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29 July 1982

Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

(FOUO 16/82)

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JAPAN

NTT FAMILY'S UNCERTAIN FUTURE

Tokyo SHUKAN TOYO KEIZAI in Japanese 24 Apr 82 pp 82-85

[Article by reporter Kenichi Komahashi]

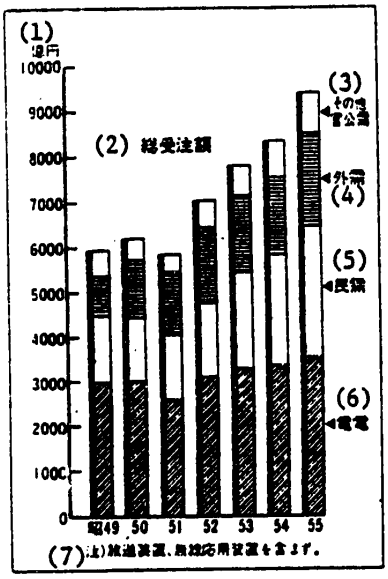
[Text] The situation in the Nippon Telegraph and Telephone Public Corporation (NTT) has changed greatly during the past year so, with liberation of material procurement as of 1 January and changes made by the new president, Shinto, who took over his new post on the same day. The effect of the rough waves is surging toward the so-called "NTT family" of approximately 300 firms which supply equipment to NTT.

The NTT family is also called the "mighty closed society." Communication circles have been upgrading their technological know-how through joint research with NTT. Specific manufacturers are given orders through private contracts. Outsiders are able to achieve official status in NTT through the recommendation of the business concerned. It an extremely difficult feat for a new participant to break into this bastion.

It is a fact that in achieving a quick reconstruction of the Japanese telephone network, which was devastated by the war, it was more efficient to concentrate orders with specific firms. In the actual contracts today, the first order depends on the degree of contribution in the joint development. The allocation of next year's orders is decided after the assessments have been made as to the quality of goods, condition of conservation system, delivery time, price offer, and management situation, including the previous year's performance.

In other words, "The principle of competition is working, to a certain degree, and there is absolutely no allotment of an entire order to one single manufacturer. In addition, members of NTT do not take 'gifts.' In that sense, things are working well" (according to a party connected with NTT). Nevertheless, a "coquettish structure" continues to thrive in the long closed society. Even the cost of telephones is set by the "accumulative system" of adding the cost of parts of rigid quality standards and a fixed profit margin. Home appliance manufacturers say that telephones "can be made much cheaper."

Moreover, the "rights" of the four members--consisting of NTT, the Ministry of Posts and Telecommunications, the postal group, and private enterprises--have been functioning. Thus, the power to crush the family never developed from within. In the final analysis, the door was finally opened by "external



Leading NTT Demands, Telecommunications Machinery Industrial Association

Key:
(1) In 100 million yen
(2) Total orders
(3) Other government
(4) External demands
(5) Civilian demands
(6) NTT
(7) Note: Broadcasting equipment, radio equipment not included

pressure," through the participation of foreign enterprises made possible by the government-level procurement negotiations at the Tokyo round of GATT. This changed the whole situation.

Time-Consuming Overseas Procurement

Through an agreement between Japan and the United States, the material procurement method was divided into three stages, of Tracks I, II and III.

Track I includes those [items] which are not directly connected with the telecommunication network, but bids can be placed for readily usable goods on the market which can be worked into the network. Bidding and purchase of about one-half of the annual procurement, or about 1.5 billion dollars including paper and pencils, can be made according to GATT. An annual purchase of over 44 million yen will be announced in the official gazette.

Track II refers to those products on the market that require slight changes. These will be announced in the official gazette, and purchase can be made through a private contract with a manufacturer selected from applicants for joint development (with NTT).

These new methods are well received by the U.S. Embassy and USTR, but procurement from foreign enterprises has not progressed substantially.

Specification study of 56 products and 258 companies under Track I was completed at the end of March. Among these were 15 foreign products and 27 foreign companies. Bids for 45 products by 54 companies totaling 19.5 billion yen were received, but [bids for] only 9.3 billion yen for 9 products by 11 companies were from foreign firms, and many were for magnetic tapes and experimental LSI manufacturing equipment.

On the other hand, the only product announced in the official gazette under Track II was the digital echo suppressor. A Japanese firm was selected. As for Track III, 10 products were announced. A bid for automobile telephones by Motorola and a bid for satellite-use echo eliminators by the U.S. ATT were received. An examination for selection is being made in each case, but the fact is that the number is much smaller than anticipated. (Motorola was approached for the sale of pocket bells prior to the liberation of procurement, and [Japan] will purchase 2 billion yen worth during this year.)

10 Best Procurement Firms for JFY 1980 (in 100 million yen)

Nippon Electric Company Ltd	1,274
Fujitsu Ltd	844
Oki Electric Industry Co Ltd	483
Hitachi Ltd	415
Sumitomo Electric Industries Ltd	174
Furukawa Electric Co Ltd	156
Fujikura Cable Works Ltd	156
Iwatsu Electric Co Ltd	146
Dainichi-Nippon Cables Ltd	140
Tamura Electric Machinery	113

However, all the products cannot be announced immediately, and it requires time to rewrite the specifications. Among the 101 products for Track II, slightly over 60 percent of those expected for announcement have been completed. The plan is to announce all the products by December. The situation with Tracks II and III is: "Normally, the time required from research to testing and test manufacture is 1 to 2 years for short-term items and about 5 years for long-term items. Procurement takes time." (Shiro Matsuo, chief of Materials Bureau)

An orientation for U.S. firms, held in Tokyo last June, drew 56 participating firms. Application forms were simplified, and through the instruction of President Shinto, bidding instructions and specifications were translated into English and distributed free of charge. Those conveniences by NTT were rather unusual. Since then, over 100 firms have arrived to make inquiries or a sales pitch through the Japanese firms or by other means.

However, there is no denial that "foreign manufacturers do not fully understand the procedures." (Ichio Kada, chief of the international procurement room, Materials Bureau) There is a plan to send mail directly to communication equipment manufacturers for double PR work.

On one hand, under the instruction of President Shinto to "take positive steps to buy good products cheaply," a study group was dispatched to the United States in the middle of March. The group visited ITT, GTE, Bell System (ATT), and others to find ways to participate more readily in the Track II and Track III levels.

"Exemplary manufacturers have made a thorough study of NTT's procedures, but they do not understand fully the patent rights know-how in Track III" (Kada); therefore, explanations were made about this. As a result, ATT placed applications for Track III, showing some progress.

On the other hand, problems also exist within the foreign manufacturers themselves. Especially, smaller U.S. communication equipment manufacturers tend to submit applications without changing specifications or configurations, as they have been doing with local telephone companies which do not possess their own technology. There is also a difference in the way they make their sales pitch to NTT.

Talks with various companies are moving along, however, and there is a gradual understanding. A good example is the approval of private switchboards after a year of negotiation with the Rohn Company.

In any case, an improvement in getting good results through PR takes time. "Full-scale participation of foreign manufacturers will exist from here on." (Kada)

Stringent Environmental Changes for Smaller Manufacturers

Whether there are gains in procurement from foreign manufactuers or not, small and medium-size manufacturers will be affected the most from the liberation. This was visible even before the liberation.

The bidding for facsimile equipment last fall is a typical case. Up to then, Nippon Electric Company and Matsushita Denso had made deliveries through private contracts, but the bids last fall were based on Track I. Over 10 companies responded, and Toshiba won orders for 570 electrostatic high-speed equipment and 5,520 thermal-sensitive medium-speed equipment items, while NEC received orders for 1,900 thermal-sensitive high-speed equipment items.

However, the problem was in the prices of the successful bids, which were considerably lower than the market price. A certain source said, "Toshiba set the price at one-fourth to one-fifth of the market price in order to make inroads into the NTT market, and NEC emulated them." There is a rumor that "NTT's responsible persons have made inquiries regarding the excessively low price." (NTT has denied this)

Toshiba disregarded this, saying, "Delivery to TNT does not require distribution costs or inventory charges. Since a fixed quantity was assured, mass-production efficiencies can be utilized to lower the cost."

Regarding the above, executives of medium-size manufacturers could not conceal their bewilderment, saying, "We believe competition is the flow of time, but large companies which can produce in volume have the advantage in making bids. If they keep this up to become the price setters, smaller companies can only throw up their hands in despair."

In actuality, the trend in achievements of medium-size communication equipment manufacturers shows a conspicuous difference between the top-level and lower level companies. NTT's investment was reduced to cut down on telephone inventories which in turn cut down on orders for telephones.

The top-level companies, which were able to read this situation early, made gains by exporting pushbutton telephones or by succeeding in diversification into other fields so as to decrease their dependence on NTT. In contrast, the medium-level companies, which were unable or were too late in getting into the right track away from the NTT's projects, show a trend toward stagnant sales and profits due to depressed NTT investment.

Moreover, the all-out review of material procurement and construction investment under the instruction of President Shinto has added to their apprehensions.

In a normal year, a primary contract for 60-70 percent of the next fiscal year's budget is drawn in January and a contract for the year is concluded in August after the budget is completed. However, through the recent reconsideration, contracts were not concluded even in February, when the budgets should have been fixed by the manufacturers, and it is already April.

The result is the suppression of equipment, for example, by reducing the installation of new public phones, according to the slowdown in real income growth rate, instead of adding new phones.

In contrast, new equipment such as autophones and pocket bells has increased. Orders were switched from the old family enterprises to new manufacturers.

Moreover, the main object of the review is on INS (high-level information communication system). What can be accomplished now is to change to a digital system and promote a more efficient investment. However, many small and medium firms cannot keep up with the new digital technology, and a maldistribution of orders to majors is unavoidable.

In like manner, the structural changes of using LSI in equipment or moving into a nontelephone line have pushed the smaller firms into a rather austere environment. A certain trend in the introduction of new technology corresponding to the technological development of middle and lower-level firms has been seen, but such a luxury is no longer admissible.

Moreover, as seen in the facsimile case, NTT must compete for price in the event of a sales competition between NTT and private firms. Procurements are to be made by the lower market-oriented price, rather than by the purchase price set by the system of adding-on, as was the case previously. Soon, "cheaper products can be sold by competitive bidding even though private contracting continues." (Matsuo)

Medium-Size Communication Equipment Manufacturers Which Have Been Affected

	Main Procurement Items	Dependence on NTT (percent)	Affiliation (financing (percent)	Prospects for JFY 1981
Iwatsu Electric	Black phones, pushbutton phones	33	--	Increase revenues, profits by exporting pushbutton phones
Nitsuko	Black phones, pushbutton phones	33	NEC(37)	Broad increase in profits by improved export of pushbutton phones
Toyo Communication Equipment	Pocket bells, etc.	20	NEC(43)	Increase profit through favorable sales of information communication equipment
Meisei Denki	Black phones, pushbutton phones	60	NEC(10)	Revenues and profits remain the same
Taiko Electric Works	Black, pushbutton phones	50	Oki(22)	Revenue and profit increase through export of pushbutton phones
Tamura Electric Works	Black phones, public phones, private-use facsimiles	40	NEC(18) Oki(18)	Sales stagnant, loss in profits
Kanda Tsushin	Black, pushbutton phones	40	Fujitsu (12)	Recovery with new products, but profits remain the same
Nakayo Telecommunications	Black, pushbutton phones	50	Hitachi (24)	Recovery with new products, but lower profits
Anritsu Electric	Public phones, ship-use phones	25	NEC	Revenues, profits increase through information, measuring equipment
Hasegawa Electric and Engineering	Black, pushbutton phones	--	Fujitsu (55)	--

Note: Black phones: rotary dial phones
Dependence on NTT based on JFY 1980 figures

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Under these various factors, crustal movements are rising within the small and medium manufacturers of communications equipment

Dissolution of Cooperative Group After 9 Years

At such a time, the cooperative group of middle-size enterprises dissolved at the end of March. This cooperative group had been established in May 1970 to support medium-size manufacturers through cooperative production of rotary dial phones, or the so-called black phones, by transferring the production from the majors.

