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Japan Report

(FOUO 6/81)

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POLITICAL AND SOCIOLOGICAL

FORMATION OF NEW MIDDLE PARTY SUGGESTED

Tokyo MAINICHI DAILY NEWS in English 10 Dec 80 p 4

[Nagatacho Doings Column by Takehiko Takahashi: "From 'Gathering Together' To 'Formation'"]

[Text] Speaking at the Komeito convention on Dec. 2, Ryosaku Sasaki, chairman of the Democratic Socialist Party (DSP), said, "my feeling is like seeing everything mixed together and shaken, and wondering whether something new cannot be created."

Chairman Sasaki then made clear that four-party talks — with Yoshikatsu Takeiri, chairman of the Komeito; Hideo Den, leader of the United Social Democratic Party; Yohei Kono, leader of the New Liberal Club; and himself — had recently held while eating "fugu" (globefish) together.

This Sasaki statement indicates that a "movement to form a new middle-of-the-road political party" has again emerged. The DSP has already drawn up a coalition government concept with the Komeito. In the last dual elections for the House of Representatives and the House of Councillors, partial cooperation was extended by the DSP to the NLC and USDP. Meanwhile, the USDP has made a suggestion to the DSP for a loose union in engaging in Diet activities. A similar suggestion for a loose union has been made to the NLC by the DSP.

When seen in this way, the four political parties — Komeito, DSP, NLC and USDP —, are respectively involved with one another. This is a common point of the four parties sandwiched in between the Liberal-Democratic Party (LDP) and the Japan Socialist Party (JSP).

The attendance of DSP Chairman Sasaki at the Komeito convention and his speaking there indicated a change from the DSP's past way of thinking.

At the last extraordinary session of the Diet, the Democratic Socialist Party approved the three defense bills that were presented. This was the first time that the DSP had taken such a step. Prior to his party voting for the defense bills, Sasaki met with Prime Minister Zenko Suzuki to discuss the defense problem.

Why did the DSP move in this way? It was triggered by a book that Masashi Ishibashi of the Japan Socialist Party wrote and published on the theory of demilitarization and neutrality. The DSP wanted to clarify that its policy on defense was entirely different from that of the Japan Socialist Party.

Concept

The Komeito, however, did not follow suit with the DSP. Although the Komeito has established a coalition government concept with the DSP, the Komeito also has an agreement with the JSP on a coalition government concept. On its part, the Komeito is rather resistant to the unilateral action taken by the DSP in approving the three defense bills.

Notwithstanding, the reason why the DSP went ahead and voted for the three defense bills is that the DSP has changed its way of thinking regarding a "coalition." At the time when the government and opposition parties were numerically almost balanced in the Diet, the word "coalition" indicated the possibility of an administration to take the place of the LDP. But at present, when LDP enjoys a comfortable majority in both the House of Representatives and the House of Councillors, "coalition" has lost is meaning.

That is why, DSP Chairman Sasaki has changed his way of thinking and is calling for the "formation" of an opposition party capable of assuming the

reins of administration. A "coalition" carries the image of a "JSP-Komeito-DSP" coalition, a gathering of influences that would include the JSP. The DSP has no intention whatsoever of sharing the administration with the JSP. It also resists the impression of a "conservative-progressive coalition." Therefore, instead of a "coalition" or "gathering together," the DSP is calling for a "formation."

Asserting that the slogan, "the function of the opposition is to serve as a check," will not be able to gain the people's confidence, he emphasizes that there must be a political party able to compete with the LDP. By gaining the people's trust, this new influence would put a stop to the LDP's long-continuing single-handed administration.

The model that the DSP has in mind is the Social Democratic Party of West Germany. That is why it has become the most positive among the opposition in regard to the defense problem. The DSP has included as a basic policy that it is "one organization belonging to the Free World camp." From the position of belonging to the Free World camp," the DSP is endeavoring to think of a definite defense policy while keeping in mind "the framework of the Constitution" and "the financial situation."

In thinking of forming an opposition able to take over the reins of administration, the relations with the right-wing of the Japan Socialist Party will become a problem. In regard to this, the DSP is considering that "as long as there is no projecting part like Saburo Eda of olden days, action taken might be interpreted as intervention in party affairs."

The DSP's relations with the JSP must thus be through the intermediary of the Komeito. Notwithstanding, the Komeito at present lacks such power. Chairman Sasaki of the DSP therefore seems to believe that a definite movement for the formation of an opposition party able to assume the reins of administration will depend on what the political situation is after autumn next year.

CSO: 4120

MILITARY

FEASIBILITY OF MIDTERM OPERATION ESTIMATE QUESTIONED

Tokyo KOKUBO in Japanese Nov 80 pp 22-34

[Article by Yukio Kato: "Is the Defense Agency's Estimate on the Midterm Operation Really Feasible? -- An Analysis of the Actual State of the Ground, Maritime and Air Self Defense Forces"]

[Text] I. At the end of August the Japan Defense Agency decided its fiscal 1981 budget requests and draft operation plan. The requests totaled 2.44 trillion yen, a 9.7 percent increase over the previous year's original budget.

As reported in the newspapers, this rate of growth exceeds the 7.5 percent increase of most other budget requests; this is truly epochal treatment for a defense budget.

In view of the increasingly difficult international situation--Soviet military intervention in Afghanistan, the turbulent Middle East situation, deployment of Soviet forces in Japan's northern territories--the government has taken this position with an awareness that it cannot slight defense preparations. A more direct impetus, however, undeniably comes from repeated strong demands from the U.S.

The U.S. is no longer the country which prided itself on its overwhelming military and economic strength, unapproached by other countries, and which brought the "pax Americana" into being. To look at the Japanese and U.S. economies, for example, the Japan which formerly did not have even one-tenth the GNP of the U.S. now has half the GNP of the U.S., and it is on the same level as the U.S. in terms of GNP per capita. Militarily, the Soviet Union has made consistent and considerable increases in its military strength over the past dozen years, and the U.S. is now far from having overwhelming superiority; in some respects, it seems to have fallen behind the Soviet Union.

Against such a background, the U.S. has come to demand, in the name of cooperation among allies and friendly nations, that the Western countries all contribute to maintenance of international peace.

The countries of NATO have decided to increase military expenditures by three percent annually in real terms, and the U.S. itself, during economic difficulties which require that other expenditures be held down, has resolved to continue a real increase of four to five percent in military expenditures. Hence the U.S. has come to ask that Japan also make defense efforts in the same direction as these Western countries.

That was the situation when the Defense Agency drafted its Mid-Term Operations Estimate for fiscal 1980-84 in July of 1978. This Estimate is something which is reviewed annually and rewritten every 3 years. It is used by the Defense Agency for predicting operations for the coming 5 years when carrying out defense preparations on the basis of the "National Defense Program Outline" decided by the government in 1976, and serves as a reference for the annual budget requests and operations plans.

In the past, U.S. requests for expansion of Japan's defense efforts had not gone beyond abstract expressions, but when the U.S. learned of the Estimate, its demands quickly became specific. That is, "We desire steady and marked defense efforts in Japan. 'Marked' means accomplishment of the five-year plan of the Mid-Term Operations Estimate a year early."

Thus the Estimate has surfaced as an important political issue between Japan and the U.S. In the Japanese-U.S. summit talks, President Carter officially requested this early accomplishment, and the late Prime Minister Ohira promised to give the matter serious consideration.

II. So let's examine the content of the Estimate. The following outline was announced by the Defense Agency in July 1978.

Outline of Mid-Term Operations Estimate (1980-84)

1. Nature: The purpose of this Estimate is to forecast the future direction of the major activities of the Ground, Maritime and Air Self Defense Forces, for reference use during the drafting of such things as annual budget requests. A review of the Estimate is to be made on completion of each year's budget, and a new Estimate is to be drawn up every 3 years.

2. Major Equipment:

(1) Key units mentioned in the National Defense Program Outline.

Ground SDF--conversion of 7th Division to armored division; organization of 2d Composite Brigade (Shikoku).

Air SDF--organization of Early Warning Squadron.

(2) Augmentation of various facilities with defense capabilities, focusing on qualitative upgrading of equipment to keep pace with scientific and technological progress.

Ground SDF--

A. Ground Units: increased firepower and mobility through such equipment as 301 tanks, 183 self-propelled howitzers and 112 armored vehicles.

B. Air Units: increased air mobility through provision of 111 tactical aircraft including various helicopters.

C. Ground to Air Missile Units: increased anti-aircraft firepower through rearming of two AAA groups with improved Hawk missiles; discussion and decision on equipment policy regarding successor to the basic Hawk missile.

Maritime SDF--

A. Ships: increased capability for defense of adjacent waters by means of construction of 30 warships, including 16 destroyers and escorts and 5 submarines, and refitting of 6 escorts now in service.

B. Air Units: increased anti-submarine patrol capability through provision of 96 military aircraft including 37 fixed-wing (P-3C) and 51 rotary wing (HSS-2B) anti-submarine patrol aircraft.

Air SDF--

A. Air Units: increased air defense capability through provision of 94 tactical aircraft--77 interceptor fighters (F-15), 13 support fighters (F-1) and 4 early warning aircraft (E-2C).

B. Ground to Air Missile Units: increased anti-aircraft fire power through provision of one Nike AAA group; discussion and decision on equipment policy regarding successor to the Nike missile.

C. Warning Control Units: increased warning and observation capability through modernization of automatic warning organization.

(3) Augmentation of rear support and training facilities to contribute to effective use of defense capabilities.

A. Improvement of command communication capabilities, including command/control centers and defense microwave circuits.

B. Increased reserves of ammunition, and improvement of ammunition storage and sensitivity of mines.

C. Promotion of permanency of bases, including provision of anti-aircraft weapons and construction of aircraft shelters.

D. Improved training environment, including lecture halls, training airspace and training facilities to accompany introduction of new equipment.

3. Frontline Equipment Costs: between 2.7 and 2.8 trillion yen (1979 prices), approximately.

As seen in the above announcement, this Estimate is to be reviewed on completion of each year's budget. It is supposed that the review accompanying passage of the 1980 budget has already been carried out, but the results are not known since the Defense Agency hasn't really announced anything. Judging from newspaper reports, it is possible that the content of the review was a matter of moving in the direction

of early accomplishment and completion of procurement of 12 new C-130 transports, and PS-1 anti-submarine seaplanes. In any case, it does not appear that the review resulted in any major changes.

III. Of the period covered by the present Estimate--1980-84--the first year is now underway, and the Defense Agency has submitted its estimated budget requests to the Finance Ministry for the second year. Nothing certain can be said about the 1981 budget, since it has not been passed yet, but a look at the combined requests for fiscal 1980 and 1981 as a proportion of the 5-year term of the Estimate shows at least that the Defense Agency is eager to accomplish the Estimate.

The following table shows 1980 procurement, 1981 requests, and 5-year procurement in the Estimate for major equipment for the Ground, Maritime and Air Self Defense Forces. The table also shows combined 1980 and 1981 requests as a percentage of the entire procurement under the Mid-Term Operations Estimate.

Major Equipment	1980	1981	Total Estimate	Percent of Completion
Ground SDF				
(Ground Equipment)				
Model 74 tanks	60	80	301	46.5
Model 75 155mm self-propelled howitzers	26	34	140	42.9
203mm self-propelled howitzers	0	7	43	16.3
Model 73 ZPC's	9	9	44	40.9
Armored cars	0	0	68	0
Model 79 Ju-MAT launchers	8	9	33	51.5
84mm recoilless guns	188	219	852	47.8
Model 75 130mm multiple-loaded rocket launchers	8	8	40	40.0
(Aircraft)				
HU-1H helicopters	5	6	42	26.2
OH-6D helicopters	10	8	55	32.7
LR-1 turboprops	2	2	6	66.7

(Guided Weapons)				
Hawk conversion equipment (groups)	1	1	2	100.0
Short-range SAM (sets)	0	6	24	25.0
Maritime SDF				
(Ships)				
4,500-ton DDG's	0	1	2	50.0
2,900-ton DD's	2	3	10	50.0
1,400-ton DE's	1	0	4	25.0
2,200-ton SS's	1	1	5	40.0
440-ton MSC's	2	2	11	36.4
Submarine rescue tenders	0	1	1	100.0
Marine research ships	0	1	2	50.0
Supply ships	0	0	1	0
Transports	0	1	2	50.0
Destroyer refitting	0	2	6	33.3
(Aircraft)				
P-3C patrol planes	10	0	37[sic]	27.0
HSS-2B helicopters	2	11	46	28.3
S-61A helicopters	0	1	8	12.5
KM-2 primary trainers	0	1	4	25.0
TC-90 trainers	2	4	16	37.5
Air SDF				
(Aircraft)				
F-15 interceptors	34	0	77	44.2
E-2C early warning aircraft	0	4	4	100.0

F-1 support fighters	3	3	13	46.2
C-130H transports	0	6	12	50.0
T-2 advanced trainers	4	9	23	56.5
V-107A helicopters	2	2	6	66.7
MU-2 rescue aircraft	1	1	5	40.0
(Guided Weapons)				
Hawk conversion equipment (groups)	0	1	1	100.0
Short-range SAM (sets)	0	4	12	33.3

Let us examine this major equipment in a little more detail

IV. Ground SDF

Of the 301 model 74 tanks in the Estimate, 60 were procured in 1980 and 80 were requested for 1981, for a total of 140, or 46.5 percent of the Estimate. As of 1979 the procurement pace was 48 per year, but this increased to 60 in 1980, and is to be further increased to 80 in 1981. If the pace of 80 per year is maintained from 1982 on, the total in the Estimate will be reached in 1983 rather than 1984, the final year of the Estimate. If that takes place, the old M41 will disappear from among the Ground SDF's more than 100 tanks, which will be divided about equally between the model 61 and the model 74. Following the period of the Estimate, it will be necessary to consider increasing the established number of tanks and replacing the model 61 tanks, which will begin to be outdated.

