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3 April 1981

Japan Report

(FOUO 20/81)

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JAPAN REPORT

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POLITICAL AND SOCIOLOGICAL

'YOMIURI' ON CORRUPT LDP POLL

Tokyo THE DAILY YOMIURI in English 12 Mar 81 p 2

[Editorial: "Corrupt LDP Poll"]

[Text]

The preliminary draft of the "Tamura plan" offers scant hope of freeing the presidential election of the Liberal-Democratic Party (LDP) from the corruption of money politics.

The draft will be polished and worked into a formal plan to revise the election system by the end of the month. However, the technical and cheap tricks incorporated in the draft make it clear enough that this is not the hoped for reform.

Under the Tamura plan, there will be no preliminary election when only three candidates compete for the post, but in principle the preliminary election will be kept. However, we do note that steps have been taken to eliminate "ghost" party members and to conduct a centralized election at party headquarters to check the proliferation of factions in outlying areas.

Unreal, No Substance

This is not enough. The Tamura plan is only a pretty picture on canvass which is unreal and without substance, unless the LDP shows determination to carry out a truly clean election. And the past history of LDP presidential elections is not encouraging for the future.

When Tanzan Ishibashi, Nobusuke Kishi and Mitsujiro Ishii vied for the LDP presidential post in 1956 following the conservative merger, hundreds of millions of yen circulated. In the showdown vote in 1972 between Kakuei Tanaka and Taeko Fukuda, billions of yen were distributed in the worst case of money politics in the history of LDP presidential elections.

System Reformed In 1978

Under the Fukuda administration, disgust at such behavior led to reform of the election system in 1978

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aimed at bringing the party election out of the darkness and into the open. It was thought that the party would profit by expanding its membership.

Instead, bribery became rampant and widespread. Such abuses as creating fictitious party members named after infants or even cats with their dues being paid by LDP factions were exposed. Fukuda went down in defeat proving limited reform cannot overcome the vicious factional struggles within the party.

What is appalling to the public is that with the LDP so powerful and the six opposition parties so weak the winner of the LDP election automatically becomes prime minister. Under the circumstances, we believe that only by placing party elections under the Public Election Law can this evil system be corrected.

If this is not done, then money politics will continue to determine who will become the prime minister of this nation.

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POLITICAL AND SOCIOLOGICAL

SUZUKI MAY FACE SEVERE TEST IN WASHINGTON

Tokyo MAINICHI DAILY NEWS in English 5 Mar 81 p 1

[Text]

Prime Minister Zenko Suzuki is expected to face a severe trial in summit talks with President Ronald Reagan in Washington in May with the United States most likely to press Japan to do something about autos and defense.

Suzuki is scheduled to send Foreign Minister Masayoshi Ito to the U.S. capital on March 21 to lay the groundwork for the Suzuki-Reagan meeting now set for May 7-8.

Global Matters

Some government officials have expressed the belief that the Japan-U.S. summit talks should involve global matters and that they should not touch on such bilateral matters as Japan's automobile exports and defense expenditure.

But it is also believed here that the Republican administration, which has already shown a get-tough policy toward the Soviet Union and announced a policy of reconstructing the U.S. economy, is likely to bring up defense and autos.

The Foreign Ministry, to be sure, is having a difficult time trying to find out what the U.S. would concretely come up with in the forthcoming summit meeting, the first between Suzuki, who became prime minister last July, and Reagan, who assumed office in January.

Japan ships about 1.8 million vehicles to the United States, sparking some American legislators to try to curb the Japanese shipments to cure the ailing American auto industry.

Suzuki's government has earmarked 2.4 trillion yen or about 0.9 percent of the country's gross national product for defense in the budget for fiscal 1981 that is now under debate in the Diet. The figure represented a 7.6 percent increase over last year's defense outlay. The U.S. government asked for a 9 percent increase.

Defense Buildup

Vice Foreign Minister Masuo Takashima met Suzuki on Feb. 26 and reportedly recommended that the prime minister describe in his talks with U.S. leaders Japan's concept of defense buildup in years beyond fiscal 1982.

In his responses to opposition party members, Suzuki has repeated that Japan would not become a military power and that Japan would devote its strength exclusively to defense.

Some Foreign Ministry officials privately have expressed dissatisfaction with the prime minister's remarks, saying that the United States was not asking Japan to become a military power but rather pointing out that Japan was not making efforts within the scope of its own ability.

There are also those in government who are inclined to believe the United States might ask Japan to bear some defense cost as America planned to strengthen its defense structure in the Middle East, and that there might be a possibility of the U.S. proposing joint Japan-U.S. defense of the sea lanes vital for crude oil transportation.

Some officials, however, maintain that the U.S. knows what Japan can and cannot do and that Washington would not

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present Japan with any unreasonable demand.

They hope to win U.S. understanding with proposals that Japan would strive to correct the deficiency of the Self-Defense Forces, that Japan would carry out its roles in the political and economic fields in place of a military role and that Japan would increase its share of upholding U.S. military forces in this country.

Cut In Spending

It is doubtful, however, whether the Reagan administration, which has just announced plans to cut government spending but to increase military expenditure, would accept Japan's proposal.

If defense is a long-term matter standing in bilateral relations, the auto issue is an

urgent matter.

The three top U.S. car makers in Detroit last year reported deficits. Since the slump of the American car industry is directly associated with a sharp increase in the number of unemployed, the Reagan administration must do something immediately.

Suzuki has instructed his subordinates to settle the auto issue before his trip to Washington in May.

For the moment, it appears that the U.S. wants Japan to exercise self-restraint in the shipments of cars.

However, Japan may not easily comply with the U.S. wish. One out of every 10 workers in Japan is involved with auto-related industries.

Any curb in the Japanese auto exports to the United States would have some effect on Japan's shipments to the European Community (EC) and Canada.

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GROWING DISSATISFACTION WITH POLITICS OF 'HARMONY' REPORTED

Tokyo MAINICHI DAILY NEWS in English 25 Feb 81 p 2

[NAGATACHO DOINGS column by Takehiko Takahashi: "Growing Dissatisfaction With Politics of 'Harmony'"]

[Text]

Dissatisfaction with Prime Minister Zenko Suzuki's political posture based on "harmony" has started to grow within the Liberal-Democratic Party.

This concerns, first of all, Prime Minister Zenko Suzuki's replies to questions on the problem of the Constitution. The prime minister has not only declared that he will "respect and be faithful to the Constitution" but he also stated that "a minister who does not agree with the cabinet's policy can only be asked to leave." Needless to say, this is an explicit warning against the statement made regarding the Constitution by Justice Minister Seisuke Okuno.

This statement by Prime Minister Suzuki was taken up as a problem at the regular meeting of the LDP's Nakagawa faction on Feb. 18. Among the opinions advanced were that "the prime minister is ignoring the party platform and engaging in action that can be considered as being against the party" and that "his statement is too irresponsible and rash for a prime minister and party president to make."

Basic Policies

There are reasons for such opinions. "Enactment of an independent Constitution" is one of the LDP's basic policies. This was resolved at the last LDP convention also. The Suzuki cabinet is an LDP cabinet and is responsible for carrying out the LDP's policies. Notwithstanding, an attempt is being made to curb even a discussion on constitutional amendment. This is contrary to the party's basic policies, it is averred.

The meeting of the Nakagawa faction was attended by Ichiro Nakagawa, director general of the Science and Technology Agency. Nakagawa is saying that these views within his faction will not be reported to Prime Minister Suzuki at once, but this movement is likely to spread to the League of Diet Members Seeking an Independent Constitution and other groups within the LDP, leading to stronger criticism of the prime minister's attitude on the Constitution.

Second, there is the defense problem. In his reply to a Diet interpellation, Prime Minister Suzuki stated that even if there is an American request for an increase of Japan's defense strength, he will clearly declare at the Japanese-American summit meeting, scheduled in May, that this cannot be done.

Gen. Goro Takeda, chairman of the Joint Staff Council, whose statements on defense created a furor, and other high ranking officers of the Self-Defense Forces are consultants for Shin Kanemaru, former director general of the Defense Agency. Kanemaru is an influential member of the Tanaka faction. Accordingly, there is a possibility that criticism of Suzuki's attitude on defense will arise from around here.

Thirdly, there is the problem of the inaugural ceremony of President Chun Doo Hwan of the Republic of Korea. After President Chun's recent visit to the United States, there was some talk about his stopping over in Japan on the way home. This was ultimately not realized. The reason was that different views within the government on the treatment to be accorded President Chun could not be reconciled.

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The opinion has been advanced that Prime Minister Suzuki should attend the inaugural ceremony. This would have the meaning of apologizing for the earlier "discourtesy." Nevertheless, it has been decided that because of the Diet schedule for deliberations on the budget, Foreign Minister Masayoshi Ito will be going to the inauguration. On March 3, the day of the inaugural ceremony, only a subcommittee meeting of the House of Representatives Budget Committee is scheduled and the prime minister need not necessarily be present.

The prime minister's failure to go to the Republic of Korea is because, it is viewed, he is afraid of criticism arising from the opposition parties or the mass media in regard to the Chun Doo Hwan regime and the Kim Dae Jung case.

Complaints Rising

Complaints have arisen within the Liberal-Democratic Party that these problems are being caused because Prime Minister Suzuki is giving excessive consideration to "harmony," particularly "harmony" with the opposition parties.

The LDP viewpoint is that at a time of near equilibrium between the government and opposition parties in the Diet, there may have been a necessity to give attention to "harmony" and seek compromises, even if unwillingly, with the opposition parties.

But now, with the LDP enjoying a comfortable majority, it is inappropriate for Prime Minister Suzuki to give excessive consideration to the attitude of the opposition parties.

These same voices arose at the time of the Ikeda Cabinet. "Magnanimity and perseverance" was the Ikeda Cabinet's catchphrase. The Diet was operated in such a way that the selection of bills to be presented rested with the opposition parties.

Strong criticism arose, asking, "didn't the people cast their votes for the LDP - this is contrary to democratic rules." In the vanguard of that criticism was the late Eisaku Sato.

Prime Minister Suzuki was a member of the Ikeda faction. Chief Cabinet Secretary Kiichi Miyazawa was once Ikeda's personal secretary and has promoted the Ikeda style of politics.

Therefore, Prime Minister Suzuki's politics of "harmony" is undoubtedly based on strong conviction. Yet it cannot be denied that signs are appearing of dissatisfaction within the LDP about his politics of "harmony."

(The writer is an adviser to the Mainichi Newspapers and former chief editorial writer).

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OPENING OF YAMASHITA OFFICE ATTRACTS ATTENTION

Tokyo MAINICHI DAILY NEWS in English 11 Mar 81 p 4

[NAGATACHO DOINGS Column by Takehiko Takahashi: "Opening of Yamashita Office Attracts Attention"]

[Text]

The opening by the LDP's Ganri Yamashita of an office with considerably extensive space near the Diet building is attracting attention. Yamashita is now the chairman of the Diet Steering Committee of the House of Representatives but he has served previously as director general of the Defense Agency and has had experience as a cabinet minister.

Yamashita is one of the members of the Tanaka faction in whom great expectations are placed for the future. As a member of the Tanaka faction, however, his political activities have been restricted. Differing from Shintaro Abe, chairman of the LDP Policy Affairs Research Council; Finance Minister Michio Watanabe; Ichiro Nakagawa, director general of the Science and Technology Agency; and Toshiki Kaifu, former Education Minister, Yamashita has refrained up to now from acting positively on the stage of "new leaders."

But now, he has opened an office for the first time and seems to be preparing to mount that stage. This is what has become the subject of discussions.

Among the "new leaders" in the Tanaka faction is Noboru Takeshita. He early opened an office near the Diet building and has engaged in positive activities, such as publishing a daily newspaper. There was a time when it was rumored that Takeshita might leave the Tanaka faction and form a Takeshita faction. When this rumor reached the ears of former Prime Minister Kakuei Tanaka, it is said that Tanaka was angry and shouted: "such impertinence!"

Being aware of this, Yamashita took steps, before opening his office, to gain the understanding of not only former Prime Minister Tanaka but also Susumu Nikaido, chairman of the Thursday Club (Tanaka faction) and Takeshita, his political senior.

Since Yamashita was born in 1921, he is now 60 years old. Although he is older in age than Takeshita, Abe, Nakagawa and Kaifu, Yamashita has only been elected six times to the Diet and there is a gap in his political career with Takeshita's nine times, Abe's eight, Nakagawa's seven and Kaifu's eight.

Elite Bureaucrat

Yamashita might be regarded as having been an elite bureaucrat who graduated from the First Higher School (under the old system) and University of Tokyo, then serving in the Ministry of Finance. But before he was able to reach the first rung of this ladder, he experienced great hardships, just as his boss, former Prime Minister Tanaka, did. Yamashita did not graduate from a regular middle school. He passed a qualification examination, which was the system at the time, to enter the First Higher School. He worked his way through school by taking jobs, such as delivering newspapers.

At the time of the Hatoyama Cabinet, he transferred from the Ministry of Finance to become the prime minister's secretary. This opened Yamashita's eyes to the reality of politics for the first time. His last post as a Finance Ministry official was director of the Hiroshima regional tax administration bureau.

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His electoral district in Shiga Prefecture was formerly that of the late Yasujiro Tsutsumi (at one time the Speaker of the House of Representatives; founder of the present Seibu Group). After Tsutsumi's death, Yamashita succeeded to Tsutsumi's constituency and entered politics in this way. For that reason, there is a close relationship between Yamashita and the Seibu Group. The office that Yamashita opened this time is in a building having a connection with Seibu.

In the Tanaka faction there are, besides Takeshita, such men as Shin Kanemaru, Tatsuo Ozawa and Takao Kameoka who are directly affiliated with Tanaka. Among those who have come from other factions to participate in the Tanaka faction are Masumi Ezaki, Hajime Tamura and Tokusaburo Kosaka. Among them Takeshita has formed his own group of Diet members that is often called the Takeshita branch of the Tanaka faction.

In this sense, Yamashita has made a late start. Pledging loyalty to his boss Tanaka, Yamashita has not attempted to form what might be called a "Yamashita branch" of the faction. But even if he continues to maintain the same stance in the future, a clear distinction is bound to be made between those who frequent the Yamashita office and those who do not. This will naturally become connected with the formation of a "Yamashita branch."

Yamashita is a big man. But he bows low in a manner that is said to be unusual for a former bureaucrat. This gives a particularly strong impression because of his large size. Although some say that "it's not necessary to bow so low," this seems to have become part and parcel of Yamashita's manner.

It would not be a mistake to say that Yamashita is one of the men aiming eventually for the premiership. He is probably seeking the finance minister's post as a step along the way. For that purpose, instead of being one of the nominal leaders of the Tanaka faction, as he has been up to now, he has probably decided to create an environment in which he can make his own views better known.

Yamashita's new move is likely to create a storm in the rivalry among LDP leaders from now on.

(The writer is an adviser to the Mainichi Newspapers and former chief editorial writer).

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NLC AIMING AT REORGANIZATION OF POLITICAL WORLD

Tokyo MAINICHI DAILY NEWS in English 4 Mar 81 p 4

[Text]

The New Liberal Club has recently held its party convention.

After the "New Liberal Club boom" that took place five years ago, its strength dwindled to only four seats in the House of Representatives. As if to take responsibility for this, Yohei Kono withdrew from the position of NLC's Representative, being succeeded by Seiichi Tagawa. In last year's general election, the number of Diet seats became 11 and the party has revived somewhat in spirit.

It can be said that the New Liberal Club is a political party centered on the Tokyo metropolitan zone. It possesses eight seats in the Tokyo metropolitan assembly, 13 seats in the Kanagawa prefectural assembly, and nine seats in the Saitama prefectural assembly.

The NLC possesses a considerably strong voice in this region. This is because in addition to Seiichi Tagawa and Yohei Kono, both of whose constituencies are in Kanagawa Prefecture, its Secretary General Toshio Yamaguchi has been elected from Saitama Prefecture, and it has five members in the House of Representatives from Tokyo Metropolis - Takashi Kosugi, Koji Kakizawa, Minoru Yoda,

Mamoru Tahima and Kosuke Ito.

What political path will the New Liberal Club follow from now on? Takeo Nishioka, who was at one time the NLC secretary general, came into confrontation with Kono's middle-of-the-road course and withdrew from the party. This scar still remains. The NLC opposes the formation of a new middle-of-the-road party as advocated by Chairman Ryosaku Sasaki of the Democratic Socialist Party.

This is because the New Liberal Club is inherently a conservative party and there is a strong rejection of unification with any political party having the word "socialist" in its name. There is opposition to the formation of ties with such a party within the Diet and a merger is inconceivable.

Such a political concept is not the sole reason, however. The New Liberal Club is competing fiercely with the Komeito and the DSP in electoral districts. It is strongly felt that clasping hands with such rivals will be disadvantageous in elections.

Best Opportunity

The NLC is placing its expectations on a reorganization of the political world. The best opportunity for this will be the next general election which is expected to take place two or three years from now. It is believed that the Liberal Democratic Party will lose some seats in that election. Then if the NLC can gain five to six more Diet seats, a near equilibrium between the government and opposition parties will emerge again. The New Liberal Club plans to initiate a reorganization of the political world at such a time and to become the core of the movement.

In this respect, the NLC is seeking some way to clearly differentiate itself from "that other conservative party," the LDP. The subject being taken up for this is the problem of the Constitution. One of the LDP's basic policies is the enactment of "an independent Constitution," in other words a revision of the existing Constitution. As opposed to this, the New Liberal Club has come out with "protection of the Constitution."

"Revision of the Constitution

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or protection of the Constitution?" This is an easily understandable problem. It is with this clearly understandable theme that the New Liberal Club is emphasizing that it is a conservative party that differs from the LDP.

As the New Liberal Club sees it, "no matter how vigorously the LDP may call for a revision of the Constitution, everyone knows that this is difficult to realize." Besides, even within the LDP, there are members who oppose a constitutional revision.

Thus, at the time of a reorganization of the political world, the LDP will be split into two on the problem of constitution revision. The NLC could join with the members opposing a constitutional revision, thus creating two large conservative parties.

Then by joining forces with the Komeito, Democratic Socialist Party and possibly the right-wing of the Japan Socialist Party, which are all desirous of preserving the existing Constitution, an influence able to take over the reins of administration might be formed.

This is the future design of the political world that the New Liberal Club now has in mind. It is now strengthening the foundation to prepare for such a change.

Meanwhile, the New Liberal Club's financial situation is not too bright. Nevertheless, the party is saving up one million yen every month. At the time when the number of Diet members dwindled to four, the secretariat was reduced. Although it now has 11 Diet members, the secretariat remains the same in scale. The resulting margin of expenditures is being saved in order to prepare for the next election.

At present the NLC's debts total about 120 million yen. It is planned to repay this by holding "New Liberal Club parties" two or three times.

There was a time when it was rumored that "the New Liberal Club might be dissolved." Today it seems to have recovered its energy, with "reorganization of the political world" as its new aim.

(The writer is an adviser to The Mainichi Newspapers and former chief editorial adviser).

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ADOPTION OF CONSCRIPTION SYSTEM ANALYZED

Tokyo SHUKAN ASAHI in Japanese 20 Feb 81 pp 16-21

[Article by ASAHI SHIMBUN reporters, Shunsuke Saito; Fumio Ikeuchi; Yukimasa Okamoto]

[Text] The statement made by Chairman Takeda of the Joint Staff Council brought a stagnant Diet back to life. Was the Takeda statement, as the Socialist Party claims, the first road marker on the way to constitutional revision and implementation of a conscription system? In a country as peaceful as present-day Japan, is such a thing possible? Furthermore, in terms of Japan's defensive strategy, is the building of a large military force through conscription actually necessary? Leaving aside the political maneuvering going on in the Diet, we present here a calm analysis.

Because of the stable LDP majority, most observers felt that the present Diet session would proceed without incident at the pace set by the LDP Government. And it went exactly as expected until the first meeting of the Budget Committee of the House of Representatives. Until then the only remarkable event was the usual reading of responses by Prime Minister Suzuki.

Then the "Takeda statement" burst upon the scene. The deliberation of the Budget Committee was cut off at the beginning by the inquiry of the Socialist Party and other opposition parties. While the Government party and the opposition parties went back and forth with calls for "disciplinary dismissal!" and replies of "not necessary!" the person who started the uproar, Chairman Takeda of the Joint Staff Council had this to say to military officials gathered in his office: "You will probably be asked many things about my statement. What I most wanted to express was the difficulty of constructing a defense strategy on the basis of the principle of 'defense forces for 'defense' only.'" Depending on the situation, bombs may be dropped on the main island and some parts of the country may be occupied. I wanted people to be more aware that such a situation may occur. I wanted particularly to explain this to outsiders and I want it understood that this was not a last outburst prior to resigning office."

Chairman Takeda probably meant to say that the opposition parties and the media did not pay attention to his true intentions and placed their own interpretation

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on his statement. The Takeda statement was published in the March issue of the monthly magazine HOSEKI. Besides the statement about "defense forces for 'defense' only," the following two statements (abridged) appeared as replies in an interview there.

"In discussing the calculation of the defense budget as part of the GNP, the issue of percentage always comes to the fore. I think this is meaningless. The budget is prone to be expressed as a percentage or compared to social welfare expenses. No one ever asks what the defense forces are able to do.

"Whether conscription would be advisable or not is a separate question, but the reasons usually advanced against conscription are the clause "All of the people shall be respected as individuals," of Article 13 and the prescription against "bondage" or "involuntary servitude" in Article 18 of the Constitution. This would imply that the members of the Self Defense Forces are in a state of slavish submission and involuntary servitude."

The response to the Takeda statement by the opposition parties was extraordinarily quick. It was a bit of luck for the Socialist Party that the statement was made on the day before the House of Representatives Budget Committee met and the first questioners, Sanji Muto and Masatsugu Ishibashi, pressed the government hard for Takeda's dismissal. The questioning by the Socialist Party in the Diet had been dragging along in a desultory fashion up to that point, so this was a godsend for them.

The Socialist Party took the Takeda statement rather seriously as "the first step toward conscription." This is clear from the heated debate between Ishibashi and Keitaro Hasegawa in the latter part of this issue. Of course, there is a shrewd calculation behind this response.

"If we can plant an image in the people's minds that the armor of constitutional revision and a conscription system can be glimpsed behind the robes of the LDP Government, we can appeal to the people's emotions. Then a comeback may be possible of the old Socialist Party built on the support of the people who are against war and for peace," says an experienced Socialist Party Diet member with urgency in his voice.

The Komeito and the Communist Party have taken a position fairly close to the Socialists, but Secretary of the Democratic Socialist Party Mr Tsukamoto, made a statement sympathetic to Takeda in the Budget Committee meeting on 4 January. So a split is beginning to develop between the opposition parties. This problem may have a subtle influence on the coming restructuring of political alignments.

At any rate, with respect to the view of the Takeda statement as the "first step toward conscription," some feel that "an extreme reaction to the first appearance of militarism is the best strategy," but there is strong support for the view that "too much commotion about conscription will produce results opposite to those hoped for."

The actual strategy of the LDP Government up till now in influencing public opinion has been to throw up extreme statements, have them attacked, and throw

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them up again until gradually they can move in the direction of realizing what they want. A prime example is the constitutional revision argument of Justice Minister Okuno. With respect to a conscription system, most constitutional law scholars would say that conscription is impossible unless a military service obligation is written into the Constitution.

The Government and LDP are well aware of this. It is hardly conceivable that they would rush to implement conscription just by excluding Article 18 from the grounds for unconstitutionality of conscription. N, the member of the House of Councilors who quickly obtained a copy of HOSEKI and gave it to Ishibashi says remorsefully, "The only ones to profit from this were HOSEKI and Takeda."

Will Work Only Within the Law and the System

The problem for us is whether or not there is danger of a conscription system actually being implemented soon. Are the LDP Government, the business sector, and the military beginning to study a conscription system? We conducted a wide-ranging examination of this question. The outcome was that, at present at any rate, no such facts could be discovered.

On the contrary, we found a great deal of information denying this. First, the military. Wasn't Takeda really thinking, "If possible we want to build a large military force through conscription"? We asked this question to several Self Defense Force Officers. They all said no.

The unified view of the Defense Agency was clearly based on the reply of former Prime Minister Fukuda in the October 1978 meeting of the House of Councilors Budget Committee: "A conscription law is not under study." One officer said, "Under present circumstances, I think you could say that there is no one who thinks that a conscription system is necessary." He is a colonel, a graduate of the Defense College, and a middle-ranking officer at the Defense Agency.

"Speaking only militarily, there is no reason to refuse if we are asked to carry out a draft. However, the real problem is that unless the Constitution is revised, it cannot be done, and the requisite conditions for this do not exist. We are not asking that the system be changed. We are only trying to work at defense within the bounds of the law and the system."

According to him, the biggest grievance is "the attitude inside the Agency which will not listen to our desires and relay them to the outside."

One example he gives is the "Defense Study." A report was prepared on this in the Diet on 4 January, but the details were designated top secret. The "Defense Study" was a study of a system whereby the Self Defense Forces could begin to move ahead of circumstances in case of an emergency.

According to an informed source, it contains concrete plans such as moving 5.6 million Hokkaido inhabitants onto fishing boats within 2 weeks, and how to use the Aomori-Hakodate tunnel for the movement of refugees and military reinforcements. There are many items which will require discussion with other ministries

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and agencies and local government bodies, such as designing bridges or harbors at the time of construction so that they can be easily demolished in an emergency to prevent their use by the enemy.

The colonel mentioned earlier says, "We would gladly answer questions if asked, but our views have never been sought. This is the reason for a lot of frustration." In addition to resenting being treated as children, most Self Defense Force members probably agree with Takeda in protesting against the view that military service is "involuntary servitude"; they feel that it is a noble calling.

Draftees Cannot Handle Modern Weaponry

The colonel believes, however, that "Takeda's true concern lies elsewhere." This refers to something he said twice during the interview--"Night is falling but the road is long." Right now, the feeling is growing among Self Defense Force officers that a situation of great danger for Japan's defense might occur before 1990. That is the collapse of the military balance between the United States and the Soviet Union. The colonel explains: "Takeda wanted to say that the danger is imminent. 'Night is falling' means that the danger is already close. 'The road is long' means that the defense system is not adequately prepared."