The group consisted of six companies: Meisei Denki, Taiko Electric Works, Tamura Electric Works, Kanda Tsushin, Nakayo Telecommunication Works, and Hasegawa Electric and Engineering Company. At the time, none of these companies had the capability to produce a complete set. Under the guidance of NTT, each company supplied different parts (not sales) to be assembled and delivered to NTT. This method improved their productivity and technology.

However, when the pushbutton phones became producable by a single company, the cooperative group became meaningless. In contrast, closer ties with new affiliated firms would only hinder their progress. It was decided that it would be better not to rely on the cooperative group, in order to establish a firmer administrative base, and this led to the dissolution.

Up to now, orders have been placed through the group, but starting in 1982, individual orders will be placed to the nine companies, which include Iwatsu Electric Company, Nitsuko and Tokyo Shibaura Electric Company. Transactions of parts will probably remain among the former cooperative group members but there will be a gradual and stronger move toward independence. This will sweep each company into a more vigorous competitive world.

NTT, on the other hand, has stated soberly, "This will mean that an order can be placed or received by an ordinary person, and NTT is no longer in a position to provide detailed guidance." (Kada)

However, it does not apply to all small and medium firms. Under the GATT provisions, enterprises with capitalization of less than 100 million yen and with fewer than 300 employees are excluded, and private contracts for small parts such as connectors and fuses are being carried out. Moreover, over 20 percent of the procurement is allocated to smaller enterprises, under the "law on assuring orders for government needs by smaller enterprises."

"Although it is said to be small in quantity, they cannot take any more orders because of technological limitations." (Matsuo) Thus, the Communications Institute has decided to offer training in digital communications, etc., with a view toward a cooperative association of small and medium enterprises.

The problem is with the lower level medium-size enterprises. NTT has the earlier [goal] of "reducing dependence on NTT to 30 percent and striving toward civilian demands without missing out on the new technology." In actuality, however, things are not going too well, as mentioned earlier.

An attempt can be made to follow up the sudden rise in exports of electronic pushbutton phones to the United States during the past 2 or 3 years, but there is a delay in development, and the market will cool off by the time it is completed. Aiming for domestic sales will also result in severe competition between similar industries, due to delays in operational structure and sales network resulting from their past dependence on NTT. They also do not have design specialists for civilian goods.... Many problems such as these exist. There is a strong move toward seeking protection for the affiliated new firms to replace the NTT.

However, the environment is turning all the more severe. A wrong move will produce dropouts. It is said that "If a functional, and cheap product is available, we will buy it" (Matsuo), but things are not that simple. How they can remove themselves from NTT in the future will be the crucial point in the next 2 to 3 years. The "NTT family" which has been glorified in the spring of our society is being compelled into a complete turnaround at "dusk."

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NTT LABOR UNION'S VIEW

Tokyo EKONOMISUTO in Japanese 27 Apr 82 pp 52-55

[Interview with Kazuo Oikawa, chairman of the All-Japan Telecommunications Workers Union by EKONOMISUTO reporter; date and place not given]

[Text] The Nippon Telegraph and Telephone Public Corporation (NTT) introduced three proposals regarding reorganization of NTT to the Emergency Administrative Group. These show fully the feelings of President Shinto, who came up from the civilian ranks. On the other hand, the All-Japan Telecommunication Workers Union, consisting of NTT employees, expressed its basic concept on managerial improvement to the Central Committee meeting held during March. It appears that both labor and management are cool toward support of the NTT system, but what is their intention? Mr Oikawa was born in Miyagi Prefecture in 1929. He is 52 years of age, and has served his entire life with the union, starting as chief secretary of the Sendai Telegraph Office chapter. He has been in his present position since 1974.

Return Profits to the People

Interviewer: Both NTT management and the union have agreed to disavow the present NTT system in the reorganization disputes. Proposals have been made for a special company and a special corporation, respectively, but the common point is in the form of management. Is it over how it can operate efficiently as a business?

Oikawa: Yes, that is true. Telecommunications work is part of an industry with a promising future, but projects which should maintain civilian ties are growing steadily. I believe that if corporate management continues to place importance only on the public interest, with no regard for business, an irrationality will develop. From now on, even public corporations cannot neglect efficiency. In the final analysis, the question is over harmonious promotion of telecommunication's future, expansion, and business and also how we can nurture the telecommunication industry in the world market. The problems lie in the reorganization of the managerial form, based on its role

as protector of the benefits of all the Japanese people and of corporate management. There are criticisms against this position taken by the union, but the points to be rectified cannot be rectified if the government undertakings continue the way they are.

In this sense, I believe the article by Mitsuharu Ito, professor at Chiba University (in EKONOMISUTO of 2 March, entitled: "Truth or Falsehood in Talks on Monopoly-Private Management of NTT"--which advocates the necessity of certain "government control" but opposes completely private management) shows a constructive view.

Interviewer: The union's proposal is aimed toward a special public corporation financed by the government and subscribers, but how are you accepting the NTT's concept?

Oikawa: Frankly, the most important point is the form of ownership, and there is a conspicuous difference from our view. If a special company in the form of the Japan Airlines Company is established, many problems regarding stock ownership will arise.

A limited stock ownership system may be adopted, but be that as it may, stock for a new business body can be issued to the public. Even if the government should be asked to own one-third of the stock [for a while], this stock will be sold within a certain time. We are opposed to it because it is different from the Japan Airlines system and can be shifted into a private operation. It means that public control will be removed completely.

In contrast, we are not proposing stock ownership but a special corporation. Regardless of how we obtain efficient management, we cannot avoid the public interest in telecommunications. In the management of a public entity, the effects of the fluctuations of stock prices and dividends should be avoided. Stock ownership means strictly private management, and that is why we are opposed to it.

A change to private management means selling the present enterprise for private capital, but there is no need to sell a profitable enterprise. Therefore, we want it to operate profitably for the people and pass the profits on to the people. This can be accomplished by a reduction in rates, and there is also a merit of converting the present payment system for tax benefit. Perhaps as a means of financing, a voluntary investment by subscribers is possible, so that profits can be returned in the form of dividends. In such manner, it is believed the profits from the NTT operation should be distributed fairly. There is no reason why the enterprise should be sold wholly to private capitalists and let them benefit alone.

Unclear "Corporate Proposal"

Interviewer: However, as shown in the nine electric power system, an investment by, for example, the Tokyo Electric Power Company can be huge. A change to a stock company does not necessarily make management easier.

Oikawa: There is that view, but the makeup between electric power and telecommunications is entirely different. All the electric power company has to do, in an extreme sense, is to keep the electricity flowing, or in short, keep the commodity moving.

However, there are senders and receivers in telecommunications. Moreover, there is an exchange of information through conversation, and the secrets of individuals and management must be protected. This is where the significance of going public or expansion can be mentioned, but to pursue a moneymaking corporation freely brings out the contradictory side.

I feel that if making money is the foremost objective, going public or expansion will be negated and great confusion will arise...including the problem of privacy.

Interviewer: It seems that career members of NTT are opposed to the NTT's proposal for a special company.

Oikawa: You mentioned career members, but it is more so among the outsiders who were appointed into the so-called "NTT family." There are some of the "A"-class college graduate elite who are definitely opposed to it. In other words, their goal is for reemployment into the "family"; therefore, the attraction for NTT as a public corporation or as a special corporation or privately operated company would not be the same.

Another point is that, no matter what is said, the A-class members in our corporation are, after all, bureaucrats. Some classmates are in the Ministry of Finance and some are in the Ministry of Posts and Telecommunications. Bureaucrats have the consciousness of belonging to the first-class bureaucratic domain. A change to a private management would eliminate the future positions [in NTT] for those who are now, for example, in the Ministry of Posts and Telecommunications. To state it explicitly, since President Shinto came up from the private sector, he tries to push civilian logic. There are some who are not happy about this. From our viewpoint, President Shinto is going too far, and there is criticism over how long he is going to remain as a "civilian" president. He now should act as the president of NTT. We don't know whether he is forever talking as an "outsider" or as a responsible NTT member.

As a good example, President Shinto submitted three proposals (special company system, private managed system, and reformed public corporation system) to the Emergency Administrative Investigation Group, but none is designated as final. This is on the premise that the decision should not come from NTT. It was intended that "I only submitted the material," but I feel that he is not a person in charge unless he says to the investigation group: "We want to do this." We did not submit a proposal. We are just offering "our views."

In any case, the investigation group will be issuing reports, but if the NTT's intention is shown too soon in the Shinto's "three proposals," a free discussion by the investigation group can be impaired. Although the underlying tone seems to point toward a special company, the goal is for private management.

Interviewer: In the event the union's special corporation plan is to be implemented, will the entire capital of the corporation be returned to the government?

Oikawa: This is a controversial [point]. The government says that it invested 18.8 billion yen when we became a public corporation and explains that this would be 480 billion yen at the present price rate. It can be said that all one has to do is to return this amount, but the problem is in future investment--whether to have the subscribers put up the new money or not. It will have to be done on a voluntary basis.

There is also the problem of capitalization. As for the type of management, many problems such as the establishment of an investor-represented committee to decide on intentions, an inspection committee, etc., remain to be discussed. We are thinking of getting knowledgeable persons together to discuss these issues. In any case, even after the investigation group issues its report, the reorganization will not progress immediately because of the pending legislative work. It will probably reach a climax by the ordinary session of the Diet next year.

Interviewer: The corporation's proposals and the union's proposal for having the government hold the stock "for a while" seem to agree in the joint investment portion.

Oikawa: Strictly speaking, there is a difference, but the form of management is quite similar. In essence, it appears that our views have been incorporated. After all, we have been advocating reorganization for 8 years.

Off-the-Mark Statement by MPT

Interviewer: Returning to the basics, a truly private company such as ATT in the United States is operating quite well. Why not the NTT?

Oikawa: The background is completely different. The size of the land is not at all the same. In the U.S. case, monopolistic control by a powerful person is strongly despised. At any rate, if a company is determined to be monopolistic, it is split up by the Antitrust Law. Moreover, in reality it is impossible for a single enterprise to cover such a wide territory. But the size of Japanese islands is insignificant.

In the case of Japan, a look at history shows that talks on the private management of telecommunications came up before. It required money and could not compete as a private entity. Therefore, the decision was that it should be operated by the government, and it has continued to this day. Because of this background, it is outrageous to say that the United States can and Japan cannot.

We are against private control, but if it should come about, there is a method for changing the entire system to private control. In such a case, however, the Antitrust Law can be applied, and as a result, a split of private control will be included.