Of the Estimate's 140 model 75 155mm self-propelled howitzers, the nucleus of divisional firepower, 26 were procured in 1980 and 34 requested for 1981, for a total of 60, or 42.9 percent of the Estimate. If the remaining 80 are procured at a pace of 40 per year, the total will be reached in 1983. But if procurement is at a pace of 26 or 27 per year, it will be difficult to finish earlier than 1984.

The 203mm self-propelled howitzer is a newly-procured item. It is scheduled to be deployed to the corps as the range of cannon increases internationally, and it is hoped to be decisive as firepower at ranges appropriate to corps operations. The first 7 are to be procured in 1981, and 43 during the period of the Estimate. The figure of seven in 1981 may be necessary as a first-year figure, but that figure is small, and unless considerable efforts are made from 1982 on, there is little chance of completing procurement by the end of the Estimate, not to mention early completion.

Of the Estimate's 44 model 73 armored personnel carriers, there are 9 in 1980 and 9 in 1981 for a total of 18, or 40.9 percent of the Estimate. If the pace of 9 per year is maintained, it will take 5 years to achieve the 44 set in the Estimate. It seems to have been decided not to complete procurement of APC's ahead of schedule.

Some 68 armored cars are scheduled in the Estimate, but procurement has not begun yet. These armored cars are to be a new type with tires, rather than the old Caterpillars.

The Estimate includes 33 model 79 Ju-MAT launcher sets; these missile launchers are effective against small vessels and tanks. Eight sets were procured in 1980 and nine were requested for 1981. These 17 sets represent a completion rate of 51.5 percent. At this pace early completion by 1983 would be possible.

The 84mm recoilless gun is primarily an anti-tank weapon made in Sweden under the name Karl Gustav. It is similar to the once-famous bazooka. Of the 852 in the Estimate, 188 were procured in 1980 and 219 were requested for 1981, for a total of 407, or 47.8 percent of the Estimate. Here, too, it will be possible to finish early--by 1983--if the procurement pace remains above 200 per year.

The model 75 130mm multiple-loaded rocket launcher is like a beehive on wheels, and is capable of concentrating firepower on a given area. The 8 in 1980 and 8 in 1981 will total 16, or 40 percent of the 40 launchers in the Estimate. At that pace completion will take 5 years and early completion will not be possible.

As for helicopters, there were 5 multiple use HU-1H helicopters in 1980 and 6 for 1981; these 11 are 26.2 percent of the 42 proposed in the Estimate. The 18 OH-6D observation helicopters, 10 in 1980 and 8 for 1981, make up 32.7 percent of the 55 in the estimate. In both cases it will be difficult, at the present pace, to finish during the period covered by the Estimate, much less finish early. Two LR-1 liaison and reconnaissance helicopters were procured in 1980, and with two in 1981, only two will be needed for completion of the Estimate.

Procurement of Hawk conversion equipment will be completed in 1981.

The short-range surface-to-air guided missiles--what are called "Tan-SAM's"--are a new procurement item for the Ground and Air Self Defense Forces beginning in 1981. Procurement of the 24 sets proposed will take, at the pace of 6 sets per year, until the last year of the Estimate.

Thus we see that of the major equipment for the Ground SDF, early completion of the goals of the Mid-Term Operations Estimate can be expected for the model 74 tank, the model 79 Ju-MAT launchers, the 84mm recoilless gun, the LR-1 turboprop and Hawk conversion equipment. But at the present pace, it will take until 1984, the last year of the Estimate, to procure planned quantities of the model 75 155mm self-propelled howitzer, the model 73 APC, the model 75 130mm self-propelled multiple-loaded rocket launcher and the Tan-SAM.

The pace of procurement of the HU-1H and OH-6D helicopters is slow; unless it is increased, procurement will not be completed within the period of the Estimate. Considerable efforts will also be required for the new 203mm self-propelled howitzer and the armored car.

V. Maritime SDF

Two DDG guided missile destroyers are to be built, and one of these was requested for 1981. Thus only one more will be needed. The DDG's will be deployed to escort flotillas composed of eight destroyers, and will be responsible for air defense of the fleet. Earlier DDG's have been in the 3,900-ton class; because of the equipment mounted on it, the 1981 ship will be 4,500 tons.

Destroyers of the 2,900-ton class are the main force of the escort flotillas. Of the 10 in the Estimate, there were 2 in 1980 and 3 in 1981, for 50 percent of the total. Early completion in 1983 will be possible if this pace is maintained.

The main force of the regional district units is the 1,400-ton destroyer escort. Four are planned, but only one was to be built in 1980. If one is built each year from 1982, on, the goal will be reached in 1984 as planned.

Similarly, at the present pace of 1 submarine and 2 minesweepers each year, it will take 5 years to get the 5 submarines and 11 minesweepers planned; early completion would be impossible.

Only small numbers--one or two each--of submarine rescue tenders, marine research ships, supply ships and transports are to be procured; the point is not the percentage of procurement completed, but rather the effort put into construction of these ships in terms of overall expenditures. These ships are, nevertheless, important auxiliary ships which will back up the front rank of warships, so early completion is desirable.

The modernization of escort ships is a matter of overhauling and extending the life of the escorts now in service and renovating or replacing their armaments. Six ships are scheduled during the period of the Estimate, and two have been requested during fiscal 1981. At the pace of two per year, the refitting will be completed by fiscal 1983.

The National Defense Council decided on procurement of 45 P-3C anti-submarine patrol planes beginning in 1978. Eight were procured in 1978 and 10 in 1980, so the remaining 27 are to be procured during the period of the Estimate. Past practice has been to procure in alternate years, so it seems the Defense Agency will split the remaining 27 planes between 1982 and 1984.

It is conceivable that the portion scheduled for 1984 could be moved up to fiscal 1983, but this might be difficult in terms of the pace of production. In any case, it is hoped that the introduction of these planes will bring a vast improvement in the anti-submarine capabilities of the Maritime Self Defense Force.

The HSS-2B anti-submarine helicopter can be either ship-borne or land-based, and is to engage in anti-submarine warfare. Two were procured in 1980 and 11 were requested for 1981. These 13 are 28.2 percent of the 46 scheduled in the Estimate. If future procurement is at a pace of 11 per year, it will take until 1984 to reach the expected number.

Of the eight scheduled S-61A rescue helicopters, only one was requested for 1981, and unless there is greater effort in the future, it will be difficult even to meet the target of the Estimate.

Four KM-2 primary trainers are scheduled; one was requested for fiscal 1981. At that pace it will take until 1984 to get the four.

Of the Estimate's 16 TC-90 instrument flight trainers, 2 were procured in 1980 and 4 requested in 1981. These 6 represent 37.5 percent completion. Early completion in 1983 will be possible only at a pace of five per year.

Thus if we look at the prospects for completion of the procurement of primary armament for the Maritime SDF under the Estimate, it appears that early completion in 1983 will be possible for the guided missile destroyer, the 2,900-ton destroyer, the submarine rescue tender, and destroyer escort modernization, but considerable effort will be necessary for early completion for the marine research ship, the supply and transport ships, and the TC-90 instrument flight trainer.

At the present pace, procurement of the 1,400-ton destroyer escort, the submarine, the minesweeper, the P-3C anti-submarine patrol plane, the HSS-2B anti-submarine helicopter, and the KM-2 primary trainer may be completed in 1984, the final year of the Estimate, as originally scheduled.

Procurement of the S-61A rescue helicopter within the period of the original Estimate will be difficult at the present pace.

VI. Air SDF

It was decided in the National Defense Council that 100 F-15's, the next main interceptor fighter of the Air SDF, would be procured beginning in 1978. Twenty-three were procured in fiscal 1978, [and 34 in 1980], so the remaining 43 are obtained in 1982, or split between 1982 and 1983.

Procurement of the E-2C early warning patrol plane will be completed with the four requested for 1981.

Three of the 13 F-1 support fighters scheduled in the Estimate were procured in 1980, and 3 more were requested for 1981; these 6 represent 46.2 percent completion. Early completion by 1983 will be possible if efforts continue at this pace.

The C-130 transport is a new transport to be imported from the U.S. to replace the C-1 as the main transport of the Air SDF. Twelve are to be obtained during the period of the Estimate, so if six can be procured in 1981, it will be possible to procure the other six during 1983.

Of the 23 T-2 advanced trainers scheduled in the Estimate, the 4 in 1980 and the 9 requested for 1981 total 13, or 56.6 percent completion; at this pace, early completion in 1983 will be possible.

Of the six V-107 rescue helicopters scheduled, only two will be left after two each in 1980 and 1981, so early completion is possible.

One of the five scheduled MU-2 search and rescue aircraft was procured in 1980, and there is to be one more in 1981. At that pace procurement will be completed in the final year of the Estimate.

Procurement of Nike-J's will be completed in 1981.

The short-range surface-to-air missile, what is called the "Tan-SAM," is a new purchase made jointly with the Ground SDF, and it is expected to be effective in air defense of bases. Four sets were requested for 1981, so at that pace all 12 sets scheduled will be ready by 1983.

Thus, looking at the prospects for completion of the Estimate in regard to the major armaments of the Air SDF, it appears that all can be completed early except the MU-2 search and rescue helicopter, and at the present pace it will be possible to complete procurement of even the MU-2 within the period of the Estimate.

VII. Finally, here is a compilation of the prospects for completion of the Mid-Term Operations Estimate for the Self Defense Forces as a whole.

It is the Air SDF which seems able to complete procurement of almost all its major armaments a year early. This does not mean, however, that there will be no problems in the Air SDF. What about the F-4 Phantom fighter, which is becoming obsolete? Should it be renovated, or should a new replacement be introduced? How should the automated warning organization, which is similarly becoming obsolete, the BADGE System and the Nike surface-to-air missile be modernized? In any case, these will be big projects requiring vast expenditures and much time. It appears that these issues are scheduled to be considered during the period of the Estimate; we will watch for the outcome.

As for the Maritime SDF, it will generally be possible to complete procurement within the period of the Estimate, but the chances of early completion are only fair. The Maritime SDF, however, has a diversity of ground, sea and air equipment. Since only small numbers of each type of ship are procured, we cannot predict procurement of a fixed number each year, so it is quite difficult to state the prospects for completion. In the Defense Agency's fiscal 1981 budget estimate, the request for construction of warships, excluding refitting of warships or auxiliaries, comes to 10 ships totaling over 21,000 tons. This is the highest ever. If ship construction can be maintained at this pace, it will be possible, needless to say, to complete all the shipbuilding under the Estimate ahead of schedule, and to accomplish augmentation and strengthening of the Maritime SDF at an early date. It is necessary, however, to reduce shipbuilding in years when procurement of aircraft is increased, and construction costs have become very great. From this perspective, it will be quite difficult to maintain the pace.

There is the bitter experience, in regard to Maritime SDF equipment, of failure to complete the Fourth Defense Buildup Plan where costs were driven sharply upward because of the oil shock. Considerable effort will be required for completion of the schedule within the period of the Estimate, not to mention early completion.

The major armaments of the Ground SDF are a mixture of those for which early completion of procurement will be possible, those which will require the full period of the Estimate, and those which can hardly be procured during the period of the Estimate. The procurement pace for new equipment and helicopters is particularly low. Looking at the requests of the 1981 budget estimate, we can see the desire to quicken the pace, but it cannot be called sufficient. Only when the Ground, Maritime and Air Self Defense Forces become complementary bodies can we hope for the perfect defense of Japan, and it is not wise to let the Ground SDF lag behind. Moreover, since the cost of ground equipment is quite low in comparison with that for the Maritime and Air Self Defense Forces, early procurement of ground equipment would be possible with relatively little effort.

9601
CSO: 4105

ECONOMIC

GOVERNMENT TACKLING PROBLEM OF ALTERNATE ENERGY SOURCES

Tokyo ENERUGII FOORAMU in Japanese Nov 80 pp 24-25

[Article: "Difficulties in Making Policy on Goals for Alternate Sources of Energy"]

[Text] The Japanese Government is faced with difficulties in making policies on goals and application principles for alternate sources of energy. Unlike other former tentative plans, this plan will include the consideration of final demands for secondary energy. Intensive discussions are taking place among the Ministry of International Trade and Industry, the electric industry, and other industries, concentrating on the problem of the location of atomic energy.

Tense Energy Situation

The energy situation, both domestic and international, is becoming increasingly confused. No sooner had the second oil crisis subsided than the Iranian-Iraqi war started. If this war should develop to the point where the Strait of Hormuz is blocked, the energy demand and supply of the entire world would be gravely affected.

Thus it is necessary for Japan to jointly promote energy conservation and the development and application of alternate sources of energy. In the "Long-Term Tentative Outlook on Energy Demand and Supply" set forth by the Advisory Committee for Energy last August, the goal for 1990 was to limit oil consumption to about 6 million barrels per day. This would mean an energy saving of 2.1 million barrels (14.8 percent of total consumption), and 6 million barrels per day of alternate sources of energy (50 percent of the consumption in the form of alternate sources of energy) would be developed.

In October 1979, the "Law Concerning the Rationalization of Energy Utilization" (Energy Conservation Law) came into effect. In this law, standards for energy conservation have been set up. Its practical application was put into effect for electric goods and appliances in October 1979, for enterprises in October and December, for automobiles in December, and for buildings in February 1980.

The problem remains how to develop and apply about 6 million barrels per day (about 3.3 times the present volume) of alternate sources of energy by 1990. To solve this problem, at the end of May 1980, the government promulgated the "Law Concerning the Promotion of Development and Introduction of Petroleum-Substitute Energy" (Petroleum-Substitute Energy Law). This law fundamentally has three main issues:

the formulation of policies for "goals" for the development of alternate sources of energy, the formulation of policies for "application principles," and the establishment of a "New Energy Development Corporation" as a central organization responsible for the development of alternate energy. The New Energy Development Corporation was founded on 1 October. The remaining two issues are still awaiting solution.

By the terms of the Petroleum-Substitute Energy Law, the minister of international trade and industry is responsible for assessing energy demands and the long-term oil supply outlook, and for developing substitute sources of energy. Moreover, he is to evaluate and select the different sources of alternative energy which should be further developed and applied, he is to set up quantitative targets for the supply of each source, and he is to publish these goals after the cabinet decides on them. At the same time, the minister is responsible for examining both the supply situation and the necessary technologies for the application of alternate sources of energy, and for setting up guiding principles for the application of alternate sources of energy in industry. The formulation of these goals and policies are urgent tasks awaiting completion.

