CHAPTER 8. ORGANIZATIONAL AND MANAGERIAL SYSTEM

The growth of socio-economic activities and the improvement in living standards will never come without being accompanied by a sharp increase in demand for diversified telecommunication services.

ANTELCO which is a monopoly of public telecommunication services, is called upon to review and modernize its entire management and operation system for the purpose of meeting this need and at the same time providing for further growth and development of telecommunication services through consolidation of its management foundation.

ANTELCO's business department should invigorate its window services, sales activities, marketing research and consulting services to the users for the purpose of keeping itself well informed of the needs and wants of the people for telecommunication services.

The planning and construction department should build up its material and personnel resources so that it will be able to forecast demand properly, plan the systems properly, and promote the construction works without hitch.
To this end, the existing organization should be ameliorated, and the staff should be given constant training courses for their ability development.

For the improvement of the organization, considerations should be given to improve the inter-functional communication so that the data and information available from the business department, operation department and maintenance department will be reflected properly in the management and future planning of the telecommunication systems.

The operation and maintenance departments should also push forward the personnel traning and labor-saving measures for the purpose of operating and maintaining in an efficient manner the telecommunication facilities which are growing in size and at the same time diversifying.
The operation and maintenance departments will be discussed in more detail in CHAPTER 9.

The rate system should be formulated in a forward-looking manner as new telecommunication services will be introduced one after another in the future.

In the future, the billing and collecting services will face ever-increasing volumes of business loads, and the labor-efficient measures for such services should be introduced with forwardness.

As the volume of construction and maintenance works will grow more and more in future, the procurement department will have to manage increasing volumes of orders and requisities. Namely, it should be ready to have a well-knit system for planned procurement and acceptance inspection of domestic products for the purpose of keeping the construction works on stream and improving the quality of the telecommunication facilities. This will also do much toward improving the quality of domestic products.

Vast investment is required for the amplification of telecommunication services and for the rationalization and modernization of ANTELCO's operation and management system. So that the funds available are to be used effectively for these purposes, the hard-and-fast balance-of-payments accounting and the prospective financial planning are indispensable.

In future, the telecommunication services will be improved in terms of both quantity and quality, and it will be required to station expert engineers not only in central but also local cities. It is therefore necessary to streamline the personnel management system for smooth rotation of personnel.

The following are a few supplementary explanations to the discussions above.

(1) Demand and marketing management

1) Marketing management, and demand forecast

To get precise hold of the demand trends is a basis upon which an expansion plan for telecommunication services will be formulated. Namely, the following business should be improved.

a) Window service management for acceptance of applications and cancellations.

b) Measures to turn potential demand into real one. (including questionnaire surveys, interview surveys, etc.)

c) Statistical analysis of demand trends.

d) Formulation of annual sales targets based on demand forecast data.

e) Management and control of sales activities.

2) Diversification of services, and promotion of sales activities

With the popularization of telecommunication services, the demand for diversification of services will increase.

The use of the telecommunication facilities for various services will improve the utilization efficiency of the telecommunication facilities and increase the revenue, going a long way toward consolidating the management foundation of ANTELCO.

It is therefore recommended for ANTELCO to promote sales activities through marketing surveys and consulting services in order to identify and meet the needs and wants of both active and potential users.

If ANTELCO wishes to operate data communication services on its own, it is particularly important to push forward the marketing survey and consulting services.
To put it generally, the data communication system is a means to compaginate complex flows of information involved in business activities into an optimal information processing system.

What should be done prior to the final decision on a data communication system includes the identification and analysis of the problems involved in the existing operation and management system, the scope of systematization, economic evaluation of system introduction, and other various detailed studies. During the period of these studies, the expert staffers well conversant with computer and telecommunications technology and user-oriented business will have to extend consulting services to the users.
The consulting services for users will be a definitive factor on the performance of ANTELCO's activities to canvass orders for the data communication services and also on the future growth of data communication business.

3) Facilities management

For efficient facilities investment, it is mandatory to keep the demand and supply status always in sight. Namely, the installed capacity and service conditions of the existing facilities must always be kept clear, and must be compared with the demand trends to see well in advance when the facilities will be overloaded and what and how much facilities should be installed when due. As regards the subscriber lines, the demand varies widely depending on areas and directions, and this facilities management is particularly important.

4) Management of telephone installation work

It is expected that the work volume for telephone installation will increase, particularly in Asunción. Thus, it is necessary to carefully study the time trend of work volume, available work force capabilities, contracting of work, work progress control, etc. for the purpose of establishing a powerful and efficient construction and engineering system.

(2) Establishment of technical standards

A diversification of telecommunication services will bring about a growing need for the connection of privately owned terminals to the public communication networks.
Such connection, however, must not be a physical threat to the public telecommunication networks, nor interfere with communication services. It is therefore necessary to establish tight technical standards for such privately owned terminals and a system for

qualifying and approving the applications for such connection.
It is also necessary to draw a fine line in relation to duties and responsibilities for maintenance work between ANTELCO and the owners of such terminals.