If it should be split, a new facility will be needed for senders and receivers of information. This requires huge sums of money. Moreover, [the need for] different technology to suit regional situations would make consistently good service difficult. In fact, second and third telephone companies are being established in the United States, and this is viewed as an invitation to confusion. For example, telephone rates would rise in the depopulated areas and be lower in the densely populated areas.

Interviewer: The MPT has been stressing reduction of personnel and rationalization within the framework of the present corporation system as part of the NTT reorganization. Does President Shinto include such "nuances" in his statement?

Oikawa: The MPT (Ministry of Posts and Telecommunications) can be called irresponsible. By and large, important personnel of NTT require first of all the approval of the MPT. Without approval from the MPT, Ministry of Finance cannot decide on the budget, either.

Such views can emerge if one considers that the president has had experience in rationalization of a private shipbuilding firm. This is one way to look at it in a restricted sense, and it can be viewed affirmatively. But there are 330,000 employees in NTT, and their workload differs according to their place of employment. In some areas, an absolute value of personnel is lacking.

Frankly, therefore, the rationalization has been carried out through talks between labor and management in the redistribution of essential personnel to busier areas. Thus, there shouldn't be any surplus of essential personnel to be called lazy. The union cannot accept labor intensification on the grounds of working a little harder to become essential.

Rationalization is not simple, but consequentially, they should have cooperated in the corporation plan. The problem of wages tied to working hours cannot be worked out readily, because they are regulated by the budget. Despite this, rationalization has been carried out. It is believed the corporation has shown its good faith.

Interviewer: It seems that the MPT is not aware of such a scenario.

Oikawa: That is correct. Despite many restrictions, negotiations must be carried out in the live labor and management relationship; therefore, I cannot understand the seemingly critical statement, though it is a supervisory agency.

There are 330,000 personnel working in NTT, and the president and outsiders may see other weak points, but in actuality, the workers want to work, and new services are being proposed by labor and management.

However, under the framework of the present system, nothing can be done without the approval of the MPT, even if they are agreed to by labor and management. After going through various deliberation councils and committees, a reply will take at least a year. In some cases, it has taken 4 years. The world situation can change by that time. That is why I like to say "nonsense" when a surplus of workers is mentioned.

Interviewer: Is that the reason the union is proposing that NTT be reorganized?

Oikawa: Yes. At present, weakness depends on the point of view. At any rate, a reorganization of the system will provide work, which in turn will improve the enterprise and provide better services to the people. I feel there are many things which can be put into practice. This is what we think and I feel that if they can place importance there, the MPT cannot be critical. It is often said that an enterprise with 330,000 people is too large, but the issue is tied to inequitable cases. The administrative structure....

Interviewer: Cannot see them....

Oikawa: They occur in a sense from not being able to see, but this is one view and I believe that it is an indication. However, if the split theory is effected, cases such as these can be prevented through a change in authority. That is why we are proposing decentralization of authority.

Hereafter, leadership from a central office is no longer valid. At the same time, a change would provide closer services to the regional subscribers, since telecommunications will penetrate into the people's lives. Unless decisive authority is given to chiefs of telegraph and telephone stations or to chiefs of communications departments that will maintain prefectural control, the needs of the people in the regions cannot be met. It is a good idea, and we want to go ahead with it, but it must be heard by the head office. A system where a reply takes 2 or 3 months after going through the communications department, the communications bureau, and the main office is hopeless.

Authority should be transferred decisively. The NTT leaders are thinking along this line, and we have submitted our demands for this.

Repeating the Errors of the NRC

Interviewer: The reorganization of NTT, the National Railways Corporation (NRC), and the Japan Monopoly Corporation is said to be the target of "Doko's investigation group"; therefore, a substantial reorganization can be expected. Is there a "preparedness" for this at this time?

Oikawa: If Mr Doko were questioned politically, he would probably deal with the issues on three corporations. Unless a clear-cut reply is made on the NRC issue, one's ability [to carry it out] will be questioned. Therefore, the NRC is number one [issue].

With regard to the NTT issue, there are quite a few bureaucratic outsiders in the Fourth Subcommittee, which is in charge of the investigation group. They will probably take a conservative view, and so I believe that the discussion will evolve on keeping the present NTT system intact. Those who used people as a basis will probably counter by taking the stand of split and private management. The question is for those who are taking the neutral stand.... There are also mass-communication people, although their number is small.

I doubt that any of the mass-communication people feel that the present situation is good. When the problem of efficiency is taken up, they will insist on putting the scalpel to the abuse of "having the good government foot the bill." In that sense, I believe the decision will be closer to the people's viewpoint. That is the situation...I believe.

The most critical [issue] at this time is on the present and future of the telecommunication information industry, as was mentioned at the beginning. The question is whether the report to be issued will be based on the discussions from their true meaning.

Interviewer: Whose telegraph and telephone work will it be?

Oikawa: This is not yet a pressing issue. It will be related to the international economic activities and industrial activities.

The type of management must be formed after taking a hard look at 5 years to 10 years into the future.

Under the existing conditions, speculation presents the concern that the corporation will be chopped up because of superficial conclusions that there are too many employees or the scale of the enterprise is too large, or that the corporation after all relies too much on the good government to foot the bill.

Interviewer: It seems that the investigation group is saying that they need further investigation.

Oikawa: That is in the proposals. The president has not mentioned which of the three proposals he wants. That point will be questioned. When that question is posed, the president should respond clearly as president. This is how I feel, irrespective of whether the proposal will be adopted by the investigation group or not.

Interviewer: Earlier, you mentioned the three corporations. Do you sense that the mistake seen in the case of NRC should at least be avoided?

Oikawa: Yes, I do. If NTT performs the entire work on the national telecommunication network and lets the private enterprises do the rest, it can lead to another NRC mistake. [A mistake] also can happen by having the data communications sector take over the depopulated areas.

In short, by taking over the red-ink portions.... The second NRC mistake is definite if they say the good portion will be handled by the private sector and the poor portion by others because of the public interest.

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VIEW OF MINISTRY OF POSTS AND TELECOMMUNICATIONS

Tokyo SENTAKU in Japanese May 82 pp 72-75

[Text] The Second Emergency Administrative Investigation Group (chairman, Toshio Doko) has entered the final stage of work toward issuing its basic report on 10 July. Various subcommittee reports will be consolidated in mid-May to be reported to the Investigation Group. Active "intervening operations" are being developed for this report by the Liberal Democratic Party, concerned government agencies, business circles, and organizations with their underlying interests.

Above all, a violent "counterwind" is raging from the Fourth Subcommittee (headed by Keio University Professor Kan [or Hiroshi] Kato), which is working on "ways of the three corporations and five agencies." The National Railways Corporation is the symbolic topic of this subcommittee, but the Nippon Telegraph and Telephone Public Corporation (NTT) is pushing for a change in management structure. From the deliberations, it appears certain that the report will favor the private management line of changing to a special company aimed toward greater mobility of the enterprise and competency of the persons involved.

As this line of thinking became apparent, the LDP, Ministry of Posts and Telecommunications (MPT), the NTT family, and even the corporation started blasting with their counterheadwind. The postal group in the LDP, which is trying to bend the report, is working on NTT to go against the Investigation Group at this time. In reality, the postal bureaucrats, who are maneuvering to gain control over personnel and supervision of NTT in the event of a change in management, the NTT family's enterprises, which are afraid of losing their rights and interests, and certain technology firms, which have been spending development funds extravagantly as part of the NTT "technology kingdom," all have different views. But the "counterwind" has started to gyrate over the "green" of the Investigation Group. The Investigation Group is in a precarious situation.

Advancing the "Shinto Concept"

"To correct the improper administration."... Under this project, Hisashi Shinto, who came over from private enterprise (Ishikawajima Harima Heavy Industries), assumed the presidency of NTT about 15 months ago. He has complained, "I accepted the position because I was told to correct the improper

administration. But I have been drawn into a preposterous thing called the Investigation Group." His reputation up to a year after his appointment had been good.

Through "reporting to work early," he drew the mass media's attention by straightening out the lax regulations found in the corporation, has drawn the union to his side through dialog, etc. His greatest achievement has probably been the opening of NTT to society by breaking the secretiveness which had been NTT's the "special quality." He left voluntarily for the United States and met with Secretary of Commerce Baldridge and Brock, a representative of USTR (United States Trade Representation), to raise the overall assessment of NTT within the U.S. Government. When the procurement of telecommunication materials was about to become an issue in the U.S. House of Representatives during the time of increasing trade friction in March, USTR representative Brock and others reproved the Congress that there is "no problem" with NTT.

NTT was looked upon as a stronghold of the Tanka faction and the Miki faction, but the Shinto style of operation captured both factions, and persons such as former prime minister Kakuei Tanaka spurred on "to take the private management route by providing capital of 1 trillion yen and support funds of 3 trillion yen." At least from the present situation, leaders of the Tanaka faction, the Miki faction, and of course the Suzuki faction are solidly behind Shinto's concept of private management.

Up to now, Shinto has refrained from issuing his views publicly on the problem of changing NTT to a privately managed enterprise. In response to the report, issued last July, "to carry out a drastic review of the forms of management, including private management," he submitted three proposals for a special company, private management, and a reorganized public corporation on 26 February of this year. This is merely a way of entrusting the [final] selection to the Diet, the government, or the Investigation Group.

However, there is no doubt that the intention of Shinto is private management, even if it means taking the route of a special company. The basic concept of Shinto is that "a public communications work which can be of service to the people and users cannot evolve in the absence of efficient management." But in actuality, the prize pupil called NTT has reached its peak in telephone demands, and the difference between revenues and expenditures has turned to a 2-3 percent minus factor and carries a long-term debt of 5.3 trillion yen.

On the other hand, it is being pressed with the problems of rectifying long and short disparities (presently at 1 to 60) and meeting new needs, such as an expansion of the data bank and other nontelephone services. The INS (high-level information communication system) concept, to be promoted by NTT under the 20-year plan with an investment of 20 trillion yen, is a typical example.

However, a situation of continuing persistently with the current rates or relying completely on rate hikes, as seen in the National Railways Corporation case, must be avoided. To attain this, efficient management and a stable financial base are indispensable. Since Shinto assumed his position, "industrial efforts

such as a reduction of expenses by the monthly settlement of accounts, which is normal in the private sector, increased revenues through sales promotion, and reduction in the interest payment burden have been carried out. However, NTT is stymied by budget control, the Public Corporations and Government Enterprises Labor Relations Act, the public corporation law, public telecommunication laws, etc., all of which create difficulties in the performance of its own operations. Unless government controls are removed and it becomes an active, self-supporting corporation, its downfall into becoming "second National Railways Corporation" is inevitable. This is the logic Shinto is using in his concept of private management.

MPT, the Ringleader for Scrapping

President Shinto appears "short-tempered," and his maneuvering for private management of NTT is rather impetuous. For this reason, there are increasing signs of "stopping private management" in opposition to his hastiness, as well as annoyance at his popularity as the conclusion of the Investigation Group draws near. For example, MPT-aligned freshmen Diet members are saying, "Shinto will bow his head to executives, but he does not even look at us."

However, as you well know, NTT, along with its family, has built a solid "structure of rights and interests" around the rights and interests of NTT in the 30 years since the war. If it changes to a private management system, considerable shaving will take place, and it will be devoid of "sugarly" indulgence. The "structure of rights and interests" up to now has been very conservative. But there is opposition, as suggested, for example, by certain firms to Diet members that "we can no longer continue to associate if NTT comes under private management."

