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Japan Report

(FOUO 18/81)



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POLITICAL AND SOCIOLOGICAL

DIET SPLITS OVER ARMS EXPORT ISSUE

Tokyo THE JAPAN ECONOMIC JOURNAL in English 17 Feb 81 p 4

["Political Scene" Article by Yoshiaki Kohzuye: "Diet Is Split over Arms Export Issue"]

[Text] A serious impasse has developed in the Budget Committee of the House of Representatives between the Government and the ruling Liberal Democratic Party, on the one hand, and opposition parties, on the other. The problem involved is arms exports.

The Opposition parties predictably are calling for a new legislation formally to prohibit arms exports. The Government and the ruling party, on the other hand, are strongly opposed to this.

When Hotta Hagane Co., a specialty steel trader based in Osaka, was found to have been shipping semi-finished arms products (gun barrels, to be more exact) to the Republic of Korea, the Opposition parties, headed by the Japan Socialist Party and Komeito, demanded the Government to formulate a new legislation against arms exports on the grounds that the present laws and regulations were not tight enough to plug all loopholes.

Controls on arms exports are currently conducted by the Foreign Trade Control Ordinance. Under this regulation, exporters are required to file application with the Ministry of International Trade & Industry when they want to export out-of-the-ordinary products. When the products are found to be arms, MITI is empowered to turn down the export requests.

If exporters fail to make such requests, however, it is extremely difficult for MITI to detect arms exports. It is also very difficult in some cases for the authorities to determine whether the particular items are arms or not.

When the opposition parties demanded a new legislation to plug such loopholes, some Cabinet ministers and ranking LDP officials

declared themselves strongly opposed to the move at Cabinet meetings and LDP Executive Council meetings.

"First of all, we have to make a clear definition of what constitute arms," Construction Minister Shigeyoshi Saito stated. "If a new legislation of the nature proposed by the Opposition parties comes into effect, Japanese construction companies may find it difficult to advance into foreign countries for fear of getting involved in projects of military connotations. Exports of steel plates, sheets, caterpillars for cranes etc. may become difficult on the ground that they are liable to be used for military purposes."

"Electronics can be easily turned to military purposes, if importers so desire," Director General Taro Nakayama of the Prime Minister's Office said. "If electronics are judged to be potential arms on that ground, Japan will have virtually nothing to export."

This sense of crisis in the face of the Opposition parties' proposal for a new arms legislation, as a matter of fact, was so strong among LDP members that the party executives called on the Government to make a review of its present stand on the issue.

At the time of the Sato administration, Japan formulated the following three "no" principles on arms exports: 1) when other parties are Communist countries, 2) when arms exports are prohibited by the U.N. resolutions, and 3) when other parties are involved or are liable to be involved in international disputes.

The regulations against arms exports were greatly tightened when the Miki administration adopted the so-called "unified view of

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the Government." The "unified view" proclaimed that: 1) arms exports to the areas covered by the Sato administration's three principles would be prohibited, 2) arms exports to other areas would also be discouraged in light of the spirit of the Constitution and the Foreign Exchange & Foreign Trade Control Law, and 3) arms-manufacturing plants and equipment would be treated same as arms.

LDP party executives now want to have the Miki administration's principles modified

in view of the growing international tensions and on the strength of the conservative party's overwhelming majority in the Diet.

"All the LDP administrations have been in perfect agreement in that arms are those for directly used for combat purposes and do not involve any universal products used also for other purposes," they hold. "If Cabinet ministers and party executives are truly aware of this fact, there would have been no renewed discussions on the arms problem."

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POLITICAL AND SOCIOLOGICAL

TANAKA FACTION GROWING IN SPITE OF LOCKHEED SCANDAL

Tokyo BUSINESS JAPAN in English Feb 81 pp 15-16

[Text] Former Prime Minister Kakuei Tanaka, who is a defendant in the Lockheed case, is not a member of the Liberal Democratic Party at present. It is very surprising, however, that in the LDP, only the membership of the faction which Tanaka leads is continuing to increase rapidly in size despite the discrediting of its leader. Why is the Tanaka faction growing bigger and bigger? Why is the faction trying to expand its strength? In Japan's political world, recent moves of Tanaka and his faction have aroused great repercussions.

On December 23 last year, Diet members of the Tanaka faction met for a year-end party held by the Thursday Club, the faction members' social organization. The get-together was, as explained by a faction official, more than just a meeting of the Tanaka faction. It was better described as inaugural festivities for the Tanaka party. Participating in the event were all members of the faction of the House of Representatives and House of Councillors, plus seven LDP Dietmen, including Tokusaburo Kosaka, former Director-General of the Economic Planning Agency, who joined the Tanaka faction on December 19. Now with its 101 members in both houses of the Diet, the Tanaka faction is in every way the largest faction in the LDP — even larger than the faction led by Prime Minister Zenko Suzuki.

It is generally said that the proper size for a faction is between 70 - 80 members, because a huge amount of political funds are needed to maintain a faction, and because important posts have to be distributed in such a way as

to keep everybody happy. Nevertheless, the Tanaka faction has adopted a policy of expansion, making it far larger than the norm. At least three major reasons can be given for the faction's expansion:

First, recent moves of the Tanaka faction are closely related to the Lockheed court trial. It is said that there is now no possibility for Tanaka to be found innocent in the district court's judgment which is expected to come within two years. With an eye on the outcome of the Lockheed trial, the faction is trying to demonstrate its political power. As assessed by the faction, the more powerful the faction, the less the shock it will suffer when Tanaka is judged guilty.

Second, the faction is working to have its member Susumu Nikaido acquire the post of the LDP Chairman. One of the "gray government officials" in the Lockheed case, Nikaido has already been reinstated in politics — as Chairman of the LDP's Executive Board when the Suzuki Cabinet was formed. Faction leaders say that the faction with its growing power will be able to arrange for Nikaido to obtain the post of Foreign Minister in a possible cabinet reshuffle in July. And in the party election scheduled for next year, Nikaido will be supported by the faction as the party chairman who will eventually assume the post of prime minister. Obviously Tanaka is behind the faction's attempt, as his final goal is a return to the political stage. Expanding the faction's strength and unifying the faction around Nikaido is part of this plan.

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An attempt to check the moves among some faction members to support former Foreign Minister Noboru Takeshita comes as the third reason. Within the faction are two strong groups — one under the umbrella of Nikaido and former Defense Agency Director-General Mototoshi Yamashita, who are directly linked with Tanaka, the other group composes of close affiliates with Takeshita and another former Defense Agency Director-General, Shin Kanamaru. Now that the Tanaka faction has had Kosaka, a strong supporter of Nikaido, joining in, an intra-faction move toward possible formation of a Takeshita faction are more or less disappearing.

The expansion of the Tanaka faction is worrying other LDP factions because its growth can overturn the power balance within the party. Even Prime Minister Suzuki who is supposed to be closely linked with Tanaka can hardly remain calm at seeing a drastic growth in the Tanaka faction, according to informants. There's no mistaking the fact that Tanaka is behind the faction's growing strength, and those in political circles are watching each and every move of Kakuei Tanaka who, at the moment, appears to be holding the greatest power on Japan's political stage.

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POLITICAL AND SOCIOLOGICAL

NEW BUDGET SHOULD INSPIRE MOVE TOWARD POLITICAL HOUSECLEANING

Tokyo BUSINESS JAPAN in English Feb 81 p 55

[Article by Yutaka Matsumoto, Essayist]

[Text]

THE Government's FY1981 budget draft providing for ¥46,788,000 million in the general accounts (up 9.9% over the preceding year) and for ¥19,489,700 million (up 7.2%) in government investments and loans, based on a financial reconstruction program, was finally adopted following several twists and turns.

A breakdown of the general accounts budget lists estimated tax revenues of ¥32,028,000 million (up ¥5,873,000 million), including a tax increase of ¥1,396,000 million, and a general outlay of ¥32,050,400 million (up 4.3%), including the issuance of national bonds worth ¥12,270,000 million (down ¥2,000,000 million), social security payments of ¥8,836,900 million (up 7.6%), defense expenditures of ¥2,400,000 million (up 7.61%) and public works project expenses of ¥6,655,400 million (zero growth). In the main, expenditures were not reduced, and the national press played up the budget as the "beginning of a heavy taxation era."

Shintaro Abe, Executive Chairman of the Liberal Democratic Party's Policy Research Committee, rated the budget draft highly, and claimed at a press conference that the government had adhered to the basic principle of fiscal reconstruction. It had, he said:

1) Reduced the issuance of national bonds by ¥2,000,000 million and had succeeded in limiting the size of the budget to a one-digit percentage growth;

2) Strengthened limitations on wel-

fare payments but had also managed to modulate measures wherever necessary;

3) Considerably reduced various expenditures, despite criticisms of insufficient efforts at cutting spending, the growth in general expenses being held to an ultra-stringent 4.3%.

Kiichi Miyazawa, Chief Cabinet Secretary, also stressed that the government had formulated a budget draft that was well in keeping with the first year of fiscal reconstruction. And with respect to anxiety about a whip-lash effect resulting from the large tax increase, he pointed out three reassuring points:

1) The domestic economy's stable supply and demand situation; 2) the reserve strength of producers as a result of the balance between production and consumption; and 3) the progress achieved in measures regarding prices of fresh food product and supply stability.

Miyazawa stated that he believed consumer prices could be pegged to a growth of around 5.5% but that the cooperation of labor would be required. This year's spring wage struggle, he said, would be watched in connection with the price situation.

Prime Minister Zenko Suzuki had all along insisted on reducing the issuance of national bonds by ¥2,000 million and limiting the size of the budget to a single digit percentage growth as compared with the preceding fiscal year. He claimed that this basic principle had been achieved and

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that a giant stride had been made toward fiscal reconstruction.

Regarding the fact that the growth in defense expenditures had slightly surpassed that of social welfare, Suzuki expressed the view that outlays for both defense and welfare were up by about the same rate - 7.6%. He did not believe that defense expenditures alone were outstandingly high. But as to the sharp rise in the defense budget, he explained that steady efforts must be made towards building up the minimum necessary defense strength.

Come to think of it, it is the task of every Japanese, in this environment of turbulent international politics, economic developments and diversifying values, to take drastic and positive actions directed towards political

housecleaning and administrative reforms as well as measures to cope with the problems of rising prices, energy, welfare, small and medium-sized businesses, middle-aged and old people and defense - all under the banner of fiscal reconstruction.

In this connection, I recall the words of Mencius that if people in high office are covetous, the people below would become even more covetous (a saying that stresses the importance of self-discipline on the part of those in authority). And I, constantly and seriously, believe that all conservative and opposition party members, both in the national Diet and local assemblies, should at least be willing to take the initiative in sharply cutting their monthly allowances.

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MILITARY

JAPAN MUST FACE FACTS, INCREASE DEFENSE BUDGET

Tokyo BUSINESS JAPAN in English Feb 81 p 7

[Article by Masamichi Inoki, Chairman, Peace and Security Research Institute]

[Text]

AS is well known, the Ministry of Finance occupies an especially high position among Japanese government ministries. The fact that it was the only ministry before and during the war not headed by a military man shows that it possesses an excellent tradition. However, it would appear on the basis of recent press stories that this ministry, supposedly with a concentration of elite talent, is making a terrible mistake.

I was astounded by a frontpage story in the December 4 issue of the Sankei Shimbun (Tokyo morning edition). The article stated:

"In regard to defense costs in the general budgetary demands, the Defense Ministry's request for special treatment outside the budgetary framework has been approved in essence and the agency has submitted a demand for a 9.7% increase over this year's budget. This fact has been explained to the U.S. and other countries. However, forced to limit increases in its general account expenditures, excluding defense and grants to local administrations, to 4% in the face of the severe government financial situation, the Finance Ministry is claiming that it cannot grant large-scale increases for defense costs alone, and for this reason, it can allow an increase in the range of only 7%."

There are two reasons for my surprise upon reading this article. One is the Finance Ministry's claim that the need to hold down any defense spending increase to 7% is due to the deteriorated government finances which forced it to limit the increase in general account expenditures to 4%. According to the December 8 issue of the Sankei Shimbun, the Finance Ministry strongly insisted "it is out of the question to raise defense spending alone by 9.7% when general account expenditures are being raised by only 3.4%."

If the Finance Ministry has such a strong feeling for the need for balanced spendings, then I would like to ask why in 1967 when the general account was increased by 14.8%, the defense budget was limited to only 11.8% and in 1973, when the former was increased by 24.6%, the latter was held down to 16.9%.

When it is seen that the increase ratio for spendings on welfare, education and public projects was well above that for defense, the current Finance Ministry's explanation of balanced expenditures is merely an excuse and the truth of the matter is that the ministry is taking the defense issue lightly.

Difference Between West German Defense Capability

The responsibility, of course, for holding down defense spending below the increase level of general account expenditures normally lies with government leadership. However, from the viewpoint of compilation processes of this country's annual budget, the Finance Ministry must also share the blame. As a result, as clearly delineated by the Defense White Paper entitled "Defense of Japan" approved for release by the cabinet last August, the various defects of Japan's defense capability on the weapons level were made crystal clear. Was it not this very reason that top priority was given to the overhaul of defense equipment in next year's budget and the 9.7% increase figure set?

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Even more astonishing nonsensical is the Finance Ministry's claim that even if the increase is limited to 7%, it would still enable Japan to maintain the 0.9 percent-to-GNP level in its defense spendings and that the real increase will be 3%-plus thus approximating the figure for West Germany. What does the maintenance of the 0.9% of the GNP-level actually mean? What kind of sensitivity lies behind the claim of the need for only maintain a figure which has been harshly criticized by the U.S. and NATO countries as a free ride?

Over the past 20 years, West German defense budgets have consistently been much higher than those of Japan and for this reason, a real increase of 3% by West Germany has great significance. In contrast, Japan's defense capability has had serious defects due to foot-dragging in budgetary appropriations over the past 20 years, as revealed in "Defense of Japan." Hence it is clear to everyone that with the almost irresponsibly small real increase of 3% by Japan, there can be no improvement in Japan's defense capability.

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DEFENSE OUTLAYS EXPECTED TO SHOW RAPID INCREASE

Tokyo BUSINESS JAPAN in English Feb 81 p 56

[Article by Yoshiteru Oka, Associate Editor, EVENING FUJI]

[Text] THE Cabinet has agreed on the government draft of the fiscal 1981 budget. Under the draft budget, defense spending was set at ¥2,400,019 million, an increase of 7.6% over the current fiscal year's level. With this increase, fiscal 1981 has been termed as the initial year of Japan's full-scale defense buildup. They've so termed the year not because the gain granted is the all-time high, but because the increase exceeds for the first time the rate set for the budget for social welfare schemes, although the excess is as small as 0.01%.

In the past, it was an implicit understanding among those concerned with the annual budget formulation that a policy would be taken of avoiding special treatment for defense spendings in relation to the spendings on welfare, and priority was always to be given to welfare expenses. This practically checked any sizable increase in the scale of defense spendings. It can be compared to a doubles match of tennis played with defense and welfare budgets against other budget items. Now that the rate of increase in the defense outlay has exceeded the rate of increase for welfare spendings, it is noted that the defense budget can compete in a singles match. The situation has enabled defense spendings to be increased from now on, with little concern about appropriations for social welfare schemes. At the Defense Agency, there are high hopes that sizable appropriations will be granted without difficulties in the future.

The defense budget includes ¥458,600 million, up 17.7% from the fiscal 1980 level, for weapons and other major equipment to be used by the tri-service Self-Defense Force (SDF). The outlay for logistic support amounts to ¥797,100 million, up 7.6% from the fiscal 1980 level, while the outlay covering personnel and food costs, which are the largest portion of the defense budget, registers ¥1,144,000 million, up 4% from the level of fiscal 1980.

It is also noted that the budget represents a 6.4% gain in spendings allotted to the Ground Self-Defense Force (GSDF), while the Maritime Self-Defense Force (MSDF) and Air Self-Defense Force (ASDF) receive a gain of 8.5% and 9.8%, respectively. Apparently, more emphasis is being placed on the outlays for the MSDF and the ASDF. A substantial amount of expenditures for the purchase of lethal weapons such as tanks, destroyers and fighters is also a marked feature of the budget for 1981.

Obviously these features indicate that the government is trying to meet the U.S. requirements that priority be given to strengthening Japan's air and naval forces. Since the ceasefire in Vietnam, the U.S. has gradually withdrawn its conventional forces from Asia, while the Soviet Union has been increasing its armed forces in the Far East — it has sent its powerful submarine fleets and more recently Tu-22M Backfire bombers, to Asia.

In the face of the rapid Soviet moves in Asia, the U.S. has urged

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Japan to increase its defense capabilities to carry out joint operations by the three branches of the SDF and the U.S. forces on the basis of the U.S.-Japan Security Agreement. The U.S. has specifically demanded that Japan 1) beef up its anti-submarine patrol capability so that sea lanes can be secured, 2) increase its naval power to counter air attacks, 3) strengthen its overall air defense, 4) bolster its ability to block naval intrusion with mines in the Soya, Tsugaru and Tsushima Straits, and 5) increase its ability to sustain military operations.

A quick review of the budget authorized for the purchase of weapons, although pending the final Diet approval, will also make it clear how seriously the government considers it is to meet such requirements from the U.S. For instance, the MSDF has been authorized to buy a 4,500-ton guided missile destroyer which will increase anti-air attack capability, while the ASDF will obtain two units of the domestic-made short-range surface-to-air missile system and four E-2C Hawkeye airborne early warning planes by which to strengthen air defense capability to a large extent, in addition to two U.S.-made C-130H Hercules transport planes which will be used mainly for laying mines. The purchase of other equipment includes 245 mines - 200 were purchased in the current fiscal year. The ammunition stock will be also increased by 25% so that Japan will be able to sustain military operations on land for at least 12 - 13 days. It is estimated that Japan's current level of military

preparedness would provide for no longer than one week's defense.

According to the Defense Agency, even the fiscal 1981 budget is far too small to cover what is actually needed, though many see it as a substantial increase - if they consider it from the small defense spending so far allowed. The U.S. has also voiced disappointment with the rate of increase Japan has set for the defense outlay; as Ambassador M. Mansfield says "It represents a mere 3.9% gain after inflation is considered."

Meanwhile, it must be noted that most of the payments for the purchase of weapons and other major equipment will not be settled within any given fiscal year but will be footed in the following fiscal years. In fiscal 1975, 20.5% of the total defense outlay was footed in fiscal 1976 and after. The figure soared to 23.4% in fiscal 1980, and it will soon reach the 30% level because the outlay for buying weapons and other equipment is expected to increase year after year. For fiscal 1982, the percentage of the payment to be footed in the following years will have to rise at least by 10%, as the purchase of 12 F-15 and 12 P-3C is expected during the year.

Now that the defense outlay appears to have broken away from its relationship to social welfare appropriations, it is feared that the defense outlay may expand at an incredible pace. The question is, how will the government be able to find a source of revenue to balance accounts other than through tax increases which will hit hardest Japan's working people.

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EXPERT ANALYZES U.S.-JAPAN RELATIONS IN TRANSITION

Japan's Defense Budget Discussed

Tokyo THE JAPAN ECONOMIC JOURNAL in English 3 Feb 81 pp 20, 11

[Serialized Article by Chikara Higashi, Guest Scholar, The Brookings Institution: U.S.-Japan Relations in Transition: Case of Japan's Defense Budget, (1) and (2)]

[Text]

Genuine dialogue is still difficult between the U.S. and Japan. Misinterpretations and misunderstandings still abound. Although exchanges of personnel, information and products have increased dramatically of late, barriers to effective communications remain unique and varied in U.S.-Japan relations, reflecting wide gaps in language, culture, policymaking and so on.

Trade friction

In recent years, the two countries have almost continuously experienced so-called trade frictions. Trade imbalances on the order of approximately \$10 billion per year and not infrequent, damaging blows by Japanese imports to certain U.S. industries alone have been more than enough to explain the emergence and persistence of such problems.

Frictions, however, can be aggravated and prolonged unnecessarily by ineffective communications and lack of clear understanding of the reality and policies in the two countries.

Many Americans still wrongly blame Japanese gimmicks, its closed markets,

subsidies, dumping, administrative guidance, or whatever, while more knowledgeable observers have been increasingly aware of more fundamental problems — the declining competitiveness of U.S. industrial products and the rising competitiveness of Japanese industrial goods.

In trade issues, focusing on such fundamental and structural problems and trying to solve them fundamentally through industrial revitalization, for instance, is pertinent. Frequent patchwork attempts such as tinkering with trade rules and procedures would simply delay genuine resolutions of the problems. So would exchange of accusations or intimidation.

It may be too naive to believe that effective communication through reliable face-to-face dialogue would be a panacea for mutual problem solving, but at least it should be a first step and without such a first step, there is no possible way to further a mutual solution.

Recent happenings in the area of national security may provide an example of the failure of communications between the two countries. Lack

of rigorously precise and effective communication and too much wishful thinking naturally created an unrealistically inflated expectation among American policy-makers.

Accordingly, they were disappointed and upset rather than pleased with the Japanese performance. The story originated in December 1979, when the Russians invaded Afghanistan.

The Carter administration, which had been earnestly working on arms reduction and SALT II with the Soviet Union, reviewed its security policy and shifted its priority to an increased military buildup.

Understandably, the U.S. asked Japan as well as America's NATO allies to increase defense expenditures significantly to deter Russian aggression collectively and effectively. Since the size of the free world's military buildup was so great and the U.S. economic capability to allocate such resources was limited, it was impossible for the U.S. alone to bear the burden.

In March 1980, visiting Japanese Foreign Minister Saburo Okita expressed

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"receptiveness to increasing his country's military spending, as urged by the United States, but made no commitment about when, or whether, such an increase will take place." (The Washington Post, March 22, 1980.)

In May, the late Prime Minister Ohira reportedly pledged to President Carter that Japan would make a steady and significant increase in defense expenditures in its FY 1981 budget.

In August, considering the serious concern of the United States, the Ministry of Finance allowed the Defense Agency to request a 9.7 per cent increase in its 1981 budget. Other ministries and agencies were limited to increases of 7.5 per cent over the previous year. The budget request was, however, subject to statutory review by the Finance Ministry.

Earlier budget request

Prime Minister Suzuki also repeatedly stated in the Diet that the defense budget would not be sacred. The higher ceiling was, then, primarily intended to provide the Defense Agency with more maneuvering room in its budget request to conform to U.S. wants.

The budget request was submitted to the Ministry of Finance at the end of August, the deadline at the national level. The Ministry of Finance normally takes nearly four months from September to December to assess the budget requests from all requesting departments and agencies.

This period is critically important in Japan since the Ministry's budget assessment, de facto, determines the nation's policies for the next fiscal year. That is, budget proposals accepted by the Ministry become legitimate policies for automatic implementation while the ones not adopted have to be abandoned.

Each Ministry's budget proposal, once approved by the

Cabinet after appeals at ministerial levels, tends to survive the legislative process without any revision because the majority party (now Liberal Democratic Party) forms the Cabinet in the parliamentary system.

The budget review is also significant since it concurrently functions as both an authorization and an appropriation for a project. Accordingly, any project which is approved is subsequently implemented (or at least started) in the next fiscal year.

Minimum acceptable

As early as the beginning of September, before any statutory budget review had been made by the Finance Ministry, rumors were widespread in Tokyo that the United States grudgingly accepted the Japanese 9.7 per cent target as the minimum acceptable.

In Tokyo, the Defense Agency, the Foreign Ministry and numerous pro-military members of the Liberal Democratic Party lobbied for an even larger increase in the defense budget and went as far as to say that a 9.7 per cent increase was the absolute minimum.

They argued that anything less than a 9.7 per cent increase would be detrimental to U.S.-Japan relations and suggested that existing trade relations could be greatly jeopardized.

Such rumors eventually won the support of certain industrialists and academics and as a result there were increasing reverberations in Tokyo and throughout Japan. As usual, Japanese mass-media fueled such speculation.

The reverberations traveled across the Pacific to Washington, where observers heard repeated reassurances that a 9.7 per cent increase would be the "floor" of the defense budget increase for the next fiscal year. The "ceiling" then had become the "floor." American officials generally attributed this to Japanese

politicians, including the top officials who desire Japan to have a stronger military and closer U.S.-Japan relations.

From the official U.S. point of view, these sources were supportive of assurances the U.S. had heard from the U.S. ambassador in Tokyo following his meetings with cabinet level officials.

Thus, there was a strong conviction that Japan would increase defense expenses at least by 9.7 per cent, possibly more. Protests at administrative levels by Japan's diplomatic corps were reportedly too weak to refute the misinterpretations and to cool adequately the heated expectation.

7.6 per cent increase

It was in such an atmosphere that the Finance Ministry showed the Defense Agency its draft proposal which contained a 6.6 per cent increase for defense on December 22, 1980.

On December 30, after the Defense Minister repeatedly appealed to the Finance Minister for reinstatement of deleted items with the strong support of pro-military Diet members, the Finance Ministry finally agreed to a 7.6 per cent increase. This was later approved by the Cabinet.

Thus, the Japanese defense budget for FY 1981 has been de facto determined to increase by 7.6 per cent.

Since many American policymakers had felt assured of a 9.7 per cent increase, they probably now feel betrayed. This article sheds light on how this happened, who was responsible, and how the same mistake can be prevented from happening again.

Among the sources, the voices of visiting politicians sounded powerful and convinced U.S. top policymakers. Accordingly, their contribution must have been significant. Politicians cannot be, however, blamed completely. After all, they are supposed to seek and

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express their beliefs and dreams and they may be excused for not making any technical or procedural distinction between ideal and reality.

While this might cause less misunderstanding domestically, it can produce more damaging illusions or misunderstanding internationally, because the policy-making varies greatly with the legal system, culture, history, tradition, and practices of a nation, as do the roles of politicians or bureaucrats.

Informal power

Often in a country informal power exceeds real authority in terms of its contribution to policy formulation. The extent of the delegation of authority to a bureaucracy may be much greater in Japan than the U.S. and the decisionmaking process in the Japanese bureaucracy generally is more consensual than the more autocratic style of the U.S.

Accordingly, Americans should be careful not to overestimate the practical influence of Japanese figureheads in making decisions and not underestimate the significance of administrative or bureaucratic decision-making processes.

On the other hand, the Japanese should be careful not to make the opposite mistakes in analyzing American policies.

Diplomats' responsibility

Diplomats are normally responsible for effective international dialogues. Therefore, they can hardly escape some responsibility for any failure in communicating effectively.

If diplomats cause international misunderstanding by ignorance of their own domestic affairs, incomplete explanation or distorted information, their responsibility should be called "primary." If they do not create a misunderstanding but fail to straighten it out in time, they are still responsible for the situation.

This latter responsibility may be called "secondary." In this case, many Congressional staff members and State and Defense Department officials believed a 9.7 per cent increase would be the minimum approved. Even respectable American experts on Japan believed that Japan would approve a 9.7 per cent increase because Japan understood the international situation.

A high official in the Pentagon, however, persistently

defends Japanese diplomats by insisting that the true situation — that a 9.7 per cent increase was merely a ceiling at or below which the budget request was permitted — had been explained to Americans by them but they were disregarded as overly pessimistic primarily because more pleasant statements had been made by higher officials at the cabinet level in Tokyo or by visiting Diet members in Washington.

Traditional arrogance

Although Prime Minister Suzuki sometimes responded to opposition parties in the Diet that the defense budget was not sacred, he too frequently said he understood the needs of international security, which Americans tended to regard wishfully as more evidence of getting at least a 9.7 per cent increase.

The same Pentagon official maintains that military and political attaches faithfully portrayed what was likely to happen but were ignored. If so, this reflected the traditional arrogance of American foreign policy, which sees what it wants in the way it wants. Unfortunately, both the U.S. and Japan have long indulged in this tendency in their unequal partnership.

U.S. Pressure Analyzed

Tokyo THE JAPAN ECONOMIC JOURNAL in English 10 Feb 81 pp 20, 15

[Text] Since Commodore Perry's request to Japan to open its door to the West in 1853, the use of foreign pressure, particularly from America, has been an effective, convenient measure often used to expedite policymaking in Japan where the traditional consensual decisionmaking process often produces a stalemate.

Outside pressure

Such a method, however, presupposes that Japan is

weaker than or inferior to the U.S., that Japan is vulnerable to U.S. intimidation, and worse, that Japan cannot decide policy on its own without outside pressure.

Some of these assumptions insult the Japanese and too many of these measures cause the Japanese public to become hostile to Americans and pro-American Japanese. This is not good for either country in the long run.

As a matter of fact, a high official in the U.S. Embassy in

Tokyo recently told me that excessive use of the "U.S. pressure" was embarrassing to the United States because it would damage the sound development of mutual respect and an equal partnership.

The time has come and is even long overdue when full exchange of information and views based on mutual openness should replace the fragile, sensitive and intricate diplomatic techniques which had been preferred.

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Anyway, American policymakers did not receive prior to December an accurate picture of Japan's defense budget, which this paper will present more accurately.

There is now a consensus in Japan that the practice of accepting a "free ride" on the U.S. deterrent force should be ended and that Japan should pay an equitable share of the burden to maintain world peace and the global system of economic prosperity.

Some people think strengthening the military is the most effective means of peacekeeping because of the deterrent effect of defense forces.

But others fear that military power can stimulate a limitless arms race; they think that economic and political stability in Third World countries is essential for world peace.

Various alternatives

Thus, the Japanese see various alternatives to promoting world peace. As a matter of fact, the Government of Japan is committed to increasing economic assistance and to a steady and meaningful increase in defense expenditures.

Accordingly, Japan's new role and contribution should be measured not only by the increase in its defense expenditures but also by its overall performance in economic assistance, defense, and trade and overseas investment promotion policies.

The optimum combination of such measures should be determined by the people of Japan on the basis of available resources and the international situation. Close cooperation among allies is commendable, but any excessive interference in domestic policymaking should be strongly discouraged.

At present the Japanese public financial situation relies on borrowing for nearly 30 per cent of the total revenue, one of the highest rates among

the advanced industrial nations. The government is strongly determined to decrease the deficit as much and as early as possible.

Furthermore, social welfare in Japan is still relatively inadequate. For example, a recent paper by the European Community staff criticized the Japanese as "workaholics who live in rabbit hutches."

Under these circumstances, an increase of 7.6 per cent in defense expenditures can be considered unusually high.

