JPRS L/9868

24 July 1981

Japan Report

(FOUO 43/81)

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

FOR OFFICIAL USE ONLY

JPRS L/9868

24 July 1981

JAPAN REPORT

(FOUO 43/81)

CONTENTS

MILITARY

DECISION PROCESS IN SELECTING TAN-SAM OVER ROLAND EXAMINED

Tokyo MAINICHI DAILY NEWS in English 19-26, 28, 29 Jul 81

[19 Jun 81, p 3]

[Article: "Roland's Defeat by Tan-SAM"]

[Text] *Against a backdrop of mounting tension in what is called the new cold war, the focus of attention is now on the role Japan will play in its defense. The United States is determinedly pushing hard its demand that Japan spend more for its defense buildup, while Tokyo appears to be following the line set by Washington by making a conspicuous turnabout in its defense policy from its past low posture.*

Last year Japan decided to adopt a new low-altitude surface-to-air guided missile called Tan-SAM from fiscal 1981 (April 1981-March 1982). The Tan-SAM is a production of domestic technology, outracing the French-made Roland in a business competition.

This business game was a reminder of history that shows that past global expansion of military outlays provided wider arms markets, eventually leading to the birth of "Merchants of Death." Today, there is an indication that arms makers have grown powerful enough to exercise their influence over political decisions.

It may be meaningful, therefore, to trace the following questions: How was the Tan-SAM developed? Why did the Japanese government adopt it? What is business competition like in securing a missile contract?

The MDN is running a 10-installment series, starting today, presenting the background stories of how weapon makers actually conduct their business. The series will probably lead to the question as to whether it is possible to check the growing trend toward militarism.—Editor.

Upon learning of his failure to win a contract to sell Roland missiles to Japan, Jacques Tissandier, vice president of the French Export Office of Aeronautic Material (OFEMA), lamented, "I cannot believe the Roland is inferior to the Tan-SAM (Japanese-made missile). I was very confident that the Roland would outmatch the Tan-SAM even though its price is higher.

"But Japan refused to buy the Roland. This is because the Defense Agency made a 'political' decision. Then it was no longer within our reach, no matter how powerful we might have been."

OFEMA is a well-known, state-funded French arms dealer, covering worldwide markets under its sales network. Tissandier led the company in a three-year campaign to sell the Roland to Japan. Behind the company stood the French Defense Ministry encouraging their efforts aimed at the Japanese Air Self-Defense Force.

But last autumn Japan picked the Tan-SAM developed by Toshiba Corp., dashing OFEMA's hope of selling Rolands to Japan.

OFEMA's sales basket, offered to Japan, contained not only Rolands but other items such as Mirage F-1s and Milan antitank missiles as well as Hot Gazelle and Dauphis multipurpose helicopters were also included. All these weapons were offered to Japan, but none were purchased as they were outrivaled by American weapons.

"I suspect," said Tissandier, "Japan might have used our products as a camouflage to hide its intention to finally pick what it really wanted to buy." He went on to say, "In turning down our offers, Japan used as an excuse the fact that it has a policy of standardizing its weapons with American specifications."

Because of this policy, however, the Roland was a promising item as the United States approved the production under license of Rolands in 1975. The French side was expecting much from the possible sale of Rolands to Japan, which would have reversed the past pattern of arms business with Japan.

In April last year, a think-tank of the French Defense Ministry issued a report entitled "Rolands or Tan-SAMs." The paper pointed out that a possible Japanese purchase of Rolands would bring about significant benefits to France.

"Amid the sharpening trade dispute between Japan and France," the paper read, "Roland sales to Japan would have been a great help in rectifying our trade deficit (with Japan)."

On Aug. 3, 1980 Isamu Nakamura, representative of OFEMA's Tokyo office, dispatched a telex to its headquarters in Paris that the Defense Agency had decided "two days ago" to buy Tan-SAMs for both the Ground and Air Self-Defense Forces. This telex was a surprise to OFEMA.

Surprise Telex

OFEMA suspected that the Ground Self-Defense Force would be certain to adopt the Tan-SAMs. But it has a strong feeling that the Air Self-Defense Force would use the Rolands. OFEMA had this hunch on the basis of an analysis of views of Self-Defense Forces officers.

The DA's decision was taken at a meeting of working counsellors. Among those present were senior officers of the DA's Internal Bureaus, staff officers of the three forces. There remained no room for doubt that the decision would be approved at a higher level to formalize it.

The telex was immediately conveyed to the chief of the Arms Agency (DGA) of the French Defense Ministry. Two days later French Ambassador to Japan Xavier de la Chevalerie visited the DA office at the instruction of the DGA.

But the explanation given to him by Toru Hara, vice minister of the Defense Agency, was: "No decision has been made on the option between the Roland and the Tan-SAM."

Next day the French ambassador called on Vice Foreign Minister Masuo Takashima. Takashima only said that he would relay to the foreign minister and the parliamentary vice foreign minister what he heard from de la Chevalerie.

On Nov. 29 Francois Missoffe, special French envoy arrived in Tokyo on a mission to discuss the bilateral trade issue with Japanese leaders. While in Tokyo he kept consulting with Paris over whether he should touch on Roland sales to Japan.

Quality

In the wake of the DA's official announcement late last August to purchase the Tan-SAM, questions were raised at Diet sessions on the quality of the Japanese-made missile. Keigo Ouchi, a Diet member of the Democratic Socialist Party, spearheaded the debate at an extraordinary Diet session in October. He argued that the Tan-SAM was inferior to the Roland.

Under these circumstances, OFEMA maintained that Missoffe should strongly raise the missile issue at a press meeting. The office even prepared a press release on it, in which OFEMA rebutted DA Director General Joji Omura's contention that the Tan-SAM was superior to the Roland in quality.

Omura had, for instance, assured the Diet that the range of the Tan-SAM was twice that of the Roland. (In actuality, the two missiles are almost the same in this category.)

By revealing these facts, OFEMA apparently thought it could render the DA's decision to pick the Tan-SAM null and void. But at the last moment the press release was discarded.

"The DGA took that decision. I guess the overall bilateral relations were taken into account rather than the benefit that might be obtained from making the missile issue a diplomatic dispute," grumbled Nicolas Sirieix, an OFEMA official in charge of the Japanese market.

On Dec. 5 Missoffe met the press. Missoffe narrowed down the scope of his mission to economic problems facing the two countries. But when asked about the trade issue he answered ironically, "I hope Japan will not dash our hopes with a shot of Tan-SAM."

On Dec. 29 the National Defense Council chaired by Prime Minister Zenko Suzuki gave the green light to the purchase of Tan-SAMs.

[20 Jun 81, p 3]

[Article: "'Satisfactory' Trial Firings"]

A ceremony celebrating the establishment of Japan's first fully-mechanized division — the Seventh Division — was held during a snowstorm at the Higashi-Chitose garrison camp in Chitose, south-western Hokkaido. Taking part in the military parade were 230 Type-74 main battle tanks, 340 armored vehicles and guns.

The division is a "crack" force commissioned to defend Hokkaido, Japan's northern most main island. One division officer said proudly that the much-improved striking power of the Seventh Division could match that of an American or Soviet armored division.

But when it comes to air defense, the GSDF division has vulnerability. For instance, high-angle M-42 guns and self-propelled M-15 artillery are either obsolete World War II or Korean War vintage.

Evidently these old-fashioned weapons are a far cry from required performance in an actual war in this era of high technology.

It was in 1966 that the Ground Staff Office launched studies of the deployment of Tan-SAMs in a bid to fill the gap between medium-range antiair missile Hawks and 35mm antiaircraft automatic L-90s.

The office expected the missile to have a shooting range of more than 10 kilometers, to be capable of shooting multi-targets in succession, and to be invulnerable to electronic intervention. There was no discussion about whether or not the missile should be a domestic product or foreign made.

In the intial stage of the basic studies on the Tan-SAMs, the Defense Agency's Research and Development Institute was allowed to spend 36 million yen in fiscal 1966. The missile-guiding system was defined as an electric-wave terminal homing method.

Assistance was extended by Toshiba Corp., Hitachi Ltd., Mitsubishi Heavy Industries, Nippon Electric Co., and Mitsubishi Electric Co.