CHAPTER 9. OPERATION AND MAINTENANCE SYSTEM, AND PERSONNEL PLAN

9-1 Outside Plant Department

The outside plant department must be adapted to be ready for the forthcoming rise in the subscriber population and introduction of new technologies.
The demand for the line maintenance crew will grow with increase in the population of subscribers. To meet this demand, the workers who are engaged in the line installation work should double as maintenance crew. Namely, the training in servicing operations should be offered in parallel with the training in the installation of subscriber telephones and public telephones for the purpose of fostering personnel serving as construction and maintenance engineers concurrently.

In Asunción, the outside plant department will undertake maintenance work. In the local districts, however, highly efficient, intensive maintenance service will be hard to offer because of long distances between telephone offices. For the purpose of local maintenance activities, the following system should be studied.

(1) Maintenance crew should be assigned to major local cities such as Ciudad Pte. Stroessner and Encarnación as required.

(2) Maintenance crew should also be assigned to other automatic offices to meet their situations (size of coverage, geographic conditions, etc.). They should double as maintenance crew for switches if proper so to do.

(3) In principle, no maintenance engineer will be assigned to manual offices. But, the telephone operators and office workers should be so trained as to undertake simple maintenance jobs such as renewal of telephone. The troubles that beyond the capacity of telephone operators and office workers should be remedied by the experts available from the nearby automatic offices.

9-2 Switching Department

What counts most in discussing the operation and maintenance system during the Master Plan period is the increase in the installed capacity and the introduction of new technologies. To cope with the increase in the installed capacity, it will be only enough to increase the manpower with the existing organization intact. As regards the new technologies, however, a simple increase in labor force cannot provide any solution.

The digital switch is an integration of hardware technology and software technology, and is quite different from the conventional switches. It has an inseparably close relation with the digital transmission network, too. In other words, its operation and maintenance call for highly refined interdisciplinary technical know-how.
In the early stages of the introduction of digital switching system, posting necessary personnel to introduced offices may answer the needs for the moment. Thus, the existing personnel organization may be maintained while being reinforced as the circumstances may require. But when the number of digital switch-equipped offices has grown up, it may be necessary to centralize the operation and maintenance of digital switching system for efficiency's sake.

While the methods of centralizing the operation and maintenance should be studied in detail in near future, the centralization usually has its merits and demerits as cited below.

Merits

(1) Automatic logging and analysis of maintenance data (data concerning troubles, service quality and traffic).

(2) Quick and pertinent actions.

(3) Efficient use of labor force.

(4) Efficient inventory control of maintenance parts.

Demerits

(1) High initial investment costs.

(2) Necessity to offer advanced training courses to staffers. (The course extension may be limited to a selected few, however.)

(3) Provision of a backup system against the failure of centralized system.

A personnel plan for the introduction of digital switching system during the Master Plan period is given in Table III-I-36.

Table III-I-36 Personnel plan for DTS

Items \ Year		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
DTS Units		2	3	4	6	7	7	8	10	11	12	13
DTS Capacity		32,800	64,800	87,400	106,600	139,800	168,800	193,400	230,200	258,200	283,600	312,600
Administrative work	I	2	4	5	7	8	8	10	12	12	13	14
	II	4	12	15	17	20	20	25	30	32	34	36
Operation & maintenance	I	2	4	5	7	8	8	10	12	12	13	14
	II	12	23	26	35	42	47	56	63	69	73	79
MDF Work	I	-	-	-	-	-	-	-	-	-	-	-
	III	8	16	24	28	32	38	42	44	46	48	52
Total	I	4	8	10	14	16	16	20	24	24	26	28
	II & III	24	51	65	80	94	105	123	137	147	155	167

Note: I Engineer
II High level technician
III Medium level technician
The capacity of one unit of DTS is supposed to be 50,000 terminals.

9-3 Transmission and Radio Systems Department

9-3-1 Toll transmission line

At present, the Asunción Maintenance Center is undertaking the maintenance of all the toll circuits in the country. On the other hand, appearance inspection of equipment, simple panel replacement work, etc. are undertaken by some telephone offices.

In the future, the repeating stations to be installed distant from Asunción will increase in number, and their installed capacity will increase as well. Accordingly, it will become necessary to install local maintenance centers at places. A plan concerning local maintenance centers is given in Table III-I-38.

9-3-2 Junction in Asunción area

All the alarm signals concerning the digital transmission lines to be constructed as junction lines will be displayed at Central II for centralized monitoring of transmission lines.
Therefore, the maintenance center will be installed in Central II.
Those simple maintenance services such as appearance inspection which do not need high-technology carrier system knowledge will be undertaken by respective local offices under the guidance of the maintenance center.

9-3-3 Rural telephone

For the purpose of keeping the rural telephone system in good working order, the maintenance centers will be located with due consideration given to efficient distribution of maintenance crew and to the availability of local traffic means.

The telephone offices and maintenance centers will share the functions as follows.

(1) Operation and maintenance activities to be carried out by the telephone office workers

The telephone office will be equipped with remote supervisory equipment and automatic testing equipment. The alarm monitoring and routine test by these equipments, handling of subscriber's complaints and tests, telephone set maintenance and collection of coins from public telephones, etc. will be carried out by the telephone office workers. The troubles other than telephone sets should be reported to the maintenance center.