Meanwhile, members of the North Atlantic Treaty Organization (NATO) pledged to increase arms spending by 3 per cent annually in real terms through 1986 but most members, including West Germany and Britain, are likely to have less than a 2 per cent increase.

More than NATO

Mike Mansfield, U.S. Ambassador to Japan, said in a recent news conference: "Japan spends more on its defense than most of the NATO countries... Japan has increased defense expenditures at an annual rate of 8 per cent a year over the past 10 years, compared to an annual rate of 2 per cent increase on the part of the NATO over the same period and the 2 per cent decrease in U.S. expenditures." (*The New York Times*, March 20, 1980.)

I am not so naive as to believe that discussing budgetary figures is the equivalent of discussing defense policy.

A high-Pentagon official told me with some skepticism that there is no Defense Minister in Japan and that the Finance Minister has played the role of the Defense Minister there.

He insists what is important is not the actual increase in budget figures but the effectiveness, readiness, and deterrence.

I am sorry that my discussion in this article has not been as substantive as I would like, partly because of

the limited space but mostly because of lack of my expertise.

However, let me repeat one of Defense Secretary Brown's remarks: "Before you solve all the policy issues you have to come up with a budget. Logically, you ought to do it the other way around, starting with what's necessary for U.S. security, the international factors, your strategy, what forces that takes, what budget that takes. But you don't have time to work out the world from its primordial atoms. You have to come up with a budget as we did a month after we came to office." (*The Washington Post*, December 7, 1980.)

Faithful cooperation

Thus, I hope that a budgetary discussion remains practically meaningful for dealing with defense policies pragmatically. I also hope that Americans and other allies will appreciate how sincerely and seriously Japan has tried to do its best to attain an increasing international role.

As a matter of fact, what actually happened can be explained as the absolutely sound, faithful and painstaking crystalization of cooperation among responsible people in Japan. I suggest that Americans recall how faithfully Japan has long cooperated with the U.S., even at the expense of its vital economic interests and often with little appreciation, as in the recent economic sanctions against Iran and the Soviet Union.

Japan's GNP is the world's second largest after the U.S. Japan's foreign economic assistance is the second largest in the world after the U.S. Japan produces more automobiles than any other country in the world, having surpassed the U.S. in 1980. Japan produces more steel than the U.S.

Furthermore, Japan may be able to act as a military superpower very soon if it wants. Its

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military budget is already the world's seventh largest.

The polls clearly show, however, that the Japanese people do not want their country to become a military superpower, while they are increasingly supportive of more effective defense capability for Japan. Nor do neighboring and distant countries seem to want Japan to become a superpower.

The Japanese, however, are well known for their ability to cope with crises and effectively adapt to a new environment.

I hope American policy-makers have patience, respect, deep appreciation for and confidence in the way the Japanese handle the issues.

Faster implementation

Social anthropologists and comparative policy analysts have found that while the Japanese may be slower in reaching a decision, they are faster in implementing it compared to their American counterparts.

For the defense policy, at least, two things are now clear: first, Japan will remain one of the most reliable allies of the

U.S. in its peacekeeping mission. Second, Japan has been determined to increase the defense capability steadily in the years ahead.

This would undoubtedly not only conform to but also be indispensable to the U.S. overall geopolitical strategy.

In view of current and future international relations, unity among the allies is critical for the Free World to maintain the capability to encounter aggression. Bickering over small differences of percentages in Japan's military budget would not be constructive or wise.

A 7.6 per cent increase in the Japanese defense budget should be appreciated in the proper context. In addition, in the same budget proposal, there are several encouraging factors which would surely enhance Japan's and its allies' military effectiveness.

These include a substantive increase in the future procurement commitments, more actual purchases of fuels, missiles and jet fighters because of the recent substantial appreciation of the yen, and almost no actual cutting by the

Finance Ministry of major equipment items needed for speeding up the Defense Agency's 5-year operational program by a year.

Be positive, not negative

Furthermore, the U.S., Japan and NATO members will be able to multiply their integrated capability through joint exercises, adoption of a uniform size and standard for major equipment, and joint or cooperative exploration of research and development in a more systematic way.

These are, thus, sufficient reasons why I am optimistic about Japan's security policy. If there is any factor to justify pessimism, let's consult with each other to solve it in a constructive and sensible manner, and not accuse each other in the emotional, hysterical and selfish manner of a child.

We must not allow elusive high expectations to hamper deserving appreciation. My message to the new Reagan administration is be positive, not negative.

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ECONOMIC

JAPAN'S COMMITMENT TO ASEAN REMAINS SHROUDED IN AMBIGUITY

Tokyo THE JAPAN ECONOMIC JOURNAL in English 20 Feb 81 p 20

[Article by Shiro Saito]

[Text]

SINGAPORE — The members of the Association of South-east Asian Nations (ASEAN) — Indonesia, Malaysia, the Philippines, Singapore and Thailand — which quietly greeted Japanese Prime Minister Zenko Suzuki during his visit to their capitals in January are digesting the meaning of their encounter with the Japanese leader, relating it to the emerging Asia policies of the just inaugurated Reagan Administration of the United States.

As a consequence of Suzuki's swing in the region, the relationship between Japan and the ASEAN has taken a big step toward political symbiosis from the mere economic interdependence that

bound them in the past. Suzuki's speech in Bangkok at the conclusion of the tour is taken by the ASEAN as having committed Japan politically to the region more articulately than ever, although the issues addressed by Suzuki in this connection were limited to a call for an end to the Vietnamese military intervention in Cambodia and restoration of peace in the Indochina country. There is a rising expectation for an environment conducive to "triangular cooperation" among the U.S. under the new administration, Japan and the ASEAN to secure peace and stability in Asia.

What has Prime Minister Suzuki's visit to ASEAN capitals added to development and direction of international relations in Southeast Asia and the Pacific region? What commitment has he left? What the Japanese leader spoke and did in those capitals was so low-keyed that it even did not cause ripples so far as region's international political environment was concerned. He simply left the impression that he was reiterating Japan's position which already had been clear and well known.

Ironically, the strongest reaction to Suzuki's remarks during his tour came not from within but from without the ASEAN. In what was its bitterest accusation of Japan ever,

Vietnam's Radio Hanoi called Suzuki's speeches and meeting with ASEAN leaders "manifestation of Japanese fascism aiming for restoration of Great East Asia Co-prosperity Sphere."

Hanoi appeared to have taken strongest offense about the passage in Suzuki's Bangkok speech which said that "the fighting in Cambodia, and devastation of the country that sent hundreds of thousands of its people fleeing the country as refugees has been caused by none but Vietnam's military intervention." Vietnamese leaders seem to be taking Suzuki's words to be little different from Ronald Reagan's.

As Hanoi sees it, Japan's economic power now is going to be used to underwrite a political scheme that binds Tokyo firmly with non-Communist nations of Asia. Political togetherness of Japan and the ASEAN, moreover, appears to look to Vietnam not to be limited to the Cambodian issue but also to be meant as demonstration to check southward thrust of the Soviet navy which could threaten the sea traffic lane of crude oil and other essential commodities bound for Japan.

Though distorted by Hanoi's own prejudices, there is some truth to such reactions to the Japanese move toward the ASEAN. If so, Prime Minister

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Suzuki, whether conscious of it or not, has undeniably given a firm commitment to mutual support and cooperation between Japan and ASEAN.

Asked about the essential point of his Bangkok speech, Suzuki replied that it was on the extension of the so-called Fukuda Doctrine, laid down in the speech the then Prime Minister Takeo Fukuda delivered in Manila in August of 1977 when he was winding up a tour of the five ASEAN countries and Burma. And Suzuki added, "In line with progress and changes to be made in ASEAN, I hope to develop my own thinking about Japan's relations with the region."

The Fukuda Doctrine in Manila was regarded as an improvised political declaration aimed primarily at easing the still harsh feelings that existed toward Japan in the ASEAN region and at changing the way they see Japan. Suzuki's speech in Bangkok, by contrast, can be taken as a success in that it drew more attention than Fukuda's Manila speech because of its being more substantive and concrete as regards Japan's readiness for action.

This difference between Fukuda and Suzuki speeches, however, probably can be explained more by changed international relations in Southeast Asia rather than that Suzuki's speech itself had stronger appeals. The difference reflects the fact that against the continuing crisis in Indochina, ASEAN countries have inevitably taken sharper interest in Japan's diplomacy, and Japan in return has been forced to be more conscious of the ASEAN's presence.

Even though Prime Minister Suzuki's ASEAN tour made clear Japan's commitment to this political group and laid a foundation for a cooperative policy toward it, what specific measures and actions Tokyo will take to implement the commitment is still shrouded in "Japanese ambiguity." The rhetoric of being "an economic power without military strength" is hard to accept not only for Europe and the United States but for Southeast Asia as well. Leaders of the ASEAN are showing a look of irritation over this "Japanese ambiguity" because those Asian leaders had been expecting a specific security commitment from Suzuki as extension of the Japan's much publicized political role.

Singapore Prime Minister Lee Kwan Yew has, on every opportunity, been appealing for a Japanese military buildup and non-nuclear rearmament, but he made no mention whatsoever of Japan's military capabilities when he met with Prime Minister Suzuki. Perhaps, in a hope not to embarrass Suzuki, the Singapore leader chose to avoid the subject, sensing in advance Suzuki's intention to declare that his country is denying itself a military role in Asia.

It is also questionable if Japanese offer of an effort for Asian security through economic cooperation is understood and appreciated by Asian countries themselves. Security of the Asia-Pacific region in standing up to the Soviet threat after all must be discussed in a global context of strategies of the Western world, centering on the United States.

When Prime Minister Suzuki was winding up his ASEAN

trip, Ronald Reagan was inaugurated as the President of the United States and ASEAN countries' attention converged on Washington. Secretary of State Alexander Haig, in giving his view on Asian situation in the Senate confirmation hearing, cited Lee Kwan Yew as a leader with whom he can freely exchange opinions on Asian issues and seek advice from. The Singapore prime minister hails Haig as a "powerful, promising leader."

Incidentally, the post of the assistant secretary of state in charge of East Asian and Pacific affairs has been assumed by John H. Holdridge, who was formerly U.S. ambassador to Singapore.

Prime Minister Lee Kwan Yew also is expected to carry a considerable importance in his advice to the new U.S. administration on the China issue. He apparently is in the best position to communicate with Washington on the issue as he only last year visited Peking. The Singapore Prime Minister also has made remarks full of suggestions on the political solution to the Cambodian issue and fostering of the third party of Song Sang toward that goal.

Now that Prime Minister Suzuki has made the tour of ASEAN as his first overseas trip as prime minister, his next major diplomatic mission is a call on the White House to see the new American leader. When he has talks with President Reagan and his staff, Suzuki is expected to make his suggestions for the formation of Asia policies of the new administration. In his Bangkok speech, Suzuki appealed for "matured relations between Japan and the ASEAN," whereas the ASEAN is seeking the "political maturity" of Japan.

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ECONOMIC

CLOSE TIES BEING FORGED BETWEEN JAPAN, EGYPT

Tokyo BUSINESS JAPAN in English Feb 81 pp 37-45

[Article by Masayuki Tomita, Middle East Dept, West Europe-Africa-Middle East Division, International Trade Policy Bureau, MITI]

[Text]

THE ceremony to commemorate the conclusion of the first-stage expansion project of the Suez Canal, connecting the Mediterranean and the Red Sea, took place at Port Said on December 16, 1980. Government leaders of Egypt headed by President Anwar Sadat attended the ceremony. Foreign Minister Ito of Japan also attended.

This canal expansion project called for the expansion of the canal width from the previous 99 m to 160 m, and increase of the canal depth from the previous 14.5 m to 19.5 m. The maximum gross tonnage for navigable vessels was to be raised to 150,000 tons in loaded state and 370,000 tons in an unloaded state.

Japanese enterprises took part in this construction project. In fact, three Japanese enterprises, namely, Penta-Ocean Construction Co., Mitsui Construction Co. and Toa Construction Co. acquired about 70% of the construction work Egypt contracted with foreign firms.

In view of the importance of this project the government of Japan twice provided yen credits totaling ¥61 billion as an economic aid. Economic cooperation between Japan and Egypt dates back to 1958 when Japan extended to the former Arab League financial aid within the frame of \$30 million used for the import of capital goods on deferred payments. Up to 1964, Egypt imported from Japan capital goods including a sugar-making plant and cotton-spinning plant through the fund.

It was after 1970 that Japan's economic cooperation with Egypt developed more fully. Yen credits on deferred payment have been provided almost every year so as to contribute towards stability and expansion of the Egyptian economy.

Besides the above-mentioned project to expand the width and the depth of the Suez Canal, Japan furnished financial aid to the project to increase the dredging capacity of the canal (by providing two dredgers) and the construction project of Jobra Thermal Power Plant in the

Jobra-El-Kaima district to the north of Cairo to cope with the anticipated sharp rise in demand for electric power in the course of Egypt's economic reconstruction (Japan is furnishing power transmission and transformer facilities).

In addition, Japan's economic cooperation included such capital goods as industrial raw materials, machinery and equipment, vehicles and communication equipment.

Financial aid on a government basis including both gratuitous cooperation and yen credits totaled ¥140 billion as of the end of August 1980. They are broken down into ¥8,422 million in gratuitous cooperation and ¥131,580 million in paid cooperation.

Principal items of gratuitous cooperation are machines for Jobra Center for machine operation and vocational training and equipment for a children's hospital attached to Cairo University. Paid cooperation is entirely composed of yen credits for financial assistance to projects and for providing capital goods.

A credit line was drawn at \$100 million for three years between 1976 and 1978, and at \$200 million for three years between 1979 and 1981. They are earmarked for purchasing machinery and equipment for the development of the economy.

Financial aid in the private sector included deferred-payment exports totaling \$65,242,000 in 1978 (a total of \$253,831,000 up to the end of 1978) and investment in Egypt totaling \$3,712,000 in 1978 (a total of \$11,976,000 up to the end of 1978).

Other items of technical aid on a government basis include the receiving of trainees by the Japan International Cooperation Agency (JICA) (128 trainees in 1978 with a total of 907 trainees up to the end of 1978) and dispatch of specialists (137 specialists in 1978 with a total of 346 specialists up to the end of 1978) in the fields of transportation, postal services and machinery and electric industries.

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Furthermore, an investment guarantee treaty was concluded between Egypt and Japan in January 1977, for the purpose of encouraging Japanese corporations to make direct investments in Egypt. The treaty, which is not by itself economic cooperation, is structured on two points: protection of invested assets and most-favored nation treatment of Japanese investors.

Japan-Egyptian Trade

According to IMF: DOT (1979), Egypt's overall exports totaled \$2,348.5 million and overall imports \$8,178.6 million. Exports to Japan accounted for 3.6% of the total while imports from Japan accounted for 5.3%. Japan ranked 7th as Egypt's export market and 6th as import partner.

According to Customs Clearance Statistics, exports from Japan to Egypt totaled \$387 million in 1977 (up 18% from the previous year), \$400 million in 1978 (up 3%) and \$397 million in 1979 (down 0.8%).

Japan imported from Egypt goods totaling \$78 million in 1977 (up 16%), \$82 million in 1978 (up 5%) and \$94 million in 1979 (up 14%). Apparently the trade volume between Japan and Egypt is on gradual increase.

Japan's main export items in 1979 were machinery and equipment, metal products and light industrial goods.

Exports of machinery and equipment as a whole in 1979 increased 3.3% from a year earlier. An 11.8% decrease in transportation machines and a 17.9% decrease in general machines were more than offset by the 33.2% increase in electric machines.

Rolling stock among transportation machines grew as much as 35.3% from a year earlier, reflecting an increased transportation capacity. However, motorcars registered an export decrease of 3.8%. Exports of ships dropped sharply by 84.8% from a year earlier reflecting the shipbuilding recession.

Among electric machines, heavy electric machines increased four to five times over 1978 thanks to expansion of power supply and production facilities.

In addition, household electric appliances and communication equipment increased 32.4% and 15.2%, respectively.

Exports of metal goods increased 10.3% from a year earlier. The export decline of processed metal products by 5.1% was offset by the 20.3% export growth in steel bars and shapes.

Exports of light industrial goods decreased 24.7% from a year earlier. The main factor in this downtrend was the sharp decline of 46.6% in exports of textile products due to Egypt's determined policy to protect and expand the indigenous textile industry.

Exports of other light industrial goods, excepting non-metallic mineral products, dropped 2.6% chiefly owing to the downtrend in tire tubes.

As regards Japan's imports from Egypt, raw cotton, the main import item, accounted for 74.9% of overall imports from Egypt. Raw cotton imports grew 59.6% from a year earlier and attained the import level of ordinary years.

Imports of aluminum ingots, on the other hand, decreased 42.3% since Egyptian quotations were higher than the international level.

Other Japan-Egyptian Relations

The Egyptian Petroleum Development Co. of Japan has been participating in the development of petroleum resources in Egypt since 1970. The company acquired the concession for the West Bakr Mining Area in 1976 and was continuing trial drillings. As a result, it announced in April 1980 the discovery of commercially feasible deposits.

The Egyptian Petroleum Development Co. will become the third successful Japanese-established company after Arabian Oil Co., and Abu Dabi Oil Co. among the overseas petroleum development projects. When the full-scale commercial production starts, Egypt will benefit from it. Part of the oil will be shipped to Japan.

Each year since 1972 Japan has been taking part in the Cairo International Fair initiated in 1968. Japan has already taken part in the fair seven times including 1980 and has been exhibiting its merchandise since 1977.

JETRO (Japan External Trade Organization) and private enterprises will again participate in the 14th Cairo International Fair (March 14 - 28, 1981) with various programs including the exhibition of merchandise.

Future Outlook

The Egyptian economy has been eroded by several Middle East wars. Egypt was on the brink of economic collapse in the middle of the 1970s, beset with chronic deterioration of international balance of payments and budgetary deficits.

However, the country's economic condition is in the process of gradual recovery thanks to the implementation of an economic open-door policy, financial assistance from leading Western countries, growing revenue from the exports of petroleum and the improvement of the trade balance.

According to the Financial Times, the current accounts in the first half of 1980 were \$16 million in the red. But this deficit had dwindled to only 2% of the figure in the same period of 1979.

The main factor that had brought about such spectacular improvement was the sound growth of trade, especially the

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Table 1. Japan's Exports to Egypt

(Unit: \$1 million)

Item	1977	1978	1979	Compared with year before	1980 first half	Compared with same period before
Export total	387	400	397	99.2	285	136.4
Foodstuff	8	11	7	65.1	9	241.7
Light industrial goods (Textile goods)	56	64	48	75.3	35	164.3
	(29)	(32)	(17)	53.4	(9)	113.5
Heavy industrial goods and chemical products	323	324	340	105.0	240	131.0
(Metal goods)	(41)	(58)	(64)	110.3	(37)	131.9
(Machines and equipment)	(275)	(256)	(264)	103.3	(192)	130.7

Table 2. Japan's Imports from Egypt

Item	1977	1978	1979	Compared with year before	1980 first half	Compared with same period before
Import total	79	83	95	114.3	62	117.4
Raw materials	65	45	71	159.0	53	149.0
(Raw cotton)	(64)	(44)	(71)	159.6	(52)	148.8
Processed goods	14	37	22	58.8	0.5	2.9
(Aluminum ingots)	(13)	(37)	(21)	57.7	0	0.0

increase in the oil revenue which amounted to \$1,237 million, up 81% from the same period in 1979.

Of the petroleum output of 630,000 B/D in the first half of 1980, about 200,000 B/D were turned to export. The increase in petroleum revenue was chiefly ascribed to soaring international oil prices.

Although exports of petroleum were the main factor in the improved trade balance, the following items, too, made vital contributions: remittances by Egyptian workers abroad with \$1,337 million in the first half of 1980, up 37% from the same period in 1979; revenue from the Suez Canal with \$329 million, up 25%; and tourism with \$286 million, up 16%.

The peace treaty between Egypt and Israel, signed in March 1979, created quite a stir in Arab countries. These countries were so angered that they decided, in a conference of Arab foreign and economic ministers held just after the signing of the treaty, to impose sanctions against Egypt, such as disqualification for membership in the Arab League and other Arab organizations and discontinuation of economic aid.

Nevertheless, Egypt is enjoying a comparative economic prosperity at present, although there was concern about the

Table 3. Paid Cooperation to Egypt

As contracted in exchange of notes as of August, 1980, totaling ¥131,578 million

(Unit: ¥1 million)

Date of contract	Project	Value
	(Yen credits)	
73. Apr. 29	01. Commodity aid	3,080
74. Jul. 25	02. Commodity aid	7,500
75. Apr. 16	03. Expansion of the Suez Canal	38,000
75. Oct. 2	04. Commodity aid	15,000
76. Jul. 19	05. Repair of Alexandria Port	5,805
76. Dec. 21	06. Improvement of Greater Cairo water supply	5,820
77. Nov. 5	07. Expansion of the Suez Canal	23,000
78. May 30	08. Improvement of Greater Cairo water supply	3,375
79. Jan. 31	09. Commodity aid	8,000
79. May. 12	10. Improvement of the Suez Canal dredging	12,000
79. Aug. 20	11. Expansion of telephone network in the Suez Canal region	5,138
80. Jun. 8	12. Construction of Jobra thermal power plant	4,862

Table 4. Gratuitous Cooperation to Egypt

As contracted in exchange of notes as of August, 1980, totaling ¥8,422 million

(Unit: ¥1 million)

Date of contract	Project	Value
	(General gratuitous cooperation)	
77. Oct. 12	Machinery and materials for Jobra Center for machine operation and vocational training	360
78. Oct. 5	Housing program for low-income bracket (small steel bars)	2,500
79. Aug. 20	Program to counter Rift Valley fever	500
79. Nov. 24	Housing program for low-income bracket	1,600
	Program for improving nation's nutrition	400
80. Jun. 8	Program for establishing Fisheries Control Center at High Dam Lake	500
	Cairo University's children's hospital	2,000
	(KR foodstuff aid)	
69. Jan. 22	Spanish rice	2
	(Gratuitous cooperation to liquidate liabilities)	
79. Mar. 25	Purchase of general commodities	30
80. Mar. 23	Purchase of general commodities	30

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possible effects these sanctions might produce on the Egyptian economy.

As mentioned above, Japan intends to make a positive contribution to the recovery of the Egyptian economy through various types of economic cooperation.

Table 5. Technical Cooperation

A. (Receiving of trainees and dispatch of specialists)

(In number of persons)

	Organization	1978	Total up to end of 1978	Field
Receiving of trainees	JICA	85	723	Transportation, administration, postal services, agriculture, light industries
	UNIDO	-	10	Machines, metals, electric industry
	AOTS	43	174	Ships, industrial machines, petroleum
Dispatch of specialists	JICA	137	346	Transportation, public utilities enterprises, heavy industries, administration, light industries

Note: Dispatch of specialists by JICA includes survey teams.

B. (Technical cooperation projects)

Classification	Project	Years
Planning and survey for overseas development	Planning and survey for improving Helwan iron mills	76-78
	Planning and survey for the construction of direct reduction type integrated iron mills in Dikehla	78-79
Development survey	Survey for project screening	78
	Program for management system design for Suez Canal	77-78
	Comprehensive development program for southern regions	78
	National railways modernization program (preliminary survey)	78
Technical Co-operation Center	National railways modernization program	78
	Jobra center for machine operation and vocational training	76-81
	Arab Seamen's Academy	76-80
	Textile R. & D. (preliminary survey)	78
Sanitation and medical cooperation	Study on educating nursing personnel	78-82
Equipment and materials	Machinery and materials for seismological observation (¥1,324,000)	75
	Microwave communication equipment (¥21,200,000)	77

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ECONOMIC

EXPERT ON ECONOMIC OUTLOOK FOR 1981

Tokyo BUSINESS JAPAN in English Feb 81 pp 49-54

[Article by Shinichi Goto, Director and General Manager of Research Division, Mitsui Bank]

[Text] THE second oil crisis, in 1980, again threw the world economy into an adjustment phase. The Japanese economy was no exception, price inflation occurred, economic growth slowed, and Japan's current account balance in external trade recorded a big deficit.

As a consequence of the rise in the crude oil price, wholesale prices surged upward and in the peak month of April 1980 showed an increase of 24% over the corresponding month of the year before. Subsequently, the upward thrust weakened, but the average increase for the year as a whole was still expected to reach 18%. Consumer prices, too, continued to rise stubbornly, abetted by the increase in the prices of seasonal goods caused by the unusually cool summer. For the year as a whole, the rise in consumer prices was expected to reach close to 8%.

Economic growth rate was erratic. In the first quarter (January - March) of 1980, the GNP increased by 1.8% (annual rate 7.4%) but in the 2nd quarter (April - June) it sagged to 0.8% (annual rate 3.2%) and in the 3rd quarter (July - September) it rebounded to 1.5% (annual rate 6.1%). The high rate in the 3rd quarter was due to a temporary decrease in imports. If only private domestic demand is taken into account, the growth rate in the 3rd quarter compared with the preceding quarter would be minus 0.6%. Economic growth led by private demand, continuing since 1978, is beginning to falter.

An analysis of the main demand categories shows that personal consumption, which constitutes the biggest item, maintained steady growth in nominal terms, but stagnated in terms of real growth because the inflation rate of consumer prices was high. Home construction was extremely depressed due to the big rise in land prices and construction costs, the increase rate was higher than that of income. In addition, public works expenditure was held down in order to check inflation.

In view of the above, the leading factors in economic growth were the steady growth in exports and equipment investment. Exports, led by motor cars and electric appliances, registered high growth in terms of volume because the yen's exchange rate remained low from the start of the year. In the April - June quarter, exports expanded by 21% over the corresponding quarter of the year before and have continued to increase at a high rate. Equipment investment continued its vigorous growth from 1979. Equipment investment has been in an expansion phase since 1978 as aging equipment necessitates replacement. Good corporate earnings in 1980 also helped spur equipment investment. Taking the March 1979 term as 100, the current profit of companies capitalized at more than ¥1,000 million in the September 1980 term rose as high as 158.9. Even when the electric power and gas industries, which realized big earnings gains as

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result of hikes in rates, are excluded, the figure was a high 156.8. This earning performance was due to the strengthening of corporate constitutions through drastic "weight-reducing," the stabilization of prices of imported raw materials as a result of the rise in the yen's exchange rate after mid-year, and the raising of product prices.

As a result, the real economic growth rate in calendar 1980 was expected to have been around 5%, lower than the 5.9% of 1979. The Japanese economy's growth must be considered as being very high compared to the average real growth rate of the 24 OECD countries, expected to be around 1.2%.

Finally, the trend of Japan's international balance of payments shows that the current balance continues in the red. The fact that the current balance continues in the red despite the high growth of exports is due, it goes without saying, to the big increase in the crude oil price. The price of imported crude oil in the January - March period of 1980 reached a peak of 115.2% of the corresponding period of the year before. In the same quarter, the current account deficit also reached a peak of \$5,800 million. However, the current account deficit has been contracting since then, becoming \$4,500 million in April - June and \$900 million in July - September. This was due to the slackening of the upward tempo of the crude oil price, the slowdown of domestic demand, and the falling off of oil imports because of the war in the Middle East. The long-term capital balance, on the other hand, generally showed an excess of in-flow, except for the time when the difference in interest rates — high overseas and low in Japan — became exceptionally big. The capital in-flow resulted in pushing up the yen's exchange rate and attested to the high international evaluation of Japan's economic growth power.

On the basis of the above perception of the present situation, let us attempt a prognosis of the Japanese economy in 1981.

The key to forecasting the economy in 1981 lies in how one assesses the trend of prices. With the Iraq-Iran war in the background, it is difficult to forecast the oil situation. However, because of the stagnation of the world

economy and the large stockpiles, the increase in the price of crude oil in 1981 will probably be held down to the 10% level. Aside from crude oil, the international commodity market seems stable. Therefore inflationary pressure from imports will probably lessen. As for internal factors, the point will be the extent of wage increases in the spring. Prices rose sharply in 1980, but it was mostly import inflation. Domestic inflationary factors were effectively checked. This was due in large measure to the fact that, learning from the lesson of the confusion that followed the first oil crisis, the average wage increase was held down to 6.9%, or under the growth rate of labor productivity. The same outcome is expected in 1981 and the balance between wage increase and productivity growth is expected to be maintained. On the basis of the above assumptions, it is believed that the rise in wholesale prices over the preceding year will be several percentage points. Consumer price inflation is expected to cool down to a rise of 6% or so in January - March and of 5% or so in April - June over the year before levels despite the expected increases in postal rates, Japanese National Railways fares, and other service charges.

With the anticipated settling down of inflation with the turn of the year, personal consumption is expected to recover gradually and become the pillar to hold up the economy. Adjustment of corporate inventories will keep in step with this and be completed in the January - March period. Mining and manufacturing production will hit bottom and start rising again. Corporate equipment investment remains deep-rooted in the midst of rising energy prices and intensification of international competition. In addition, the lowering of long-term interest rates will exert an effect, and private equipment investment, principally of the big corporations, can be expected to increase steadily. Home construction, too, is expected to turn upward. The outlook for 1981, thus, is growth led by domestic private demand centering on personal consumption.

Externally, it is anticipated that trade friction with the United States and the countries of the EC will increase while the yen's exchange rate will remain strong. Therefore, a

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slowdown in the growth rate of exports seems inevitable. Exports, however, are expected to continue expanding because efforts will be made to diversify export goods and destinations while dollar-based export prices will probably be increased. Imports, on the other hand, will stay weak. As a consequence, the current account balance will continue in the red although the size of the deficit will be reduced conspicuously.

All in all, business in 1981 will turn towards a moderately paced recovery. The real economic growth rate, however, is expected to be about 5%, or the same as in the preceding year, because the growth in the early part of the year will be low. The easing of the monetary situation is expected to continue, but it will be necessary to keep the increase rate of the money supply to 1 - 2% above that of the present (7 - 8%) in order to maintain the balance with the economic growth rate.

The first task of economic management in 1981 will be the rehabilitation of fiscal finances. If nothing is done to check the ballooning of the fiscal deficit, it will invite fiscal inflation. Moreover, it may even weaken the vitality of the private economy which is the foundation of Japan's economy. On the basis of this perception, the issue of government bonds in fiscal 1981 should be reduced by ¥2,000,000 million (amount after reduction would be ¥14,270,000 million), thus bringing down the dependence of the general account of the

budget on bonds to around 26% from the preceding year's 33.5%. Treasury loans and investments are expected to be trimmed by about 9% compared with the original program of the preceding fiscal year. The efforts to put fiscal finances on a healthy basis should not be limited to these steps. It is hoped that greater efforts will be made to restrict expenditures in an all-out attempt to rehabilitate fiscal finances.