Even if this were not the case, the result would be preeminent. This line of argument has become the center of the "counterwind." A look into the chorus of "Stop NTT from coming under private management" and "Crush Shinto" shows that the MPT, a supervisory agency, is behind it. Hiroshi Asao, administrative vice minister of the MPT, said at one of the meetings: "We can even have about one-half of the NTT executives occupied by the members of the MPT." This is the underlying intention of the MPT. The MPT feels that NTT is a subordinate public corporation, but in actuality it does not possess that much influence. The MPT and NTT were split from the prewar Ministry of Communications (NTT was then known as the Ministry of Electric Communications), and NTT feels that they are of equal level and has resisted strongly the MPT intervention regarding personnel, labor affairs, accounts, etc. When it is time to draft a budget, the MPT sits in as a supervisory agency, but NTT can only remain silent in the sorrow of being a "third-rate agency." The International Telegraph and Telephone Company (KDD) also is embroiled in this situation. Although it is a private enterprise, it is subjected to thorough intervention.

In a sense, it is the desire of the MPT to have NTT, in name and in reality, under its supervision. Additionally, if NTT became a truly private enterprise, the MPT would lose the 40 billion yen in contract funds received each year from NTT and may even have MITI take over the supervision. This already is evident in the problem involving data communications.

Since the Investigation Group wants to replace postal savings, which is one of the important parts of the MPT, there is a fear of losing even this if NTT turns private. As the mood toward private management of NTT heightened along with the popularity of Shinto, a sudden change toward counterattack developed.

Its basic strategy is in countermeasures through the Diet and the mass media. Vigorous countermeasures are being planned by having Norimasa Hasegawa, an inspector with the Secretariat's Documents Section, in charge of the project, with Hiroshi Hamada, deputy chief of the Second Section of the Telecommunications Policy Bureau assisting. They have made candid requests, such as by saying, "The private management view given by NTT is peculiar. If you can print articles to refute this, we can provide you with materials." However, except for a certain industrial publication, this did not work, probably because it was too candid.

Vice Minister Asao's attack against NTT is also appalling. He takes every opportunity at the press conference to say, "NTT's view that it is unable to do anything unless it changes its managerial system is ridiculous. Those who say that the present budget system is quite elastic yet lacks elasticity do not know anything about the budget. Labor conditions are better than in the other two public corporations and agencies. A revenue gain of 3 percent and an increase of 6 percent in expenditures are wrong. A drop in labor conditions can reduce the increase in expenditures to under 6 percent. At present, 330,000 personnel are taking it easy and the MPT is now carrying out rigorous personnel management." He becomes indignant about the union's queries. He also makes statements which betray his personality, such as: "There are voices saying that there is opposition within the public corporation, and there are five or six party members who are stuck together in the opposition."

The argument of the MPT, headed by Vice Minister Asao, is that "It can be done through efforts, even within the current framework," and "your mental attitude is bad." However, there is an indication of a doubt as to the sincerity of the MPT's counteroffensive. Vice Minister Asao and other postal executives say repeatedly, "If NTT becomes privately managed, an enterprise tax and a fixed property tax will be levied. It would be disadvantageous." In addition, MPT Minister Noboru Minowa has stated, "A reevaluation of assets would have to be made if it were to become privately managed. This would mean a payment of 600 billion yen in fixed property taxes each year."

An investment in kind without necessarily a reevaluation of assets can be made under the present system; therefore, the above statement reveals the government official's sorrowful lack of knowledge about private enterprise. Furthermore, there is uncertainty in their basis for calculation. They cannot give numerical explanations at the press conference and end up apologizing, to be sneered at by correspondents. Finally, Prime Minister Suzuki became infuriated by the haphazard figures and prohibited further publication.

Tug-of-War With Postal Group in LDP

A maneuver toward politicians seems to be progressing steadily. After all, the MPT is a gigantic family, backed by 16,000 postal offices throughout Japan. It is not only large in numbers, but there also is much energetic

young blood. The feature of the postal family is that each faction has a freshman and second-year Diet member assigned to the communications committee. Since the popular committees for budget, commerce, agriculture, and forestry are usually occupied by members who have been elected at least four times, younger members are sent to the less popular communications committee, but there are many who become that much more vocal.

In contrast to the popular committees, the MPT treats Diet memebers on the communications committee with care; therefore, those who leave the committee have an indescribable nostalgia and they become easily rekindled backers of the MPT.

The Telecommunication Basic Problem Study Group (headed by Tsunetaro Kato) of the Policy Research Committee of the Liberal Democratic Party is the body which is undermining the private management issue of NTT. The group has forcefully "taken over" the discussion on private management of NTT which had been carried out by the Subcommittee on Telecommunications Work (headed by Ken Harada) of the Policy Research Committee since 2 March.

The "subcommittee" takes the position that the problem of changing the form of management is "being handled by the Investigation Group, and the party should not express its views," (Chairman Harada), but the "Basic Problem Study Group" has taken the opposite view--that "the party's views should be expressed positively to the Investigation Group." (Chairman Kato)

The argument of the "Basic Problem Study Group" has many faults, and a slightly lower dimension is seen, but at any rate its distinctive feature is its thrashing of NTT. Executives of the MPT have stated, "We are politicians, and we represent the people; therefore, we should express our intentions to the Investigation Group. A takeover of NTT by financial circles is preposterous," (committee member Ko Suita), and a "Regarding the problem of private management, a fixed direction established by having the party call in concerned people is one thing, but to have the president of the public corporation say that the trend toward private management is uniform is a problem. It lacks sufficient study." (Diet member Eijiro Hata)

Moreover, on 7 April a neutral collective view that even Chairman Kato did not know of spread within the "Basic Problem Study Group." The neutral collective view of "what form of NTT management should take" is literally an antiprivate-management proposal. It clearly states, "The majority of committee members have doubts about private management and also about the transition to a special company and [feel] it should seek rationalization and efficiency under the present public corporation system. There is no positive view on the transition of a special company."

The grounds for opposition are identical to the document on "How NTT Should Be Managed," put together by the MPT in March, which leads to the suspicion that opposition views were prepared by the MPT. Recently, this postal group strongly opposed the private management and split of the National Railways Corporation and started associating with Kato and transportation group in the Diet who are trying to stop NTT from becoming private. In addition, Kazuo

Tamaki and other members of the House of Councilors have started to demonstrate creepy activities. Thus, the moves "to torment Shinto" have been growing steadily.

At any rate, the MPT and the postal group have achieved a certain success in the tug-of-war match. Although the Shinto concept may not be squashed completely, the MPT's final goal, upon the Investigation Group's proposal for a special company, is to obtain indisputable rights and interests (supervision of personnel), as in the case of the KDD, when NTT is reorganized legally as a special company. The present administrative reform movement is nothing more than the first wave of the reorganization.

Group for Preservation of Status Quo Regarding NTT

The term NTT family is becoming obsolete, but the annual procurement of over 1.6 trillion yen is still attractive to businessmen. What about the relationship between the corporation and the family enterprises? NTT is not necessarily monolithic. It is said that those who control the Technology Bureau, the Facilities Bureau, and the Materials Bureau also control NTT. Vice President Yasusada Kitahara and chief engineer Kaisei Yamaguchi are at the top in building a technology kingdom. Their feelings are to preserve the existing system; Yamaguchi, especially, is furiously opposing Shinto's concept. This corporation support group and the family enterprises will probably mesh together both openly and secretly in the future.

The NTT engineers form a solid group through personnel, materials, and money but this myth has gradually been crumbling ever since the liberation of material procurement by the so-called three-track system. Moreover, the introduction of monthly settlements and the squeeze on facility investments by Shinto are diluting the "sweet gravy" of the family. If NTT becomes a completely independent enterprise, be it in the form of a special corporation or a private enterprise, rationalization will follow, and the investment which has been the source of "sweet gravy" and the procurement orders to specific firms will surely change. Apprehensions will keep rising among the family. Large diversified manufacturers of equipment, machinery, and wires are better off, since they are not totally dependent on NTT, but the construction business, which has to cling to NTT, will be seriously affected. In any case, it is reported that Shinto was infuriated when certain construction businessmen brought him money when he assumed the presidency. However, for the sake of preventing private management, it is not unusual to see money thrown in the direction of politicians. NTT officials who have been assigned to the family enterprises are said to have been meeting once a week at the Imperial Hotel to formulate countermeasures. They denounce Shinto and are studying a concrete political maneuver.

NTT executives have also participated in these meetings at times; therefore, with "unexpected enemies," the change in the form of management will not be easy as believed by the pro-Shinto group. Indeed, Shinto has been maneuvering among the factions and pulling to his side young administrators and persons of practical business knowledge who have been cold-shouldered in the kingdom of technicians. The great current, under the banner of the Investigation Group, is turning toward private management. The question of the future effectiveness of the "counterwind" will become the crucial moment for the popular Shinto.

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JAPAN

IMPACT OF NTT REFORM DISCUSSED

Tokyo NIHON KEIZAI SHIMBUN in Japanese 11-13 May 82

[11 May 82 pp 9-11]

[Text] Impact of NTT Reform (Part 1)

NTT (Nippon Telegraph and Telephone Public Corporation), a mammoth organization which can be said to be the "central nerve" of the Japanese Archipelago, is about to be transformed. The report by the 4th Sub-Committee of the 2nd Provisional Administrative Affairs Research Council, which report will be made public soon, is expected to incorporate such reform plans as a "change to private management" from the present public corporation system, "separation off of some business operations," and "regional division." As to whether or not these will go as planned by the Research Council, we must note their whereabouts in the future. On the other hand, however, NTT itself also is showing various moves toward self-reform, in response to the new age. They are typified by its positive challenge to the field of advanced technology. Such moves over NTT will have an impact on the industry circles in general, at any rate.

Is NTT a Superior Enterprise?

In the middle of April, the figure shown by the Postal Services Ministry varied greatly from that shown by NTT, over NTT's change to private management. In a tentative calculation to see how far expenditures will increase due to taxes, dividends, etc., when the present NTT is assumed to be a joint-stock corporation with a capital of ¥1 trillion, the Postal Services Ministry calculated the increase as ¥600 billion, and judged that it is impossible for NTT to be placed under private management. However, NTT asserted that it can be placed under private managment because the increase can be limited to ¥250 billion.

This is because prior conditions are different between the Postal Services Ministry, which puts in question what should be done to conduct management which is desirable for an enterprise, while paying 10-percent dividends and securing sufficient internal reserves, too, and NTT which expects 8-percent dividends (no dividends for the shares held by the Government), the receiving of measures to reduce some taxes, and future efforts for management. As can

be seen from this example, too, NTT, which is said to be a superior Government-affiliated enterprise, "is by no means a good company, when it is assumed to be a private company" (President Hisashi SHINTO). Moreover, unrest is beginning t, be seen as to the future, too.

Future of Telephones, Which Are Relied upon, Is Dark, Too

NTT's income includes that from telephones, telegrams, data communications, etc. Of these, the income from telephones accounts for 88 percent. Moreover, of the balance between income and outgo (surplus -- equivalent to the before-tax profit) in the case of NTT, amounting to ¥388,100 million, ¥538,200 million is earned by this sector. In other words, management is supported by the telephone sector, with the deficits in other sectors offset.