Two years later the guiding system was changed to an infrared terminal homing method. The decision on the change was made by the DA's Equipment Council. The financial burden of the electric-wave terminal homing method was a key element leading to this conclusion.

A Tan-SAM guided by the electric-wave terminal homing method needs two radar sets for a single shot. When the missile is guided by the infrared terminal homing method, it is capable of automatically chasing an enemy aircraft after launching. The only problem was the latter has a shorter range than the former.

A lesson learned from the Middle East war also served as a factor to support the infrared terminal homing method. In the war, the performance of antiaircraft missiles vulnerable to electric jamming suffered humiliatingly.

Of the five companies supporting the Tan-SAM studies, only Toshiba was enthusiastic about the infrared terminal homing method. In 1970 the firm devised a lock-on-after-launch system, a variation of the infrared-guided missile method. At that time the Ground Staff Office termed the company "ambitious."

In the Toshiba method, a missile is designed to fly to a specified height in the direction of a likely point of encountering an enemy aircraft without using its "eye." After passing the specified height it opens its "eye" to sight the enemy, using the infrared terminal homing method.

With this method it was expected that the Tan-SAM missile would be able to extend its shooting range and aim at successive multitargets.

In August 1971 the DA's Equipment Council officially gave the go-ahead for the development of the Toshiba missile. During the period between 1972 and 1976 Toshiba launched more than 40 missiles off the Izu islands in a technology test. Between 1978 and 1979 the firm also fired another 20 missiles in practical tests.

The trial firings came to an end with what was described as "satisfactory results" by the then chief of staff of the GSDF.• But the road to the development of Toshiba's Tan-SAM missile was not an easy one. The company had to shoulder the costs amounting to 10.4 billion yen.

On the part of the Defense Agency, an Equipment Council meeting was called into session at least five times in order to discuss the propriety of the Tan-SAM missile project. In fact, there are many cases in which weapons domestically designed and developed have failed to get final DA approval after passing a test for practical use. The AAM-2 air-to-air missile is such an example.

"Indeed, it was an adventurous project for us to equip a missile with the lock-on-after-launch device and with the automatic chase capacity. We spent 15 years and some 10 billion yen developing the Tan-SAM," said Mitsuaki Yokoji, chief of the DA's Equipment Bureau.

"The cost was far less than what the U.S. usually spends on a new missile. But the Tan-SAM was the first weapon system Japan studied and developed independently," he added.

In August 1980 the Defense Agency asked for the appropriation of funds in the budget draft for fiscal 1981 to purchase Tan-SAMs. On Oct. 7, the DA officially approved at the Equipment Council the introduction of the missile.

It was 10 days later that Democratic Socialist Keigo Ouchi labeled the Tan-SAM a defective missile and raised objections to the Air Staff Office's decision to buy them.

[21 Jun 81, p 3]

[Article: "Monopoly of Mitsubishi Group Ends"]

When the Defense Agency came to the decision to adopt Tan-SAM missiles, no one else but Toshiwo Doko, honorary chairman of the powerful Federation of Economic Organizations (Keidanren), was pleased most at the news. He was the architect of the Toshiba project to develop the Tan-SAM while he was president of the company from around 1965.

Doko gave full-fledged support to the project with a view to getting his company acquainted with the weapons business as Toshiba had been far behind other companies in that field, although the firm had enjoyed a high reputation in prewar days for its manufacture of transceivers and radars for military use.

Around the time Doko took the action, Toshiba ranked low on the DA contractors' list.

The Mitsubishi group, notably Mitsubishi Heavy Industries and Mitsubishi Electric Corp., was monopolizing the missile business. The case of Mitsubishi Electric is particularly worthy of special mention.

Yoshinaga Seki, then vice president of the company, stood firm in his belief that the time would soon come for missiles to replace manned aircraft while insisting that the company should allow him to run the risk of spending 200 million yen for researching and developing missiles.

Thanks to his energetic efforts, the company rose to become a top leader in the field of missile manufacturing toward the end of the 1950s.

Meanwhile, Toshiba entered the missile business by starting research thereof soon after 1955 although the work then was a far cry from what could be called a full-fledged business.

But thanks to its wartime experience of producing a prototype missile and to its accumulated high technology and know-how of electronics, which hold the key to success in missile development, Toshiba was moving on a rather smooth path in shifting to the missile business.

In 1967 Toshiba was awarded a contract, together with Mitsubishi Electric, by the Ground Self-Defense Force for the production of the Hawk surface-to-air missile, manufactured here under the license of Raytheon Co. of the United States. In this contract Mitsubishi carried away the lion's share of 70 percent in value.

Toshiba played just a supporting role by installing radar facilities on the ground.

Mitsubishi Contract

In the same year, Mitsubishi Heavy Industries was chosen as a prime contractor for the licensed production of surface-to-air missile Nikes for the Air Self-Defense Force. The Mitsubishi groups thus established its name as a missile producer.

It was the Tan-SAM that helped Toshiba drive a wedge into the Mitsubishi group's domain in missile production.

In October 1968, the DA sounded out Toshiba and Nippon Electric Co. as well as the Mitsubishi group about the possibility of manufacturing Tan-SAM missiles. The conditions attached to this request were very severe, however, in respect to quality.

Several months later the three manufacturers submitted their draft plans to the Defense Agency. Among them, Toshiba's idea was selected as the best in quality.

In fact, it was a surprise to the other manufacturers when Toshiba showed the concept of mounting a lock-on-after-launch device on its missile. "I was really skeptical about whether Toshiba's concept could be materialized," recalls Takeshi Abe of Mitsubishi Electric. "I sincerely pay my respects to Toshiba's achievement."

On the part of Toshiba, the job of developing the Tan-SAM was a kind of a gamble. The company put at stake its own future in the business of missile manufacturing by going ahead with Tan-SAM development.

"I was well aware that many DA officers had bet that Toshiba would not be able to develop a missile of such high quality. I also knew that a lot of harassment letters about our missiles were delivered to the Defense Agency," said Shuji Nakanishi, then an executive of Toshiba in charge of defense facilities and equipment. "But we were in high spirits and we were confident that we would be able to materialize our project," he recalls.

Why, then, was Toshiba so enthusiastic about attempting to win that missile contract? An explanation given by Nakanishi was: Developing missiles was expected to contribute greatly to the improvement of Toshiba's technological assets. Another aim, probably more important, was to drive a wedge into the Mitsubishi group's monopoly of the missile business.

Boon For Toshiba

The development of the Tan-SAM is apparently contributing much to an increase of Toshiba's sales to the Defense Agency. In fiscal 1981, ending in March 1982, the GSDF is to take four sets of Tan-SAM and the ASDF two sets, with the total cost amounting to some 16.6 billion yen on the budget account basis.

The DA envisages the deployment of 36 sets of Tan-SAM in total by fiscal 1984, the final year in the DA's current medium-term defense buildup estimate.

In fiscal 1979, Toshiba's procurement contracts with the DA amounted to 18.18 billion yen, compared with 97 billion yen recorded by Mitsubishi Heavy Industries, and 54 billion yen by Mitsubishi Electric. The Tan-SAM contract is expected to become a springboard for Toshiba to close the gap with the Mitsubishi group in business with the DA.

The DA intends to introduce a total of 70 Tan-SAMs, including 36 sets covered under the current medium-term program. In Toshiba's calculation, the DA will pay a bill of 300 billion yen if an inflationary factor is taken into account.

"We see the possibility of the Maritime Self-Defense Force arming itself with Tan-SAMs along with the GSDF and ASDF," says Tomiou Tanatsugu, Toshiba's vice president and president of the Japan Ordnance Association. "The prospect for our Tan-SAM business is very bright."

Toshiba is now competing with the Mitsubishi group for the licensed production of air-to-air missile AIM9Ls to be mounted on F-15 fighters. Precision guided missiles will be left as a potential battlefield between Toshiba and the Mitsubishi group, too. Thus, no end seems to be in sight in the arch rival competition between Toshiba and Mitsubishi.

[22 Jun 81, p 3]

[Article: "France Takes Aim at ASDF"]

In early June 1977 Koiichi Hamada, a Diet member of the Liberal-Democratic Party, was invited to the annual Paris Airshow held at Le Bourget Airport. He was the first Japanese politician invited as a formal guest to the show by the French Ministry of Defense. Hamada was then the Defense Agency's parliamentary vice minister.