The second task is greater efforts to economize on energy and to accelerate the development of energy sources alternative to oil. For Japan, which depends almost entirely on imports for its oil supply, the securing of a stable supply of oil and alternative energy is more important than anything else in order to ensure economic growth over the long term.

The third task is to accelerate internationalization. The new Foreign Exchange Law went into effect from December 1, 1980, easing many former restrictions, with particular emphasis on liberalization of capital transactions. As a result, capital exchange with overseas will become more vigorous and monetary internationalization will take a major step forward. At this time when the move towards trade protectionism is becoming stronger throughout the world, it is vital for Japan to make efforts to set an example for spurring free trade by taking such steps as reducing residual import restrictions and lowering tariffs.

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ECONOMIC

NEW THOUGHTS ON CHINA'S ECONOMIC OUTLOOK

Tokyo BUSINESS JAPAN in English Feb 81 pp 46-47

[Article by Yukichi Yanagishima, SANKEI SHIMBUN Correspondent]

[Text]

AFTER having covered the first ministerial meeting held between Japan and China recently in Beijing, it is my frank impression that the economic situation of China is extremely severe, and quite beyond my expectations. The economic adjustment that started in 1979 will now take another four or five years, according to Toshio Komoto, Japanese minister in charge of the Economic Planning Agency who attended the meeting. Vice Chairman Deng Xiaoping of the Chinese Communist Party made a reflective comment by saying, "Our targets have been disproportionate to our means." Large projects for industrial development have been suspended and it has become clear that China's supply of oil to Japan that was once promised cannot be fully realized. What China now wants to sell to Japan is coal instead of oil. The following is my impression of today's China after covering the three-day meeting.

Streets in Beijing

The streets I visited in Beijing after a lapse of eight years have undergone a complete change. The new Beijing Airport that was opened January last year has now extended its terminal building on both sides and now bears a close resemblance to the terminal building at the New Tokyo International Airport at Narita. A more marked surprise than this is a huge advertisement tower for Mitsubishi Motor Company that one sees immediately after coming out of the airport. Instead of the busts of

Marx, Lenin and Stalin that have already disappeared from the Tiananmen Plaza, large signboards for Japanese companies, among them Sanyo Electric Co., are occupying large spaces around the plaza. At a corner of the plaza, which was so famous for its wall newspapers, are now many commercial posters and signboards. People are crowded in front of movie theaters all day long. A discotheque is open every other day next door to the famous People's Restaurant in the center of the city. Every weekend, foreigners and young people spend many hours at the disco, dancing all night through.

Prime Minister Zhao Ziyang is said to have told Japanese visitors recently, "We are not trying to follow a capitalist way for our economy." But as far as we see these phenomena, the wave of capitalism seems to be rapidly surging over China.

Economic Structure of An Oil Producing Country

Vice Chairman Deng Xiaoping once said, "Though China is promoting its modernization in four ways, what we have tried to do is beyond our capability. How to achieve the modernization from now on is the largest problem for our country." At the ministerial meeting held in Beijing in the beginning of December, leaders of the Chinese government were all loud in their criticism concerning the economic policy.

After purging the Gang of Four, China has been positively promoting

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industrialization with its abundant oil resources as a strong support. In other words, China has been purchasing industrial products and large industrial plants with the money it has earned by exporting oil. China has thus adopted an economic structure typical to oil producing countries like the Arab countries.

However, it has become difficult for China to fully supply oil to other countries as it promised.

Vice Prime Minister Yao Yilin, who is in charge of the State Economic Committee, has recently made it clear that China would continue to curtail crude oil production until the latter half of the 1980s. He meant in saying this that due to a failure in development, the current annual production of 106 million tons is expected to level off or decrease and that this situation would continue for a decade or so. As a result of the fact that China has promoted its industrialization too rapidly, domestic oil consumption has increased and caused a vicious circle that has reduced the country's capacity to export crude oil. In its trade with Japan, the rate of crude oil assumed 42.1% of its total exports in the first half of last year. Vice Chairman Deng has confessed, "Though we promised to supply 15 million tons of crude oil to Japan in 1982 alone, this was too large a figure."

China is now trying to sell coal to Japan instead of oil. China is said to have coal reserves totaling 600 billion tons and produces 600 million tons a year, the third largest volume in the world. But the price of coal is only one-sixth that of oil.

Though Chinese sources expected to be able to export some \$3,000 million worth of crude oil in 1985, the foreign currency China would receive through oil exports would remain at a level of only \$1,500 million or so even though the price of crude oil further increases in the future. Even if it tries to compensate for this drop with the export of coal, China can obtain only \$400 to \$500 million by exporting 10 million tons of coal. Furthermore, if China tries to export this volume of coal, it has to complete port and harbor facilities near the coal mines. In fact, the infrastructure in China is not complete yet, and it demands both

time and money to complete these facilities. It is then doubtful that it can export a large volume of coal to Japan even though China increases coal production.

Economic Adjustment

It was in 1979 that China envisaged promoting its economic adjustment in 1980 and 1981, and starting its new 10-year economic development program from 1981. But it has become doubtful that this economic adjustment can be completed in 1981.

Prime Minister Zhao has disclosed the difficulty by saying, "The Chinese economy is low in efficiency and wastes too much. What we have to do from now on is improve the excessively concentrated economic setup. We must revise the unrealistic targets we early set."

The inefficiency of the Chinese economy is serious beyond expectation. In 1979, 23.7% of the enterprises owned by the people were in deficit operation. No improvement had been made from the previous year.

The state finances had a large deficit of 17 billion yuan, equivalent to ¥2,380 billion or \$11,900 million, in 1979. The finances are estimated to have caused a deficit of 8 billion yuan last year and are expected to cause a deficit of 5 billion yuan this year. The pace of domestic construction has to be curbed. The economic adjustment has thus started. Simply stated, the adjustment is intended to shift the previous emphasis on heavy industrial projects to the light industries and agriculture, a far more realistic approach.

This shift of emphasis was revealed at the ministerial conference in Beijing by Vice Prime Minister Yao Yilin. He said, "Large industrial projects which have been introduced from abroad must be closely reexamined, and some of them must be cut." If any projects for which contracts have already been concluded are stopped, those Japanese enterprises concerned with them will be dealt a severe blow.

After Prime Minister Zhao assumed his post, the decentralization of authority and the expansion of independence of enterprises as well as other reforms have been attempted, especially in the economic systems.

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But none of these new reforms is functioning smoothly. Because of the traditional lack of liaison among the bureaucratic organizations, similar projects are being conducted at the same time in many areas, wasting money and labor. Even though factories have been built, they cannot go into operation due to the lack of electric power. In order to sell low-quality tractors produced locally, it is prohibited for people's communes to purchase high-quality but less expensive tractors produced in other areas.

The problem is how long this economic adjustment will continue. Every leader of the Chinese government is ambiguous on this point. Vice Prime Minister Yao says, "The adjustment could continue until 1983." Even Vice Chairman Deng is vague in this respect by saying, "The Chinese economy could improve in 1984 or so when the fourth ministerial conference with

Japan will be convened." If the economic adjustment continues till 1984 or 1985, the Chinese economy is expected to be sluggish and no improvement can be expected. Furthermore, China is suffering from a high-paced inflation and the current rate of price increases is 5.6% a year.

At the meeting, Japanese Finance Minister Michio Watanabe complained by saying, "The Chinese government must let us know if it is to attempt any new adjustment in the overall economic planning." When Vice Chairman Deng asked Rokusuke Tanaka, Minister of International Trade and Industry, "Are you disappointed in the Chinese economy?" he replied, "We are not disappointed, but anxious about its future." China is expected to undergo changes through trial and error just as some other developing countries have done. The injury the Chinese economy has been suffering is very serious indeed.

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ECONOMIC

BUDGET: LITTLE SUPPORT SEEN FOR GOVERNMENT'S PROPOSAL

Tokyo BUSINESS JAPAN in English Feb 81 pp 16-17

[Text]

The Finance Ministry decided on the draft of the fiscal 1981 national budget last December, and after reporting on it at an extraordinary Cabinet meeting, informed other government departments concerning budget appropriations. According to the draft, the general account amounts to ¥46,788 billion, up 9.9% from the original national budget for fiscal 1980. The Finance Ministry kept the growth rate of the new budget at 9.9%, a one-digit rate of increase for the first time in the past 22 years since fiscal 1959 when the growth rate of the national budget was kept at only 8.2%. However, the new draft budget involves large tax increases amounting to ¥1,390 billion, a record high. As a

result, the new budget, though a highly retrenched one, forces taxpayers to bear a much larger burden.

A severe retrenchment policy has been adopted in allocating expenditure in many areas, and while an increase of some 15% has been approved for measures to save energy, the highest priority item, no increase has been made in expenditures for public works and for measures for smaller enterprises. The promotion of science and technology has been pegged at the same level as in the previous fiscal year.

Treasury investment and loans have been increased by 4.9% to ¥19,063 billion, but will be increased by 7.0% or more to some ¥19,500 billion

The Finance Ministry's Draft for the Fiscal
1981 National Budget

(Figures in parentheses are ratios over the fiscal 1980 budget, in percentage)		
General Account		
• Revenue	¥46,788,000 mil.	(9.9)
Tax and stamp revenue	32,284,000 "	(22.2)
Revenue other than taxes	2,234,000 "	(17.1)
National bond issues	12,270,000 "	(-14.0)
• Expenditures	¥46,788,000 "	(9.9)
Expenditures for bonds	6,650,000 "	(25.2)
Revenue transfers to local governments	8,083,000 "	(23.5)
General expenditures	32,055,000 "	(4.3)
Public works	6,655,400 "	(0)
Economic cooperation	420,000 "	(9.0 or more)
Measures for energy	488,000 "	(15.0 or more)
Defense expenditures	2,377,000 "	(6.0 or more)
Treasury Investment and Loans	¥19,063,000 "	(4.9)

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through interdepartmental budget sessions with other ministries.

Before compiling the new budget, the Finance Ministry was determined to start the reconstruction of the deficit-ridden state finances and cut by ¥2 trillion the fiscal 1981 deficit-covering national bond issues. As a result, such bonds to be issued will total ¥12,270 billion and the rate of dependence on bonds has been reduced to 26.2% from 33.5% in fiscal 1980.

Drastic retrenchment measures have been adopted in budget appropriations, and the increase rate for general expenditure, excluding expenditures for national bonds and revenue transfers to local governments, has been retained at a level of only 4.3% over fiscal 1980.

In view of this fact, as to even such priority items as measures for saving on energy, the promotion of smaller enterprises and science and technology, as well as public works, budget appropriations will be closely re-examined. No increase will be made in the budget appropriation for public works by keeping the volume at the same level as in fiscal 1980 in real terms. The proposed construction of the new airport in Osaka is not likely to be approved at the current stage.

Requirements by the Ministry of International Trade and Industry for measures to save on energy have been

sharply curtailed and budget appropriations for measures for smaller enterprises will be kept at the same level as in the fiscal 1980 budget. No new measures are likely to be approved for the promotion of science and technology.

Though the Defense Agency has required the Finance Ministry to increase defense spending by 9.7%, this target is not expected to be realized.

As far as national revenues are concerned, in order to compensate for automatic increases, attempts will be made to secure revenues other than taxes, and the estimated amount of such revenues will reach ¥2,230 billion or an increase of 17.1% over fiscal 1980. Furthermore, corporate income taxes will be sharply increased. In fiscal 1982, a large-scale consumption tax will be introduced to secure more tax revenue.

The government seems to be trying to rebuild state finances by increasing the burden of the workers as well as private enterprises. All government departments, the ruling Liberal Democratic Party and industrial circles are showing great opposition to the new draft budget.

Meanwhile, the government has completed a supplemental budget for fiscal 1980 totaling ¥1,092 billion, including expenditure for damage from cool weather and natural disasters. The final size of the fiscal 1980 budget is now quoted at ¥43,681 billion.

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ECONOMIC

FINANCE: LIBERALIZING TREND OBSERVED

Advent of New Age

Tokyo ASAHI EVENING NEWS in English 18 Feb 81 p 5

[Article by Shinichi Hakoijima]

[Text] The Japanese economy in 1980 showed performance which was outstanding among advanced industrial nations. Although the nation's customs-cleared foreign trade had a record deficit of \$10,700 million for the whole year, quarterly figures improved in the latter half and produced a surplus in the October-December period. The current account deficit narrowed substantially from \$5,086 million in the January-March quarter to \$433 million in the October-December quarter, mainly reflecting a marked increase in exports.

Among factors responsible for the nation's economic growth, personal consumption increased only moderately, but capital spending expanded satisfactorily for energy-saving, rationalization, and other purposes. The wholesale price index displayed a year-on-year rise of 30 percent early in 1980 under the pressure of rising crude oil prices, but both wholesale and consumer prices levelled off steadily in the second half of the year.

Such strength displayed by the "fundamentals" of the Japanese economy encouraged foreign capital, especially oil money, to flow into Japan, resulting in large net foreign

purchases of Japanese stocks and bonds. This led the value of the yen against the U.S. dollar to rise nearly 30 percent from around ¥260.00 to the dollar early 1980 to ¥203.60 at the close of the Tokyo foreign exchange market on December 31.

The good performance of the Japanese economy continued into 1981. The wholesale price index rose early in the year owing to a sharp increase in the prices of vegetables caused by heavy snowfall in many districts of the country. But the uptrend of prices is expected to calm down in time reflecting continued appreciation of the yen.

Most of the OPEC nations raised their crude oil prices starting from January in accordance with an agreement reached at the OPEC general meeting held in Bali in December. However, the increases were by four to five dollars a barrel at most indicating that they have switched from the previous policy of raising their prices sharply at a stroke to one of piecemeal hikes in line with the price trend in advanced industrial countries.

Although there will be further increases in oil prices at the next general meeting of OPEC to be held in Geneva

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in May this year and other occasions, there is little danger of a sharp rise that may disrupt the market, so long as the present quantity of oil is ensured.

As for wages, which represent another factor affecting prices, increase this year is likely to be moderate, as will be seen from the fact that labor unions are demanding wage hikes averaging 10 percent for the shunto (spring labor offensive) this year.

Discount rate cut twice

The same is true with the monetary policy. The official discount rate of the Bank of Japan was cut twice in August and November, last year by a total margin of 1.75 percent from 9 percent to 7.25 percent. Another cut in the rate is believed inevitable this spring, because while prices are expected to stabilize reflecting the yen's appreciation, economic slowdown has been intensifying strongly affecting smaller enterprises. The number of bankruptcies has been steadily above the so-called peril line of 1,500 cases monthly in recent months.

As evidenced by the fact that the national budget of the Japanese Government for fiscal 1981, starting next April, showed only a one-digit increase over fiscal 1980, no meaningful support to improve business conditions can be expected from fiscal expenditures this year.

The so-called "budget for reconstruction of public finance," which cuts government bond flotation by ¥2,000,000 million and covers the shortfall with tax increases, cannot be expected to spend much money on public works to boost business.

As public finance has now lost flexibility, time has arrived for the monetary policy to play a big role. The Bank of Japan is said to have "recovered its lost powers" against

the background of a fiscal policy failure exemplified by the massive flotation of government bonds, which have reached an outstanding balance of ¥7 trillion.

On the other hand, however, the massive bond flotation has seriously restricted flexible operation of the monetary policy. Under the heavy pressure of large government bond issues, long-term interest rates in Japan, which should be declining to pave the way for a cut in the official discount rate, have not fallen, but have actually increased in some cases.

While such an unusual development is taking place on the market, it is obvious that a cut in the official discount rate, forced against the market environment, will not produce the desired effects.

Postal saving made a big leap forward last year to add fresh fuel to the rivalry between the Finance Ministry and banks on the one hand and the Post and Telecommunications on the other concerning the introduction of the "Green Card" system in 1984 for identification of tax-free depositors.

The increase in postal savings caused the flow of funds on Japanese money markets substantially. While the channel for the movement of funds from postal savings to the Finance Ministry's Trust Fund Bureau widened considerably, movement of private funds has been affected adversely by the development.

As a result, financial institutions related to agriculture and forestry, regional banks, and credit associations, which used to be buyers of government bonds, could no longer acquire funds to continue their operations.

The Trust Fund Bureau was thus compelled to intervene in the secondary market to buy government bonds in support of their prices.

That such intervention was conducted repeatedly clearly indicated the maldistribution of funds caused by a sharp increase in postal savings.

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Overseas interest rates were another factor which seriously affected Japan's monetary policy last year and are expected to play even a more important role this year.

The prime rate in the United States rose to 21.5 percent in January 1981, while discount rates in Italy and the United Kingdom increased to 16 percent and 14 percent, respectively, reflecting high inflation rates in Europe. Similarly, Eurodollar rates also jumped to an abnormally high level.

If in these circumstances Japan alone lowers its level of interest, there is a danger of overseas investors switching their funds out of yen assets, strong as the fundamental of the Japanese economy may be.

In this respect, Japan should be particularly cautious about the attitude of Arab oil-producing nations, which have been leading buyers of Japanese bonds and stocks. While the monetary policy is counted on to play a leading role, a coordinated judgment based on the assessment of complex factors has become indispensable.

Several noteworthy reforms have been carried out on the Japanese financial system in the past few years. They include the liberalization of interest rates on the bill-discounting market, permission to issue negotiable certificates of deposits in yen, flotation of medium-term government bonds through auctions, and emergence of mutual funds based on medium-term government bonds. They have all been developments in line with the trend toward liberalization.

Another important development was the enforcement on December 1, 1980, of a new Foreign Exchange Control Law, designed to open Japanese money markets to foreign countries. The new law liberalized in principle foreign currency bank deposits by Japanese depositors, the supply of foreign currency impact loans by Japanese banks to Japanese companies, and

foreign investors' investments in Japanese stocks.

The enforcement of the law was a highly significant development, in that it publicized the principle of liberalization the Japanese Government was pursuing both in Japan and overseas, although the Finance Minister retained the power of application of controls in an emergency and the law itself was not of a character that was expected to bring forth marked changes immediately following its enforcement.

Since liberalization begets liberalization, it should not be easy for the Finance Ministry and the Bank of Japan to invoke the emergency powers as a trump card.

The trend toward liberalization is bound to encourage the internationalization of the yen. The Tokyo Market will thus necessarily discard its closed nature and gradually open itself to outside forces.

An increase in the holding of the yen by non-residents will naturally pose difficult problems to the Japanese monetary authorities.

The yen's position is thus liable to be disturbed by external factors, making Japanese monetary policy less effective than before. On the other hand, resistance against the trend of liberalization would mean refusals for Japan to let the yen play its appropriate international role and distortion of the international nature of the Japanese economy.

Japanese monetary authorities are thus faced with the need for acquiring advance technology to reconcile the stabilization of the yen's value with the acceptance of the trend toward its internationalization.

This makes it all the more important to resolve the problem of massive flotation of government bonds, which constitutes a stumbling block for liberalization. Coupon rates of government bonds are fixed at a low level by artificial means, because the

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Finance Ministry abhors the burden of high interest rates on public finance. This disturbs efforts to foster the secondary market for government bonds.

The secondary market

It is impossible in the long run to maintain the coupon rates of government bonds alone at a rigidly-controlled low level at a time when all other interest rates are moving toward liberalization. It is thus inevitable that the trend of the secondary market should come to be taken into consideration in determining the issue terms for new government bond issues. This should also turn out to be an effective brake for an endless increase in the government bond flotation.

For Japanese financial institutions liberalization of interest rates will mean the advent of an age for the survival of the fittest. The economies of scale will work in supplying profitable loans, so it cannot be denied that smaller banks, such as regional banks and sogo (mutual loan and savings)

banks will be at a disadvantage in the future, while leading city banks equipped with international information networks and an outstanding capacity of credit investigation will have the advantage.

Two developments concerning the monetary policy and the financial system in Japan are attracting particular attention this year. One is that the bill for amending the 1927 Banking Law is expected to be presented to the National Diet for deliberation.

The other is that the Council on Postal Savings has started its work for the unification of monetary systems in Japan.

The proposed amendment of the Banking Law has gone through many ups and downs due to rivalry between banks and securities firms, but it is expected that, if the amendment is approved, banks will be allowed to deal in securities in a limited way through the sales of government bonds to the public through bank offices.

They are both natural developments within the trend toward liberalization.

Nation's Finances Still Healthy

Tokyo ASAHI EVENING NEWS in English 18 Feb 81 pp 5, 7

[Article by George Murakami]

[Text] How are Japan's finances responding in a time of uncertainty in the world economy, of double-digit inflation, of heavy deficits in the balance of payments, of growing unemployment, of sky-high interest rates?

The situation is particularly serious in the United States where the Reagan Administration is speaking of crisis. It is bad in Britain, France, Italy, the Benelux countries, Scandinavia. Even West Germany, long the powerhouse of Europe, is having trouble.

It sounds smug and compacent to say so but Japan on the whole is doing quite well, and so are its finances. Wholesale prices in April 1980 were 24 percent higher than in the same month of the previous year but the rate of year-to-year rise declined to 9.6 percent by December. The rate of rise in consumer prices has been between seven and eight percent.

The payments balance has been heavily in deficit but has shown considerable improvement in recent

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months and the official foreign exchange reserves have risen from \$18,543 million in April 1980 to \$26,502 million in January. Interest rates have eased notably and are much lower than in other countries. The prime rate is 7.5 percent in Japan, around 19 percent in the U.S. The yen's exchange rate against the dollar, which had been as high as ¥264 in the spring of last year, is now around ¥204.

Inflation, deflation

The current troubles in the world economy, it is generally agreed, come chiefly from the second oil crisis sparked by the revolution in Iran. The steep 1979-80 boosts in the oil price pushed up prices as a whole and also worsened balance-of-payments deficits. Inflation had as well a deflationary effect in the reduction of real purchasing power by the rise in prices. The oil price boost had the further deflationary effect of transferring income and purchasing power from the oil-importing to the oil-exporting countries.

Japan is in better shape than most other industrial countries because it has adjusted more rapidly to the strains and stresses of the second oil crisis. In the aftermath of the first oil crisis, it developed the industrial capacity to outcompete other nations in the world market and rolled up in 1977-78 enormous trade surpluses. The capacity represented by these surpluses, a tight credit policy, restraint in fiscal policy despite a massive budget deficit and moderation by labor in its wage demands are what has enabled Japan to come through the second oil crisis.

By getting down to a considerable extent the price rise in 1980, Japan reduced the deflationary effect of inflation. By increasing exports to offset the higher import price of oil, it also reduced the transfer of income from Japan to the oil-exporting countries.

There was in 1980 the growing recognition abroad that Japan was performing well in the "fundamentals" of price stability and payments balances. As a result, a heavy inflow developed during the year of foreign funds into the Japanese stock market, bonds, "free yen" (yen freely convertible into foreign exchange) accounts and short-term lending such as certificates of deposit. Most of the inflow was petrodollar capital, from the oil countries via western Europe, plus money from American and European pension funds, insurance companies and other institutionals. The monthly inflow was well over a billion dollars and this recycling of petrodollars helped to offset the deficits in the current account.

This is a relatively new development in Japan's balance of payments and international finance. The bulk of recycled petrodollars has been going into America and European banks and other financial channels and very little into Japan. The Japanese Government lacks a payments balance policy and effective measures to ensure a steady inflow of long-term foreign capital, particularly petrodollars.

The higher yen

The yen-dollar exchange rate has fluctuated widely, more so than the ups-and-downs in the economy and its external position. In April 1980, the rate, as has been said, had been down to ¥264. It closed out the year around ¥206. Early this year, a surge of speculative buying sent it briefly to ¥198 and there was heady talk it might approach or even exceed its alltime high of ¥175 in October 1978. Although the rate has since eased a bit into the low ¥200 range, the general view is that the yen will stay strong this year, fluctuating in a band between ¥185 and ¥210.

What has sent up the yen are the relatively low rate of inflation, the improvement in the payments balance and the inflow of foreign capital.

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Foreign investment in the stock market was heavy again in January. Also, interest rates in the U.S. eased slightly during January.

Nevertheless, U.S. interest rates remain high and continue to be a seriously disturbing factor in international finance. They are not only a product of inflation but contribute to it worldwide. They upset the normal flow of funds by acting as an abnormal attraction pulling money into the U.S. They pull up interest rates in other countries, depress bond markets and impede the raising of long-term investment capital.

In the Japanese bond market, as in other bond markets, the jump in U.S. interest rates sent down bond quotations of new lows. Ten-year 6.1-percent government bonds in March were down to 77.30 (100=par) despite efforts by the Finance Ministry and the Bank of Japan to prop up the price. U.S. interest rates, however, began to ease in April and this brought a firming in the bond market.

Another reason for the weakness of the bond market was the excessive issues of government bonds—¥14,270 billion in fiscal 1980. The banks and other financial institutions, forced to accept governments, took heavy losses on them. The situation improved somewhat as the Finance Ministry issued a larger proportion of short-term governments and made other adjustments. Also, for fiscal 1981, the Finance Ministry is cutting the volume of government bond issues by ¥2 trillion and reducing further the amounts of bonds to be taken by the banks. When U.S. interest rates rose again from the fall of 1980, the bond market, although it eased, held up fairly well.

New exchange law

The new Foreign Exchange and Trade Control Law went into effect in December 1980. Under the old laws, although they have been liberalized in practice in recent years,

Japan had the most complex and confining of exchange controls. In theory, without specific administrative permission, foreign exchange transactions were forbidden. Every penny of foreign exchange was deemed the property of the Government and could be used only for purposes approved by public policy. Under the new law, foreign exchange transactions are as a general rule free of official control except in situations specified by law. In practice, the shift to the new system has been gradual and red tape and the spirit of Big Brother is watching remain but the change has been made and it is watching remain but the change has been made and it is considerable.

Residents (Japanese), for example, may now hold foreign currency bank accounts in any amount. Before, aside from firms engaged in foreign trade and services, individuals were limited to foreign currency accounts of not more than ¥3 million. The ceiling has been removed. During December, the first month, such accounts increased by \$1,400 million to \$3,750 million.

In January, however, there was a drop of \$450 million. Bankers explain the novelty has worn off, the rise in the yen's exchange rate discouraged foreign currency accounts and the yield on short-term funds in the Japanese financial market is better than the interest rate on foreign currency deposits. Interest rates on domestic yen deposits are subject to official regulation. Those on foreign currency deposits are not, the authorities had feared the banks might compete to raise them in order to attract depositors but this has not happened. By and large, this step in decontrol, like the other steps, has gone fairly smoothly and has not had seriously upsetting effects on Japan's payments position or the yen's exchange rate.

The great gap in interest rates be-

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concern but it is not as seriously as had been feared. International hot money has tended to flow to the U.S., attracted by the high interest rates there, and there has also been an outflow of domestic funds from Japan for the same reason. In Japan's payments balance, however, the deficit in the long-term capital account in recent months has been small, the yen has stayed firm and the official policy of pushing down interest rates has made some headway.

Interest rates in Japan have been affected by trends in U.S. rates but not too closely. Japanese rates early in 1980 rose when U.S. rates did, came down in April when U.S. rates did. However, when U.S. rates began to rise again from August on, rates in Japan did firm but were less affected than they were early in the year.

The Bank of Japan cut the discount rate twice in 1980, in August and November, and the rate is now down to 7.25 percent. The situation has permitted the discount rate cuts and a policy of easier credit to stimulate a sagging economy—prices are fairly stable, the yen is strong and the overall payments balance has been in surplus since July 1980.

The authorities are now studying the matter of a third cut in the discount rate, probably in early March, and other measures to give more life to the economy. The Government cannot do much in fiscal policy to help the economy through such measures as cutting taxes or stepping up expenditure because of the enormous budget deficit. In fact, the Government in fiscal 1981 plans to raise taxes and hold down expenditure. This means credit policy will have to carry the burden of official action to stimulate the economy.

The present indications are that that the Bank of Japan will lower the discount rate by one percent or so. The remaining question is whether the

BOJ and the Government will also reduce across the board interest rates subject to official regulation such as those on bank deposits, trust accounts, postal savings, bank debentures and government bonds.

There is still a gap between the coupon rate on government bonds and their yield in the trading market. The going yield on 10-year, eight-percent governments is around 8.3 percent, a situation which makes difficult a new reduction in the interest rate on them.

There are other concerns for Japanese finance this year and in the years ahead. For one thing, an offshore banking center is opening in New York in October, and 24 Japanese banks are to participate in this new market, which should grow in scale to match London's Eurodollar market. What has made possible the creation of the New York offshore banking center are action by the Federal Reserve Board to waive the reserve rate, interest rate and other controls on funds in non-resident accounts in this center and agreement by the New York state and city authorities not to levy taxes on the center's business.

In Asia, Hongkong and Singapore, and also Bahrain, in the Persian Gulf, have flourishing offshore banking centers. There is no reason why Tokyo should not have a similar facility and every reason it should as Asia's leading financial and commercial center. There should be pressure as well from New York for Tokyo offshore banking. Under the principle of reciprocity, if Tokyo banks can take part in the New York offshore banking facility, then Tokyo should set up a similar center in which the New York banks can participate.

To set up offshore banking in Tokyo would be a simple matter. Interest rate, reserve rate and other regulations would have to be dropped on non-resident accounts and the withholding tax waived on interest of such

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accounts. A degree of decontrol has already been applied to non-resident accounts.

Tokyo offshore banking

The arguments for Tokyo offshore banking sound persuasive. The international financial market in the recycling of petrodollars, international trade and investment and the funds of multinational corporations is rapidly growing and Japan would benefit with its own offshore banking center giving it direct access to these funds. In particular, with surplus petrodollars piling up so heavily, keeping payments in balance through trade no longer seems possible. The bulk of recycled petrodollars goes to American and European banks and the oil states are now setting up their own commercial and investment banks. Japan needs a direct channel to such funds and as part of a new, thoroughgoing payments policy.

Japan has thus far made its way in the world economy with its industrial strength—solid work, technological innovation, tight management, quality control, hard selling, foresight, adaptability. These qualities have been applied to goods. To make a living in future, Japan may have to apply them to money as well.