(2) Operation and maintenance activities to be carried out by the maintenance center

The routine test of the radio equipment, control equipment and power facilities and repair work (replacement with spare panels) will be undertaken by the maintenance center.
The repair of defective panels, etc. will be undertaken by the Asunción Maintenance Center.
The number of maintenance centers required will be determined with account taken of the number of rural telephone-served areas and the availability of traffic means there.
Table III-I-40 shows a plan for maintenance centers.

9-3-4 Mobile radio communication

(1) Land mobile radio telephone

A maintenance center will be installed at Asunción for operation and maintenance of land mobile radio

telephone switching office, radio circuit control office, base stations, and mobile equipment.
The maintenance center will be staffed with switch engineers and radio engineers. The switch engineers for the maintenance center should preferably serve concurrently as the engineers for the maintenance of the switches at the telephone offices.

(2) Ship communication service

In Asunción, the manning of the operation center, transmitting station and receiving station will remain intact for some time now. In future, however, studies will be made for the possibility of centralized maintenance using the remote supervisory and control system.
The maintenance of the VHF-band radio equipment to be installed at Pilar, Concepción and Bahia Negra will be conducted together with the maintenance of UHF/VHF radio equipment to be installed within the same areas.

9-3-5 Labor requirements for operation and maintenance

The annual manpower requirements for transmission and radio systems department as classified by duty are shown in Tables III-I-37 through III-I-42.

Table III-I-37 Required operation and maintenance staffs (Transmission and radio system department)

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Trunk transmission line		I	5	8	8	9	10	12	15	15	15	15	15	15	15	15	15
		II	7	10	12	15	18	25	33	42	52	52	52	52	52	52	52
Assunción area junction		I				2	4	4	4	4	4	4	4	4	4	4	4
		II				6	14	14	14	14	14	14	14	14	14	14	14
Rural telephone		I	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3
		II	4	11	11	13	15	17	19	19	21	21	24	24	26	26	28
Land mobile telephone	Switching	I	-	-	-	-	-	3	3	3	3	3	3	3	3	3	3
		II	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
	Trans-mission	I	-	-	-	-	-	3	3	3	3	3	3	3	3	3	3
		II	-	-	-	-	-	5	5	5	5	5	5	5	5	5	5
Ship communication		I	0	0	0	0	1	2	3	4	6	6	6	6	6	6	6
		II	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11
Total		I	6	10	10	13	17	26	30	31	34	34	34	34	34	34	34
		II	21	31	33	44	57	78	88	97	110	110	113	113	115	115	117

I Engineer

II High level technician

Table III-I-38 Required operation and maintenance staffs for trunk line - Year 1997

Staff \ Maintenance center		Asunción	Cnel. Oviedo	Cdad. Pte. Stroessner	Encarnación	P.J. Caballero	Total
Work administration	I	1					1
Maintenance administration	I	1					1
	II	2					2
Operation	I	2		1			3
	II	5		5			10
Radio link maintenance	I	2	* 1	* 1	* 1	* 1	6
	II	6	4	4	2	2	18
Carrier terminal maintenance	I	2					2
	II	6	4	2	2	2	16
Repair	I	2					2
	II	6					6
Total	I	10	1	2	1	1	15
	II	25	8	11	4	4	52

Example: I Engineer

II High level technician

* Concurrent with carrier terminal maintenance

Table III-I-39 Required operation and maintenance staffs for Asunción area junction-transmission system - Year 1997

Staff		Number
Work administration	I	1
Maintenance administration	I	1
	II	2
Work instruction	I	1
Maintenance & operation	II	10
Repair	I	1
	II	2
Total	I	4
	II	14

Example: I Engineer

II High level technician.

Table III-I-40 Required operation and maintenance staffs for rural telephone system - Year 1997

Staff \ Maintenance center		Asunción	Cnel.Oviedo	Encarnación	P.J.Caballero	Pilar	Total
Work administration	I	1					1
Work instruction	I	1					1
Maintenance & operation	II	8	10	2	4	2	26
Maintenance administration	I	1					1
& repair	II	2					2
Total	I	3					3
	II	10	10	2	4	2	28
Maintenance area		Chaco Dpto. Central Dpto. Paraguarí Dpto. Cordillera	Dpto. Caaguazú Dpto. Guairá Dpto. Alto Paraná Dpto. Canendiyú Dpto. San Pedro	Dpto. Itapúa Dpto. Misiones	Dpto. Amambay Dpto. Concepción	Dpto. Ñeembucú	

Example: I Engineer
II High level technician

Table III-I-41 Required operation and maintenance staffs for land mobile telephone system

Staff			Number
Switching	Work administration	I	1
	Maintenance administration	I	1
		II	1
	Work instruction	I	1
	Claim handling	II	2
	Maintenance & operation	II	4
	Sub-total	I	3
		II	7
Transmission	Work administration	I	1
	Maintenance administration	I	1
		II	1
	Work instruction	I	1
	Maintenance & operation	II	4
	Sub-total	I	3
		II	5
Total		I	6
		II	12

Example: I Engineer

II High level technician

Table III-I-42 Required operation and maintenance staffs for ship communication system

Station / Staff		Operation center	Asunción transmitting station	Asunción Receiving station	Total
Work administration	I	1	1	1	3
Maintenance administration	I	1			1
	II	1			1
Work instruction	I		1	1	2
Claim handling	II	1			1
Maintenance & operation	II	1	4	4	9
Total	I	2	2	2	6
	II	3	4	4	11

Example: I Engineer

II High level technician

9-4 Non-Telephone Department

9-4-1 Operation and maintenance system

The operation and maintenance system of the telegraph, telex and data communication systems department will be divided into two as follows.