Other matters aside, there is one piece of evidence that this colonel's explanation about conscription is not an especially extravagant one among the Self Defense Force officers. It is a report put together by a colonel-grade officer at the end of last year. It was scheduled to be published in an intra-departmental study journal, but it was suddenly stopped by an order from above to "hold for a while." The significant thing about this report, apart from the content, is that it is the first time that a Self Defense Force member has directly dealt with the pros and cons of adopting a conscription system. According to the report, even from a purely military point of view, "voluntary soldiers are most appropriate in the composition of a military force using high level science and technology. As long as there is a policy of 'defense forces for defense alone', a large force is not necessary."

Military experts believe that fighting capacity is proportionate to double the number of soldiers. In other words, between armies of 100 and 200 soldiers there is a difference in fighting strength of 1 to 4. Therefore, the larger the army the better. This is the standard theory. So what is the meaning of the judgment that "a large force is not necessary"? We asked the author directly.

"We always have the image of the old Japanese army in our heads. The old army was originally organized as an expeditionary force. If we specialize in defense, we can exert many times the strength of the attacking side, so a smaller force is sufficient. This can be handled with volunteers. And furthermore, soldiers just cannot learn to use modern weapons effectively in a 2-year conscription period. Therefore, a conscription system would actually lead to a reduction in fighting strength. More important, isn't the priority to modernize our weaponry?"

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This argument is persuasive in a way. At the end of the Pacific War, many young men were mobilized for the purpose of dying to defend their country. This was to gain members for the Special Attack Corps characterized by "one man killing many." In a modern war this kind of foolish consumption of men is unthinkable.

In the view of the business world, conscription is not only taboo but a nuisance.

Just one year ago, the president of the Kansai Economic Association, Hosai Hyuga, made a hawkish statement at a Kansai financial seminar: "A study of a conscription system for emergencies is necessary." However, this statement not only drew fire from the public, it was even criticized by the defense industry and from within his own company, becoming a general scandal. "This statement might be permissible if there were a national consensus, but at present it is too sensational. It will only turn public opinion more against the industry." Mr Hyuga broached his argument for increasing defense capability again at the Kansai financial seminar held on 6 January and even referred to the Takeda statement. But he restrained himself firmly and did not refer to a conscription system.

According to Bonshi Morikawa, secretary of the Keidanren's Defense Industry Committee, "Before saying this or that about a conscription system, there are any number of things that can be done in application of the present system." For example, improvement of the Reserve Self Defense Force system that began in 1954, the first reserve. Although 29 years have passed since its inception, the regular number of reservists in the 1981 budget proposal was 42,000 men in the Land Self Defense Forces, and 600 in the Maritime Self Defense Forces. This is only 20 percent of a 260,000-man force. "Compared to foreign reserve percentages this is very small. With a monthly allowance of 3,000 yen and a daily allowance of only 4,700 yen when they are called up and participate in training, it's no wonder that there aren't many applicants. Building up the Self Defense Forces under the present system is a prior problem. Last year's Hyuga statement was far too reckless."

Business Sector Wants Increased R & D Expenses

Even if a conscription system goes into effect and the number of military men increases, it would not necessarily mean that the military-related industries would profit. The real situation is just the opposite. Unless there is a fantastic increase in the defense budget, an increase in personnel expenses would lead directly to a reduction in the amount of orders to industry.

At present about 50 percent of the Self Defense Force budget of 2.4 trillion yen goes to personnel and food expenses. The equipment expenses which go to industry are only 500 billion yen. During the war when there was close cooperation between the military and industry, the total tonnage of the combined fleet was one-fifth of the 7 million tons of raw steel produced annually. The present-day weapons production of 500 billion yen is not even 1 percent of total industrial production." This seems a little too innocent though.

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"There isn't anyone who wants to make a profit in defense production. 'For the country', we accept orders that are not even profitable. If there is any advantage, it is that in dealing with the government the work is regular."
(Morikawa)

Before the war the military and the zaibatsu (the great financial combines) were "the two wheels on the car" that carried our country to militarism. Now both the military and industry say they have doubts about conscription as such. And they give rather convincing reasons. However, in the future if the situation changes, it is not impossible that they will want to adopt a conscription system.

However, even if the "conscripting side" makes a decision, there will be a great obstacle if the "conscripted side" does not want conscription. About a year ago, the ASAHI SHIMBUNSHA did a national poll in which it was asked, "If Japan is attacked by a foreign country, would you fight?"

There were four multiple choice answers--"I would fight"; "I would flee"; "I would surrender"; and "I will decide when the time comes." Among men only, there were almost half, or 46.2 percent who said "I would fight"; 19.4 percent said, "I would surrender"; 13.4 percent said, "I will decide when the time comes"; 12.8 percent said, "I would flee." The problem is the morale of the young men who would be sent to the battlefield first if there were a draft.

This is actually very low. Looking at the results by age, of those who answered, "I would flee," the 25 to 29 age group was on top with 23.0 percent, and the 20 to 24 age group was next with 19.6 percent. There is a great difference compared to the age groups raised before or during the war, 7.3 percent of the 50 to 59 year age group and 8.8 percent of the age group of 60 and above. Of those who answered, "I would fight," the 20 to 24 and 25 to 29 age groups were both around 40 percent, about as low as elderly men of 60 and above.

Whether these young people can be forcibly dragged to the battlefield is the chief headache of the conscripting side.

"I believe it is absolutely impossible. In an effective conscription system we cannot allow any dropouts. This kind of absolute equality is a great prerequisite. If there is continual evasion of the draft, the system will collapse. There is a lot of criticism of "democratic education" in the 35 years since the war, but it has been consistent in not praising war and this has had a definite effect. It is no wonder that the right wing considers the Japan Teacher's Union as the enemy."

This statement was made by Hosaku Kikuchi, who has investigated the status of draft evasion since the war. According to Kikuchi, it took a long time for the conscription system to gain acceptance among the people of Japan even under that absolutist system. Peasant uprisings against conscription occurred right after the conscription order was promulgated in 1874. These "compulsory military service protests" are famous. In 1876, a publication called "How To Evade Conscription" was a best seller. It is not widely known that, following these instructions, there were a large number of legal draft evasions carried out by false adoptions and sale of domicile registrations.

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Prewar Draft Evasion Frequent

It is reported that the well-known Natsume Soseki transferred his domicile registration to Hokkaido, which was excluded from the conscription system, and succeeded in evading the draft. It is held that the same Soseki was a pun on the word "soseki" (meaning transfer of domicile). On the basis of such examples, Kikuchi says, "As long as freedom of speech is guaranteed, it is inevitable that how-to books on draft evasion will come out in abundance."

In 1886, conscription exemption regulations were sharply curtailed and reduced, and at the same time the people began to be heavily indoctrinated with the idea of the sacredness of the obligation to perform military service. A stiff penalty of at least 3 years in prison was meted out for evasion of conscription. Just the same, there was no end to evasions. Since it might be useful if by chance the conscription system is introduced again, we will explain some of the methods here.

The simplest way is to run away before being conscripted. According to the "Army Statistics Annual," there were 44,000 men in 1917 who "fled and could not be recruited because their whereabouts were unknown," and even in 1937 this number was 23,000 men. Most of them were hiding in places like coal mine construction camps. One can just imagine the painfulness of such a fugitive life in constant fear of the searching military police.

Conscription would not mean that all young men in their twenties would become soldiers. In peacetime only a portion of the first-grade conscripts will be subject to conscription. Therefore, at the time of the conscription examination, one only needs to produce some physical defect and be evaluated as second-grade or lower. Many things have been tried such as cutting off a finger, becoming near-sighted, taking a laxative to lose weight, drinking soy sauce to cause heart trouble, and wearing women's underwear to the inspection station and acting crazy.

However, even in that era, the rich and intelligent used smoother and shrewder methods. One is fleeing to a foreign country, going nominally as a student and then not returning. In 1944, the student deferment was abolished and students began to enter the service. But even then medical and science students were not conscripted. As reported in the 29 August issue of this magazine last year, Mr Nakagawa, Science and Technology Agency director and an LDP hawk on the extreme right, entered the Agricultural Department of Kyushu University just before the end of the war in 1945 and escaped conscription. Also, Mr M, a well-known hawkish commentator, stayed in the science department at Tokyo University during the war and as soon as the war was over he switched to humanities. This is generally the way things go in this world.

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MILITARY

JAPAN ARMS SOUGHT BY ASEAN NATIONS

Tokyo MAINICHI DAILY NEWS in English 8 Mar 81 p 2

[Text]

Some members of the Association of Southeast Asian Nations (ASEAN) have recently sounded out the Japanese government about the possibility of supplying them with arms or convertible all-purpose craft, government sources said Friday.

Indonesia wants Japan to supply it with high-speed patrol boats while Thailand hopes Japan can furnish it with automatic rifles, the sources said.

They added that the Japanese government, in line with its three principles banning arms exports and its "peace diplomacy" principle, had rejected these approaches.

The ASEAN countries' requests for arms were apparently motivated by political unrest created by anti-government guerrilla activities and by the increasing need to reinforce their security.

The Japanese government at present is in a dilemma, sandwiched between its "peace diplomacy" principle and the need to enhance Japan's diplomatic policy by contributing to the political stability of ASEAN countries.

Since requests for arms from ASEAN countries are anticipated to increase in the future, the Japanese government is likely to experience difficulty in dealing with such requests, the sources said.

According to the sources, requests for arms have been made on various occasions to ranking Japanese government officials when they visited ASEAN countries and to Japanese ambassadors stationed in those nations.

The requests of Indonesia and Thailand for arms are connected with ASEAN countries' requests that Japan should assume a more positive attitude toward military defense.

According to the government source, ASEAN countries are becoming more dissatisfied with Japan which, though it promised to contribute to the political stability of ASEAN countries, has treated the ASEAN countries' requests for arms rather coldly.

In the meantime, the Foreign Ministry has begun to study the problems of arms exports from the standpoint of disarmament and economic cooperation.

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MILITARY

NEC-AFFILIATE IN ROK REPORTEDLY PRODUCING MILITARY EQUIPMENT

Tokyo MAINICHI DAILY NEWS in English 2 Mar 81 p 1

[Text] **A leading Korean telecommunications and radio equipment manufacturer, Gold Star Electric Co. Ltd. of Seoul, an affiliate of Japan's leading telecommunications and electronics manufacturer Nippon Electric Co. (NEC) has been producing land mine detectors and military radio equipment, it was learned Saturday. This is the first time that Japanese capital has been involved in manufacturing "tools of war" abroad.**

Japanese corporations have been prohibited in principle by the three-point weapons export ban policy of the Japanese government to make any capital investment for engaging in weapons manufacturing abroad or to make any capital investment in foreign enterprises engaging in manufacturing weapons and the like.

Embarrassed at the disclosure, the pertinent Japanese government agencies started their own investigations.

According to NEC, Gold Star Electric started preparations for the production of land mine detectors around 1975 and started production about two years later. The Korean manufacturer made deliveries of these in 1977 and the following year.

NEC, however, did not disclose the production volume and capabilities of the Gold Star-made mine detectors and military radio equipment.

The Korean Business Directory, published by the Korea Chamber of Commerce and Industry (KCCI), refers to the Gold Star products as metal and nonmetal mine detectors and various radio equipment.

NEC is a leading Japanese telecommunications and electronic apparatus manufacturer, and is a ranking manufacturer of defense-related equipment. The company delivered the BADGE (Base Air Defense Ground Environment) system to the Defense Agency.

When Gold Star Electric Co. was established in 1970, NEC concluded a technical licensing contract with the Seoul-based company on the transmission equipment necessary to establish intercity telephone networks. In 1974 NEC made a 20 percent capital investment in the Korean company and has three officers on the board of directors.

NEC stressed that its capital participation has been strictly

intended for civilian purposes and that licensed technologies could not be converted for military purposes.

An NEC executive explained the circumstances that although NEC has a 20 percent interest in Gold Star Electric Co., NEC is not responsible for the overall operations of the Korean company and its responsibility is limited to the scope of its business ties.

NEC does not have any interest in manufacturing land mine detectors and military radio equipment, the executive continued.

Gold Star Electric, in reply to inquiries from NEC, said that the company has made no delivery of such products since 1979 and will not engage in new production of these items hereafter. The reply added that the company will continue to replace the already delivered products only when these break down and will eliminate these products from its product catalogues.

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Weapons exports from Japan have been strictly restricted by the arms export ban and the export control ordinance. The Japanese Foreign Exchange Control Law restricts capital investments in overseas enterprises manufacturing weaponry designated by the ordinance.

But these Japanese restrictions could be circumscribed as evidenced by this case in which the Korean company started the production of military equipment after NECHad made the investment.

The Ministry of International Trade and Industry's Aircraft and Ordinance Division commented on the case that the land mine detectors could be classified as proper military equipment but that does not necessarily make these unequivocally combat equipment. The division said it has yet to make its interpretation on this case.

As to the radio equipment, the division added that these could not be recognized as weapons since the military radio equipment could also be used for civilian purposes.

Gold Star Electric Co. is a member company of Korea's leading industrial group, the Lucky Group. The company employs about 3,000 workers and produces such equipment as UHF, VHF mobile stations and microwave apparatus.

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MILITARY

NEW TYPE-88 MITSUBISHI TANK BEING DEVELOPED FOR GSDF

Tokyo MAINICHI DAILY NEWS in English 3 Mar 81 p 5

[Text]

A Japan's next-generation battle tank, dubbed type-88, will undertake test runs from April, according to Mitsubishi Heavy Industries Co., a contractor for the 500-million-yen tank.

The company said it has already completed trial production of engine and gun turrets for the improved model tank. Around late March, these products will be delivered to the Ground Self-Defense Forces (GSDF) for checking under field conditions.

The Defense Agency hopes the type-88 tank will be deployed in 1988, replacing the type-74 model presently in use.

Detailed performance data for the next mainstay tank is unknown. But industrial sources said the type-88 tank would markedly surpass the current type in terms of fire and mobile power as well as in the strength of armor. They rated the new model as one of the most sophisticated tanks in the world.

The type-88 tank will have a special 1,500-horsepower water-cooled 10 cylinder engine. The current type-74 has an 870-horsepower air-cooled 10-cylinder engine.

The engine capacity of the future tank is equal to that of West Germany's Leopard tank believed to be the world's most advanced tank.

In addition, the type-88 model is planned to be capable of running at a speed 20 to 30 percent faster than the type-74, whose top speed is 53 k/h.

As to firepower, the type-88 model will be mounted with a 120-mm barrel controlled by far more precise electronic equipment than the type-74 that has a 105-mm barrel.

The Mitsubishi company has independently developed type-61 and type-74 tanks, with studies for the latest model under way since 1972. It says the GSDF will buy a total of about 560 type-88 tanks, worth 300 billion yen.

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ECONOMIC

TRADERS FORECAST INCREASE IN EXPORTS

Tokyo THE DAILY YOMIURI in English 11 Mar 81 p 4

[Text]

Major Japanese traders expect their exports will rise 15 to 16 percent and imports 10 to 17 percent in fiscal 1981, in yen terms on a customs clearance basis, a government survey showed Monday.

The trading houses also forecast Japan's trade surplus will be between \$7.5 billion to \$13 billion on an IMF basis, in which both exports and imports are calculated on a free-on-board basis.

Japan had a \$2,076 million surplus on this basis in calendar 1980.

These findings were obtained in the survey conducted mid-February by the Economic Planning Agency (EPA), covering 33 Japanese corporations, including nine major trading houses.

The report said most of the 33 corporations foresee export prices of auto, steel, machinery and electric appliances will record remarkable increases along with import prices of crude oil, grain, coal and oil products.

As for dollar-yen rate, many of them forecast the dollar will continue climbing against the yen during the latter half of fiscal 1981 after fluctuating in a ¥190-215 range in the first half.

Some of them forecast the central trading rate at ¥200, while others predict ¥215 for the latter half, it said.

The survey showed the uptrend in exports, in yen on a customs clearance basis, will slow on the year-to-year comparison in the April-June period.

A 6.3 percent rise was projected for the first quarter of fiscal 1981 and a 6.8 percent gain for the second quarter, after scoring an estimated 14.3 percent jump in the January-March period.

EPA officials said the prospective slowdown was influenced by trade frictions over autos and other fast-growing export items.

Seasonally-adjusted figures indicate a steadiness in exports, showing a 3.0 percent fall in the first quarter compared with the previous three months but a 4 percent rise for the second quarter.

Exports are estimated to rise 7.1 percent in the January-March period over the preceding quarter.

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JAPAN SHOULD USE ECONOMIC POWER FOR POLITICAL OBJECTIVES

Tokyo THE JAPAN ECONOMIC JOURNAL in English 3 Mar 81 p 20

[Text]

Japan's postwar diplomacy has often been ridiculed as "traders' diplomacy" or "transistor salesman's diplomacy." There is no denying the fact that Japan's postwar diplomacy has been "the diplomacy of the economy, by the economy and for the economy" with the nation's basic strategy lying in clear separation of politics, economics and culture.

Herman Kahn once commented that Japan was trying to become a winning Olympic swimmer without getting wet — without getting involved in the hard facts of international politics.

Looking back, one finds that the Cold War years were a period of universal linkage (in the words of Stanley Hoffmann) when everything from economy to culture, was eventually politicized on the basis of the ideological rivalry between the East and the West.

Even in this period, Japan succeeded in minimizing the encroachment of ideologies and politics into other fields by adamantly sticking to its policy of separation of politics and economy. The biggest symbol of success of this policy was the reasonable expansion of Japan's trade with China even before the resumption of the two nations' formal diplomatic ties.

A serious test

The Japanese way, however, was subjected to a serious test by the drastic changes in the international situation brought about by the first oil crisis, which hit the world in October, 1973. Japan was confronted with the dire possibility that the central postwar values — economic prosperity and improvement of public welfare — would instantly collapse because of serious disruptions in stabilized supply of energies and natural resources even in peacetime. Japan was rudely jolted awake to the existence of a completely different world where the "all-directional diplomacy" and the "policy of separation of politics and the economy" are utterly powerless. Brandishing oil as their weapon, the Arabs forced Japan to choose sides between them and the Israelis.

The dramatic rise of the Islamic fundamentalism preached by Ayatollah Khomeini in Iran has come to rub Japan's nose in yet another different world where politics, the economy and culture are inseparably intermingled.

The conclusion of Japan-China Treaty of Peace and Friendship in August, 1978 with its anti-hegemony clause also has forced Tokyo to face up to another cold reality of tough international politics. Regardless of the Japanese Government's wishful thinking, Moscow viewed this treaty as a sign of closer cooperative relations and possibly the beginning of military arrangements among Japan, the United States and China. In response, the Soviet Union has greatly strengthened its military buildup in the Far East. Japan should have foreseen such a development at the time it signed the peace treaty with Peking; it is too late now for the parties concerned to try to fan up the sense of fear among the average Japanese about the Russians.

Japan has ever since made frequent diplomatic bunglings and has committed many miscalculations on the international scene. It, for example, got widely accused of the lateness and inauspicious timing of its sanctions against the Soviet Union following the latter's military intervention in Afghanistan. The Mitsui group's construction plan of a major petrochemical complex in Iran, on the other hand, has bogged down in an apparently bottomless quagmire. The

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nation's enthusiastic rapprochement with China also is now rapidly cooling off. The Japanese Government, moreover, is under intense pressure from the United States to bolster its military preparedness. In other words, Japan's diplomacy of the economy, by the economy and for the economy is now facing the toughest test of its existence with the arrival of the turbulent 1980s.

First of all, Japan is strongly required to make a thorough review of its "diplomacy for the economy." Japan's economy-oriented diplomacy so far has not only been a means to an objective but also an objective in itself. As was clearly announced in the Japanese Government's first "blue book" on diplomacy published in 1957, "peaceful advances into foreign countries" have been given a supreme legitimacy in Japan as a national credo replacing the militaristic adventurism of the prewar days.

Clash with the West

This Japanese-style diplomacy, however, has been destined to clash with the Western peoples' sense of international justice upholding a firm order of things based on mutual acceptance of respective interests and values among nations. Free international competition is liable to be viewed as market-disrupting actions if they are pushed to the extreme extent where the very basis of Western workers' life style (precedence of home, leisure and cultural activities over work) is threatened. Japan is now required, first of all, to restructure its political objectives and to use its economic power to obtain them.

The second problem is whether Japan is correct in continuously pursuing the diplomacy of the economy. Japan's postwar "economic diplomacy" owes its spectacular success to the fact that it has been deeply rooted in the nation's time-honored tradition and has been one form of its flowering. Japan's extraordinary export capacity clearly reflects the Japanese people's penchant for self-sufficiency in everything — the penchant which is often referred to as "one-package" mentality. This mentality has been carried over, almost unaltered, from the time of the nation's physiocratic stage to the present age of strong emphasis on industry.

With the sole exception of some high technology industries, such as aircraft, computers and atomic power equipment, Japan has always tried to foster every industry from the highest upstream area down to the lowest downstream sectors. This fact has been one of the most serious causes of Japan's economic frictions with other countries.

The third problem is that Japan's policy of separating economy from politics has inevitably led to international exchanges not based on words but on commodities. The Japanese people are just as firmly convinced of the uniqueness of their own culture as all other peoples of the world. The Japanese, however, differ from other peoples in their strangely adamant belief that their culture lacks universality; that other peoples can never understand it.

A silent salesman

Because of this belief, the Japanese people have never paid half as much attention to propagating and popularizing their own culture as they have done to improve and promote their automobiles, TV sets and cameras. The Japanese people, in other words, have devoted themselves to their self-

imposed role of a silent salesman.

It is true that high quality and reasonably-priced commodities are by far the most powerful messages of the modern world — more powerful even than religions and ideologies in universality and easy currency. If such messages are not accompanied by basic cultural and political objectives of "what for," however, they always run the risk of reviving the image of Japan as the sneak attacker of the Pearl Harbor — the image of men and commodities making sudden and torrential advances into other countries without any warnings. If the Japanese people do not seriously reflect upon this point, they are liable to forever remain inscrutable and unreasonably aggressive in the eyes of the Western peoples.

Japan is now urgently required to restructure its ways of life toward political objectives, trying to attain them through the use of its abundant economic power and on the basis of its wide-ranging cultural backgrounds.

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MITI: JAPAN'S BUSINESS PERSUADER

Tokyo THE DAILY YOMIURI in English 9 Mar 81 p 5

[Text]

"MITI" (the Ministry of International Trade and Industry) has become synonymous abroad with Japan's "engineering machinery" setting its extraordinarily high pace of economic growth since World War II.

As foreign governments grope for the best ways of revitalizing their national economies, the Japanese ministry figures prominently with the debate centering on how far they can go in steering business and industry in the right direction.

The following article from *The Economist* describes MITI as continuing to play a key role in such fields as research and development projects being jointly carried out by government and business, organizational streamlining and in particular, in creating the people's consensus on major economic policies.

How much of Japan's victory in its trade war against Western Europe and North America is owed to government? A smaller proportion of gross national product is spent by the public sector than in any other big industrial country.

Japanese cars, television sets, audio gadgets, machine tools, microchips and much else are selling fast in Western markets because they are intelligently designed, well made, reliable and cheap. Thoughtful managers and energetic workers, living together in a tightly ordered society, are responsible for most of the success. But for Japanese industry the government is a powerful friend.

Industrial Policies

Not even the Japanese can agree on the importance of the country's industrial policies, or on how well they work. "Japan Inc"—once the catchphrase for the close relationship between the Ministry of International Trade and Industry (MITI) and private companies—is out of fashion.

Anyway, MITI's powers are on the wane, say many Japanese. Westerners still cannot make up their minds whether Japan is a planned economy, or an inscrutable version of liberal economies like West Germany and the US.

'Must Overtake West'

No single slogan suffices. For one thing, government-industry relations in Japan are changing fast. For another, they vary vastly from industry to industry. That said, two generalizations stand out:

- Japanese officials, as well as the corps of business elite, are still committed to the original aim of the Meiji Restoration of the 1860s—that Japan must catch up with, and overtake, the industrial prowess of Western nations.

- Mandarins' guidance remains especially important to Japanese industry, no matter how relations between government and private firms are interpreted. The government has bullied and bribed old industries out of existence; encouraged new ones to take their place.

Japan's own statistics usually proclaim that the government spends only just over 20 percent of the country's GNP (of more than \$1,000 billion in 1979). But if you add in the funds channelled into the public sector through a separate account financed by national insurance and postal savings (some of which helps to pay for more than 100 publicly-owned corporations like the railways, the Japan Development Bank and a computer leasing company), OECD figures suggest that the public sector's share of GNP is around 29 percent, on the same conservative definition whereby the US' is 32 percent, Britain's 40 percent. The US spends 6 percent of its GDP on defense, civilian government spending is now probably

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higher in Japan than in the US.

Gentle Push

Until the 1970s, MITI and other ministries used legal powers—eg, licensing, foreign exchange controls, etc.—as levers over industry. Companies protected from foreign competition by tariffs and investment bans, and relying on loans from government-influenced banks, learned to respond smartly to official dictates.

These powers have now mostly been dismantled. Nowadays, successful industries (eg, motor manufacturing) finance most of their own investment. Gone are many of the guided loans and tax breaks that gave the government planners influence over them. In the process, relations between industry and government have become more subtle and pragmatic.

MITI needs neither ideology nor extensive legal powers to intervene. Officials and businessmen wholeheartedly agree that Japanese companies should prosper. Industry often follows MITI's lead without a single company out of step, thanks to the conformist instincts of Japanese business.

MITI gets most of its ideas on policy from industry itself. And, most important, MITI and industry can egg each other on free from the interference of meddling politicians.

Persuasion—aimed at, say reducing exports, shutting capacity or investing in new technology—is mainly done through what officials call "administrative guidance."

National Consensus

Administrative guidance is effective once MITI's ideas also become industry's. Quite how this happens often puzzles Westerners. In reaching a national consensus, Japanese industrialists are as motivated by a desire to conform as much as by the common interest they share with the government.

Companies and their workers in many industries (particularly the older and less entrepreneurial ones) are conscious of their place and status among competitors, much like members of a family. They want to be liked and to avoid offense. This makes competing firms more willing to conform to new rules—say, that all should cut capacity.

The readiness of firms to absorb new ideas worked out between government officials and industry representatives is far more important to Japan's success than the fact that the most influential MITI officials retire to become senior executives of big companies between the ages of 45 and 55. Retired officials may, in fact, make it easier for companies to dig in their heels against MITI.

A former bureaucratic superior turned business executive can inhibit young men from the ministry. One popular haven for superannuated officials in Japan is the oil industry. That is where MITI has had the most trouble imposing its will.