Essential Points of the Goals and Application Plans

The Ministry of International Trade and Industry, which is responsible for these tasks, started its preparatory work in April by setting up a Bureau of Energy Countermeasures and Promotion in the secretariat of the ministry, and a Petroleum Substitute Energy Countermeasure Section in the Natural Resources and Energy Agency. Since the end of July, studies have been conducted which have mobilized the entire ministry. The basic theme of these studies is the "merging of commercial, industrial, and technological policies with energy policies." Emphasis is placed on the demand side; furthermore, not only the supply of primary energy but also the transformation to secondary energy forms such as electricity and gas are considered, in order to properly balance supply with the final demand.

So far, the outlook for energy demand and supply has been limited to the demand and supply aspects of primary energy. However, in the actual development and application of alternate energy sources, it is of utmost importance to consider first how to transform the structure of demand, which is heavily dependent on oil, and second how to deal with secondary energy, especially in relation to its problem of power resource location. Therefore, the approach of the above-mentioned studies, which take secondary energy into account in order to balance supply with final demand, is very noteworthy.

One characteristic of the Japanese energy demand structure is the fact that its industrial demand is high, compared with other industrial countries--making up 60 percent of total demand. It is very important, therefore, for the industry to know how to transform energy, in order to successfully introduce alternate sources of energy.

The first task would be to develop and supply alternate sources of energy which are conveniently used by industry and which can be inexpensively and easily supplied. Specific examples are the development of alternate power resources, the use of liquefied natural gas for city gas systems, and the increase of the thermal coal supply.

The second task is how to transform oil to other sources of energy in industry, which accounts for more than half the total demand. For this purpose, detailed development and application policies which suit the conditions of each industry should be examined. These policies should not only be reflected in the application principles but should also be strongly promoted to stimulate the transformation process of energy.

9666
CSO: 4105

SCIENCE AND TECHNOLOGY

USSR APPLIES FOR SURVEY NEAR BONINS

Tokyo MAINICHI DAILY NEWS in English 19 Dec 80 p 1

[Text] The government is studying carefully a Soviet application for permission to conduct an undersea survey in an area around the Bonin (Ogasawara) Islands, south of Tokyo, the Foreign Ministry said Thursday.

The study is underway at working-level consultations among ministries and agencies concerned as to whether the survey would damage fishery interests in the area located within Japan's 200-nautical mile economic zone, as well as from legal viewpoints.

The Soviet Union said it wants to carry out a 40-day sounding survey using sound waves and also to observe warm currents beginning Jan. 10. The Soviets would use a 1,120-ton undersea research vessel during the tests at four points in the sea within 200 nautical miles of the Bonin Islands.

The government is also expected to study the Soviet application from the military viewpoint in consideration of defense facilities on Iwojima near the area.

CSO: 4120

SCIENCE AND TECHNOLOGY

COOPERATION AGREEMENT IS SIGNED WITH CZECHS

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 6

[Text] The Iron & Steel Institute of Japan has signed a technical cooperation agreement with the Federal Head Office of Iron & Steel Industry of Czechoslovakia.

The five-year agreement calls for ISIJ and the Prague head office to exchange information about nuclear steel materials, ferrous metallurgy, coking and automation technology.

Under the agreement, the two parties will hold the third Japan-Czecho iron and steel symposium in Tokyo in the fall of 1981. The previous two symposia were held in 1977 and 1979.

CSO: 4120

SCIENCE AND TECHNOLOGY

COUNTRY'S INDUSTRIAL TECHNOLOGY PRAISED

Tokyo INDUSTRIA in English Dec 80 p 6

[Text]

The trade conditions surrounding Japan continue to be severe. Increasing auto exports from Japan have caused chronic trade frictions with importing countries.

However, there are reasons why Japanese-made cars sell well in importing countries. Japanese cars are meeting the needs of the times. That is why the general public wants to buy them, thus creating sustained demand for them.

We feel sympathy to the foreign auto industries which are suffering from Japanese car imports. At the same time, we hope that these industries will study why Japanese cars are popular in their countries before working out measures to check Japanese car imports. They should be able to find the fruit borne by the effort of Japanese engineers. When the Japanese Government enforced the world's severest emission control standards, Japanese engineers successfully met them after painstaking efforts. Japanese automakers have sunk large sums of capital in costly measures for quality control, which have led to the manufactures of popular quality products.

In the past Japanese engineers used to purchase drawings from the United States or Europe and copy products only by changing the measurements from the inch to the centimeter. But since around the end of the 1960s, Japan's technology introduction has been undergoing changes. In the process of domestically manufacturing foreign-designed products, they inevitably learned engineering techniques abroad, created new techniques in applied engineering, and then began exporting products to the countries from which they imported techniques in the past.

The Asahi Shimbun, a leading Japanese daily, recently carried an article describing the experience of the patent division manager of a leading electric equipment

manufacturer in Japan. When he visited the United States 20 years ago for engineering studies, he made friends with an American engineer, who often discussed engineering theories with the Japanese and gave him a tour of his company's production facilities. When the Japanese manager visited the U.S. again last year, the American friend welcome him but refused to discuss engineering problems with him and to show him his company's plant facilities. This change in his attitude might indicate that the Americans have become cautious about competitiveness of Japanese industry in the field of engineering.

The patent manager says that the era has passed for Japan to take in technology from the U.S. and Europe. He says, "We now should obtain many patents of our own and use them for business strategy."

His experience and words eloquently depict a phase of the technological development of Japanese industry. To be sure, Japanese engineers have achieved great progress with relatively small sums of research funds.

But it would be a great mistake for us to presume that we have become a leader in the field of technology in the world. In fact, we have barely joined the group of industrialized nations in technology only through 20 years of streneous efforts and are able to cooperate with other nations in the technological field. Many Japanese engineers think that way.

An executive of another major electric appliance manufacturer visits the United States at least once a year to exchange views with American engineers in his own field. He says he will continue to do business in cooperation with them. We believe that Japan's real international cooperation in the technological field has just begun for the benefit of the world.

CSO: 4120

COOPERATION BETWEEN JAPANESE, FOREIGN FIRMS SEEN INCREASING

Tokyo JAPAN ECONOMIC REVIEW in English 23 Dec 90 p 11

[Text] Cooperative moves between Jpanese Corporations and their foreign counterparts are rapidly increasing. To cite some notable examples, there are tieup talks between Toyota Motor and Ford Motor, technical tieups and mutual stock holdings between Nippon Steel Corp. and Armco Steel Corp. and joint production agreement between Nissan Motor and Volkswagenwerk. Such cooperative moves are expected to spread further to such industrial fields as electric machinery, shipbuilding, general machinery and trading.

The primary reason is that Western Corporations are putting great store in the unique ingenuity, versatility and strength of Japanese corporate management systems and are making positive approaches to Japanese firms for guidance and cooperation.

Japanese corporations themselves have their own reasons to go into cooperative arrangements with their foreign counterparts. The most obvious is the sharply rising share of foreign transactions in Japanese firms' business operations in an increasing number of different industrial sectors and the resultant necessity of doing something about the fact.

Cooperative relations with leading foreign corporations are certain to help Japanese companies attain worldwide reputations and gain access to the true community of international corporations.

However, many Japanese Industrial leaders, while welcoming the growing moves for international cooperation between Japanese firms and their foreign counterparts, voice strong warnings that they should never take success for granted. "the overall prowess of Japanese corporations is still very limited," they claim. "they should never let their guard down."

Changes in leadership

There is no denying the fact that a dramatic change has taken place between the 1970s and the 1980s in the nature of business tieups between Japanese corporations and foreign firms. In the 1970s, especially in the early part, it was mostly Japanese corporations which looked to foreign companies for assistance and guidance in the face of stiffening international competitivenesss. Mitsubishi Heavy Industries (before it separated its automobile division and turned it into Mitsubishi Motors Corp.), for example, sought Chrysler Corp.'s assistance and guidance, while Isuzu Motors, Ltd. ran to General Motors for similar purposes. Both of the Japanese automobile manufacturers wanted to revitalize their operations by aligning themselves with giant foreign corporations for greatly improved scale merits.

Foreign corporations, for their part, were greatly interested in the promising Japanese markets and accepted Japanese corporations' calls for assistance in search of additional profits in their operations. Foreign corporations, in other words, proved to be undoubted leaders, while their Japanese counterparts were followers.

With the arrival of the 1980s, however, the table apparently has been turned, with Japanese corporations playing the role of leaders. Cooperative moves between Honda Motor and BL Ltd. (formerly British Leyland), Toyota Motor and Ford Motor, Nippon Steel Corp. and Armco Steel Corp., and Nissan Motor and Alfa Romeo all run true to form. In other words, it is Japanese corporations which are offering cooperation to their foreign counterparts.

This is a definite turnaround from the 1970s. Foreign corporations, moreover, are not seeking Japanese firms' cooperation in the hope of advancing into Japanese markets. They rather are seeking Japanese corporations' assistance in capital, technology and management knowhow.

An exception is the recent tieup between Nissan Motor and Volkswagenwerk. This particular tieup apparently is a cooperative move between two.

equals and may open a third road for Japanese corporations' alignment with their foreign counterparts.

A series of recent international tieups involving Japanese companies testify that: 1) the corporate power of Japanese manufacturers has grown sharply in the recent several years, 2) foreign companies, on the other hand, have recently been slipping in overall prowess, and 3) Western corporations are increasingly recognizing Japanese companies' ingenuity and versatility in overcoming a variety of economic crises with apparent ease. Possibilities are that Western companies' approaches to their Japanese counterparts will continue to grow in the days to come.

Coping with frictions

Japanese corporations, for their part, have their own reasons to cope positively with such approaches. One is that the share of exports has been sharply swinging upward in total sales in many different industrial sectors. Another is the growing necessity for Japanese corporations to expand their business scales, multinationalize their operations and turn themselves into true international organizations.

The share of exports in total sales of Japan's leading automakers, for example, now exceeds the 50 per cent mark. It certainly is moot whether such a high export ratio is a plus or not. There is no denying the fact, however, that Japan's aggressive automobile exports are causing considerable friction in overseas markets. This is also true with exports of many other powerful Japanese industrial sectors.

Criticism against Japan is getting all the more exacerbated by the fact that, while Japanese corporations are steadily expanding their operations every year, many of their Western counterparts are suffering from serious business slumps.

One of the best ways for Japanese corporations to circumvent strong foreign criticism is to embark upon joint ventures with foreign corporations or to start local subsidiaries in host countries. Such moves, moreover, will pave the way for Japanese corporations to become true international operations. All these considerations are certainly behind the recent international cooperative moves made by Japanese automobile manufacturers.

In the field of iron & steel, Nippon Steel Corp. has cooperative tieup relations with Armco Steel Corp. of the United States, while Nippon Kokan K.K. is being approached by Kaiser Steel Corp., also of the United States, for similar tieups. Export ratios of Japanese iron & steel corporations also stand high at 35-40 per cent. Almost all the raw materials being used by the Japanese iron & steel industry, moreover, come from foreign sources. In view of these facts and in full consideration of the nation's security, international frictions have to be avoided at all costs. This necessity is particularly acute now that the Japanese iron & steel industry is certain to outpace its U.S. counterpart and become the largest crude steel producer in the free world in the current year.

"We are determined to do our best to cooperate with U.S. corporations," declares President Eishiro Saito of Nippon Steel Corp. in full recognition of the leader's obligation to extend a helping hand to its ailing colleagues.

Spreading moves

Cooperative moves are rapidly spreading to other industrial fields as well and possibilities are that international tieups will soon surface in such industrial sectors as electric machinery, general machinery and shipbuilding, especially in view of the fact that some Japanese corporations are highly receptive to foreign approaches for guidance and assistance. It seems hardly possible that enthusiasm for international tieups will die down in the foreseeable future.

Some Japanese industrial leaders, however, show misgivings about the future of Japanese corporations.

"Although some Japanese corporations are now in leadership positions in international cooperative moves," say Chairman Hisao Makita of Nippon Kokan and Chairman Shigeo Nagano of Japan Chamber of Commerce & Industry in unison, "it is wrong to consider that Japan is really No. 1."

As Chairman Yoshihiro Inayama of *Keidanren* (Federation of Economic Organizations) says, there is little doubt that the United States has a far greater economic and other power than Japan because of its far greater population and vast natural resources, although Japan's per capita GNP has come close to that of the United States.

President Takeo Murakami of Tokyo Gas Co., on the other hand, points to the fact Japan depends almost entirely on foreign countries for its supply of vital natural resources and pays much more for them than Western countries.

"We have to be modest in out attitude in international cooperation," states President Kiyoshi Kawashima of Honda Motor. "We have to approach international cooperation in the same spirit as we would share a single piece of fruit with our friends."

"We will do our best to contribute to the world's industrial community — to its mutual development and progress," says President

Takashi Ishihara of Nissan Motor.

There is, of course, no need for Japanese corporations to be too condescending in their attitude toward international cooperation.

They have to eliminate, at the earliest possible date, the view, prevailing in some parts of Europe and the United States, that Japanese products are fine but that Japanese corporations are still less than something to be admired.

The outcome of the recent tieups between Nissan Motor and Volkswagen bear particularly close attention because of its nature as an agreement between two equal giants.

CSO: 4120

SCIENCE AND TECHNOLOGY

GOVERNMENT POLICIES BLAMED FOR NSC PLANT TENDER LOSSES

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 6

[Text] "Unlucky" is not necessarily an appropriate word to express a series of Nippon Steel Corp.'s recent defeats to its European counterparts in international tenders for steel plant engineering and construction.

The most important reason for NSC's setbacks may be the fact that the European governments have offered better financial help to their enterprises than the Japanese Government's.

Among others is a a political one.

NSC once teamed up with Armco Inc. of the U.S. and won a Soviet order for construction of an electrical steel sheet manufacturing plant last December. Eventually, however, Creusot-Loire of France got the order and announced this last September.