Another change that needs to come is decontrol, and the principle of liberalization in the new Foreign Exchange and Trade Control Law should be applied to banking and finance as a whole. If Japanese banks are to compete against foreign banks abroad, the tight controls the Finance Ministry puts on them as to the number of branches, overseas as well as domestic, they can open should be eased. They could use authorization to issue bonds and long-term certificates of deposit, engage in the securities business, and so on.

New Foreign Exchange Law

Tokyo ASAHI EVENING NEWS in English 18 Feb 81 pp 6, 7

[Article by Mikinori Yoshida]

[Text] A new Foreign Exchange and Foreign Trade Control Law was enacted on December 1, 1980. It represents a wholesale revision of the old Foreign Exchange Control Law and Foreign Investment Law enacted shortly after the end of World War II and their unification into one single legislation.

The new law made a volte-face from the old laws' principle that everything which is not specifically permitted is banned to a new principle that everything which is not specifically banned is permitted.

This will lead to the unification of money and capital markets in Japan and overseas and undermine the

monetary order and monetary policy in Japan, based on a rigidly-controlled interest structure and government control of financial institutions such as the authority to permit them to open branch offices.

Actually, however, the Finance Ministry has been providing "administrative guidance" openly and covertly on the pretext of "making a soft landing on a new age," so that liberalization is only superficial. Financial institutions are also secretly welcoming the intervention by monetary authorities, because it preserves the old practice of giving protection in exchange for controls.

It may be said that the present situation is that while the historic

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trend toward liberalization cannot be changed, both the Japanese Government and private institutions are colluding with each other to retard the trend as much as possible.

The old Foreign Exchange Control Law and the Foreign Investment Law were enacted shortly after the end of World War II with emphasis on ways to save foreign exchange and protect a weak economy in Japan against foreign capital.

Capital transactions and foreign trade settlements were banned in principle under the laws, with only specific cases approved. The laws thus had rigid frameworks for controls through permission and authorization.

However, as Japan grew into an economic power, the old laws became a target of criticism by Western nations as a symbol of the closed nature of the Japanese economy. The new Foreign Exchange Control Law was a measure taken in response to the pressure from foreign countries to open the door of Japanese markets almost completely to the two-way flow of funds across the border in a way becoming the second largest economic power in the free world.

Freed in principle

The law thus freed in principle foreign exchange transactions under normal conditions. It must be pointed out, however, that the authorized foreign exchange system has been retained, while a new system of designated securities companies has been newly established.

The system of prior reporting of transactions to the Finance Ministry and the Bank of Japan and the system of ex-post fact reporting to them were combined to enable the monetary authorities to grasp the movement of money precisely.

Moreover, the Finance Minister can invoke his "emergency control powers"

in an emergency to place all capital transactions under control requiring approval.

The "emergency control powers" may be invoked if circumstances arise which may be judged to fall under one of the following three conditions: 1) it has become difficult to maintain an equilibrium of Japan's balance of payments, 2) erratic fluctuations are liable to be caused in the exchange rate of the yen, and 3) monetary market or capital market in Japan is liable to be affected adversely by a massive movement of capital into or out of Japan.

Invocation of the "emergency control powers" will make it possible to take measures for restricting the inflow of foreign capital, such as requiring prior approval for the supply of impact loans (term loans in foreign currency without specifying its use) or banning the flotation of external bonds by Japanese companies, or measures for controlling the outflow of capital, such as banning acquisition of U.S. Treasury bills and other foreign securities by Japanese and restrictions on overseas lending by Japanese banks. In addition to direct controls mentioned above, indirect control may also be applied through foreign exchange banks by prohibiting payment of interest on yen deposits for foreigners (non-residents) or raising reserve requirement ratios for such deposits.

The "emergency control powers" may thus be described as a trump card for the monetary authorities. However, officials of the Finance Ministry and the Bank of Japan are inclined to believe that the emergency control powers "are not something that can be invoked frequently; if you consider the spirit of the law and international public opinion."

Foreign currency deposits

Foreign currency deposits means literally the depositing of foreign currency such as U.S. dollars or sterling

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with Japanese banks. Under the old Foreign Exchange Control Law depositing of proceeds from exports or collection of overseas investments were free to deposit, but deposits by general depositors were limited to the equivalent of ¥3 million per depositor. Under the new Foreign Exchange Control Law there is no limit for such deposits.

Foreign currency deposits are free from the controls over interests paid on domestic yen deposits, which are restricted by the Extraordinary Interest Rate Adjustment Law. Moreover, foreign currency deposits can take the form of "foreign currency deposits with forward cover," which means that the date of withdrawal of the deposit is set on the day of depositing and forward cover is supplied by buying forward yen at the forward market rate.

This allows the depositor to avoid the risk of foreign exchange fluctuations. Since the amount of deposit on maturity is indicated in yen, the foreign currency deposit is to differ from yen deposit from the depositor's point of view, except for the rate of interest.

The interest rates for "foreign currency deposits with forward cover," which reflects the differentials between Japanese and overseas interest rates, are related to the interest rates on Japanese short-term money markets, such as the call loan market and bill-discounting market, where large amounts of money move between financial institutions for short-term funding.

Short-term money market rates are usually at a far higher level as domestic yen deposit rates. For this reason, interest rates for foreign currency deposits may be substantially higher than domestic yen deposit

rates, if the bank concerned so decides. That will make foreign currency deposits attractive to the depositor.

Attractive interest rates

On the other hand, however, such a measure increases the amount of interest to be paid by the bank, thus increasing its fund raising cost. In other words, competition for soliciting foreign currency deposits becomes a race for offering attractive interest rates to depositors. This will not only be a menace to those financial institutions that are not allowed to engage in foreign exchange business or relatively weak in this area, but is liable to develop into a battle in which the overall financial position of each bank, including its earning power and fund-employment capacity, will be at stake.

For this point of view, the Finance Ministry and the Bank of Japan, prior to the enforcement of the new law, issued a warning that "setting of interest rates out of step with sound management of a bank is undesirable."

Responding to the warning, foreign exchange banks decided that bank's handling charge of two percent per annum and selling or buying commission of one yen per dollar should be charged for small-lot deposits of \$100,000 or less.

The actual situation since the beginning of December has been completely in favor of yen deposits. In short, competition among foreign exchange banks for soliciting small-lot foreign currency deposits has virtually ceased to exist. In addition, those financial institutions which were not allowed to engage in foreign exchange business or weak in the area no longer needed to fear that their deposits might be attracted to stronger financial institutions.

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As for larger-lot foreign currency deposits of more than \$100,000, the principle is that each bank should use its own judgment. But foreign exchange banks say they are obliged to submit reports regularly on their foreign currency deposit positions to the Finance Ministry and the Bank of Japan.

Finance Ministry officials said: "we are receiving reports, but we are not providing administrative guidance. However, if the banks give thought to sounding management of their business, a line should naturally come out," stressing that the so-called line is the outcome of a natural development.

A general feeling among bankers is that, realistically thinking, the administrative guidance provided by the Finance Ministry, though provided under the leadership of the Finance Ministry, is not producing unfavorable effects on the banking world.

Against the background of such developments, foreign currency deposits increased only moderately by \$1,400 million in December and even declined in January in their outstanding balance.

Foreign currency deposits without forward cover are exposed to the risk of foreign exchange fluctuations.

This also means, however, the depositor may get foreign exchange profit, if the foreign exchange market moves in his favor. It is thus possible that a large amount of speculative funds may be invested in foreign currency deposits of this type.

There is no possibility of such speculative activities at present.

Exchange speculation has been going on for a long time centered round overseas investors. More quick and effective measures than taken in the past are required to deal with future speculation.

Impact loans

In the past a limit for impact loans was set for each bank as a result of consultations between the Finance Ministry and the Bank of Japan. This has been freed under the new Foreign Exchange Control Law. Impact loans are outside the framework of the "window guidance," unofficial control over net additional lendings by commercial banks, which is the one of the most important way of monetary adjustment by the Bank of Japan.

It will be a big question for the Finance Ministry and the Bank of Japan to control impact loans in times of credit squeeze.

Be that as it may, there is little danger at present of a sharp increase in impact loans, because overseas interest rates are relatively high.

Moreover, the domestic monetary policy is moving toward easing, so that a moderate increase in impact loans will pose no serious problem. For these reasons, the supply of impact loans should be completely free in accordance with the principles of the new Foreign Exchange Control Law.

Foreign exchange banks are required to submit their schedules for supplying impact loans in the next month to the Finance Ministry and the Bank of Japan during the last ten days of each month.

They are also required to report every ten days of a month on their actual impact loan positions.

On each occasion they must report details of each loan, including the borrower, the type of currency, the rate at which the foreign currency was raised, the bank's margin added to it, etc.

Bankers are strongly inclined to believe that the Finance Ministry must have quantitative guidelines for

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impact loans to be supplied by each foreign exchange bank.

In December, bankers say figures of \$150 million to \$200 million were given verbally to each of top foreign exchange banks.

Furthermore, bankers say that the Finance Ministry seems to be thinking that leading banks should charge a bank's margin of at least 0.5 percent per annum.

Finance Ministry officials deny that the ministry is providing administrative guidance, saying that they are only receiving explanation of schedules and reports on actual positions to grasp the market situation. Senior officials of the ministry said: "a sudden inflow of a large amount of foreign capital is not desirable. For this reason, some officials in charge of impact loans may have told some banks that they felt their supply of impact loans was rather large. However, that should not be taken as a guidance for cuts in impact loans. Of course we have not given any figures at all to the banks." As for the banker's margin, they said "a margin of one percent to 0.5 percent is necessary for sound management of banks. They will settle down on that level as a natural course of events."

Some foreign exchange banks reportedly declined requests from their customers for replacing import usance, short-term trade credit, with lower-interest impact loans, on the ground that their quota for impact loans has been exhausted.

Administrative guidance thus turns out to be useful for banks in some cases.

Actual supply of impact loans by all banks amounted to \$1,500 million in December and about \$800 million in January.

Foreign investments in Japan has been freed, if selling and buying are made through leading securities firms designated by the Finance Ministry,

except for 1) "direct investments" for the purpose of participation in the management of Japanese industries and 2) acquisition of stocks of "designated enterprises" in which an increase in the share of foreign capital beyond a certain limit (to be determined by the Finance Ministry, but generally considered to be 25 percent in principle) is liable to produce ill effects on "security or order" or "the management of the Japanese economy." That is the general principle of the new Foreign Exchange Control Law.

The "designated enterprise" include at present Sankyo Co., Ltd., manufacturer of vaccines, Katakura Industry Co., Ltd., producer of silkworm eggs, Fuji Electric Co., Ltd., a nuclear equipment maker, Hitachi, Limited, Tokyo Precision Instrument Co., Ltd., related to aircraft industry, Arabian Oil Co., Ltd. and Showa Oil Co., Ltd., both energy-related firms. They total eleven in all.

'Designated firms'

The Finance Ministry plans to designate more companies in these areas, when and if foreign share holding increases to around 20 percent.

Securities firms interpret the fact that the number of "designated firms" was limited to eleven as "a measure designed to achieve liberalization of securities business to some extent." It was also fortunate for the Finance Ministry that foreign investments in Japanese stocks resulted in net sales of ¥8,600 million in December, according to the Tokyo Stock Exchange, indicating foreign interest in Japanese stocks was at a bottom, and no rush for foreign investments in Japanese stocks developed in January either, eliminating any need for Finance Ministry intervention.

Not that there are no problems about the liberalization of securities business. The Finance Ministry refused to accept a prior notification

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from a Hongkong investor of acquisition of stocks of Katakura Industry Co., Ltd., a "designated enterprise." The notification said the investor would like to acquire 3,400,000 stocks (9.9 percent of total share capital) of Katakura during the next one year through the stock market. The Finance Ministry refused to accept the notification for technical reasons, because a ministerial regulation rules that stocks should be acquired within 40 days of notification.

A Hongkong investor is reportedly considering a law suit on the ground that 1) the designation of the company as a "designated enterprise" because it was engaged in the production of silkworm egg production runs counter to the spirit of foreign trade and foreign exchange liberalization, and that the ministerial regulation

that stocks should be acquired within 40 days ignores the nature of the market where selling and buying may not necessarily proceed as planned and constitutes a procedural obstruction of stock acquisition, which may be against the law.

The Finance Ministry refuses to budge, saying that one single foreign investor's application for acquisition of a large block of stocks over such a long period as one year will virtually exclude other foreign investors from the market, while an attempt at getting a monopoly of the market on a first come first served basis is not desirable."

If the case is taken to court, the principle and actual policy of the Japanese Government will be judged. This is why the case needs close watching.

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ECONOMIC

DOMESTIC ECONOMY: STRENGTH OF BUSINESS ANALYZED

Tokyo THE JAPAN ECONOMIC JOURNAL in English 17 Feb 81 p 4

[Article by Masahiko Ishizuka]

[Text]

In the past several months, the business pages of newspapers have been full of reports about the slowdown of domestic business. It is not really a recession though, as the economy is expanding at a reasonably high 4 per cent-plus annual rate. High marks given internationally to performances of the Japanese economy in riding out the consequences of the second oil crisis seem to make this clamor about business slump all the more implausible.

Few people say that the Japanese economy is in a serious trouble as a whole, but personal consumption and housing have been embarrassingly weak for months, keeping inventories of basic materials at a high level for an unexpectedly long period and sending a record number of businesses bankrupt month after month.

The question is why inventories have been staying at a high level for such a long time, while most economists have kept predicting liqui-

dation would be over soon. No convincing answer has been offered yet, except by those who tend to take a rather severe view of the underlying strength of the Japanese economy, especially about personal consumption. These people who tend to discount the strength of -end demand say that even the currently vigorous business capital investment may eventually lose momentum if the slump in personal consumption and housing persists.

How serious is the slump and when is a turnaround coming? There is a vague consensus that the recent unquestionable stabilization of the price trend will lead consumers to spend more soon, but even among the economists at the Economic Planning Agency opinions are split as to how soon, while the Agency's director-general, Toshio Komoto, a known proponent of stimulation of the economy, keeps stressing an early policy to shore up business. Government and ruling

Liberal Democratic Party leaders last week agreed on the need to discuss the measures early next month, but the Ministry of Finance was quick to express a cautious view about lowering of interest rates so soon as favored by Komoto and International Trade & Industry Minister Rokusuke Tanaka.

The cooling of personal consumption and housing could be likened to just a flu for the economy as a whole and nothing more serious. Yet it does cause unpleasantness and pains and could complicate. If personal consumption keeps depressed, the Japanese economy will have to depend on exports and business capital investment as it has in the past year, and it is obvious that this will cause constraints on the country's external economic relations. The economy appears to be at a very difficult, crucial stage as to the judgment of its underlying strength.

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ECONOMIC

NEW FIVE-YEAR OFFICIAL INVESTMENT PLAN FOR PUBLIC WORKS REPORTED

Tokyo BUSINESS JAPAN in English Feb 81 pp 17-18

[Excerpt]

The Finance Ministry announced its preliminary budget program for the new five-year official investment plan for public works (1981 - 1985) on the basis of the appropriation requests filed earlier by each sector. Out of the 14 public works projects under the direct control of the government, the budget covers eight projects whose term will expire at the end of fiscal 1980. The eight projects are construction of housing, sewage systems, parks and public gardens in urban districts, coastal facilities, special traffic safety setups, port facilities, airport facilities and waste disposal systems.

According to the preliminary budget program, a total of ¥24,000 billion has been set to proceed with these projects excepting the housing construction. Although the amount represents a hefty 55.3% increase over the spendings of the existing five-year plan, it actually shows a reduction of 31.3% from the budgetary requirements earlier presented by competent authorities.

Housing Construction

The Finance Ministry has fully agreed with the Construction Ministry on the number of private houses to be built during the period of the new five-year plan, yet it has reduced the number of houses to be built with financial support from the Public Housing Financing Corporation. Of the private houses totaling 7,700,000 units expected to be completed during the period, those officially financed are assessed at no more than 3,400,000 units, as compared with the original assessment of

3,650,000 units given by the Construction Ministry. Instead, those wholly financed by private sector have been estimated at 4,300,000 units against 4,050,000 units as presented by the Construction Ministry. The Finance Ministry made such adjustments in order to keep away from possible unfavorable effects anticipated from reducing the scale of total housing construction assessed during the period while trimming the outlay for financial assistance to private house construction.

Sewage Systems, Parks, and Port Facilities

For these three projects requiring a huge amount of appropriations, the date of completion originally set at the end of fiscal 1985 has been postponed until the middle of 1986 in line with the extension of the period of the New Seven-Year Economic and Social Investment Program on which the new five-year public works plan is based.

For the project to build sewage systems, a sum of ¥11,800 billion is expected to be appropriated - 57.3% more than the amount spent for the current program. Consequently, the nationwide dissemination rate of the sewage system is expected to reach 47% at the end of fiscal 1985. The rate, however, is 8% lower than the original goal set by the Construction Ministry. As explained by the Finance Ministry, extension of the date of completion for this specific project constitutes the reason for a lower dissemination rate at the end of fiscal 1985.

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The Budgetary Program of the New 5-Year Public Works Plan

(Unit: ¥1 billion)

	Preliminary program by the Finance Ministry*	Original requests by competent authorities*	Current 5-year program (1976-1980)**
Housing construction (Phase 4) (Houses completed with official financing)	7,700,000 units (3,400,000 units)	7,700,000 units (3,650,000 units)	8,600,000 units (3,500,000 units)
Sewage system construction (Phase 5)	¥11,800	¥17,400	¥7,500
Construction of parks in urban districts (Phase 3)	¥2,800	¥4,500	¥1,650
Construction of coastal facilities (Phase 3)	¥900	¥1,350	¥580
Special traffic safety setups (Phase 3)	¥900	¥1,365	¥570
Construction of port facilities (Phase 6)	¥4,250	¥7,300	¥3,100
Construction of airport facilities (Phase 4)	¥1,700	¥3,030	¥920
Construction of waste disposal facilities (Phase 5)	¥1,650	¥2,520	¥1,130

Notes: 1. * Based on the 1980 price
 ** Based on the 1975 price

The appropriations for the public park construction project amount to ¥2,800 billion, an increase of 69.7% over the current program. Under the new plan, before the end of fiscal 1985 residents in urban districts will be provided with 125 square meters of park facilities, instead of the present 4.1 square meters.

In contrast to the port facilities construction project which shows a 37.1% increase in the budget program as compared with the sum expended under the current program, an amazing 84.8% gain is noted in the appropriations made for airport facilities construction projects. No doubt the generous outlay represents special official emphasis on improving and expanding facilities for domestic air transport. Despite such substantial increases from the level set for the current program, the Transport Ministry has remained dissatisfied because as much as 43.9% of its appropriation request has been trimmed.

Voices of dissatisfaction have also been raised by the Construction Ministry and other authorities responsible for implementing public works projects under the new five-year plan. All consider that a certain degree of increase in the appropriations is not at all impossible in view of the budgetary scale of the New Seven-Year Economic and Social Investment Program under which the new five-year plan has been

organized. The Construction Ministry has accordingly filed its requirements for the reinstatement of the cuts made by the Finance Ministry so an additional sum of ¥1,720 billion will be appropriated to bring the total sum for the sewage system construction project to ¥13,520 billion. For the park construction project, the ministry has also requested an increase in appropriations by ¥730 billion to total ¥3,530 billion. The Finance Ministry, however, has been showing reluctance to accept such requirements

New Kansai Airport Construction

Of a number of expansion and improvement programs for the airport facilities projected under the five-year plan, the proposed construction of the new Kansai Airport is perhaps the most important issue for the Transport Ministry. For this particular project, the ministry has requested a total sum of ¥4.1 billion covering expenses to design and construct facilities which amount to ¥3.7 billion plus preliminary survey expenses of ¥400 million, but the Finance Ministry has agreed upon spending no more than ¥300 million for preliminary surveys under the five-year plan. At the Construction Ministry, the greatest concern is how much of the proposed expenses to design and construct facilities will be reinstated in the course of negotiations with the Finance Ministry.

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ECONOMIC

OIL DOLLARS FLOW INTO JAPANESE STOCKS

Tokyo BUSINESS JAPAN in English Feb 81 p 57

[Text]

THE comparatively strong outlook for the Japanese economy in 1981, in general, and for certain high-growth, high-technology industrial sectors, in particular, is helping to pull more funds from foreign investors into the Tokyo stock market. And despite dizzying interest rates in the U.S. and the recent spurt in the yen's strength, observers feel that this flow of overseas investment funds will continue and, perhaps, even gather considerable speed in the months ahead.

Tokyo's recent easing of the rules governing foreign exchange transactions (which also pertain to dealings in stocks and bonds) has also helped pave the way for greater foreign access and, therefore, interest in the capital market in Japan. This is particularly true for the flow of investment funds from countries in the Middle East. By the end of August (1980), foreigners held the equivalent of approximately \$54 billion in yen assets (\$10 billion in Japanese equities, \$18 billion in bonds, \$14 billion in European deposits and \$12 billion in free-yen deposits), compared to approximately \$36 billion at the end of 1979.

The figure is now thought to exceed \$56 billion, about two-thirds of which is, in turn, thought to come from OPEC members in the Middle East. As 1980 progressed the initial foreign investment surge into Japan abated somewhat. The major exception, however, was investments in the equity market which, on average, continued to grow rather quickly.

Foreign funds flowing into Japanese equities did hit a temporary peak in August and September (1980) of

about \$1 billion dollars each month. Observers estimate that these funds came almost entirely from Middle East investors. And while the big OPEC buying spree may be over temporarily, the consensus in Kabutocho — Tokyo's Wall Street — is that the flow will pick up again before too long. Such forecasts are based on the perception that OPEC money managers have become better acquainted with the Japanese capital market and will look increasingly to Tokyo as a receptacle for oil dollar surpluses.

At the end of 1979, it is estimated that Middle East oil producers had a total of about \$230 billion in investment assets worldwide. Of this amount, only about 4% was in yen assets, compared to approximately 75% in dollar assets and 12% to 13% in Deutschmark assets. The total figure is now estimated to have ballooned to \$350 billion with the yen occupying a 7% share. But securities brokers in Tokyo would like to see that ratio increased and feel that 12% share is a realistic target for the medium-term.

Middle East investors are not the only ones casting a more interested eye on Tokyo these days. The inflow of petrodollars has recently been accompanied by an influx of U.S.- and European-based pension fund money into the Japanese stock market. The magnitude has been smaller than that of OPEC investment, sources say, but such funds are likely prove a steady and stable source of investment in the future. Of the \$5 to \$6 billion estimated to have flowed into the Tokyo equity market in 1980, 30% to 40% is thought to have come from

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panies which look for lucrative commissions on handling such international and "internationalizing" their investment portfolios.

The growing popularity of Japanese equities among foreign investors has been welcomed by securities companies here who look for lucrative commissions on handling such international deals. But not everyone is overjoyed at the prospects of a large proportion of shares of domestic companies being held by non-Japanese. Since the December 1 liberalization of Japan's foreign exchange law (which, in principle, eliminates previous ceilings on the amount of shares foreigners are able to hold), a number of corporate managers are concerned that the move could have some troublesome side-effects.

While there is recognition that such investment could help enhance a company's international image and, thereby boost its fund-raising options, many worry that should non-Japanese buy large portions of a company's stock and then sell them suddenly the movement in stock prices could prove harmful to the company's well-being. So far, however, there appears to be little evidence for this, as the majority

of identifiable OPEC funds have avoided speculative issues and opted for basic industries with solid, long-term growth prospects.

Perhaps the biggest worry is that large foreign shareholders will demand a hand in the actual management of the company. Exceptions do exist, of course, but most of these have tended to be companies with an overwhelmingly large ratio of exports to domestic sales. At present, few Japanese companies are actively seeking out foreign investors. And, while investment by non-Japanese is permitted up to 100% in most cases under the new foreign exchange law, the Ministry of Finance has reserved the right to exercise "emergency" powers to designate individual companies for limits on foreign ownership.

But a sudden and overt return to protectionism on the part of the public or private sector in Japan with regard to foreign stock ownership would undoubtedly ignite criticism from investors overseas who have recently "discovered" Japan as an attractive investment option. And none in Japan — at least for the moment — seriously expects Tokyo to attempt such a move.

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SCIENCE AND TECHNOLOGY

WORLD TRADE CONFLICTS OVER NEW PRODUCTS MUST BE AVOIDED

Tokyo COMPUTOPIA in Japanese Vol 15, No 172, Jan 81 pp 55-59

[Article by Hirotsugu Shimoda, associate editor of the journal]

[Text] Growing Use of Microprocessors

A great change has occurred in the structure of the machine industry due to the development of LSI in the late 1960's and the appearance of the microprocessor in the early 1970's. Conventional machine industry products have entered the new category of "mechatronics" (mechanical + electronics) through the active application of microelectronics technology.

This qualitative change in mechanical products, the unification of machinery and electronics, began in the 1950's, way before LSI and microprocessors appeared. It was stimulated by the development and industrial application of the transistor. This technological revolution brought new products into existence such as industrial robots and numerically controlled machine tools. However, the appearance of LSI and the microprocessor had a wide-ranging influence on all products related to the machine industry, from machine tools to precision machinery, automobiles, ships, communications equipment, and home electrical products. In particular, the appearance of the microprocessor dramatically raised the cost performance of industrial robots and NC (numerically controlled) machine tools as well as greatly changed the product character of office machines, communications equipment, measuring equipment, optical equipment such as cameras, medical equipment, home electrical products, and audio products. And as a result, the structure of market competition is undergoing tremendous changes.

For example, in the field of machine tools, the use of numerical control with the application of IC's and LSI's has brought about changes in the composition of parts used in manufacturing machine tools. Electronic parts now account for a large part of the total cost. Also, the importance of microelectronics has grown in technological development--the key to success in market competition. This technology is central to NC machine tools, and a growing number of machine tool manufacturers are setting up new electronics technology development departments. In this field, electronic equipment manufacturers such as Fujitsu Fanuc and Mitsubishi Electric are taking the lead in the application of electronics to machinery.

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This trend of applying electronics to machinery by use of the microprocessor is widespread. In addition to machine tools, it includes packaging machines, scales, agricultural equipment, freight-handling equipment, and also sewing machines, cameras, and recreational equipment. It could be called a new wave in the machine industry, and in general this growth of "mechatronics" increases the added value of machine products, makes product discrimination possible, and increases international competitiveness. But at the same time, dramatic changes are underway in the structure of machine industry market competition due to the progress of "mechatronics." The biggest change is that electronics-related industries such as computer, semiconductor, and electrical products manufacturers are beginning to have a great deal of influence on the machine industry. In the NC machine tool field, the added value accompanying improved performance and greater use of electronics, which in the past would have gone to the machine manufacturers, is being taken away by the electronics manufacturers. In the field of packaging machines, companies which previously had no connection with the field whatsoever, such as Tokyo Electric and Ishida Koki Seisakusho, have come in with microcomputer technology and are rapidly eating away at the market. The wrapping and packing machine industry has had a market of less than 150 billion yen, and with 400 manufacturers struggling for it, competition has been excessive. Now, the advent of the microprocessor is a new cause of competition. This is also true for weighing and measuring equipment and automatic knitting machines. The appearance of the microprocessor has had a great impact on the structure of sectors dominated by small and medium enterprises as well as on the home electrical products market, which is dominated by large industries.

The Role of Small and Medium Enterprises and System Houses

The term "microcomputer revolution" probably has a more insistent impact on the smaller machine manufacturers than on large industries. At any rate, this kind of technology has the power to directly affect the life of a business. Stated differently, a pattern is emerging in which getting behind in "mechatronics" means losing out and, conversely, fast application means growth for a company. But there are many medium and small enterprises that develop unique "mechatronic" products and expand the line of business, even with real limitations in personnel and development time in fields which are difficult for larger industries to enter.

For example, Teraoka Seisakusho, a long-established manufacturer of scales, is noted for actively absorbing new technology. It leads the industry with an electronic tariff scale with digital display, and it has ridden the wave of the new era to successfully defend its traditional position by marketing the SM 20 electronic scale, an electromechanical product with multiple functions. Along with this, Teraoka Seisakusho, Tokyo Electric, and Ishida Koki Seisakusho are the three strongest manufacturers in the new electric scale market replacing the traditional spring scales. Of these, the newcomer Tokyo Electric has managed to obtain almost 20 percent of the market share within a short time, changing the picture of power in this industry. In addition, representative electromechanical products introduced by the Small and Medium Enterprise Research Center (corporation) have become known. These include Iida Seisakusho's NC embossing and contouring machine, which won the small business-oriented automation machine development prize, and in industrial sewing machines the multiple-head embroidery machine by Tokai Industries Sewing Machine Company, Ishida Koki's computer scale, and the moisture content detector operated together with the grain drier produced by Shizuoka Seki.

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These small and medium machine manufacturers began this development of electronics applications in machines between 1977 and 1978, and more kinds of companies are becoming involved every year. Among them are local industries that organize micro-computer application study groups which include industrial sectors connected with prefectural industrial development. The application of electronics to machinery has become a major trend that cannot be avoided by small and medium machine manufacturers trying to open up new markets.

In connection with promoting the application of electronics to machinery by small and medium machine manufacturers, we must touch on the role of the system house, an industrial organization set up for development. The definition of a system house is not definite yet, but in general it is understood to be an enterprise which specializes in system design with the use of microprocessors or microcomputers. There are some 170 system houses established throughout Japan, with wide-ranging activities including production and sales of their own products using microcomputers, commissioned development, cooperative development, and consulting (on the use of microcomputers). There are two main types of system houses: enterprises which do subcontracted work for large industries and develop specially ordered products, and enterprises which develop mass-production products such as personal computers and system analyzers in order to manufacture the systems themselves.

However, viewed as a propelling force for "mechatronics," they are staking out territory in their fields of specialization supporting the use of microcomputers in various fields of machine industry products, such as measuring instruments, machine tools, agricultural equipment, medical equipment, data communications terminals, etc.

Strengthening of International Competitiveness

The unique "mechatronics" products recently being unveiled one after another by small and medium machine manufacturers are becoming very competitive in overseas markets as well as in domestic markets. For example, the automatic dicer for IC wafers developed by Disco K.K. has secured 98 percent of the domestic market share and 60 percent of the world market. Originally, this company manufactured grinding stones for machine tools. However, it made efforts to develop cutting technology for IC silicon wafers as the semiconductor industry grew. The results became known and contributed to the growth of the company. The company developed the wafer dicer in 1975, and in 1979, after further improvements, it developed the world's first fully automatic dicing saw (a totally automated device for the silicon wafer cutting process). The motivation of this "mechatronics" product development was the fierce battle among the semiconductor manufacturers to lower costs. All semiconductor manufacturing companies are working hard to achieve more automation as the key to reducing costs. Because of this situation, the Disco Company, as a manufacturer of grinding and cutting stones, developed an ultrahigh-precision cutting machine. The company is small, with 81 million yen in capital and 380 employees, but with this new technology it has made a vigorous entry into the world market as well as the domestic market. In 1975, it opened an American branch in Mountain View, Silicon Valley.