Namely, the ANTELCO headquarters will be provided with an administrative department, and each site office (telex switching office, telex concentrating office) will be provided with an operation department and a maintenance department.
The maintenance department for the telex concentrating office will undertake the maintenance of telex terminals, facsimile terminals and MODEMs at own office and at the subordinate end offices.

The operation and maintenance staff for the site office will cover the operation and maintenance of both telephone and telex equipment.

(1) The maintenance administrative department at the headquarters has the following duties and responsibilities.

1) Preparation, updating and management of the plant records of all the telecommunication facilities in the countries that must be maintained.

2) Preparation and updating of standard maintenance manuals.

3) Administration of spare parts, measuring instruments, vehicles, etc.

4) Preparation of annual plans for equipment upgrading and replacement, etc.

5) Preparation of staff training programs.

6) Emergency measures against major disasters, accidents, etc., and repairing measures.

(2) The major tasks of the site office maintenance department are as follows.

1) Routine tests and adjustment and other preventive maintenance servicing for equipment and facilities.

2) Acceptance of complaints, remedial work, and information of recovery to complaints.

3) Analysis and archiving control of trouble records.

4) Technical support to the end offices.

9-4-2 Personnel plan

A personnel plan for the telegraph and telex department is shown in Table III-I-43. It is formulated on presupposition that the manpower necessary for the maintenance of telex switching equipment and concentrators to be newly installed by 1987 has already been incorporated in the ongoing projects. The personnel to be assigned to those offices to which new technologies are to be introduced should preferably be the trained workers. They should be posted to respective offices from the beginning of the construction work, so that they will be given an opportunity to hone their knowledge and skill in the operation and maintenance of equipment.

Table III-I-43 Required operation and maintenance staffs for telegraph & telex department

Staff \ Year		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Telex switching office	Technical & operation					4	8	11	13	15	17	19	21	23	25	27
Concent-ration office	Technical					5	8	11	14	17	20	25	27	29	31	33
	Operation					7	12	16	19	25	35	46	53	62	62	62
End office	Operation					12	26	35	42	53	61	73	81	85	85	85
Total						28	54	73	88	110	133	163	182	199	203	207

Note: The table shows the number of staffs recruited after 1987.

CHAPTER 10 RATE SYSTEM

10-1 Rate Making Principles

In Paraguay, the rate making principles are stipulated by "Lay de Telecomunicaciones (1944)" and Ley No. 1296, "Orgánica para la Administración Nacional de Telecomunicaciones (1967)," as follows:

(1) "Ley de Telecomuncaciones (1944)"

Article 23, sec. 3
The rate shall balance with the sum of the service cost and normal operating profit.

(2) Ley No. 1296, "Orgánica para la Adminsitración Nacional de Telecomunicaciones (1967)"

Article 54
The rate for the telecommunication services shall be determined so that the revenues resulting from their application will permit ANTELCO to cover operating expenses and obtain a reasonable profitability on the investments appropriated for the telecommunication services; with the object of ensuring ANTELCO free disposability of monetary resources for the attention of its liabilitites and the normal expansion of its services.

Article 55
To achieve the purpose provided for in the preceding article, the rate shall be determined based on the operating budget to yield net annual profit which will be neither short of 8%, nor in excess of 10%, of the immobilized investment in force during fiscal year.

Article 56
In the event the net annual profit has fallen below 8% of the immobilized investment, ANTELCO may change its tariff in accordance with the procedures provided for in para. 19 of Article 22 hereof.

In particular, the telegraph rates are "different by the types of transmission and uniform irrespective of distance (Article 96 of "Ley de Telecomunicaciones")"

As regards the telephone rates, it is specified in Article 133 of the same law that they may be "subject to revision whenever Dirección General de Correos y Telecomunicaciones considers it proper.".

The procedure of rate making is also stipulated in both laws as follows:

(1) "Ley de Telecomunicaciones"

Article 23, sec. 1
The rates for public telecommunication services shall be determined by Dirección General de Correos y Telecomunicaciones with the approval of "Poder Ejecutivo."

(2) Ley No. 1296, "Orgánica para la Administración National de Telecomunicaciones"

Article 53
The rates corresponding to telecommunication services to be offered by ANTELCO shall be approved by "Poder Ejecutivo" with the decision of "Consejo Nacional de Coordinación Económica."

The basic matters concerning the telegraph, telephone and telex rates are promulgated in the form of "Decreto." Other rates are also promulgated in the form of "Resolución" under the name of "Presidente del Consejo" of ANTELCO.

