment within itself in the days to come.

Body Industry

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 12 Jun 81 p 9

[Text] Today robots fill the place of a main character in the welding process of the automobile assembly. Already, a total of 2,000 robots are working in Japanese automobile factories. This is the result of a repeated process of trial and error explored through the combined knowledge of the auto makers and the robot makers. Now the Japanese auto industry has risen to the point of being credited as the best manipulator of robots among the world's auto industries.

The introduction of robots which started in the welding field has now been expanded to the painting field, but where do the auto makers think this will end...? Yoshikazu Tamura, director of the Second Engineering Department of Nissan Motors, asserted: "Robots of the present type cannot be applied to anything but the body." The use of robots in every process of automobile manufacture, such as casting, forging and outfitting (fitting of internal parts), has not materialized.

According to the auto makers, the present robots can only strike "dots" as seen in spot welding. Multiple operations cannot simultaneously or continuously be accomplished in a single motion. Also, robots are not good at performing fine, intricate work. Auto makers demand much more from robots. How to accommodate this aspect will be the task of the robot makers and also an issue of the auto makers themselves.

When Toyota introduced Kawasaki Heavy Industries' "Unimate" on a trial basis, it was driven up the wall by failures. When a Toyota engineer took the "Unimate" apart, he found defects in the gears. The technology for gears is a speciality of auto makers. Toyota is said to have offered the technology to improve the gears to Kawasaki Heavy Industries. The companies which were in the first group to introduce robots, for instance, Nissan Motors and Toyo Kogyo, likewise offered various technologies to robot makers.

In this way, know-how from various auto makers flowed into the present welding robots. In the background of the firm grip on the market share held by Kawasaki's "Unimate" in the welding robot market, there is Kawasaki's positive incorporation of technology drawn from various auto makers integrated into the "Unimate".

However, auto makers must try to take some measures to prevent leaks of their own know-how regarding robots. Indeed, they have already started to ask for a royalty in exchange for the know-how offered to the robot makers. Makers other than Nissan Motors are to pay the royalty added on top of the cost of the robots.

Now, auto makers are beginning to think of a method to design an automobile body suitable for robot operation. The body will be preshaped in the designing stage with robot welding as a premise. Hidden welding sites will be "brought out" in new designs so that the hands of robots can reach them. The more human welding operations can be avoided, the more robot welding can be fully utilized. Auto makers are exploring many innovations to get the maximum use from robots.

Small Car Lines

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 17 Jun 81 p 7

[Text] Suzuki Motors (president, Osamu Suzuki) has decided to introduce 70 robots for welding within this fiscal year. The intention is to upgrade production efficiency through labor saving. The three plants expecting the introduction are the Kosai, Iwata and Toyokawa plants. With this, the robots introduced by this company will jump from 100 units in the past to 170 units in one sweep, a gigantic step-up in the robot ratio used in the production process. In the automobile industry, the introduction of robots is currently being spurred mainly in the small passenger car production plants, as a measure to ride through the world automobile war. With this mass introduction by Suzuke Motors, it seems that the light car lines will enter into full scale automation by robots.

The number of units assigned to the three plants scheduled to have robots breaks down as follows: 30 for the Kosai plant, 30 for the Iwata plant and 10 for the Toyokawa plant. They are all to be used for automation of the welding lines. Models Alto, Fronte and Salvo are produced in the passenger car production plant at Kosai. Carry, Carry Van and Gemeni are produced in the commercial car production plant at Iwata. Also, medium-size and large motorcycles (auto-bai) primarily for export specifications are produced in Toyokawa plant.

Up to now, Suzuki has introduced a totai of 100 robots to the four-wheel car plants, Kosai and Iwata, but not to the two-wheel car plant, Toyokawa. When the installation of robots in the Toyokawa plant is completed within this fiscal year, it will mark the first introduction of robots to a two-wheel car plant for the company.

Suzuki decided on the mass introduction of robots in order to upgrade production efficiency through labor saving. In the company, demands for passenger vehicles and commercial vehicles has dramatically increased, supported by the light car boom appearing from last year through this year. In conjunction with this, in the January-April period this year production increased by 36.1 percent compared with the same period last year, to 178,000 cars, stretching the operation to the limit of capacity. Of all the models, the popular "Alto" model is now produced at the rate of 13,000 to 14,000 a month, and the company is straining to catch up with the pace by the use of overtime and weekends and holidays. In these circumstances, it decided to make production more efficient by the mass introduction of robots and to provide some leeway in the operation.

The automobile industry is now fighting desperately to introduce robots as a "feature measure" to rationalize the production process in order to win and survive in the world automobile war. Already, Toyota and Nissan have introduced 500 robots. Others, such as Toyo Kogyo, Mitsubishi Motors, Isuzu, etc, are definitely planning to introduce robots, although primarily to small passenger car lines. Now, however, Daihatsu, at this stage of the game, is indicating a will and desire to introduce robots built within its company, showing a tendency to promote automation of light car lines by robots. It is likely that the mass introduction by Suzuki motors will give "momentum" to these trends.

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