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The success of Disco is a spectacular example of the application of electronics to machinery in the small and medium machine industry. Generally speaking, however, the role of the small and medium companies in promoting the growth of "mechatronics" in the Japanese machine industry, including the systems houses specializing in microcomputers, has centered on subcontracted work for the large industries. The role of these companies is to promote the growth of "mechatronics" from the bottom up in the various fields of machine products, from machine tools to all types of labor-saving equipment and testing and measuring equipment, with the exception of mass-produced consumer devices.

Comparison of Japanese and West German Machine Tool Exports to the American Market
(units: 1 million dollars/percent)

	Total Machines Tool Imports		From Japan		From West Germany	
1977	536.0	100	127.9	24	125.4	23
1978	969.4	100	264.7	27	216.2	22
1979 (Jan-Nov)	1300.5	100	371.3	29	247.4	19

Date source: U.S. Department of Commerce, "Highlights of U.S. Export and Import Trade"

While large-scale industries keep plenty of electronics engineers inside the company, they also utilize the strength of systems companies which are more flexible as they work hard to increase their competitiveness in electromechanical devices. By this method, Japan has come to be recognized as a leader, along with the United States and West Germany, in the application of electronics technology to the machine industry. For example, METALWORKING NEWS, a machine industry trade journal, predicts that Japan will achieve tremendous international competitiveness in the 1980's in all fields of machine industry, including NC machine tools and industrial robots.

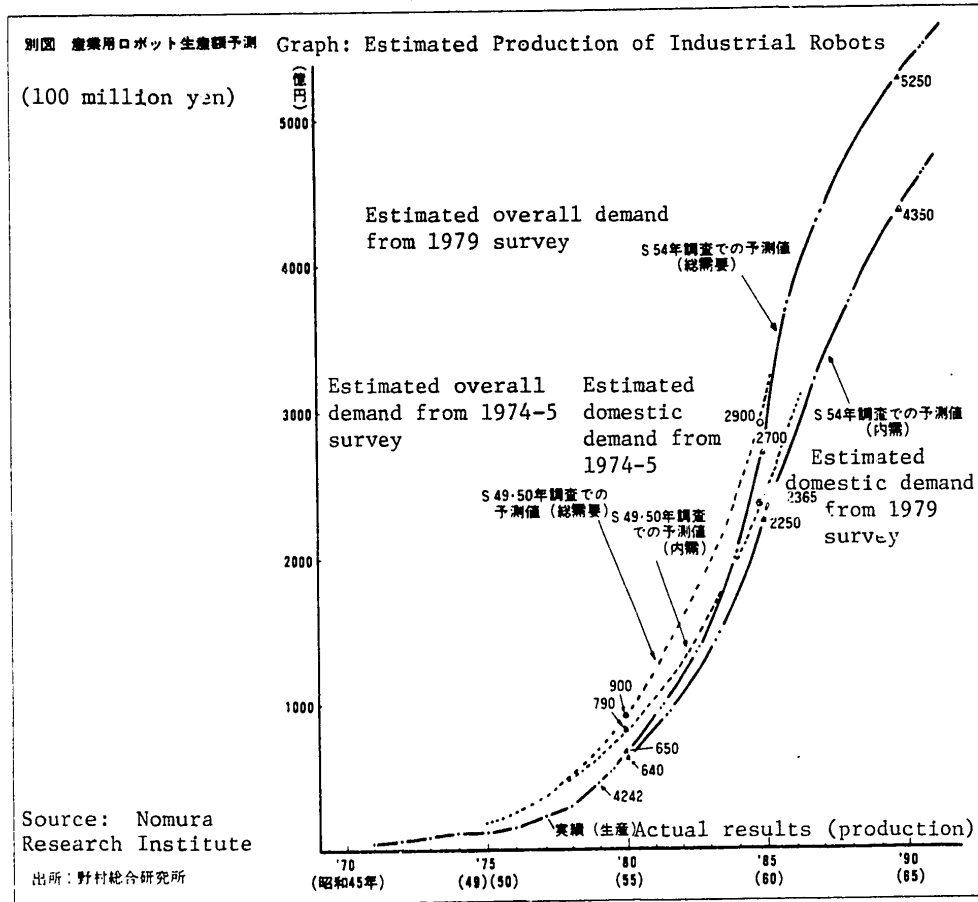
This trend is already materializing. For example, in the area of NC machine tools, a typical "mechatronic" product, Japan has become more competitive than either the United States or West Germany. At first, Japan had a chronic import surplus in machine tools from the United States and West Germany, which had had advanced machine industries for a long time. In the late 1970's, however, as the use of NC devices with built-in microcomputers became common, exports to the United States and West Germany had a sudden spurt of growth, and in 1978 Japan had an export surplus in trade with West Germany. In particular, the amount of exports to the United States in 1979 was 12 times the amount of imports, and Japan was 180 billion yen in the black. In trade with West Germany, we were 4.5 billion yen in the black. The machines exported to both countries are of the most advanced types, including NC machines. In 1979, 49.2 billion yen worth of exports to the United States, or 73 percent of the total, were in NC machines. Some 79 percent of the amount of exports to West Germany was also in NC machines. (See table).

A rapid growth in exports is also expected in the 1980's for industrial robots, which are closely associated with machine tools. According to a survey by the Japan Industrial Robot Industry Association (corporation) the annual production of industrial robots amounted to no more than 400 million yen in 1968, but it

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reached 42.4 billion yen in 1979, exceeded 60 billion yen in 1980, and there is a good possibility that it will reach 290 billion yen by 1985 and cross over the big hump of 500 billion yen by the end of the 1980's. (See graph). Also, the amount of exports is expected to reach 20 percent of total production between 1985 and 1990.



Wariness of Japan Spreads

Industrial robots were developed in the early 1960's, but early examples were large in size and low in capability. With the advent of LSI's and progress in micro-computers, all types of industrial robots were reduced in size, and performance improved significantly. At present, there are 140 companies in Japan which produce industrial robots, and there are 55,000 such robots installed in Japan, the largest number in any country in the world. The automobile industry has been especially active in installing this type of machine. Next in line are the electrical machinery

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and appliance industries, the chemical industry, safe and vault manufacturers, and the steel industry. The automobile industry began using robots very early to improve productivity and become more competitive internationally. 1980 has been called the "base year of industrial robot dissemination." Many government measures have been carried out, such as establishing an industrial robot leasing system with government loans (from the Japan Development Bank) and inclusion of industrial robots in a special loan system for industrial safety and hygiene facilities.

However, these moves on the part of Japan are being looked upon with suspicion by the countries of Europe and the United States. For example, the "United States Japan Trade Report" presented last September in the Trade Subcommittee of the U.S. House of Representatives mentions that industrial robots and machine tools are moving in, along with computers and semiconductors, as long-term industrial problems between the United States and Japan in addition to the present causes of economic friction such as the automobile and NTT problems. Chapter 5 of the report states that in the advanced technological fields of semiconductors, computers, and the "mechatronics" products described above, Japan is gaining the lead or has already surpassed the United States. In response to this trend, the report warns, the U.S. Government and U.S. industry must work out effective countermeasures.

The following kind of awareness about industrial robots and machine tools under scrutiny here is presented. "Japan is the world leader in the field of robot engineering--the use of mechanical operating devices for groups of machines which carry out repetitive or dangerous assembly operations. The use of robots not only aids in controlling costs and improving productivity, but it also helps improve quality by eliminating the human error which creeps into monotonous or difficult work. Robot technology was originally systematized in the United States, but according to the estimate of Nomura Securities, there are now 135 robot manufacturing plants in Japan and only 40 or 50 in the United States and Western Europe together. It is said that there are 10 times as many industrial robots in operation right now in Japan as in the United States and Europe."

In short, there is a huge difference between Japan and the United States in the field of industrial robots. Also, on the basis of this awareness, the report analyzes the role played by MITI in the development of Japan's industrial robots and suggests that tax measures and technological development like that being carried out in Japan are necessary for the United States.

The following statement is made with regard to machine tools: "Japan is becoming a major exporter of machine tools, and this will probably lead to future trade friction. Japan is especially competitive in the development of high-level, numerically controlled (NC) machines using microprocessors."

The threat of NC machine tools is more real than that of industrial robots. In fact the rapid growth of NC machine tool exports to the United States, chiefly medium-grade machines, has been an issue since last year in the Joint Economic Committee of the U.S. Senate and House of Representatives. When international competitiveness grows rapidly and exports expand through the use of microprocessors, as in the case of machine tools, a clash with local manufacturers in the importing country is inevitable. It is highly probable that Japan's "mechatronics" products will cause a decreased market share and business difficulties for local industries in the countries where they are exported. There is a growing awareness that certain measures

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should be included in the world market strategy of Japanese industry to cope with this situation. These measures would include suitable industrial coordination and steps to avoid friction, such as local production, sales agreements with local manufacturers, and mutual development projects.

Increased trade friction may be considered harmful to Japanese industry over the long term, so our influence on local industry in the countries that import Japanese goods must be considered carefully. Especially with electromechanical products, there is a great possibility of causing labor and social problems as well as adversely affecting local industry. For example, in the past few years a negative influence on the microcomputer industry is drawing attention, especially in Europe, and a number of surveys and reports are being prepared by both the public and private sectors. Labor officials are especially concerned about this problem. This is because "mechatronics" products such as industrial robots are usually developed as effective labor-saving devices for the factory or office, and there is great concern about resultant unemployment. Microprocessors are referred to in Europe as a new technology, and their impact on employment is feared. As this tendency develops, the international competition related to Japanese electromechanical products may take on new dimensions that go beyond simple business strategy.

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MAJOR JAPANESE OVERSEAS PROJECTS OUTLINED

Tokyo EKONOMISUTO in Japanese 20 Jan 81 pp 42-49

[Article by EKONOMISUTO editorial staff]

[Text] Japanese National Project Method

At the end of 1979 the cumulative total of Japanese postwar overseas investment exceeded 30 billion dollars. The expansion in overseas investment has resulted in many so-called "big projects." Big projects are, generally speaking, large-scale projects in which large amounts of capital are invested. Each of these big projects involves a number of companies or whole industries, and has great significance for both industry and the national economy. This report is an overview of big projects which involve large-scale plant and equipment, such as resource development projects and steel and petrochemical projects.

Although all are called big projects, they take a variety of forms. They can, however, be roughly classified into three groups based on how overseas expansion is achieved.

Japanese Enterprise Leadership: In these projects Japanese firms bear the financial, operational and sales responsibilities, and receive all or most of the resources developed. Japanese firms generally provide all the financing, or more than 50 percent. Most projects are promoted in developing countries. Examples are Arabian oil, Abu Dhabi oil, Asahan aluminum, Alaska pulp, Zaire copper mines, Mamut copper mines, Iranian petrochemical and Singapore petrochemical projects. The Qatar steel mill belongs to this category even though Japan has a minority share.

Import-heavy Participation: These projects are usually undertaken in combination with enterprises of advanced countries, with Japanese firms holding up to a 50 percent interest and a corresponding financial responsibility. The Japanese firms sometimes receive developed resources over and above the investment share. Operation is generally left to partner firms. Examples are ADMA oil development, Indonesian oil, Brunei LNG, Malaysian LNG, Niger uranium, Ranger uranium, NZAS aluminum, VENALUM, Robe River iron ore and Bowen coal.

Investment-Purchases/Advance Payment for Imports: In these projects, financing is providing to the operating entity as development capital for new projects, or capital is provided for expansion of existing projects, or import costs are paid in advance;

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in return Japanese firms receive long-term imports of ore or other resources. This method is widely used for Indonesian LNG, enriched uranium, iron ore, unprocessed coal, copper and so on. Recently there have also been projects involving oil from Indonesia or Mexico, although in the past these countries had been developing oil products independently for the most part.

The term "national projects" has come to be much used lately. This term generally indicates those projects where, as in the case of the Iranian petrochemical project, the government obtains a cabinet decision to provide necessary assistance via concerned government agencies or via the Overseas Economic Corporation Fund (hereafter referred to as the Fund). The terms "national project" suggests government management or leadership, but these are large projects where decisions and risks belong entirely to private firms. Still, from the perspective of economic cooperation with other countries and in terms of securing resources and industrial sites for Japan, the government and the private sector do have a large degree of unity which can be characterized as "Japan Incorporated."

Thus the government provides aid by negotiating with the other government to formulate the project, and to lay out the foundations for the work. Financing is provided in the form of yen loans, investment by the Fund or the Petroleum Development Corporation, (both government-related bodies), and in the form of borrowing, usually in all cases, from the Export-Import Bank or from others.

But a close look at "national projects" shows that they correspond almost exactly with big projects of the Japanese enterprise leadership type; the main ones are ADMA, Asahan, Amazon Aluminum, Japan-Brazil paper and pulp, Alaska pulp, Usiminas iron mill, Mexican large-diameter pipe/cast-forged steel, Iranian petrochemicals, Singapore petrochemicals, Saudi methanol, Japan-Brazil agricultural development etc.

Here are the main "big projects" classified by industry.

Oil

With the OPEC price increases and the rush to participate in oil development projects, Japan has increasingly encouraged oil exploration and development projects during the mid-1960's and the mid-1970's. But there have been few development successes; there are now only about ten projects which provide Japan with imports of crude oil. Japan's "independently developed crude" secured from overseas projects came to 25 million kiloliters in 1979, about nine percent of all the crude oil Japan imports. The greatest source of imports is Arabian oil (13 million kiloliters), followed by ADMA (5 million kiloliters) and Indonesian oil (3 million kiloliters).

Arabian Oil Co. (Saudi Arabia-Kuwait border zone)

This was the first of the Japanese-leadership overseas oil development projects. In 1957 President Yamashita of the Japan Export Oil Co. took the initiative and the project was started after a cabinet understanding was obtained on necessary measures for assistance. The resulting Arabian Oil Co. concluded a concession agreement with the governments of Saudi Arabia and Kuwait, and production in the Khafji oil field began with a high-volume well in 1960. This was followed by more successful wells and production increased rapidly--sales to Japan reached a level of 18 to 19 million kiloliters from 1970 to 1973. But the khafji oil field produces a heavy

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crude with high sulfur content, and sales to Japan have fallen off since 1974. The sales volume increased following the Iranian revolution, but has not returned to former levels. Although it is highly significant that this project provided an independently developed source of oil throughout the past 50 years of operation, it has now encountered problems. Japan's take has been reduced because the Kuwaiti government has increased its take.

Arabian Oil Co. was established in 1958 and now has 25 billion yen in capital. The largest shareholders are the governments of Saudi Arabia and Kuwait, each with a 10 percent share. Other major shareholders are Japanese steel, electric power and trading companies.

ADMA (Abu Dhabi marine areas)

The Japan Petroleum Development Co. has developed the Zakum and Umm Shaif oil fields in cooperation with BP, CFP and the government of Abu Dhabi. Investors in the Japan Petroleum Development Co. are the Japan Petroleum Development Corporation (68.3%), The Overseas Petroleum Development Corporation (14.8%) and eight other companies. Aid for participation in this project was promised in a cabinet decision of December 1972, and the following year a 22.5% share was obtained from BP for \$780 million. But in September 1974 the government of Abu Dhabi suddenly increased its participation in the project from 25% to 60% and its take from 55% to 85%, so Japan's share dropped to 12%. Thus the project's environment has become less successful. The production level has been about 500,000 B/D for the past few years. Japan has plans for secondary recovery from the upper level at Zakum by pumping in water, and for development of smaller oil fields like Sateh.

Indonesian Oil Co.

This project is based on production sharing contracts with Pertamina and carries out oil production in conjunction with Conoco of the U.S. and Total of France, (both operators) in such oil fields as Attaka Handel and Bekapi off East Kalimantan. Production has gone well; it ranks second to Caltex among Indonesian producers.

Other production/import projects in which Japan has participated are the Abu Dhabi Mubarraz oil field (Abu Dhabi Oil Co.), Indonesia-Japan Low Sulfur, and Zaire Oil Co. In addition, Gabon's (Baliste) oil field, Oman's (Smar) oil field and Egypt's West Bakur oil field began or are to begin production in the second half of 1980 and the first half of 1981.

LNG

Recent years have shown a sharp increase in demand for natural gas, as clean energy or as an energy alternative to oil. In the 10 years after the power industry introduced LNG from Alaska in 1969, it became the source of 15 percent of the electrical power produced, and over half the resources of the gas industry are in the form of LNG. This increased demand is met not only by simple importation, but also by participation in joint ventures in Brunei and Abu Dhabi and long-term deals in return for financing in Indonesia.

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Indonesia LNG (Badak in East Kalimantan and Arul in Northern Sumatra)

Pertamina will build liquefaction plants--two systems in Badak and three in Arul (using the MCR method of America's Air Products Co., 1.6 million tons per system). Most of the funding will be provided by Japan, in return for which Kansai Electric and five other users are to receive 7.5 million tons of LNG per year for 20 years.

This concept was firmed up by Pertamina and Nissho Iwai between 1972 and 1974. Japan provided a yen loan, and five users, seven trading companies, 16 banks and one other company set up Japan-Indonesia LNG Co. (Jilco) as the funnel for financing. By 1975 construction costs had swollen from 1 billion to 1.5 billion yen and the problem of cost overruns arose, but additional financing was found, and since then construction has gone as it should. LNG production began in Badak in July 1977 and in Arul in August 1978, and about a month later the first tankers arrived at the Senboku nr. 2 plant of Osaka Gas and Chubu Electric's Chita base respectively. Production and shipment have gone along well; this is a major import source which provided over half of the approximately 16 million tons of LNG Japan imported in 1980.

Brunei LNG

Brunei LNG was established as a joint venture of Shell, Mitsubishi Corp and the Brunei government (with shares of 45%, 45%, and 10%); it liquefies LNG and sells the entire volume of 5.14 million tons to three Japanese users including Tokyo Electric. The joint venture contract was concluded in December 1969, and a liquefaction plant from America's Air Products Co. (five systems of 1.05 million tons per year) was constructed with engineering by Japan Gasoline and America's Procon. Operations and shipments have gone smoothly since production began in 1973.

This was Japan's first overseas LNG project. Because construction was done in an earlier period the construction costs were reported at only 250 million dollars. It is a good example of a successful project.

Another is Abu Dhabi's Das Island, where Mitsui & Co. and Bridgestone liquid Gas (total share 24.5%) joined with the Abu Dhabi Government (51%), BP and CFP. This project produces 2.05 million tons of LNG per year, all of which is to be sold to Tokyo Electric Co. for 18 years. The first ship arrived in May 1977.

In addition, Mitsubishi Corp. has joined with Shell and the Malaysia Petroleum Corp. in an LNG production plan in Bintula, Sarawak. An annual million tons of LNG will be sold to Tokyo Electric and one other company for 20 years beginning in 1983. Construction of three liquefaction plants [will have three systems]--each with a 2 million ton capacity-- is now underway with Japan Gasoline Co. and Kellogg as general contractors. The Japanese users are negotiating for increases of 3.2 million tons of Indonesian LNG from Badak and 3 million tons from Arul. And there is a western Australia continental shelf project in which plans are being worked out to supply gas to Australia and 6 million tons of LNG per year to Japan.

Uranium

Japan now has 21 atomic power plants with an output of about 15 million kilowatts. Seven plants now under construction will have a capacity of 5.8 million kilowatts.

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A construction plan for another seven plants with a total capacity of 7 million kilowatts is also being formed. The supply of uranium ore which is necessary to operate these power plants is not well distributed; over 70 percent comes from Canada (Denison Mines and Rio Algom Mines Co.), South Africa (Nafco) and Australia (RTZ). Thus to secure a stable supply of uranium ore Japan has used advance payments, loan-purchases and direct participation in overseas projects.

Niger Project (Akouta Mines)

The Overseas Uranium Resources Co., an investment corporation which comprises nine Japanese electric power companies, 10 nonferrous mining companies, six trading companies and others, has a 25 percent share of a uranium mine development joint venture with France (COGEMA, 34%), Niger (31%) and Spain (10%). Over a period of 19 years Japan will take back 13,000 tons of uranium concentrate (enough to keep 10 light water reactors of a million kilowatts operating for 10 years). The Akouta mines are located in the Sahara desert 100 km from Niamey. COGEMA, the operator, extracts a very high-grade ore averaging 0.48 percent from the mine pits. The ore is processed to a concentrate (yellowcake) by the sulfate mixture method; the concentrate is transported 1500 km by road and 500 km by rail, then loaded onto ships at Cotonou, Benin.

Excavation began in July 1975; extraction began in February 1978 and production that October. Incidentally, Japan joined other countries in providing funds for construction of a 650 km paved road between Arlit and Tahoua.

Ranger (Australia)

This is a joint venture of the Japan-Australia Uranium Resource Co. [(formed by Kansai Electric Co and three others), which has a 10.1% share,] and West German capital and the Australian operators, PEKO and EZ, to excavate the Ranger Mines 220 km east of Darwin. The Japan-Australia Uranium Resource Co was formed by Kansai Electric Co and four other Japanese companies and has a 10.1% share in the project. For 15 years beginning in 1982, Japan will receive a total of 15,000 tons of uranium concentrate, about 13 percent of the total output. The first mine developed by the open pit method has a relatively high-grade ore of 0.3 percent; construction is now going ahead with production scheduled to begin by the end of 1981.

In addition, there have been advance payments for uranium enrichment services from 10 Japanese power companies to the U.S. Department of Energy, and advance payment from 8 Japanese power companies to France's Aurodif. Until the second Japanese facility is completed, Japan must rely on other countries for reprocessing, so Japan has financed construction of British and French Nuclear Fuel Corporation reprocessing facilities (Windscale in England and La Hague in France) and will rely on these facilities between 1982-1990.

Aluminum Refining

As a result of the jump in the cost of electric power because of the first and second oil shocks, power expenditures have come to constitute more than a third of the cost of refining aluminum. Domestic refining plants with a total capacity of 530,000 tons have been shut down or have remained idle since 1978; domestic pro-

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duction is now held down to 1.1 million tons per year. Demand, on the other hand, exceeded 1.8 million tons in 1980; it is expected to grow by about 5 percent per year to 2.3 million tons in 1985. The shortfall must be made up by importing refined metal. In order to obtain cheap metal, the aluminum industry is actively participating in overseas projects, and its large-scale projects are being implemented one after another.

Japan will import about 700,000 tons of aluminum ingots in fiscal 1980. Of this, about 250,000 tons will be development imports. By 1985, 1.2 million tons will be imported and development imports will increase to 700,000 tons.

NZAS (New Zealand)

NZAS is the first of the overseas aluminum smelter projects. It is a joint venture of Showa Aluminum and Sumitomo Light Metal Industries (25% each) with Australia's COMALCO. The Japanese receive the raw material alumina from COMALCO and have it refined by the NZAS smelter. Each participant takes the refined metal in proportion to their investment. This is the consignment refining method. The purpose is to secure a long-term, stable supply of aluminum ingots at cost using COMALCO'S holdings of bauxite and the inexpensive electric power of southern New Zealand. Planning for this project began in the beginning of 1970 and operations began in July 1971; since then the scale of production has increased steadily to a level of 150,000 tons annually. The cost of electricity increased in October 1977, but power costs are still low, and operations continue at full capacity. Japan has been receiving 75,000 tons of refined metal per year.

Asahan (Indonesia--North Sumatra)

P. T. Asahan Aluminum, a joint venture of Japan Asahan Aluminum (75%) and the government of Indonesia (25%), constructed power plants at the harbor of (Tanga) and the (Siguragura) falls of the Asahan river in northern Sumatra (513,000 kilowatts combined maximum output) and is using that power to refine 225,000 tons of aluminum per year. Japan receives two thirds or more of that aluminum. Planning for this project began around 1970. Sumitomo Chemical Co headed studies and negotiations within Japan. Following cabinet approval in July 1975, Indonesia Asahan Aluminum Co was established as the executive entity in January 1976. Although total funding required expanded during this period, full-scale bidding and construction began in the second half of 1978.

Almost all the equipment has been ordered now, and the work is going forward with a plan to place some facilities in operation at the beginning of 1982. Full operation is expected by 1984. Indonesia is considering domestic development of the raw alumina.

Japan Asahan Aluminum, the Japanese conduit for investment, was established in November 1975. The Fund put up 50 percent, and the remaining 50 percent was invested by five refiners and seven trading companies.

Aside from these two projects, the greatest amount now being imported from Japanese development import sources is the 120,000 tons from VENALUM (in Guayana, Venezuela). Originally Japan had the leading role in this project, but in 1974 Venezuela began

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nationalization and the Japanese (Showa Aluminum and six other companies) have been reduced to a minor share of 20 percent. The smelter began operating in February 1978 with technical guidance from the Reynolds Co. From 1981 on, when the smelter operates at its full capacity of 280,000 tons, Japan's take will be 160,000 tons.

Moreover, projects like ALPAC (in Canada), a joint venture with Canada's ALCAN, and the South Carolina joint venture with ALMAX of the U.S. have entered the production and delivery stage.

A noteworthy future project is the Queensland Project (Queensland, Australia). Seven Japanese companies including rolled aluminum producers have joined with Australia's COMALCO and Kaiser of the U.S. to set up a smelter. Of the annual production of about 200,000 tons, Japan is to take about 100,000 tons of ingots, in proportion to its investment. Production will begin in 1981.

The Amazon Aluminum Project (in Brazil) is a plan to use the hydroelectric and bauxite resources of the Amazon region in an 800,000 ton per year alumina plant and a 320,000 ton per year smelter. Japan is to import 157,000 tons of ingots each year. This project was launched when President Geisel visited Japan in September 1976, and in September 1978 two Japanese-Brazilian joint venture companies were formed to implement the project: ALNORTE (alumina production, Japanese share 39.2%) and ALBRAS (aluminum production, Japanese share 49%). The original plan was subsequently modified, and preparations are now being made for the construction work. In September 1976 the cabinet approved support for this project, and the Fund paid in 40 percent to the Japanese investment company, Nihon Amazon Aluminum Co (NAALCO). Private stockholders are 30 companies including 10 trading companies, and Mitsui Aluminum and four other refiners.

Paper and Pulp

There are many overseas development import projects in the paper and pulp industry. In the next 10 years, however, chip imports will decline. Ensuring a supply of raw materials for domestic paper manufacture will be difficult even though pulp imports will increase. Thus there is a growing trend to push large-scale projects including development imports of pulp, overseas production of lower grade products and even afforestation.

Japan-Brazil Paper and Pulp (Caxias Escura in Minas Gerais)

The Japan-Brazil Paper and Pulp Resource Development Corp. (JBP), in a joint venture with Brazil's Rio Doce group, is carrying on large-scale operations from afforestation to chip and pulp production and exporting half the amount produced to Japan. JBP is composed of 16 paper producers and other companies. Part of this is the MG plan to produce pulp from eucalyptus trees in Minas Gerais. Under this plan, CENIBRA, a Japanese-Brazilian joint venture in which Japan has a 49.375 percent share, was established in September 1973 with a budget of about 300 million dollars. CENIBRA constructed a plant to produce 255,000 tons of bleached, broadleaf kraft pulp per year. There was a period of unstable operations after operations began in October 1977, but production and sales have gone as expected since 1979.

Another large-scale operation is the ES plan which will plant and harvest eucalyptus trees in Espirito Santo and Bahia and produce chips and pulp, each at three different

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plants. Total investment will be 1.3 billion dollars. Partial implementation of the afforestation work has begun through the Japanese-Brazilian joint venture FLONIBRA (JBP, 39.6%; CENIBRA, 21.1% Rio Doce Group 38.3%), but the work plan is currently being reviewed.

JBP, the Japanese investment company, was formed in June 1963 by 14 paper and pulp companies--primarily those from the old Oji group, including the Oji Paper Co--and a joint pulp import company consisting of 19 smaller paper and pulp manufacturers, and one trading firm. The Fund has provided 39.6% of the investment; cabinet approval was given in November 1973.

Alaska Pulp (Wrangell, Sitka)

Through its U.S. subsidiary, Alaska Pulp has acquired timber rights in Tongass National Forest; it produces dissolved pulp (DP) for synthetic textile and lumber products and buys chips from other companies, of which the major portion is sold to Japan. The Sitka plant, which provides dissolved pulp for rayon, has been in full operation since December 1959. In 1962 its capacity was increased to 180,000 tons per year, but because Japanese synthetic textile manufacturers switched to polyester production, demand for rayon pulp has been slow and prices have been depressed. In 1967 lumber capacity was expanded by purchasing the AWP plant (65 million board-feet--1 bd-ft is a board one foot square and one inch thick) to add to the plant [on] at Wrangel (100 million board-feet). In addition, chips were purchased from the U.S. and sold to Japanese users. Cooperation in this, the first large-scale postwar overseas project, was sought from all quarters and in February 1956 the cabinet approved efforts to promote it. The primary stockholders in Alaska Pulp are 17 banks and 29 textile, trading and other companies.

In other projects, Japan obtains chips of tropical woods from Malaysia and elsewhere in Asia and Oceania; the largest of these is the Harris-Daishowa project (New South Wales, Australia). This project was originally a joint venture with local capital, but now it is completely owned by Japanese firms. It produces eucalyptus chips and buys waste chips from other sources, selling its total output to Japan. Between 1965 and 1975, several overseas pulp-related projects were organized as joint ventures with local capital in Canada and New Zealand. A pulp plant for newsprint that was constructed by the Carter, Oji, Kokusaku and Pacific firms in Napier on New Zealand's North Island sends its full production of about 200,000 tons of pulp each year to Japan. There are also projects for overseas production of finished products: Jujo Paper Co joined with Weyerhaeuser in the Norpac newsprint project in the U.S. (200,000 tons per year and is now being expanded), and Oji Paper Co joined International Paper in the NBIP project in Canada (expansion of the Dalhousie plant is in progress).