10-2 Rate System for Existing Services

As stated under para. 10-1, the rates for the existing public telecommunication services offered by ANTELCO are established clearly in the form of "decreto" and "resolución."

In this Master Plan, it is assumed that the existing rate system will last.

However, the existing rate system will need improvements as itemized hereunder.

(1) The dial telephone rate is calculated in a dual system in which distance-related minute rate and meter pulse rate (25 guaranies per pulse) are combined.

In the daytime, for example, the meter pulse cycle is as follows:

1 km to 50 km	125 sec.
51 km to 100 km	62.5 sec.
101 km to 200 km	31.25 sec.
201 km to 300 km	20.833 sec.
301 km to 400 km	17.857 sec.
401 km up	15.625 sec.

Namely, the duration must be counted accurately in thousandths of a second, and the charging equipment of considerably higher accuracy is required.

It is therefore recommended for the purpose of reducing the costs of charging equipment to modify the rate system so that the charging may be made in round seconds.

(2) At present, the toll calls from the public telephone room are handled by the operator in the 3-min. 1-min. system. In the event the automatic toll dialing public telephones are introduced, the existing rate system must be reviewed.

10-3 Rate Systems for New Services

In this Master Plan, the new services (pushbutton telephone, rurla telephone, land mobile telephone and data transmission) are introduced pursuant to the basic policies stated under para. 2-1 of CHAPTER 2.

As regards the rate system for the rural telephone service, ANTELCO's tentative plan has been formulated according to the feasibility study on their national telecommunications development project conducted during the period from July to September 1981.

For other new services, however, ANTELCO has yet to decide its rate policies.

For the new services other than rural telephone, a tentative plan of rate system is proposed to reflect the rate making principles referred to under para. 10-1 and in a manner to recover the service costs and bring about proper capital gain (10%).

In principle, the tariff will be set according to the following formula.

1) Determine the initial investment cost necessary for the introduction of a service.

   Initial investment cost = Costs for materials and supplies + Installation costs + Overhead

2) Calculate the return on the initial investment which is to be realized in the form of basic charge etc. to recover the depreciation costs, maintenance costs, operating expenses and capital gain.

   Return = Depreciation costs + Maintenance costs + Operating expenses + Capital gain

As regards the pushbutton telephone, the difference in the return between the pushbutton telephone and rotary dial telephone will be recovered in the form of additional subscription rate at the time of installation, and the formula above will not be applied.

A tentative tariff plan on new services is proposed in Table III-I-44.

Table III-I-44 Tentative tariff on new services

Unit, Tariff : Guaranies

Service	Tariff	
1. Pushbutton telephone	Additional installation charge	4,800
	Basic charge and call rate	Same as rotary dial telephone
2. Rural telephone	Installation charge	170,000
	Basic charge (per month)	2,400
	Call rate	Same as ordinary telephone
3. Land mobile telephone	Installation charge	170,000
	Basic charge (per month)	6,000
	Call rate (per minute)	
	Chargeable distance	
	1 - 50 km	24
	51 - 100 km	36
	101 - 200 km	60
	201 - 300 km	84
	301 - 400 km	96
	401 km -	108
4. 1,200 Baud MODEM	Installation charge	7,400
	Basic charge (per month)	2,500

CHAPTER 11 CHARGING SYSTEM

This chapter is devoted to a general description of the charging system, what should be studied in future with respect to the existing charging system in Paraguay, and the matters to be studied in relation to the introduction of digital switching system.

(1) An overview of charging system

There are the following five systems to bill the users.

a) Flat rate system

In this system, the subscriber receives unlimited local call service in return for the payment of a fixed charge per month. (The basic charges including local calling charges are established.) (Refer to GAS 1, Chap. IV, p. 5.)

b) Message rate system

This system is applied to the charging of automatic dialing call. Namely, a meter for a specific calling party counts the number of messages (charges) automatically.
In the case of local calls, there are available two systems; one in which the meter counts every message and the other in which the messages are counted on unit duration of 3 min. or 6 min.

In the case of toll calls, many Administrations have adopted methods of charging for use with their national automatic long-distance call service, in which the charges are recorded on subscribers' meters, but based on two different principles:

(a) some Administrations have for many years used a system based on trains of meter-pulses issued at the start of each period of 3 minutes, the number of pulses in the train depending on distance;

(b) other Administrations use, or intend to use, a system based on individual meter-pulses issued at short intervals of time, the length of the interval depending on the distance.

There is another system in which the flat rate system and message rate system are combined; namely, the local calls of up to a certain number of messages are charged in the flat rate system, and those exceeding that number are charged in the message rate system. There are several countries employing this combined system, and the fixed charge usually is set for nearly the average number of messages.
(Refer to GAS 1, Chap. IV, p. 6.)

c) Automatic detailed billing system

This is an automated system of recording in detail the service rendered to automatic dialing calls and accounting charges for it. It automatically stores in memory the charging data (telephone numbers of the persons calling and called, start and end times of speech, etc.). These data are read out and processed in a computer to prepare a detailed statement of calls and a bill.
(Refer to GAS 1, Chap. IV, p.7 and 14.)

d) Coin collection system

This system is applied to the calls from the public telephone.
Namely, the coins are collected according to the rate period, the distance and the duration of call handled.

e) Operator's ticketing system

This system is applied mainly to manual toll switching service.
The operator records the details of a call handled, for later charging. (Refer to GAS 1, Chap. IV, p. 8.)