In the telephone sector, where the income showed an increase of more than 10 percent at one time, growth is likely to stop at 2 or 3 percent in the future, because the spread of telephones has run its course. The future of telegraph, which causes a deficit of more than ¥100 billion, is quite dark, and data communications, too, have not grown so greatly as desired, because of the severe competition with private enterprises.

While the growth of income is slowing down, there are many factors for an increase in expenditures. The financial expenses accompanying the long-term debts (most of them are NTT bonds, amounting to ¥5,305,900 million as of the end of March, 1981) account for about 10 percent of the income, and these expenses will increase further. The increase in the personnel expenses for 330,000 persons, which expenses account for about one-third the total expenditures, are also a heavy burden. When the increase in non-personnel expenses is estimated, it is found that the situation of the increase in expenditures exceeding that in income is approaching. President SHINTO also admits this, saying that "There is the danger that if this situation continues, NTT will become a second National Railways."

Under such a situation, SHINTO assumed the post of President, from private circles (former President of Ishikawajima-Harima Heavy Industry), in January, 1981. He cynically referred to NTT people's way of speaking, "We will install a telephone for you," which way was brought about amid monopoly, as "NTT language instead of the Japanese language." He embarked upon drastic measures including the reduction of expenses and investments, while inspiring the concept of a private enterprise in the form of pre-empting the recommendation by the Provisional Administrative Affairs Research Council.

Reflecting such an intention of the top-ranking leader, the fiscal 1982 budget was epochal. The number of personnel has decreased by 1,000 compared with the preceding fiscal year, and the construction investments have decreased by ¥50 billion. Both have fallen below the level of the preceding fiscal year for the first time since the inauguration of NTT.

On the other hand, enthusiasm about "trade" has budded, too. Last fall, Toshiba received an order for about 6,400 telephone facsimile sets from NTT, accounting for 80 percent of the total. This caused big repercussions in the industry circles concerned, because Toshiba, which has not so far been very friendly with NTT, received such a big order, and moreover, because its bidding price was exceptionally low, reportedly one-fourth to one-fifth the market price.

Family Has Collapsed?

Such an occurrence is due to the fact that a formula of competitive bidding, in which both Japanese and foreign enterprises can participate, has been adopted on a large scale, from the traditional equipment procurement system centered on specific manufacturers constituting the "NTT family." This was occasioned by the opening of the doors for the procurement of materials, which opening was realized from January, 1981 after the matter became a political problem between Japan and the US. However, as it occurred when the NTT market itself had become smaller because of the curbing of investments, it accelerated the intensification of competition among the manufacturers.

The unrest of the industry circles concerned is not limited to this alone. NTT itself, which has so far been their customer, is about to become a strong rival. NTT is also engaged in the sales of such terminal equipment as telephones and facsimiles, which are connected with circuit networks including telephone lines. However, the share of its equipment which comes into competition with that produced by private manufacturers is falling steadily, except for the main telephones (first telephones to be installed for telephone subscribers).

Partly because of the shortage of business efforts, it has become unable to compete favorably with private manufacturers who move quickly. In the case of telephone facsimiles, for example, which are being spotlighted as a new means of communications, NTT's share in the number of those installed in fiscal 1975 was nearly 40 percent, but it has dropped to nearly 1 percent recently.

To vitalize this terminal equipment sector, President SHINTO intends to open main telephones also to private manufacturers, on the one hand, and on the other, he is trying to roll back by establishing an "Inhouse Equipment Business Headquarters" where the related sectors are combined, as early as next year. NTT has no manufacturing sector, and it purchases all equipment from private circles. However, in the fields which come into competition with those of private circles like in the case of terminal units, it is trying to purchase products at low prices by issuing orders for large amounts through competitive bids, on the basis of its own technological development,

and stand up against private circles' offensives in real earnest by adopting the selling-out system and price reductions, too.

At the same time, it is trying to make the data communications sector more efficient. This sector has continued to have a deficit since it was started. If NTT's activities are strengthened, its competition with private circles will come to the fore, inevitably. In the report by the Provisional Administrative Affairs Research Council's Sub-Committee, separation of the terminal equipment and data communications sectors is scheduled to be included, and therefore, it is inevitable that an impetus will be given to such moves. The stirs of "re-organization" of NTT, which has approached a period of a big reform, are spreading as big swells, both in and outside NTT.

[12 May 82 pp 10-12]

[Text] Part 2

The "My Frank Account of NTT (Nippon Telegraph and Telephone Public Corporation)," which is NTT President Hisashi SHINTO's writing put on sale in January, became a best seller, and SHINTO, pleased with this, will soon contribute the royalties to the Japan Scholarship Society, etc. SHINTO's views on the management of NTT, which views are included in that book, are so bold that they could not have been considered by the NTT Presidents in the past. However, even President SHINTO was unable to agree to the plan for "dividing NTT into regional groups." As far as this point is concerned, he entertained uneasiness as to what conclusion the 4th Sub-Committee of the 2nd Provisional Administrative Affairs Research Council will form.

Taking over Development from Private Circles

In early May, the Sub-Committee's plan for reforming NTT became clear. In this plan, the following item was included: "Placing NTT under private management should be pushed by dividing it into the central company unitarily holding the nation-wide key circuit networks and the research and development sector, and 8 - 11 regional companies providing telephone communication services, etc., in various areas." President SHINTO is said to have expressed to an NTT leader his dissatisfaction with the plan for division, saying as follows: "If it is divided into regional companies, NTT may lag behind in international technological development."

In regard to division of NTT, not only NTT leaders but also electric machinery manufacturers and university research organs are entertaining apprehension, saying, "I wonder if NTT's research and development structure can be maintained."

This is natural. NTT has extremely important roles, being the general manager of telegraph and telephone services in Japan and at the same time the general headquarters for Japan's electronic and communications technology. As to the development of advanced technology, including VLSI's (very large-

scale integrated circuits), computers, optical communication, and picture communication, NTT is carrying it out jointly with domestic electronics manufacturers and influential research organs, and entrusting them with manufacture. By so doing, it is producing immeasurable benefits for the fostering of advanced industries in the form of eventually taking over the moving of advanced technology and expenses for research and development.

Moreover, such technology is on the top level in the world. NTT is exchanging technology with ATT (American Telephone and Telegraph Corporation), which is termed the biggest enterprise on earth, and US IBM (International Business Machines), which is a world giant in the computer industry circles. This is because NTT has technology ranking with that of these two companies.

Fear of Research Expenses Decreasing

In view of its high technological power and its power of influence on private circles, NTT is called the "NASA (National Aeronautics and Space Administration) of Japan." Such a position has been built up by the plentiful research expenses. The expenses for fiscal 1982 are estimated at ¥88,500 million, and this is because huge business yields, amounting to ¥4,166,400 million, are expected.

However, if NTT is divided into the central company and a plural number of regional companies, as planned by the Sub-Committee of the Provisional Administrative Affairs Research Council, the income of the central company, which has the research and development sector, will decrease, as a matter of course. Will it be possible to maintain the same research expenses and technological level as in the past in such a situation? The uneasiness of NTT and electronics manufacturers stems from this.

Another focal point for private enterprises is the problem of procurement of materials. As NTT has no manufacturing sector, it purchases most communications and information-processing equipment from outside, and purchases the remainder through joint development. The monetary amount of this procurement was ¥776,800 million in fiscal 1980. This amount is so huge as to exceed by nearly ¥200 billion the amount of sales by Fujitsu, which is an influential member of the NTT family, in March, 1981. This is by far the largest among the three public corporations.

The materials procured by NTT are of the following three kinds (fiscal 1980): (1) Materials procured by the Head Office (automatic switchboards, transmission wireless devices, cable, data communications equipment, etc.); (2) things procured locally, on the local communications bureau level (telephone directories, wood poles, steel strand wires, etc.); and (3) things procured at actual scenes (consumer goods, fixtures, etc.). The materials procured by the Head Office account for 81.5 percent of the total.

If NTT is divided into regional companies, the items now procured by the Head Office, excluding the key circuit networks, will come to be procured by regional companies. If so, "There is the fear that the advantage of

making unit prices low by package orders of large amounts of materials will become small." So saying, NTT leaders knit their brows. As NTT gives big orders under monopoly, it faces the manufacturers side with a firm attitude, and there are even voices saying that "NTT is high-handed," at times. However, if the advantage of collectively purchasing large amounts of materials becomes extinct, and if the purchasing cost rises as a consequence, this may drag down on the feet of management rationalization, which is the chief aim of placing NTT under private management.

Intensification of Competition in Bidding, Too

Conversely, it is possible to take the view that if the authority for procurement is dispersed to local areas, NTT will open its doors further, at this time when it is carrying out the opening of the doors for the procurement of materials, and competition, which will become vigorous, will lead to the lowering of costs on the part of NTT. Moreover, regional companies will become strict about costs, under a self-support accounting system, and bidding competition will possibly become severe.

The plan by the 4th Sub-Committee of the Provisional Administrative Affairs Research Council does not as yet refer to what to do about procurement. The plan calls for effecting the division within five years, and there still is enough time. At any rate, it is likely to press the NTT family and the enterprises concerned for a new posture to cope with the problem.

NTT's Research and Development Structure

Musashino Tele-Communications Research Institute --

Located in Musashino City, Tokyo; number of personnel: 1,900 *; contents of research: electronic switchboards, VLSI, data exchange, and memory devices.

Yokosuka Tele-Communications Research Institute --

Located in Yokosuka City, Kanagawa Prefecture; number of personnel: 1,100; contents of research: data communication, picture communication, optical communication, and satellite communication.

Ibaraki Tele-Communications Research Institute --

Located at Tokai-mura, Ibaraki Prefecture; number of personnel: 300; contents of research: optical cable, transmission lines, and civil engineering.

4th Research Institute (tentative name) ** --

Located in Atsugi City, Kanagawa Prefecture; contents of research: VLSI.

Note: * Includes the personnel at the Research and Development Headquarters.

** Expected to be opened in the spring of 1983.

[13 May 82 pp 3-4]

[Text] Part 3

"A telephone by which what has been spoken in Japanese becomes a foreign language and what has been spoken by a foreigner becomes the Japanese language;" "a facsimile which can transmit a message in two or three seconds;" and "a TV picture which was televised earlier appears on the Braun tube in an instant, with the pushing of a button." If the INS (information network system -- high-level information communications system) project, which is being drawn up by NTT, is completed, such devices will be used at home, and we will become able to receive various information services. Even working at home will become possible.

Industry Circles Also Making Vigorous Responses

This is by no means a dream. From the fall of 1984, the first test services are scheduled to be started in the Mitaka area in Musashino, Tokyo. With the surfacing of NTT's future strategy, such influential manufacturers as NEC, Fujitsu, and Oki Electric Industry have recently established special organizations for INS measures, one after another. On the other hand, some enterprises have already applied for participation in the testing of work at home. Thus, industry circles' moves to cope with INS have suddenly become vigorous.

Since its inauguration in 1952, NTT has been pushing its business with these items as its goals: "Telephones which are installed immediately;" and "telephones by which people are put through immediately." Now, however, there are 56 million telephones, and one out of every two persons, including babies, has one telephone. It has become possible to make a telephone call anywhere in Japan, immediately, by dialing a number. As far as telephones are concerned, the dream at the time of the inauguration has already become real. Succeeding this, INS is being tackled by staking the existence of NTT in the future.