Iron and Steel Raw Material

In the past, raw materials for iron and steel making were secured mostly in the form of imports through trading companies. In the mid-1960s, however, greater quantities of raw materials were needed from about the mid-1960s on, and steel companies began to participate directly, in management of mining operation, and to finance and purchase ore. There are, however, no "captive mines" under the direct control of Japan's blast furnaces.

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For 7 years since crude steel production peaked in 1973, the level of production has stayed around 100 to 110 million tons. There has thus been little enthusiasm for taking part in new projects during this period, but now crude steel production is expected to increase, and new projects may now be undertaken.

Robe River Iron Mines (Western Australia)

A Japanese-U.S.-Australian consortium (unincorporated joint venture) has carried on open pit mining of the Robe River and East Deepdale iron ore deposits; the ore is crushed at the port 160 km distant and part is pelletized and sold to Japan (9 million tons in 1979). In 1977 production was expanded to 20 million tons. Both Nippon Steel Corp. and Sumitomo Metal Mining Co. joined Mitsui & Co. as consortium members by acquiring part of Australia's holdings. The share of the Japanese partners totals 35 percent, but operation of the project is left in the hands of the American partners.

In 1979 Japan's iron ore imports totaled 125 million tons, of which over 40 percent came from Australia. The largest source is the Hamersley Mine (18 million tons imported); Japanese trading and steel companies have 6.2 percent of the stock in its holding company. In second place is the Mount Newman Mine (16 million tons); Japanese trading companies hold 10 percent of the consortium. Japanese and U.S. companies have the Savage River Mine on Tasmania which has been producing pellets since 1967.

Bowen Coal (Queensland, Australia)

In 1966, Mitsubishi Corp. formed a consortium with Utah Development, a U.S. company. Since 1971, they have successively developed the Goonyella, Peekdowns and Salagee Mines in the Bowen coalfield. These are all open pit mines, and the coal is shipped mostly to Japan from Hay Point, 200 km distant. At present Japan's take of Bowen coal is 9.7 million tons, about 15 percent of the total. Mitsubishi Corp. controlled 15 percent of the consortium at the time of development, but its holdings have dropped to 12 percent with the participation of other partners.

In Brazil, Japanese blast furnace operators and trading companies have a 20 percent share in development of the Agunas Cuteras iron mine at Belo Horizonte in Minas Gerais. The mine began producing ore in November 1973. Kawasaki Steel Corp. is participating in the development of the Capanema Mines. Production will begin in 1982. Capanema iron ore will be supplied to Rio Doce, Kawasaki's partner, and to the sintering plant which Kawasaki Steel and Tubarao iron mill (described later) operate on Mindanao in the Philippines.

To secure coal from the U.S., which has the highest quality unprocessed coal, financing and purchases began around 1970 for development imports of Virginia Pocahontas No 4 coal, Cello coal and Blue Creek coal.

Nonferrous Metals

As early as the 1950s Japan sought to secure copper ore overseas to cover domestic shortages by investment-purchases, primarily in the Philippines but also in Canada and Latin America. In the latter half of the 1960s the scale of mine development began to increase, and there were more [and larger] instances of investment-purchases, first in Canada, and then in Chile, Africa and Malaysia.

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After the oil shock occurred, copper prices became depressed while development costs increased because of inflation. Copper development projects fell on hard times worldwide. Although there have been few new development import projects in the late 1970s, there is a growing need to promote such imports to meet expected increase in the demand for foreign ore and metal.

Zaire (Musoshi-Tshinsenda Copper Mines)

This is the first of the overseas copper development projects in which Japanese companies played a leading role. The Nippon Mining Co and five other nonferrous metals companies from Japan formed the investment company Zaire Mining and Development Corp. (Codemisa), which in turn joined with the government of Zaire to form the Zaire Mining and Manufacturing Developing Co. (Sodemisa). Japanese investment is 80 percent. Sodemisa is developing mines at Musoshi and Tshinsenda in Shaba Province and sells all copper concentrate to Japan. The Musoshi mine began operating in October 1972, and the high-grade Tshinsenda mine began to produce ore in October 1977. Both mines extract ore from mine shafts. Present copper concentrate exports to Japan amount to 30,000 tons per year. Because of disputes with neighboring countries in recent years, shipments of the concentrate have been forced to pass through East London, South Africa, a detour of 3,327 kilometers.

Manut Copper Mine (Sabah, Malaysia)

The Overseas Mineral Resource Development Corp. and the government of Malaysia formed the joint venture company OMRD-Sabah (called the Sabah Co.) for open pit development of the Mamut mine the investment ratio is 51.49. Mitsubishi Metal Corp. and six other nonferrous metals companies invested in the Sabah Co. through the joint investment company Mamut Mines Development (MMD). They export equipment on a deferred payment basis to Malaysia, and in return take all the concentrate produced. Production began in October 1975, and about 100,000 tons of concentrate is exported to Japan each year.

Other copper concentrate and crude copper investment-purchase projects include Rio Blanco mines in Chile (100,000 tons of concentrate to Japan each year), Bougainville mines in Papua-New Guinea (80,000 tons of concentrate), Toledo and Sipalay mines in the Philippines, and Low Necks and Fox mines in Canada.

Nonferrous metal projects other than copper are represented by Indonesia's Soroako Nickel (joint venture with INCO; Japan's share is 3%), the Philippines' Rio Tuba (independently developed by Japan, exports nickel to Japan), Australia's Glenbarry (investment-purchase; exports nickel and cobalt to Japan), and Peru's Huancayo (independent development; exports zinc and lead concentrate to Japan).

Iron and Steel

Overseas iron ore projects began with the Usiminas iron works, a joint venture with Brazil. In these projects Japan runs all operations, from building an integrated steel mill to producing finished products. Motivations for the venture include economic and technical cooperation, acquisition of overseas sites, of protection of export markets.

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Tubaraõ Iron Works (Brazil)

Kawasaki Steel Corp. and 14 trading and other companies, in a joint venture with the Italian and Brazilian public steel corporations (Japan 24.5%, Italy 24.5%, Brazil 51%), will construct an integrated steel mill and take back the semifinished slabs produced there in proportion to investment. The project was planned in 1973 and the basic agreement was concluded in May 1976. Because of Brazil's financial difficulties and changes in market conditions for steel in Japan, changes were subsequently made to the plan. The first phase of the project is underway, however. Three billion dollars is being invested to produce 3 million tons of slabs. Work is going on at the site and operation is scheduled for November 1982. This project came about because of Brazil's policy of exporting iron ore with a higher added value, and Japan's interest in supporting local processing of semifinished products to ensure supplies of raw materials for steel from abroad.

Qatar Iron Works (Umm Sa'id)

Kobe Steel, Tokyo Boeki and the government of Qatar formed the joint venture Qatar Steel Co. (QASCO; Japan 30%, Qatar 70%), which produces iron by the direct reduction method using natural gas. QASCO produces billets and rods for reinforced concrete and sells them within Qatar and to neighboring countries. Operations began in August 1978 and are going smoothly.

On a crude steel basis, the scale of production is small--400,000 tons per year--but it is the first direct reduction iron project in the Mid-East that is supported by Japanese investment. This is of great significance because it is an investment in a full-scale manufacturing industry.

Usiminas Iron Works (Itipanga, Brazil)

This was the first overseas cooperation project for Japan's steel industry. The project started when President Kubitschek requested Japan's cooperation in 1956. In 1957, the Nippon Steel Corp., six other steel companies, and seven machinery manufacturers established Nippon Usiminas, the investment company. Nippon Usiminas invested in Minas Gerais Iron Works (Usiminas), a Japanese-Brazilian joint venture, and participated in construction of a 500,000 ton iron works. The construction was delayed by Brazil's severe inflation and a shortage of funds. Moreover, after production began, the operation of Usiminas was still not very successful. Both Japan and Brazil took steps in support of Usiminas, however, and the company streamlined its operation. Since 1968 the project has been going in the right direction. In line with subsequent demand for steel in Brazil, production progressively increased to 1.4 million tons, 2.4 million tons, and now 3.5 million tons. Japanese industry has cooperated in the expansion by exporting equipment on a deferred payment basis and increasing investment by Nippon Usiminas. At present the share held by Nippon Usiminas is 17.3 percent.

The industry is now pushing other cooperative steel projects in Mexico. These are Japanese-Mexican joint ventures that plan to produce large-diameter pipe (290,000 tons per year) and cast and forged steel (20,000 tons of each). Japanese investment companies have been set up, with Sumitomo Metal Mining Co. the principal investor in the large diameter pipe project and Kobe Steel the principal investor in cast and forged steel project. In each case, an investment of 30% from the Fund is scheduled. The investment required is 33 billion yen for the large-diameter pipe project and 58.4 billion yen for the cast and forged steel project.

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Petrochemicals

Iran Petrochemical (Bandar Khomeine)

This project is a plan to construct a comprehensive petrochemical complex which would produce 300,000 tons of ethylene annually from gas and naphtha produced in Iran. The ethylene would be used to produce EDC, vinyl chloride monomers, high and low pressure polyethylene, polypropylene, benzene, synthetic rubber etc., and also LPG as a byproduct. The entity implementing the project is the Iran-Japan Petrochemical Co. (IJPC), a joint venture in which Iran and Japan each invest 50 percent.

Singapore Petrochemical (Merbau Island)

This project will construct a 300,000 ton per year ethylene center and in the first stage produce (1) high-pressure polyethylene and polypropylene, (2) low-pressure polyethylene, and (3) ethylene oxide and ethylene glycol as derivatives. The managing company, Petrochemical Company of Singapore (PCS), was established in August 1977 as a joint venture in which Japan and Singapore each hold 50 percent shares. Equipment is being ordered with operations scheduled to begin in early 1983. Companies to handle the derivatives are being formed as joint ventures between Japan and Singapore for derivatives (1) and (3), and between Sumitomo Chemical Co., Singapore and the Phillips Co. of the U.S. for derivative (2). The Japanese investment company, Japan-Singapore Petrochemical Co. (JSPC), was formed in July 1977, with a 30 percent investment from the Fund. There are 28 private stockholders, including Sumitomo Chemical Co. and 11 other chemical companies.

Besides these two projects there are joint ventures to handle derivatives at the Yoch'on petrochemical complex in South Korea and the Camacari petrochemical complex in Brazil. Moreover, in the Jubayl area of Saudi Arabia, the first example of Japanese-Saudi economic cooperation being implemented. This is a plan to produce methanol for chemical use (2,000 tons per day). Production will start in 1983. A feasibility study for a Saudi petrochemical project is also in progress between Saudi Arabia and the Japanese survey company, Saudi Petrochemical Development Co. The basic concept of this project has not been firmed up yet.

Agriculture, Coal and Others

Cerrados (Brazil)

This is a Japanese-Brazilian plan to develop 180 million hectares of brushland for agricultural use in the Serrado region of west-central Brazil. In the first stage, 50,000 hectares in Minas Gerais have been selected for experimental production of foodstuffs, such as soybeans, wheat, corn and coffee. The managing entity of the project is the Japan-Brazil agricultural Development Corp., a joint venture (50% for each country) which was established in September 1978. It is now buying land, bringing in farmers, and inviting agricultural enterprises.

Other agricultural projects worthy of note include a project to buy or lease grain elevators in the U.S. to store wheat for import to Japan, the Mitsugoro project to cultivate corn in conjunction with Indonesian cooperatives for import to Japan, and a project to raise cattle for beef in Brazil and Paraguay.

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Projects for coal for general use are in progress primarily in Australia: New South Wales coal (Lithgow, Barsrock, Workworth, Drayton), Queensland coal (Bracewell) etc. Preparations for coal extraction are already being made at some projects, but the project structure and financing for most of the large projects is still being formulated.

The above projects are those financed by Japan. To conclude, here are three representative examples of large-scale plant exports:

Algerian gas processing plant: This is a 300 billion yen plant exported to SONOTRAC by the Japan Gasoline Co. and C. Itoh & Co. It is a large-scale plant constructed in the northern Sahara.

Baoshan (PRC) steel plant: This is an integrated iron mill (6 million tons per year) constructed in the Baoshan area of Shanghai. Engineering was undertaken by Nippon Steel Corp., and exports of about 370 billion yen are projected for the first phase (3 million tons per year).

Hong Kong Subway Construction: The subway is to connect Kowloon and Hong Kong. The civil engineering for the first phase is a large-scale project of about 230 billion yen. Japanese construction companies are responsible for nine areas of construction costing 60 billion yen. Deferred payment Export-Import Bank financing has been approved for this work.

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SCIENCE AND TECHNOLOGY

JAPAN-ABU DHABI COOPERATIVE DEVELOPMENT OF SATEH OIL FIELD STARTED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 21 Feb 81 p 1

[Article: "Development of Sateh Oil Field Started: the Japan Oil Development Co. to Produce 40,000 B/D in 1984"]

[Text] The Japan Oil Development Co. (JODCO, headed by Takeki Tanaka) and the Abu Dhabi National Oil Co. (ADNOC) have begun a joint exploitation of the Sateh oil field, which is part of the Abu Dhabi Marine Area (ADMA) drilling concessions. Although Japan's overseas oil development ventures usually take the form of participation through investment, in this venture, JODCO is the operator. The Japanese oil development industry has long wished to be operators, and much is expected from this project. Oil production is projected to be 40,000 B/D by the end of 1984.

JODCO and ADNOC reached agreement on the Sateh oil field development project last summer. The project includes the development of (Jarnayn), Dalma', and Sateh fields. The existence of crude oil and natural gas has been proven by two experimental drillings made by ADMA OPUCO. ADMA OPUCO is a consortium of JODCO, British Petroleum (BP), Compagnie Francaise des Petroles (CFP) and ADNOC.

Sateh crude has an API of 31 (American Petroleum Institute Scale) and contains 0.7 percent sulfur. The estimated oil reserve in Sateh amounts to 800 million B. The project will begin with three drillings at the Sateh oil field. About \$30 million will be invested. Japan's share will be 40 percent of expenses. Drilling of Dalma' and (Jarnayn) will begin if Sateh drilling is successful. The JODCO's take from these oil fields will be 40 percent of production, and ADNOC's take will be 60 percent.

The ADMA drilling concessions were obtained in 1972. Drilling interests are distributed as follows: JODCO 12 percent, BP 14.7 percent, CFP 13.3 percent and ADNOC 60 percent. JODCO has since participated in the development of Umm Shaif, lower Zakum, upper Zakum and Umm al-Dalkh oil fields. JODCO is the operator of the Umm al-Dalkh oil field development project. Between 1972 and 1980 it has drilled 19 wells. Production of oil will begin by the end of 1982. Thus, JODCO will be the operator of two oil fields in ADMA, at Umm al-Dalkh and Sateh.

In addition to these development projects, Japan's Abu Dhabi Oil Co. and Godo Oil Development Co. are also promoting oil development in ADMA. Thus, the ADMA has become the focus of oil development in the Japanese petroleum industry.

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SCIENCE AND TECHNOLOGY

NEW JAPANESE LAUNCHERS DESCRIBED

Paris AIR & COSMOS in French 17 Jan 81 pp 40-42, 48

[Article by Pierre Langereux: "New Mu-3S and Mu-3U Launchers From the University of Tokyo"]

[Text] Japan has undertaken a very ambitious space program which now puts it in third place among the space powers, behind the United States and the USSR.

The Japanese space effort is expanding both in the domain of satellites and that of launchers*, as we found out during a recent series of reports from the Japanese space centers and launching fields.

The Japanese space program has the characteristic--and that is not astonishing in the least--of being completely two-pronged.

The Japanese space program is in fact divided into two activity sectors (science and applications) assigned to two distinct space organizations (the NASDA [National Space Development Agency] and the ISAS [Institute of Space Aeronautical Science]) which construct their own satellites and each has available its own launching facilities, rockets, and launching stations.

Japan has thus successfully launched 18 satellites in 10 years, of which 11 were ISAS satellites and 7 NASDA satellites.

The next Japanese satellite launchings will take place--traditionally--in February.** So, on 16 February 1981, the ISAS is to launch the "ASTRO-A" scientific satellite with the "Mu 3S-2" rocket and in that same month the NASDA is to launch the "ETS-4" technological satellite to test the capabilities of the new "N2" launcher.

NASDA, established in October 1969, is responsible for development and launching of applications satellites (telecommunications, meteorology, teledetection, navigation, geodesy, etc). For that purpose it has its own facilities for study,

*See AIR & COSMOS No 826: "The New Japanese Launchers"

**The most favorable time, free from monsoons and typhoons.

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construction, and testing of satellites as well as its own launching field on the Isle of Tanegashima (Kyushu) in southern Japan. The NASDA also has available its own launchers--the "N2" rocket which will replace the "N1" in 1981 and the future "H1" rocket with a cryogenic stage--which we shall describe shortly.

ISAS of the University of Tokyo is the oldest Japanese space organization. It was established in April 1964 to replace the IIS (Institute of Industrial Science) of the University of Tokyo which carried out the first Japanese space research, starting in 1955. The ISAS of the University of Tokyo is under the jurisdiction of the Ministry of Education which is attached to the Japanese prime minister.

The ISAS is responsible for scientific exploration of space, with the traditional means (ground observatories, rocket probes, and balloons) as well as with automated satellites, and soon, in addition, with manned vehicles (Shuttle-Spacelab). It also has available its own facilities for construction and launching of scientific satellites, in this case with rockets of the "Mu" family (Mu 4S, Mu 3C, Mu 3H, Mu 3S, and Mu 3U) as well as its own launching field at Kagoshima (131° 05' East, 31° 15' North) about 100km north of Tanegashima.

The ISAS has already successfully launched 11 technological and scientific satellites out of 13 attempts since 1970. It is now developing 3 new scientific satellites (Nos 7, 8, and 9), designated "ASTRO-A, ASTRO-B, and EXOS-C," which will be launched in 1981, 1982, and 1983 respectively by the new "Mu 3S" rocket (Nos 2, 3, and 4).

In addition the ISAS is preparing to construct three other satellites, including a technological satellite ("MS-T5," also known as "Tansei 5" and two new scientific satellites Nos 10 and 11), also known as "PLANET A," (135 kg), and "ASTRO-C" (400 kg) which will be launched in 1985 and 1986 with the new "Mu3S-Kai-1" rocket, also known as the "Mu3U" (Nos 1, 2, and 3).

Two other satellites are also under study at the ISAS: A technological satellite, the "MS-T6," also known as "Tansei 6," and a scientific satellite, the "EXOS-D." They should be launched in 1986 and 1987 respectively with an improved version, "Mu 3S-Kai-2," of the new "Mu3U" rocket.

The "PLANET A" satellite will be Japan's first interplanetary probe. It is to be launched in March or August 1985 to fly over Halley's Comet on the occasion of its next passage through the solar system in March 1986 after having taken advantage of the gravitational trampoline effect caused by flying over the planet Venus.

The ISAS Rockets

The "Mu" launcher family used for 10 years by the ISAS is directly derived from the "Lambda 4S" rocket of the 115 which placed the first Japanese satellite, the "OSUMI" (24 kg) into orbit on 11 February 1970 from Kagoshima. The "Lambda 4S" rocket, which had four consecutive failures in the course of its development

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between 1966 and 1969, was abandoned soon after in favor of the "Mu" rocket. But all the launchers of the "Mu family, like the "Lambda" rocket, use the technology of large probe rockets.

All the "Mu" rockets are of three or four solid fuel stages with boosters also burning solid fuel, which utilize relatively heavy structures (steel) of constant diameter (1.41 m) for all the stages. Nevertheless, the series has allowed progressive increases in performance, each version serving only for three or four firings at most. In 15 years the mass of payload in terrestrial orbit will have more than tripled, going from about 200 kg with the first "Mu 4S" rocket to about 670 kg with the latest "Mu3U" version, which will fly in 1985. And this within acceptable development costs. Thus the development of the present "Mu3S" version cost is 25 billion yen and that of the future "Mu3U" version is estimated at above 35 billion yen, according to the ISAS.

The first generation "Mu4S" rocket, placed in service in 1970, retained the technology of the "Lambda 4S" (four solid fuel stages) but on a larger scale. The "Mu4S" actually measured 23.6 m in height and weighed 43.6 t at take-off whereas the "Lambda 4S" was 16.5 m high and weighed 9.4 t. The new rocket still had a highly simplified guidance system except for the fourth stage (piloting by jet deflection). Three of the four "Mu4S" firings were successful.

The second generation "Mu3C" rocket, introduced in 1974, was a three-stage launcher retaining the first two stages of the preceding launcher with an improved version of the "Mu4S" fourth stage as its third stage, placed beneath a nose of larger diameter (1.41 m). The radio-inertial guidance of the launcher was kept but the second stage included a new device for piloting by jet deflection by injection of liquid (freon) into the motor's main jet, as well as a roll control device using lateral propulsors (with hydrogen peroxide). Three of the four "Mu3C" firings were also successful, the last in February 1979.

The third generation "Mu3H" rocket, placed into service starting in 1977 retained the elements of the "Mu3C," but with a lengthened first stage as well as nose, which then permitted the addition of a fourth stage (solid fuel) for improved performance. Three firings of the "Mu3H" have been successfully carried out.

The Mu3S Rocket

The new fourth generation rocket, "Mu3S," introduced in the beginning of 1980 and still being used by the ISAS is identical to the "Mu3H," with the addition of a device for piloting by jet deflection and a roll control device on the first stage. The performances of the "Mu3H" and "Mu3S" rockets, incidentally, are the same. Into circular orbit at 250 km altitude inclined at 31° they can place a payload of about 300 kg for the three-stage version and about 380 kg for the four-stage.

The "Mu3S" rocket is a rocket of either three or four solid fuel (polybutadiene) stages assisted by eight solid fuel boosters at take-off. It is 23.8 m high and 1.41 m in diameter with a take-off mass of 49.5 t. The total thrust at take-off (first stage plus boosters) is 223 t.

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The M13 first stage carries 27.1 t of solid fuel and develops an average thrust of 1,120 kilonewtons (114 t) during a burn of 56 s. The tank envelopes are formed of four rings of steel (maraging) and the nozzle is composite (fiber reinforced plastic). The "Mu3S" stabilizers are only two-thirds as large as those of the "Mu3H" in order to improve the effectiveness of the device for piloting by injection of liquid freon (120-liter tank) into the motor nozzle by means of 8 valves. The launcher's roll control is provided by 4 small gas generators (solid fuel) of 20 kg(kgp) thrust attached to the extremities of the four stabilizers.

The eight 0.31-m diameter boosters arranged in pairs around the first stage each develop an average thrust of 133 k during a 5.5-second burn. They serve to increase the take-off thrust and reduce the stray during the initial flight phase.

The M22 second stage carries 7.22 t of solid fuel and the motor provides an average thrust of 357 kilonewtons (in vacuo) during a 55-s burn. The envelope is formed from a single ring of steel (maraging). The second stage piloting is also provided by injection of liquid freon (20-liter tank) and roll control by lateral nozzles (8 kg thrust) utilizing hydrogen peroxide (H_2O_2).

The M3A third stage carries 1.08 t of solid fuel in a spherical titanium envelope with an integral composite (fiber reinforced plastic) nozzle. This spun motor delivers an average thrust of 67 kilonewtons during a 45-second burn.

The nose of the "Mu3S" launcher is of composite (fiberglass-resin) covered with thermal protection. It's diameter is 1.41 m and completely covers the third stage and the satellite.

The nominal firing conditions for the "Mu3S" launcher from the Kagoshima launching field are 71° elevation and 119° in azimuth (from the North). The majority of the launching and flight sequences of the "Mu3S" are provided by commands from an on-board electronic programmer. After 7.7 seconds of operation the boosters are jettisoned and flight begins (9 s after ignition), the launcher's stability being assured by the stabilizers. The piloting, by jet deflection, of the first stage is active in two periods, from 6 to 20 s and from 40 to 65 s after ignition. The four roll control propulsors are ignited 4 s after firing. After burn-out of the second stage they provide control of the launcher about the three axes. The second stage piloting by jet deflection then takes over the piloting for 64 seconds, starting with ignition of the M22 motor. The nose is jettisoned after extinction of the second stage. The third stage and payload are then put into rotation at two revolutions per second. The guidance logic maintains the launcher upon a predetermined trajectory up to extinction of the second stage. Next, it determines the direction, and instant of third stage ignition in accordance with the flight program of the on-board computers. But these conditions can be altered by radio commands from the ground (C band).

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The first launching of an "Mu3S" rocket took place successfully a year ago, on 17 February 1980. The rocket placed the "MS-T4" technological satellite, also known as the "Tansei 4" (85 kg) into orbit (at 500-600 km inclined at 39°), intended as a test of the new launcher's operation and that of certain equipment for the next scientific satellites. During the flight the consumption of freon for piloting was 68 liters in the first stage and 5.9 liters in the second stage. Roll control was $\pm 1^\circ$ after 15 s of flight. The perigee of the orbit attained was 3 km greater than predicted and the velocity at the perigee 30 m per second lower than predicted.

The next "Mu3S" rocket launching (No 2) is planned for 16 February 1981, to put the seventh Japanese scientific satellite, "ASTRO-A," into circular orbit at 500 km altitude (inclined at 31°). This 195-kg satellite is intended for study of solar particles and x-rays emitted at the time of solar eruptions.

Two other launchings of the "Mu3S" rocket are still planned, in 1982 and 1983, to place the eighth and ninth scientific satellites, "ASTRO-B" and "EXOS-C," into orbit. Then the ISAS plans to place into service a new version of the launcher, the "Mu3S-Kai-1" rocket, also known as the "Mu3U."

The "Mu3U" Rocket

The future "Mu3U" rocket which is to fly in 1985 will be of the fifth generation. It is an enlarged (in length) version of the preceding. The first stage of the "Mu3U" remains unchanged for the "Mu3S" with the exception of the eight small solid fuel boosters which are replaced by two large boosters (10 m long) each containing 4 t of improved polybutadiene solid fuel (specific impulse 236 s). These propulsors with swiveling nozzles burn longer (31 s) and deliver a distinctly greater unitary thrust (298 kilonewtons) than the preceding.

The second stage is a lengthened version of that of the "Mu3S." It carries more fuels (9.85 t) with increased performance (specific impulse 280 s) but burns for a little less time (52 s). However, the thrust of the second stage is considerably increased (519 kilonewtons). Let us also note that the interstage connections (1st-2nd) consisting of spacers will be replaced by a flat metallic skirt.

The third stage is a very much enlarged version of the "Mu3S" third stage. The new spherical propulsor in fact carries three times as much fuel (3.3 t) of improved performance (specific impulse 292 s and burns twice as long (82 s); the thrust is thus practically doubled (118 kilonewtons).

The nose of the "Mu3U" launcher is also lengthened and increased in diameter (1.65 m).

This new "Mu3U" launcher will then be 28.2 m high with total mass at take-off of about 61 t. The total thrust at take-off will be only 175 t (therefore distinctly lower than that of the preceding versions). But the total impulse will be distinctly higher--81,196 kilonewtons for the "Mu3U" versus 68,572 kilonewtons for the "Mu3S"--thanks to the increased performance of the new boosters, in thrust as well as in burn time. Because of this, the performance of the new "Mu3U" will be very much greater than that of the "Mu3S" (almost double). The "Mu3U," as a matter of fact, can place a payload of about 670 kg into circular orbit at 250 km altitude inclined at 31°.

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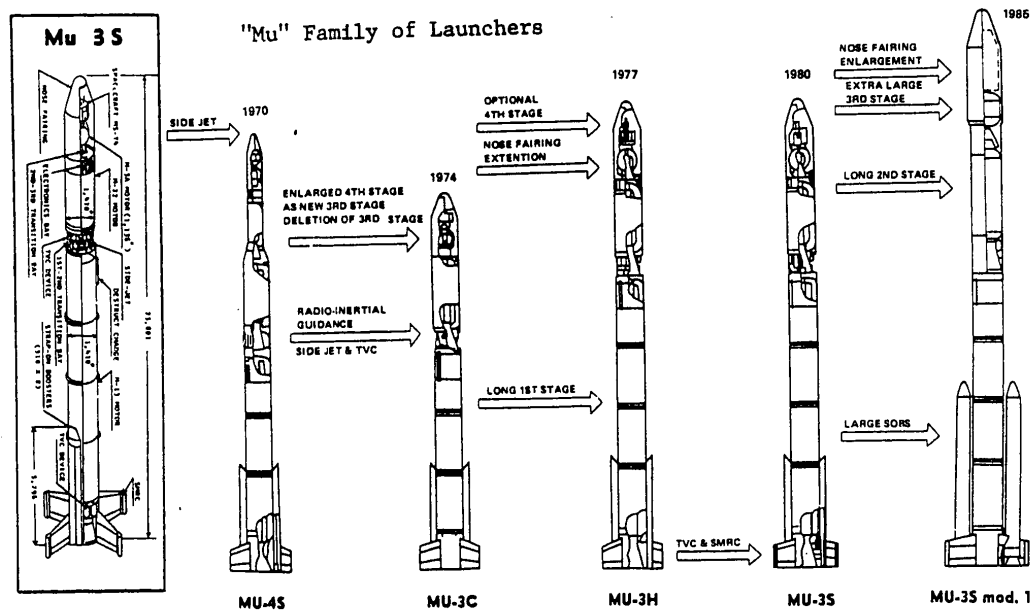
A new launching pad will be built at Kagoshima for launching the "Mu3U" rockets.

The first "Mu3U" rocket launching is planned for the beginning of 1985 in order to send the small "MS-T5" technological satellite, also known as "Tansei 5" (135 kg) into solar orbit.

Two other firings in addition are planned for 1985 and 1986 to place the satellite "PLANET A" and "ASTRO-C" into orbit.

"Mu" Rocket With Cryogenic Stage

The ISAS has next planned to develop a further improved version which may be the final version of the "Mu" family of launchers. This new launcher, the "Mu3S-Kai-2," about which few details are yet known, at present figures in the plans of the ISAS for launching satellites starting in 1986. It should have a second stage fueled with liquid hydrogen and liquid oxygen, like the future NASDA launcher, "H1." But it will not be a matter of the same cryogenic propulsor as that of the "H1" launcher in whose development, by the way, the ISAS is also associated with the NASDA. The second stage motor of the "Mu3S-Kai-2" rocket was shown to us by the ISAS, in particular, with a reduced scale model. It involves a motor with 7.1 t of thrust (instead of the 10 t for that of the "H1") of highly original design, tests of which are at present under way.