(2) Existing charging system

The charging system is one for accounting the charges for the services rendered to the customers according to the tariff specified by the rate system.
The charges are accounted manually or automatically. It is therefore important to formulate the rate system so as to simplify the charging system which is a means of implementing the rate system.
The telephone service usually follows manual switching at the outset and then is gradually transformed into automatic switching. For this reason, the rate for automatic dialing call usually is determined based on the rate for manual switching. From the viewpoint of investment cost, the manual and automatic dialing calls cannot be handled equally, and the charging method may also be changed. For automatic dialing calls, the charging system must be formulated to be simple and economical.

From the reasons discussed above, it is recommended to specify in the rate system that the frequency of message pulses in the existing charging system which varies depending on the distance between the calling and called parties should be in round seconds. Anyway, the above should be left for further study.

(3) Matters concerning the introduction of digital switching system

As for the digital switching system, the metering system or detailed billing system can be applied whichever is preferred.
In the metering system the sum total of meter pulses which is used by the subscriber is calculated.
In the detailed billing system, each call as identified by the numbers of calling and called parties, start and end times of call, etc. is memorized. Namely, these call identification data are stored in an electronic memory, collected into a magnetic tape or the like, and then processed in a computer for billing.
Even when the message rate system is applied, it is possible to apply a detailed billing to specific subscribers for the purpose of disposing of grievances concerning the bills.
The more the number of subscribers, the more the load of accounting. The use of computer for more efficient, economical accounting and billing services is a natural consequence.
The detailed billing system and ANTELCO's own computer-aided accounting and billing service system should be studied further on account of their economics and prospects.

CHAPTER 12. CONSIDERATIONS IN IMPLEMENTING THE PROJECT

The matters which are to be considered in implementing the Master Plan have already been discussed in respective chapters. In addition, the following should be fully taken into consideration.

(1) Relations with the on-going projects

As discussed in para. 2-3 of CHAPTER 2, the first five-year period of the Master Plan has already been formulated, and the second and third five-year periods are planned on condition that the first five-year plan will be completed as scheduled. If the first five-year plan is changed for some reasons or other, the following plans must naturally be reviewed and modified.

(2) Asunción area junction circuits

The following local junction circuits in Asunción have been scheduled in the first five-year plan in anticipation of the introduction of digital telephone exchanges.

1) To install digital junction circuits using optical fiber cables to interconnect digital exchanges.

2) To install metallic cable junction circuits to interconnect digital exchange and EMD exchanged.

In the first five-year plan, quantities of metallic cables are necessary. But toward the end of the Master Plan, however, all the exchanges in Asunción will be digitalized, making all the metallic cables useless. To prevent this loss, it is recommended to modify the aforesaid first five-year local junction circuit plan; namely, the cable PCM system should preferably be employed to interconnect digital exchanges and EMD exchanges using existing cables instead of laying additional metallic cables. The costs earmarked for additional metallic cables will meet those required for the introduction of the cable PCM system.

Further, part of the cable PCM system scheduled for the second and third five-year plans is installed in advance in the first five-year period, and the corresponding cost can be slashed from the investment costs for the second and third five-year plans.

(3) Review of the rural telephone introduction project in the first five-year plan

According to the first five-year plan, it is contemplated to install 24 CH UHF/VHF radio communication circuits between telephone offices and MAS base stations in some areas. Of them, the circuits between Concepción and MAS NO. 2 base station, between San Pedro and MAS NO. 2 base station, between Hohenau and MAS NO. 1 and NO. 2 base stations, and between Carapegua and MAS base station may be used as toll trunk circuits for the telephone exchanges which are to be automated during the Master Plan period.

It is therefore recommended to change the capacity of these circuits to 60 CH or 120 CH in advance.

In passing, the cost increase due to modification of 24 CH UHF/VHF system into 60 CH or 120 CH one will be negligibly small if the number of actually equipped channels is the same.

(4) Radio frequency utilization plan

A radio channel utilization plan should be worked out prior to the introduction of rural telephone system, toll transmission circuits and mobile radio telephone systems, etc. which use radio waves of UHF and VHF bands.

Since these systems use a good number of radio channels, considerations should be given to the ways for preventing radio interference and for common use of radio channels among geographically separated areas for the husbandry of limited radio frequencies.

It is therefore recommended to formulate a long-term plan for the introduction of these systems, to study radio interference conditions between areas, and to work out a radio channel utilization program according to the study findings.

SECTION II INTERNATIONAL TELECOMMUNICATIONS

CHAPTER 1 PRESENT STATUS OF INTERNATIONAL TELECOMMUNICATIONS

1-1 Transmission Routes

The international transmission routes in Paraguay consist those by microwave systems installed between the adjoining countries and by satellite communications via the Atlantic satellite of the INTELSAT.