Hamada was publicizing that he would make military problems his lifetime study. He visited the show on his way back from a firsthand inspection of the military situation in Israel and Egypt.

While in France, however, Hamada failed to accept an invitation to dinner at the Versailles Palace. Because of his absence at the dinner, officials of the French Export Office of Aeronautic Materiel missed a golden opportunity to sound out an influential Japanese politician for his support of the sales of Roland to Japan.

The French officials were apparently attempting to use Hamada's influence in Japan as a tool to build a "political foothold" for promoting missile sales to Japan.

One year later OFEMA's Vice President Jacques Tissandier came to Tokyo to see Hamada with the same aim of promoting the sales of Roland to Japan. But Hamada had already lost his Diet seat after becoming involved in a gambling scandal in Las Vegas.

"Arms sales are quite different from the sales of cosmetics," said Nicolas Sirieix, OFEMA's official in charge of the Japanese market. "In arms sales we are required to obtain thorough analyses of the political stance and the defense policy of our potential client country," he went on to say.

"We have to get government approval of our sales after submitting our analyses," he elaborated. "In the case of Japan, the incident in 1976 of a MIG-25 flight to Hakodate, carrying a Soviet pilot seeking political asylum, prompted us to study the possibility of selling Roland to Japan."

"Keeping in mind the possibility of Japan buying Roland, the French government made a thorough examination of the possible impact which the sales might have on Japan-France relations and the possible diplomatic repercussions coming from the Soviet Union," he said.

In October 1977 Tissandier sounded out a senior DA officer supervising Ground Staff Office equipment about the sales of Roland. The officer's response sounded encouraging, Tissandier said. "The officer answered that the ASDF plans to send a mission abroad in a bid to find better antiair weapons like Roland, although the GSDF has Toshiba engaged in the development of Tan-SAM. Therefore, our briefing on Roland would be greatly welcome."

Sales Strategy Rush

Isamu Nakamura, representative of OFEMA's Tokyo office, lost no time in flying to Paris to map out a sales strategy. "The DA's response almost assured me of success in Roland sales," Nakamura recalled.

"The OFEMA headquarters decided to set the sales target at the ASDF alone. If the ASDF bought Roland, we expected that the result would have a favorable influence on the GSDF in its selection of a missile."

OFEMA's sales campaign was thus launched, aiming at the ASDF. Nakamura started visiting the DA office to give his explanation on the performance and price of Roland. Meanwhile, C. Itoh & Co., a leading trading house in Japan, started its own operation in selling Roland to the ASDF. The trading company had already been appointed as OFEMA's sales agent.

In May 1978, technology experts of Euromissile Co., manufacturer of Roland, visited Japan. They came here to give a briefing on Roland at the Defense Agency.

In September 1979, the Air Staff Office sent a mission of two officers to Europe and the United States. The mission was aimed at collecting information on short-range antiaircraft missiles for guarding bases.

Roland Emphasis

Out of the countries the mission visited, all but Britain had already adopted Roland. It was obvious that the DA officers carried out their fact-finding mission while placing emphasis on the study of Roland.

In France, Jacques Clementin, a senior Euromissile official in charge of sales, showed the mission around. "They (the Japanese officers) were very earnest and asked pertinent questions," he said.

In the past, Clementin recalled, he received several Japanese missions on arms purchase. All the earlier missions he met visited France just for the sake of study before going to the United States for real shopping there and their questions in France were usually lukewarm, he said.

After a visit by the DA's research mission, OFEMA came to believe firmly that the Air Staff Office was giving a higher rating to Roland. Both Nakamura and C. Itoh shared that assessment.

In late 1979, however, Nakamura was tipped that the DA's intra-ministerial bureau might have ordered the Air Staff Office to study the adoption of Toshiba's Tan-SAM missile. This was the beginning of trouble for Roland in its sales campaign to Japan.

In March 1980, C. Itoh & Co. formally signed a contract to be OFEMA's agent in Japan. In C. Itoh's judgment, the possibility was very strong that the ASDF would adopt Roland.

But the decisive moment came soon after that day. The DA's intra-ministerial bureau began applying pressure on the Air Staff Office, turning the tide in favor of Toshiba's Tan-SAM.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000400030049-1

[23 Jun 81, p 3]

[Article: "U.S. Arms Makers Involved"]

If the French Roland missile had not been produced under license in the United States, the Roland-vs-Tan-SAM (Japanese-made short-range surface-to-air missile) sales campaign would not have developed into such heated competition. Or the French-made weapon might have not been brought to attention in arms sales in Japan, which was attempting to standardize its arms specifications with the U.S.

The Roland was the first European-made missile the U.S. adopted. This fact was significant for France and West Germany attempting to sell weapons to Japan. Euromissile Co., the manufacturer of the Roland, envisaged a chance to sell its missiles to Japan because of the U.S. adoption of the Roland.

For the U.S., the purchase of the Roland was the first step toward standardizing weapons used by the North Atlantic Treaty Organization (NATO). Another merit was the technological advantage Europe enjoyed over the U.S. in the field of short-range surface-to-air missiles.

The Roland had already cost Euromissile Co., jointly invested by France and West Germany, $1.5 billion and required the company to spend 10 years to develop it. If the United States started anew its own development of a short-range missile like the Roland, according to U.S. military sources, the cost would have been three times as much as the amount required for the development of the Roland.

It was in 1972 that the U.S. acquired a license from Euromissile to build Rolands. Hughes Co. was picked to build the missile's components and Boeing Co. to manufacture launchers.

The conclusion to select the Roland came after careful comparison with the British-made Rapier and the French-built Crotale. Through this comparison, the Roland turned out to be the best in quality. The U.S. further spent $256 million transferring technologies and redesigning the French missile to complete an all-weather type Roland II.

Joint Campaign

This improved type was what the Defense Agency's Air Staff Office once had in mind to introduce into Japan. Euromissile Co. had the vested right to sell Rolands in Japan despite the fact that improvements were added to the missile in the United States. Therefore, Euromissile and the American companies joined hands in promoting a sales campaign of the Roland in Japan.

It was in June last year, when the DA was almost concluding its selection of a missile—Roland or Tan-SAM—, that three officials of Hughes and Boeing visited Tokyo. Robert Roderick, deputy director of the Hughes Missile System Group, said: Although Euromissile has the exclusive rights for Roland sales in Japan, we have guaranteed that the Defense Agency would be fully supplied with parts in case Japan buys our improved Rolands.

The Hughes official was hinting that the U.S.-Europe joint operation was progressing smoothly.

But the DA's decision put a sudden end to the Roland-Tan-SAM sales competition after it announced the purchase of the Tan-SAMs. After this announcement a DA senior officer contended that the U.S. itself does not attach much importance to the Roland judging from the fact that Washington has slashed to nothing the outlays for the purchase of Rolands in its 1982 budget. "The U.S. only adopted Rolands in return for the F-16 fighters NATO purchased from the U.S.," the officer said.

This was denied as groundless by Hughes missile engineers. The licensed production of Rolands in the U.S., they said, was aimed at saving both time and money.

They complained that the DA officer used old data of the Carter administration which actually did not set aside money for the purchase of Rolands in the budget for fiscal 1982. But, they went on to say, the Reagan administration would earmark more than $500 million to buy Rolands in its revised defense budget.

Actually, President Reagan proposed in March the purchase of 795 Rolands with a total outlay amounting to $564 million.

The DA's contract for the purchase of Tan-SAMs gave rise to further suspicion.

Sources well informed about the Tan-SAM business revealed that Toshiba, the manufacturer of the Tan-SAM, ordered more than 10 travel wave tubes worth some $500,000 from Hughes in late 1979.

The tube was only used for missile making. If Toshiba had failed to sell its Tan-SAMs to the Defense Agency, the result would have been a loss of $500,000 to the company.

Thus Toshiba, no matter how high its technology level might be as a domestic manufacturer producing missiles like the Tan-SAM, had to depend on the U.S. for ultra-high military technological know-how in making some particular parts of its missile.

But Toshiba's order for the tubes coincided with the time the DA's intraministerial bureau began "advising" that the Air Staff Office study the adoption of Tan-SAMs.