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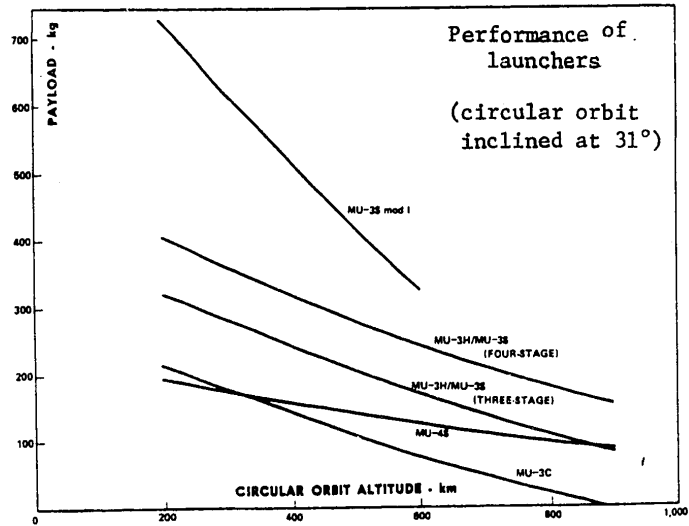
Characteristics and Performance of New "Mu" Launchers

Launcher	Mu3S	Mu3U
Entry into service	1980	1985
Overall height	23.8 m	28.2 m
Average diameter	1.41 m	1.41 m
Weight at take-off	49.5 t	61 t
Total thrust	223 t	175 t
Payload (+)	300 kg	680 kg
Boosters	8	2
Weight of fuel	8 x 0.34 t	2 x 4 t
Total weight	8 x 0.51 t	2 x 5 t
Specific impulse	219 s	236 s
Burn time	5.5 s	31 s
Thrust	8 x 133 kilo- newtons	2 x 298 kilo- newtons
Diameter	0.31 m	0.74 m
First stage	M13	M13
Weight of fuel	27.1 t	27.1 t
Total weight	34.6 t	34.6 t
Specific impulse	236 s	236 s
Burn time	56 s	56 s
Thrust	1,120 kilonewtons	1,120 kilonewtons
Diameter	1.41 m	1.41 m
Second stage	M22	--
Weight of fuel	7.2 t	9.85 t
Total weight	11.1 t	11.9 t
Specific impulse	277 s	280 s
Burn time	55 s	52 s
Thrust	357 kilonewtons	519 kilonewtons
Diameter	1.41 m	1.41 m
Third stage	M3A	--
Weight of fuel	1.1 t	3.3 t
Total weight	1.4 t	3.7 t
Specific impulse	284 s	292 s
Burn time	45 s	82 s
Thrust	66.8 kilo- newtons	118 kilonewtons
Diameter	1.14 m	1.40 m
Nose		
Diameter	1.41 m	1.65 m

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SCIENCE AND TECHNOLOGY

UNIVERSITY OF TOKYO LAUNCHED SATELLITE TO WATCH SOLAR FLARES

Tokyo JAPAN TIMES in English 22 Feb 81 p 2

[Text] UCHINOURA, Kagoshima Pref. (Kyodo)—The University of Tokyo's Institute of Space and Aeronautical Science succeeded Saturday in launching a satellite to observe solar activities.

The M-3S three-stage rocket carrying the Astro-A satellite blasted off from the institute's station here at 9:30 a.m.

Eight minutes after the blast-off, the satellite was placed in orbit. Its apogee (the farthest point from the Earth) is 695 km and perigee (the nearest point from the Earth) 568 km.

While circling the Earth in a nearly circular orbit in one hour and 37 minutes, the Astro-A satellite will catch and analyze

X-rays and gamma rays from solar flares or explosions on the surface of the sun.

Solar flares release various rays such as X-rays, gamma rays, ultraviolet rays and light.

Because the Earth's atmosphere prevents most of the X-rays and gamma rays from reaching the Earth, so far very little study of the rays has been conducted.

Scientists are looking forward to Astro-A contributions to determining the locations and mechanism of solar flares, now that the SSM satellite launched by the U.S. in February 1980 to observe solar flares is out of order.

The University of Tokyo's space scientists nicknamed their satellite Hi no Tori (Fire Bird) after its successful launching.

The study of solar flares is expected to contribute to the study of what happens on the surfaces of stars. It will also enable prediction on interference in radio communications from solar activities.

The Astro-A is Japan's 22nd satellite and 7th scientific satellite. It is shaped like an octagonal prism with a height of 85 cm and sides 92.8 cm long. Weighing 190 kg, it is the heaviest satellite launched so far by the University of Tokyo.

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SCIENCE AND TECHNOLOGY

GEOLOGICAL SURVEY SATELLITE TO BE LAUNCHED IN 1986

Tokyo MAINICHI DAILY NEWS in English 22 Feb 81 p 5

[Text]

The Ministry of International Trade and Industry is planning to launch a geological survey satellite around 1986 which will be used for prospecting for mineral reserves.

As part of the program, a new office will be founded some time in April that will analyze information to be gathered by the satellite.

Ministry sources said that the information to be collected will be shared with other nations. Also, they said, joint exploration with developing nations would be possible.

MITI believes this will strengthen technical cooperation for development of energy resources with developing countries.

The projected satellite will be launched into an orbit some 560 kilometers from the earth, and will take photos using microwave and infrared sensors.

The government has already set aside in its budget proposal for fiscal 1982 some 1 billion yen

for the purpose of developing photo analytical technology.

The new office, tentatively called Natural Resources Analysis Center, will be joined in by such industrial organizations as: Japan Mining Industry Association; Petroleum Producers' Association; and Japan Coal Association.

The satellite will be launched in 1986 and will orbit the globe, taking photos of the entire earth over a period of two years, MITI officials explained.

So far, the U.S. has been using a satellite, LANDSAT, for prospecting for natural resources, but the satellite cannot penetrate dense clouds. For this reason, there has been little information available from LANDSAT on such areas as Southeast Asia due to heavy rainfall most of the year.

MITI officials said that their satellite will overcome such shortcomings of LANDSAT.

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SCIENCE AND TECHNOLOGY

DRIVE TO EXPAND NUCLEAR ENERGY CAPABILITY

Independently Developed Nuclear Technology

Tokyo NIHON KEIZAI SHIMBUN in Japanese 5 Jan 81 p 10

[Text] It has been 25 years since Japan established administrative organizations such as the Japan Atomic Energy Commission and the Atomic Energy Bureau to develop nuclear energy. Since then, Japan has been promoting the construction of nuclear power plants through the acquisition of reactors from abroad, while making an effort to establish its own reactor technology. Now, at last, this research effort is about to bear fruit in practical applications.

Among nuclear reactors used for electric power generation, U.S. light water reactors are currently the most popular ones in the world. With the worldwide expansion in nuclear power generation, however, it is feared that continued reliance on light water reactors will result in a shortage of uranium resources around 1995. For this reason, the development of new types of reactors that can effectively utilize nuclear fuels such as uranium and plutonium is being pursued throughout the world.

In Japan, efforts have been made to develop a fast breeder reactor and an advanced thermal converter reactor. Because it creates more plutonium than the fuel it actually consumes, the fast breeder reactor is called the "dream reactor", and is expected to become the mainstream of future nuclear power generation. The fast breeder reactor has been developed by the Power Reactor and Nuclear Fuel Development Corporation. The first-stage experimental reactor (Joyo) is already operating smoothly at the Oarai Engineering Center in Ibaragi Prefecture, and data needed for the design and construction of the next reactor (Monju, electric output - 280 MW) is being collected. It reached criticality in April, 1977, attaining the phase 1 target of 50 MW thermal output, and has been operating since February of last year at the phase 2 target of 75 MW.

Plans for the next prototype reactor have been greatly delayed by prolonged negotiations with Fukui Prefecture, the proposed construction site. But, the approval by Fukui Prefecture for starting the first safety review was finally obtained in December of last year, and the Science and Technology Agency conducted the study. Preparations for construction will begin in fiscal 1980, the actual construction will begin by the end of this year at the earliest. A total construction cost of about ¥400 billion has been projected, with a budget of about 15.4 billion yen earmarked for fiscal 1980. Criticality is expected in December, 1987.

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It appears that the fast breeder reactor will come into practical use in the distant future, and for this reason the Power Reactor and Nuclear Fuel Development Corporation is also working on the development of advanced thermal conversion reactors (ATR) as an interim reactor. A special feature of this type of reactor is that, because it uses a low neutron absorber as the moderator (heavy water), the use-effectiveness of the nuclear fuel is high, and it can also burn plutonium obtained from the reprocessing of spent fuel from light water reactors. A prototype of this reactor (Fugen, electric output - 165 MW) first came on line in March, 1979 (it is currently shut down due to the discovery of cracks in pipes). The next step is to proceed to the development of a proof reactor (electric output - 600 MW). The Japan Atomic Energy Commission is currently conducting a technical and economic study on this by its Special Committee for Evaluation of ATR Proof Reactors, and is expected to give the "green light" to the project in March. The managing entity which will construct the reactor will be chosen among several power companies, including the Electric Power Development Co., Ltd., when the estimate for the fiscal 1982 budget is requested. The government will probably give financial assistance to the managing company.

The domestic production of enriched uranium will soon become a reality. A uranium enrichment pilot plant which uses centrifuges developed by Japanese technology will be completed this fall. The centrifuge method is a technology which the Power Reactor and Nuclear Fuel Development Corporation has been developing. Construction of centrifuges has been underway since 1977 at Ningyo-toge in Okayama Prefecture, and seven thousand centrifuges will soon be completed. The pilot plant enables the annual production of 50 tons SWU (separative work units), which corresponds to a one year supply of fuel for a 600-MW nuclear power plant. Total construction costs for the pilot plant will be ¥58 billion.

The operation of this pilot plant will provide the basis for building a prototype plant. Thus, the Atomic Energy Commission established the Special Committee on the Domestic Production of Enriched Uranium in December of last year, and began to form a plan for building a commercial plant. Setting its target at 30 percent of domestic production of all enriched uranium used in Japan, the electric power industry has spelled out a plan to build a commercial plant by 1990 with annual production capacity of 3,000 tons SWU. It has decided to set up by March the "Uranium Enrichment Preparation Division" within the Federation of Electric Power Companies. The plan for the prototype plant (annual production - 250 tons SWU) must be finalized this year following the pilot plant. On the basis of the conclusions of the special committee, construction costs for the prototype plant will be requested within the framework of the fiscal 1982 budget. Thus, it seems that the domestic production of enriched uranium is to be speeded up.

Japan will make great progress this year in the establishment of Japanese developed nuclear fuel cycle technology. This technology will be the key to the nation's nuclear power development. However, there are difficulties in promoting nuclear power plant sites, and in disposal of low-level radioactive wastes in the ocean, with the anti-nuclear movement as intransigent as ever. Efforts to facilitate nuclear power development have greatly expanded recently both at home and abroad. Viewing this situation, the current Long-Term Nuclear Power Development Utilization Plan (established in September, 1978) must be re-examined this year. These plans have been revised every five years, but they may have to be re-examined annually from now on.

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Safety Measures

Tokyo NIHON KEIZAI SHIMBUN in Japanese 12 Jan 81 p 15

[Text] In order to make full use of the lessons learned from the accident at Three Mile Island, which sounded an alarm on the problem on nuclear power plant safety, interest in nuclear plant operation systems has grown. Because the results of analysis showed that the nuclear accident at Three Mile Island was caused by human error, this triggered an effort to reexamine the man-machine interface. Humans err constantly. Thus, an idea is conceived that man should build "machine-machine" systems and turn over the operation of nuclear power plants to computers, leaving humans with only the responsibility for monitoring the system. But, making a computer understand and run the intricate mechanisms of nuclear power plants is totally out of the question. The consensus of opinion among the experts is that, at the moment, the establishment of "man-machine systems" which aim at raising the quality of human operators and of nuclear plants is the shortest road towards assuring safety.

The Lesson of Three Mile Island

During the accident at Three Mile Island, approximately three hundred signal lights in the central control room blinked on and off simultaneously. Moreover, the measurement apparatus monitoring conditions in the reactor and the operator keys were widely separated from each other, and this is said to have added to the confusion. With this as a lesson, many countries have been undertaking the development of automated operating systems through the incorporation of computers and of central control and monitoring systems which are easy to operate.

Japanese power companies and nuclear energy instrument manufacturers have also been developing new systems, which are expected to be in operation five years from now, in about 1985. For example, Hitachi, Ltd. has developed a new central control and monitoring system, in which the length of the operator's console is shortened to 7 meters, about one-third the previous length. Also, through the introduction of color image display units, the area that an operator must monitor is cut to one-eighth.

The functions of the operator are three-fold: monitoring the central control panels, judging the situation, and maintaining safe operation. In the Hitachi's systems, substantial improvements in these three functions have been achieved through analyses of operator movements filmed on video tape and through questionnaire surveys.

First, with regard to monitoring, an operator can receive through color image display units all the information which was previously dispersed throughout the central control room. The display units can monitor as many as 140 different points, that show the operating condition of the reactor clearly. A diagram of the nuclear reactor displays its operating condition in color, and draws operator's attention to abnormal spots with flashing red lights.

As for the function of judgement, improvements were made to facilitate the recognition of small irregularities that foreshadow large accidents. Previously, the

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operator would discover slight irregular oscillations on the control panel measurement apparatus, and repair the points that might become the cause of an accident. But, as the safety devices and measurement apparatus increase in number in order to improve safety, it becomes more difficult to catch irregular meter oscillations. Thus, the Hitachi system makes full use of sensors and computers in order to immediately draw operators attention to the slightest abnormalities.

Substantial Reduction in Number of Operations

With regard to operations as well, full use of the computer enabled the number of operations to be reduced to one-third. As a result, the approximately 2,000 operations that were previously necessary for the start-up of a nuclear power plant have been reduced to about 700 steps, and a 3-man work load has been reduced to one.

When starting up a reactor with this system, first, an arrangement plan of the control rods within the reactor appears on the display unit screen. Then the control rod withdrawal procedure for bringing the reactor to criticality is projected sequentially onto the screen. The control rods being withdrawn are indicated by flinking lights on the screen, and a voice announces: "control rods being withdrawn". Thus, the operator learns both visually and aurally of the present operating situation and the upcoming sequence of steps.

The Tokyo Electric Power Co., Inc. will use this new system in three reactors projected for startup in 5 years: Kashiwazaki-Kariha, No. 1; and No. 3 and No. 4 at the Fukushima Second Nuclear Power Plant. All are boiling water reactors with total estimated electric outputs of 1,100 MW. They will however avoid excess automation. Ryo Ikegame, manager of the Atomic Power Construction Division, The Tokyo Electric Power Co., Ltd., said, "vital operations will be carried out under the responsibility of the operators".

A computer can handle routine operations, but the problems that actually arise on location are complex, and require human judgement. MITI is of the opinion that totally computer-automated systems will not be used for some time, because "nuclear power plants are just too complex to be automated, although hydroelectric plants and electric power substations are being computer-operated."

Thus, the decisive factor in preventing accidents is the improvement in the quality of the operators. MITI has decided to start, as of 1981, an operator qualification examination system in an effort to raise the competence level of operators. The subject of the examination system will be the shift manager, who supervises the operators working in the central control room. On successful completion of tests of actual skills, interviews, and all the training courses, a certificate will be issued by the Thermal Nuclear Power Generation Engineering Society, Inc., the non-government certifying organ.

The U.S., Canada, and West Germany have operator qualification systems. Great Britain and France, in which the electric power companies are under government management, have no particular qualification system.

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In Japan, the power companies carry out their own education programs at training centers, and MITI considers that the operator's competence levels are quite high in Japan. For this reason, MITI regards that basically the qualification system is unnecessary for operators. MITI has decided, however, to introduce a qualification system for shift managers who are the individuals responsible for actual operations.

The Important Ability for Situational Judgments

MITI considers that the essential qualities of a shift manager is the command ability and ability to make situational judgments at the time of an accident. Thus, the competence of the shift manager is examined in a test situation in which the manager supervises 3 operators in a central control room mockup. In these tests, the shift manager first directs the operators and starts normal operation. After a while, a hypothetical accident arises, and the shift manager is evaluated on how he judges the situation and how he directs the operators.

On the basis of an announcement issued by MITI last December, shift managers must have a qualification certificate as of June, 1982. This test of actual skills is quite difficult, but there is an interim measure that would enable shift managers with experience to obtain the qualification certificates by taking the training courses. It is reported that this qualification examination system will immediately apply to about 70 shift managers and about 130 assistant shift managers, or a total of about 200 people.

The method of reactor operation seems to be slightly different from country to country. It is said that the Japanese have a stronger tendency to prefer decisions made by humans rather than machines unlike West Europeans such as the French. The attentiveness to detail of the Japanese is brought into play even in the measures taken following the outbreak of an accident, and every effort is made to prevent reactor shut-down. Once this type of thinking is properly linked with the new central control and monitoring systems, then, for the first time, a Japanese man-machine system high in safety will certainly be realized.

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MITI Pessimistic on Power Capability

Tokyo NIHON KEIZAI SHIMBUN in Japanese 16 Jan 81 p 3

[Text] It has been disclosed that MITI is drawing up a pessimistic forecast which holds that in 1990, the number of nuclear power plants on-line will at most be slightly over 50 units with a total electric output of 45,000 MW. This is three times the current capacity, but falls at least 6,000 MW short of the 1990 nuclear energy supply target (decided upon by the Cabinet last December), and thus indicates that MITI has acknowledged the fact that nuclear power plant siting difficulties shall persist in the future as well. MITI therefore intends to speed up the construction of nuclear power plants by establishing the Nuclear Power Plant Siting Cooperation Subsidies System and by improving the efficiency of nuclear power plant licensing procedures, but concedes that if the prospect of reaching the target is not promising, it will re-examine the overall energy policy, including that of nuclear power.

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Japan has 21 nuclear power plants in operation producing 14,950 MW, and is second to the U.S. in nuclear capacity. The U.S. has 71 plants generating 54,270 MW. There are 14 new plants under construction or in the construction-preparation stage, which are to produce a total of 12,390 MW. If all goes well, when these are completed by the end of 1985, the nuclear power capacity will reach 35 plants generating just short of 27,900 MW.

The information that has just disclosed is confidential data compiled by MITI in order to gauge the long-term construction prospects. According to this, besides these 35 plants, only 15-17 plants, which are to generate 17,000-17,500 MW are projected for completion by 1990, bringing the total 1990 capacity to, at most, 45,000 MW.

Among these 15-17 plants, first of all, the power companies are expected to submit plans to the Power Development Council in fiscal 1980 for 7 plants, with a total capacity of 6,744 MW. These seven are: Hokkaido Electric Power Co., Kyowa-Tomari: No. 1 (electric output, 579 MW); Tohoku Electric Power Co., Maki (Niigata Prefecture; 825 MW); Tokyo Electric Power Co., Kashiwazaki-Kariha; Nos. 2 and 5 (Niigata Prefecture; 1,100 MW each); Chugoku Electric Power Co., Shimane: No. 2 (Shimane Prefecture; 800 MW), etc. In addition, there are plans for the installations of 12 plants generating 12,315 MW. These plans are expected to be submitted to the Power Development Council in 1981 by seven power companies such as Tohoku Electric Power Co., Shimokita (Aomori Prefecture; 1,100 MW) and Shikoku Electric Power Co., Ikata: No. 3 (Ehime Prefecture, 890 MW). Eight to ten of these twelve are considered to be completed by 1990. But the construction of the remaining 2-4 plants, are expected to be delayed, and it is regarded as doubtful that they can be operable even after 10 years.

According to the government's alternative energy supply target, the 1990 nuclear capacity is set at 51,000-53,000 MW, 11 percent of the primary energy supply (the current figure is 4 percent). According to the MITI forecast, 6,000-8,000 MW-worth of power sources projected for completion by 1990 may not be achieved, and this may require a further restrained energy policy.

In order to avoid such a situation, MITI intends to establish, as of fiscal 1981, nuclear plant siting cooperation subsidies (monthly sums of ¥300-900 per household to residents in nuclear plant site areas; a maximum of 50 percent over this sum for residents in new plant sites), hoping thereby to accelerate negotiations on nuclear plant sitings with the local residents. MITI also plans to shorten the time period from the drawing up of a plan for submission to the Power Development Council (now 3-5 years). It also wants to shorten in half the period from submission of a plan to the Council to the start of construction (now about 4 years) by simplifying the procedure for construction permit approval.

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LDP to Promote Site Procurement

Tokyo NIHON KEIZAI SHIMBUN in Japanese 18 Jan 81 p 1

[Text] The Liberal-Democratic Party (LDP) announced their 1981 platform policy draft on the 17th. This will be formally decided at the regular meeting on the 23rd. In this policy draft, the Party noted the following 5 items as national issues: 1) the surmounting of energy restrictions; 2) promoting the establishment of a technological state; 3) preparation of a comprehensive security system; 4) rebuilding of the economy and promoting administrative reforms; 5) the stabilization of prices. In regards to the energy problem in particular, the draft proposes the establishment of the Power Source Siting Promotion Headquarters (tentative title), which controls all the related organs within the party, and spells out a posture under which the party will go all-out to help speed up the construction of nuclear power plants. The Party has also addressed the constitutional question, which it had not touched upon in its platform policies over the last several years, and maintains that it will work to fan public opinion, all of which exemplifies its new overall posture of strength gained from its overwhelming victory in last year's double victory in both houses of the Diet.

The proposed platform sets forth, as the fundamental ideology, the following statement: "let us concentrate our collective forces on national problems that face us in this new age and aim to construct a foundation towards the future...". This is a signal that, although the confusion that arose because of the two oil crises has finally left behind, the party is now prepared to work squarely and constructively with the stable power base gained in both houses of the Diet, towards the necessary solutions for many difficulties still remaining.

The proposed policy first cited in regards to these problems is the 'surmounting of energy restrictions'. In particular, they have expressed a sense of crisis, saying, "no progress is being made in the siting of sources of nuclear power, which is the most effective alternative to petroleum-based energy", and have stressed that the government, industry, and the local residents must unite and begin a movement for power source siting promotion. Thus, the Party has decided to consolidate the scattered efforts that have been carried out by various Party organs, such as the policy affairs research council, both the organizing and publicity committees, and the National Movement Headquarters, etc., and to establish the Power Source Siting Promotion Headquarters.

As for the comprehensive security system, while at the same time noting the "soundness of the self-defense capability and adequate preparedness", the Party advocates "international contributions as a major economic power", emphasizing the role and obligations of Japan as one of the Western nations. With regard to its stated policy of rebuilding the economy and instituting administrative reforms, it indicates that it has reflected on the fact that although they agreed on generalities, the leading and opposition parties always disagreed on particulars", and maintains that the time has come to, "having obtained a safe minority, eliminate all resistance".

With regard to the establishment of an independently formulated constitution, this incorporates their intention of "working to stir up public opinion". They express also the idea of sweeping away the social problem of violence at school and in the home, and, as one facet of this drive, of reviving an "all-out confrontation with

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the Japan Teacher's Union". On the matter of diplomacy, the party line is of a "diplomacy of action", and it has asserted that it will "aggressively advocate Japan's standpoint".

As for Party activity, armed with the self-assessment that the support base has expanded "with the introduction of a system of public elections for the party president", the Party has called for the development of a movement to recruit 4 million party members.

Aside from these concrete measures, comments such as, "the period during which the government catered to the exorbitant demands of the people is over", and, "we will put an end to unwarranted dependence and inertia" everywhere in platform policy proposals. Publicity Committee Chairman Ito, who drafted the policy proposals, explains, "this was the first step after bringing the era of weak majority power to a close; we have challenged the taboos". It may be said that the posture of the LDP, which has taken the "offensive," is reflected quite vividly in this year's platform policy proposals.

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SCIENCE AND TECHNOLOGY

RIVALRY AMONG NUCLEAR REACTOR MANUFACTURERS OBSERVED

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 22, 23, 24 Jan 81

[22 Jan 81 p 5]

[Text] The storm blowing in the nuclear reactor business, where once one unit costs 300 billion yen, has changed direction. Since the nuclear power plant accident at Three Mile Island in the United States, procurement of sites for nuclear power plants went into a state of hibernation. Now it is going ahead as if to make up for the lost time, and an important turning point has been reached which will greatly affect the coming strategy for developing new reactors such as the fast breeder reactor (FBR). Together with this, the competition among nuclear power plant manufacturers is entering a new phase. We made a close examination of the nuclear reactor business, now making a new start under the impetus of the conservative and stable government. (Reporter Nishioka)

America Also Looking to New Government

The new Reagan administration got its start at the festive inauguration in Washington on 20 January. The American business community welcomed the inauguration of President Reagan, who advocates a strong America and a free economy. The American nuclear industry is also looking expectantly to the new administration. The industry underwent a time of trials under former President Carter, such as having construction of the fast breeder reactor, the most promising of future reactors, suspended. So the industry has high hopes for the Reagan administration, which favors nuclear power development, to begin promoting plants again. Between 1975 and 1980 there were only five or six business transactions involving nuclear power plants, and since the Three Mile Island incident 2 years ago there have not been any. On the contrary, there were almost 50 cancelled orders, a miserable situation. It is understandable that the American nuclear industry "welcomed the new administration with joy" (NEWSWEEK report).

The change in the atmosphere of the nuclear reactor business was not limited to the United States alone. In Japan as well, the business environment has changed greatly since the end of last year. Just as in the United States, the construction of nuclear power plants was in a frozen state after Three Mile Island. The thaw started 2 years later as construction began on the No 3 and No 4 reactors in Kansai Electric's Takahama Nuclear Power Plant, the No 3 and No 4 reactors of Tokyo Electric's No 2 Fukushima Nuclear Power Plant, a total of four reactors. At the end of the year, the "First Public Hearing," which will be the basis for future site procurement, was held for the No 2 and No 5 reactors for Tokyo Electric's Hakozaiki-Kariwa Nuclear Power Plants.

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To Be Determined by the Hearing

One reason for this development is the unexpected landslide of the LDP in last year's combined election for the Upper and Lower Houses in the Diet. This made it much easier for MITI and the electric power companies to promote development plans for nuclear power. Also, based on the awareness that we must not delay at all the development of alternative energy sources, the LDP took a strong posture of "resolutely breaking down the anti-nuclear movement" as part of this year's proposals for action to overcome energy restrictions. This strong resolve by the government provides a strong impetus to the industry.

In any case, the appearance of a public hearing system has great significance for the nuclear power plant manufacturers. Hearings are to be held at two stages in the new procedures for nuclear power plant site procurement in order to gain public acceptance and guarantee safety: before the application goes to the Electric Power Plant Development Coordination Council and during the safety inspection by the Council. These hearings will be conducted by MITI and the Nuclear Safety Committee respectively. Nuclear Power Plant manufacturers will cooperate with the power company in providing data and reference material. However, orders will be informally confirmed only after the first hearing is completed and the matter goes before the Electric Power Plant Development Coordination Council. In reality there is a growing tendency to prepare plans well in advance of construction in order to reduce the construction time for nuclear power plants. There is a great deal of actual negotiating done behind the scenes some time prior to legal procedures, such as the decision of the Development Coordination Council and granting of construction approval. In other words, the manufacturer who will receive the order is more or less decided on when the public hearing and council meeting take place, but the manufacturer is not sure of getting the order until he gets over the hurdle of the hearing.

Some people even felt that holding a public hearing would be enough to "kill" nuclear power plant manufacturers. Attention was focused on the No 2 reactor of the Hakozaki-Kariwa plant. Toshiba Corporation has been constructing the No 1 reactor which is next to the site for the No 2 reactor, and the company representative on the site was sent to the hearing to make reports to the head office on events as they unfolded. All the manufacturers nervously awaited the results. When the hearing ended according to plan, everyone was greatly relieved. "We have entered a new era of nuclear power business negotiations," said Sei Urata, managing director and general manager of the Power Generation and Transmission Group at Hitachi Ltd.

Just Before Prices Are Raised

As if to endorse this, the public hearing for the No 2 reactor of Chugoku Electric's Shimane Plant is to begin on the 28th of this month, on the heels of of the Hakozaki-Kariwa "success." The Tohoku Electric Maki Plant and the No 3 and No 4 reactors of Kyushu Power's Genkai Plant are waiting their turn. The leaders of the heavy electrical industry are beginning to feel this way: "We knew there were fish out there. Now they are finally coming into the net."

Japanese nuclear power plant manufacturers have had no new orders for 2 full years. They were spared the trial of cancelled orders undergone by their American counterparts, but the situation was still difficult. "The Toshiba, Hitachi, and Mitsubishi Groups have an annual production capacity of 6 million kilowatts. A demand for at

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least six units a year is necessary to keep their bellies full," according to Yoichi Aoi, director and general manager of the Nuclear Power Group at Toshiba Corporation. They have survived on the projects obtained in 1978 when nuclear power plant site procurement was going well, but they do not have the escape route of exports, and long-term continuation of this situation would hurt. Just as the manufacturers were about to raise prices, the wheels have started turning in nuclear business negotiations. With the return to conservatism, which almost smacks of collusion between the United States and Japan, this year will see increased activity for the nuclear reactor business.

[23 Jan 81 p 5]

[Text] It was just a while back that a trailer truck carrying a nuclear reactor passed right in front of the plant which produces nuclear power plants for Hitachi's main plant, the Hitachi Works, in Ibaraki Prefecture, as if to say, "Look at this!" Its destination was the Fukushima No 1 Nuclear Power Plant of Tokyo Electric in Fukushima Prefecture bordering on Ibaraki. The Toshiba Corporation brand name could be clearly seen. Hitachi's nuclear power plant staff could only stamp their feet in frustration. Tokyo Electric brought the first boiling water reactor (BWR) to Japan from General Electric (GE) of the United States. The second unit was ordered from Toshiba and GE and now the third order had gone to Toshiba. Hitachi, like Toshiba, depended on GE technology but could not break through the Toshiba wall.

A Trillion Yen's Worth of Transactions

The nuclear power plant organization at Hitachi had its pride hurt, but succeeded subsequently with the Shimane Power Plant of Chugoku Electric. It was 2 years behind Toshiba. With this behind them, Hitachi was finally able to get an order from Tokyo Electric for the No 4 plant in Fukushima. But when it came to large capacity, advanced reactors, it had to give way to GE and Toshiba.

Toshiba drove the first wedge into the second largest user of BWR's, Chubu Electric, and pretty much captured the Hamaoka Power Plant. In this period of shake-up in the nuclear power plant business, Toshiba's "older brother," Hitachi, has been relegated to the position of a younger brother and is still following behind. At present, of the BWR's approved by the Electric Power Plant Development Coordination Council, Toshiba is the main contractor for 11 units (including joint contracts) and Hitachi for 6 (also, including joint contracts), about half.