The microwave communications with the adjoining countries are offered by extending part of the domestic microwave main lines to the neighboring countries.

The satellite communications started their services as soon as the Areguá earth station was completed to replace communications via short waves. The satellite communications were started with six circuits to three destinations. In four years, the satellite communications services expanded to 66 circuits (converted into voice-grade circuits) with nine destinations including SPADE by the end of 1981, thus forming the backbone of international communications in Paraguay together with microwave transmission routes.

These mainline communication networks were completed and operation was started at the end of 1977 as part of Paraguay's telecommunications development program. As the demand for circuits increased, the facilities have been expanded or revamped on several occasions until the present.

Due to insuficiency of the system redundancy, there is some dificulty on maintenance. Initial failures of the facilities have been reduced, and the facilities have been in operation without problems.

In the following, the outline of the facilities are presented.

(1) Facilities in the I.T.M.C.
(International Transmission Maintenance Center)

The I.T.M.C. is equipped with multiplex terminal, data, VFT, (voice frequency telegraph) terminal, and other equipment. The increase in the circuit has been met by expanding the systems and installing new equipment. These expansions and additional installations have been made only for the sections directly affected by the immediate increase in the traffic, without any margin for future expansions.

The multiplex equipment, including that for the domestic system facilities, has no space for any future expansion due to the past expansions and additional installations. The multiplex equipment requires that action be taken for its future.

The television transmission line facilities have undergone revamping of facilities and installation of television system coverter parallel with the increase in domestic television stations and in the volume of traffic by satellite relay. They do not offer any leeway for a future transmission increase.

(2) Microwave Link (I.T.M.C. - Areguá) Facilities

Three systems , each system comprising 960 channels, have been provided in microwave links between the I.T.M.C. and the earth station, allocating one system each to the telephone and television systems and the third system as a common stand-by system for both the telephone and television systems.

As explained, the microwave facilities have a leeway for future expansions caused by the increased demand in the future. However, terminal equipment needed for the increase only in circuits has been additionally installed in the past, and the surplus capacity left is very small.

(3) Earth Station Facilities

At present, the Areguá earth station facilities have a performance equivalent to the INTELSAT Standard A type, being operated by accessing the Atlantic V satellite. The facilities have been expanded or revamped to meet frequency changes, circuit increases, and changes in satellites to be accessed.

The existing facilities have such problems as causing a hit when switching to the stand-by units. Considering that communications will require a faster speed due to the introduction of data comunications and to other reasons, the existing facilities may lead to degradation of the circuit quality.

(4) H.F. Communication Facilities

In addition to these facilities, there are short wave communications facilities that had been the principal communications facilities before the satellite communications were introduced. Except for a part of these that are used for maritime radio telephone service, they remain as stand-by facilities.

1-2 Telephone

In the international telephone services, the station call and personal call services are offered. Collect call service is also available to cartain countries in the personal call service.

At present, the international telephone charges are divided into the following three charge types:

Frontier Charge:

This charge system is applied to calls between adjoining areas across the border, and the charges are the lowest. Depending on the trunks between two cities, connection routes do not pass through Asunción as normal connection.

Regional Charge:

This charge system is applied to calls terminating in nearby states of adjoining countries. Connections are made through the international offices.

International Charge:

The system is applied to calls other than those mentioned above. Connections are made through the international offices in both countries.

For calls terminating in Argentina, Brazil, Uruguay and Chile discount rates are applied and for Argentina, Brazil and the United States special discount rate are applied for weekends.

International telephone traffic has grown steadily in the past ten years. However, the traffic has increased drastically since the earth station was built and the microwave main line extending to Brazil and Argentina was completed in 1977. The bulk of the outgoing international telephone traffic is calls to Argentina and Brazil.

To the United States, Argentina and Brazil, outgoing calls to these three countries count for about 84.5% of the entire traffic. This trend can be considered inevitable when one considers the cultural and economic ties which Paraguay has with Argentina and Brazil, and commerce ties which Paraguay has with the United States (Ref. Fig. III-II-1).

As of the end of 1981, 142 international telephone circuits to 12 destinations were in operation by utilizing domestic microwave main lines or the Atlantic communications satellite. Semi-automatic connection to 32 countries is possible by the SPADE system of the Atlantic satellite in addition to the foregoing 12 destinations. Calls to principal destinations are connected by the operators of the semi-automatic operation in Paraguay by directly dialing the subscribers in the destinated countries. A limited number of calls are connected by manual operation. Terminating calls are also handled by similar operating methods. Terminating calls by a fully automatic service are possible from West Germany, Argentina (limited to only certain telephones), Brazil, Spain and from the United States.

The signaling systems used for international circuits are CCITT No.1 for manual circuits and CCITT R-2 and No.5 for microwave cricuits and CCITT No.5 for satellite circuits in (semi) automatic circuits. For domestic circuits, EMD switching signals are used. The signals used for telefónico fronterizo are signal systems matching the trunk equipment in the opposite offices.