At that time Toshiba was seemingly very confident that the DA would purchase its Tan-SAMs, the sources said. "Something was hinting at 'business collusion' between Toshiba and the DA," they added.

Hughes Co. was careful in commenting on the tube order by Toshiba. Raymond Neever, associate director of Hughes International just remarked: "The campaign for Roland sales in Japan is over. For a firm like Hughes manufacturing weapons, the consumer-in-the-street is not king. The king is government. That's why I don't like to speak ill of the Defense Agency."

[24 Jun 81, p 3]

[Article: "Roland Takes Early Lead"]

In consideration of growing threats from low-altitude air raids, the Air Self-Defense Force is now placing greater emphasis on the defense of air bases and radar sites. Until recently, the ASDF's priority was to build up squadrons of F-4Es and F-15s.

On the European military front, the NATO countries redesigned their tactical "countermeasures" around 1974 when the Soviets deployed swing-wing MIG-23s in Warsaw Pact countries. Ground-attacking MIG-27s were also positioned.

Both MIG-23s and MIG-27s are capable of penetrating into the NATO countries at an ultra low altitude and at top speed without being detected by NATO radars.

Western military intelligence sources indicate that the Soviets have recently deployed Sukhoi-24s, far-advanced fighter-bombers, in the European theater. Both MIG-23s and Sukhoi-24s are also confirmed as having been sent to the Soviet Far East Air Force.

The ASDF drafted a comprehensive program to protect air bases from low-altitude air strikes in its five-year defense buildup estimate which was worked out in 1978. It aimed to arm air bases with anti-air cannons and portable anti-air missiles and short-range surface-to-air missiles.

The ASDF began introducing the Vulcan anti-aircraft cannon with a tracking radar in April this year. It has decided to procure the U.S.-made Stinger as a portable missile.

On the three foreign-made surface-to-air missiles the ASDF had studied, the U.S.-remodeled Roland II type was considered the best because the type's all-weather capability and infrared-seeking device was "appealing" to the ASDF.

ASDF officers have attached greater importance to all-weather capability in selecting not only missiles but also jet-fighters. The ASDF's purchase of the F-104J in 1959 triggered a rash of criticisms because the aircraft lacked all-weather capability.

In selecting F-4Es and F-15s, the ASDF apparently took their all-weather capability into account.

In 1979, Toshiba's Tan-SAM was developed to the stage of practical testing, with the backing of the Ground Self-Defense Force. Air Staff Office officers were also invited to observe the Tan-SAM firing tests.

But the ASDF's interest in Tan-SAM was scant because the two forces have conflicting views on each other's missiles. In addition, rivalry among the Ground, Air and Maritime Self-Defense Forces apparently stops one force from using weapons developed by another force.

For instance, while the MSDF announced the adoption of the U.S.-developed Harpoon ship-to-air missile, the ASDF developed the ASMI missile.

From about March 1980, the

DA's working-level officials began singling out missile models and estimating expenditures necessary to purchase these missiles.

On March 30 this year, the DA director general officially instructed his subordinates to purchase short-range surface-to-air missiles, key weapon items in the fiscal 1981 budgetary request.

Initially, the Air Staff Office assessed that the Roland II was the best, and that Toshiba's Tan-SAM outperformed the British-made Rapier. But all three missiles were rated as good to meet the DA's efficiency standards.

The highest score was given to Roland largely because of its all-weather capability, controllability and mobility mounted on armored vehicles.

It is true that the ASDF placed greater reliance on the Roland which the U.S. Army had remodeled.

The assessment of the three missiles was made between officials from the Air Staff Office and the DA's Defense Bureau from May through June.

Another session was held from June to July, joined also by officials from the DA's Equipment and Finance bureaus. Hisakatsu Ikeda, defense councillor, stated that the view supporting the introduction of Toshiba's Tan-SAM for both the GSDF and ASDF dominated the session.

"It was a result of our keen awareness of economizing cost, personnel training, smooth supply and maintenance," Ikeda explained. "Our budgetary allotment is limited."

On Aug. 28, Ryoichi Yamada, the ASDF chief of staff, officially decided to introduce Toshiba's Tan-SAM. He stressed the inter-service use of the domestically-developed missile is more preferable. But he made no secret of the ASDF assessment that the Roland missile is the best.

[25 Jun 81, p 3]

[Article: "Confusion at Air Staff Office"]

Even when it was revealed that the DA's Internal Bureau had instructed the Air Staff Office to procure Toshiba's Tan-SAM missiles around late March 1980, officials at C. Itoh & Co. still saw a ray of hope of selling Rolands to the Defense Agency.

"Sure, we felt a bit uneasy about our prospects," said an official at the nation's third largest trading house. "Yet, ASO's love affair with the Roland was deemed so deep-rooted that we expected that the French missile would be sold to the DA."

It was on March 31 that the trading house became an official agent for the French Export Office of Aeronautical Material for the Roland.

Euromissile Co., Roland producer; and U.S. Hughes Co., designer of the improved Roland, were active in the sales campaign. Euromissile's Vice President Friedemann Striegel and Hughes' Vice President Leonard Gross called on senior ASO officers in Tokyo in early April last year.

Officials at C. Itoh & Co. were puzzled over one persistent question: "Why hasn't the ASO issued a RFP (request-for-proposal) yet?"

It is common that in making final selections of weapons, the DA requests manufacturers of selected weapons to submit specifications to the agency for detailed analyses.

The trading house and OFEMA's Tokyo office did not receive an RFP from the DA. The businessmen became increasingly worried over the Roland sale campaign in Japan because if appropriations for the Roland had been compiled in the budgetary request for fiscal 1981, which was to be finalized by late August, the DA should have been active in making the final selection of the next-generation missile system by analyzing specifications sent from manufacturers.

C.Itoh & Co., officials pressed ASO officers for a reply, but the officers only repeated that an RFP would be issued later. Finally a "quasi-RFP" was issued to the Roland salesmen. The salesmen undoubtedly interpreted the "quasi-RFP" as a "real RFP" and met in Tokyo in late May to draw up detailed specifications.

The Air Staff Office designated June 10 as the deadline for submitting specifications to the agency. On that day, C. Itoh & Co. officials repeatedly telephoned the ASO to determine the date when Toshiba would submit its specification.

One C. Itoh & Co. official said that the submission of specifications should be made "simultaneously," because "earlier submissions" of specifications could help tardy rival manufacturers learn key figures and finally win the race.

The Roland specifications were submitted to the agency shortly after 8 p.m. on June 10. Unexpectedly, ASO refused to accept the OFEMA specifications. The Roland salesmen strongly protested ASO's refusal, saying "Euromissile, Hughes and OFEMA officials had the specifications drawn up in Tokyo. Such an unreasonable refusal will cause a serious international problem."

ASO gave in and accepted the specifications.

ASO had been in deep confusion over the selection of the next missile system, it is said. One Ground Staff Office officer explained that the Air Staff Office had preferred the Roland, but later was instructed by the Internal Bureau to select the Tan-SAM.

Yet, uniformed officers preferred the Roland to the Tan-SAM. Thus the ASO became indecisive. "I have never heard of the DA issuing a "quasi-RFP" to salesmen before," the officer said. "ASO officers might have been astounded at the Roland specifications."

On the other hand, Hisakatsu Ikeda a defense councillor, said that the Tan-SAM was developed by the DA and Toshiba over a period of 14 years, adding that "this is a great achievement. Unless the DA adopted the domestically-developed missile, it would be a great national loss."

It was apparent that ASO selected the Tan-SAM system from a highly political point of view—in order to bolster the domestic arms industry.

In August, three pro-Roland officers were transferred from ASO to other sections in a "regular" personnel reshuffle.

C. Itoh & Co. officials had to admit that the missile sales war was finally over.

[26 Jun 81, p 3]

[Article: "DSP Helps To Publicize Tan-SAM"]

Keigo Ouchi, a Democratic Socialist Dietman, argued against the Defense Agency's plan to purchase Tan-SAMs at a House of Councillors Budget Committee session in October 1980.

Ouchi even called the Tan-SAM a defective missile because it lacks all-weather capability and subsequent direct-hit accuracy under unfavorable weather conditions. The Dietman said that "it is just a waste of money for the DA to purchase Tan-SAMs."

Producing an ASO memo favoring the selection of Roland, Ouchi went on to say that some irregularities might exist in the selection of the ASDF's next missile system.