However, at this point, Hitachi's nuclear power division has gotten aggressive. Even its rival admits it. "Lately, when I meet the officers of electric power companies, I have been prodded by statements like 'Hitachi is different lately'," says Ichiro Watarisugi, managing director at Toshiba.

The secret is that from now on throughout the year Hitachi will be unofficially concluding order agreements one after the other. The first will be either the No 2 or No 5 reactor for Tokyo Electric's Hakozaiki-Kariwa Plant, and it also has in its sights the Tohoku Electric Shimane No 2 Plant, and the Hokuriku Electric Noto Plant. What about Toshiba? They will certainly get in on the Hakozaiki-Kariwa Plant, but other projects are up in the air right now. If Hitachi is able to conclude these agreements it will have transactions worth about a trillion yen in its hands. The number of orders will be close compared to Toshiba, but Hitachi will move ahead of Toshiba in the volume of jobs in hand.

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Steady Building of Fighting Strength

"Toshiba drew the first lucky numbers. If we alternate in getting orders from now on, we cannot avoid coming in behind if the total number of orders is an odd number. However, our technology is highly regarded and the difference between us will not be as great from now on as it has been up till now." (Sei Urata, Hitachi managing director) It is as if he were saying "We've got Toshiba now!" There may have been a polite practice of regarding Toshiba as superior among previous nuclear power executives such as Vice-President Tsutomu Memmori, who was transferred to a new post, director of the New Energy Development Organization. However, the present leaders have plenty of desire to take over the lead from Toshiba. They are laying the groundwork with Chugoku Electric, Hokuriku Electric, Tohoku Electric, and the two large central power companies, Tokyo and Chubu Electric, and are set for a decisive battle.

In preparation, the Nuclear Power Department in the Electric Power Generation and Transmission Group was elevated to the status of Nuclear Power Division to build up strength for the conflict. At the same time, Hitachi is collaborating with Bechtel of the United States, the world's largest engineering firm, and is arranging to make free use of Bechtel's experts, who are known for determining the standards of technology for nuclear power generation engineering. Also, it is making substantial investments in plant and equipment for hardware production such as a new plant for stainless steel pipe.

Toshiba Emphasizing Profitability

Toshiba is being pressed. "As the domestic market grows, we cannot maintain an overwhelming lead forever. Since this product is tremendously costly at around 100 billion yen per unit, there are aspects of negotiations which are not determined by the quality of technology and sales effort alone." (Yokichi Yoshida, Toshiba executive director) Toshiba appears to be taking a relaxed posture. "The Tohoku Electric Onnagawa No 2 and the Namie-Kodaka plants are coming up next year, and there is still a big difference in our sales performance," says Mr Yoshida, showing confidence. There is no use worrying about the ups and downs for a single year. In the nuclear reactor business many orders have entailed losses in the past, so Toshiba thinks the important point is whether it can be made into paying business or not.

Naturally, however, Toshiba cannot be calm on the inside with Hitachi's footsteps sounding close behind. Toshiba is watching carefully for another change to open up their lead.

The stage as been set for conflict between the two companies. It will be over the Aomori Prefecture Shimokita Nuclear Power Plant to be jointly developed by Tokyo Electric and Tohoku Electric. It is a huge project with a planned ultimate output of 20 million kilowatts. The first unit is expected to come up for review by the Electric Power Plant Development Coordination Council in fiscal 1981, and intense negotiations are expected to start during this year period. Toshiba would like to secure the order for the first reactor, just as it did with the Fukushima and Hakozaiki-Kariwa plants, and maintain its lead in the 1980's. For Hitachi this is a great chance to turn around the "order" of the nuclear reactor business. These business negotiations are also drawing attention for another reason. This is the fact that in the coming negotiations the companies will not be in a "chronic hungry ghost state". The manufacturers will have a track record of orders in hand and will not be in the weak position of the past. For this reason, the manufacturers will be able to drive a harder bargain.

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Will this transaction, described by an electric company official as "even at the start," fall to Toshiba or Hitachi? It is a turning point that will determine the future pattern of the BWR business. (Reporter: Nishioka)

[24 Jan 81 p 5]

[Text] Prospects With "Monju"

"The gas reactor which we built 15 years ago unfortunately did not become the main type of power plant reactor. To make a comeback with the light water reactor now is impossible. However, the fast breeder reactor (FBR) is a different case. Construction of the 'Monju' is about to begin, and when we imagine the condition of our energy department in 10 or 20 years we cannot give up no matter what." (Fukushige Shishido, president of Fuji Electric Manufacturing Company) In company strength, Fuji Electric cannot help taking a back seat to Hitachi Ltd., Toshiba Corporation, and Mitsubishi Heavy Industries. Therefore, it has steadfastly endured the heavy pressure exerted by the development of advanced reactors. It found out the hard way the difference between operating as a heavy electrical equipment manufacturer with or without a nuclear department through its experience with light water reactors. But its pains may be rewarded with the construction of the FBR prototype reactor "Monju" (output of 280,000 kilowatts) which is likely to begin this year.

The FBR is the "dream reactor" that breeds a new fuel, plutonium, from spent nuclear fuel. The "Monju" will be the next major battlefield for the nuclear reactor manufacturers and will be a takeoff point leading to a practical nuclear power plant reactor.

The four electrical equipment manufacturers, including Fuji Electric, are pouring an enormous investment into research and development of FBR's. A total of 20 billion yen will be required for the "Monju" for construction alone. The technological expertise of the companies will be pooled in a joint company, "FBR Engineering," set up just to handle the design and engineering. However, the important start of construction was delayed for the uranium enrichment device in the prototype plant construction schedule. However, the prospective location Fukui Prefecture game approval on the safety inspection late last year, clearing the way to start.

Threat of Foreign Competition

The coming of the Reagan administration will also provide relief. President Reagan is promoting nuclear development as the basis of his energy strategy. Westinghouse Chairman R. Covey says, "The Clinch River FBR project suspended by former President Carter is certain to be restarted." The Americans are determined to regain the huge lead taken over by France in FBR development.

It is here that our development policy becomes a problem. The Atomic Energy Commission, The Science and Technology Agency, and the Power Reactor and Nuclear Fuel Development Corporation are advocating the strategy of forging ahead with independent technology. However, the electric companies who will be the users want quick practical application, and they have not abandoned the alternative of importing practical reactors from the advanced countries. French manufacturers have already begun a sales campaign aimed at Japanese manufacturers, electric power utilities, and the government. Westinghouse and General Electric are also expected to begin an active campaign in Japan. Already at the end of last year, Westinghouse executive including J. B. Yashinsky,

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the department manager who heads the Clinch River FBR project began exchanging technical information with, and at the same time feeling out, the Japanese side. Domestic manufactureres such as Hitachi and Toshiba are rapidly expanding the engineering and software personnel in their nuclear power departments and increasing their international competitiveness. Some feverish action is likely to be seen in response to moves by the foreign manufacturers.

Meanwhile, development is getting under way on the advanced thermal conversion reactor (ATR) which will provide a link between the light water reactor and the FBR. A specialist subcommittee of the Atomic Energy Commission is making a technical study of what to do with the certified reactor (output of 600,000 kilowatts) to follow the prototype reactor "Fugen" which has already started operating. The growing view of the people connected with the advanced reactor is that "the go-ahead will come this spring and the 1982 budget request will begin this summer." Therefore, the preparation of organization and facilities for this development has become a matter of concern for the nuclear power plant manufacturing companies. The three major companies, Hitachi, Toshiba, and Mitsubishi, have moved at the same pace, maintaining equal positions. However, Hitachi is showing strong motivation with regard to the ATR, and in fact has taken the lead in previous development. Electric power equipment manufacturer explain the difference this way. "Hitachi is trying to recover its loss to Toshiba with the BWR by making an all out effort on the ATR. The other two companies are overconfident." Mitsubishi Director Yasutaro Iida says, "We have plenty of technological strength and if there is an order we can handle it at any time." However, it is a fact that both Toshiba and Mitsubishi have set their sights on the FBR and nuclear fusion after improvement of the light water reactor. They are afraid of having a success that turns out to be useless once the FBR is developed, just as Fuji Electric was stopped after its first gas reactor.

CANDU Reactor Problem Returns

The problem of importing the CANDU (Canadian heavy water reactor) came up during the visit to Canada of Mr Tanaka, minister of international trade and industry, in January. The advanced nations' summit meeting will be held in Ottawa in July of this year, and the problem is not likely to go away for some time.

The nuclear power plant manufacturers will probably joint together for advanced reactor development so that Toshiba and Mitsubishi can secure their beachhead and Hitachi can diffuse the danger to itself. However, whether they go at it halfheartedly or all out, all the companies are being pressed to carry out an inspection of the front lines in their nuclear energy departments.

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SCIENCE AND TECHNOLOGY

ATOMIC PROCESS IN LASER PLASMA DISCUSSED

Nagoya NUCLEAR FUSION RESEARCH in Japanese Vol 43, No 1, not date given pp 19-23

[Article by Yukio Hayakawa of the Plasma Research Laboratory, Faculty of Science, Nagoya University: "The Atomic Process in High Density Plasma"]

[Text] Plasma produced for inertial nuclear fusion is high in density, and the atomic process taking place in this plasma differs in many points from the atomic process taking place in dilute plasma. Since this phenomenon takes place in a short time, a behavior which involves a different transport phenomenon takes place. This paper will discuss in a qualitative manner these various physical processes occurring in high density plasma.

1. Effect of Finite Debye Radius

The Debye radius becomes smaller than the outermost electron orbital when the density is large. By measuring the electron density N in 10^{21}cm^{-3} units and electron temperature T in 10^7 K units, the Debye radius is

$$D = 6.9 \times 10^{-7} (T_7/N_{21})^{1/2} \text{ cm.} \quad (1.1)$$

In contrast, the classical orbital radius of ion charge number $Z - 1$, principal quantum number n , and angular momentum quantum number ℓ is the following

$$a(n, \ell) = 5.3 \times 10^{-9} \cdot \frac{1}{2Z} [3n^2 - \ell(\ell + 1)]. \quad (1.2)$$

As a result, the following state

$$n > n_d = 11.4Z^{1/2} (T_7/N_{21})^{1/4} \quad (1.3)$$

is thought to be unrestricted.

The energy levels and wave functions for the Debye (Yukawa) potential need to be determined for a quantitative treatment.¹⁻³ For example, the bond energy for the $\ell = 0$ state is given in the following approximate manner.

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$$B_n = Ry \frac{z^2}{n} \left(1 - \frac{n^4 a_B^2}{z^2 D^2}\right) \exp\left(-\frac{2a_B n^2}{zD}\right) \quad (1.4)$$

Here a_B is the Bohr radius. A decrease in bond energy corresponds to an increase in orbital radius, and this provides an increase in the electrical dipole moment. It is possible to determine level structure and changes in transition probability in an approximate manner, but the general case is for the level number to become finite, ionization cross-section to increase, and rebonding rate to decrease.

2. Effects of Plasma Oscillations

The Debye potential is an average effect, and the electric field operating on the ion varies with time. The plasma vibrational number

$$\omega_p \sim 2 \times 10^{15} N_{21}^{1/2} \text{ rad/s} \quad (2.1)$$

is of the same order as the orbital electron angular vibrational number

$$\omega_n \sim 3 \times 10^{16} z^2/n^2 \text{ rad/s} \quad (2.2)$$

and one must not consider the magnitude of the large orbital of n in terms of a static electric field generated by the plasma.

When energy is distributed uniformly as the result of plasma vibration and electron movement, the breadth of the electric field corresponding to the amplitude of the plasma vibrations is the following.

$$F_p = (12 \pi NkT)^{1/2} = 2.2 \times 10^9 (N_{21}T_7)^{1/2} \text{ v/cm.} \quad (2.3)$$

This value is larger than the average value of the fluctuations in the electric field (Holtmark field) created by the various electrons and ions shown below.

$$F_H \sim 3.8 \times 10^7 N_{21}^{2/3} \text{ v/cm} \quad (2.4)$$

As a result, it may be thought that the electric field of the plasma wave mixes the level structure rather than broadens the width of the various levels through the Stark effect. In other words, the $n \gg Z$ levels actually become continuous.

The relationship $\Delta\lambda = \alpha F$ holds in some cases at levels near the ground state, and measurement of the spectral line profile should reveal the electric field of the plasma wave such that this measurement may prove to be a valuable diagnostic tool.

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3. Effect of Electron Collisions⁴

As the electron density increases, collision ionization becomes more rapid than radiation transition for any given level. The principal quantum number n_t at which the probabilities of the two processes become the same is given by Griem⁵ in the following manner.

$$n_t \approx 0.54z^{12/27} (T_7/N_{21})^{1/17} \quad (3.1)$$

Since $n_t < n\alpha$ in many cases, the effect of collisions is more important than the effect of the Debye radius. In other words, the actual situation is that the $n > n_t$ level can be handled as though it belonged to a continuous band.

The excitation rate to the $n > n_t$ level

$$C_b \approx 4.8 \times 10^{-8} z^{-2} n_t^{-2} T_7^{-1/2} \exp[-(I_z + I_t)/kT] \text{ cm}^3 \text{ s}^{-1} \quad (3.2)$$

is added on the ordinary ionization rate

$$I_t/kT \approx z^2/63T_7, \quad I_t/kT \approx 1.1z^{2/17} N_{21}^{2/7} T_7^{-8/7} \quad (3.3)$$

and cannot be disregarded when compared to the direct ionization rate of dilute plasma. On the other hand, the radiative deexcitation from the $n > n_t$ level may be thought to be a rebonding, however, the rebonding rate for this process

$$\alpha_b \approx 3.7 \times 10^{-17} z^4 n_t^{-1} T_7^{-3/2} \exp(I_t/kT) \text{ cm}^3 \text{ s}^{-1} \quad (3.4)$$

is so small that it may be disregarded. Since the $n > n_t$ level does not contribute to the z electron rebonding, the z electron rebonding rate decreases. Now, the three-body rebonding to which two free electrons contribute is important in high level plasma, and this rebonding rate increases as the result of the electron collision effects. The three-body rebonding rate when there are two separate electrons in actual free state is given in the following manner.

$$\alpha_{c2} \approx 6.1 \times 10^{-14} z^{-2} N_{21} T_7^{-2} \text{ cm}^3 \text{ s}^{-1}. \quad (3.5)$$

This rate is larger than that of (3.5)

$$\alpha_{b2} \approx 2.0 \times 10^{-13} z^{-2} n_t^{-2} N_{21} T_7^{-2} \exp(I_t/kT) \text{ cm}^3 \text{ s}^{-1} \quad (3.6)$$

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4. Radiative Process

As indicated by (3.1), there are few effective restricted levels at $n < n_t$, and radiation is discharged mainly by radiative rebonding and bremsstrahlung. The respective reaction rates for these processes are given in the following manner.

$$\alpha_o \approx 3 \times 10^{-15} z^2 T_7^{-1/2} \text{cm}^3 \text{ s}^{-1}, \quad (4.1)$$

$$R_b \approx 1 \times 10^{-15} z^2 T_7^{-1/2} \text{cm}^3 \text{ s}^{-1}. \quad (4.2)$$

As a result, the time required for radiative discharge is the following

$$t_r = \frac{1}{(\alpha_o + R_b)N} \approx 2 \times 10^{-7} T^{1/2} / N_{21} z^2 \text{ s}. \quad (4.3)$$

In this manner, the radiation time is very much longer compared to heating time, and the entropy generation due to radiation associated with initial compression is small.

Even when a weak radiation is emitted, there is need to consider transport of this radiation before it can have any effect on external items. The Thomson scattering is effective in the transport of high energy x-ray. The optical depth in plasma of thickness ℓ cm with respect to this phenomenon is the following

$$\tau_{es} = \sigma_{Th} N \ell \approx 6.0 \times 10^{-4} N_{21} \ell. \quad (4.4)$$

In this manner, there are many instances when optically thin situations are encountered at high energies, and it may be thought that radiation exits directly. When heavy elements retain the orbital electrons, the photoelectric effect takes hold. When an element of atomic number Z retains a single K electron, the photoelectric absorption cross section of x-rays with higher energy than the K absorption edge I_Z is the following

$$\sigma_k(z, hv) \approx 6.3 \times 10^{-18} z^{-2} \left(\frac{I_Z}{hv}\right)^{7/2} \left[1 + \frac{5}{6} \left(\frac{hv}{I_Z} - 1\right)\right] \text{cm}^{-2}. \quad (4.5)$$

This value is approximately the following for a neutral atom of $Z \gtrsim 6$.

$$\sigma_k(z, hv) \approx 3.6 \times 10^{-19} \left(\frac{10}{Z}\right)^{2.2} \left(\frac{I_Z}{hv}\right)^{8/3} \text{cm}^{-2}. \quad (4.6)$$

The optical depth is greatly dependent on the energy and the degree of ionization. When ionization is by way of photoionization, radiation goes deeper, and the propagation rate is dependent on the rate of generation of radiation and is of the order of $\ell/\tau t_r$.

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Should $n_t \gtrsim z$, Lyman lines and similar lines are radiated. They are resonantly scattered. The cross-section with respect to photon number of vibration number ν at resonance vibration number ν_0 and Doppler width $\nu_D = \nu_0 (kT_e/Mc^2)^{1/2}$ is

$$\sigma(\nu) = \pi \frac{e^2}{mc^2} \frac{f}{\nu_D} \exp \left[-(\nu - \nu_0)^2 / \nu_D^2 \right]. \quad (4.7)$$

The line width $10^{-4} (T_7/A)^{1/2} \nu_0$ with respect to the Lyman α is smaller than the shift in level of $8\alpha_B/ZD \gtrsim 6 \times 10^{-2} (N_{21}/T_7)^{1/2} Z^{-1}$ due to the finite Debye radius effect, and resonant scattering is with no great effect should there be a density or temperature gradient.

Free-free absorption takes hold at low energy, and the accompanying optical effect is

$$\tau_{ff} \simeq 1.3 \times 10^{-5} N_{21} \ell T_7^{-7/2} \left(\frac{kT}{hv} \right)^3 \sum_z z^2 \frac{N(z)}{N} \quad (4.8)$$

As a result, there is optical thickness with regard to visible light, and the spectrum approaches a Rayleigh-Jeans spectrum.

The above discussion can be summarized in the following manner. Plasma of $N \ell \sim 10^{21} \text{cm}^{-2}$ is optically very thin except for near the K absorption edge and the visible region. About half the radiation generated at the surface of the target solid is radiated from the surface while the remainder is absorbed into the target solid body. The latter is converted to radiation similar to black body radiation, but the black body temperature is lower than the electron temperature so that a soft x-ray or ultraviolet radiation is the result.

When low temperature black body radiation and high temperature electrons interact, Compton heating occurs. The heating rate depends on

$$y = \tau_{es} (kT/mc^2) \quad (4.9)$$

$y \ll 1$ under the present experimental conditions.

The effect of the magnetic field was disregarded in this discussion, but cyclotron [phonetic] radiation appears in the radio region of laser plasma.

Should a strong radiation be generated in the long wavelength region, it is transported outside as a light bubble. These interesting phenomena have no direct relationships with atomic processes but should not be disregarded when the entire phenomenological effects are considered.

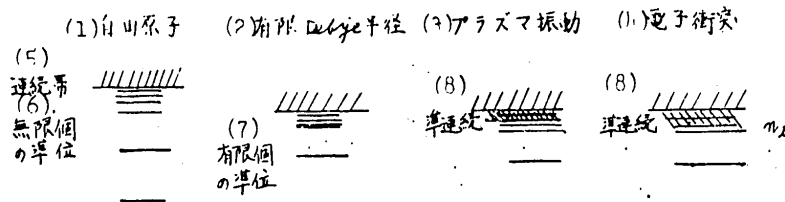
5. Summary

When plasma is created with laser, first of all, ionization occurs, and the actual situation is the formation of ions with essentially no restricted levels. Radiation is so weak at this stage that it can be disregarded. Effective restrictive levels gradually begin to appear during the period that irradiation

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ends and plasma expands while rebonding proceeds slowly. This is accompanied by generation of radiation as a result of which the plasma is continually ionizing during the course of formation after which it makes the transition back to a plasma undergoing rebonding. Radiation is observed mainly at the latter state.

As shown in modeled form below, the level structure differs from that of an individual atom. There are the shielding effect of the plasma (effective Debye radius effect), plasma vibration effect on the electric field, and the electron collision effect. These effects propose new subjects to the area of atomic physics, and there should be no shortage of research subjects for the next several years. At the same time, these effects not only are related to plasma formation, heating, cooling, and instability but are also directly tied in with diagnostic methods where plasma physics is concerned. Research on high density plasma is bringing up new subjects in the areas of atomic physics and plasma physics.



Key:

- | | |
|-------------------------|---------------------|
| (1) free atom | (5) continuous band |
| (2) finite Debye radius | (6) infinite level |
| (3) plasma vibration | (7) finite level |
| (4) electron collision | (8) quasicontinuous |

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SCIENCE AND TECHNOLOGY

GENETIC ENGINEERS TO PRODUCE VACCINE

Tokyo JAPAN TIMES in English 22 Feb 81 p 2

[Text]

The Science and Technology Agency announced Friday that it will start a three-year 1135 million project to produce vaccine against influenza and type-B hepatitis through genetic engineering.

Akira Otani, chief of the virus-rickettsia section of the Health and Welfare Ministry's National Institute of Health, will direct the fiscal 1980-82 project to be participated in by various universities and research institutes.

So far, it has been impossible to make vaccine to prevent type-B hepatitis because it is extremely difficult to cultivate the virus which causes the disease. But Otani said that genetic engineering will enable the production of the vaccine.

At present, influenza vaccine is produced by cultivating virus in fertilized hen's eggs. But the vaccine sometimes has side effects because of impurities. Genetic engineering is expected to produce genuine vaccine which will have no side effects.

The goal of the project is to produce antigenic protein which in the body will stimulate the production of an antibody with immunity against influenza or type-B hepatitis.

In the genetic engineering project, genes which trigger the production of antigenic protein will first be taken out of influenza or type-B hepatitis viruses. Then the genes will be embedded into colon bacilli with the help of special enzymes so that the protein-producing "factories" of colon bacilli will produce antigenic protein.

As a first step of the project, the Health and Welfare Ministry's National Institute of Health and Institute of Public Health will be engaged in the work of taking antigen-triggering genes out of influenza viruses. The work of taking antigen-triggering genes out of type-B hepatitis viruses will be entrusted to the Chemo and Serotherapy Research Institute in Kumamoto.

Research will also be carried out to ensure efficient production of antigenic protein by the "factories" of colon bacilli that have received antigen-triggering genes taken out of viruses.

The school of medicine at Osaka University will find ways to improve the ability of colon bacilli to read the information for antigenic protein production carried by the implanted genes.

The Education Ministry's National Institute of Genetics will find ways to keep the ribosomes or protein-producing factories of colon bacilli active.

It is expected that vaccines which use antigenic protein produced by colon bacilli manipulated by genetic engineering will have slight differences from vaccines directly produced from viruses. Therefore animal tests will be repeated to confirm the effects of vaccines made through genetic engineering.

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SCIENCE AND TECHNOLOGY

EXPERIMENT ON LINEAR MOTOR CARS PROGRESSES

Competition Between JNR, JAL

Tokyo SHUKAN SHINCHO in Japanese 1 Jan 81 p 25

[Text] The magnetic lift type linear motor car, being developed by National Railways Corporation as an innovative hypersonic train of the new post super-express train era, has at last entered into the unmanned running test stage using test cars with enough space for people. The test cars have finally started "lifted runs" at the experimental center in Mimitsu, Hyuga, Miyazaki prefecture since December 16th.

On the 16th, Car MLU 001, weighing approximately 10 tons, recorded 240km/h for 26 seconds. -----JNR maintains that the tests would be repeated some more, and, "Practicalization target date is set for the decade starting from 1985, and a speed of 500 km/h will be realized."

On the other hand, Japan Air Lines is also developing a similar linear motor type "lifted transport" (note: JAL calls it a "transport"). This one is envisioned to serve as hypersonic transport which runs at about 300 km/h between the center of a city and a suburban air port, for example, Tokyo-Narita airport and Sapporo-Chitose airport. According to the blueprint, it is designed to run a distance of 70km from Tokyo to Narita in 15 minutes and 45km from Sapporo to Chitose in 9 minutes. Up to the present time, however, an unmanned transport recorded a speed of 380km/h and 100km/h with men aboard.

As already reported in newspapers and magazines, the Ministry of Transportation has expressed "objection" to this project. This is accountable for slimmed government budget and the difficulty in setting up a separate company. "Abortion of Development" was at one time considered even among the insiders. Nonetheless, JAL continues to develop it, aiming, for the time being, to demonstrate the transport at the Science and Technology Fair to be held at Tsukuba science and academical community 5 years later.

Well, is it really necessary to have these hypersonic cars? If so, why waste money and efforts by permitting both JNR and JAL to develop bilaterally practically the same object? How about the technological and environmental problems that lay on top of those moral questions?

First of all, commenting on 500 km/h surface transportation, man's endless desire for "faster speed" should be admitted, which inevitably created super-express railways and

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endorsed the flight of jet passenger liners. Now, if the linear car is really "faster, cheaper, safer, pollution free, noise-free and useful for energy saving practice," isn't it much better than the jet planes that gobble enormous amounts of oil or the super-express trains that unabashedly emit noise and vibration?

Next, what about the technological aspect of the car? The lift type linear motor car "can make the 500 km/h mark without serious difficulties," since nothing but air resists its movement because it does not have wheels. In fact, JNR achieved the 500 km/h mark although the test run was operated using only one car without men aboard. However, many unsolved problems still remain before it can be actually used, for instance, running on curves, pressure in tunnels and cross-wind stability. To cope with these problems, they say, "We will completely remodel the present test course for a new model car (U-shaped) and conduct the tests using a train of cars and manned cars."

Yet, the road to the practicalization is still far away. When all these problems are resolved, the hardest obstacle of securing land for use is awaiting.

How about the Linear car of JAL (HSST)? This one, different from the so-called JNR's "repulsion lift type" (note: applying the principle of N to N and S to S repulsion in magnets, the body of the car is repulsed from the guideway and lifted), is called "absorption lift type." The magnets on the edges of the car body, which is curved as if to embrace the guideway from both sides, are drawn into the back side of the guideway, but the secret of this car is that the car, at this time, will not stick fast to the guideway but "be lifted in space by magnets." It will run lifted, maintaining clearance of approximately 1 cm.

The technical team of the JAL contends, "All problems are solved," and they assure that "600 km/h is also OK." "It's no big deal, we can install tracks along the highways between a city and an airport," commented the team referring to the land for use....

Anyway, it doesn't seem possible to combine these two linear motor car projects, since the purpose and the systems are different. It may even be meaningful to appropriate a budget for the development of a pollution free, energy saving transportation system sought after by competitive rivals, at least more meaningful than rescuing the nuclear ship "Mutsu" and the like....

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JNR's Plan of Operations

Tokyo NIHON KEIZAI SHIMBUN in Japanese 28 Jan 81 p 11

[Text] JNR's Council for Promotion of Lift Type Railways (Chairman, chief engineer Koji Takahashi), which has been promoting the development of "Hypersonic Railways" linear motor cars, has now compiled a performance calculation regarding construction cost, passenger demand and energy consumption on the assumption that the linear motor car track will be created between Tokyo and Osaka, the route most demanded by the passengers, sometime in the early half of the 1990's. The technological development is in progress, with problems few enough to start manned tests within this year. Now, the JNR has started to engage in research on operational methods from the standpoint of business strategy. This gives a realistic tone to the linear motor cars, which have previously been only something of a "dream."

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According to the performance calculation compiled so far by the promotion council, construction expenses for the basic part of the track, such as tunnels and bridges, will amount to the same as the super-express railways, but the total construction expenses will be about 6 billion yen/km at the current price, an approximate 20 percent increase compared to the super-express railways because the propulsion guide coils (magnets) will be installed in line formation instead of using rails even if the coil is assumed mass-producible. The cost of construction work between Tokyo and Osaka is estimated to be on the scale of approximately 3 trillion yen. However, due to the absence of rails, wheels, wiring and pantographs, the increase of the construction work expenses will be balanced out by the decrease of the operational expenses. All in all, the linear cars can be managed by expending just about as much as appropriated for the super-express railways.

Additionally, on the matter of energy consumption, the "superconductive magnets" installed in the body of the car serve as an "energy saving power" which does not require a supply of electricity in its service life once the electricity is initially charged after it is cooled close to absolute zero (minus 273°C) in a freezer and its electric resistance is reduced to zero. Nonetheless, the electricity must be constantly supplied to the coils on the ground, and the electric consumption shoots up with the acceleration of speed. With a speed two times faster than the super-express railways, the energy consumption is estimated to become about 3-fold. Also, in this case, if the linear car is operated at a conservative speed of around 300 km/h, the energy expenses will be balanced out fairly well by the reduction of the maintenance expenses.

On the other hand, if this linear car line is opened and operated at 300 km/h, the distance between Tokyo and Osaka will be only 90-100 minutes. Adding to the passengers of the super-express train "hikari," which currently amounts to little less than 35 million people a year, many of the air line passengers, over 3 million people a year, will be expected to switch over to the linear line. The promotion council predicts an annual passenger demand of about 40 million people. To cope with this passenger increase, the capacity of the linear car, they say, shall be slightly under 100 people/car and the train shall be composed of several cars.

The JNR's linear car development project has been undertaken at the JNR Miyazaki Lift Type Railway Experiment Center in Hyuga, Miyazaki prefecture. Since the 4km utility type U-shaped running track was completed at the end of last year, they have started to lift test run using a new model "MLU 001" test car with passenger space. It is projected that a 7 km running track will be made within fiscal 1981 to conduct manned tests. In fiscal 1982, a 3-car train will be tested. Finally, in fiscal 1983 and thereafter, they will speed up for the establishment of undeveloped technologies such as test runs on sections with slopes, sections under tunnels and sections between points.

Takagi, the president of the JNR, announced ambitiously at the Diet: "Hope for giving practical effects to the linear car is elevated more than ever. From now on, we shall devote ourselves more intensely and continue the tests. We may yet need another decade before we can achieve our goal, but we would also like to study concretely the feasibility of the practical use of the linear car."

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