Common ambitions, close contacts, conformity and the weakness of politicians all make it easier for industrial policies to take hold in Japan than in Western Europe or the US. This does not mean that all policies are well thought out. Nor does it guarantee that they will work.

But, on the whole, industry has benefited because the mandarins (unlike politicians) are keen on fostering efficiency in tomorrow's industries, rather than on saving yesterday's jobs.

Dying Industries

Over the past two years, MITI (plus the Transport Ministry) has coordinated big cuts in energy-hungry and bloated industries. Those suffering the biggest cutbacks in capacity include aluminium smelting (32 percent), urea production (45 percent) and, of course, shipbuilding (35 percent).

For shipbuilding, officials and industry bosses decided together which shipyards should be shut. By March, 1980, a third of Japan's shipbuilding industry had been closed down and new capacity frozen until mid-1983.

Picking Winners

Apart from the now largely abandoned protective barriers (behind which Japan's infant industries grew into mighty adults), MITI has given industries a leg-up by joint research, development and marketing schemes. Two recent initiatives have been in aircraft and robots.

MITI has often been unable to force mergers which it wanted but businessmen did not. Despite its success in organizing research and marketing in computers, MITI failed to persuade the computer firms to merge into a monolith really "capable of competing with IBM."

One of MITI's biggest merger coups was Nippon Steel, formed from two wings of one prewar company; critics say that the merger slowed the advance of productivity in steel.

Trade Wars

Japan's trading strength has left the government with the disconcerting task of restraining exports. Companies dislike it. MITI often gets nowhere until a row has provoked everyone—from the prime minister down—to criticize the industry guilty of being an overachiever.

But MITI can rely on a consensus if things get rough. Companies rarely stand out against the crowd, even though defiance may cost them nothing.

Recently MITI has had trouble getting the motor industry to listen to pleas for restraint. Competition among car makers at home is uninhibited. Last year MITI broadcast a warning, hoping to get manufacturers to show some restraint in exporting cars to the US.

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"They'll hear it once they are persuaded they should," says one top motor official. Even so, MITI is slowly succeeding in shaping motor industry policy—by, for example, getting manufacturers to set up assembly plants in some of their more import-sensitive foreign markets.

Technology

Official encouragement of new technology has a high priority. MITI has put seed money into research projects and is trying to start a craze for new research.

Research into microchips for computers is rated one of MITI's biggest successes. It is being used as the pattern for future government

intervention in research.

By March, 1980, following four years of joint research by five leading electronics companies, Japanese firms were producing the most advanced memory chips (256 kilobits) on machines rivalling the best of US technology. About a third of the project's cost was paid for by the government.

At first, computer manufacturers were reluctant to cooperate so closely on applied research. But they all feared IBM—and they all needed the extra research cash.

Another Plan

MITI now has a similar plan for optical communications technology. Sceptics think this will work less smoothly, because it is less urgent. But a steady drone about the importance of optical communications can already be heard at MITI, in the steel and transport industries and in the newspapers, too.

Another Japanese industrial consensus is in the making.

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SCIENCE AND TECHNOLOGY

STATUS OF NEW TECHNOLOGY IN 1981 HIGHLIGHTED

Tokyo NIHON KEIZAI SHIMBUN in Japanese 4-10, 12 Jan 81

[4 Jan 81, p 3]

[Text] "Every enterprise in the pharmaceutical industry is involved in a treasure hunt," observed one corporate executive in charge of research and development. Biotechnology, principally in the area of rearranging genes, has advanced rapidly in the past few years. Insulin and interferon produced under such a process are, in the hands of Western pharmaceutical manufacturers, already in the clinical testing stage, which is one step prior to commercialization. The Japanese manufacturers, in pursuit of their Western counterparts, are competing among themselves to create, also through gene manipulating technology, as yet "undiscovered drugs" no manufacturer in the world has ever undertaken. A treasure hunt for a post-interferon prize has thus involved Japanese corporations and has begun to take on an international scale.

Secrecy Is Top Priority

"Recently, [Genentech?] and other companies specializing in genetic engineering, as well as major Western chemical and pharmaceutical corporations that lie behind them, have been visiting us frequently," (said one executive of a pharmaceutical concern). The Western enterprises that have outstripped Japan in the production of interferon through the gene rearrangement process are now trying hard to sell their technology in Japan.

In Japan, Toray Industries, for example, is conducting research on mass production of interferon, not by rearranging genes but by utilizing a "cell mass-culture technique" which aims at increased production of cells by culturing them under laboratory conditions. The present view, however, strongly favors gene rearrangement as the key to mass production of interferon. If so, the Japanese enterprises must rely on importation of Western technology.

But it is said that the world's major chemical and pharmaceutical enterprises, including Japan's leading enterprises, have already mastered the overall technology of gene rearrangement. The issue now is what to produce with this advanced basic technology. It is said that the Japanese corporations, although they lag behind the West in interferon, could catch up where development of new drugs in the future is concerned.

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The largest chemical company in Japan, Mitsubishi Chemical Industries, plans to merchandise as drugs two kinds of new physiologically active substances produced through the application of gene rearranging technology. The causes of various human diseases are being determined by advances made in "life science." The existence of not only interferon but also of "substances which destroy pathogenic bacteria" produced by the human body has gradually become clear. If these substances can be mass-produced by gene rearranging technology, they can be used as drugs. "In 5 or 6 years, we may be able to merchandise new drugs," says Mitsubishi Chemical.

There are those who stress secrecy in strategy, saying: "Specifically what we will produce is absolutely confidential. If others surpass us, there goes our business." As in the case of interferon, which is receiving a great deal of publicity as a new miracle drug, it is said that once it becomes possible to mass-produce a drug by gene technology, two or three suppliers can meet demand worldwide. Because of this, maintaining secrecy is a must.

Contribution to Cost Reduction

Mass production of drugs such as interferon through gene rearranging technology begins by extracting from the human body cells which produce the desired substance. Next, a portion of the genes of the cell which contains the information that produces the substance is resected. If that portion is then buried in bacteria such as colon bacilli or yeast fungi which multiply like rats, then as much as needed of the desired substance can be produced. Although the entire process appears simple, it requires tremendous time and labor to find the desired portions from the genes and cultivate them. This is precisely why once a company succeeds in doing this it can take a huge lead over its competitors.

Biotechnology also contributes a great deal to cost reduction for pharmaceutical makers. For the first time in Japan, in 2 years Mochida Pharmaceutical Co Ltd plans to merchandise a drug for pregnancy diagnosis and other uses by using the "cell fusion" technique. The raw material for the diagnosis drug, which can detect minute quantities of hormone discharged in blood or urine, is a special "antibody." The key to this technique lies in uniting the antibody-producing cells of an experimental rat with the cells of a rat which has a certain type of cancer. In such a union the number of cells would be increased during cultivation. In comparison with the conventional method of extracting antibodies from rabbit serum, the cost is said to be reduced to less than one-tenth, since the labor and time of feeding the rabbits are eliminated.

Mitsubishi Petrochemical Company has succeeded in mass production of enzymes used for testing the effectiveness of new drugs by using the gene rearranging technology on colon bacilli. In order that new drugs can be put to actual use, prior to animal experiments or clinical experiments using patients there is the task of selecting a substance that holds promise as a drug from among thousands of candidates. This task involves duplicating in a test tube a reaction similar to that of a living organism. Previously this task involved a laborious procedure of collecting enzymes that are secreted in small quantities in hundreds of domesticated animals. But now, thanks to this success, any amount of enzymes can be obtained easily. "This is not a technology that directly produces 'fine

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chemicals' for pharmaceuticals, but it is significant as a technology that helps in such development." (Yojin Ota, managing director, Mitsubishi Petrochemical Co Ltd)

Aside from the pharmaceuticals, the application of biotechnology is wide. One of its most promising areas of application is in the manufacture of ethyl alcohol, which is drawing attention as a raw material for an oil alternative. "Its practical use will be realized sufficiently in 2 or 3 years." (Hiroshi Samejima, director, Kyowa Hakko Kogyo Co Ltd) The technology used here is called "bacillus fixation." A common fermentation method used thus far has been to boil the yeast in a large container. In the new method, yeast fungi are locked inside agar-like high molecular [compounds?] and are kept alive as long as possible under fixed conditions so that they will produce alcohol continuously.

The characteristic of this new method is that alcohol fermenting facilities can be built in a limited space inexpensively. It does not appear beneficial for Japanese corporations with already depreciated equipment expenses to employ this technology by scrapping their present facilities, but "it will be good news for the developing nations which hope to produce fuel alcohol by using biomass resources such as vegetation." (Mr Samejima) The major trading firms in Japan have realized this and are already beginning to seek a role as intermediary between various countries and the manufacturer.

Technical Information Exchange

As in the example of Ajinomoto's attempt to produce amino acid more efficiently through the gene rearranging technology, biotechnology is not limited to production of expensive pharmaceuticals, but has begun to permeate slowly into areas where products are handled at kilograms per unit price. Under these circumstances, starting in the spring of 1981 Mitsubishi Chemical Industries and Monsanto (headquartered in St Louis), a major U.S. chemical maker, will hold regular annual conferences to exchange technological information on research and development, including the area of life science. As seen by this example, a movement toward cooperation between enterprises in the development of biotechnology has started. There is strong awareness among corporate executives that even a large corporation might be left behind in the cut-throat competition for development of biotechnology if they sit idle.

But in biotechnology, a single step in the wrong direction will lead to mass production of harmful substances such as those classified as "bacteriological weapons." For the time being those involved in biotechnology all say: "It is absolutely safe since we are working in laboratories that meet certain requirements, such as being completely shut off from the outside world and using colon bacilli whose life is weak." However, there may be a blindspot somewhere along the line if they neglect to build a social consensus for their work; the general public in Japan may react against developments in biotechnology as they once did against petroleum (micro-organism) protein. Those involved are not without headaches in this account.

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[5 Jan 81, p 7]

[Text] A cubic puzzle called "rubic cube" created a boom last year. The new extremely popular superlarge computers will be reduced to the size of the rubic cube in the 1980's. We are talking about a model of the "[Josephson?] computer" designed by Dr W. [Anacker?] of the IBM Watson Research Institute (Yorktown Heights, New York) in the U.S.A.; the computer, a model of which will be completed in the near future, will fit into a cube of only 10 cubic cm.

Technological Computation of Immense Magnitude Possible

In comparison with the Japanese superlarge computers in use now, the Josephson computer is expected to process 25 times faster and possess the incredible ability to handle 250 million orders per second. The main body consumes only 10 watts--20 watts if the cooling device is included; it therefore operates at half the power of Japanese computers. This is because it is built of energy-saving super-performance Josephson [joining?] elements.

IBM has successively developed logic and memory elements using the Josephson joining elements. By 1985 it plans to test a Josephson computer the size of a miniature computer and by the end of the 1980's. In contrast, the Agency for Industrial Science and Technology in Japan will start a large-scale project, the "Super Computer Research and Development" (high speed computer system for science and engineering purposes). The project will begin in 1981 and continue 8 years with a total investment of 31 billion yen. The agency's Electrotechnical Laboratory and the Japanese computer makers will probably join forces in the project.

Using super high-speed elements, the "supercomputer" will attempt to achieve a processing speed of 10 billion orders per second, a performance which is 1,000 times faster than the present superlarge computer. For the super-high-speed elements, which constitute the heart of the computer, Josephson joining elements, high electronic moving transistors, and gallium-arsenic electric field effective transistors are considered hopeful candidates. As for the Josephson joining elements, last year Hitachi Ltd, Fujitsu Ltd, Nippon Electric Co, and Mitsubishi Electric Corp started on a joint development under a government subsidy designed to promote development of unexplored new technology; the Institute of Physical and Chemical Research is also doing research on the Josephson elements. The high electronic moving transistors were developed by Fujitsu last year. The gallium-arsenic electric field effective transistors have shown excellent test results at the Musashino Electric Communication Research Center of the Nippon Telegraph and Telephone Public Corp and at the Electrotechnical Laboratory; they have been evaluated as superior to any transistors in terms of international standards.

The reason why a "supercomputer" 1,000 times faster than existing superlarge models is needed is because the present multipurpose computers are almost useless for the enormous engineering computations required by scientists. For example, in the design of an earthquake-proof skyscraper, vibration is analyzed by shaking a model of the building, which is a long stick skewered with balls whose weights correspond to the respective weights of the floors.

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The actual building is not one-dimensional but three-dimensional; when it comes to analyzing a complex three-dimensional structure, today's large-scale computer cannot fish the calculation even if it takes a hundred years. Anyone interested in increasing computer speed wishes: "If only the speed of light (i.e. limit of the speed of electrons) were one digit faster."

The question of speed is not limited to earthquake-proof designs. The present superlarge model cannot handle the data from nuclear reactor accidents and experiments in nuclear fusion, or analyze instantly the video data transmitted by resources exploring satellites. Weather forecasts, earthquake predictions, forecasts of socioeconomic phenomena, etc will all become far more precise with the "supercomputer."

Active Participation for the "Next Generation"

Parallel with the "supercomputer," a 10-year research and development for a 5th generation computer will begin in 1981, with MITI playing the central role. The computer elements have advanced step by step from vacuum tubes, transistors, and integrated circuits to the super LSI; the plan aims at a new generation that is two generations beyond the present one. The elements of such computers will most likely be those found in the "supercomputer," i.e. Josephson joining elements; their design ideology, however, will change radically from that of the existing multipurpose computers.

This computer will have "eyes," "ears," and a "mouth" so that direct input and output of sounds, writing, diagrams, photographs and images will become possible; it will also be able to understand the spoken word and translate. In addition, there will be no need for complex programming and it will repair itself when it breaks down. Furthermore, it will be equipped with the ability to make associations, draw inferences, and learn; it will be a computer which most closely resembles the human brain. Japanese computer makers along with governments, industries, and research institutes of Europe and America will participate in this project; a study is now underway to determine a Japan-U.S.-Europe joint development.

Before the "supercomputer" and the fifth generation computers can be realized, the 1980's will be the age of super LSI's. With the introduction of the super LSI, where the limits of silicon semiconductor technology were exhausted, microcomputers made their appearance, so that one small piece the size of a fingertip can now perform the task of a large computer of a generation ago. As far as microcomputers are concerned, it is said that there is no longer any gap between Japan and the United States.

Microcomputers are permeating every aspect of society: information, "mechatronics," energy, home life, medicine, education and government. In addition to microcomputers, the area of application of super LSI technology is successively expanding.

For instance, a series of new elements have already been put to practical use in such products as magnetic bubble memory, solid [image] pickup elements, semiconductor laser, amorphous silicon solar battery, etc. Having caught up with the United States in the super LSI, Japan must now develop new elements independently. A breakthrough will come in the form of a group of "new function elements" which

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will be taken up under the "System To Research and Develop Industrial Basic Technology for the Next Generation," beginning in 1981. The system will invest 31 billion yen over a period of 10 years to develop: 1) biochemical detecting elements capable of detecting odor and taste; 2) supergrid elements which emit super-high-frequency waves and a visible optical laser; 3) three-dimensional circuit elements which multiply and integrate elements three-dimensionally; and 4) "environmentally strong" elements which perform stably in radioactive rays, vibration and shock.

Kuraray Co Ltd has already shown interest in biochemical elements, and Tokyo Shibaura Electric Co Ltd has the basic technology for "environmentally strong" elements. It is expected, however, that in addition to electronics makers, makers of parts and others from nonelectronics fields will participate actively in the research and development of these "new function elements."

Elements to Coexist and Coprosper

Overseas inquiries about 100 percent Japanese high-speed elements are pouring in. For example, inquiries about electrostatic induction transistors invented by Professor Junichi Nishizawa of Electrocommunications Research Institute, Tohoku University, have been coming in from the Lincoln Research Institute at MIT, which has generous U.S. Government support, and from the Microfabrication Research Institute at Cornell University.

In order to develop "perfect crystal elements" by improving the (high) speed and power consumption of the electrostatic induction transistors, the Science and Technology Agency plans to adopt the development of such elements as one of the themes for its "creative science technology promotion projects" that will begin in 1981 and continue for 5 years.

In the "revolution of elements" thus far, the super LSI has played the lead. Soon, from the latter half of the 1980's to the beginning of the 1990's, high-speed elements such as "perfect crystal elements," super-high-speed elements such as Josephson joining elements, and a group of new function elements will appear. The "new frontier" created by these elements will expand, depending on social needs, and holds possibilities beyond our imagination. The relationship between these new elements will be not that of one element substituting for another, but that of coexistence and coprosperity, as, for example, the super LSI can be used in automobiles, the Josephson joining elements and other super-high-speed elements in jets and rockets. If this is the case, since any one of these elements has almost infinite applicability, each one will grow independently as a fundamental industry of its own and simultaneously have a tremendous influence on other industries.

[6 Jan 81, p 6]

[Text] It has been exactly 10 years since the "MICON" (microcomputer) appeared. Its special characteristics, such as its extremely small size, low cost, and function as a "substitute for intelligence," have limitless fields of application. When installed in home electric appliances such as microwave ovens and

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washing machines, it turned them into machines which require minimal human attention; functioning as a brain of machinery and equipment at production sites, it has also become responsible for "plant revolution." According to R. Noyce, vice chairman of the U.S. Intel Corp and developer of microcomputers, "Microcomputers can be applied to 25,000 items." If this is the case, it may be faster to look for areas where microcomputers are not in use.

"The 1970's was the age of application of microcomputers. In the 1980's, microcomputers will permeate throughout the nation, its social systems, culture and individual lives, and thereby radically change the heretofore preconceived ideas," said Prof Ryoichi Mori of Tsukuba University 10 years ago, predicting today's flourishing of microcomputers. "Technopolis" is the "city of the future" which MITI is promoting extensively. MITI's aim is to realize a series of "technosocieties" throughout Japan in the 1990's, within each of which there would be advanced technology industries and research institutes for semiconductors and computers, research organs such as universities, and an environment suitable for living, that is, a harmony between industry, learning and living. Here again, the microcomputer is expected to display its versatility. In short, it is an experiment for the purpose of forming "microelectronics."

Information Exchange on Television

First of all, there is a "television revolution." The major responsibility will come from the multichannel, two-way CATV (cable TV) with which every home will be equipped as part of a home information network. This television has 100 channels. In Japan, Tokyo has the largest number, seven. Some may say: "What is the sense of having so many?" But the question is not one of numbers only. This is a set fully loaded with video information and capable of playing multiple roles. In addition, since it is equipped with a two-way system which enables communication between the broadcast stations and homes, the viewer can participate in programs from his own living room simply by operating the terminal device to transmit and receive.

In this system, the flow of information is not one-directional so that the viewer, too, can supply information. In addition to programs classified under such subject categories as news, sports, movies and variety shows, the viewer can read the newspaper on the screen and, by operating the terminal, purchase goods, make airline reservations, and pay bills through banks. It will be the start of the "electronic shopping age." An "electronic voting system" which collects voters opinions directly is not a dream either.

There are experiments to be conducted in the area of "doing without oil," such as a public transportation system based on electric vehicles and introduction of a solar system. Electric vehicles would, of course, be "MICON cars." Naturally, microcomputers would control the engine and prevent accidents; the passenger would simply insert his personal card into a slot in a "display" and push the button indicating his destination; the computer would show him the closest and least congested way to his destination and the vehicle would carry him there.

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All aspects of home life in the "technosociety" will be taken care of by micro-computers. The home computer, connected to information lines, will control all the basic needs of pleasant living by preventing home accidents and burglary, saving energy, providing household information, and planning vacations. Home appliances with built-in MICONs are merely extensions of the "home computer." Children would stay home from school for 2 or 3 days a week and would take lessons through television. Some businessmen and women would work at home, staying in touch with an office by television and microcomputer.

Information Transmitted by Optical Communications

The picture of such a future technosociety contains aspects which are all in the forefront of the "MICON revolution" and for which experiments and development are currently underway.

Higashi Ikoma New Town is located at the foot of Mt Ikoma in Nara Prefecture; there, a large-scale CATV experiment which is said to be the most advanced in the world is being conducted using optical fibers. The system sponsored by the MITI and Ministry of Posts and Telecommunications is called Hi-OVIS (High Two-Way Video Information System) and broadcasts local information such as shopping information to about 150 households. Optical communication does not use wires or electric waves, but is capable of transmitting the equivalent of 5,000 telephone circuits at a time. This has already been put to use in this town. This Hi-OVIS system will be shown at the "Kobe Port Island Expo (Port Pier '81)" which will open in Kobe in March this year; two-way CATV experiments will be conducted between exhibit halls.

Hotel New Otani in Tokyo is equipped with a two-way CATV developed by Pioneer; the system connects the broadcast center in the hotel with all the guestrooms by cable and provides "program request services" through terminal devices. An experiment in video information service called the "CAPTAIN" is being conducted by the Ministry of Posts and Telecommunications and Nippon Telegraph and Telephone Public Corp; this service provides everyday information on home television sets through existing telephone circuits.

Within the year, a system will appear in which information from a computer center can be transmitted to moving cars through antennas set up along the streets. This is one of the MITI's huge projects, "Automobile Comprehensive Control Technology," which will be handed over to the Ministry of Construction and the National Police Agency to provide, respectively, traffic information and traffic signals. Since a "MICON car" is connected to the computer center through radio waves, an increase in information services would make the car a "moving information center." Toyota Motor, Nissan Motor, and Mitsubishi Motor have already manufactured "MICON cars"; they are, however, shifting the focal point of the electronics from the engine to the dashboard which can serve as "window" for receiving information.

This change is shown in Toyota Motor's "Mark II" and "Chaser" which are equipped with an audio synthesizing "speak monitor" and in Nissan Motor's ["Leopard" ?] which is equipped with an electronic meter which shows fuel level, water temperature, oil pressure and electrical voltage in bar graphs.

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Revolution in Lifestyle, Too

The first home electrical appliance with a built-in MICON was the microwave oven. It started 4 years ago when Sharp Corp and Matsushita Electric Industry developed it separately and began sales on a trial basis as an export item. After that, microcomputer applied products wasted no time in invading home life so that today we find them in use in unexpected places.

The home electrical appliance manufacturers' next target is a home computer system which will connect these microcomputerized products into a network. Its model has been developed by Matsushita Electric, Hitachi Ltd, and Sharp; and Misawa Home is selling houses equipped with such a system. The technosocieties described by MITI as a vision for the 1990's may appear throughout Japan sooner than expected, due to unceasing progress in electronics.

However, a highly "informed" society is also a highly controlled society. It appears that the closer the arrival of the technosociety, the stronger the voice cautioning about its rosy future (theory); the only certain thing is that the residents of the technosociety will be forced to reform their lifestyle.

[7 Jan 81, p 6]

[Text] "With the appearance of microcomputers, the age of machinery has ended. Enterprises that failed to get on the bus called 'electronification' are destined to fail." (Ernst Hoffmeister, managing director in charge of research and development, Siemens Corporation of West Germany). In concert with the "MICON revolution," a new industry called "mechatronics" is drawing a great deal of attention. This is a combination of machinery and electronics. Starting with electronic watches, the wave of electronics is vigorously advancing toward traditional mechanical industries, such as sewing machines, cameras, cash registers, and scales. Furthermore, this combination is about to open up new "frontiers" in automation and elimination of labor. Industrial robots and office automation (OA): simultaneously, both in plants and offices, large-scale innovation (technological revolution) through industrial robots and office automation, which represent "mechatronics," is now under way.

60-Billion-Yen Production Last Year

The Toyota Motor Co Ltd, which has microcomputer-utilized robots in operation in its plants, boasts of its production efficiency, which is already six times higher than that of U.S. and European automakers. It is impossible to overtake Toyota (plants) other than by relying on new microcomputers and robots." (J.J. Servan-Schreiber in "Challenge to the World")

The "Japan Corporation" is proud of its international competitive power. Western countries have begun to notice that one of the secrets of this lies in its superior automation equipment represented by robots. Western automakers, headed by GM (General Motors), have begun to visit Japanese automakers, which lead the field in utilization of robots. "Managing executives and engineers are taking tours of our plants in increasing numbers" (Kaicho Kanao, executive director, Nissan Motor Co Ltd)

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Japan owns about 75,000 units of industrial robots. This means that nearly 80 percent of the world's robots are operating in Japanese plants. Naturally, the robot market has grown; production has grown at the high annual rate of 50 percent in the past 2 years, and it is said that it exceeded 60 billion yen last year. "The 1980's is Japan's 'first year of robots'; it has become profitable as an industry." (Hikoo Ando, vice president of Kawasaki Heavy Industries and chairman of the Industrial Robots Industry Association). With the heightening of the trend toward industrial automation and elimination of labor, the robot industry is fully expecting that the market will grow into one that will handle 300 billion yen (annually) in 1985, and 600 billion yen in 1990.

It is said that the etymology of the word "robot" is derived from the play "RUR"-- Rossum's Universal Robot factory-- written by Czech playwright Karel Capek. The play, written in 1920, has an ironic ending in which man-made robots (from the word robota, meaning "slave labor") rebel against their human creators. The concept of industrial robot was created in the early 1960's. Soon after, the first industrial robots called "Unimate" and ["Versatron"?] were produced in the United States.

"Intelligence Revolution in Progress"

In the beginning, single unit transistors were combined and incorporated into the control mechanism of the robots. The control mechanism became smaller and smaller as a result of technological innovations in semiconductors, from IC to LSI (Large Scale Integrated Circuits). Today, due to microcomputer progress, robots have become "wiser." Robots can handle various types of works simply by changing the programs of the microcomputers. In addition, the control system has been further miniaturized and there is much room for large reductions in cost.

"If the industrial revolution of the 19th century started by Watt's steam engine was a muscle revolution, then we can say that an intelligence revolution by microcomputer is in progress today." (Toshiyoshi [Shirosaka?], executive director, Matsushita Electric Industrial Co Ltd)

[The next 5 years will be the age of audio. Every machine will be capable of talking and recognizing sounds. Furthermore, if the semiconductor technology progresses at the present pace, the machine's intelligence will reach the level of a human's." (Ryoichi Mori, professor at Tsukuba University)

Full-scale industrial robots appeared in Japan in 1967. The following year, Kawasaki heavy Industries established technological cooperation with Unimation of the United States and began production of "Unimates." About the same time, many corporations, beginning with Yasukawa Electric Mfg Co Ltd, Hitachi Ltd, and Aida Engineering, and followed by Mitsubishi Heavy Industries, Kobe Steel Ltd, and Shin Meiwa Industries, made themselves known as robot makers.

Almost Breakdown-Free

The first major area of application was in automobile spot welding. In those days, "there were so many breakdowns, we were kept busy making repairs."