At the same time, the INS project includes the aim of correcting the present fare system on which it is constantly pointed out that "It is not harmonious." As to telephone charges by distance, they are low in the case of short distances and high in the case of long distances, compared with actual costs, partly because of the historical circumstances. With the city charge as 1, the fee for a telephone call to an area more than 750 kilometers away is 60. However, in the case of DDX (new data network), which is a public network exclusively for data communications, the ratio of charges is 1 to 12, and in the case of the network exclusively for facsimiles, the ratio is 1 to 1.5. Thus, the charge systems among various circuits are disorderly.

Charge System Also Can Be Unified

Under INS, however, it is possible to unify the networks of telephones and data communications, which cannot ride together at present, and to make all kinds of information pass through the same circuits as numerical digital

signals. Therefore, it is possible to measure the amount of information in the same unit (bit -- the smallest unit of information), and to unify the charge systems.

With the creation of INS, double investments will disappear through the unification of the plural number of networks, and the costs per unit of information will fall, too, due to technological progress. Therefore, it will be possible to lower the charge level from the present level. Moreover, the difference according to distance will also finally become 1 to less than 10, and all this will greatly contribute to the promotion of information society. This is NTT's synopsis. INS is steadily heading toward materialization through the brilliant results of research and development by NTT which leads the world, such as the optical fiber which makes long-distance transmission possible, and VLSI's (very large-scale integrated circuits) consisting of about 600,000 transistors in a basic plate several millimeters square.

According to NTT's plan, commercial services, covering 10,000 houses, will be started in Tsukuba Research and Education City where a Scientific Exposition will be held in 1985, with experiments in model areas taken into account. The networks of telephones and data communications will be unified in the cities where the Prefectural Government Offices are located, in 1987, and throughout the nation by 1995. In the year 2000, NTT is planning to unify the picture networks (moving pictures) which require 1,000 times as much information as that by telephones, and complete all the networks.

In the middle of February, there occurred an incident in Hokkaido in which an NTT employee stole information from data communications circuits, forged a cash card, and drew out cash. "Crime in Japan has come to this point." So saying, an NTT leader recognized "maturation" of information society, and at the same time felt as if he were made to look at the reverse side of the communication and information society which is progressing limitlessly.

Effects of Division Unknown

Vice-President Yasusada KITAHARA, who is a promoter of the INS project, emphasizes: "From the standpoint of natural science, including technological development, we have acquired prospects for the achievement of INS. In the future, we must tackle the sociological and cultural scientific fields." There is an increase in the number of computer crimes, uneasiness over controlled society, and information public nuisances. As to problems which are closer to us, there is such a question as whether or not salaried-men's work will go well even if there is "no drink on one's way back" to work at home. Such problems which are expected when INS society has become real "cannot be settled only by technology" (Vice-President KITAHARA).

On the other hand, what will become of the INS structure when the "division into the central company and a plural number of local companies,"

which division is scheduled to be included in the report by the Sub-Committee of the Provisional Administrative Affairs Research Council, is carried out in the future? As to this, persons connected with NTT are avoiding making any comment, and it seems that they are unable to gather actual effects, too. There is also arising the vague fear that the charge systems among various local companies and their efforts will become uneven, and that this will put a brake on the construction of INS on a national scale. However, if the theory of competition works and if management becomes more efficient, as aimed at by the Provisional Administrative Affairs Research Council, this will become material for promotion, too.

Of course, apart from such problems as what to do about such "non-natural scientific" fields and NTT's structure, "NTT has sufficient power to undertake the information and communications revolution which is symbolized by INS" (President Hisashi SHINTO). Whether or not it will be able to display this capability fully depends upon how NTT itself will tackle self-reform, in the stream of the NTT reform which seeks greater efficiency.

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'ORBITA', 'EKRAN' AND 'MOSKVA' SATELLITE TELEVISION BROADCAST SYSTEMS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 82 pp 37-44

[Article by D.L. Zaytsev and L.Ya. Kantor, State Scientific-Research Institute for Radio]

[Text] Scientists in many countries have long shown significant interest in the problem of television broadcasting employing artificial earth satellites. Simple calculations show that a satellite which is at a high enough altitude - up to 36-40,000 kilometers - can be used to transmit signals, including television, to huge territories - as much as 1/3 of the earth's surface.

The idea of such transmission was expressed long ago, particularly in P.V. Shmakov's work.

A real base for this idea was provided after the 1957 launch of the first Soviet satellite; in the mid-1960s, after resolving a number of technical problems, it was possible to turn directly to solving the problem of satellite TV broadcasting.

The practical interest in solving this problem is explained by the high economic efficiency of satellite TV broadcast systems.

Traditional TV broadcasting methods based on the use of terrestrial facilities for feeding and distributing TV programs - radio relay and cable lines and high-power transmitting stations - cannot provide TV broadcast services for the entire territory as the degree of broadcast coverage increases, even in the most developed countries.

This is because practically every state has inaccessible regions where it is difficult to built TV transmitters and radio relay or cable lines leading to them.

In this country, the problem of providing TV broadcasting for the entire country at times convenient for the population, allowing for the long distance from west to east (11 time zones) and the presence of inaccessible regions with low population density (less than one person per square kilometer), presents significant difficulties; the resolution of the problem is of special interest. Prior to 1967, this problem was solved strictly through the use of terrestrial facilities - by building powerful television transmitting stations (5-50 kW) as well as low power relays (1-10 W).

The dynamics of the development of the terrestrial transmitting network in the USSR [1] shown in figure 1, and the rates at which TV broadcasting is being provided to the population (figure 2), indicate that the construction of a terrestrial transmission network was an efficient approach during the early stages; stations were built in heavily populated areas of the country, and the introduction of each of these provided a significant increase in the number of TV viewers.

By 1 January 1961 there were 100 high-power TV stations and about 170 low-power relays, providing television for approximately 35 percent of the population. Within that five-year plan, i.e., by 1 January 1966, the amount of terrestrial facilities more than doubled (190 high-power transmitters and 480 low-power relays); however, the increase in viewers was only 20 percent. Then, as TV stations were put into operation in sparsely populated regions, the efficiency of terrestrial facilities began to drop sharply. For example, during the next five-year plan the amount of transmitting equipment increased by 100 stations, but this provided an increase in viewers of only 15 percent. It became clear that it is not possible to solve the problem in this manner: at those rates, even to provide coverage for 95 percent of the population it would be necessary to build over 2500 high-power television stations which, in turn, would require significant capital investment as well as the construction of a large number of trunk lines, and would require a long time; even so, it would be impossible to provide coverage for 100 percent of the population.

The employment of satellite systems is now a fully realistic way to solve this problem within short periods; the common use of these systems for transmitting television programs in the USSR began in 1967 with the initiation of the "Orbita" network of ground stations. TV programs were fed to "Orbita" stations through the "Molniya-1" satellite in the 1 GHz range; the activation of the first 20 "Orbita" stations provided an increase of more than 40 million television viewers [2].

In the subsequent years, the construction of "Orbita" stations continued intensively; stations were built in practically all of the large cities in Siberia, the Far North, and the Far East; there are now nearly 90 of them. Beginning in 1974, most "Orbita" stations were switched to the 4 GHz band to operate with the "Molniya-2" satellite; these stations are now working with the "Molniya-3", "Raduga" and "Gorizont" satellites. The table presents the basic technical parameters of the "Orbita" system, and the external appearance of the station is shown in figure 3.

The "Orbita" station has been described in the technical literature many times [3,4]; therefore, we can limit ourselves here to the most general characteristics. The station is based on a fully turnable two-reflector parabolic antenna 12 meters in diameter installed on a round reinforced-concrete building; the building contains an input low-noise parametric amplifier cooled with liquid nitrogen, receiving equipment, a system of equipment for programmed aiming of the antennas toward the satellites, and a great deal of auxiliary and power supply equipment. The program received at the TV station is then fed to a local television center or high-power relay station and sent over the air in the meter or decimeter frequency band.

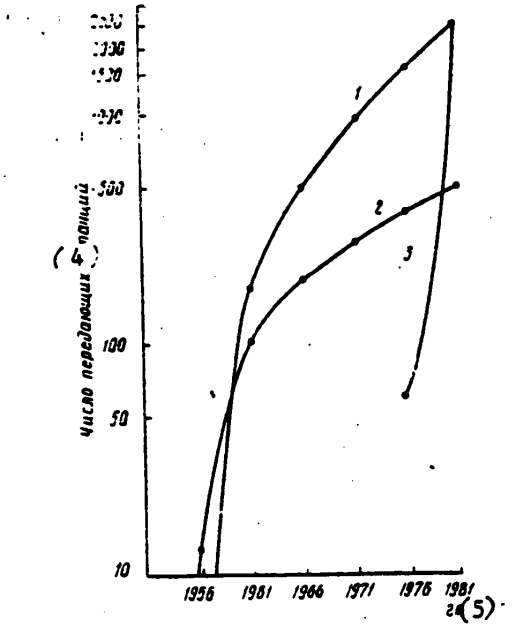


Figure 1. Rates of development of transmitting television network in USSR (by five-year plans): 1--low-power relays; 2--power transmitters; 3--"Ekran" stations; 4--number of transmitting stations; 5--years

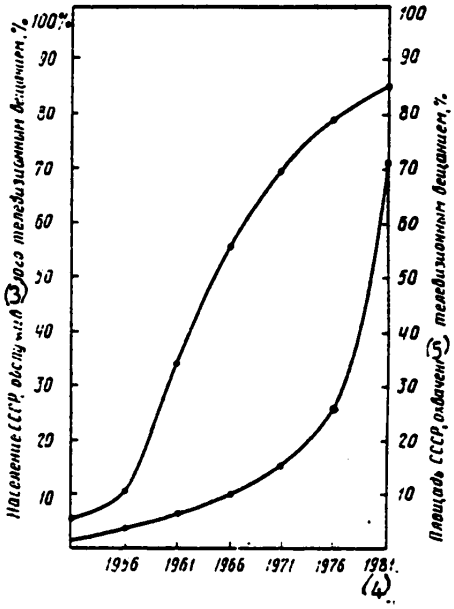


Figure 2. Rates of coverage of USSR with terrestrial television broadcasting (by five-year plans): 1--population; 2--territory; 3--USSR population provided with television broadcasting, percent; 4--years; 5--area of USSR covered by television broadcasting, percent

The "Orbita" station was the world's first multi-station TV distribution system; however, the space technology capabilities existing at that time did not allow the creation of powerful satellites: as a result, the cost of the "Orbita" ground station was extremely high. The construction of these stations was justified economically only in heavily populated regions. "Orbita" stations were actually also built in relatively sparsely populated areas with populations of 5,000-10,000: this was done in the name of, and for the good of, the Soviet people.