His bombshell statement stirred the hottest debate in the Diet. It perplexed not only DA and Finance Ministry officials but also officials of the Democratic Socialist Party and the Japan Confederation of Labor (Domei), a support organization for the party.

In fact, Ouchi's statement came as a great shock to Domei members, many of whom work in the arms manufacturing sector. The statement even "ran counter" to his party's (and Domei's) policy favoring the domestic production of arms.

Moreover, Ouchi's statement was likely to have a potential "backlash" impact on the party's strategy in defense policy which has taken on a more pragmatic course.

It was true that the Democratic Socialist Party and the Liberal-Democratic Party were intending to map out a "partially-coordinated" defense policy.

Caution

As Eiichi Nagamatsu, chairman of the DSP's Diet Tactics Committee, pointed out, it was feared that Ouchi's criticism of Tan-SAMs might harden the attitude of LDP seniors and possibly mar the chance of holding a top-level meeting between the heads of the two parties.

So far, Japan's purchase of arms has always been tinted with political interference, either covertly or overtly. Under such circumstances, rumors were rife that Ouchi took up the issue, together with the ASO memo "at the instigation" of certain pro-Roland ASO officers or Roland salesmen.

Ouchi refused to disclose how he obtained the memo, but said he had previously told top DSP leaders of his scheduled questioning about Tan-SAMs at a House of Representatives meeting.

He explained that the Defense Agency made the sole decision on arms procurement but added:

"This should be altered, especially at a time when Japan's defense strength is being beefed up. For instance, the efficiency and accuracy of new weapons should be discussed thoroughly among all parties concerned."

About two weeks after Ouchi's controversial questioning, DSP Chairman Ryosaku Sasaki and LDP President Zenko Suzuki met and agreed in principle that Japan should enhance its defense potential within the limits of the Constitution—with consideration given to the stability of state finances. Sasaki asked Prime Minister Suzuki to select Tan-SAMs with "due prudence."

New Approach

Ouchi's questioning apparently opened a new page in the history of Diet debates on defense.

Previously, debates centered on whether new weapons would be "offensive" or "defensive," or whether the weapons would run counter to provisions in the Constitution.

It was unprecedented for the efficiency and accuracy of weapons to be discussed in the Diet in postwar years.

The DSP Dietman touched on the missile issue on the assumption that Japan should build up its defense strength.

But some critics said that although Ouchi spoke ill of Tan-SAM's he actually played a key role in publicizing the ever-growing technology of the Japanese arms industry.

One Japan Communist Party Dietman said that "Ouchi's anti-Tan-SAM questioning—in fact—publicized the domestically-developed missile excessively."

There was another "dangerous" side to Ouchi's questioning.

This is because the DSP, one of the six opposition parties, has shown its pro-defense buildup stance, thus weakening the previously-unified antidefense buildup stance among the opposition parties.

Even some LDP Dietmen voiced their concern over the DSP's recent policy shift.

Hirohide Ishida, a senior LDP Dietman who supports disarmament, lamented that the recent mood in favor of a stronger Japan is very dangerous.

"What perplexed me the most was the policy shift of one opposition party that is increasingly fanning the pro-armament mood in Japan," Ishida said.

[28 Jun 81, p 3]

[Article: "Finance Ministry Losing Control?"]

In compiling the fiscal 1981 budget, the Finance Ministry gave positive support for the Defense Agency to adopt Toshiba's Tan-SAMs.

Besides simply believing that the Tan-SAM would outperform the Roland, the ministry decided in favor of the adoption of the domestically-developed missile — in consideration of increased pressure from both here and abroad (namely the U.S.) for marked defense expenditures.

The Defense Agency, in an effort to avert the increased American pressure, wanted to procure the domestic missile system, a missile-carrying destroyer and C-130 cargo planes in the 1981 budget in a bid to "hasten" the DA's mid-term defense buildup estimate.

It might also be true that the Finance Ministry decided to give support to the procurement of the Tan-SAM in the belief that the public would denounce it as a waste of public money if the DA adopted the Roland instead of the Tan-SAM, which Toshiba had developed with a state subsidy of about 10.4 billion yen.

Therefore, DSP Dietman Ouchi's "bombshell" statement about the Tan-SAM's alleged inefficiency before the Diet sent shockwaves to the Finance Ministry to the point that the ministry considered "freezing" the budget for the purchase of the missile.

To break the stalemate, the Finance Ministry "indirectly" worked on the DA to set up a private study committee for a "rubberstamp" recognition of the Tan-SAM. The DA, however, wasted no time in spurning the idea.

This was because DA officers did not want Finance Ministry officials to "select" new weapons in the belief that it was strictly their job. Besides, the DA officials were rather distrustful of Finance Ministry officials who had held down defense expenditures in the past.

In fact, the post of the DA's Finance Bureau director general has been occupied by officials sent from the Finance Ministry. Defense spending accounted for 19.81 percent of the total general account in 1950 — in the days of the National Police Reserve. Yet, the ratio shrank radically to 5.24 percent in 1979.

"The decline merely reflected the shift of social needs from guns to butter," maintained Akira Watari, a former DA vice minister who was formerly a Finance Ministry bureaucrat.

It was Prime Minister Zenko Suzuki who urged the DA to sit on the FM-proposed study committee on the Tan-SAM's capability.Only 13 days after the committee's inauguration, the six-man committee members mapped out a report favoring the adoption of Toshiba's Tan-SAMs.

The decision led the Finance Ministry to finance six units of the Tan-SAM for the DA in fiscal 1981, although the number was four less than the DA's initial request.

The so-called "Ohira-Sakata debate" is often cited as proof that the Finance Ministry has pegged defense expenditures at a low level for years. In 1976, then-DA Director General Michita Sakata requested that the defense outlay be kept at one percent of the gross national product (GNP). On the other hand, however, then-Finance Minister Masayoshi Ohira adamantly insisted that the defense spending should not exceed one percent of the GNP.

Eventually, Ohira won the day. The guideline, set by Ohira with support from FM officials, limited the defense outlay to within one percent of the GNP.

Gradual changes have taken place at the Finance Ministry as more officials seem to favor a defense buildup. One middle-ranking official at the ministry's Budget Bureau said that defense spending is like a straight insurance policy.

He added, "It is only natural that we should increase defense expenditures when necessary."

Watari explained that the Finance Ministry compiles the budget in a manner most appropriate to the needs of the year, adding that the ministry has given preferential treatment to defense spending for fiscal 1981 in apparent consideration of the U.S. request.

Then, one vital question remains.

"Is it too much to believe that the Finance Ministry, in this current military buildup mood, is losing its grip on the escalating defense expenditures?"

[29 Jun 81, p 3]

[Article: "Start of New Competition"]

For the Mitsubishi group, a leading weapons manufacturer in Japan, the production of short-range surface-to-air missiles is just one of various lines in its arms-making business which is expected to remain prosperous.

Although the group, with Mitsubishi Heavy Industries and Mitsubishi Electric as the core, lost to the rival Toshiba Corp. in the competition for winning a contract to sell Tan-SAM missiles to the Defense Agency, the failure is just a matter of the past for the group.

The group is now taking aim at a post-Nike-J missile contract expected to be offered by the Air Self-Defense Force. Success in winning a contract for the new medium-range SAM missile would produce far bigger profits than the sales of SAMs.

In a bid to successfully win the contract, Mitsubishi Heavy Industries is in the middle of its work to remodel the Nike-J into a modernized Nike-Phoenix missile in cooperation with the DA's Technical Research and Development Institute.

DA chief Joji Omura has already revealed before a Diet session that the institute is planning to replace the Nike-J either with the U.S.-built Patriot or the Nike-Phoenix.

At the moment, DA authorities are divided in their opinion about the selection between the two missiles.

For instance, Osamu Namatame, chief of staff of the ASDF, indicates his support for the Patriot on the ground that Japan lacks an appropriate firing test site for medium-range SAM missiles.

In this sense, he argues, the development of the Nike-Phoenix must shoulder a crucial handicap while the Patriot can be test-fired in the United States.

On the other hand, Atsuhiko Bansho, the DA's counsellor in charge of technology, is admittedly in favor of the Nike-Phoenix. He supports the domestic missile from the cost factor.