Though NSC made utmost efforts to roll back the French firm, it now seems to have given up.

The Soviet Government cancelled the order to the NSC-Armco group because the Japanese Government agreed on U.S. economic sanctions against the Soviet Union in relation to the latter's military action in Afhganistan.

More recently, NSC lost out to Voest-Alpine, a major Austrian steelmaker, in an East Germany's international tender for construction of a large-scale steelmaking plant at its VEB Eisenhuttenkombinat Ost.

Voest is said to have offered an unusually low bidding price to the Austrian Government.

NSC also has been defeated by its European counterparts in winning most of orders for plant and equipment relative to expansion of Sicartsa steel works in Mexico.

Adding to NSC's headaches is the recent announcement by China that it will postpone the second-phase construction of the new Baoshan steel works in Shanghai.

NSC now is intending to call on the Government to review its financing policy more in earnest. The Government, on its part, is not in a position to ignore NSC's request since NSC showed a positive attitude toward the Government's economic sanctions against the USSR.

CSO: 4120

SCIENCE AND TECHNOLOGY

EDITORIAL: NUCLEAR ENERGY DEVELOPMENT

Tokyo JAPAN ECONOMIC JOURNAL in English 23 Dec 80 p 10

[Text] In the white paper on nuclear energy published recently, the Atomic Energy Commission emphasized above all the urgent need to develop atomic power as an important alternative energy source in view of the stringency of the world's oil situation and Japan's scarcity of energy resources. The International Energy Agency, for its part, is seeking a moratorium on new power generating facilities that burn oil directly, while conservation of oil and a switch to oil substitutes are the central issue for the seven industrialized countries' summit each year.

Under the circumstances, the Government has set the target for nuclear power generating capacity 10 years from now at 51 million to 53 million kilowatts or 292 billion kilowatt hours in annual volume of generation, meaning an annual oil conservation of 75.9 million kiloliters.

In Japan, whose annual power generating capacity amounts to 100 million kilowatts, power consumption both for home and industrial purposes keeps rising steadily despite deceleration in economic growth. In the past three years, it has grown by 4-6 per cent annually. To keep pace with swelling demand, capacity to generate more than 5 million kilowatts will have to be added each year. If additional oil-burning power generation is out of the question, the only choice is development of nuclear energy and coal. This is the point on which people must be educated to be sagacious consumers and a rational nation.

Critics of the government's nuclear energy policy often say that the target for the generating capacity 10 years ahead that represents a 4.9-time increase is too ambitious. Criticisms are also directed at an "unrealistic target" to achieve 51 million-53 million kilowatts from the present level of 28 million kilowatts at 35 plants, even including those under construction.

But these critical comments are based either on misunderstanding or on misleading presentation of facts. The prospective rate of increase, for example, will have to be precipitous simply because the current level, which

constitutes the base figure, is low to begin with. Also the current capacity of 27,881,000 kilowatts at 35 plants in operation, under construction or preparation for construction, does not present an accurate picture as far as the future prospect is concerned. The counting is so strict that it includes only those which have been formally authorized by the Government, while there are some 20 other plants, the locations of which are being negotiated between power companies and local communities. If these plants come into being as planned, the target of 51 million-53 million may well be too modest.

International consultations on the International Nuclear Fuel Cycle Evaluation that lasted for two years and four months concluded in February that nuclear nonproliferation and peaceful use are compatible. The international consensus opened the way for Japan to establish its own nuclear fuel cycle, such as uranium enrichment and reprocessing of plutonium. There also emerged a problem of opposition from local residents of the South Pacific islands to the Japanese plan for experimental ocean dumping of low-level radioactive waste.

Japan's nuclear power development is at a critical point. A national project in which 26 years' time, ¥8,000 billion yen and 40,000 men have been invested is at a junction as to whether or not it can grow into a viable energy alternative. With a view to overcoming various obstacles, it is mandatory for the Government to be more candid about the problems of nuclear energy development and more forceful in presenting its case in an attempt to persuade the nation to a logical conclusion.

CSO: 4120

SCIENCE AND TECHNOLOGY

NUCLEAR REACTORS OPERATED WELL DURING YEAR

Tokyo JAPAN TIMES in English 7 Jan 81 p 5

[Text]

The rate of operation of Japan's 21 working nuclear power reactors exceeded 60 percent on an annual average last year for the first time in six years, the Natural Resources and Energy Agency reported Tuesday.

The corresponding figure for 1979 was a meager 49.3 percent, or 11.9 percentage points lower than the 1980 figure, due primarily to the impact of the Three Mile Island power station mishap in the United States.

Agency officials attributed the unexpectedly good performance to more efficient inspections, improved operation management supervision procedures and other measures taken as a result of the U.S. nuclear plant accident in the spring of 1979.

By reactor type the average rate of operation was 63.4 percent for 11 boiling-water reactors (BWRs), 58.3 percent for nine pressurized water reactors (PWRs) and 69.7 percent for one gas cooled reactor (GCR).

The previous high of 62.0 percent was registered in 1974 when the nation had only eight operational nuclear power reactors.

The government's electricity supply plan set as a goal the average rate of operation for nuclear power plants at 56.4 percent for fiscal 1980 ending this March.

The agency officials said that this target could be attained without difficulty by March this year "unless a major accident occurs."

Two more nuclear power reactors are scheduled to be put into commercial operation this year. And the officials said they were confident of the feasibility of maintaining an operation rate of 60 percent or more for several years to come.

Given the legally-stipulated regular inspection period of three months a year at each reactor, a rate of operation close to 70 percent practically means full operation, they added.

Thanks to the good performance of nuclear reactors, the nation's nuclear power plants combined to supply about 13 percent of the total electricity output last year, industry sources said.

CSO: 4120

SCIENCE AND TECHNOLOGY

LEAGUE FOR INFORMATION INDUSTRY WANTS DEVELOPMENT OF SUPER COMPUTER

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 9 Dec 80 p 16

[Text] The Diet Member's League For Information Industry (Chairman Narimasa Kura, Member of the House of Representatives) and the Information Industry Investigation Committee (Chairman Morihiro Hosokawa) held a joint liaison conference, decided on the fiscal 1981 projections for development of the information industry, and submitted this resolution to the LDP's three top-ranking officials and the Taxation System Investigation Committee. The resolution emphatically points out that "If a short-term financial condition is used as an excuse to delay the projections for the development of the information industry, the vitality of our national industry will be scaled down and social activities will be retarded, which consequently may leave unattended the root for future troubles." Furthermore, it deftly seeks the realization of promotion policies such as, to begin with, approval of research and development works for a large project, "Science and Technology Use Highspeed Computer System" (commonly called super computer), expansion of credit ceiling by the Japan Development Bank for the promotion of home-made computers, and extension of the time limit applicable for the computer repurchase loss reserve system. The office of the Ministry of the Finance, eager for financial reconstruction, weilded an ax during the budget compilation, and especially severely revised the policy for aiding the information industry and indicated a disapproval of new research and development. Under the circumstance, the large project for super computer research and development, the highlight of the resolution presented this time, will be the major focus in questioning the budget compilation procedure.

On the 3rd, the Diet Member's League For Information Industry consulted about fiscal 1981 projections for development with industrial leaders Chairman Taiyu Kobayashi of Japan Electronic Industry Development Association (President of Fujitsu Limited), President Masao Miyake of Oki Electric Industry Company, Limited, Vice President Atsuyoshi Ohuchi of Nippon Electric Company and Vice President Tomio Tanatsugu of Toshiba Corporation. During the deliberation, the industrial leaders requested: "We hope the next fiscal year budget approves super computer research and development projects concerning the national security in the areas of nuclear power, meterology and earthquake control." In consideration of the request from the industries, the Diet Member's League and the Committee held the joint liaison conference and concluded the resolution concerning the fiscal 1981 projections.

Following are the essentials of the resolution.

Budget: (1) Science and Technology Use Highspeed Computation System Research and Development (75 million yen, none for 1980), (2) Investigation Pertaining to the 5th Generation Computer Research and Development (15 million yen, none for 1980), (3) Promotion of the Next Generation Computer Basic Technical Development (6 billion 300 million yen, 5 billion 785 million yen for 1980), (4) Pursuit of Software Related Technology (2 billion 997 million yen, 2 billion 281 million yen for 1980).

Treasury Investment and Loan: (1) Japan Development Bank Loan For Computer Development (52 billion yen, 48 billion yen for 1980), (2) Monetary Measure For Development of Information Processing, Subscription of Bank Debenture (5 billion yen, 5 billion yen for 1980).

Taxation System: (1) Extension of the time limit applicable for the computer repurchase loss reserve system, (2) Extension of the time limit applicable for the program reserve system.

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CSO: 4105

SCIENCE AND TECHNOLOGY

RAILWAY MAGNETIC PROJECT ENTERS SECOND PHASE

Tokyo JAPAN TIMES in English 5 Jan 81 p 2

[Text]

The Japanese National Railways' experimental linear motorcar MLU-001 is seen on a test guideway at the JNR's floating railway test center in Hyuga, Miyazaki Prefecture.

MIYAZAKI (Kyodo) — The Japanese National Railways' project to develop a high-speed train that would run as fast as the YS-11 twin turboprop transport by means of magnetic levitational force has entered the second stage, with the JNR beginning levitational test runs with a test car capable of carrying passengers toward the end of 1980.

The JNR plans to conduct test runs of a two-coach linear motor car train capable of carrying passengers around this autumn.

JNR engineers say they actually might test three-coach train with passengers on board.

The prospects are also getting brighter for a plan to construct a 40-km test guideway for manned linear motor trains this year.

JNR engineers say they are confident that they will develop a commercial linear motor train by the middle of the 1980s.

A linear motor car floats along a guideway using magnetic levitational force. Thus it can run at a speed far faster than trains running on rails.

JNR engineers demonstrated this with unmanned test cars named ML-500 that set a speed record of 517 kph toward the end of 1979.

The newly-developed test car named MLU-001 is 3 meters wide, 3.3 meters tall and 10 meters long and is capable of carrying passengers.

However, it is now filled with measuring equipment instead of men.

Akira Tachibana, chief of the JNR's floating railway test center in Hyuga, Miyazaki Prefecture, says that data collected from test runs of MLU-001 indicates that passengers aboard the linear motor car would feel just as comfortable as they would aboard an airliner.

JNR engineers at the test center say that tests as the center will conclude by the end of 1983 and the next stage will be test runs on a 40-km test guideway which will be same as commercial guideways.

If tests on such a guideway end in success, the guideway will be extended to a commercial guideway which is likely to be built as part of the

planned second Shinkansen, Chuo Shinkansen, linking Tokyo, Nagano, Nagoya, and Osaka.

An official at the Shimonoseki construction bureau of the JNR says that from the viewpoint of continuity of experiments, the 40-km test guideway plan must be drawn up before the end of this year.

JNR engineers say a commercial linear motor car will be twice as long as the present test model MLU-001 but other dimensions will be almost same as MLU-001. Each coach will have four rows of seats and be capable of carrying 1,400 passengers.

A train of linear motor cars will be operated by one engineer and two conductors using a computerized control system.

A JNR engineer says technical feasibility of linear motor cars has already been confirmed and whether they will be in commercial operation or not depends on when such super vehicles will be needed.

Thus the JNR plans a demonstration operation of linear motor cars on the occasion of the planned science exposition to be held in Tsukuba Academic City in Ibaraki Prefecture, in 1985, and the Nagoya Olympics, if the event is to be held in Nagoya, in 1988.

Another plan under study is to enter a linear motor car in the world traffic exposition scheduled to be held in Vancouver, Canada, in 1986.

The problem with these plans is the cost, estimated at ¥50 to ¥60 billion.

CSO: 4120

RAILWAY TECHNICAL AID EXTENDED TO U.S., PRC

Tokyo JAPAN TIMES in English 3 Jan 81 p 2

[Article by Masato Kawahira]

[Text]

Overseas technical cooperation is probably the sole topic that officials of the deficit-ridden Japan National Railways (JNR) can be happy talking about.

They are confident of their railway engineering capabilities and proud that JNR, a state-owned corporation, is extending technical assistance to many countries of the world as part of Japan's foreign aid program.

JNR's railway knowhow is highly regarded overseas, and requests from other countries for technical cooperation to improve their railway systems have been increasing ever since the JNR's proudest achievement, the Shinkansen bullet train, began service in 1964, a JNR official explained.

Such requests have been increasing of late, he said, because many nations apparently have come to realize the importance of fuel-efficient railroads with the current renewed interest in mass transit since the two grueling rounds of the oil crisis in the 1970s.

JNR sends its experts abroad and receives foreign trainees through the Japan International Cooperation Agency (JICA), a government foreign aid organ, and the Japan Railway Technical Service (JARTS), a semi-private organization. Most of the funds needed for overseas cooperation are borne by the two bodies.

JNR sent 81 technicians abroad in 1977, 94 in 1978, and 145 in 1979. Almost as many were dispatched last year, to nearly 100 countries. The corporation received 520 trainees from abroad in 1977, 576 in 1978, 679 in 1978, and 768 in 1979. The number last year was about 800.

JNR's overseas cooperation began in 1954, when Japan became a member of the Colombo Plan, an international organization formed by the British Commonwealth for promoting economic development in the Third World.

JNR's assistance is not limited to the developing countries of Africa, Asia and South America, but extends to industrialized states such as the United States, and to socialist states including China.

Japan plans to provide ¥419.6 billion worth of official development assistance (ODA) during fiscal 1981, about 9.7 percent more than in the current fiscal year ending next March 31. Assistance for railway engineering and consult-

ing accounts for only a small portion of the ODA total. Nonetheless, JNR officials point out, railway technological cooperation plays an important role in improving Japan's image as a major economic power.

JNR cooperation includes assistance in "double-tracking" of existing railway lines for the expansion of transportation capacity, conducting feasibility studies on projected lines, modernizing urban transport systems as part of city planning, planning integrated transportation systems that include railroads, and evaluating the economic impact of such projects.