However, the efficiency of building new "Orbita" stations as a means for supplying TV programs then dropped sharply; the construction of stations in sparsely populated areas (with a few thousand residents) led to costs per viewer of thousands of rubles; therefore, the development of the network of "Orbita" stations as a means

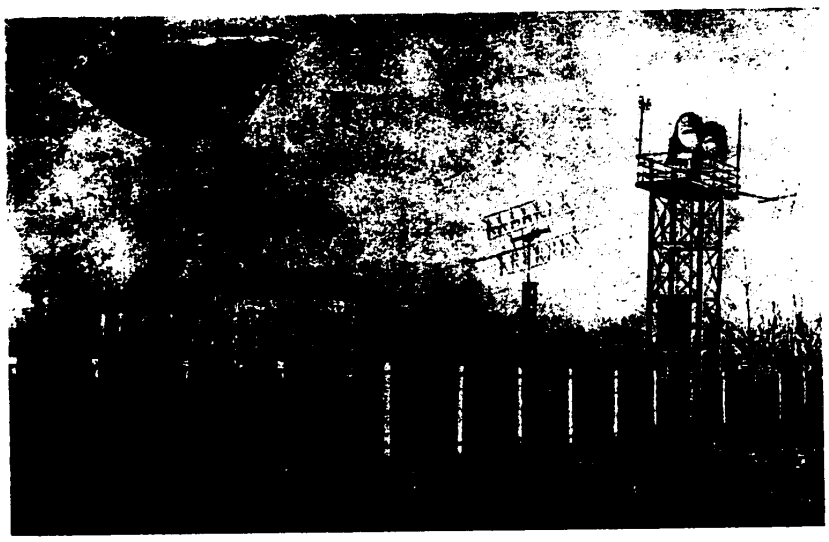


Figure 3. "Orbita" station

for distributing TV programming was curtailed*.

Technical-economic aspects of creating satellite TV broadcast systems

As was mentioned above, the most important factor which determines the parameters of satellite TV systems and which has an effect on the choice of frequency band and technical characteristics is economy: in the final analysis, economy determines the advisability and effectiveness of the creation of systems. Economically optimal systems are designed on the basis of considering the cost relationships for the space complex and the earth stations, as well as the size indicator of the receiving network on the ground.

Examples of the cost of these complexes as a function of the power of the satellite transmitter P_s and the Q (sensitivity) of the antennas of the ground receiving installations $(G/T)_g$ are shown in figure 4, where G is the antenna gain, T is the equivalent noise temperature of the ground station.

It is apparent from figure 4 that the cost of the satellite and its launching is a strong function of the power of the on-board transmitter: the higher the power, the larger and heavier the transmitter, the greater the power consumption, dimensions

*"Orbita" stations are now being reequipped with transmitting facilities, and the network of "Orbita" stations is being used as the basis for creating and developing the national duplex telephone communications network.

and weight of the power source; in the final analysis, the size and weight of the satellite as a whole increase, requiring a more powerful carrier rocket.

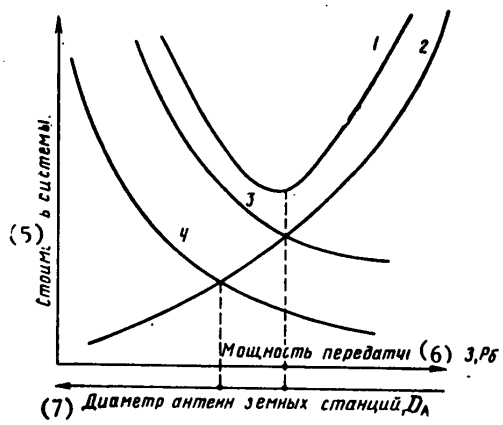


Figure 4. Calculation of optimal system parameters (cost): 1--entire system; 2--satellite and launch; 3--N ground stations; 4--one ground station; 5--system cost; 6--satellite transmitter power, P_S; 7--diameter of ground station antennas, D_A

However, the cost of the receiving station on the ground becomes smaller, since the same reception quality of TV signals can be provided with a more powerful on-board transmitter with the use of less sensitive, simpler and less expensive receiving installations on the ground.

We can reach the following basic conclusions from analyzing these relationships:
--an optimal relationship exists between P_S and $(G/T)_g$, for which the total system cost is minimal;
--the optimal values of P_S and $(G/T)_g$ depend upon the number of ground stations N in the system; as N increases, the optimum moves toward larger values of P_S.

The basic optimization principle is thus to select that on-board relay power which makes the system as a whole as inexpensive as possible for satellite TV broadcasting systems with mass receiving networks [2]. Of course, allowance must be made for the possibility of the technical implementation of the relay and satellite as a whole, as well as the fact that interference may be created for other systems operating in the same or adjacent frequency bands.

From this viewpoint, the highest acceptable relay power or, more precisely, the highest effective isotropic radiated power (EIRP), is determined on the basis of the Radio Communications Regulations which limit the radiated power flux density of a satellite on the ground W in each of the frequency bands allocated for satellite broadcasting or fixed satellite service in order to avoid crosstalk between services.

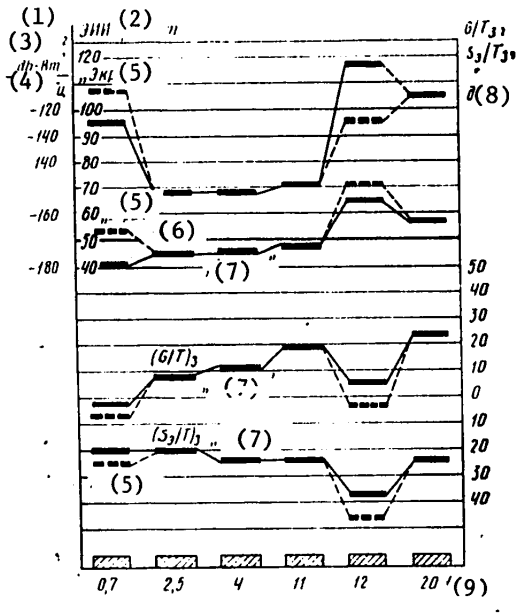


Figure 5. Optimal parameters of satellite systems: 1--W_{sat}; 2--EIRP, db/W; 3--dB·W/m^2; 4--$\frac{dB \cdot W}{1^2/4KHz}$; 5--"Ekran"; 6--EIRP; 7--"Moskva"; 8--dB/k; 9--f, GHz

According to the Regulations, satellite TV broadcasting in the USSR can be done in the 0.7, 2.5 and 12 GHz bands; in addition, TV programs within the framework of fixed services can be transmitted in the 4, 11 and 20 GHz bands (higher frequency bands are not considered here).

Figure 5 shows the limitations on W imposed by the Regulations for these frequency bands, as well as the maximum tolerable satellite EIRP and Q-factors $(G/T)_g$ of ground receiving stations needed to provide a given reception quality and calculated on the basis of these values of W. Also shown are the values of $(Se/T)_g$, where S_e is the effective surface of the ground receiving antenna, which characterizes its physical dimensions and consequently its costs; these are more convenient for economic calculations. The first optimization step thus results in selecting the basic parameters of the on-board transmitter and the Q-factor of the ground stations $(G/T)_g$ or $(S_e/T)_g$.

In the second optimization step, values of G, S_e and T which provide the minimum cost of the ground station as a whole are selected so as to preserve the required ratio $(G/T)_g$ or $(S_e/T)_g$. The discussions here are as follows: the greater the effective service of the antenna S_e, the higher its cost; however, it is then possible to employ a less sensitive receiver (with higher noise temperature) with accordingly lower cost, and conversely. Obviously, for certain optimal values of

S_c and T the cost of the entire ground station, which is equal to the sum of the cost of the antenna and receiver, becomes minimal. It must be noted that this choice is discrete, since there are only a few types of input devices (parametric or transistor amplifier, mixer).

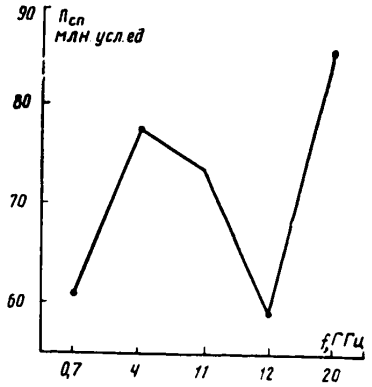


Figure 6. Costs for creating optimal TV systems in different frequency bands.

These data provided the basis for determining the comparative cost of creating economically optimal satellite systems in each of the frequency ranges; the results of the calculation are shown in figure 6. It follows from the figure that in terms of economy the most profitable frequency band is 12 GHz, where the small limitations on the value of W permit the use of low-Q, low-cost receiving installations. Comparable economic indicators can also hold for systems in the 0.7 GHz band; in the other bands, the cost of creating satellite TV systems is significantly higher.

These considerations have made it possible to develop a strategy in the area of selecting frequency bands in determining the optimal parameters of satellite TV systems of the next generation; the "Ekran" and "Moskva" systems were created in accordance with these principles.

"Ekran" system

The first satellite in the "Ekran" system was launched on 26 October 1976 into a geostationary orbit with coordinates of 0° latitude and 99° west longitude. An experimental network of 60 receiving installations had already been built by that time. The zone served by the system covers 9 million square kilometers, which amounts to about 40 percent of the entire country. Included are regions of Siberia, the Far North and part of the Far East.

The "Ekran" system [5] was created in complete agreement with the optimization principles presented in the preceding section; the 0.7 GHz band was selected which has the advantages of simplicity and low cost of ground receiving devices. The employment of inexpensive transistor input amplifiers, simple multi-element

"wave channel" antennas and on-board transmitters with maximum acceptable power made it possible to obtain the required signal/noise ratio and the required TV channel performance indicators with inexpensive receiving installations (cf. table).

Basic Technical Parameters of Satellite TV Broadcast Systems

Parameters	System		
	"Orbita"	"Moskva"	"Ekran"
Frequency band, GHz	4	4	0.7
Transmitter power fed to antenna, W	8	40	200
Satellite transmitting antenna gain, dB	22	30	33.5
Satellite EIRP, dB·W	31	46	56.5
Modulation method	FM	FM	FM
TV signal frequency deviation (without sync pulses), MHz	9.1	9.1	6.3
Type and diameter of ground receiving antenna, m	Parabola 12	Parabola 2.5	32/4* sheet
Gain of ground receiving antenna, dB	51.9	37.5	30/23
Equivalent noise temperature	100	200	800/800
Q-factor G/T of ground receiving installation, dB/k	31.9	14.5	1/-6
Signal/noise ratio at receiver input, dB	12.5	12.5	20.8/13.8
Signal/weighted noise ratio at output of receiver in video channel, dB	53	53	53-55/48
Signal/noise ratio at output of receiver in audio channel, dB	57	57	54-56/49

*Here and below in the table the numbers in the numerator refer to a type-1 ground station, while those in the denominator refer to type 2.

Since terrestrial TV facilities also operate in the 0.7 GHz band, a system service zone arrangement was selected which provided sufficiently high power flux density within the zone and made it possible to satisfy the standards for noise field intensity outside the zone in territories belonging to neighboring governments [6].

The basis of the system is the "Ekran" satellite, which has a transmitter with unprecedented power (200 W) and a huge 3 x 5 meter folding transmitting array containing 96 spiral radiators. The widely unfolding wing, which holds solar batteries, provide power of up to 2 kW. A special high-precision three-axis satellite stabilization system holds the vehicle in the required position above the earth and boresights the beam of the transmitting antenna toward the service zone [7] (the "Ekran" satellite has been exhibited at the VDNKh). The "Ekran" system employs two types of ground receiving installations. The first type of installation (figure 7) is used to feed high quality TV signals to high power TV stations which service fairly large populated areas. These installations are configured with "wave channel" antennas consisting of 32 sheets. The receiving equipment consists of a single rack which receives, amplifies, demodulates and separates the video and audio signals. The cost of the first type of receiving installation is lower than that of the "Orbita" station.