He estimates that the domestic missile will be 20 to 30 percent cheaper, in terms of per unit price, than the Patriot which is expected to be priced at 10 billion yen a unit.

But the solid fact exists that help from the Mitsubishi group is indispensable for producing post-Nike-J missiles regardless of whichever missile the DA selects.

Mitsubishi Heavy Industries is a prime contractor for the current Nike model. It is natural for the company to think that it will again become the main builder of the Nike-Phoenix if and when the DA picks it up.

Meanwhile, the introduction of the Patriot will be made in the form of licensed production by Mitsubishi Electric Co. Through its experience in producing Hawk missiles under an American license for the GSDF, the firm has accumulated extensive know-how concerning medium-range SAM missiles. Mitsubishi Heavy Industries is naturally expected to join its sister company in producing the Patriot by manufacturing its airframes.

"Engineers in the arms section of the two firms frequently get together. In short, the two companies are engaged in 'friendly competition,'" commented Takeshi Abe of Mitsubishi Electric Co.

Dominance of the domestic arms market by the two Mitsubishi firms is unshakable. In fiscal 1980 the two companies enjoyed combined sales of 307 billion yen in their procurement contracts with the DA. This figure accounted for more than 30 percent of the entire defense contracts during the year.

At the moment Mitsubishi Heavy Industries is also planning to develop a post-Nike-Phoenix missile.

The Nike-Phoenix is designed to mount a target-detector device on the warhead of the current Nike model. The detector is capable of distinguishing a friendly aircraft from an enemy aircraft.

The follow-up missile of the Nike-Phoenix will have the capability of dealing with a CCV-type fighter which, it is believed, will become a mainstay model in the next generation.

The CCV stands for Control Configured Vehicle. A CCV-controlled fighter is designed to fly in such a way as to move smoothly upward or downward like a butterfly or sideways like a crab without changing its flight position. The fighter will thus be able to dodge an enemy missile easily.

The Mitsubishi firm intends to remodel the airframe of the Nike-Phoenix in its efforts to develop a missile capable of checking a CCV-controlled fighter.

It still remains to be seen as to when the company will actually start and complete the development of a post-Nike-Phoenix missile. But it is certain that the completion will not be an end of competition but rather the start of new competition in developing more sophisticated weapons.

CSO: 4120/269

SCIENCE AND TECHNOLOGY

OPTICAL FIBER CABLE TRANSMISSION SYSTEM DEVELOPS RAPIDLY

Tokyo TSUKEN GEPPO in Japanese Vol 34 No 3 1981 pp 1-5

[Text] Optical fiber cable transmission can be used over a wide area of public communication from subscriber transmission systems to medium and small capacity (short distance) and then to large capacity (long distance) transmission systems. This laboratory has been making all out efforts to develop interchange modes of optical transmission and recently was able to put into operation inter medium and small office transmission and intraoffice communication, and optical fiber cable transmission will undergo its first commercial tests in JFY 1981.

Top Batter in Practicalization--Inter Medium and Small Business Offices and Intraoffice Communication Mode

Optical fiber cable transmission is associated with a very wide area of application because of the superior transmission properties of optical fibers and is expected not only to replace existing transmission systems but to make contributions in promoting digital network formation and introducing imaging service.

This laboratory classifies optical fiber cable transmission modes into the five following public information transmission modes of subscriber systems, intraoffice, short distance (medium and small capacity), long distance (large capacity), and sea bottom modes, and research is being conducted to bring these up to the commercial application stage. Among these categories, the intracity office and inter medium and small volume office communication mode which ties together communication facilities between nearby cities and their suburbs became technologically feasible at an early stage, and there has been a high degree of introduction into company businesses. As a result, research was initiated as quickly as possible after which the first phase on-site tests (FR_1) and second phase on-site tests (FR_2) were completed, and these modes are presently the top batters among these five communication modes.

Here, we will introduce the technology associated with these various modes at the final stage of practicalization in terms of the inter medium and small capacity office transmission mode centered on the results of the second phase on-site tests.

From the First Phase to Second Phase On-Site Tests

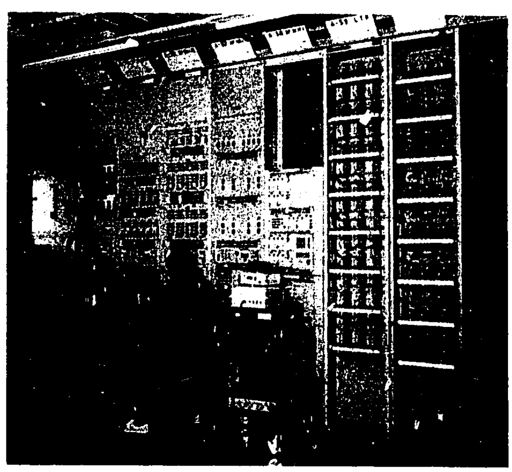
Serious studies were initiated from JFY 1975 with the objective of putting into practical form the optical fiber transmission mode, and at the end of JFY 1976 a

32 Mb/s digital transmission test was conducted within the confines of the Yokosuka Laboratory in order to recognize the properties of basic technology related to optical fiber cables, optical relays, optical parts, and optical measurement equipment and to grasp the problem areas.

This was followed by initiation of studies on inter medium and small capacity offices and intraoffice optical communication mode. In order to ferret out the problem points with respect to practicalization and to evaluate the suitability of optical communication technology under the on-site environment, a first phase field test was conducted over the 20.8 km distance between Karagasaki and Hamamachi in Tokyo urban prefecture from March 1978. The results of this study indicated that the basic technology necessary to inter medium and small capacity offices and intraoffice mode showed early promise of becoming practical as a result of which problems associated with practicalization became even more lucidly defined.

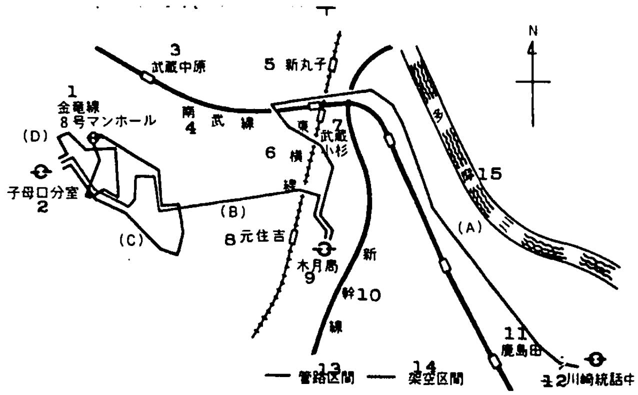
This was followed by studies which placed emphasis on the economics and reliability of this mode in order to establish it as a technology which should be introduced into the Public Corporation's activities in which second phase on-site tests were conducted within the limits of Kawasaki City from January 1980 using two spans of conduit facilities and two spans of overhead lines for a total distance of 17.6 km.

These tests were ended in September 1980 from which was drawn the final conclusion that there were no problems in the practical technology. In the particular case of the FR_2 test studies on new technology such as introduction of long wavelength band mode and use of a VAD[1] fiber were conducted, and a number of results were obtained. Many of these technological results will be discussed in order below.



Second Phase On-Site Test of Optical Fiber Cable Transmission Mode within Inter Medium and Small Capacity Offices and Intraoffice at the Koboguchi Branch Station of the Kawasaki Telephone Central Relay Station.

From left to right: 32 Mb/s intermediate relay, 32 Mb/s terminal office relay, two 100 Mb/s terminal office relay, power supply, distribution panel (LTF).



The route selected for this inter medium and small capacity transmission mode FR_2 route included the 11.1 km conduit line tying together the Kawasaki Central Telephone Relay and its Koboguchi Branch (between A, B) and the 6.5 km distance of overhead installations from Koboguchi Branch Office to the No 8 manhole at Kinryu (between C, D). The intraoffice transmission mode test was conducted within the Koboguchi Branch Office.