JNR officials also note that inquiries from abroad requesting other JNR-developed knowhow such as its modern railroad maintenance procedures, railway network management system, and human resources development programs, have been on the rise.

Some of the major projects that have received — or are receiving — JNR assistance are the "Northeast Corridor Improvement Project" (NECIP) in the eastern U.S., the electrification of Mexico City's trunk line, the construction of the Roca railroad in the suburbs of Buenos Aires, the modernization of lines in northeastern China and the construction of a railroad bridge at Matadi in Zaire.

U.S. Lagging

The United States, JNR officials noted, is lagging behind Japan, France, West Germany and Britain in railway technology. Its outdated rail knowhow is in sharp contrast to its highly-developed aerospace technology, achieved through the costly Apollo program, they said. They explained that railroads provide only a small percentage of U.S. mass transportation needs.

In the early 1970s, however, the federal government decided to improve the 192-km line between Boston and Washington at a cost of ¥1.9 billion in order to meet the steadily growing demand for inter-city transportation. Amtrack, the closest U.S. equivalent to the JNR, plans to operate trains at a maximum speed of 120 k.p.h. in the "corridor," when the project is completed in late 1982 at an estimated cost of ¥2.5 billion.

Japan had been cooperating in the reconstruction project on the so-called "JARTS" basis since 1976, but at the request of the U.S., the assistance was upgraded to the intergovernmental level in 1979. In addition to two JNR staff members stationed in Washington, JNR plans to dispatch experts in signals, electrification, train operation and maintenance to the U.S. this year.

Irapuato Line

The Mexican National Railway Corporation, which operates some 20,000 km of railroads has been pressed beyond its capacity in the face of the burgeoning demand for cargo transportation.

The government consequently decided to electrify about 2,000 km of major lines at a cost of some $1 billion, and asked major industrial countries to conduct feasibility studies for the 350-km section connecting Mexico City with Irapuato via Queretaro.

In 1979, France won the consultancy contract in international bidding for the 250 km Mexico City-Queretaro stretch. Japan failed in the bidding, but was later asked by Mexico to evaluate the French study. A total of 15 JNR, JICA and JARTS officers were dispatched for the evaluation between May and December, 1980.

Mexico plans to open orders for signal facilities, telecommunications equipment, and coach-manufacturing for the new line to international bidding soon. Japanese industries have high hopes of winning a big share of the orders.

Roca Railroad

The 20-year-old negotiations between a Japanese business consortium headed by Marubeni Corp., and the Argentine National Railway Co. are coming to a successful conclusion, according to industry sources.

The talks are on Japan's cooperation in electrifying the Roca line stretching southward for 130 km from Buenos Aires at an estimated cost of ¥130 billion.

The engineering work for the line started in February 1973, but was suspended due to the first energy crisis. In 1979, the Japanese consortium reached an agreement with Argentina for the first phase of the project, the renovation of the 45-km line between Plaza Constitution Station and Glew Station.

But the agreement was nearly scrapped in October of that year, when President Jorge R. Videla visited Tokyo and called for some $50 million in investment from Japan in the expansion of the Somisa steel mill's output capacity in exchange for Japan's participation in the Roca project.

The Japanese consortium has recently agreed to invest in the Argentine steel industry to pave the way for an early resumption of the railway project, sources said.

Full Scale Aid

Since 1979, Japan has been sending JNR experts and accepting Chinese trainees to help work out programs for modernizing major railroads connecting Beijing and regional cities. The JICA-sponsored cooperation is due to end in March, 1981, but China hopes

Japan will continue its assistance beyond that date.

Railway reconstruction is one of the main "pillars" of China's four-point modernization scheme which pragmatist leader Deng Xiaoping has been vigorously pushing forward.

In 1979, the late Prime Minister Masayoshi Ohira visited Beijing and pledged to extend ¥50 billion in soft loans to help China carry out six major development projects — in addition to the ¥56 million extended to China last year.

Among the six projects are plans to reconstruct three lines — the Beijing-Qinhuandao, the Yanzhou-Shijiusuo, and the Hengyang-Kwangzhou — for which about ¥38 billion from the 1979 and 1980 Japanese loans has been alloted.

JNR expects China to seek its consulting and engineering services once full-scale construction begins. But the project is making only slow progress, JNR officials said, because the Beijing government has been conducting a thorough review of its economic development programs.

Personnel Exchanges

In 1974, Japan signed an agreement extending a ¥34.5 billion soft loan to Zaire to help construct a railroad between the Banana seaport and Matadi for the transport of copper ore.

The project was soon scaled down, however, to cover only the construction of the 800-meter-long Matadi railway bridge — due to a sharp drop in world copper prices, serious domestic inflation and the instability of the Zairean government.

The construction of the bridge started in February 1979. Sixteen Japanese engineers, including 9 JNR officers, were sent to Zaire to help carry out the project due to be completed by the end of 1984.

Japanese railway cooperation with Zaire has encouraged business transactions and personnel exchanges in broader areas between the two nations, JNR officers added.

Similar railway based cooperation is also being promoted in Brazil, Bolivia, Thailand, Indonesia, the Philippines, New Zealand and several other countries.

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SCIENCE AND TECHNOLOGY

LIBYA STEEL MILL CONSTRUCTION ORDERS WON

Tokyo JAPAN TIMES in English 19 Dec 80 p 6

[Text]

Libya has awarded Japanese firms cash-on-delivery contracts for construction of steel mills in Misurata, east of Tripoli, capping years of marathon negotiations, sources said Thursday.

A Japanese-Mexican consortium, led by Kawasaki Heavy Industries Ltd., has landed a ¥90 billion (about U.S.$ 430 million) contract to build two 550,000-ton-a-year direct-reduction iron mills, after underbidding the Korf Group of West Germany and other companies.

The contract is expected to be signed in Tripoli shortly.

The mills, based on technology developed by Mexico's Hylsa, will be powered by locally abundant natural gas. They are designed to serve as the core of the Misurata integrated steel complex.

The Libyan Government-owned Corporation for Iron and Steel Projects has also selected the group of Kobe Steel Ltd. and Mitsui & Co. as the successful bidder for construction of steel bar, wire rod and shape mills and water treatment and other related facilities for the steel complex.

This contract is valued at ¥160 billion ($760 million).

Among the unsuccessful bidders were West Germany's Schloemann-Siemag A.G.

The bar and wire rod mill will have annual capacity of 400,000 tons and another mill will be capable of producing 120,000 tons of shapes and beams annually.

The Misurata projects are included in Libya's five-year development plan, which began in 1976.

The mammoth steel complex, with an annual capacity of 1.26 million tons, is estimated to cost the equivalent of ¥700 billion ($3.3 billion).

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SCIENCE AND TECHNOLOGY JAPAN

POLYCRYSTAL SILICON PRODUCTION WILL RISE

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 8

[Text] Production of polycrystal silicon, a starting material for semiconductor substrates, will exceed 460 tons this year, representing a 40 per cent increase from last year.

This prediction was announced last week by the Japan Society of Newer Metals, a trade association comprising 35 companies.

According to the organization, polycrystal silicon output in the first 10 months (January-October) of this year totaled 380 tons, up 44 per cent from the same period of last year.

The high growth is expected to continue for some time as domestic demand for semiconductors remains very strong. However, polycrystal silicon exports have been marking time due mainly to the recession in the U.S., the largest customer.

Polycrystal silicon is made by purifying metallic silicon which is smelted from silica. Polycrystal silicon is processed into single-crystal silicon. Single-crystal silicon is then cut into a slice about 0.5 mm thick and the slice is polished to become a silicon wafer on which circuit geometries are printed.

Most of the polycrystal silicon produced in Japan are for transistors, integrated circuits and solar batteries. Demand for polycrystal silicon thus grows in parallel with that for semiconductors.

Production of semiconductors has been rising greatly in Japan. These strong semiconductor demands keep polycrystal silicon producers busy, the association said.

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SCIENCE AND TECHNOLOGY

JAPAN

HITACHI APPROACHES NISSAN MOTOR TO PRODUCE ROCKET FOR SPACE USE

Tokyo JAPAN ECONOMIC JOURNAL in English 23 Dec 80 p 8

[Text] Hitachi, Ltd., a leading electric-electronic appliance and machinery maker, is preparing to branch out into the defense equipment field by tieing up with Nissan Motor Co.

A Hitachi spokesman said that his company had recently approached the nation's No. 2 automaker in a move to work together in research and development of rockets for defense and space exploration.

The spokesman also said that Fuji Heavy Industries, Ltd. may join the Hitachi-Nissan team in developing new missiles. Fuji HI, associated with Nissan Motor, owns accumulated know-how on flying objects in its aircraft division.

The current bargaining is aimed at combining Hitachi's electronic control technology with Nissan's rocket-related expertise. Reports have it that both companies are ready to exchange each other's experts and engineers in the two sectors as a preparatory step toward their final target of fully advancing into the defense and space equipment field about five years hence.

In reforming its organizational setup last August, Hitachi created the Defense Technology Development Division in an effort to bolster its sales of defense supplies and equipment.

Hitachi lags far behind other major electrical machinery makers in delivering equipment to the Defense Agency. The company was not listed in the ranking of the 20 biggest order winners from the agency in fiscal 1979. Hitachi's order receipts in the year rested at ¥6,000 million, while its three rivals, Mitsubishi Electric Corp., Toshiba Corp., and Nippon Electric Co., ranked second, fifth and sixth with ¥53,900 million, ¥16,600 million and some ¥16,600 million, respectively.

Nissan Motor, the sole maker of solid fuel-powered rockets in Japan, chalks up an annual ¥12,000 million in its aerospace division's sales of rocket ammunitions, missile propulsion parts and other components for defense use and space development.

Hitachi and Nissan will thus strive to build up their accumulation of elementary techniques related to their joint project in preparation for possible inquiries of the Defense Agency for rockets as well as missiles.

As for aeromechanics needed to develop missiles, the two companies intend to ask Fuji HI to cooperate with them in that field.

Hitachi now supplies Nissan with automotive electrical equipment.

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SCIENCE AND TECHNOLOGY

SEMICONDUCTOR MAKERS' CAPITAL OUTLAY WILL GO UP 50 PERCENT

Tokyo JAPAN ECONOMIC JOURNAL in English 23 Dec 80 p 9

[Text] Japan's 11 semiconductor manufacturers are expecting the upsweep in production and sales to continue during the second half of the 1980 business year as it did during the first half, informed local industrial sources reported recently.

Thus, they are planning correspondingly great increases in current annual capital expenditures (investments to expand production lines) even over last year's all-time record.

Accroding to the sources, this year's first-half semiconductor production and sales of the 11 companies were simply excellent. Their combined output swept up as much as 42 per cent over the corresponding period last year. Such an upsweep in semiconductor production reflected a huge increase in exports to the U.S. of computer memory chips, chiefly of the 16-kilobit RAM (random access memory) type, and continuing brisk expansion in domestic demand for other semiconductors including transistors, which are a specialized discrete type. Such domestic demand growth, in turn, resulted from a continuing increase in domestic demand for microprocessors (mirocomputers) and a long-lasting increase in both domestic and international demands for home video tape recorders (VTR) whose world production is now 90 per cent concentrated in Japan.

40% more output

In the light of such a boom, which could be traced back to last year or the year before, the sources tentatively figured the industry's annual semiconductor production in the 1980 business year would run up to something around ¥920 billion, 40 per cent up from last year, though so far they have had to piece together either sales or production values provisionally estimated by the 11 makers for such a prediction.

As for the entire makers' planned current annual capital expenditures, the sources gave a total of ¥170 billion, no less than 50 per cent up from last year, wherein the corresponding total had hit a record peak of ¥110 billion. All the companies have invariably revised their original plans upward since the middle of this year apparently in view of continuing snowballing sales.

The sources also recalled that until a few years ago, the semiconductor divisions of the 11 companies had been invariably frowned on by their own people as money-guzzling liabilities. But the picture had changed dramatically by last September when every such division came out as the top-earner in each company when eight of the 11 companies provisionally closed their accounts for the six-month period ending that month, the sources said.

These companies' semiconductor export situation has somewhat changed since the start of the current second half of this year, the sources also reported. This was chiefly because of the protracted American recession, they said.

A resultant decline in the hitherto snowballing exports of memory elements, chiefly 16K dynamic RAM chips, to the U.S., their most important foreign market, has resulted in a rapid weakening in international market prices of such elements. In the case of the 16-kilobit RAM chips, the mainstay export item accounting for about 60 per cent of all foreign sales of memory elements, the international per-unit prices, standing at the $6 level at the beginning of this year, were found to have dipped to the $4 level by the middle of this year, and some makes are said to have even fallen off to the $2 level recently.

Most such semiconductors are expensive at the start of marketing because the production yield, the output of products passing quality inspections, is as low as several per cent. But that yield quickly pushes up yearly to send down prices by an average of about 30 per cent a year. The international market prices also go down correspondingly.

But the 16-kilobit RAM type had been an exception to such a price fall pattern for two years until early this year because of a great supply shortage.

SCIENCE AND TECHNOLOGY

SEMICONDUCTOR PRODUCTION IS CLIMBING AT FAST RATE

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 8

[Text] Production of semiconductors in the third quarter (July-September) of 1980 rose 40.3 per cent from the year-earlier level to ¥228,080 million, the Ministry of International Trade & Industry reported recently in its production trend statistics.

The high increase rate mirrored the growing demand for semiconductors, mainly from VTR producers and automakers.

Third quarter production broke down into ¥151,769 million, up 54.7 per cent, for integrated circuits and ¥76,311 million, up 18.4 per cent, for discrete semiconductors.

Exports of semiconductors in the July-September quarter rose 48.3 per cent to ¥63,197 million, according to the Finance Ministry's customs clearance statistics. The export value represented a 2.9 per cent decline from the predecing quarter, indicating a slowdown in semiconductor exports.

Imports of semiconductors in the third quarter of 1980 rose 16.1 per cent from the same quarter of 1979 to ¥37,003 million. They showed a 6.3 per cent gain from the preceding quarter.