The second type of installation (figure 8) is designed to feed TV signals with slightly lower quality (as compared with the first type of installation) to low-power television relays, or to a cable distribution network. These installations use four-sheet antennas and small receiving devices which translate the spectrum of the 714 + 12 MHz frequency to the spectrum of a channel in the meter band and which convert FM and AM. A receiving installation of the second type costs almost 300 times less than an "Orbita" station. In order to provide servicing convenience and simplify the installation, the second type of receiving systems have recently been updated and combined in a single unit with a one- or 10-W transmitting device.

The "Ekran" system has successfully passed tests, and its technical facilities are very commonly used under widely varying conditions: large populated areas, small villages and even individual geological prospecting and exploration parties. More than 1000 of these systems (cf. figure 1) have now been installed around the country, which has made it possible to provide television in regions which are practically inaccessible for terrestrial TV program delivery facilities. The network of stations continues to expand, and the equipment is being improved at the same time. For example, an input amplifier is now being put into use which has a lower noise temperature; it has been proposed that special antennas be produced for regions with difficult weather conditions, and that the first type of system be provided with an additional audio channal for supplying radio broadcast programs.

All of the above allows us to assert that the "Ekran" system is an extremely efficient means for organizing TV broadcasting in areas of Siberia and the Far North of the USSR.

Unfortunately, this system cannot be employed in other regions of the country, since irradiation of the territories to the east and west of the existing service zone would result in exceeding the standards established by the Regulations. This has required the creation of technical facilities for providing TV programming for the Urals, Central Asia and the Far East which are comparable in simplicity and efficiency.

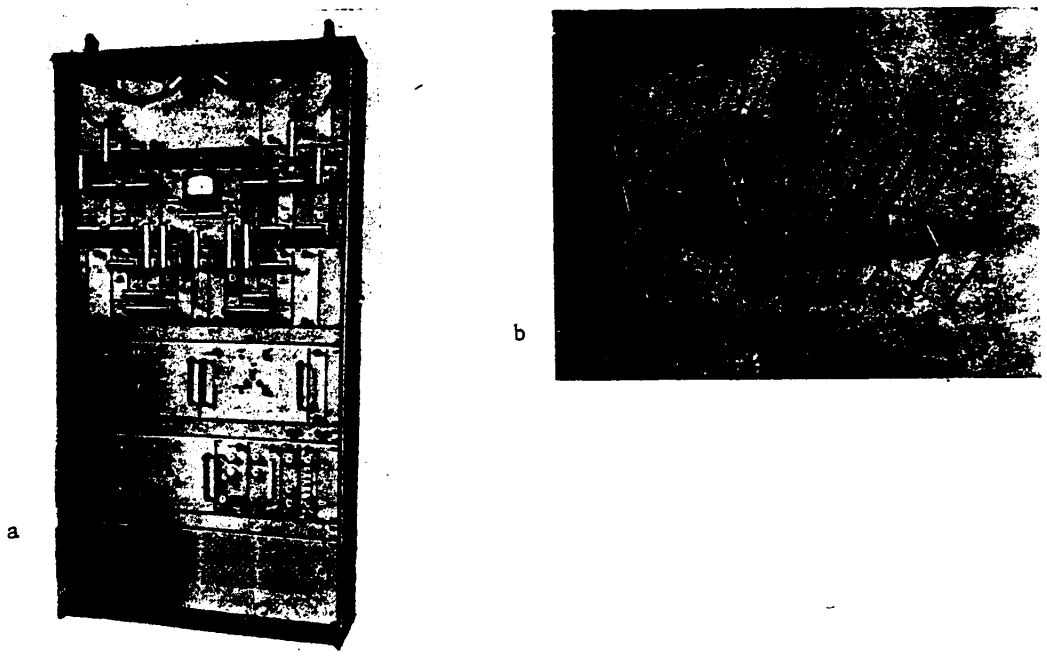


Figure 7. First type of installation in "Ekran" system.

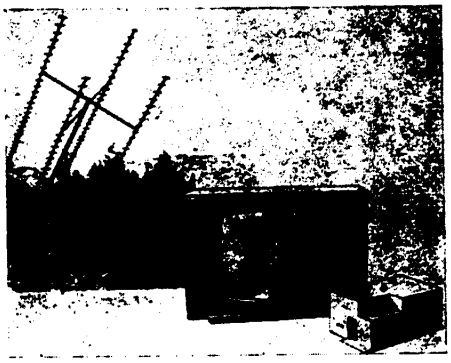


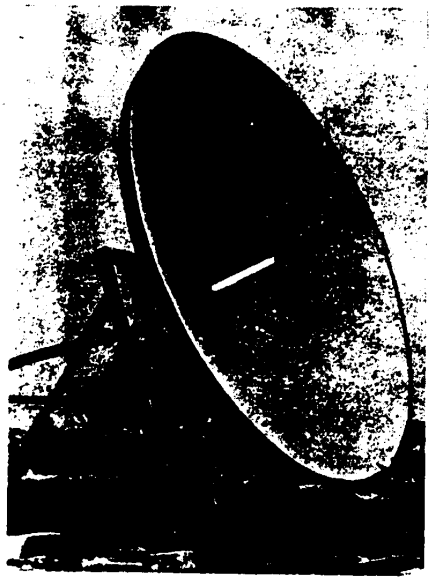
Figure 8. Second type of installation in "Ekran" system.

"Moskva" system

In accordance with the tasking, the new "Moskva" satellite TV broadcast system was developed and put into operation in 1979 in the widely used 4 GHz band, which made it possible to develop and introduce the equipment making up the system within short periods. The "Moskva" system (technical parameters given in table) is an addition to the existing "Orbita" and "Ekran" systems, and opens up possibilities for almost complete coverage of the country with Central television programming [8].

This system was created by employing special trunks carried by the new "Gorizont" series of geostationary satellites, in which the power fed to the antenna from the on-board transmitter has been increased to 40 W. In combination with a directional transmitting antenna, this makes it possible to obtain the maximum EIRP which can be achieved in this frequency band (cf. figure 3). At the same time, in order to observe the standards established by the Regulations for acceptable spectral flux density (-152 dB·W/m^2 in the 4 KHz band), dispersion of the energy of the FM signal transmitted by the satellite by an additional triangular signal at 2.5 Hz has been introduced which provides additional deviation of ± 4 MHz.

a



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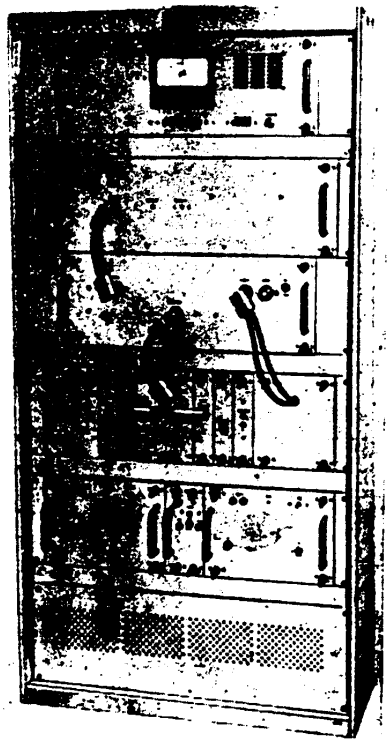

Figure 9. "Moskva" station.

The dispersion signal is extracted in the receiver with the help of a frequency feedback device which controls the frequency of the local oscillator. The use of a dispersion signal frequency below the video signal spectrum allows it to be filtered off and to close the frequency feedback device circuit only for the dispersion signal. The frequency band of the receiver is designed to pass the FM signal modulated only by valid intelligence. This treatment makes it possible to avoid noise tolerance losses which would occur if the bandwidth of the receiver were increased. The problem of electromagnetic compatibility with existing terrestrial and satellite facilities was resolved in this way.

The high power flux density of the signal near the ground has made it possible to use an antenna with relatively small reflector diameter (2.5 m) at the "Moskva" ground receiving station, and to use an uncooled parametric amplifier with noise temperature of 100 k as the input device; all of the other radio equipment is contained in a single small rack similar to the receiving rack of the first type of station in the "Ekran" system. These technical treatments have made it possible to create a simple, small station which does not require capital construction and can be housed in any existing buildings or in special containers. The energy indicators of the communications lines in the "Moskva" system provide the capability of a single high performance television channel and two audio channels. The low frequency TV video and audio signals from the station output are input to a transmitter whose type and power depends upon the required service zone. The cost indicators of the "Moskva" station correspond approximately to the first type of "Ekran" receiving installations, and are such that the use of this station for organizing TV broadcasting is economically effective for a large number of populated areas in the country.

In order to cover the territory of the USSR, there are plans to employ four space segments (high-capacity "Gorizont" satellite trunks), in geostationary orbit at 14° west longitude, 53°, 90° and 140° east longitude, in the "Moskva" system. Tests which have been completed have confirmed that the technical treatments used are correct. A network of these stations will soon be under intensive expansion.

Employment of "Orbita", "Ekran" and "Moskva" Satellite Systems

We have thus examined the principle foundation of the creation of optimal satellite TV broadcasting systems, and briefly described three domestic systems, two of which - the "Ekran" and "Moskva" - correspond to these principles and are economically optimal.

There are some natural questions - why do we need three systems working at the same time, and what is their role and prospects for development? The answer to these questions follows from the formulated task of satellite TV broadcasting - providing multiprogram TV broadcast coverage for the entire country allowing for local time differences. This problem is resolved by using the First All-Union Central Television Program for distribution to the five broadcast zones* into which the USSR is

*Each broadcast zone occupies the territory of approximately two time zones, or 30° longitude.

divided, and mass satellite TV broadcast systems with relatively local service zones - the "Ekran" and "Moskva". The second All-Union program, which is also produced allowing for local time differences, is distributed over the "Orbita" network [9].

The basic task of satellite TV broadcast systems is now to deliver TV programs to the terrestrial distribution facilities (transmitting TV stations, television centers and relays). Therefore, heightened requirements for the quality of programs delivered are imposed on these systems.

In order to satisfy these requirements, and in accordance with the Radio Communications Regulations, the appropriate type of signal modulation has been selected - broadband noise-tolerant frequency modulation - which makes it possible to provide the required performance indicators with the difficult energy situation on the downlink.

The audio signals accompanying the video in the "Ekran" and "Moskva" systems are transmitted on a frequency-modulated subcarrier located above the frequency spectrum of the video signal. The total signal (video signal ± FM subcarrier audio signal) also frequency-modulates the HF carrier.

Conclusion

Our country has the world's largest and most powerful TV satellite broadcast network.

The integrated use of the "Orbita", "Ekran" and "Moskva" satellite systems, as well as ground facilities has made it possible to organize TV broadcasting throughout the entire country and to provide television coverage to 86.5 percent of the population of the USSR. Central television programs are now transmitted in five copies, so that residents in any area of the country can watch these programs at convenient times. It should be noted that with approximately 15 hours of TV broadcasting daily, five simultaneous TV channels are required to relay just one program.

Television in the USSR is now faced with the problem of providing the same conditions for all Central television programs; in addition, problems of distributing union republic TV programming have not yet been fully resolved. All of this forces us to find new technical facilities, one of which should be a 12 GHz satellite TV broadcast system.

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