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(Kanao, executive director of Nissan) Today, there are hardly any breakdowns. Toyota Motor plans to introduce 720 robots over a 3-year period starting in 1980, and Nissan and Toyo Kogyo Co Ltd are introducing them at the rate of 100 units annually.

In addition, the demand for robots for arc welding and painting has grown. From automobiles to home electric appliances and machinery, the industries that employ robots are increasing more and more. Those engaged in the industry forecast that: "Eventually, assembly robots equipped with sensor functions such as that of sight will become the mainstream." (Katsuo Enomoto, director, Robot Design Center, Hitachi Ltd)

Consequently, the number of robot makers is growing rapidly. One hundred thirty companies are competing fiercely to secure the market. With expanding areas of application and rapidly growing demand in the background, the Japanese makers have acquired substantial strength. Altogether there are only about 80 robot makers in Europe and in the United States. Because of business managers who feel positive about technological innovation and labor unions that are capable of coping with automation and labor reduction, it would appear that the industrial environment in Japan is suited to the introduction of robots.

The largest maker, Kawasaki Heavy Industries, will soon conclude a large volume export contract for industrial robots with Unimation Corporation, Kawasaki's partner in technical cooperation. Kawasaki will supply annually 200 robots not produced by Unimation. This will be the first large volume robot export to the West. Also, Hitachi recently provided [Automatics?] Corp, a U.S. robot maker, with industrial robot manufacturing technology.

The "mechatronics" revolution is taking place in "offices" as well. This is because microcomputers have "invaded" office equipment and begun to bring about acceleration in office automation. Microcomputers will change typewriters into "smart terminals." Instead of typing letters on paper, one strikes the keys of the terminal and the message is entered into the memory device of a computer. Paper has begun to disappear from offices. If such a terminal is installed at home, people can work at home. Communication circuits will connect the terminal at home with a larger computer at an office. The majority of business will be handled in this manner in the future. The "age of work at home" is no longer just a dream.

Ivrea is an hour and a half from Milan (Italy) by car. There, Olivetti, one of the top office equipment makers in Europe and famous for its typewriters, is now undergoing changes to become an information equipment maker. It purchased 600,000 units of microcomputers last year and built them into its products. The company expects to increase its volume of microcomputers by more than 20 percent in 1981. Its goal is "to become the NCR of Europe." (Carlo DeBenedetti, president) America's NCR used to make cash registers, but it has now grown into a computer maker. In Europe, the United States and in Japan, "the greatest technological revolution since the Gutenberg press" (Atsuyoshi Uchi, president of Nippon Electric Co Ltd) is about to change the office radically.

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[8 Jan 81, p 7]

[Text] Osaka South Port is the entrance to the Hanshin metropolitan area. Here, construction of a "port town" is moving at a rapid pace under the slogan "21st Century Urban Development." This is a giant project, involving reclamation and construction of highrises in an area of approximately 1 million square meters, for 400 residents; the construction cost will total 200 billion yen. Already some residents have moved into one area, but the completion of the project is expected in 1983. It is said to be the world's largest housing development exclusively for highrises.

21st Century Urban Development

Since the construction of this "new town" aims at 21st century urban development, it differs greatly from developments of the usual developers. The greatest feature lies in consolidation of housing environment. The entire town is marked "no-car zone," and there will be a wild bird sanctuary surrounded by deep woods, a sports garden, a man-made beach of white sand, and a fishing park.

A new transportation system called "new tram" will connect the "port town" with downtown Osaka. For this system, a concrete path will be installed in place of rails, and electric cars with rubber tires will run without conductors or drivers; getting on and off will be entirely automatic. It is designed so that when the number of passengers exceeds capacity, a buzzer goes off and renders the vehicle inoperative.

Garbage will be collected automatically from homes by the "air transportation system." All television will be antennaless CATV (cable TV). This is because television antennas spoil the environment aesthetically. The project differs radically from the traditional "bed(room)-town" developments. Nippon Steel Corp is responsible for part of the project. The construction of a new town requires various engineering technologies and these are combined to produce a single "system." The utilization of a wide range of technologies inevitably calls for a union of various enterprises and industries. In the construction of the port town, various industry forces will be mobilized for the work on dredging and land reclamation, construction of the highrises, development of transportation facilities, creation of information networks, and consolidation of the environment. This is indeed a "compound project" in which various enterprises and industries are organically united.

In order to execute such a multi-industrial project, it is necessary to have an organizing function equipped with a systematic, i.e. comprehensive, ability capable of organizing the entire project. The greater the project, the greater the number of technologies and enterprises involved; therefore, the existence and role of the organizer becomes even more indispensable.

In this "compound project," the "enterprise experienced in actual production and in processing the know-how" will take control. The requirement for the organizer is the experience which enables it to integrate and execute the giant project in which technologies and enterprises are intricately combined.

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The "Soft Engineering" Called "Society Engineering"

The staff of Nippon Steel's new division, "Living Environment Development Division," unhesitatingly calls their own unique and comprehensive engineering in respect of city planning "urban engineering" (urban development engineering). They explain it as "new engineering, different from the methods of the present developers and appropriate to city planning for the 21st century."

The top management of the company has given top priority to the execution of the "compound project" within its management strategy, over and above steel, and points out that a promising new industry in the form of "compound project" industries has appeared for the future of the steel industry.

The development of Nippon Steel's "engineering business" reflects a "new face" in the engineering industry aiming at the 21st century. The engineering industry originated in the United States at the beginning of the 20th century with the method of building plants that refine petroleum and petrochemical products. Even today, the term engineering refers principally to the field of petrochemicals.

The nature of new engineering, however, is changing toward "know-how as a system" that was nurtured through the experiences gained in organizing plants. One may call this an aggregate of experiences that takes into consideration the balance between technology, humanity and society, and executes the entire project in an orderly manner. This advanced method of "project engineering" is about to take off, seeking new areas of application.

From the eighties to the nineties, the "compound projects, in which the new engineering method is expected to play an active role will emerge in various areas on land, in the sea, and in the air.

On land, it will concentrate on the development of petroleum alternative energy, such as nuclear power and coal. The nuclear power complex plan, based on the establishment of the nuclear fuel cycle and the high-temperature gas reactor, is about to take a long stride forward. Liquefaction and gasification of coal will be realized probably by the latter half of the 1980's. Projects related to social development, such as housing and urban development, are flourishing.

Needs Expanding to Seas and Sky

Agricultural development using an industrial production system is one of the most prominent projects. For instance, as a "new weapon" of economical cooperation in Middle Eastern countries, the idea of building an "agricultural complex" for industrially producing foods in the middle of a desert is being considered through the joint efforts of C. Itoh & Co Ltd, Chiyoda Chemical Engineering & Construction Co Ltd, Kurita Water Industries Ltd, and Hitachi Ltd. It is expected that this application of an engineering method in agriculture will become a breakthrough in dealing successfully with the low farm productivity of Japan.

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There is a wide variety of marine projects. The most crucial area is in the development of oil and natural gas in the ocean. The trend is toward drilling in deeper seas, and "help" from various technologies is being sought. This area is called "marine engineering" and includes tidal power generation, thermal difference power generation system, marine oil storage base, mining of manganese nodules, and fish farming; giant industrial projects are now shifting from the land to the ocean.

In the sky, a wide range of satellite uses will probably bring about the birth and development of "satellite business." The utilization of a "satellite communications system" will expand as a means of communication and information. Also, the development of solar energy cannot be realized without the use of giant projects.

It is certain that the "compound project industry" will become the mainstay of future economic growth and the core of the export industry. The development of this "new business" that fully utilizes the advanced engineering method, even in the United States, where it is referred to as "macroengineering," is highlighted in academic circles as the "frontier" in the formation of industries. "Compound project" is one of the areas U.S. enterprises with their comprehensive powers are good at; however, it can be said that the development of the new engineering industry in Japan is one in which the Japanese enterprises will pursue their "tough competitor."

DEVELOPMENT OF COMPOUND ENGINEERING INDUSTRIES

Related to Resources and Energy

Nuclear Power

Nuclear fuel cycle

Nuclear power complex, such as high-temperature gas reactor

Petroleum and Gas

LNG comprehensive utilization system

Petroleum storage system

Marine petroleum and natural gas development systems

Coal

Unmanned coal-mining engineering

Coal liquefaction system

Coal gasification system

Electric Power

High efficient generation system

--MHD

--compound cycle generation system

--high-performance gas turbine generation system

Superconduction-transmission system

Wind and tidal generation systems

Thermal difference generation system

Geothermal development and utilization system

Mining

Mining and refining of manganese nodules

Low-grade ore mining engineering

Super deep ore deposit development system

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Solar Energy

- Orbital solar energy power generation plant
 - Marine solar energy power generation system
- Agricultural Alcohol
- Alcohol plant construction system

Related to "Social" Development

Housing and Cities

- Production and construction system for housing industry
- New transportation system
- New information and communications system
- Environmental protection and disaster prevention systems
- Energy saving urban mechanization system
- Sewage and waste water high rotation utilization system

Medical, Health and Welfare

- Hospital automation system
- Regional medical information system
- "Positive health care system"
- Plant system for the aged and disabled

Education and Culture

- High level CAI system
- Lifetime education and training system
- System to increase the level of education via radio and TV

Foods

- Green leaf protein producing system
 - Production of glucose from cellulose sources and its application and development system
 - Large-scale open-sea fish farm system
 - Rice field high utilization system
 - Animal waste fertilization system
- Industry Adjustments to New Environment
- Resources-saving and energy-saving
 - raw material conversion
 - production method conversion
 - energy conversion
 - design ideology conversion
 - Adjustments to society with a growing population of elders
 - high-level robot system
 - Adjustments to meet diversified needs
 - CAD system
 - multi-item, small quantity production system
 - automatic assembly system.

[9 Jan 81, p 7]

[Text] OPEC's (organization of Petroleum Exporting Countries) crude oil hikes arrived at during its general meeting on the island of Bali last December have spurred the development of new energy. This is because we have come to a stage where we can no longer postpone "doing without oil" and because the new energies have become more economical.

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Although the 1970's was a period of turmoil, oil still remained the "ace" among all energies. However, the 1980's and thereafter will be an age in which there will be no "ace." There is a fear that living and economic foundations may crumble unless all possible alternative energy can be summoned up and offered continuously bit by bit. The promising alternative energy available in time for the 1980's will be limited to nuclear power (light water reactor) and coal. Even these two will be exhausted eventually. Although at present we possess an ample supply of natural uranium, if we continue to build light water reactors that use uranium-235 exclusively, the latter constituting only 0.7 percent of natural uranium, then natural uranium will be exhausted, along with petroleum. Coal may be burned unprocessed in large boilers, but it cannot be used for smaller boilers unequipped with desulfurization and denitrification devices. It is impossible to use coal in its natural state for transport vehicles unless we go back to the age of the steam engine.

There is an urgent need to develop new energy for the post-light water reactor and unprocessed coal burning period. The areas in which unprocessed coal burning cannot be used as a substitute will use synthetic fuel oil. Coal liquefaction, tar sand, oil shale, and alcohol from biomass will be the "hopes" after the 1990's. The principal force which will succeed light water reactors will be fast breeder reactors; but as far as electric energy is concerned, it appears that not only nuclear energy but also smaller, diversified types of energy will emerge, including geothermal, solar, wind and ocean energies.

The United States and other countries are actively involved in the development of synthetic fuel oil. This is because the present petroleum-based energy system doesn't have to be changed, and furthermore it will allow putting a check to the movement of OPEC.

Turning the White Elephant Into a Treasure

First, the emphasis must be placed on liquefaction of coal. The amount of coal reserves far exceeds that of oil; they are widely distributed in such advanced countries as the United States, Australia, Canada and West Germany. If liquefaction of coal is realized, it can reduce tremendously the IEA (International Energy Agency) countries' dependence on OPEC. Furthermore, although we have hardly utilized brown coal--found in great quantities in Australia and China--because of its high liquidity, if we can succeed in liquefying it, we can convert this "white elephant" into an energy source. There are two coal liquefaction methods: in the indirect liquefaction method, coal is first gasified and then liquefied; in the direct method, coal is liquefied immediately after addition of hydrogen. Japan, the United States and West Germany are now promoting the development of direct liquefaction technology, since this has a higher liquefaction rate. A commercial plant would be one which can process daily 30,000 tons of coal and produce 100,000 barrels of liquefied coal.

Germany and Japan have the experience of having produced a significant volume of liquefied oil during World War II, when they fell short of crude oil. This, however, was accomplished without consideration of profit. The technology of processing mixtures of solids, liquids, and gases under high temperatures and pressure is difficult, and it is not easy to produce liquefied oil at a price competitive with oil.

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Under the "Target for Supplying Alternative Energy," the government has indicated a goal of securing 22.6 million kiloliters of (coal) liquefied oil for fiscal 1990. Five enterprise groups, including Nippon Brown Coal Liquefaction (headquarters in Tokyo, Kokichi Takahashi, president, capital 500 million yen) which is eyeing the brown coal reserves in the Province of Victoria, Australia, and Mitsui Coal Liquefaction (headquarters in Tokyo, Shingo Ariyoshi, president, capital 500 million yen) are developing technologies to meet the goal. It will be difficult, however, to achieve.

Fast Breeder Reactors by 1987

The fast breeder reactor is seen as the next generation replacement for the light water reactor. The construction of a prototype, "Monju" ["Wisdom"] will begin this year. It will be completed in 1987 and is expected to generate 275,000 kilowatts.

The fast breeder reactor uses as fuel re-treated plutonium from the light water reactor; moreover, since the reactor is capable of self-breeding more plutonium than it consumes, eventually it will be able to produce its own fuel.

However, it is uncertain as to when it can stand on its own as a commercial venture; additionally, there is the fear that since plutonium is easily converted for use in nuclear weaponry, trends in international politics might influence the handling of plutonium. Furthermore, the Japanese Government has yet to determine a long-term strategy dealing with the relationship between this reactor and the converters presently under development, which also use plutonium and natural uranium as fuel.

On the other hand, it would appear that diversified types of energy will become one of the characteristics of the 1990's and beyond. Among them, more work has been done on geothermal energy. There are 6 geothermal power plants in operation, including the Hatchobara (output, 55,000 kilowatts) plant of Kyushu Electric Power Co Ltd, and the total output nationally has reached 162,000 kilowatts.

Japan has 9.4 percent of all active volcanoes in the world. For Japan, which is not blessed with abundant natural resources, geothermal energy is its most promising "domestic" source of energy. Although surveys have not been completed, it is said that about 30 million kilowatts of geothermal energy are available in 50 locations where data are available.

Also Useful for Regional Development

Geothermal energy will contribute greatly to regional development. Geothermal generation uses steam built up within the earth, but along with steam, hot water of temperatures exceeding 100 degrees Celsius boils out. This water can be used for many purposes: in agriculture and fishery, it can be used to heat greenhouses and in fish farming; it can be used for regional heating, for supplying hot water, and for removing snow from roads.

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According to the government, in the long-term prospect, geothermal generation will be increased at a rapid pace, to 3.5 million kilowatts in fiscal 1990 and 7 million kilowatts in fiscal 1995. The capacity of conventional geothermal plants working at (shallow) depths of less than 2,000 meters is at most 50,000 kilowatts per location. The development of deeper geothermal generation, 3,000-4,000 meters, will be the future issue; for this however, a higher level of technology is required for probing and digging.

Solar energy has even more potential than geothermal energy. The energy produced by direct sunlight per square meter of ground surface is 1 kilowatt. The average solar energy utilizing the entire land surface of Japan exceeds by several hundred times the present power generation capacity. Of course, we can use only a fraction of it, but its attraction lies in the fact that each household can use it creatively.

The sale of solar bath water heaters has already reached 1 million units annually, and as of the end of 1979 solar systems which provide hot water and heating in addition to bath water have been installed in over 5,000 households. According to the "Sunshine Plan," it is expected that by 1990 solar systems will be installed in about 7.8 million households, which is equivalent to about 20 percent of the total households in Japan.

The next objective in this area is the technological development of solar light generation (solar battery) which provides residential power generation. Power is generated when the sun's rays hit the silicon semiconductors; unfortunately, however, the cost of power generation by solar battery is still prohibitive, running as high as 5,000 yen per watt. It would cost over 10 million yen to build a system generating 2 kilowatts. The goal is to reduce the cost down to 1/100 by 1990. The time may come when the greater part of the energy consumed at home will come from solar energy.

[10 Jan 81, p 6]

[Text] In the United States, there is the view that: "Energy saving is an untapped resource; if the United States makes a serious effort at conservation, we can cut 30-40 percent of the present consumption of energy. The total amount of oil imported by the United States will become unnecessary." ("Energy Future," a special report by Harvard Business School) A challenge to save energy is as significant as the development of promising resources.

Highly Efficient MHD Power Generation

Since 1978, the Japanese Government has instituted the so-called "Moonlight Plan," promoting the development of advanced energy-saving technology as a national project. What we call "energy saving" involves various technologies; roughly classified, they include technologies to: 1) improve energy consumption efficiency, 2) recycle waste heat and waste materials, 3) store and transport energy, and 4) develop energy-saving raw materials. The most important among them is the technology which improves consumption efficiency, which would in turn reduce the energy input.

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A highly efficient gas turbine involves a new technology which radically enhances the heat efficiency of power generation and is considered the most promising in that it is one in which "Japanese research and development is the most advanced in the world." (Maretoshi Nishida, researcher at the Agency for Industrial Science and Technology) In addition to the national research agency, the Highly Efficient Gas Turbine Technology Research Association, comprised of 14 private enterprises, including Mitsubishi Heavy Industries and Ishikawajima-Harima Heavy Industries, and electric power companies are working together to bring about its utilization. Since 1980, they have been involved in the construction of a pilot plant on the property leased through the Takasago Plant of Mitsubishi Heavy Industries; the government budget proposal for fiscal 1981 appropriated 5.92 billion yen for construction expenses.

They plan to complete the plant by 1982, conduct a trial run and, by improving it further, build a protoplant by 1984. They expect to invest as much as 10 billion yen, but the heat efficiency of the protoplant should exceed 55 percent. This has epoch-making significance, considering that despite the fact that about 10 percent of the total demand for energy in Japan is in the form of electricity, the heat efficiency of the most advanced thermal power plant is only about 40 percent. The power generation capacity of the prototype is 100,000 kilowatts and the plant is designed so that it can be put to practical use.

In addition to the highly efficient gas turbine generation, another heat efficiency improving technology, designed for actual use in the 1990's, is magneto hydrodynamic (MHD) power generation). In a large area, 18,000 square meters, within the Takasago Plant of the Mitsubishi Heavy Industries, a large almost windowless building and facilities such as dust-collecting equipment and a cooling tower are nearly complete. This is the MHD power generation test plant called "Mark 7," which the Agency for Industrial Science and Technology and the Electro-technical Laboratory are jointly constructing. During fiscal 1981 the plant will conduct test runs with the goal of running for 200 hours at 100 kilowatts.

This MHD plant generates power by running high temperature gas of about 2,700 degrees Celsius, obtained by burning heavy oil, natural gas and coal, through generation channels placed between powerful magnets at a high speed of about 1,000 meters per second. The temperature of the gas, after it has generated power, is still nearly 2,000 degrees Celsius, so it can be used again to produce steam to operate conventional thermal power generation. With this combination, the heat efficiency will increase by more than 50 percent.

The MHD power generation started in 1976 as a national project, and the current research and development will end in fiscal 1982, when data from the operation of Mark 7 will have been gathered. However, the power output of Mark 7 is only 100 kilowatts. For actual use it must be able to endure several thousand hours of operation and produce several hundred thousand kilowatts; therefore, there still remain the issues of: 1) improving the durability of power generation channels, 2) developing heat exchangers that resist high temperatures and erosion, and 3) developing superconducting magnets with powerful magnetic forces.

Both the United States and the USSR are also competing fiercely in the development of MHD power generation. The USSR, in particular, by 1985 plans to complete its "U-500," which has a capacity of 500,000 kilowatts. The United States also

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plans to operate a large test facility within the year and is aiming at its practical application in the first half of 1990. The Agency for Industrial Science and Technology will determine the next stage development policy after it examines the results of the operation of Mark 7, and it will also study international cooperation with the United States.

Large Capacity Storage Batteries

About half of the energy used in Japan is dispersed into the air in the form of heat. The development of technology to recover this waste heat, too, has been encouraged as a result of the energy price hikes following the second oil shock. In the technology to recover waste heat, the difficulties are in dealing with high temperatures of over 1,000 degrees Celsius and low temperatures of under 100 degrees Celsius. In the case of high temperatures, large equipment and huge investments are required, and in the case of low temperatures there are technological difficulties as well as the question of economy.

In the manufacture of cokes where coal is carbonized, the temperature that escapes from the furnace ranges from 900 to 1,200 degrees Celsius. As a part of the Moonlight Plan, last November Mitsubishi Heavy Industries and Toho Gas Co Ltd built a "dry-type coke extinguishing facility," capable of processing 10 tons per hour, in the latter's Komei Plant (Nagoya). Inert gases (nitrogen, etc) are stored inside a doughnut-shaped dome 10 meters in diameter. When the scorching cokes go through the dome, the inert gases are heated to 750 degrees Celsius. The high-temperature gases are then sent to a boiler and used for power generation. After test runs in 1981, Toho Gas plans to build another facility four to five times larger than the present one.

On the other hand, Sumitomo Metal Industries Ltd, in cooperation with Kawasaki Heavy Industries, has put to actual use the world's first technology of generating power by recovering low-temperature waste heat. The special characteristics of this technology lies in the use of Freon 11, which has a boiling point of 23.8 degrees Celsius, as a heat medium; the cooling water (76-98 degrees Celsius) from the converter evaporates the Freon which in turn rotates the turbine. The maximum output is 2,900 kilowatts, and the average generation cost is 7.5 yen per kilowatt; therefore, it produces considerably cheaper electricity than can be purchased.

If only electricity can be stored--a project aimed at realizing this dream started last October. If a large capacity storage battery system can be developed to store excess electricity during night hours by electrochemical reaction, the stored electricity can be discharged during daytime peak hours and thereby energy can be saved. The 11-year project is designed to develop new type storage batteries and test them. In storing electricity, pump-up power generation has already been utilized; other methods use flywheels, compressed air, superconducting coils, condensers, and hydrogen. The Agency for Industrial Science and Technology, however, regards the storage battery system as the most realistic.

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Combination of Technologies

In addition, among future energy-saving technologies are the development of aluminum refining technology using the blast furnace method, superconducting electric transmission technology with minimal loss of electric transmission, and energy-saving high-performance magnetic materials.

Since the oil shock, the steel industry has introduced continuous casting equipment with high energy-saving efficiency; progress is being made in energy consumption efficiency in the automotive and home electric appliance industries; the energy-saving technology of Japanese industries is the highest in the world.

However, energy saving requires more than these advanced technologies. The Tokyo Electric Power Co Ltd built its Otsuka branch office equipped with every possible energy-saving device including a solar system and air-conditioning equipment. While it boasts that this is "the world's number one energy-saving building," the equipment is available on the market. With its "know-how," it combined the existing technology and equipment, so that the company saves 52 percent of the energy consumption of ordinary buildings.

Depending on the size of the equipment, degree of operation, and willingness of employees, the energy-saving method will vary. "Know-how" is needed which fits the energy-saving equipment to the conditions peculiar to each company. Asahi Chemical Industry Co Ltd has merchandised a wide range of energy-saving know-how which it has accumulated. For an enterprise, energy-saving aims at reduction of cost. The pressing issue now is the development of know-how which will lead to effective use of energy-saving equipment and enhance profitability.

[12 Jan 81, p 7]

[Text] "Technology is what propels enterprises" (from the New Year's message of Shoichi Sanami, president of Tokyo Shibaura Electric Co Ltd). President Sanami aside, in no other year has there been such heavy emphasis on the importance of the response of enterprises to new technologies in the New Year's messages of the top management of various industries. This is because management has begun to share the awareness that any lag in technological strength is fatal to development of an enterprise.

Determines the Fate of Enterprises

In the long-term outlook, there is the theory that for the moment, no technological innovations of great magnitude will surface. In fact, however, advanced compound industries are diversifying infinitely, one after another. Furthermore, there have been large movements in the development of advanced basic technology, which heretofore has been considered weak, but which will be responsible for the "next generation." If so, the industries' approach to R&D (research and development) can be regarded as a "battlefield" on which, to exaggerate, they are gambling their own fate.

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Last summer, an American television program introduced very clearly Japan's high production technology, including quality control, through its reportage on Japanese production sites. The average Japanese who saw the program appeared to have been convinced of the high level of Japan's technology. But those who are responsible directly for technological development may not feel so self-assured.

Improvement and advances in production technology will continue, but the interest of the developers of technology lies in tackling the areas of advanced compound technologies which are beginning to show expanded "business opportunities" and in preparation for the development of basic advanced technologies which will become their weapons in the next 10 to 15 years.

First, in the area of advanced compound technologies, the new markets formed by the combination of existing technologies of "mechatronics," "labor-saving," and "office automation," are appearing at a rate surpassing expectations. This is not limited to areas developed by advances in microcomputers, but extends to those of raw materials and engineering. "With a trend toward 'compound engineering,' we are in a position where, if we are not careful, we will be left behind." (Akio Mukai, director, Mitsubishi Chemical Industries Ltd and chief, Mitsubishi Research Institute) For this reason, competition for development increases daily.

Multidirectional Diplomacy

In this bewildering movement, it becomes indispensable for those in the R&D of an enterprise "to extend their feelers in the right directions constantly and catch the technological development of the entire industry." (Toshimasa Mitsui, vice president, Mitsubishi Heavy Industries Ltd) This is because, in a situation in which what appear to be totally unrelated technologies can combine to develop an unexpected market, there is "the need to find out what and where improvements and applications of a technology are being carried out and to envisage how one's own products are related to them." (ibid)

It is also important to perceive how information gathered through "multidirectional diplomacy" in the development of technology can be incorporated into one's own R&D. Because incorporation of technology is no longer "vertical" but "horizontal," "it is inefficient for one company to go into everything, but if you let outsiders take care of everything, you'll miss the bus." (Mukai, managing director) If there is a failure here, then everything has gone for nothing. In order to prevent such a danger, there is the need to structure the R&D so that one is prepared "to build a 'core' technology in a particular field which is superior to that of competitors and furthermore is flexible enough to extend into surrounding areas while keeping a sharp eye on them." (ibid) Furthermore, in R&D, which demands unprecedented horizontal extensions, "it is extremely important to train individuals who can control and lead without losing the overview" of a development project in "compound engineering." (Isamu Yamashita, chairman, Mitsui Shipbuilding and Engineering Co Ltd) Just as in an actual combat division, such leaders are needed in an enterprise to develop and control technologies. The number of enterprises holding regular strategy meetings of responsible persons from management, production, and technological development is increasing.