Key:
1. Kinryu line, No 8 manhole
2. Koboguchi Branch Office
3. Musashi Nakahara
4. Nanmu line
5. Shin Maruko
6. Tokyo-Yokohama line
7. Musashi Kosugi
8. Motosumiyoshi
9. Kitsuki Office
10. Shinkansen
11. Kashimada
12. Kawasaki Telephone Central
13. conduit route
14. overhead aerial route
15. Tama River

Optical Cables Installed

1 区 間	2 施設	ケーブル長(km) 3	4 種 類
5 A 川崎-木月	6 管路	6.6	7 24心 無給電形
8 B 木月-子母口	6 管路	4.5	9 48心 無給電形
10 C 子母口-金竜線8号マンホール	11 架空	3.8	12 24心給電形
13 D 金竜線8号マンホール-子母口	11 架空	2.7	15 48心 無介在形
16 全 長		17.6	

Key:
1. interval
2. type of installation
3. cable length (km)
4. type of cable
5. A-Kawasaki-Kitsuki
6. conduit
7. 24 core, no power supplied type
8. B-Kitsuki-Koboguchi
9. 48 core, no power supplied type
10. C-Koboguchi-Kinryu No 8 manhole
11. aerial
13. D-Kinryu No 8 manhole-Koboguchi
12. 24 core, power supplied
14. aerial
15. 48 core, no interposition type

Comparison between FR_1 and FR_2

1a 項目		FR_1	FR_2
1 FRの目的		現場環境における光伝送技術適用性の評価 2 実用化上の課題の発掘	3 公社事業に導入可能な技術の確立
4 光ファイバおよびケーブル技術	5 使用ファイバ種別	MCVDファイバ主体 8	MCVDおよびVADファイバ 10
	ファイバ寸法 6	コア径60μm, 外径150μm 9	コア径50μm, 外径125μm 11
	布設場所 7	とう道・管路 7a	管路・架空 7b
32 光部品技術	13 半導体レーザの寿命	約1万時間(推定) 16	19 3万時間以上(10万時間の見込み)
	14 光素子の信頼度保証	なし 17	あり 20
	光コネクタ 15	高精度調整形(C形) 18	無調整形[現地組立形(FA形)] 21
22 伝送技術	回線設計法 23	短波長方式のみ 26	短波長方式および長波長方式 29
	監視・制御・切替 24	監視のみ 27	あり 20
	架実装法・密度 25	横形実装・4システム/架 28	縦形実装・6システム/架 29

Key:

1. purpose of FR
1a. item
2. evaluation of applicability of optical transmission technology to the on-site environment
3. establishing technology capable of introduction into the corporation's activities
4. optical fiber and cable technology
5. types of fiber used
6. fiber dimensions
7. installation sites
7a. roads, conduits
7b. conduits supports
8. MCVD fiber main body
9. 60 um diameter core, 150 um outer diameter
10. MCVD and VAD fiber
11. 50 um core, 125 um outer diameter
12. optical parts technology
13. life of semiconductor laser
14. reliability guarantee of optical elements
15. optical connectors
16. about 1,000 hours (estimated)
17. none
18. high precision prepared type (type C)
19. more than 30,000 hours (prospects of 100,000 hours)
20. available
21. nonmanufactured type [field assembled type (type FA)]
22. transmission technology
23. circuit design methods
24. observation, control, switchover
25. aerial installation method, density
26. shortwave mode only
27. observation only
28. Yokosuke installation, 4-systems/support
29. shortwave and longwave modes
30. available
31. vertical type installations, 6-systems/support
32. optical parts technology

Principal Specifications for Inter Medium and Small Capacity Offices and Intra-Office Optical Transmission Modes

2 伝送方式 / 1 項目	3 中小容量局間伝送方式						6 局内伝送
	4 短波長 (0.85μm) 帯				5 長波長 (1.3μm) 帯		
	DF－6M·S	DF－32M(S)	DF－100M(S)	AF－4M(S)	DF－32M(L)	DF－100M(L)	
7 伝送信号	ディジタル 8 2次群	ディジタル 9 3次群	ディジタル 10 4次群	テレビ1チャネル 音声1 11 チャネル	ディジタル 12 3次群	ディジタル 13 4次群	ディジタル 14 2次群
15 適用距離	16 最大50km				16 最大50km		17 最大600m
18 中継間隔	12km	10km	9km	10km	9km * 21km **	18km	—
19 適用光ケーブル	20 グレーデッド形多モードファイバ (3.5～4dB/km)				21 同左 (1.2dB/km)		21 同左 (7dB/km)
22 光源	23 半導体レーザ				24 発光ダイオード 半導体レーザ	半導体レーザ	25 発光ダイオード
26 受光素子	27 Siホトダイオード				28 Geホトダイオード		29 PINホトダイオード

30 * 光源: 発光ダイオード, ** 光源: 半導体レーザ 31

Key:

1. item
2. transmission mode
3. inter medium and small capacity office transmission mode
4. shortwave-length band
5. longwave-length band
6. intra-office transmission
7. transmission signal
8. digital second group
9. digital third group
10. digital fourth group
11. TV 1 channel, audio 1 channel
12. digital third group
13. digital fourth group
14. digital second group
15. applicable distance
16. 16 maximum 50 km
17. maximum 600 meters
18. interrelay distance
19. applicable optical cable
20. graded type multiple mode fiber
21. same as left
22. light source
23. semiconductor laser
24. light emitting diode, semiconductor laser
25. light emitting diode
26. light receiving element
27. Si photodiode
28. Ge photodiode
29. PIN photodiode
30. * light source: light emitting diode
    ** light source: semiconductor laser

Longwave-length Band (1.3 um band) Will Also Be Developed

We conducted tests on 3 types of digital transmission modes (second group, third group, fourth group) and analog image transmission mode using pulse frequency modulation for the inter medium and small office transmission mode with FR_2. The third and fourth group digital tests involved the addition of shortwave band (0.85 um) to employ a longwave band (1.3 um) transmission mode.

These on-site longwave band transmission tests were the first of their kind in the world in which an InGaAsP laser diode was used as light source and a Ge avalanche photodiode was used as the light receiving element by which means it was hoped to enable greater transmission distance. We were able to roughly double the results obtained with the shortwave band mode of 20 km between relay points.

In addition, a new observation and control system was set up as well as the installation of mechanism to enable system switchover which were changes from FR_1. The supports were changed from the horizontal type to a vertical type, the installation density was improved from a four-system affair to a six-system affair, and the transmission panel was installed at the lowest stage of the support positioned at the site of comparatively low ambient temperature in order to make possible longer life of the laser diode. In this manner, many technological improvements were introduced.

In another direction, second group digital transmission mode tests were conducted on the intraoffice transmission mode aimed at relaxing overloading of cables installed between offices and to increase transmission distance, and it was possible to increase the operating distance of the coaxial cables from the 200 meters of the past to 600 meters.

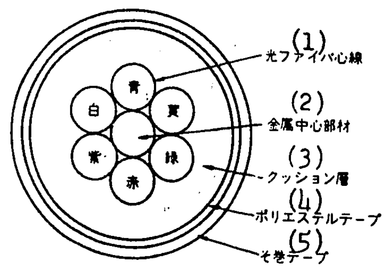
VAD Method and MCVD Method Optical Fibers

We test produced and made practical 24-core and 48-core optical fiber cables mostly of the no power supplied type for short distance transmissions. The optical fibers were made to meet international standards where dimensions were concerned with core diameter of 50 um and outer diameter of 125 um using graded type multiple mode fiber in which 50 percent of the fibers were of the VAD type which was newly developed at this laboratory recently. The remaining 50 percent was $MCVC^2$ fiber of which a fraction was used for the longwave transmission mode.

The optical fiber cable was unitized into 6-core optical fiber core cables which incorporated interposition pairs and tension members, and they were 29 mm in outer diameter and about 0.70 kg/m in weight.

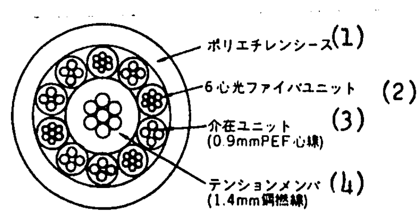
Some of the transmission characteristics were average loss 3 dB/km in both VAD and MCVD fibers and a transmission band region of average 1 GH_z.km for the MCVD fiber, and these values showed that we had developed topnotch technology even when judged from a worldwide basis.

We substituted VAD fiber for the multicomponent glass fiber used in FR_1 in the intraoffice transmission system, and cables which assembled the optical fiber codes into 2-core, 6-core, and 10-core units were test manufactured. We were able to attain an average loss of 3.1 dB/km loss characteristic as a result.