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The particular type of semiconductor thus has certainly lost its outstandingly high profit margin attraction. But the export slowdown has been more than offset by the growth in domestic demand for other kinds of semiconductors.

Changing production mix

As things stand, some makers are changing their production shares by item. Nippon Electric Co., the largest maker, has already started cutting down by about 10 per cent its 16-kilobit RAM production, while increasing its manufacture of large-scale integration (LSI) chips for making electronic calculators, erasable/programmable read-only memory (EPROM) chips, microprocessors, and discrete semiconductors.

Hitachi, Ltd. is similarly adapting its production, but it is now concentrating on integrated circuit (IC) chips, having stopped production of discrete types. The company is paying more attention to the 64-kilobit RAM type as the potential next generation of the hottest selling semiconductor item.

Toshiba Corp. and Mitsubishi Electric Corp. are building up transistor production to make the most of domestic demands. Fujitsu Ltd., after sharply building its sales chiefly with its memory chips, has turned conservative in its current annual sales prospects for electronic components.

But Matsushita Electronics Corp., Sharp Corp., Tokyo Sanyo Electric Co. and Sony Corp. are expecting continued brisk sales of transistors for VTRs and microprocessors for consumer electronics to keep them at capacity operation as far as the year-end.

Fuji Electric Co. is similarly optimistic, with additional hopes for new products emerging from its recent technological tieup with the Siemens group of West Germany, and its promising solar cell business.

The informed sources, however, said the enormously expanding capital expenditure plans of these companies, unlike last year, now involve complex policy considerations beyond conventitnal semiconductors. Much of their mounting capital spending projects has been motivated by their awareness of the need for setting ready for tomorrow's mass production of the very large-scale integration (VLSI) elements in fierce competition with one another. VLSI factory construction have already been started by many of them, but such ventures are enormously expensive. Such competitive investments, could be a gamble because the VLSI technological prospects are still volatile.

Capital Spending for Semiconductor-Manufacturing Facilities and Semiconductor Production Value

(In billions of yen)

	Plant & equipment investments			Production value			
		1980				1980 (Outlook)	
	1979	Original	Revised	1979	1st half of 1980	Original	Revised
Nipon Electric	27 (+74)	30	32 (+19)	157.5 (+32)	108 (+49)	204.5	222 (+41)
Hitachi	15 (+50)	20	23 (+53)	130 (+30)	78 (+30)	165	170 (+31)
Toshiba	10 (+67)	10	13 (+30)	100 (+18)	68 (+40)	130	140 (+40)
Fujitsu	16 (+38)	22	27 (+69)	56.5 (+98)	38.8 (+60)	90	85 (+50)
Matsushita Electronics	10 (+100)	17	20 (+100)	50 (+25)	36 (+60)	65	80 (+60)
Sharp	8.8 (+340)	3.3	8.5 (—3)	56.3 (+46)	34.4 (+28)	67	73 (+30)
Mitsubishi Electric	8 (+33)	10	10 (+25)	44 (+14)	29 (+38)	54	60 (+36)
Tokyo Sanyo Electric	4.3 (+187)	8	8.5 (+98)	31 (+24)	20 (+30)	40	41 (+32)
Oki Electric Industry	5.5 (+62)	12	13.4 (+144)	19.2 (+64)	12.3 (+36)	26	28 (+46)
Fuji Electric	1.8 (+20)	2.4	3 (+67)	15 (+10)	11 (+57)	N.A.	23 (+53)
Sony	5 (+11)	8	8 (+60)	N.A.	N.A.	N.A.	N.A.
Total of 11 companies	111.4 (+66)	142.7	166.4 (+49)	659.5 (+32)	435.5 (+42)	—	922 (+40)

Note: Percentage change from the same period of a year earlier in parentheses. Production value includes in-house consumption. Total of electronic components for Fujitsu, Sharp and Oki Electric Industry. Production value for Fuji Electric include those imported from Siemens of West Germany. Business year ends in October for Sony, in November for Tokyo Sanyo Electric, in December for Matsushita Electronics and in March for the rest.

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SCIENCE AND TECHNOLOGY

EXPERIMENTAL ARRAY PROCESSOR DEVELOPED

Tokyo NIKKEI ELECTRONICS in Japanese 8 Dec 80 pp 74-80

[Article: "Array Processor for Two-Dimensional Processing Developed"]

[Text] The Musashino Electrical Communications Laboratory of the Nippon Telegraph and Telephone Public Corporation has built an experimental array processor with processing elements arranged in two dimensions (Aoki, Kondo, Nakajima, and Sudo, DENSHI TSUSHIN GAKKAI GIJUTSU KENKYO HOKOKU, SSD80-53, October 1980).

The trial processor is built around an array processor comprising 256 processing elements (PE), with one bit as the processing unit, in a 16 by 16 matrix. This array processor uses LSI's of 4 PE's (2 x 2); the machine cycle is 270 ns. LSI's which bring together 64 PE's (8 x 8) on one chip are now being attempted; the machine cycle is to be 100 ns. Evaluated in terms of matrix operation, two-dimensional FFT (Fast Fourier Transformation) and character recognition at speeds 10 to 100 times those of existing high-speed computers (CRAY 1 and ILLIAC IV) can be expected.

The concept of this sort of array processor, having an orderly arrangement of large numbers of processing elements all with the same basic structure, is an old one. The characteristics are, in addition to simplification of hardware because of the orderly structure, the expectation of increased processing capability because of parallel operation of processing elements and the application to two-dimensional processing such as image processing or matrix operation. A number of systems like ILLIAC IV have been developed so far, but none could really be called successful. The reasons for this are that they lack general utility and that too much hardware is involved. Their practicality in terms of cost and performance has been another point.

But because this array processor has a highly regular structure, it is well suited to large-scale integration, and the recent progress in integration technology has laid a foundation for making even fairly large-scale array processors at relatively low costs. In consequence, the waning enthusiasm for array processor development has been revitalized. With the development of STARAN, the famous American Goodyear Aerospace Company is now under contract to NASA to develop an MPP (massively parallel processor) array processor comprising 16,384 elements (128 x 128) for use in analysis of images from satellites.

The structure of the system built by the Musashino Laboratory is shown in Figure 1. Because the array processor is a type of specialized device, it operates as a backend processor with a general-use computer as host. Operation of the array processor is in the SIMD (single instruction multiple datastream) mode; on receipt of an instruction from the host computer, the single instruction is carried out by each processing element. In the experimental system, the host computer is a PDP 11/34. LSI's bearing 4 PE's (Figure 2)[not reproduced] are used in the array processor. The LSI's characteristics are shown in Table 1. The experimental array processor has been built with 16 of these LSI's, and is thus equipped with 256 elements (16 x 16) (Figure 3) [not reproduced]. An LSI which packs 64 PE on one chip (Figure 4) [not reproduced] has been tested; its characteristics are shown in Table 2.

The processing elements (PE) are composed of arithmetic and memory sections; the processing unit for data is one bit. Each PE is connected with the eight PE's adjacent in horizontal, vertical, and diagonal directions.

A PE block diagram is shown in Figure 5. It is divided into an arithmetic section (including memory section) and two data transfer sections. Because these can operate independently, it is possible, for example, to transfer data during an arithmetic operation. The ALU carries out arithmetic or logic operations in one-bit units. The register file is memory to hold arithmetic data and control data; in the case of the experimental LSI (8 x 8 structure) the memory capacity per PE is 96 words x 1 bit. Of these, eight words are used as a control register. Each selector selects one of the input lines in accordance with the control signal and outputs to it. By the operation of the selector it is possible to change connections between PE's or connections within a PE.

The various control signals are distributed from the host computer to these PE's by the broadcast method. These signals can direct the operations of the ALU, provide addresses to the register file (addresses for arithmetic data A and B and for control data S can be specified simultaneously), or control individual selectors. Since the same control signals can be broadcast to all PE's, each PE can perform basically the same operation.

If the PE selectors all performed the same operation because of the control signal from the host computer, the interconnections within and between PE's would be the same and would be unable to adapt to the structure of the data involved in the operation. Thus, the selection control in each selector can respond not only to control signals from the host computer but also to control signals from the register file(s) and signals put together from the contents of register R1. As stated above, an eight-word portion of the register file of each PE is reserved for control data; these control data are established in advance by the host computer. Since different control data can be established for each PE, it is possible to change the interconnections of individual PE's without a uniform change.

By this means, it is possible to operate a single PE independently, or to operate data serially through four PEs as with data j in Figure 6, or to conduct parallel operations on multiple data (i), (i-1) and (i-2) in that figure. And it is possible to perform multiple operations simultaneously if the PE's involved do not overlap.

Consider the example of the addition of data (i), (i-1) and (i-2) in Figure 6. Each of the data is housed in the register file of a given PE. In each case, the most significant bit (MSB) is the farthest to the left. Addition proceeds from top to bottom, and the result is accumulated in the PE where data (i) was located. Besides sending an addition ($X+Y+C_i$) instruction to the ALU's of all PE's, the host computer provides the appropriate control signals to the selectors to carry out the addition of the three data (including address assignment to the register file in order to read out the desired control register B). In this example, the selector control prevents carrying to processing elements 44, 54, and 64 (by choosing "0" in selector 6) and cuts off data input to processing elements 41, 42, 43 and 44 from the upper adjacent PE. Selectors are controlled in such a way that processing elements 51, 52, 53, 61 and 62 and 63 do receive carrying input from right adjacent PE (CIR is chosen in selector 6) and data from upper adjacent elements are input to their ALU's (passing through selector 1 and selector 5).

As seen in this example, because operations on multiple data are executed by asynchronous logic, the operation time varies with the number of operands. In the experimental LSI (8 x 8), the critical path delay of a single PE is 33 to 34 ns. Thus, an operation which progresses through m PE's would require about (33 x m) ns. The machine cycle of 100 ns in Table 2 is calculated from the average length of operations.

The problem with this sort of array processor is that it consumes time in exchanging information with the host computer. As seen in Figure 1, generally only the uppermost rank of PEs (or a portion thereof) can exchange data directly with the host computer, so an exchange with other PE's requires that the data be shifted between the desired PE's and the uppermost rank. In order to reduce the slowing of throughput from this sort of transfer, each PE is given memory of considerable capacity (register file), and a bypass for transfer use is established (in the planned LSI, bypasses are placed between the top and bottom PE's and between those to the extreme left and right). As mentioned above, there is a data transfer section in each PE and it is possible to send data through in any of eight directions.

In the array processor system using the experimental LSI, there is the capability for processing the various functions of two-dimensional FFT, matrix multiplication, and multifont printed Kanji recognition. Figure 7 shows the capability for two-dimensional FFT operations. What would require a processing time of 100 ms in the ILLIAC IV, with an array size of 400 x 400, is handled in 4 ms or less by this array processor. Its processing time for matrix multiplication is 1/10, or less that of the CRAY 1.

Thus this array processor is powerful in specified applications. Its uses, however, are still limited, and it is necessary to develop new applications and software to accompany them. Architecture corresponding to the application is also needed.

FIGURE APPENDIX

Figure 1: Basic structure of array processor system. On command from host computer, all processing elements execute same command in parallel.

Key: (1) host computer
(2) control section
(3) array processor
(4) PE: processing element

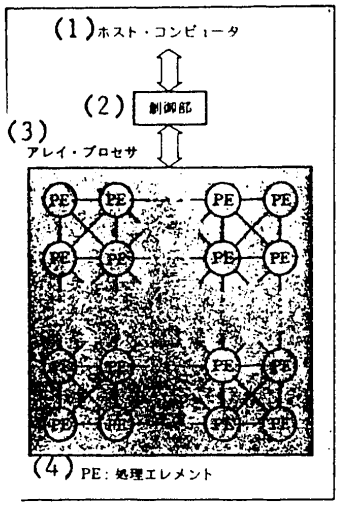


Table 1: Characteristics of tested LSI (2 x 2).

Number of PE's	2 x 2
data processing unit of PE	1 bit
memory capacity in PE	64 words (x 1 bit)
gates	2000
technology	4.4 μm rule n channel E/D MOS
power consumption	400 mW
machine cycle	270 ns
number of terminals	64

Table 2: Characteristics of experimental LSI (8 x 8)

Number of PE's	8 x 8
data processing unit of PE	1 bit
memory capacity in PE	96 words (x 1 bit)
gates	20,000
technology	3 μm rule n channel E/D MOS
power consumption	3 W
machine cycle	100 ns
number of terminals	125

Figure 2: Photograph of tested LSI (2 x 2) chip. Size of chip is 4.5 x 5.5 mm.

Figure 3: External view of test array processor. It uses 16 LSI's with 4 PEs each, for an array processor board with 256 PE's (16 x 16).

Figure 4: Mask pattern for experimental LSI (8 x 8). Size of chip is 7.4 x 8.2 mm.

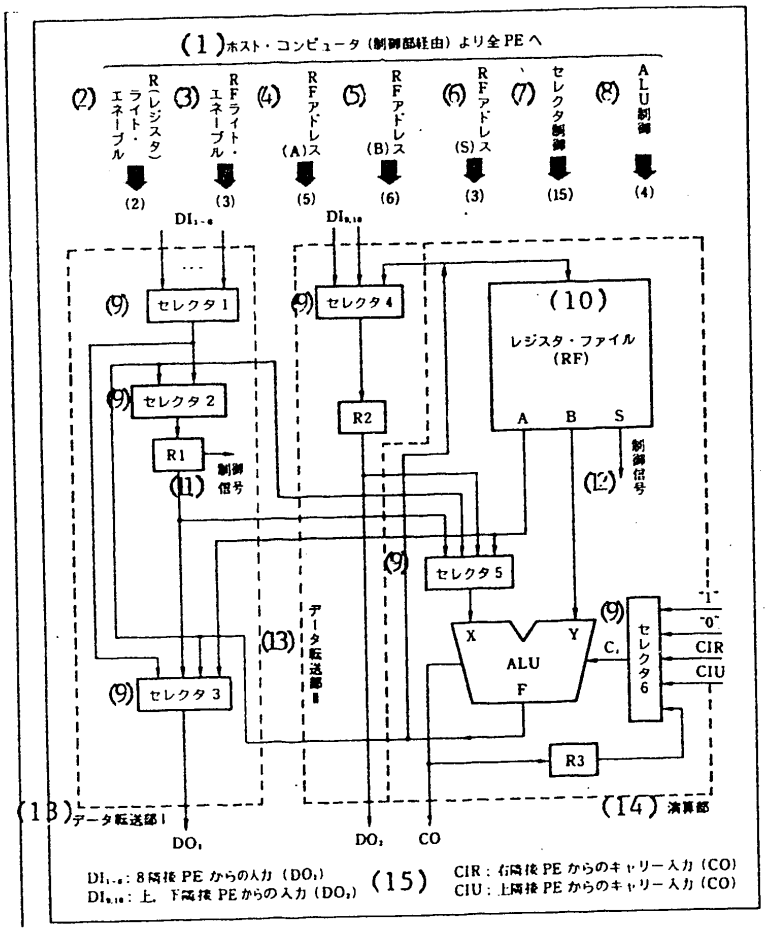


Figure 5. Structure of processing element.