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In this respect, one can say that "there will be a stronger linear organization of the research and development division." (Mashisa Ito, president, Toray Industries Inc) For example, at Toshiba, among the research centers which were formerly classified as "staffs," those which have strong ties to actual production have been newly established under its present business division. Six research centers, such as the "Medical Equipment Engineering Research Center," are now operating independently of the "Research Institute," which handles basic research.

Technology as True Resource

In this manner, R&D which is directly related to business is being actively pursued. In comparison, the development of advanced basic engineering which looks ahead 10 to 15 years, despite considerable results in nuclear fusion engineering, cannot be said to be "sufficient."

According to a study conducted last summer by the "Friends of High Molecules," made up of chief technicians from chemical and synthetic textile makers, the world's comprehensive chemical manufacturers such as Hoechst (West Germany), DuPont (United States) and ICI (Great Britain) spend about 140 billion yen for research and employ 12,000 to 13,000 researchers. In comparison to Japan, they spend 10 times as much for research and researchers.

With this being the case, then, the outcome 10 to 15 years from now is already clear. In order not to lag behind in basic technological development, MITI and the Agency for Industrial Science and Technology, respectively, will sponsor the "System To Develop Basic Technology for the Next Generation of Industries," and the "Promotion of Creative Scientific Technology." The two giant technological development projects will start in fiscal 1981.

These projects are "aimed at providing government backup in areas in which the risks are too great for private enterprise to venture alone, and furthermore the R&D of industries with objectives in basic technology will play a major role in the coming generation." (Hisao Kobayashi, director, Technology Promotion Division, Agency for Industrial Science and Technology) The idea is to use the technological research associations of the private enterprises which succeeded in developing the super LSI in such areas where we face difficulties today as biotechnology, new functional elements, and new materials. The new systems differ from previous large projects. "They are, to be frank, government subsidies in untested technologies which may or may not prove fruitful. They represent government efforts at creating new R&D structures." As new systems they are evaluated highly within industry circles.

For this reason, even the synthetic textile and chemical industries, which used to compete rather meaninglessly in the past, have set up a "Highly Functional Molecular Material Association" and related research groups. "Cooperative structures in technological development" are beginning to surface. In the electric industry, it is said that "although it was difficult to run the Super LSI technological research association, the second association, that of optical fibers, is running smoothly." (Kenji Kakizuka, managing director, Toshiba) The trend is to compete fiercely in technologies that face the enterprises immediately, but cooperate in those which require cooperation.

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The reason is that: "The time is past when we could import advanced basic technology from the West even if we wanted to do so. It is time for Japan to shoulder its responsibilities for these time- and money-consuming technologies. To do this, government cooperation is needed." (Kobayashi, director) With the beginning of a technological development race among the advanced countries to secure technological superiority 10 to 15 years from now, the awareness that for Japan, which lacks resources, "technology is resource" is spreading among officials and those engaged in R&D.

It can be said that both short-term and long-term R&D structuring is finally becoming full-scale.

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ECONOMIC

MAJOR INDUSTRIALISTS EVALUATE 1981 BUDGET PLANS

Tokyo NIHON KEIZAI SHIMBUN in Japanese 30 Dec 80 p 8

[Article: "How the Industries View the Government Budgetary Plans: Flexible Management of Finance and Money Circulation Desired, and an Easygoing Tax Increase Is Not Satisfactory; Boost in the Expenditures for Economic Cooperation Is Highly Valued"]

[Text] The evaluation of the government budget for 1981 by the industrial circles may be summed up as "somewhat unsatisfactory." The largest complaint was directed at the fact that the government did not make sufficient efforts to bring about a "small government" through reduced expenditures, although it claimed this as the first year of the financial reconstruction. Instead, the government forged a line for a tax increase in an attempt to resolve conflicts in finance. The industrial circles strongly demand a thoroughgoing administrative reform and the readjustment of subsidies beginning in 1982. In terms of business the industrial circles are afraid that the tax increase, including the expanded commodity tax, may depress consumption. However, the industrial circles have welcomed the increased expenditures in defense spending and economic cooperation, as they are linked to strengthening national security. Since the industrial circles anticipate the economic situation in 1981 to also be serious, many of them are voicing their hope for flexible management of the financial and monetary policy for the recovery of business.

Steel Industry: The steel industry is focusing its complaint on the fact that the growth rate of the budget for public works has remained at the level of 1980. The reason is that when the expenditures for the acquisition of land sites and the rise in the personnel expenditures are taken into account, the scale of public works in substance amounts to a minus growth, and a proportionate fall in the demands for steel materials is unavoidable. Thus, the Japan Iron and Steel Federation recently forecast that the demands for steel materials to be used in civil engineering in 1981 would be decreased by 3.6 percent over 1980. Particularly small steel bars used in construction will feel the impact of the budget. Since the small bar industry is consolidating its determination to apply for a recession cartel as early as this January, it is grimly accepting the budget.

Nonferrous Metal Industry: Since the nonferrous metal industry business is affected by the demands related to public investment, the real reduction in public works in the 1981 budget is painful to them. The reduction in the

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number of houses to be built has an impact on the consumption of electric wires and other materials. The commodity tax increase on passenger cars and videotape recorders casts a dark shadow on the sectors with large demands such as aluminum and lead.

However, some nonferrous industrialists judge that within the framework characterized by the financial reconstruction, the Ministry of Finance has shown "its share" of consideration. In particular, they view that the industry has received a better-than-expected understanding of individual problems of the nonferrous metal industry. First of all, this has been shown by the creation of subsidies to prevent mining pollution from dormant and closed mines. For the disposal of waste water from mine pits for which the last holders of the mining rights were held fully responsible, a subsidy to cover one-third of the disposal costs was approved as a new form of subsidy. The industry estimates that an increased rate in subsidies is possible also in fiscal 1982 and thereafter.

Also, it is of immense significance that the development of a mining system for manganese nodules has been adopted by the large-scale industrial technology research and development project (large-scale project) of the Agency of Industrial Science and Technology. Amidst the rising nationalism with regard to natural resources, the project will mark an important step in securing natural resources in the 1990's and thereafter.

Electric Power Industry: The new measures for the acceleration of procurement of locations for new electric power sources, including the compensation for the surrounding areas of atomic power generation facilities, which the Ministry of International Trade and Industry has strongly demanded as an important item in the 1981 budget have all been approved in substance. Also, the budget for the development of petroleum substitutes and of new energy technology such as the construction of medium and small hydropower, geothermal power and coal thermal power plants, the development of solar energy, the low-calorie gasification of coal, and high-efficiency gas turbines has been almost fully approved as demanded.

Because of this the electric power industry appreciates the fact that the growth rate of the budget for energy measures was high in spite of the limits placed on it by the financial reconstruction. Tadao Ogaki, vice president of the Electric Power Enterprise Federation stated that the "importance of the development of alternate energy sources was recognized.

On the other hand, the electric power industry welcomes the compensation arrangements for prefectures for exporting electric power and for cities and towns with hydroelectric power facilities which have been created as measures to promote the acquisition of locations for electric power sources. The industry also welcomes the approval for the expansion in the compensation arrangements as measures to promote the acquisition of locations for electric power sources. They consider that this would be helpful in promoting the acquisition of locations for electric power sources in the future. But the electric power industry does not

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necessarily give full support to the compensation arrangements cooperation in securing locations for atomic power on the grounds that "in substance it amounts to 'individual reduction' of electric power charges..."

Petroleum Industry: Although the petroleum industry tentatively approves the fact that about 50 billion yen has been added back into the budget for petroleum measures such as petroleum development and stockpiling, they generally voice their strong opinion that the budget is inadequate to cope with the serious situation concerning petroleum. Approved in the negotiations for the budget reinstatement were an increase in the amount for the investment in and financing of mining exploration, the establishment of a new oil center designed to train petroleum technicians from oil producing nations, an increase in the expenditures for the measures to strengthen petroleum stockpiling, and the new establishment of the compensation for the interest accrued in the stockpiling of liquefied petroleum gas. The expenditures for measures related to petroleum were increased by 50.1 billion yen to a total of 305.6 billion yen. Because of this increase in the expenditure, it is a fact that some accept them as "a step forward." However, approved was only a small portion of the demands by the industry to receive no-interest long-term financing of the total amount needed for petroleum stockpiling by private firms. Although it is true that the budget related to petroleum development was also increased, some view it as still a far cry from the amounts of investment by the major international petroleum companies.

Automobile: President Takashi Ishihara of Nissan Automobile expressed his sense of dissatisfaction with the remarks: "It was an inevitable step that the current year's budget was drawn as a retrenched budget with single-digit growth, that is, 9.9 percent, in the general account. However, with regard to the financial reconstruction, first of all, an administrative reform and a review of various kinds of subsidy should have been strongly pressed forward in order to promote a budgetary cut. It is not convincing as a measure for the first year of the financial reconstruction that an increase in the corporate tax and the commodity tax was preceded by a budget cut. When we take into account the fact that as of now we are in a recession, such a step is feared as leading to the impairment of the long-term development of the economy and of the vitality of enterprises. Thus, it presents a problem." The automobile industry, which faces troubles both at home and abroad, considers that the commodity tax increase planned for 1981 will put a damper on the domestic consumers and that it might provide a cause for the international trade controversy (because European and American nations consider Japan's commodity tax as an import barrier). Thus, the automobile industry will face an increasingly serious situation. Furthermore, the automobile industry feels that the financial reconstruction should be tackled from the macro-perspective of long and medium terms, and that a consistently strong policy is necessary. Thus, many voice their expectations that for now stability in the domestic business situation should be stressed and that appropriate measures to promote business including a higher interest rate should be adopted.

Electric Machinery and Appliances Industry: In addition to the corporate tax increase, nine new home appliances, including home videotape recorders which

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are entering the stage of mass consumption and large refrigerators, were designated as subject to the commodity tax. Therefore, the electric machinery and appliances industry generally accepts the view that its reward is small compared to its increased burden. Some strongly fear that "the increase in the commodity tax is an easy way to achieve a large-scale increase in revenues, but it will likely become an impediment to the recovery of individual consumption." (Shoichi Sanami, president of Tokyo Shibaura Electric Company) Thus, there is hardly a voice of satisfaction in the industry. Except for videotape recorders, the general demand for home appliances, heavy electric machinery, and electronic instruments has reached a ceiling. However, the 1981 budget imparts a feeling that it has not given adequate consideration to the improvement of business, as it tends to suppress the expenditures for public works. Some in the industry, however, evaluate highly those sectors related to the promotion of increased orders and the invigoration of overseas business negotiations by appropriating additional expenditures for international cooperation. They also evaluate highly the defense-related budget which has set the goal of achieving in advance the medium-term defense program and the tax cut in the investment in the development of energy-saving technology and new energy sources. Also, some (as Mr Sanami) expect a balance in budget management between the financial reconstruction through administrative rationalization and simplification and business and measures for prices.

Industrial Machinery Industry: A strongly-rooted dissatisfaction is expressed with the suppression of public works in the 1981 budget in the industrial machinery industry, including the construction machinery industry and the environmental machinery industry which are highly dependent on the investment in private sector facilities. However, many in the industrial machinery industry which includes the machine tool industry have misgivings only about the indirect calming effects of the retrenched budget on business.

Many in the construction machinery industry who have agonized over the decreased sale of machinery since last spring due to the suppression of public works say that "because of the 1981 budget, the decrease in domestic demands for construction machinery is likely to be quite severe." (Makoto Nakano, president of Caterpillar-Mitsubishi Company) There is a considerable degree of "dissatisfaction" as Tadashi Ouchida, president of Hitachi Construction Machinery Company, stated: "Using public works as a means of adjusting business presents a problem." However, they view expenditures for a geological survey for the new Kansai International Airport to be "good news."

But many throughout the whole industry seem to demand that the suppression of public works should be carried out with discretion because excessive cutbacks will have an adverse impact on business as a whole because of the already existing investments.

Shipbuilding Industry: "The shipbuilding industry has heaved a sign of relief because the system to supplement interest on marine transportation loans, which is central to the industry, has managed to continue. But Tsunesaburo Nishimura, chairman of the Japan Shipbuilding Industries Federation claimed that "when the

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supplement loan interest was revived in 1979, there was a promise that it would be continued for 3 years." Some fear that those qualifying for interest supplement are limited to the vessels that transport energy products, which generally discourage ship construction. But others comment: "Since we are in an anti-depression cartel we must persevere at least for 1 more year." The majority tend to rate the budget favorably, although they are dissatisfied with certain parts of it.

Chemical Industry: The chemical industry is discontent with the fact that the government selected a tax increase measure to finance reconstruction. The industry maintains that in the future the government should earnestly tackle the reform of administrative structures and the review of expenditure structures, and thereby endeavor to bring about the recovery of the proper function of finance. The chemical industry estimates that because of the 2,000 billion yen decrease in the national debt and a large-scale tax increase, the economy in 1981 will be austere. As the chemical industry agonized over large-scale reductions in production and the deteriorating profits, many in the industry remarked: "Since we cannot expect financial support, we want a flexible and resilient policy management, including a monetary policy such as the reduction of the official discount rate of the Bank of Japan."

On the other hand, in terms of the substance of the budget, the chemical industry has rated highly the fact that consideration has been given to such aspects as economic cooperation, energy, and defense and national security. The industry welcomes the 1-year extension of the tax exemption on imported naphtha and the launching of the technological development system to promote new industries.

Fiber Industry: Although the fiber industry requested the continuation of the previous measures in drawing up the current budget, there were few new measures or additions. The industry remains dissatisfied with the increase in the corporate tax and the incentive measures for business. Yet the industry accepts the budget by saying: "The contents of the budget are the inevitable results of carrying out financial reconstruction." (Yoshitaro Magoku, vice president of Toyo Rayon Company) Nevertheless, the fiber industry, in regard to the 1982 budget, requested: "The question of the financial reconstruction should be handled by considering not only the tax increase but also the reductions in expenditures." (Mr Magoku) The industry is seriously concerned with the future trade conflicts. Thus, Mr Magoku commented: "We must see to it that Japan does not become an international orphan. For that purpose a minimum increase in defense expenditures is necessary. Domestic problems such as welfare must be considered in balance with such an international problem as defense. Thus, some show their understanding of the additional defense expenditures."

Defense Industry: Of the 1981 defense budget, the frontal equipment costs are 458.6 billion yen, a 17.7 percent increase over 1980. In order to secure a footing for advancing by 1 year the Medium-Term Defense Program (1980-1984) which is the important weapons procurement plan of the Defense Agency, emphasis has been placed on the standardization of the major equipment such as large-missile-carrying escort vessels (4,500-ton type), and C-130H transport planes.

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The defense industry has unanimously rated the budget highly by saying: "Taking the serious financial situation into consideration, the budget is somehow tolerable." However, there are many items such as HSS2B anti-submarine helicopters and F-1 support fighters which have received smaller sums than the budget requested based on initial projection. Because important items of equipment such as C-130H helicopters are to be imported from the United States, some still remain dissatisfied by saying: "Because in the 1981 budget there are no purchase orders planned for large equipment such as F-15 fighter planes, we wished for more appropriation expenditures on other items of equipment, but as it is now, there is no difference from 1980." (Kenji Ikeda, managing director of Mitsubishi Heavy Industries Company)

Aviation Industry: The aviation industry supports the progress in the consolidation of airports, but it opposes an increase in public taxes and levies such as the transit tax, the airport user fee, and the fuel tax, as measures to secure financial resources.

In the 1981 budget 2.45 billion yen is appropriated for the boring and the geological survey as the basis of the construction for the newly proposed Kansai Airport. Also, 62.2 billion yen (a 7.7 percent increase over 1980 budget) has been secured for the consolidation of local airports, including the expansion of runways. However, the expenditures for the consolidation of airports in the other areas have been reduced. Instead all costs are to be financed by the special airport account. Also, some have misgivings about the financial sources of the new Kansai Airport as well.

Because the increased burden in the public taxes and levies has already become a factor for pressuring aviation management, the industry makes a request for measures to secure financial sources by saying: "It is unreasonable to let only the current users pay for it. A long-term borrowing system too should be introduced."

Maritime Industry: The maritime industry has been watching the outcome of the new interest supplement on loans for planned shipbuilding. In the first unofficial budgetary announcement, its assessment was stern, as supplemental interest for new ships was completely curtailed and even that for vessels under construction was drastically slashed. But the maritime industry has heaved a sigh of relief, because ultimately 403 million yen for new ships was approved. (An 0.1 percent reduction compared to the 1980 budget.) However, the types of vessels to receive supplemental interest were limited to energy-transport vessels such as liquid natural gas transport ships. Besides, a condition was imposed that the other types of ships will get a reduced rate of supplemental interest. Also, in exchange for approving the supplemental interest for new ships, the continuation of the supplemental interest for ships built before 1979 was terminated. Accordingly, the industry has keenly felt the stern attitude of the government toward the interest supplement. The industry harbors enormous misgivings about the continuation of the interest supplement after 1982.

Housing Industry: The government budget proposal has not included the restriction on the construction area as a qualification for the low 5.5 percent annual mortgage loan by the Housing Loan Corporation. The current criteria have been

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retained. For this reason, the housing and real estate industries feel relieved and say: "It is only proper in view of the current situation where people are clamoring for improvement in the standards for residential housing." (Hideo Matsuo, president of Tokyu Real Estate Development Company) The industries vehemently opposed the original budget proposal made by the Ministry of Finance on the grounds that imposed limits on the building area would further aggravate the depression in housing construction, and repeatedly petitioned for its withdrawal. They feel it unavoidable to impose a restriction that those home buyers eligible for a low-interest loan must earn less than 8 million yen annually (6 million yen by the Ministry of Finance's original plan). According to the Ministry of Construction, the number of home buyers who are subject to income limitations in the financing by the Housing Loan Corporation is estimated at about 10,000 (the total number of houses to be financed in 1981 is 510,000).

Some in the industry remain dissatisfied with the reduction in the number of houses to be financed by the Housing Loan Corporation by 20,000. Because there is a strong view that the housing recession will continue another year or 2, the decrease in the number of houses to be financed is important to the industry for improving business. For this reason there is a prevailing view: "If the sale of houses should deteriorate further, they must consider an increase in low cost mortgages some time in the future."

Construction Industry: The construction industry is strongly dissatisfied with the zero growth for 2 consecutive years in the budget for public works: "We have failed to make the government understand the destitute condition of the industry." (Junnosuke Toda, president of the National Construction Industry Federation) In 1980 steady private works supported the total construction demand. But as private construction has now declined, 1981 seems to become a difficult year for the construction industry."

The construction industry has kept appealing in regard to the 1981 budget: "With a consideration for the inflationary rise in costs, at least the 1980 amount should be maintained in terms of the work volume." However, amidst the clamor for the financial reconstruction, the "public opinion" demanding the expansion of public works has not surged at all among the entire industry. As a result, the petition of the construction industry has ultimately ended in failure.

The ceiling on public works has already been manifested in the form of the bankruptcy of leading medium and small construction businesses. Especially since the medium and small construction industry circles are not capable of developing private sector works with their own technology, some fear that: "The bankruptcy of medium and small businesses will further increase." (Mitsuo Suzuki, chairman of the National Federation of Medium and Small Construction Businesses)

There is no telling yet what the total amount of public works in 1981, including works related to government agencies, will be, but it is certain that in terms of real work volume the total amount will be decreased. Furthermore,

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when viewed in terms of the actual budgeted amount (the actually targeted amount for orders), including the carryover from the previous year, fiscal 1981 will not yield as much carryover as in 1980. Thus, there is a great probability that the amount will be decreased nominally.

Food Industry: "What has happened to Mr Nakasone's (Administrative Management Agency) ability in the negotiations for the current year's budget? It is regrettable that the administrative reform has resulted only in the transfer of the manufacture of YS11 from the Japan Aircraft Manufacturing Company to a private sector." (An executive of a food processing company) Although the food industry welcomes the decrease in the amount of national debt by 2,000 billion yen as paving the way for financial reconstruction, many indicate their dissatisfaction saying that, without administrative reform, cutting the swollen body of expenditures will not achieve much. They view also the increased defense expenditures as a realistic measure in terms of political significance in alleviating and preventing the U.S.-Japan conflict in the economic aspect. They request a flexibility in the execution and management of finance with emphasis on the recovery of individual consumption, through such a measure as the interest policy.

Medium and Small Enterprises: Medium and small enterprises accept as somewhat unavoidable the tax increase for the purpose of financial reconstruction. But many voice their opinions that the tax increase should be legislated for a limited period of time and that during this period the government should carry out a resolute administrative reform and should revert to normalcy when a sound financial basis emerges. Although they rate highly the fact that a bigger tax cut for medium and small enterprises has been approved, the majority feels that the tax decrease for investment in the energy saving is not strong enough to become an incentive for investment technology for medium and small enterprises, as compared with large enterprises.

Because such public utilities as the Japan National Railway rates and the postal charges are expected to be raised and furthermore the budget is to suppress business expansion, many are afraid that such steps may further hurt the economy. Accordingly, many voice their opinions that, as a measure for lifting business, the reduction in the official discount rate should be implemented at an early date. While the budget related to medium and small enterprises was originally proposed by the Ministry of Finance to have only a 0.4 percent increase over 1980 almost at the same level as before, medium and small businesses appreciate that it has become 2.6 percent in the final budget.

Evaluation of the 1981 Government Budget Plans by Major Industrialists

Kind of Industry:
Name:
Evaluation:
Brief Comments:

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Iron and Steel

Yoshinari Yamashiro, managing director of Nippon Kokan.
Somewhat unsatisfactory.
Efforts to cut the expenditures were inadequate, and an easygoing tax increase was adopted.

Nonferrous Metal

Setsuo Takashima, president of Mitsui Mining and Smelting Co.
Generally satisfactory.
The industry appreciates that individual demands by the nonferrous metal industry have been met.

Electric Power and Gas

Gaishi Hiraiwa, president of Tokyo Electric Power Company.
Generally satisfactory.
Amidst the financial reconstruction, energy measures have had a high growth rate.

Petroleum

Hiromu Obori, president of Kyodo Petroleum Company.
Somewhat unsatisfactory.
The budget related to the development of petroleum is small compared to that of other countries.

Automobile

Masaya Hanai, chairman of Toyota Automobile Industry Company.
Unsatisfactory.
Reasons for the tax increase and the increase in public utilities charges are not convincing.

Electric Machinery and Appliances

Hirokichi Yoshiyama, president of Hitachi.
Somewhat unsatisfactory.
The tax increase and the suppressed growth in public works adversely affect the vitality of enterprises.

Industrial Machinery

Ryoichi Kawai, president of Komatsu.
Somewhat unsatisfactory.
Measures in terms of expenditures for the financial reconstruction are inadequate.

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Shipbuilding

Zenji Umeda, president of Kawasaki Heavy Industries.
Generally satisfactory.

About 90 percent of the budget proposal has been approved. A pressing forward in the implementation of the budget is desired.

Chemical Industry

Takeshi Hijikata, president of Sumitomo Chemical.
Somewhat unsatisfactory.

The tax increase as an option with an inadequate cut in expenditures is not desirable.

Defense Industry

Kosaku Inaba, vice president of Ishikawa-jima-Harima Heavy Industries.
Generally satisfactory.

The budget was designed to please everyone, but as a whole it is passable.

Maritime and Land Transportation

Susumu Ono, president of Nippon Yusen.
Generally satisfactory.

The new interest supplement for planned shipbuilding was approved.

Air Transportation

Shizuo Asada, president of Japan Air Lines.
Generally satisfactory.

The industry opposes an increase in airport users' charges as measures to finance the consolidation of airports:

Real Estate

Hajime Tsuboi, president of Mitsui Real Estate Development.
Somewhat unsatisfactory.

The regulation on the housing loan corporation's mortgage loans was unavoidable. A reform of the land tax system is desired.

Construction

Sadao Atsumi, president of Kajima Corporation.
Unsatisfactory.

The guarantee of the amount of construction at the previous year's level was totally rejected.

Food Industry

Bunzo Watanabe, president of Ajinomoto.
Somewhat unsatisfactory.

The tax increase without an administrative reform is one-sided.

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Medium and Small Enterprises

Ichiro Kosuga, chairman of the Medium and Small Enterprises Committee of Tokyo Chamber of Commerce and Industry.

Somewhat unsatisfactory.

The budget was designed to suppress a business boom with a tax increase.

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SCIENCE AND TECHNOLOGY

OUTLINE OF 1981 SPACE DEVELOPMENT BUDGET GIVEN

Tokyo KOKU JANARU in Japanese No 106, Mar 81 pp 65-66

[Text] In a Cabinet meeting on 29 December the government decided on its proposed 1981 budget. The sum of 46,788,100,000,000 yen, an increase of 9.9 percent, went to General Accounts, and government loans and investments were increased by 7.2 percent to 19,489,700,000,000 yen. In aerospace many new programs were included, and the budget turned out to be rather interesting. The Defense Agency was permitted to purchase a new model aircraft, the C-130, and to develop new and used training aircraft. A YXX budget was allocated to MITI and an XJB budget was established. A budget was allocated to the Science and Technology Agency for trial production of the STOL fan jet. In space development, approval was given for development of a practical model of the H-1 rocket. Below is an outline of the aerospace budget for each ministry and agency.

Defense Agency

Total Defense Agency expenses were set at 3,400,001,900,000 yen, up 7.6 percent or 169,816,000,000 yen from last year. This corresponds to 9.1 percent of the GNP which was set at 264.8 trillion yen. Of this, the following items are related to aircraft and missiles.

Aircraft Purchases: A request was made for 58 aircraft, expenditures of 6.7 billion yen, and a Treasury debt of 152.4 billion yen to be borne in subsequent years, a total of 159.1 billion yen. Approval was given for 43 aircraft, expenditures of 5.9 billion yen, and 101 billion yen in a Treasury debt to be borne in subsequent years, a total of 107 billion yen. The new model C-130 cargo plane was approved and except for some items, a large amount of all requests was approved. Let's look at the situation for each branch of the Self Defense Forces.

Ground Self Defense Forces: From a request of 16 aircraft, 14 were approved. All the OH6's were promptly approved. One less than the requested number of both the HU-1H's and the LR-1's was also approved.