6-Core Optical Fiber Unit (4 mm Outer Diameter)

Key:
1. optical fiber core wire
2. metal center material
3. cushion layer
4. polyester tape
5. winding tape



24-Core Nonpower Supply Type Optical Fiber Cable (29 mm Outer Diameter)

Four types of optical fiber cables were test produced in FR_2. This figure shows the 24-core nonpower supply type optical fiber cable cross section. There are four sets of six-core optical fiber units and six sets of interposition units (these are the same size as the fiber unit) with two pairs each of interpositioned wires which are deployed about the tension member.

Key:
1. polyethylene sheath
2. six-core optical fiber unit
3. interposition unit (0.9 mm PEF core)
4. tension member (1.4 mm steel stranded cable)

Establishing Long Span Installation Technology

A new cable pulling method[3] was developed to enable long spans in the installation of FR_2 optical fiber cables. This method involves the dispersed siting of a number of cable installation facilities to perform dispersed cable pulling. In this present study maximum length of 1,550 meters was installed in conduits with an average length of 1,100 meters. This dispersed pulling method greatly suppressed damage to the optical fiber cable, reduced work effort, and minimized need for maintenance operation.

Two aerial intervals between supports were used in the case of FR_2 lines. Aerial support installation technology was newly set up for this purpose, and a maximum span length of 1,280 meters and average span length of 830 meters were realized.

Extending Life of Semiconductor Laser

The life of the semiconductor laser necessary to satisfy the reliability of this mode of communication must be more than 3 x 10^4 hours at a system temperature of 50°C. On the other hand, the semiconductor laser used in FR_1 had lifetime of but 1 x 10^4 hours as a result of which the improvements listed below were introduced.

1) Placement of a protective membrane to prevent deterioration of the laser reflection plane

2) Improvement to metal material used to melt attach the semiconductor element

3) Reduction in thermal resistance by a diamond heat sink[4]

4) Reducing driving current

Endurance tests were conducted at 50°C on semiconductor lasers which had undergone the above modifications, and we were able to see prospects for an average life of 4 x 10^5 hours estimated from the rate of increase in driving current of 5 mW. As a result of this study, it has finally become possible to establish reliability of the photo element of FR_2.

Establishing Low Loss Junction Technology

Optical fiber connections come under the two categories of a permanent type junction called splicing and a disengageable type junction using connectors. We made splicings using a discharge melt adhesive connection method. We developed a small and light melt adhesion connecting unit which incorporated the technologies of preheating melt adhesion connection, automatic setting of optical fibers, and two-directional observation which was used to make connections within roadways Todo [phonetic] manholes, and atop posts, and the resulting loss was an average of 0.07 db/connection for core line connection and 0.03 db/site for slack treatment.[5]

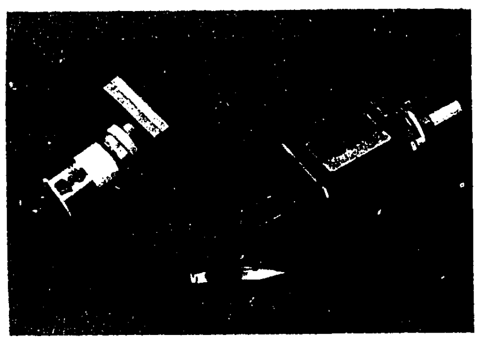
We used the FR_1 tuned core type C optical connectors to make these connections, but the FR_2 is an untuned core type with small number of parts so that a new FA type (field assembly type) optical connector which can be assembled on-site was devised and produced. This FA type is interchangeable with the C type, and it has been proposed as a standard basic construction for optical connectors within this country. The FR_2 connector is made so that 427 terminals are assembled at the plant and 432 terminals at the site, and the extremely superior performance of average connection loss of 0.32 dB and 0.42 dB was realized.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000400030049-1

Various Optical Measurement Equipment also Being Developed

During the course of these on-site tests about 10 different pieces of optical measurement equipment including optical power meters, light source for measurements, special transmission measurement instrument for optical fiber cables, and emission wavelength spectrometer were developed. These instruments all can be applied to multimode optical fiber systems for inter medium and small capacity offices and intraoffice communications.

Along the technological front, we have improved the properties of the measurement instruments which were developed and test produced for FR_1 in which every effort was made to reduce size and weight taking into account the ease of field handling while all the optical input-output terminals were replaced by FA connectors to facilitate ready coupling-uncoupling. In addition, we checked the measurement capability of each instrument anew at the longer wave-length bands in line with the introduction of longwave-length band mode to FR_2. The instruments related to the light source measurements of the emission wave length and emission spectrum are newly developed for FR_2.



Semiconductor Laser Module for Shortwave-length Band Use

Semiconductor laser modified for long life is incorporated into this module making it possible to provide laser output light with about 4kB coupling efficiency through use of a FA type optical connector to use with the optical fiber.

Optical Cable Transmission Modes of the Future

Basic studies on the optical fiber cable transmission mode were initiated in 1971, and there have been a series of spectacular developments taking place over barely 10 years to set the stage for the commercial use of inter medium and small office and intraoffice optical communications. There is research underway in steady but rapid tempo at this laboratory to develop commerciai applications for large volume, underseas, and subscriber system transmission modes.

On-site tests on the large capacity transmission mode were initiated between the Masashino Laboratory and the No 4 Communications Laboratory[6] in October 1980, and considerable advance toward practicalization has been made. Studies on the underseas transmission mode were initiated in November 1980, and there is a field test under way between Izu Inatori and Kawazu which is a no-relay transmission mode. Studies on the subscriber system transmission mode were initiated in April 1980 catering to a wide spectrum of subscriber systems in the interval between the Yokosuka Laboratory and the Yokosuka Central.

At the same time, variable demodulation technology, relay design technology, and wave-length divided multiple transmission technology adaptable to optical fiber use are mode constitutive technologies which are being developed for the inter medium and small office and intraoffice communication mode which was recently developed to a practical stage, and studies over a wide range of modes are being pursued to enable flexibility in meeting future directions in demands.

In this manner, the developments in optical fiber cable communication modes are very substantial, and we anticipate that previously nonexistent wide areas of application will be developed and play major roles in the makeup of future communication networks.

Field Testing of Optical Communication Modes

(1) 方式	(2) 実験区間	(3) ルート長	(4) 期間
(5) 中小容量伝送	(6) 唐ヶ崎統話中—浜町電話局	20.8 km	53.3 ~55.11
	(7) 川崎統話中—同所子母口分室	17.6 km	55.1 ~55.9
大容量伝送 (8)	(9) 武蔵野研究所—第4研究所	≃80 km	55.10 ~58.3
(10) 海底伝送	(11) 伊豆稲取—河津	≃10 km	55.11 ~
(12) 加入者系	(13) 横須賀研究所—横須賀統話中	8.2 km	55.4 ~56.3
(14) 局内伝送	(15) 川崎統話中子母口分室内	0.6 km	55.1 ~55.9

Key:
1. mode
2. experimental span
3. length of route
4. time period
5. medium, small capacity communication
6. Karagasaki Central-Hamamachi Office
7. Kawasaki Central-Kawasaki Koboguchi Branch Office
8. large capacity communication
9. Musashino Laboratory-No 4 Laboratory
10. underseas communication
11. Izu Inatori-Kawatsu
12. subscriber system
13. Yokosuka Laboratory-Yokosuka Central
14. intra-office communication
15. Kawasaki Central and Koboguchi Branch Office

FOOTNOTES

1 Method of manufacturing fiber base material developed at this laboratory. Gaseous raw materials are synthesized in a flame to prepare "chalky" and porpus material which is heated to prepare the transparent base material. This method is suitable for mass production.

2 One of the methods of preparing fiber used in the past. Base material is prepared by placing about 100 layers of glass with differing index of refraction on the side of a quartz tube.

3 See Optical Cable Choshaku Fusetsu, Vol 33, No 8 (1980).

4 This is an insulating material for heat dissipation of items such as semiconductors, and diamond with good thermal conduction is used for this application.

5 Extra length (slack) should be provided in the cable at the junction section. The common practice is to coil the cable into small loops, but bending damages optical fibers.

6 Temporary name, presently under construction in Atsugi City.

2267
CSO: 8129/1251

END