Key: (1) from host computer (through control section) to all PE's
(2) R (register) write enable
(3) RF write enable
(4-6) RF address
(7) selector control
(8) ALU control
(9) selector (1 through 6)
(10) register file (RF)
(11, 12) control signal
(13) data transfer section (I and II)
(14) arithmetic section
(15) DI_{1-8}: input from 8 adjacent PEs (DO_1)
$DI_{9,10}$: input from upper and lower adjacent PEs (DO_2)
CIR: carrying input from right adjacent PE
CIU: carrying input from upper adjacent PE

Figure 6. Arithmetic method of array processor. Specified PE's can carry out serial or parallel operations. Multiple operations can be performed simultaneously.

Key: (1) data (i, i-1, i-2 and j)

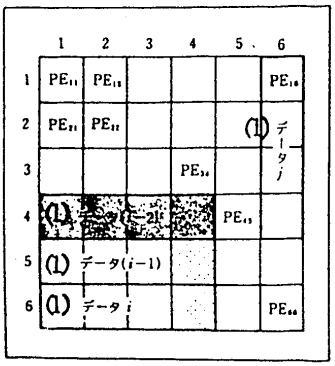
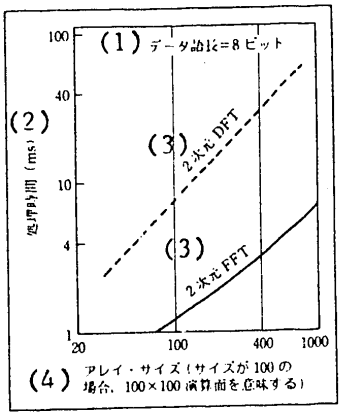


Figure 7. Operational capability for two-dimensional FFT (Fast Fournier Transfer).

Key: (1) data word length + 8 bits
(2) processing time
(3) two-dimensional (DFT and FFT)



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SCIENCE AND TECHNOLOGY

JAPAN SHARPENS MACHINE TOOL COMPETITION

Tokyo DAILY YOMIURI in English 19 Dec 80 p 5

[Text]

Japan's Ministry of International Trade and Industry (MITI) is trying to hose down overheated trade relations with Western Europe by creating a price cartel to curb fast-growing exports of machine tools. Although higher prices on some Japanese machine tools could help calm European tempers, they do not look like stopping the drive which has made Europe Japan's fastest-growing export market for its machine tools.

Sales of Japanese machine tools to Europe are expected to be worth around $290 million this year, an 80 percent increase over 1979. West Germany will take the biggest chunk of these sales (around 30 percent) followed by Britain and France.

Price rises alone will not erase the advantages of quick delivery and technological superiority. European companies complain, that MITI's price-setting formula—which is based on a machine's weight, power and the number of jobs it can do—would raise the price only of relatively simple machines (by a rumored 10 percent). Expensive, multifunction machine tools would be unaffected. They are now leading the flood of Japanese imports into Europe.

In Britain, the value of machine tools imported from Japan rose some 60 percent in 1979. But the number of imported Japanese machine tools rose only 10 percent; there was an obvious trend toward the higher value, more complex machines that will not be hurt by MITI's proposed scheme.

Even less encouraging for European makers is the example of the US, where an identical price-fixing cartel has been operating since 1978. Here, the cartel seems to have done little to dam the flood of Japanese imports. Imports are this year expected to take some 28 percent of the American machine tool market, up from 22 percent last year. And the Japanese are muscling aside import competition—increasing their share of American machine tool imports from 31 percent ($221 million out of a $715 million import total) in 1978 to around 40 percent ($500 million out of a $1.2 billion import total) this year.

Though the cartel will be extended for another year, American machine-tool makers are relying more on capacity-boosting investment to win back their market. Unlike the Europeans, they have a boom market for machine tools to encourage them.

Orders in America in the first three months of this year totaled $1.5 billion—a rise of more than six times since the trough of 1975, when only $225 million was taken in orders in the first quarter. Although a drop in orders late in the year will probably leave 1980 some 14 percent behind 1979 in machine-tool orders, makers are still looking for around 10 percent annual sales growth throughout the 1980s.

The boom since 1976 has left American machine-tool makers with a huge backlog of orders. Overstretched capacity—trying to fill an estimated $5.5 billion market with factories that can turn out only around $4 billion worth of machine tools a year—has resulted in uncompetitive delivery times. American machine-tool makers are now averaging 16 months between order and delivery; the Japanese can deliver many tools within three months of ordering.

Since the surge in machine-tool orders began in 1976, American machine-tool makers have been increasing their capital investment. Until last year, they were shelling out an average of 30 percent more each year on building new plants and modernizing old ones. (Manufacturing industry, by contrast, was increasing its capital spending by only 15 percent a year on average.) But last year the machine-tool makers' capital spending took off, increasing some 60 percent to $145 million.

Industry leaders like Cincinnati Milacron, Cross and Trecker, Bendix, and Giddings and Lewis look like keeping up these increased levels of spending into 1981, in order to capitalize on the retooling now going on in the motor and aerospace industries, their biggest customers. Increased spending on training schemes—to remedy the shortage of skilled workers—is also expected to continue.

Increased capacity—particularly for the productivity-boosting computer-controlled machine tools that have so far led the Japanese export drive—would go far toward regaining for the American machine-tool makers their grip on home markets. But they admit that the Japanese will still be very competitive on the small computer-controlled machine tools. The Americans are hoping to gain an edge from the better service and support they can offer machine-tool users on their home turf.

This edge may be hard to hold on to, as the Japanese consolidate their gains by starting up plants in America. Makino Milling Machine Company is to take a stake in LeBlond, of Cincinnati, to make more machines for the American market: its capacity in Japan is not sufficient to meet demand. Yamazaki Tekko has been putting together computer-controlled lathes from knocked-down kits in Kentucky. It plans—sometime—to start fully-fledged local production. Ikegai Tekko, another big machine-tool firm, is assembling a few knocked-down kits a month in Los Angeles. It also plans to start full local production.

The Japanese firms are in America to stay, cartel or no cartel. European makers should draw their own conclusions.

The Economist

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SCIENCE AND TECHNOLOGY

MASS OUTPUT CHANCE IS SEEN IN NEW FLAT LENS TECHNOLOGY

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 16

[Text] Joint development of a special flat plastic microlens by a Japanese assistant professor and Nippon Sheet Glass Co. of Osaka, will greatly aid development of modern fiber optics communications technology, it was recently learned. The new lens signals the likely low-cost mass production of glass lenses for glass optical fiber lines, a revolutionary means of communication under development.

That means solution of the present problem of high production costs in making the glass microlenses used for the light source, directional coupler (light beam splitting forking point) and other vital portions of the system, Nippon Sheet Glass Co. said. It also means possibility of further miniaturization of such devices, the company said.

According to the company, the plastic lens resulted from joint research efforts with Assistant Prof. Kenichi Iga of the Tokyo Institute of Technology's Research Laboratory of Precision Machinery and Electronics.

The company has developed, on a commercial basis, a cylindical glass lens of graded index type and a compounded type of lens. Based on the company's technology developed in 1968 to produce its light-focusing optical glass fiber tradenamed "Selfoc," the new glass lens, despite its cylindrical form, has the same functions as a convex lens, besides being very tiny and light weight.

The firm is now promoting sales of the two new products for application to optical fiber communication light sources, directional couplers, inserters, optical switches and light detectors, figuring its current fiscal 1980 sales of the two items at about ¥3 billion, double the preceding fiscal year.

But the biggest drawback of the two products has been their expense, due to the high costs required in ion exchange and uniform quality-assuring cutting processes.

Its joint achievement with university scientists is to develop a flat plastic microlens of similar graded index type out of a certain metal-acrylic kind of resin in a semi-molten condition by making the most of the resin's special ion exchange reaction.

The method involved in the achievement can be applied, with some more refinement, to the production of the glass type of lens at low cost. Especially notable is the method's suggested possibility of mass-producing the glass lenses by covering a basic glass plate with a special thin topping material. The company is preparing to start a new research and development project early next year.

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SCIENCE AND TECHNOLOGY

GENE ENGINEERING PATENT OF U. S. DISMAYS JAPANESE

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 16

[Text] Japanese industrial interests competitively engaged for years in gene engineering research projects, including pharmaceutical, foodstuff, chemical and biological enterprises, are shocked and dismayed over their recent finding that a series of gene swapping processes recently granted a basic patent by the U.S. Patent Office covers a very wide range of gene engineering technology, informed sources in Tokyo recently reported.

The American patent drawn by Stanford University has been unexpectedly found to cover not just the so-called "restriction enzymes," the basic chemical means to chip away part of DNA to set a growth and development pattern for any living thing, and the so-called "vector" or "plasmid" to carry replacement genes to make microorganisms produce new substances. Such means have been developed by Prof. Herbert W. Boyer of the University of California at Los Angeles (UCLA) and Prof. Stanley N. Cohen of Stanford University. The two pioneers are the joint recipients of the patent.

According to the sources, Japanese consternation is reasonable because gene engineering has been one of the hottest areas for technological development in every advanced country. Such a wide American patent right coverage could result in a heavy limitation on the Japanese freedom to develop new drugs, including cancer cures, new enzymes, proteins, and other innovational products.

The patent has been found to go so far as to cover the genes and cells of all sorts of bacteria and other microorganisms, plants and animals. That means every conceivable variety of gene engineering will be controlled by the patent. What is more, the original patent application filed in 1974 was found to have been revised to include not just the genes of natural life, but even artificially synthetic ones.

In this respect, a veteran gene engineering researcher of Mitsubishi Petrochemical Co. has even suspected an American economic strategem to monopolize all the free world's gene engineering methods, still essentially in the development stage, either to shut out foreign commercial techques from the future U.S. markets for innovational drugs and other products or to bind them by the new patent right.

If Stanford University or the two U.S. professors seek foreign patents of the same kind in Japan and other advanced countries, the situation would be more serious for all Japanese gene engineering industrial interests. In this connection, such Japanese interests are in the dark, whether or not a similar Japanese patent has been sought by the university or scholars.

Under the Japanese patent system, the governmental Patent Agency must keep strictly confidential all pending patent application for a period of 18 months from the date of application before public disclosure. The worried Japanese industrial enterprises will have to be on the alert for disclosure of possible American patent applications. The agency itself is believed to be in a dilemma if it has accepted the application in line with the U.S. precedent because it has made clear its position that a simple basic kind of technology of wide coverage representing already well-known facts or processes is not acceptable for patenting.

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SCIENCE AND TECHNOLOGY

GOVERNMENT LABORATORY FINDS WAY FOR PRODUCING GaAs LSI CIRCUITS

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 16

[Text] A new method to integrate gallium arsenide (GaAs) semiconductor elements into a large-scale integration (LSI) system has been developed by a research team at the Electrotechnical Laboratory, Agency of Industrial Science and Technology, Ministry of International Trade & Industry. The new method opens the way for developing a superfast computer for scientific and technological studies. Gallium arsenide semiconductor elements had been officially eyed by the Ministry as potentially among the best electronic elements for making such a computer. The Ministry plans to open an official program to develop such a computer in Japan's next fiscal year 1981, starting April 1.

The conventional silicon semiconductor elements are known to be too limited in signal puls: processing speed to meet the needs of the proposed super-speed computers. Besides, they are also known for their heavy electric power consumption and heat generation when worked at too high a speed.

In contrast, gallium arsenide semiconductor elements have been widely recognized for their incomparably greater speed of signal processing and far lower consumption of electricity and heat generation. They have so far been applied to making electronic communication apparatus elements for their small power consuming advantages. But their full-fledged application to computers had been delayed due to some tough technological problems.

As a still faster working substitute for the silicon type of semiconductor elements, there is the Josephson element, but it still poses many problems, notably its need for an extremely low temperature of around 270 degrees below zero C. for operation. The gallium arsenide semiconductor element has come to be considered the best possible new computer element to supersede the silicon type.

According to the laboratory, its success in using the gallium arsenide semiconductor known as a Normally-On type, fit for very high-speed computer operations, has been attained by its research team led by Mineo Tsurushima, its solid-state electronic device research section chief, and Noburo Hashizume, top researcher.

Integrating the Normally-On type of such elements had required the insertion of a special connecting circuitry called the Level-Shift circuitry between each two elements. Intended for adjusting the difference in electric pressure between each two elements, the particular circuitry had certain drawbacks. It had required a large space because each circuitry unit consists of several diodes and a power source, and it consumed three times as much electric power to operate as each element itself.

This bottleneck was broken by the research team by the application of a special Schottky-effect junction to replace the Level-Shift circuitry. Each Schottky-effect junction unit, replacing each complex-structured Level-Shift circuitry unit, has minimized not just the necessary space, but the power consumption by great margins.

A trial computer operating unit the research team has built, consisting of 11 elements with a circuitry line width of 3 microns, has proved to require 120 pico-seconds (one pico-second is equivalent to 1/1,000 billionth of one second) per element in signal processing time and 10 to 12 milliwatts in electric power consumption to do such a job.