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| OH-6D observation helicopters | 8 |
| HU-1H multi-use helicopters | 5 |
| LR-1 communication and reconnaissance aircraft | 1 |
| Total | 14 |

Maritime Self Defense Forces: From a request of 25 aircraft, 17 were approved. The new model C-130 went to ministerial negotiations but of the requested six aircraft only two were approved. Also, only three of the four E-2C's requested were approved. In this case, the remaining plane was taken to ministerial negotiations and ultimately approved. Of a combined request of 12 F-1's and T-2's, eight were approved, 1 more than last year.

| | |
|----------------------------------|----|
| F-1 supporting fighter | 2 |
| E-2C early warning aircraft | 4 |
| C-130H cargo aircraft | 2 |
| T-2 high-grade training aircraft | 6 |
| MU-2 search and rescue aircraft | 1 |
| V-107A rescue helicopter | 2 |
| Total | 17 |

Missile Purchases: Approval was given for modification parts for improved Hawk missiles for one group. [ichi-gun] A plan had been made to use improved Hawks in 4.5 groups out of the 8 and 0.5 groups of anti-aircraft training corps. With this approval, the plan was completely approved.

The decision of whether to use a domestic- or foreign-manufactured missile for the new short-range SAM became a controversial issue in the Diet. There was skirmishing right to the last over allocating the purchase expenses for the domestic SAM. This too was decided through ministerial negotiations. Four sets were approved for the Ground Self Defense Forces and two sets for the Air Self Defense Forces.

Research and Development: Basic design expenses of 2.4 billion yen were requested for the new intermediate-grade training aircraft, a leading item for this year. Approval was given for expenditures of 300 million yen and a Treasury debt of 1.3 billion yen for a total of 1.6 billion yen. This is a new budget and is connected with development so its progress was watched carefully. This began a 7-year project from trial production to testing of the new intermediate-grade training aircraft which will cost a total of 40 billion yen.

In another aircraft-related project, four small fan jet engines were approved for trial production. Five were approved in 1980 so a total of nine will be completed. Approval was also given for remodeling the T-2, mother ship for the test aircraft in CCV research.

In the missile area, approval was given for an intermediate MAT, a ground-to-ship missile, and a portable ground-to-air missile. A portable shoulder-launched missile did not receive approval.

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MITI

The YXX budget has drawn attention as a new budget, and "The Japanese aircraft industry will carry our preparatory planning on its own as a prior condition for cooperative international development." The government will provide three-fourths of the 468 million yen total operating expenses and 351 million yen was allocated for this purpose in 1981. The total operating expenses for the YX/767 development plan will be 4.08 billion yen. Government aid was secured for half this amount, or 204 billion yen. However, no aid was set aside for the development of the three 777 type aircraft which has a lot of potential.

According to government policy, the Nihon Aeroplane Manufacturing Company will be changed to a private business by 1982. With this prerequisite, it becomes necessary to cover losses, and a subsidy of 412,500,000 yen, 82.5 percent of the necessary expenses of 500 million yen, was allocated.

There was renewed promotion of space development in 1980 and a total of 1,071,000,000 yen was allocated for the Earth Resource Satellite ERS-1, 53 million yen from General Accounts and 1,018,000,000 yen from the Alternative Energy Source Equivalent Special Account. The research done with this money will focus largely on technology for processing and analyzing the data sent by the satellite.

Science and Technology Agency

Research and development expenses were approved for an experimental aircraft, the STOL fan jet. The allocation was made for expenditures of 4,370,000,000 yen and a Treasury debt of 3.9 billion yen. This includes 1) expenditures of 3,262,000,000 yen and a Treasury debt of 3,455,000,000 yen for research and development of a low-noise STOL experimental aircraft, 2) 311 million yen for technological research, 3) expenditures of 263 million yen and a Treasury debt of 445 million yen for flight simulation test equipment, 4) 130 million yen for control system function test room, and 5) 395 million yen for other expenses. With this, the main expenses for everything up through trial production of the experimental aircraft has been allocated.

Of 88.2 billion yen in expenditures requested for space development, 85,356,000,000 yen was approved.

This approval included operating expenses for the No 2 stationary weather satellite to be launched in 1981, the No 2 communications satellite to be launched in 1982, the No 2 broadcast satellite to be launched in 1983, and the No 2 ocean observation satellite to be launched in 1984. Design expenses and expenses for trial production of mounted instruments were requested for the earth resources satellite. The design expenses were not approved. Expenditures of 72 million yen and a Treasury debt of 665 million yen were approved for development of synthetic aperture radar and other optical sensors. Also expenditures of 2 billion yen and a Treasury debt of 9,285,000,000 yen were approved for development of a practical model of the H-1 rocket.

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In connection with space shuttle materials testing, 116 million yen was allocated for launching a small materials testing rocket and 370 million yen was allocated for materials tests.

Ministry of Transport (Civilian Aviation Bureau)

The Airport Maintenance Special Account depends on the aircraft fuel tax and the airport use fee for revenue and is used for maintenance of airports and runways and environmental measures. Income and expenditures are 238.1 billion yen, an increase of 8.5 percent over the previous year. The expenditures include 62.2 billion yen for airport maintenance, an increase of 7.7 percent; 2.5 billion yen in study expenses for the Kansai International Airport, more than double the previous figure; 3 billion yen in public corporation expenditures, one-third the figure for 1980; 102.5 billion yen for environmental measures, an increase of 14.2 percent; and 9.6 billion yen for runway maintenance, an increase of 13.5 percent. The corresponding income is 97.4 billion yen from General Accounts, the same amount as last year; 120.5 billion yen from airport use fee income; and 20.2 billion yen in miscellaneous income. Approval was withheld for the incorporation of the total amount of the Traveling Tax into a special account (amount requested: 70.8 billion yen) or the introduction of a borrowing system (amount requested: 2.5 billion yen) requested to start this year.

Maritime Safety Agencies

Approval was given for one 200T Beachcraft and two Bell 212 helicopters.

The sum of 7.5 billion yen was allocated for aircraft maintenance, including the amount continuing from previous years, and 340 million yen was allocated for original equipment for bases.

Ministry of Posts and Telecommunications

To promote space development and utilization, approval was given for expenditures of 1,922,000,000 yen and a Treasury debt of 949,000,000 yen. This includes expenditures of 821 million yen and a Treasury debt of 800 million yen for promoting the use of applications satellites, 840 million yen for experimental research on communications and broadcast satellites, 21 million yen for development of air and marine communications technology using satellites, 18 million yen for a multi-beam antenna for satellite use, expenditures of 28 million yen and a Treasury debt of 49 million yen for research and development for high-precision position measurement technology using radio waves in space, and 14 million yen for second generation applications satellites.

Ministry of Education

Expenditures of 11,244,000,000 yen and a Treasury debt of 3,932,000,000 yen were allocated especially for development of No 8 through No 11 satellites and the No 3 M-35 rocket for use with the No 8 satellite, and also for space shuttle experiment participation expenses and comprehensive combustion testing equipment for the M rocket.

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National Police Agency

One medium-sized helicopter and one small helicopter were budgeted. The total budget is 641 million yen for the two machines,

Fire Defense Agency

The sum of 188.5 million yen was allocated to subsidize one-third of the cost of one medium helicopter and one small helicopter.

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SCIENCE AND TECHNOLOGY

FUTURE MODE OF COMPUTER EXPORT OUTLINED

Tokyo COMPUTOPIA in Japanese Vol 15, No 172, Jan 81 pp 85-89

[Article by the Editorial Office of the journal]

[Text] Computer Export Gaining Momentum

The export of computers and related manufactured goods has steadily increased. It is not that each corporation reports every achievement with fanfare to the public, but the importance of exports has come to weigh significantly in computer related sales. The number of information industry enterprises that make a name as an exporter increases every year, and also the export articles have been diversified. The separate table lists the names of corporations with realized export records classified by the major export articles. The recent characteristics of export achievements are the rapid increase of a new export article, namely, personal computers, in addition to the very glamorous universal computers, IBM plug compatible CPU and office computers, and the distinguishable large size purchase agreement in the field of peripheral machinery and equipment. In general, the current trend is characterized by the diversification of the export goods and the appearance of small commodities in association with this.

Separate Table: Export Models and Makers (typical examples)

| | | |
|-------------|--|--|
| | IBM Plant Computer CPU Universal Computer System Office Computer | Fujitsu, Hitachi Fujitsu, Hitachi, NEC NEC, Mitsubishi Electric, Matsushita Communication Industry, Sharp, Bantic(?), Uchida-Yoko Sord Computer System Inc, Logic Systems, Ai Electronics Corporation, Sharp |
| | Home Computer | Hitachi, Toshiba |
| | Mini Computer for Control Use | |
| peripherals | Magnetic Disk | Fujitsu, Hitachi, Nihon Shuhenki, NEC, Hokushin Electric |
| | Serial printer | NEC, Oki Electric |
| | Line printer | NEC |
| | CRT Display | Mitsubishi Electric |
| | Data Entry System | Toshiba |
| | Communication Terminal | Oki Electric, Toshiba |
| | Others (OCR) | Hitachi, Toshiba, NEC |
| | Software | NEC, Software AG |

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The 9 October 1978 issue of the American economic journal, FORTUNE, reported: "The Japanese computer makers are indeed beginning to make their presence felt abroad. They have shipped a few large computer systems to the United States, Australia, Korea, China, and even Iraq. Scores of self-contained, small business computers are humming away in Australia. Japanese peripherals, from printers to disk and tape drives, as well as specialized computer terminals, have cropped up almost everywhere...." ELECTRONICS dated 27 March 1981 introduced the Japanese offensive, "Now, however, the Japanese want to increase the volume of computer products so that exports by 1984 surpass imports. Furthermore, they want to sell complete systems under their own brand names, and they view success in the United States as the cornerstone of their plans to expand their export to the rest of the world. The American computer industry has mixed feelings about the Japanese. Most industry observers agree the Japanese are ready to take the plunge...." Japan's computer exports have truly been transformed from an insignificant to a prominent existence, and achieved in part results so much as to give a threatening impact in the last 5 years.

A specific example is shown in the separate figure, using the export results of major main framers. Fujitsu which has contrived to grow into an international corporation earlier than the others, is expected to have exports of 44 billion yen in 1980, a 20 percent increase compared to the previous year. The Nippon Electric Company (NEC) forecasts a 25 percent increase to 15 billion yen. The Hitachi's projection is 15-17.5 billion yen. The export growth was curtailed by the unexpected happening of the American ITEL abandoning the computer business. However, shipping of CPU and OEM has resumed (a monthly average of 5-6 units) for the delivery of goods to American NASCO, West German BASF, Italian Olivetti Computers, and the export ratio has recovered to the level of the days when goods were exported to ITEL. Furthermore, Mitsubishi Electric, Toshiba and Oki Electric, the three companies with previous smaller export values in yen have set up a goal to double the amounts of the preceding year.

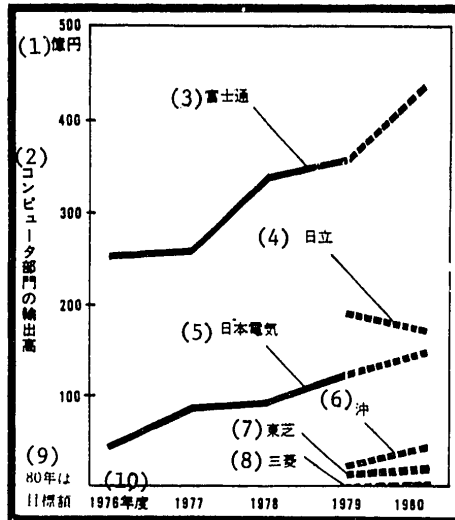
American reviews be what they may, Japanese makers have implanted exports as the great strategic pillar of the 1980's. The public announcement by Fujitsu revealed the export ratio to the total computer sales to be 30 percent, Hitachi 20-25 percent and NEC 20 percent. Yes, they are throwing their hot eyes on overseas markets.

On the other hand, what shows an explosive growth is the personal computers, which are in the class of computers sold from 700-800,000 yen to 2 million yen per unit. Sord Computer Company received tentative orders of 2,000 units from a French cosmetic company and of 5,000 units from Swedish manufacturer, and is planning to plunge into the local production in the EC (European Community) within 1981. The Logic Systems International which put the business use personal computers with micro computers in the market, exports the products to Europe and Brazil, and particularly in the EC, the sales pace has reached the mark of about 200 units/month. Even from customs clearance statistics, the rapid personal computer export increase is shown distinctively. For example, about 6,900 units cleared customs even in the short period of January to June in 1980, which was a 12-fold increase compared to the same period in the preceding year. It already indicates a tremendous potential that is likely to approach an annual export mark of 20,000 units.

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Separate Table: Export Results of Major Framers (partially estimated)



Key:

- | | |
|-----------------------------------|------------------------------|
| 1. 100 million yen | 6. Oki |
| 2. Export yens of computer sector | 7. Toshiba |
| 3. Fujitsu | 8. Mitsubishi |
| 4. Hitachi | 9. 1980 figure is projection |
| 5. NEC | 10. Fiscal 1976 |

The success of these companies, who started in the computer business earlier than others, are stirring up the other companies' urge for computer exports. The maker's approach to the computer business also has greatly altered from the development and production of computers focusing on domestic needs to the development and production for anticipated international needs.

Micro Computers and Personal Computers as Springboard

Computers born and raised in America once swept over the international market. But now, they are being reborn as a new international commodity by the hand of Japanese makers. This is attributable to the following reasons: Japan's high production technology standard, the will and desire to develop new markets, and the back-up by MITI which chose to remain behind the scene. There are two more items in addition to the above that have rendered a powerful tractional force. One of them is the aggressive development of new LSI (large-scale integration) and its application to computers, the positive utilization of micro computers based on LSI. What made this possible is the development of a high performance, low-cost, micro-computer-base, inexpensive and manageable personal computers as a result of the incorporation of LSI, which are not meant for the hobby market but are meant to spread in the business use market that can certainly be expanded. LSI and micro-computers are adopted one after another to peripheral and terminal computers and office machinery and equipment, and brought up as competitive commodities.

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And the other factor is the materialization of Japanese language data processing. Processing in Japanese sentences written uniquely in a combination of Chinese characters and the Japanese alphabet, originated in the field of office computers rather than in large computers. In the spring of 1978, an office computer with a Chinese character processing function was introduced, which consolidated its position as a very familiar machine among the smaller business computer users. Starting from fiscal 1979, Japanese language data processing systems incorporated in medium and large size computers have been presented one after another by the makers. Functions of CRT display, printer and support software were rapidly improved, and surpassed by far the imported foreign products. Furthermore, the support in Chinese characters implies the establishment of a technology that makes the computer manageable in the native language of any country in the world. This proves to be an effective weapon for computer exports to the People's Republic of China, which is doubtlessly considered to offer a tremendous future market.

Computer exports were boosted immensely by micro computers and personal computers, and were further pushed upward by the Japanese language processing function. This can be said to be the main stream of computer exports from 1978 to 1980.

American IBM AFE (a subsidiary in charge of both North & South America and the Far East) transferred their total management responsibility for business to China to IBM Japan (1980). Burroughs Corporation opened up Burroughs Engineering Center in Japan (April, 80, Yokohama), NCR Japan established their System Engineering Center in Tokyo (1979). American Honeywell Information Systems set up an office for the Southeast Asia Area (1980), American Sperry Univac used the services of Univac Japan and Oki Univac for business talks involving the Chinese market. These various movements indicate that they are following the movements of the Japanese makers who are one step ahead in mastering the Japanese language data processing, and acknowledge that the key to advancement in the Southeast Asian markets with China in the center is found in Japanese technology. Foreign affiliate computer corporations who delayed in coping with Japanese language processing have not yet recovered from the damage except for IBM Japan, who has been preparing for the new direction and has already disclosed a Chinese character system in the World Fair in Japan. Japanese makers now have a once in a lifetime chance, indeed.

MITI's Policy Transition

MITI has always backed up the progress of the Japanese computer industry. Particularly when it concerns computer exports, the agency firmly remains in the background and is hardly ever seen on the forefront. Rather, MITI concentrated their efforts on the facilitation of the super LSI development projects, building of a cooperative structure for export-oriented industries, and guiding the domestic makers on how to swim in the waves of international reorganization lest the Japanese makers be internationally isolated. However, none of the direct measures which have been planned for some time, themes such as JECC Overseas (Japanese electronic computers joint rental company), Overseas System Assistance, New Sakuramaru (crusing sample fair) and establishment of Computer PR Center, have not materialized. They are obstinately, faithfully adhering to the policy

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of leaving the matter of gaining access to overseas markets to private enterprise. What kind of views on the matter of computer exports will be introduced in the interim report to be presented as early as the end of 1980 at the Information Industry Subcommittee of the Industrial Structure Council? This report will be one of the keys.

In the "Long Term Outlook for the Electronic Industry" compiled recently by the Japan Electronic Industry Development Association, "Internationalization and Establishment of Order" was picked as one of the proposals, and it advocated: "In the highly expanded and fluidized international economy, the electronic industry cannot also be constrained within the economic frame of one nation. Under the international perspective, trade movement, capital investment, advancement of business overseas and transfer of technology must be promoted. Especially, for those enterprises which engage in multinational business practices, it is necessary and indispensable that they respect the individual nations' position and make an effort to find a rule for mutual coordination." This very electronic industry can literally fit the description of the computer industry itself, and the report is suggestive of MITI's future programs.

Indeed, MITI's policy is changing its course largely from "nurturing of domestic production" to "evasion of international friction." The automobile and semiconductor trade disputes are still smoldering. Meanwhile, the material procurement issue of the Nippon Telegraph and Telephone Public Corporation (NTTPC) has been revealed, and has not yet been resolved. A new policy direction is implemented due to the necessity for the computer industry, information industry, in a broader sense, to avoid at all costs making the same mistakes. As if to speak for this new line of thinking by the MITI, already two new ideas for international cooperation have been introduced in newspapers since the beginning of 1980.

Both were reported by the NIPPON KEIZAI SHIMBUN, and MITI's posture in trying to give new direction to the information industry policy is extensively introduced. One of the articles explained: "MITI is thinking of asking IBM to participate in planning the communications satellite project of ASEAN (Association of South-east Asian Nations) to make it a Japan-U.S. joint venture" (dated 10 August 1980). Other newspapers once or twice reported negative comments by MITI, "not investigated" or "never likely." There is no definite way to know whether the article was MITI's shot at an advertisement balloon. However, what is notable is the fact that the computer communication service, a potential new growth industry of the 1980's, was chosen as a test model, and IBM, the largest computer line business enterprise as well as the subscriber for the American Satellite Business System that is to launch three commercial communication satellites for business use, was named specifically as the partner for cooperation.

Another idea was reported on 21 October 1980, supposedly from a government source. "The fifth generation computer joint research and development plan for practicalization in the 1990's, by five nations--Japan, the United States, West Germany, England and France" is said to be embodied when "each nation's government agency agrees basically upon the joint development proposal presented by the Japanese Government. After a conference of specialists is held in Tokyo by the five nations in 1981 to come to a uniform understanding as to the functions and the

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roles of the 5th generation computers, a definite joint development plan is then to be formulated...." Although they say this story came from a government source, it is obviously a conception by MITI. Even here, they designated international harmony by international cooperation as the primary purpose of the action: "Since the 5th generation computer which substantiates basic technology for future industry is extensively applicable, we would like to direct Japan, a country based on technology, to make an international contribution through international cooperation." (the same newspaper)

These two ideas by MITI may sound unprecedented. And probably, neither of the two will start to work out as MITI wished. Nevertheless, what is noteworthy, in the bottom line of the thought, is the presentation of the premise that MITI's policy posture is subject to change by suggesting the necessity to avoid potential trade friction, the necessity for Japanese industry itself to break out of the conventional protective shell. Yes, certainly we should interpret it as such.

One of the bad examples is the automobile industry. Profit taking was the main concern and the international harmony was slighted. Japanese cars are proven to be excellent, but the political issue is involved and the industry is frustrated. Without a strategy for international harmony, even superior commodities may be emotionally or politically vulnerable to a boycott. For another example, NTTPC's material procurement issue will be singled out. Without making an effort to screen the hopes and the fundamental intentions of the American government and industries, NTTPC handed them a "wash rag and a bucket" only to aggravate the already existing problem. Well, there is no multinational corporation per se in its true sense, in Japan, and Japanese companies are immature in dealing with international harmony, as is clearly illustrated by these two cases. It is MITI that expediently caught this new movement and tried to alter its posture although it is slightly scented with an advertisement balloon effect. MITI is trying to reflect its new direction in handling of the matters related to the information industry. This means that in the 1980s, computer exports must be viewed in a new perspective known as economic diplomacy. The most effective tool of international harmony is the joint venture and joint research. British ICL and West German Nicsdorf Computer wedged themselves into the American market without inflicting frictions by using the formulas such as purchasing of local businesses and the assimilating of the local business practice.

The issue of the automobile industry has already escalated to the scene of verbal battles between American industries and the Japanese Government. This issue of the NTTPC has entered into the government to government level. Computers and the office automation (OA) machinery and equipment have not yet reached a level of trouble involving the government to a great extent, but remain in the level of the private sector versus private sector marketing race. It is now the time to take some conciliatory measures on the private level, which will eventually result in a great plus for the Japanese information industry.

Remaining Issues

There are many other problems unsolved yet in regard to computer exports. At one glance, they look like nothing but the accumulation of favorable export results,

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but they are mainly composed of OEM supply. If the current trend continues, the Japanese data processing might even fall into the state of being sub-contractor for the information machinery and equipment production. Indeed, a universal computer system is also exported, but the majority of the transaction deals with OEM export for IBM plant computer's CPU. Furthermore, the makers that manufacture IBM plant computer CPU are often deprived of a greater part of their potency as they must always devote themselves to follow in the wake of IBM. In past practice, Japanese electronics makers started with a dead copy of a product of an American maker, a partner of their business tie-up, but assimilated the know-how and soon ended up with an original product which eventually led to the present prosperity. Although they made Japan's outstanding advancements felt in the field of computers by developing Japanese language data processing, nothing worthy of mention came out in other categories. Even in the office computer field in which Japan specializes, they are greatly influenced by the concept proposed by IBM which has only a small market share.

The second point of the argument is software. Superior hardware production was demonstrated by the OEM export for IBM plant computer CPU and the export of personal computers and peripheral terminal computers and equipment. In contrast, only a handful of software were proven worthy. It is urgently desired that internationally acceptable software conducive to the sale of hardware be made.

The third point concerns the computer communication services that claim the title of the 1980's new information industry. Though not directly relating to exports, we must be aware that there is a sizable restriction at the dawn of the communication era when computers and communications join hands. Specifically, strapped by the monopoly of communications by NTTPC and KDD, the utilization of the computer communication services will be restricted to the old and conservative controls and restrictions. The Japanese information industry was raised under the free trade system along with the United States, and earned the title for Japan as the world's second largest computer country. However, entering the computer communication era Japan will go into competition under controls and restrictions, a condition entirely different from the United States. It is possible that the growth that we will see may be different from what we are accustomed to under unharnessed freedom.

The fourth question is the geographic balance of the export. According to the data obtained by the Industry and Economics Bureau of the U.S. Department of Commerce (WEEKLY PIKO, 20 October 1981 issue), the computer export ratio in the first half of 1980 was 53 percent to the EC, 9.9 percent to Canada, 13.3 percent to the Far East, 7.1 percent to Latin America, 1.2 percent to the Middle and Near East, 1.0 percent to the communist block and 14.5 percent to other areas. Our remaining homework is the question of how to set up priority areas and how to go about laying a foundation for a friendly relationship.

Just as 5 years ago, there are many other remaining subjects, for example, such as compilation of manuals, support systems, education, PR and capital. These will be, however, hopefully resolved one by one by achievement and experience.

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SCIENCE AND TECHNOLOGY

CURRENT RESEARCH PROGRAMS AT TSUKUBA UNIVERSITY DISCUSSED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 7 Jan 81 p 4

[Text] Japan-U.S. Major Earthquake Experiment

Starting in March, the world's first large-scale experimental earthquake proof plan--a Japan-U.S. joint research project--will be initiated at the Architectural Research Laboratory (Director: Seiji Nakano). It is an attempt to apply major earthquake-scale tremor to a steel reinforced, seven storey building (medium size) in order to scientifically analyze its destructive force first hand and to explore the possible factors that would make for a better earthquake proof design.

This joint Japan-U.S. experiment is a three-year plan. As there had not been any major scale demolition experiment using an actual (medium size) building up until now, it is drawing attention for earthquake proof building engineers and disaster specialists all over the world. Inadequate earthquake proof design was one of the causes of loss of many lives in Algeria and Italy. Amidst the series of disasters that struck, the ironic result was that modern buildings build recently offered no resistance at all to the quakes.

Although Japan is a country known for its earthquakes, the United States as a whole has had relatively few earthquakes, though there have been quakes on the West Coast. In terms of earthquake proof building construction and their diffusion Japan is more advanced, and the two countries differ in their expectations from the current experiment, too. Japan and the United States also take differing approaches to building design. In Japan, steel reinforced concrete pillars and cross-beams are used and the space in between is filled with earthquake proof walls. In the United States such cross-beam construction is either not used at all or else, a section of the flooring is thickened to take the place of cross-beams. For this reason, the representatives from the two countries had much discussion and debate with regard to the design for the experimental building.

Moreover, it has been said that Japan's earthquake proof, safety technology has had an element of over-kill. Such design is not only economically wasteful but at times also reduces the earthquake resistance level, as well. On the other hand, the U.S. standard has traditionally been too lax. Thus the United States has focused on Japan's construction method which has paid ample consideration to the earthquake resistance/safety feature; and the chief aim of the current experiment is to obtain direct proof of the superiority of this construction method via earthquake resistance experiment using an actual size building.

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The Architectural Research Laboratory Third Research Section Chief Tan Watanabe states that, "Japan's earthquake safety level is set too high, and how much fat we can trim off is one of the fact finding objectives of the experiment. It is said that 1 trillion yen worth of buildings are constructed each year. If we can shave off even 1 percent of concrete that is used, that would mean a substantial saving."

This experiment originated when a U.S. earthquake proof engineer spotted the Architectural Research Laboratory's "actual size experimental structural pillar." A talk regarding cooperative research, personnel and information exchange followed, and in August 1979 an agreement to implement the project was concluded between the Ministry of Construction, Science and Technology Agency and the U.S. National Science Foundation. Researchers from the University of California and the University of Michigan took turns to come to Japan, and preparation for establishing the world's first large-scale plan for earthquake proof experiment was set in motion.

The experiment will be conducted at the Life-size Structural Experiment Facility. At this site, there is a solid concrete wall 25 meters high (from the base floor) and 6.6 meters thick, and the experimental building will be constructed next to it. It will be a 7-storey building (about 23 meters high) made of steel reinforced concrete. It will have not only the structural prerequisites such as pillars and beams but it will also have all the features of an actual building--outer and interior walls, water pipes, drainage system, gas pipes and other interior plumbings. In the space between the aforementioned wall and the experimental building, a power jack operated by oil pressure will be installed. This jack will apply horizontal vibration simulating earthquake tremors. In an actual earthquake, different floors of the building will be subject to different tremor levels and thus, in order to apply differing force to the floors, each floor will have a separate jack. The uppermost floor, however, will have two jacks; and therefore, there will be a total of eight jacks.

At present, the experimental building has been concreted up to the sixth floor, and the measuring devices will be installed soon. From about 15 March small earthquake simulation tests--preliminary experiments--will be conducted and thereafter, great earthquake--the kind that comes every 200 years--simulation tests will be carried out. After having destroyed the building to some extent, repairs will be made and the type of earthquake that occurs every 10 years will be simulated and the effectiveness of the outer and inner wall repairs will be examined. The testing is expected to take the rest of the year.

This experiment is structured in such a way so that the progress of actual earthquake destruction which takes only a few minutes are stretched out to 10,000 times the duration, which will enable careful observation. During the process an industrial television will record the phenomenon in its entirety, and the distortion of pillars and beams, slant of floors, stress on concrete interior and steel reinforcements will be quantitatively recorded. Moreover, the "fissure measuring device" will measure the direction and location of cracks and record the results in numerical terms.

Ample data anticipated from this project were not available at all previously, and they will be very valuable. Analyses of these data will reveal the weak points

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of the building, and an economical and rational earthquake proof building design method can be established based on the project's findings. It is anticipated that an international technological standard for earthquake resistance/safety will eventually emerge from this experiment.

World's Foremost Artificial Diamond

The Inorganic Materials Research Laboratory (Director: Kokichi Tanaka) is about to take on a challenge of producing the world's largest (maximum crystal size: 1 centimeter) diamond crystal. It has developed a super high pressure generator device which will become the heart of synthetic diamond production, and preparation for test production is under way. As of now, testing will begin in April, and by this summer, it is anticipated that a large man-made diamond which surpasses U.S. General Electric Company's 5 millimeter size stone by far will be fabricated.

Diamond, as everyone is aware, is the hardest substance on earth. It is used in planing metals such as aluminum and brass or finishing/polishing the inside of an automobile engine. According to the Ministry of Treasury's customs clearance statistics, Japan imported about 19.2 million carat (1 carat = 0.2 gram) worth of industrial diamond for these purposes during 1979. In monetary terms, this represented approximately 16 billion yen. Japan surpassed West Germany in industrial diamond consumption volume and became the Number Two country, next to the United States, as an industrial diamond consumer.

In order to respond to this kind of industrial need, the Inorganic Materials Research Laboratory has been conducting diamond synthesization research. Thus far, it has successfully established a diamond crystal growing technique which yields 3 millimeter size crystal through a temperature differential method. By following the same procedure Japan--Inorganic Materials Research Laboratory and other institutions--has been able to consolidate a technology which enables mass production of 0.3 millimeter size gems.

But demand for industrial diamond is said to center around 1 millimeter size synthetic stones--in part due to the dresser stone shortage, a substance said to be indispensable to the precision machine processing. And the truth of the matter has been that a 1 millimeter synthetic diamond is hard to make. For this reason, the Inorganic Materials Research Laboratory project's auxiliary target is mass production of 1 millimeter size synthetic diamonds which are in high demand industrially through the use of a large facility for producing 1 centimeter stones. The Inorganic Materials Research Laboratory Coordinator/Researcher Osamu Fukunaga, who is engaged in creating high purity, high quality diamond and/or large size diamond, speaks optimistically about the future: "At the present stage, the goal is in sight."

The successful single crystal diamond production method up to now has involved the following: Carbon atom is dissolved in metallic solute in the high temperature, high pressure diamond stabilization area and then redeposited. This method has two techniques--membrane growth technique and temperature differential technique. Both deal with 50,000+ pressure and over 1300 centigrade temperature. As metallic solute, nickel, cobalt, iron are used. As a method for synthesizing a large crystal, the temperature differential technique is thought to be the more appropriate of the

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two alternative methods. The General Electric Corporation of the United States has actually succeeded in getting a 5 millimeter (about 1 carat) crystal in one week. It is transparent with a jewel-like quality and no peritectic substance. Moreover, impurities are appropriately under control. Colorless as well as yellow and blue crystals have been successfully synthesized.

Meanwhile, the Inorganic Materials Research Laboratory has made a 3 millimeter size diamond using the same method. It has also obtained a high purity diamond in which the atomic number of the impurity--nitrogen--is 10^{16} cubic centimeter. But in Japan's case, "although the level of research is the third highest in the world, exceeded only by the United States and the Soviet Union, we are behind in terms of practical application. This is due to problems regarding the diamond's quality." (Coordinator/Researcher Fukunaga) This applies not only to man-made diamonds but it can be said of fabrication of cubic crystal nitric boron which has a crystal structure similar to diamond and about the same hardness. That is, there is a gap between the United States and Japan in terms of pressure accuracy--that is, in terms of control technology.

The super high pressure generator at the Inorganic Materials Research Laboratory is cut into 14,000 ton press and it can generate about 100,000 atmospheric pressure for large test material and a maximum of 200,000 atmospheric pressure for small test material. This pressure generating chamber has an inside diameter of 25 millimeters (effective diameter is 7 millimeters). Given this measurement, the 3 millimeter product that we have obtained from it is about its maximum production capacity.

For this reason, in order to meet the challenge of synthesizing the world's largest artificial diamond, the Inorganic Materials Research Laboratory is working to develop a "flat belt" system whose growth chamber size is about 75 millimeters--three times the traditional pressure model growth chamber. This is not only the challenge of obtaining a larger size. Creation of a high quality synthetic diamond is the aim, and the plan is to reduce the nitrogen content of 100 ppm (which affects purity level) to 50 ppm and eventually down to 30 ppm.

At the present stage, equipment installation will begin in February. By July or August at the latest, 1 centimeter particle size, the world's first man-made diamond will make its appearance. "If all goes well, we can manufacture them on a monthly order/production basis." (Coordinator/Researcher Fukunaga). It is expected that this project will initiate new demands such as device pick-up equipments and semi-conductor's heat radiation base.

Nuclear Fusion Experiment Facility (TPE-2)

High Beta Plasma Movement Explained
(Consolidated Electronics Technology Research Center)

Nuclear fusion is thought to be the prospective core of the 21st century energy source. The Energy Testing Wing of the Industrial Science & Technology Agency's Consolidated Electronic Technology Research Center (Director: Tatsuji Nakajima) is focusing its effort on the coating operation of the vacuum container which will become the heart of "TPE-2"--Compressed Heat Nuclear Fusion Experiment Facility--the so-called high beta pinch.

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At present the great goals of Japan's nuclear fusion research are to construct an experimental facility where they will test plasma to reach critical temperature, and to realize low beta tokamak and reactor grade plasma which originates from its supplementary heat. But in order to create a nuclear fusion furnace via tokamak facility, beta value of the plasma must be raised.

For this reason, under the Second Strata Basic Research Development Plan promulgated by the Japan Atomic Energy Commission, the Consolidated Electronic Technology Research Center will take charge of the research concerning the high beta (torus) equipment, and research will be conducted with the goal of clarifying the high beta plasma movement up to plasma temperature of 10 million degrees.

With regard to JT-60 class large size tokamak, at the present time, the United States has the TFTR; in Europe, there is JET, and the Soviet Union has built T-15. In all instances the next step of the testing facility will bring an increase in construction cost resulting from going to a bigger facility. Thus, betterment of plasma beta value is becoming more and more important. The U.S.-Japan joint experiment "Doublet III"--a large size, non-circular sectional tokamak--is a testament to its significance.

The history of nuclear fusion research at the Consolidated Electronic Technology Research Center is long, and it has yielded many successful achievements up to now. During the initial stage, an attempt was made on the toroidal screw pinch research. High beta plasma was generated efficiently using the pinch effect, and it was locked up on the tokamak model magnetic field. The major facility during the initial stage (TPE-1) revealed that even for plasma with beta value of 10 percent or so, stability factor must be maintained against torsion (shear) instability as in the case of low beta tokamak; and the name of Tokamak mode was given to this phenomenon. In this, Japan led the world. In recent years, this kind of facility is called high beta tokamak throughout the world.

In addition, the same research produced Japan's first non-circular sectional facility and proved the superiority of high beta lock up. Recently, the Center has employed a new method called (TPE-1R), a nuclear fusion research facility using the "reverse magnetic field pinch" and was successful in locking up nuclear fusion plasma with a high degree of stability for the first time in Japanese history.

In this manner, the Consolidated Electronic Technology Research Center is conducting high beta plasma lock up research using axial symmetry torus magnetic field with a view to converting Tokamak model facility to a high beta unit. But in order to conduct tests at ever higher temperatures, it has started to construct TPE-2 (pressure heated nuclear fusion test facility). At present, it is hurrying to put the finishing touches on the main electric discharge facility unit and is planning to begin preliminary testing at the low magnetic field in late March.

According to the plan, the goal of the magnetic field intensity tests is to lock up approximately 4 million degree, beta value 10 percent plasma for 0.4 milliseconds. Its aim is to clarify the high beta limits of Tokamak model plasma. Accordingly, at the beginning of preliminary tests, "the experiment will be considered a success if 1 million degree, beta value 10 percent plasma can be locked up for 100 microseconds. (Consolidated Electronic Technology Research Center, Energy Plasma Laboratory Chief: Ken Tamaru)

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High beta (pinch) Tokamak--(TPE-2)--is a secondary stage high beta plasma research's main unit having a linear, oval cross-sectional structure the aim of which is to lock up high beta plasma at 4 million degrees temperature range. "It will serve as a decisive standard in determining the direction of future tokamak development (Tamaru)"; it holds the key to whether or not JT-60 test facility can be scaled up or not.

Its characteristics are as follows: It has a toroidal magnetic field coil, double coiled; and by directly connecting two 80 kilovolt high voltage capacity banks, it provides 160 kilovolt/turn.

Radiation Light Experiment Facility

The dream of researchers in the materials science field is "stronger light and wider variety of light." An attempt to realize this dream is the High Energy Physics Research Center's (Director: Tetsuji Nishikawa) synchrotron radiation light--"light factory." Energy involved here is 2.5 billion electron volt, and the largest in the world. At present, within the High Energy Physics Research Center complex, a construction of this "factory" is under way at a high pitch, with the total cost of approximately 17 billion yen. By the end of this year, a portion of this "dream light" is expected to be produced.

"Light factory" is a facility which employs a large-scale electronic accelerator to produce various wave lengths lights ranging from polar ultra violet ray to X-ray. It is an attempt to reproduce an atomic and molecular world, invisible to the human eye, in various forms.

At present, the optical microscope is used to see minute objects, but atoms and molecules are not directly visible even with the aid of this device. That is to say, if the light's wave length is greater than the "object" one intends to see, that "object's" location and shape are blurred. Atom and molecule size range from $\frac{1}{1,000,000}$ centimeter (100 angstrom) to $\frac{1}{100,000,000}$ centimeter (1 angstrom). If there is a light which has a similar wave length to these, then the atomic and molecular world would be visible to us.

Therefore, all over the world, there is a search for this dream light, and effort is being made to create an atomic accelerator specifically for radiation light. If such a facility is available, heretofore impossible measurement experiments can be conducted. In addition, it can certainly be used in industrial technology such as the manufacture of super-LSI (large-scale integrated circuits), and "it is possible to apply it to natural sciences and technology fields in ways that defy our present ability to predict." (High Energy Physics Research Center Teaching Staff and Chief of Radiation Light Testing Facility, Light Source Research: Kazuo Tomiya)

When an electron is moving within a vacuum at nearly the speed of light, if its path is bent with electro-magnet, synchrotron radiation light is produced in the direction that the electron was traveling in the first place. This radiation light is made up of rays of various lengths. What wave length ray is produced depends on the speed of the moving electron--that is, it depends on its energy level. If the electron's energy level is low, then the main part will be a visible ray with

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relatively long wave length. If the electron's energy level is great, then shorter wave length X-rays make up the bulk.

Japan's materials research using synchrotron radiation ray has led the rest of the world. In 1962, Tokyo University Atomic/Nuclear Research Center began its operation at 7.5 billion electron volt. Physicists concerned with property of matter pioneered a new field in softened X-ray spectroscopy using the synchrotron radiation ray thus generated. In search of a stable and strong light source, the same center completed a 300 million electron volt electronic storage ring in 1975. This can be termed the archetype of the High Energy Physics Research Center's radiation ray experiment facility.

Then a world wide move to create an atomic accelerator for radiation ray that would have a wide range of applicability began. England was the first to succeed. Last spring, it established SRS in Dewsbury. The energy level of this facility is 2 billion electron volt. The United States is planning to complete a 2.5 billion electron volt (NSLS) facility at Brookhaven National Research Center.

The radiation ray testing facility at the High Energy Physics Research Center is a large-scale facility comparable to the ones in England and the United States. It is made up of injector, light source and measurement device. The injector is an electronic lineac (linear accelerator) 400 meters long. Electrons fired from an electron gun, by passing through this device, become several masses and are accelerated up to 2.5 billion electron volts.

The light source is the electronic storage ring. It is an oval-shaped accelerator 68 meters in length and 50 meters in width. Electron accelerated by electronic lineac enters this chamber and while being pressed with electro-magnet, it circles inside the 87-meter ring for nearly 10 hours. Inside the pipe is kept at a super-vacuum state ($\frac{1}{1 \text{ trillion pressure}}$) equivalent to that found in space. The electronic storage ring has several deflector electromagnets for changing the electron's direction. In a process not unlike water drops falling outward from a revolving wet umbrella, the radiation rays are released from the storage ring.

The deflector electric magnet in the electronic storage ring is an electromagnet with 10,000 gauss strength. But by installing a 60,000 gauss capacity super electro-conductor magnet, it is possible to suddenly bend the orbit of electrons. Thus, one of radiation light's special features is the ability to obtain rays of various wave lengths at will according to the object of the experiment.

Construction of the gigantic building which will house the 200-meter length electronic lineac has been completed. Now, installation of electronic lineac is being dispatched. The light source wing which will house the electronic storage ring and a building which will contain various measuring devices are under high pitched construction. In the experiment room, various radiation lights will be channeled through 6 (10 in future) main beam channels. Full-dress light "production" is expected from spring of 1982, and it is likely that a portion of the "dream light" will be produced by the end of this year.

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SCIENCE AND TECHNOLOGY

EXPERIMENTAL ROCKET LAUNCHES IN SUMMER 1981 DESCRIBED

Tokyo ROCKET NEWS in Japanese No 18, Aug 80 pp 5-8

[Text] The experimental rocket launches this summer are scheduled as follows:

| Model | Launch date | Period of launch preparation days | Launch time |
|-----------------|----------------|-----------------------------------|------------------------------|
| K-10-14 | 26 Aug (Tues) | 27 Aug - 7 Sep | |
| K-9M-70 | 29 Aug (Fri) | 30 Aug - 9 Sep | 1940-2010 |
| K-9M-71 | 4 Sep (Thurs) | 55 Aug [sic] - 9 Sep | 2145-2215 |
| MT-135P T-28 | 10 Sep (Weds) | 12 Sep (Fri) - 25 Sep (Thurs) | 1030 - 1100 hrs 1500-1530 |
| TT-500 A-8 | 11 Sep (Thurs) | 12 Sep (Fri) - 25 Sep (Thurs) | 700-730 hrs 1030-1100 |
| MT-135P T-29 | 12 Sep (Fri) | 13 Sep (Sat) - 25 Sep (Thurs) | 1030-1100 hrs 1500-1530 |

Note: 26-28 Aug 2030-2100
 29-31 Aug 2020-2050
 1-2 Sep 2010-2040
 3-5 Sep 2000-2030
 6-7 Sep 1950-2020

Scientific Observation Rocket (From SES Note No 604)

Model K-10-14

By using Model K-10-14, 2 observations and 1 experiment will be carried out. One of the two observation projects is study of the galactic plane with the infrared telescope cooled with liquid helium. This will make it possible to survey the depths of the galaxy which are unobservable given the light of our atmosphere. The other project is to closely observe the Swan loop, that is the remnant of supernova, by using the newly invented and developed Hadamard's X-ray telescope. Also, a test is to be performed with the attitude meter that uses the

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CCD element. The meter was developed to more precisely determine the direction to which a rocket or an artificial satellite is heading by reversely using several stellar positions. After launching, the K-10-14 will be controlled to turn the X-ray telescope towards the Swan loop, and to direct the infrared telescope towards the galactic plane in the manner as if it were sweeping through the plane in a zigzag course.

Model K-9M-70

The K-9M-70 is a rocket which will be used primarily for preparatory experiment for the MPA plan (the mesospheric air observation plan). The MAP plan is a joint international project to be started from 1982. The rocket has the other mission to develop a plasma wavemeter, and also, the ionospheric plasma thermometer will be mounted on it at the same time. The experiment conducted as a part of the MAP plan is called TMA, that is to spray 4 liters of trimethyl aluminum in gaseous form at 80-110 km in mid-air, and to find out the upper atmospheric motion through observing from the ground the luminescence of the gas. Optical observations will be conducted at Uchinoura, Tanegashima, Yamakawa, Nango, and Taniyama, during the night by selecting fine weather.

The MAP Plan (International Project for Joint Survey of the Mesospheric Atmosphere)

The MAP Plan mentioned in the article on K-9M-70 in this report was planned by SCOSTEP (Scientific Committee on Solar Terrestrial Physics), and authorized officially by the ICSU general meeting, as a 4-year project from 1982 to 1984. The Science Council of Japan, the Japanese equivalent of ICUS, drafted a plan at the STP Subcommittee (chairman of the subcommittee: Takeshi Nagata) of the Special Committee on International Cooperation Project, and recommended at the general meeting held in autumn of 1978, in the form of a joint proposal of Geophysics Research Liaison Committee, Radio Science Research Liaison Committee, and the 4th, 5th subcommittees, Japan's participation in MAP to the Japanese Government. The mission of the MAP Plan is as follows:

Of the natural environments surrounding the earth, the troposphere governing the meteorological phenomena and the ionosphere where the upper air phenomena take place have been studied in detail, and vast geophysical knowledge as well as understanding have been obtained. On the contrary, as to the mesosphere located between those two spheres, there have been no effective observational means available, except for quite limited ones, such as balloons, meteorological rockets, and, therefore, the approach to comprehensive understanding of complicated phenomena occurring in the mesosphere has seriously been obstructed.

Recently, the necessity of learning the essential aspects in transfer of various energies flowing throughout the terrestrial environment, as well as in transportation of matters, has been intensified. Also, for clear understanding of the environmental conditions for human survival, such as climatic changes, the importance of the role played by the mesospheric air has been recognized.

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Furthermore, recently the remote sensing technology made it feasible to measure the temperature as well as the microcomponents' density of mesospheric air, by using the artificial satellite flying in the aerosphere. In addition to it, the high accuracy techniques for continuous surveys of the mesospheric air motion from the surface, by using large size radar, etc, have been established.

The MAP is designed to shed light upon the mesosphere through international cooperation, with the abovementioned latest technologies as the primary bases, by integrating the observational data obtained from the conventional flying bodies, as well as various surface observation stations.

Model K-9M-71

An overall survey will be conducted for the clarification of the emission mechanism of nightglow radiated by oxygen atoms and molecules from the region of 80-110 km in height. The new moon period will be selected to detect the weak lights for measuring the altitudinal distribution of the intensities of airglow rim line (5577 Å) of oxygen atoms, oxygen molecule nightglow (1.27 μ), OH airglow (1.65 μ), OH Meinel's zone (7300 Å), oxygen molecule Herzberg's zone (2800 Å), etc by using the photometer. For setting the rocket attitude, the star sensor installed at the end of head opening section will be used.

Space Material Experiment by Small Rocket

(From the TT-500-A-8 Rocket Launching Plan by the National Space Development Agency)

The TT-500-A Rocket is an improved model of TT-500 Rocket that has been launched for target range system tracking tests. The remodeled type is capable of efficiently conducting both the range tracking test and the space material experiment by a single launch. The Model No 8 (the eighth rocket counting from Model No 1 of TT-500 Rocket, and it is the first rocket as TT-500-A type) to be launched this time will conduct a performance confirmation test on the experimental apparatus mounted for space material experiments.

The space material experiments to be conducted for the performance confirmation test are based on the joint study by the related research institutions and the National Space Development Agency, and they are preliminary experiments before conducting the subsequent full-scale experiments using Rocket No 9. In other words, the preliminary experiment is to mix and melt heteroelements or heterometals by avoiding the separation between them caused by differences in density, taking advantage of zero gravity (below $10^{-4}G$, for about 7 minutes) during the rocket flight, and the following two experiments will be conducted.

(1) Experiment for Producing Nickel (Ni)-Titanium Carbide (TiC) Alloy

(The Science and Technology Agency; the National Research Institute for Metals)

By heat-treating, melting, pressurizing, and cooling, the sintered material of Ni-TiC system in an electric furnace, composite alloy of desirable structures with homogeneously dispersed TiC is to be produced.

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(For example, the titanium alloy in current use is 130 kg/mm² in maximum strength, and 400°C in heat resistance, but the new material is expected to be 2-3 times in strength and 1,700°C in heat resistance.)

(2) Experiment for Making Amorphous Semiconductor (The Institute of Physical and Chemical Research)

High quality amorphous semiconductors with homogeneously mixed three elements are to be made by heating, melting and cooling the silicon (Si)-arsenic (Sn)-tellurium (Te) system chalcogen amorphous material in an electric furnace.

(The thickness of solar cell in current use is 0.3-0.5 mm, but by the use of new material, it is expected to be 1/1000 of the existing one in thickness, also, the cost will be reduced radically.)

The Rocket TT-500-A-8 will be launched from Takesaki Launching Station of the Tanegashima Space Center, in the direction of 78° in standard launching vertical angle, and 95° in azimuth. The bow-body section with experimental apparatus for the space material experiments, will reach 326 km, the maximum altitude, after separating from the second stage, and will come down gradually onto the sea surface by opening the parachute at about 6 km. Recovery vessels and aircraft will search for it by using as guide the beacon actuated upon the opening of parachute. After the splashdown of the said bow-body section, the beacon as well as sea marker will be used as guides. Then, when it is discovered, the bow-body section will be retrieved by the recovery vessel.

Event Table

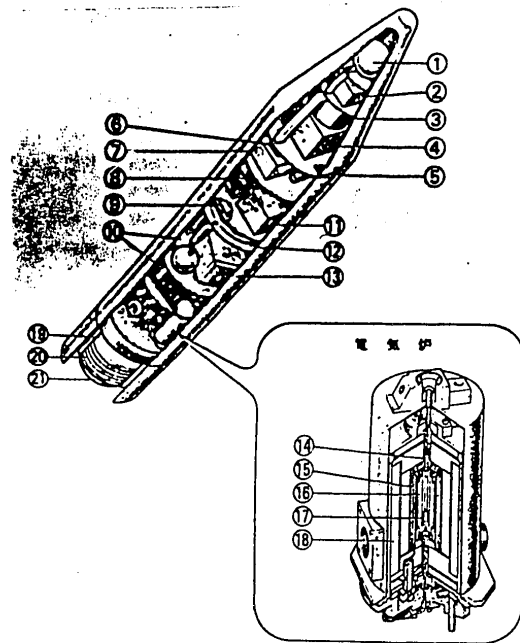
| No | Event | Time Lapse After | | Remarks |
|----|---|--------------------------|---------------|--|
| | | Launching (s) | Altitude (km) | |
| 1 | 1st stage ignition | 0 | 0 | |
| 2 | 1st stage burnout | Approx 21 | 11.5 | Approx |
| 3 | 1st, 2nd stage separation | 24 | | |
| 4 | 2nd stage ignition | 27 | | |
| 5 | 2nd stage burnout | Approx 50 | 51.9 | Approx |
| 6 | 2nd stage, bow-body section separation | 70 | | |
| 7 | Attitude angle velocity control begins | 85 | | |
| 8 | Attitude angle velocity control is completed (Space material experiment begins) | 105 | | Approx |
| 9 | Space material experiment is completed | Approx 300 Approx 520 | 326 100 | Approx Maximum altitude |
| 10 | Parachute opens | Approx 640 | 6 | " |
| 11 | 2nd stage splashdown | Approx 710 | | Level flight distance Approx 495 km |

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Upper Portion of Bow-Body Section
of TT-500 A Rocket

Key:

1. Air reservoir for gas jet
2. Power sequence distribution box
3. Control battery
4. Controlling electronic apparatus
5. Gas jet thruster
6. Guiding transponder
7. Inertial sensor package
8. Tracking transponder
9. Yoyo despinner
10. Cooling manipulation system
11. Telemetric system
12. Experimental section battery
13. Temperature and power controller
14. Sample extruding piston
15. Bobbin type heater
16. Crucible
17. Sample
18. Multilayer reflector plate
19. Location aid
20. Main parachute
21. Deceleration parachute



Outline of the Theme for Space Experiment

Genetic Consequences of HZE and Cosmic Radiation (By Mitsuo Ikenega: associate professor, School of Medicine, Osaka University)

The purpose of this study is to obtain the useful and basic data on genetic impact of radiation in preparation for the time when the mankind goes out to the space and stays there for many hours. Of the effects of HZE and the other cosmic radiations to which the human exposure is inevitable during space flight, specifically, the genetic effect will be studied. Eggs, male and female imagoes of drosophila will be irradiated in space, and after returning to earth, the genetic impacts, such as mutation, recessive lethal mutation and dominant lethality, etc will be investigated.

The reason for the use of drosophila is that the genetic data has been accumulated in large quantities on this species, thus, it is convenient for the analysis.

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Study on Perception and Movement Function Under Zero Gravity Environment
[Study on Manual Control Characteristics]

(By Toshio Kawasaki: director, the Institute of Aeronautical Technology,
the Science and Technology Agency)

In the cosmic environment, particularly under weightless conditions, differences in motor perception and motor control function of living beings are to be expected. On this assumption, of the studies on perceptual-motional function, the quadratic integration system manual control experiment will be conducted by keeping the subject in a stationary state. The subject will maneuver the control lever, trying to make the display error closest to zero, while watching the display error, and thereby the controlling results and the operator's descriptive function will be obtained.