In the trial performance the unit not only attained the highest working speed ever to be attained with gallium arsenide semiconductor element, but consumed only about 1/10th the electricity of the latter.

The team is sure that if the operating unit is further refined into a denser concentrated type with a line width of around 1 micron, or less, it is possible to cut down the signal processing time to 50, or even to 20 to 30 pico-seconds, to attain 10 times or even faster computing speed than the conventional silicon type. The power consumption then could be reduced to just a few milliwatts, also 1/10th of the latter.

A University of Tokyo professor highly evaluated the new achievement for making the most of the high-speed advantages of the gallium arsenide semiconductors to pioneer their application to tomorrow's computer development.

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SCIENCE AND TECHNOLOGY

COMPETITION WITH U.S., FRG IN COAL LIQUEFACTION INTENSIFIES

Tokyo JAPAN ECONOMIC JOURNAL in English 30 Dec 80 p 15

[Text] Expectations for coal liquefaction are sharply rising, now that drastic curtailments in the use of oil have become a global necessity. Although the two immediate non-oil energies for oil are fuel coal (for direct burning purpose) and atomic power, liquefied coal is likely to loom large as a major energy source in the 1990s.

The International Energy Agency (IEA), as a matter of fact, has recently placed top priority on coal liquefaction as the most promising new technology for developing alternative energies. The United States, on its part, has formulated a plan to boost its daily production of synthetic fuels, centering around liquefied coal, to 2 million barrels by 1992.

Japan also has decided to accelerate its Sunshine Project and plans to produce 22,600,000 kiloliters of liquefied coal by fiscal 1990. This figure represents more than 3 per cent of the nation's entire primary energy supply. Japanese corporations now engaged in development of coal liquefaction technologies are rapidly outgrowing the stage of mere subcontractors of the Government and are forming several industrial groups among themselves for the future when such technologies will be commercially profitable.

There is little doubt that the final aim of the OPEC is to boost the price of oil to the price levels of alternative energies, especially those of liquefied coal and similar other synthetic fuels which are largely interchangeable with oil. Oil consuming nations, therefore, are now strongly required to develop viable coal liquefaction technologies in order to keep crude oil prices from soaring further.

It is true that synthetic fuels can be obtained from several sources, including tar sands. The position of coal, however, is dominant in this field simply because of its incomparably vast deposits scattered all over the world. Statistics show that coal reserves, even if they are restricted to those economically retrievable, run to some 660 billion metric tons, just about five times as large as the presently ascertained amounts of crude oil reserves.

Coal, however, cannot be a viable alternative energy as long as it is used only for direct burning purpose. "Energy supply systems are now in a state of flux," says Masami Yamanaka of the Agency of Industry, Science & Technology. "We cannot simply revive steam engines." If full-fledged restoration of coal to the supreme position of the world of energies is to be realized, its use must swiftly expand to COM (coal and oil mixture) and liquefaction.

The undoubted pace-setter in the field of coal liquefaction is the United States which boasts of the largest known deposits of coal in its territories. The U.S. Government has established Synthetic Fuel Public Corp. this year and has formulated a plan to produce 500,000 barrels of synthetic fuels per day in 1987 and bring the amount up to 2 million barrels a day by 1992. For this program, America has earmarked huge funds equivalent to $88 billion.

There are already numerous coal liquefaction projects afoot in the United States. The three most promising and front-running projects, however, are the EDS project being pushed by Exxon and its group, the SRC H project being sponsored by Gulf & Western and its group, and the H Coal project being promoted by Ashland Oil and others. The Exxon group is already operating a pilot plant producing 250 tons of synthetic fuel per day, while the Gulf group is now building a plant capable of turning out 6,000 tons of synthetic fuel per day. The Ashland group, on the other hand, is producing synthetic fuel at the daily rate of 200-600 tons. Under the government support, all these groups are engrossed in perfecting their systems so that they will go into commercial production in the latter half of the 1980s.

In Europe, West Germany, the home of coal liquefaction technologies, is currently concentrating on perfecting its own coal liquefaction and gasification systems. Unlike France

which has advanced technologies in atomic power, and Britain, which has its Northern Sea oil, West Germany only has coal in the Ruhr and the Saar to fall back on in any serious energy crunch. So its enthusiasm for coal liquefaction is exceptionally strong. The country is now engaged in construction of a pilot coal liquefaction plant with a daily capacity of 200 tons. According to its long-range program, West Germany will have its powerful, large-scale coal liquefaction plants in the latter half of the current decade.

'Sunshine Project'

As Japan lacks any significant reserves of coal, success in development of superior coal liquefaction technologies will not automatically lead to a drastic improvement in its energy self-sufficiency ratio. The reason Japan is so devoted to development of coal liquefaction technologies then is the sense of crisis that unless it has superior technologies to offer to the world, it will find it increasingly difficult to secure its future energy sources.

In 1974, when it inaugurated the "Sunshine Project," the Japanese Government had only vague idea that "liquefied coal would become one of the unpolluting energies of the 21st century." Now that development of post-oil energies has become a crucial necessity, however, the Japanese Government is being willy-nilly forced to push ahead with serious studies of coal liquefaction technologies.

In the "Supply Targets of Alternative Energies" formulated last November, the Japanese Government expects that production of liquefied coal will run to 22,500,000 kiloliters in fiscal 1990. This figure is higher than the 15,000,000 kiloliter target set by the Industrial Technology Council in its "Accelerated Promotion Strategy of the Sunshine Project" formulated a year ago. The new target figure is just about equal to the present volume of oil developed and imported by Japanese corporations. The Government also has inaugurated the New Energy Development Organization to promote technological development by private corporations.

Industrial groups' moves

In the meantime, private corporations, which have so far pursued coal liquefaction projects only half-heartedly, are now beginning to place the projects into the mainstream of their management strategies.

In February, 1980, the Mitsui group jointly established Mitsui Coal Liquefaction Co. (headquartered in Tokyo, capitalized at ¥500 million and headed by Shingo Ariyoshi) for commercialization of its own coal liquefaction project. This move was followed, in August, 1980, by establishment of Japan Brown Coal Liquefaction Co. (based in Tokyo, capitalized at ¥500 million and headed by Kokichi Takahashi) by Kobe Steel and its group companies. Under the Japanese Government's promise that the project will be placed under its and the Australian Government's patronage, Japan Brown Coal is going to establish shortly a pilot plant in Australia with a daily capacity of 50 tons. The plant is to use coal produced in Queensland.

Mitsui Coal Liquefaction, on the other hand, has developed the Mitsui SRC (solvent refined coal) process of coal liquefaction and is now studying the possibility of establishing a 6,000-ton daily plant in Victoria, Australia. The Mitsui SRC process produces oil equivalent and refined coal on a fifty-fifty basis.

The three projects under the Sunshine Project — The solvolysis process of the Mitsubishi group, solvent extraction method of the Sumitomo group and the direct coal liquefaction process of Mitsui Shipbuilding & Engineering Co. etc. — also are making progress.

The Mitsubishi group, headed by Mitsubishi Heavy Industries, Ltd., has formed a steering committee composed of managing directors of the four related companies and has decided to establish another pilot plant with a daily capacity of 40 tons.

The Sumitomo group, which is now building a 1-ton plant, is still cautious about commercialization. Vice President Toshio Ikejima of Sumitomo Metal Industries, Ltd., however, talks of the possibility of establishing a joint coal liquefaction company in the future.

The direct waterization process was originally tackled by Mitsui Shipbuilding & Engineering Co. and the Hokkaido Industrial Development Station. Recently, however, three other companies — Nippon Kokan K.K., Hitachi, Ltd. and Asahi Chemical Industry Co. — have joined the project, making it a highly promising one.

Long way to feasibility

Joint technological development moves are by no means restricted to Japanese corporations. Japan Coal Liquefaction Technology Development Co. (of Tokyo, capitalized at ¥27.3 million and headed by Shosuke Idemitsu) jointly established by 12 Japanese corporations, including Idemitsu Kosan K.K., for example, has been participating in Exxon's EDS project since 1978.

The SRC II project sponsored by Gulf & Western and other companies, on the other hand, is to be jointly promoted by companies from three countries — the United States, Japan and West Germany — at a total cost of more than $1.4 billion. For this purpose, Japan is going to establish a new joint company shortly centering around Mitsui Coal Liquefaction.

The United States, the first country to embark on major coal liquefaction projects, has

been able to diffuse the risks involved by enlisting the help of Japan and West Germany.

Japan, whose largest coal liquefaction plant now is Mitsui Coal Liquefaction's puny 50-ton-daily plant, on the other hand, will benefit greatly in direly needed experiences by participating in America's gigantic projects.

Despite the glaring international limelight coal liquefaction technologies are now enjoying, their commercialization still seems years away. By far the biggest problem involved in coal liquefaction is its costly and uneconomic nature. The basic principle of coal liquefaction — that of adding hydrogen and reducing the molecule volume — has remained essentially the same for 50 long years. Germany, for example, produced considerable amount of liquefied coal in the World War II days. Japan also dabbled in the experiments in Korea and Manchuria during war days. Such production, however, was simply possible because of the absolute demand of the war. Production would have been out of the question from an economic point of view. It is by no means easy for man-made fuel, with all the labor and costs put into it, to economically compete with crude oil.

The prices of coal became far cheaper than oil at one time in 1979 because of the sharp upswings of the crude oil prices. Recently, however, the price differences between oil and coal have again greatly narrowed owing to the hefty rises in coal prices brought about by increasing demands for the solid fuel. If coal prices keep on following the upswings of oil prices, coal liquefaction will never see commercial application. OPEC countries, moreover, can always lower their oil prices for temporary periods if they want to disrupt coal liquefaction efforts in advanced consumer nations.

In its recently formulated energy supply-demand outlook, the Institute of Energy Economics (headed by Toyoaki Ikuta) predicted that liquefied coal supply in 1990 will be limited to a mere 350,000 tons, really a drop in a bucket, compared with the Government's plan of 22,600,000 tons. If all the risks involved in coal liquefaction projects are taken into consideration, the institute's prediction seems far closer to reality than the Government's plan. The most important task now facing the nation is to make the actual liquefied coal production amount closer to the Government's plan as much as possible in the intervening period between now and the target year of 1990. Much is expected of the five leading coal liquefaction projects now in progress in Japan.

CSO: 4120

MANGANESE NODULE DEVELOPMENT REPORT

Tokyo JAPAN ECONOMIC JOURNAL in English 23 Dec 80 p 6

[Text] The Metal Mining Agency has compiled a report on the importance of development of manganese nodules and such development effects.

The report, made at the request of the Ministry of International Trade & Industry, stresses the need for the nation to propel development of manganese nodules in order to secure stable supply of metals.

The report also proposes that manganese nodule mining technology be developed under the large-scale project system of the Agency of Industrial Science and Technology, starting in fiscal 1981.

According the MMA's investigations, when about 3 million tons of manganese nodules are mined yearly per mining concession, 35,000 tons of nickel, 30,000 tons of copper, 3,600-4,500 tons of cobalt and 375,000 tons of manganese will be obtained.

As Japan's nickel consumption is estimated at 155,800-174,-900 tons in 1990, one manganese mining concession will be able to fill 20 to 22.5 per cent of the nation's nickel consumption.

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SCIENCE AND TECHNOLOGY

STEEL FIBER GROWS IN IMPORTANCE FOR CEMENT HARDENING

Tokyo JAPAN ECONOMIC JOURNAL in English 23 Dec 80 p 7

[Text] Steel fiber, a composite material that greatly reinforces concrete, is entering the stage of full dissemination.

It has come increasingly to be used in tunnel and dam repair works and highway construction works.

Measuring 0.5 millimeter in diameter and 30 millimeters long, steel fiber is mixed in concrete at the rate of 0.5 to 2.0 per cent.

It increases the tensile strength, bending and shear strength of concrete 1.3-1.8 times more than usual concrete (not mixed with steel fiber).

The steel fiber concrete is also 40-200 times greater in toughness and 5-15 times greater in impact resistance than ordinary concrete.

Steel fiber now costs ¥260,000 per ton. When 100 kilograms of steel fiber are mixed per 1 cubic meter of concrete, 1 cubic meter of concrete will cost ¥40,000 – ¥26,000 for steel fiber and ¥14,000 for concrete.

This means that the price of steel fiber concrete is over twice as high as that of ordinary concrete.

Despite its high prices, steel fiber is now drawing wide attention in the civil engineering and construction world, where construction of anti-quake structures has become a major objective.

First developed in Britain, steel fiber was then employed mainly in U.S. military facilities.

In Japan, Nippon Kokan K.K. began manufacturing it in 1974 for the first time. Steel fiber has since been used in major tunnel and dam repair works and highway construction.

Japan's steel fiber output in 1979 soared over three times that in the preceding year to more than 1,000 tons. The 1980 output is also expected to surpass 1,000 tons.

Steel fibers now being marketed by major steelmakers are not very different in quality and shape. But Nippon Steel, Nippon Kokan, Kawasaki Steel and Sumitomo Metals are adopting a sheet cutting method. Ordinary rolled steel sheets are cut to small sizes by a rotary cutter.

Kobe Steel is adopting a wire rod drawing-cutting method.

CSO: 4120

BRIEFS

GUN BARREL EXPORT QUESTIONED--The Ministry of International Trade and Industry (MITI) is expected to question Hotta Steel Co. of Osaka today about its export of large quantities of gun barrels and other weapon parts to South Korea over the past four years. Hotta Steel, a specialty steel exporting company, is alleged to have exported large amounts of gun barrels in semifinished form and other gun parts to that country under the description of machine parts. MITI Monday questioned executives of Kanto Special Steel Works in Fujisawa, Kanagawa Prefecture, and Sanyo Special Steel Co. of Himeji, Hyogo Prefecture, both of which manufactured gun barrels for Hotta Steel, in connection with the present case. The ministry is expected to check whether the parts exported by Hotta Steel fall under the category of weapons whose exports are banned by the government. [Text] [Tokyo JAPAN TIMES in English 6 Jan 81 p 3]

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