Monitoring of Spacesickness and Development of the Countermeasure to It
(Observation of Human Motion and Behavior in Zero Gravity)

(By Koichi Yamaguchi: director, the System Planning Department, the National
Space Development Agency)

It is predicted that in the state of spacesickness, reflecting the functional disturbances in the central nervous system, muscle, motor system, etc., the change will be observed in maintaining the stability in the orthostatic posture as well as in posture control. Therefore, by letting the boarding scientist with a small triaxial accelerometer on his head, maintain the orthostatic posture with eyes closed and opened for one minute each, and also letting him engage in payload manipulation, the output of accelerometer will be measured and the analysis will be carried out for development of countermeasure to spacesickness.

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SCIENCE AND TECHNOLOGY

INTERNATIONAL DATA SHARING UNDER CONSIDERATION

Background Given

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 20 Jan 81 p 4

[Text] Movements toward the liberalization of communications circuits have suddenly become active. The first step taken in our country which can be called "circuit liberalization" was the 1971 amendment to the Public Electric Communications Law, which opened the way for the dissemination of data communications by ushering in a new exclusive circuit service, the "special communications circuit." A variety of restrictions were imposed in its utilization, however, thereby giving rise to complaints from circuit users and the information processing industry as data communications became increasingly active. This finally produced the "second wave" for circuit liberalization.

"Possibilities for Private Sectors Removed"

The main feature by which the second wave differs from the first wave is the fact that the participation of private industries in the communications service itself, in such facets as value-added communications (a service which adds functions to a circuit rented from the trunk communication industry to make communications more effective) and satellite communications, is included among the subjects for discussion. This makes it impossible not to touch on fundamental problem of communications, such as the propriety of the monopoly held by the Japan Telephone and Telegraph Public Corporation [JTT].

With the opening of the special communications circuit service, not only did on-line service using the exclusive circuits of private information processing industries become permissible for the first time, but also joint utilization of exclusive circuits among the manufacturing industries maintaining continuous mutual transactions or between manufacturers and wholesalers became permissible. However, numerous restrictions were still attached to "outside use" (making circuits available to outsiders by renting them from JTT for commercial purpose) or "joint use" (common use of a single circuit by multiple users), and it was this situation that created the second wave of circuit liberalization.

Another big impetus was DDX (new data network) services which the JTT inaugurated at the end of 1979 in July of last year. Of these, depending on one's viewpoint, the packet exchange service in particular can be regarded as a value-added communication. For this reason, concerned voices were raised, upon its inauguration, among private information processing industries to the effect that "it may block the possibility of private information services."

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For instance, last March the Japanese Association of Information Centers (Chairman: Kazuo Kuwae), which is a group of information-processing industries, presented to the Ministry of Postal Services [MPS] and the JTT a proposal "to limit the package exchange service to areas related to the basic communication function, and not to expand it to the area of information processing." It also requested the minister of postal services specifically: 1) to deliberate a revision of the Public Electric Communications Law in the direction of liberalizing the utilization of communications circuits on the basis of long-range perspective; and 2) to consider the possibility of commencing private services through the use of the special communications circuit in order to supplement the JTT's packet exchange service. Also, sometime after this, the On-Line Promotion Committee of the Japanese Information Processing Development Association (committee chairman: Shuzo Inabe)--a juridical person--submitted a similar opinion paper to the MPS and the JTT.

The MPS and the JTT Also Are Forward-Looking

In response to this heightening wave among the private sector for liberalization of circuits, the MPS in the latter part of October of last year established the "Conference for Electric Communications Policy" (chairman: Yoshishige Ashihara, president of the Kansai Electric Power Company) with the purpose of reviewing communications policy. The conference is expected by this summer to formulate "a vision for communications policy in the 1980's" encompassing the entire areas of communications policy. It seems inevitable [that the conference] will touch on the problems of circuit liberalization and monopoly by the JTT and the International Telegraph and Telephone Company (KDD). To be prepared for this, the MPS seems to be moving toward the formulation of concrete policies, including the drafting of a new bill. The recent instruction given by Minister of Postal Services Yamauchi to the JTT concerning the investigation of circuit liberalization can be interpreted as the first step toward the direction of such a policy development.

The proposal entitled "Toward A Dynamic and Decentralized Information Community," presented by a group of economists at its policy planning forum (representatives: Tokyo University Professor Tairyo Murakami and Kyoto University Professor Chikashi Moriguchi) at the end of last year, was also following a similar line on circuit liberalization. Because it pointed out from a professional point of view the harmful effects of the JTT's monopoly of the communications industry and "recommended" the participation of private enterprises in the area of data communications, it drew considerable attention even from persons other than communications-related people.

As a response on the part of the JTT, new director Mafuji expressed his intention to grapple with the problems of circuit monopoly and liberalization with a forward-looking posture. He is expected first to summarize the various arguments hitherto expressed, then to actively participate in the discussions of private research groups related to this field, and finally to commence the deliberation of policy measures for the JTT.

Progress Seen in International Arena

The wave for the circuit liberalization has reached international communications as well. Since foreign users are involved in this area as interested parties, exact responses are required from the KDD. Having this in mind, the KDD proposed relaxing the restricted utilization of international special communication circuits, beginning the 5th of this month.

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This allows multiple hookup of computers in the case of outsider use (it is permissible even if more than one of the computers are used by both parties of communicating countries), whereas in the past, only the hookup of one computer to one terminal was allowed. This has been a pending item requested by the information service industry of the United States for several years, and it was considered to be an important question capable of developing into "the second communication conflict between Japan and the United States," next to the problem of the JTT's procurement of materials, depending on the way Japan was to respond to it. Therefore, it can be said that this was a nimble response on the part of the KDD. Prior to this, the KDD last fall allowed the hookup of data terminals and facsimilies to international telephone circuits. This, too, is a sort of circuit liberalization. Thus, it can be justifiably said that circuit liberalization has shown steady progress in the international arena, even though it has not been conspicuous as the domestic case.

Scholars' View

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 9 Jan 81 p 1

[Text] "Toward a Dynamic and Decentralized Information Community," published at the end of last year as a recommendation for data communications policy by "the policy planning forum," a group of economists organized to recommend policy (representatives: Tokyo University Professor Tairyō Murakami and Kyoto University Professor Chikashi Moriguchi), is creating considerable reverberations, such as the immediate response of Postal Services Minister Yamauchi giving instructions to the JTT to review the liberalization of communication circuits. Criticism against JTT's monopoly of the communication industry had previously been launched by the information processing industry and computer users, but this is the first time a group of scholars who are, so to speak, a third party had pointed out problems stemming from the monopoly and has presented a clear conclusion urging free participation in the area of data communications. With excellent timing, the JTT was given a new director from the private sector for the first time, and it is preparing for a fresh start. Hitotsubashi University Professor Kenichi Imai who was responsible for putting the recommendation together, emphasized, when he was asked about its real meaning, the great possibility for the realization of "a diffuse, diverse, and individualized society" as a result of rapid progress in information and communication technology. He showed his willingness to point out further in the future the problematic questions accompanying monopoly, and to work for the realization of the contents of the recommendation. (The questions were put by reporter Hirohito Suzuki.)

--This recommendation stated that the current system of communication, based on the JTT's monopoly of the communications industry, is not suitable to the era of information revolution, which has reached the "second stage." Specifically, what does this "second stage" mean?

Imai: The first stage of the information revolution up to now tended to be preceded by futuristic arguments for information revolution; therefore they were in a misty condition, so to speak. But the second stage is characterized by its having a tangible substance as a result of the revolution in microcommunications. Computers and communication networks are not confined simply to production aspects, but are beginning to transform enterprises' organizational structures and business patterns. Furthermore, they are beginning to penetrate gradually even to individual life, beginning with the on-line system of financial organizations.

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--What is the reason for promoting the second stage of information revolution?

Imai: For one thing, there is a need to supplement the weakness of Japanese society seen from its economic and industrial structure. In order to reduce the degree of dependence on oil, it is necessary to vitalize the flow of information by developing communications networks, on the one hand, and to reduce on the other hand the movement of men and materials.

For another thing, it is important to individualize lifestyles by promoting the information revolution at the level of the people, so that everyone can respond flexibly to environmental changes. This is linked to the strengthening of the social foundation.

--Recent arguments about the information revolution seem linked to the promotion of political, economic, and social diffusion and decentralization. What do you think of this problem?

Imai: It can be said that the second stage of the information revolution is really a response to the trend toward diffusion. The direction that the Japanese industries should take in the future, I think, is to go from the concentrated mode of production to a diffused model, and from standardized products and technology to diversified ones; these new trends are already beginning to emerge, I think. Diffusion of various organizations and individual life into localities is also in progress. A precondition for such diffusion is the development of computers and communication networks, which makes the essential linkage between the loci of diffusion. Basic to the "information society's" surpassing the traditional industrial society is such a socioeconomic structure having both diffusion and linkage.

--In order to promote this information revolution, the JTT's monopoly of communication services and its restrictions on the utilization of communication circuits have detrimental effects--this seems to be the main theme of the recommendation. As for the restrictions on the utilization of communications circuits, the JTT has maintained that "the wants of users have been accommodated through the flexible application of criteria for permits, and there has been no indication of any substantial harm done."

Imai: It is true that there has been a gradual liberalization of circuits, but such methods have created an unfair outcome for users. Moreover, they have entailed the problem of making it difficult for users to chart their future plans. What is needed now is to set forth clearly the policy of circuit liberalization, and to put into practice all at once whatever is feasible. Also, if the JTT is not going to allow the liberalization of circuits, it should clarify the reasons for it.

--One of the main reasons for maintaining the JTT's monopoly has been the matter of insuring a global-scale high standard of technology and services. What do you think of this?

Imai: Such arguments may have been plausible for the traditional communication system centering around the telephone, but the plausibility is dubious for the contemporary setting, where computer and semiconductor technology has made huge progress and its diverse utilization has become available. We are advocating the introduction of competitive principles in the area of data communication, but even in the area of basic communication there are some areas, such as satellite communications, in which technology is sufficiently ready for private industries to render effective service.

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As for the problem of the quality of service, the key point to be considered is whether all users want high-quality services. In any service, the users' choice depends on a balance between quality and cost; in communication, too, there must be a large number of users who look for inexpensive cost with the knowledge that quality is not perfect.

--From now on, how do you plan to handle this problem?

Imai: We are not saying that all aspects of the JTT monopoly are bad. We plan to go on analyzing it with two alternate possibilities in mind, and at the same time we will continue to point out matters of a more specific nature.

Industries' View

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 20 Jan 81 p 14

[Text] How should computer centers, the specialists in the information processing services, respond to the needs of their clients and begin to show an ever-increasing degree of diversity and complexity? How should this industry, which is shallow in its history and weak in entrepreneurial foundation, be guided to attain heightened growth? Such prospects and direction on the part of the industry might have been fixed 3 years ago if all had gone well, and could have been in the implementation stage with the backing of the country by now. However, the industry was excluded from the category of the designated industries stipulated by the Machine Information Law (Law Concerning Provisional Measures for the Promotion of Special Machine Information Industries), and has suffered from it unexpectedly.

Because the industry entertained the idea that its inclusion among the designated industries would assure its social status, the shock of the party concerned was beyond imagination. The software industry was included in the designation.

It was due to the violent opposition of the MPS that the Ministry of International Trade and Industry [MITI] was obliged to let the computer center industry go off the designation at the last moment. As a response to the era of data communications, which combines computers and communications, MITI, using the aforementioned law for leverage, has aimed at (1) reviewing the Public Electric Communications Law from its fundamental level in order to promote the information revolution of the country's industries; and (2) promoting the information industries of the country by putting the JTT and private information processing industries in the same arena.

Against this, the MPS, which "monopolizes" the administration of communications on the basis of the Public Electric Communications Law, countered by saying: "Communication services are public affairs affecting all the people. They cannot be ruled solely by the Machine Information Law, which is designed to include the JTT simply from the viewpoint of industrial promotion." The alternative which emerged under the auspices of the MPS was the Data Communication Bill, but it has not yet seen the light of day.

At that time, most of the people concerned in the industry kept silent about this series of maneuvers in the administration. At present, however, the voices of those who are demanding at least the liberalization of communication circuits are much louder, saying: "If only we had conditions favorable to do business in the same arena with the JTT, which is rendering services from its superior position...." It is characteristic of the recent times that such voices are spreading not only in that particular industry but all over the industrial world.

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Also, there are many industrial leaders who sternly point out: "It is difficult to understand why the obsolete system of the old communications law is insisted on, when we are in the era of linking manmade satellites with computers. In order to make the information revolution of our country bloom with a variety of flowers through the vitality and creativity of private sectors, the liberalization of communication circuits is absolutely essential. Although it is argued that the regulation of communications circuits can prevent the invasion of American businesses, it works contrarily, hampering the development of our country's industries."

In the meantime, the prospects and future direction to be followed by the computer center industry are now being deliberated by the Industrial Structure Deliberation Council, under the rubric called the formulation of "a vision for information revolution. With the participation of representatives from industry, the council is reportedly having lively discussions. The industry's determination and eagerness seem to be so extraordinary that the MITI representatives have reportedly said, with a bitter smile, "Our side has been swayed all the way."

On the other hand, there has also been a strong voice saying: "Were the moaning voices of us small and medium enterprises heard?" It is reported that the investigation conducted the year before last into the industry's basic problems was administered from the subsidy granted as "compensation" for the industry's exclusion from the designation. Through the investigation, however, numerous problems that plagued the industry surfaced so starkly, contrary to expectation, that new emphasis was put on the need for the fostering and growth of the industry.

The leadership of the MITI seemed to be willing for a "return match" even in 1980 [as published], remarking that "if the MPS is inclined to be dilatory, we will give further consideration for the inclusion of the computer center industry in the industrial designation." But this may be troublesome to the industry, which is placed in the valleys of administration, some confess.

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SCIENCE AND TECHNOLOGY

GENERATION SYSTEM USING SNOW DEVELOPED

Tokyo JAPAN TIMES in English 10 Mar 81 p 2

[Text]

AKITA (Kyodo) — Researchers at Akita University have invented an electric power generation system that utilizes snow and water from thawed snow. They recently applied for a patent.

The Akita prefectural government, which has commissioned the research and development to the university, plans to start preliminary meteorological and topographical studies on Mt. Chokai in fiscal 1981 beginning April 1 this year with a budget of ¥2 million.

After the preliminary studies, the prefectural government plans to build a 10 kw-power generation plant there by the end of 1984.

In the power generation system, Freon, which is usually used as a refrigerant, will be utilized to turn a turbine.

Hot water from a solar heat collector and from an electric power generation windmill will be used to vaporize the Freon, which then will turn the turbine connected to a generator.

The vaporized Freon will be liquefied by snow and thawed snow and the liquid Freon will again be vaporized by the hot water to turn the turbine.

The researchers said that because Freon gas circulates inside the system, there will be no environmental pollution.

They said that the power generation by the system is possible if the hot water is of 50 to 60 C in temperature and the snow and thawed snow is of zero to 15 C.

The Akita prefectural government plans to build a test plant in a snow-filled valley near Mt. Chokai in Nikaho, Yuri-gun.

From fiscal 1981 to fiscal 1983,

studies will be made on the amount of water running in a river in the area, the water temperature, snowfall volume, and the amount of solar energy available.

After the windmill and heat exchanger are built, a 10 kw-power plant will be built by the end of 1984.

The prefectural government is considering using the system to supply electric power to agricultural facilities. It also hopes to build a storage dam to contain snow to be used for a multi-purpose project which includes food storage in the snow and Freon power generation.

Fumitoshi Note, 59, a professor of electrical engineering at Akita University, said that although the power generation system can produce electricity of up to 1,000 kw, the cost will be more than 10 times the present cost.

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SCIENCE AND TECHNOLOGY

HITACHI, G.E. TO EXCHANGE TECHNOLOGY

Tokyo JAPAN ECONOMIC JOURNAL in English 3 Mar 81 pp 1,4

[Text]

Hitachi, Ltd. and General Electric Co., the top general electric machinery maker in Japan and the U.S., respectively, have reached agreement on extensively exchanging information in advanced areas of production.

It is understood they have agreed in principle to open to each other all technology, centering on raising productivity in hardware and software, and quality control.

On request, they will extend such technology to the other.

Already, as part of the latest technological exchange, the two companies have decided as to the computer software sector mutually to offer to each other information on tool for development of software, language, manual and production control means, and to study what kinds of technology are possible.

Their engineers will shortly meet to consider production technologies particularly as relating to industrial robots for widening the area of interchanges.

After this, if each decides on a theme and how to go about it, ~~they will be able to ask the other for technologies on a royalty payment basis.~~

As the first step, Hitachi is going to offer G.E. its so-called "assessment system for assembly of machine parts."

This system enables determining what system will permit shortening working time the most during a worker's standard working hours.

Hitachi has managed greatly to rationalize its production by using this system at its acoustic equipment plant in Katsuta, Ibaraki Prefecture.

The basis for the two companies' extensive cooperation relations actually was their plan to set up a joint venture for producing color television sets in the U.S. three years ago.

This envisaged Hitachi and G.E. jointly forming a company and having this company absorb G.E.'s then profitless television set division.

This plan did not materialize as the U.S. Government con-

sidered that it would run counter to the U.S. anti-trust act.

At this time, G.E., it is said, perceived the advanced nature of Hitachi's technology and sounded it out on the possibility of exchanging technologies with it.

Informants said that since G.E. completely pulled out from computers and semiconductors, it strongly desires to introduce Hitachi's automation and labor-saving technologies involving use of electronics.

On the other hand, G.E. also has concluded a technological exchange agreement with Toshiba Corp.

Toshiba says it has signed a "management information exchange" contract with G.E. whose essential points concern mutual exchange of information on technology to raise productivity, quality control technology and system for training supervisors.

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SCIENCE AND TECHNOLOGY

HIGHER BUNKER OIL SPURS MAKING ECONOMICAL VESSELS

Tokyo JAPAN ECONOMIC JOURNAL in English 3 Mar 81 p 8

[Text]

The recent sharp rise in bunker oil prices has triggered greater competition among shipbuilding firms to develop energy-saving ships.

Nippon Kokan K.K., for example, has developed a new type of ship which incorporates various energy-saving measures.

The ship uses engines whose fuel consumption rate has been lowered and which effectively utilizes surplus energy.

Mitsui Engineering & Shipbuilding Co., Mitsubishi Heavy Industries and Kawasaki Heavy Industries also have improved propulsion systems.

The shipbuilders thus are manifesting increasing enthusiasm in developing new technology for conserving energy.

Attention came to be focused on energy-saving ships after the first oil crisis which resulted in a sharp increase in bunker oil costs.

In the past, the industry emphasized reducing the fuel consumption in engines.

Recently, stress is being laid on conserving energy for all systems of a ship.

As such, the energy conserv-

ing technology developed by the shipbuilders is becoming diversified.

Nippon Kokan is trying to use a variety of energy-saving measures to operate its large coal and iron ore carriers.

They include large caliber variable pitch propellers with high propulsion capacity and new type of fuel efficient engines.

It also has developed a shaft generator-engine, said to be the first of its kind in the world, for using surplus electricity for propulsion.

In addition, it has worked out a method for utilizing waste heat of engines for heating boiler water and the crewmen's quarters, and a special paint which lessens the resistance of seawater.

The company says that these new ships can save fuel consumption by 40 per cent, compared with conventional vessels.

Moves also are conspicuous among the shipbuilders to conserve energy by raising propulsion efficiency by installing unique devices near ship's propellers.

Mitsui Engineering & Shipbuilding has developed a duct propeller and Mitsubishi Heavy Industries a rear cushion fin to adjust the flow of seawater around the propellers and recycle wasted energy for added propulsion.

The duct propeller and the rear cushion fin can save fuel by 5-6 per cent. The new systems also can be used on both newly-built and existing ships.

Kawasaki Heavy Industries also has succeeded in developing a device called "stern-tip valve" which lessens the resistance of waves at the stern.

The device also enables conservation of fuel by some 5 per cent.

It was installed recently on the Stretcher Maru, a passenger ship of Tokai Kisen K.K. plying between Tokyo and Hachijo Island.

Other shipbuilders, including Ishikawajima-Harima Heavy Industries, Hitachi Shipbuilding & Engineering and Sumitomo Heavy Industries, have started to place emphasis on development of energy-saving equipment for the whole ship, not engine alone.

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SCIENCE AND TECHNOLOGY

BIG CHEMICAL FIRMS STEP UP RESEARCH IN BIOTECHNOLOGY SECTOR

Tokyo JAPAN ECONOMIC JOURNAL in English 3 Mar 81 p 12

[Text]

Major chemical concerns are stepping up biotechnological research, including genetic engineering skills, in an attempt to keep up with U.S. and European competitors. The companies see biotechnology as an area where they can lead others at a time when no innovation can be expected in synthesis of petrochemical products in particular.

Mitsubishi Chemical Industries, Ltd. is believed to have advanced its biotechnology studies beyond other major chemical companies here. It intends to use its biotechnology to maintain its No. 1 position in the chemical industry, with the second largest firm, Sumitomo Chemical Co., leading the industry in such areas as drugs, agricultural chemicals and other specialties.

As a Mitsubishi Chemical executive predicted, the company intends to commercialize its technique to produce a substance with physiological activity by means of genetic engineering five or six years from now. Like insulin technology of Eli Lilly of the U.S. and interferon technique of Hoffman La Roche of Switzerland, the Mitsubishi route features obtaining genes from the human body for mass production by bacterium. Lilly and La Roche are already capable of mass production for clinical testing.

Sumitomo Chemical Inducted the interferon know-how from Britain's Wellcome Foundation — so that it can venture into biotechnology by relying on foreign know-how, if necessary. Its research will be upgraded to include genetic engineering for

developing drugs. (JEJ, Dec. 30, 1980, issue.)

Meanwhile, Showa Denko K.K. developed a process to cut production costs of tryptphan, an essential amino acid. It will be marketed by yearend for use as a feedstuff. (JEJ Jan. 20 issue.) The SDK technology features use of synthesis for the first half and fermentation by microorganism in the last half. Industry sources believe that Mitsui Toatsu Chemicals, Inc., too, is planning amino acid ventures.

Elsewhere, Mitsui Petrochemical Industries, Ltd. is trying cultivation of plant tissues. Mitsubishi Petrochemical Co. has an interest in mass production of an enzyme by genetic engineering, with the product enzyme intended for screening in the pharmaceutical industry.

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SCIENCE AND TECHNOLOGY

NEW HYDROGEN-STORING ALLOY DEVELOPED

Tokyo JAPAN ECONOMIC JOURNAL in English 3 Mar 81 p 13

[Text]

An efficient alloy for storing hydrogen which is commercially feasible because of its low preparation cost has been developed by Japan Metals & Chemicals Co. of Tokyo and Ulvac Corp. of Chigasaki, southwest of Tokyo, it was recently learned.

Such alloys, made chiefly of iron and titanium, are known for their special ability to generate heat when they absorb hydrogen and to suck up heat and cause refrigeration when they emit hydrogen.

According to the two leading Japanese companies, respectively in metallurgical and chemical production and in vacuum engineering and hardware production, the new alloy would find wide demand not only for building hydrogen storage facilities, but for making the heat source for airconditioners, road and railway snow and ice melting facilities, and many other purposes. Hydrogen storage is an important matter in the future development of hydrogen as a new non-oil energy source.

The companies explained that an iron-titanium alloy has been considered the most commercially feasible for storing hydrogen because the two

metals are relatively low priced and their service lives in absorbing and discharging hydrogen are longer than any other.

But that alloy required expensive pre-processing ("activation") before application. Because of its slow speed in reacting with hydrogen gas in its original condition, the alloy had had to be "activated" before application in a vacuum chamber filled with hydrogen gas for long hours under a high temperature of around 400 degrees C. and a strong pressure of about 65 atmospheres.

The two companies' joint product is basically an alloy also of iron and titanium mixed at a 50-50 ratio, but it contains small amounts of zirconium and niob dissolved in a vacuum.

All it takes to activate the new alloy is to keep it several hours in a hydrogen gas-filled vacuum chamber under normal room temperature and a much lower pressure of 35 atmospheres, thus ensuring a far lower preparation cost and much greater operating safety. To be commercially produced starting next October, the new alloy could sell for only ¥4,000 to ¥5,000 a kilogram if mass-produced.

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SCIENCE AND TECHNOLOGY

RESTRICTIONS ON DNA STUDY TO BE RELAXED

Tokyo DAILY YOMIURI in English 1 Mar 81 p 2

[Text]

An Education Ministry advisory group has recommended adding a third type of medium for studies on gene recombination at Japan's universities research centers.

At present, Japan's restrictions on the study of recombinant DNA segments, or "gene recombination" are among the strictest in the world, but the Science Advisory Council has recommended that Education Minister Tatsuo Tanaka relax these rules somewhat.

The council has suggested that hay bacilli be added to the list of media which Japan allows for use in the studies.

The hay bacilli, bacillus subtilis-168, are a variable strain which cannot live in natural surroundings without a specific amino acid in its environment.

The bacilli are now used in producing fermented soybeans and some other flavoring items in Japan and the science council said they are also quite suitable for gene recombination study.

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SCIENCE AND TECHNOLOGY

BRIEFS

SMALLEST TURBOCHARGER MADE--What is believed to be the world's tiniest turbocharger, usable for small cars of 1,000 to 1,800 cc piston displacement, has been developed by Mitsubishi Heavy Industries, Ltd. of Tokyo. MHI's new turbocharger, coming in two varieties, Model TC03 for engines of 15 to 65 horsepower, and Model TC04 for those of 22 to 100 horsepower, which have turbine blade revolutions of 210,000 and 190,000 r.p.m., respectively. They are usable for both gasoline and diesel engines of not only small cars but motorcycles, smaller farm tractors and smaller power boats, according to a MHI spokesman. The new product is to follow up MHI's earlier-developed, also the world's smallest, type of turbocharger for engines of 30 to 150 horsepower, Model TC05. The new turbocharger weighs only 3 to 3.5 kgs, compared with 4 kgs for Model TC05. An initial monthly output of 500 to 1,000 units is expected, subject to demand. [Text] [Tokyo JAPAN ECONOMIC JOURNAL in English 3 Mar 81 p 13]

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