The traffic is generally satisfactory in terms of waiting time. Calls are connected without waiting for an extremely long time after applying for a call to the telephone operator. The traffic to Argentina is not very satisfactory, due to the telephone situation in Argentina which is not too good, causing a greater burden on the telephone operators compared with the traffic to the other countries. The telephone operators must

repetitively make ineffective attempts because the telephones in Argentina cannot be easily connected.

The International telephone service is furnished to a total of 186 countries. Of these, 96 countries have a high usage group of circuits and alternative routes are possible. Alternative routes are not available with the remaining 90 countries.

Maritime telephone calls have grown smoothly since 1979. However, these calls are handled through HF and VHF channels, and international calls account for about 1:4 of them. (Ref. Fig. III-II-2).

The maintenance phase of international switching systems is estimated to be in a chance failure term after ending an initial failure term. The R2 signal circuits currently have a margin in terminal capacity. However, No.5 signal trunk relay set have absolutely no leeway. Nevertheless, when the contemplated facility increase, which is expected shortly when the ISD service is introduced, is considered, the capacity will be sufficient for the traffic in the foreseeable for next few years.

1-3 Non-telephony Communications

1-3-1 International Telegrams

(1) Destinations and Traffic

As shown in Table III-II-1, international telegrams from the Republic of Paraguay are directly sent to six countries at present. A circuit each at a speed of 50 Bauds is available to each of these six countries. When the traffic over the past ten years is analyzed, originating and terminating telegrams totaled approximately 160,000 a year in the first five years and were leveling off. In the recent 4 to 5 years, however, both originating and terminating telegrams totaled approximately 135,000 a year and are slightly decreasing. Table III-II-1 also shows the proportion of traffic by destination in 1980. In 1980, originating and terminating telegrams totaled approximately 400 a weekday on average, each telegram containing an average 32 words.

(2) Operational Mode

After telegrams are accepted at the reception counter of the Central Telegram Office or are sent to the Central Telegram Office from interior offices totaling 28 via the telex switching network, telegrams are tape punched at the Central Telegram Office into telegrams in accordance with the CCITT Recommendation F.31/F.12 format and are manually handed over to the international positions. The international operation positions have one circuit each for a destination. These circuits are 50-Baud full duplex circuits, and sending and receiving of telegrams, serial No. management, retransmission of telegrams during abnormality, and other work are performed entirely by operators. Terminating calls from foreign countries are received on paper or on paper tape. Telegrams destined for inside Asunción are directly forwarded. Tapes containing terminating telegrams destined for interior districts are

handed to domestic operator positions, and the telegrams are sent to interior offices by dial connection through the domestic telex switching network.

1-3-2 International Telex

(1) Telex Switching Equipment

At present, step-by-step switching equipment manufactured by Siemens of West Germany is used. The switching equipment was installed in 1959. In 1979, its LS (local switch) section was expanded to meet the increase in subscribers. The subscriber capacity and trunk capacity with foreign carriers at present are shown below:

° Subscriber capacity : 1200 circuits

° International trunk capacity : 240 circuits

The switching equipment is of a TLS (transit and local combined switch) type, and one unit of the switching equipment handles both domestic and international traffic. Partly because the number of subscribers is small, subscribers in interior districts are directly accommodated to the switching equipment at present, without installing concentrator type switching equipment in interior cities.

(2) Numbers of Subscribers and International Trunks at Present

As of November, 1981, telex subscribers throughout Paraguay total 629, and about 80% of them are located in Asunción. Table III-II-2 shows the transition of the subscriber number in the past ten years.

A total of 101 international trunk circuits are available at present for connection to seven destinations.

(3) Traffic

Originating and terminating international telexes totaled 1,882,552 minutes in 1980, or 540,848 calls, showing an

approximately 16% increase. The transition of traffic and traffic proportion by destination in the past ten years is shown in ANNEX (Fig. A-II-7).

1-3-3 International Private Telegraph Circuits

As of November, 1981, international private telegraph circuits total 17 circuits. Of them, two circuits are 75-Baud circuits. Of the 17 circuits, five circuits are SIMPLEX circuits for receiving only.

In terms of destination, circuits for the United States total 10, which is the largest number, followed by 4 for Argentina, 2 for Brazil and one for Spain.

By user business category, the press and communication users total 7 and use 9 circuits, followed by four banks using 4 circuits, and one circuit each used by an airline company, trading company, foreign embassy, and dam public corporation.

A survey of traffic volume was made with three banks. These three banks sent and received an average of about 300 telegrams on a weekday (average 300 characters per telegram).

Regarding the present status of the utilization system, there are no laws or regulations regulating the supply, utilization, etc. of international private telegraph circuits. However, some kind of regulations may become necessary in the future. In principle, ANTELCO provides terminal equipment which the users use.

1-3-4 International Voice Grade Private Circuits

SITA and two banks have each one international voice-grade private circuit to the United States. SITA circuits were put into service in November, 1979, and a SITA computer network SP (satellite processor) is installed in Asunción. The SP is connected to the master HLC (high level center) in New York by the circuit of 2400 bps high level data link control protocol.

Five airline companies (each company using one port) are accommodated in the SP in Asunción at present. The terminal equipment is an agent set (CRT) and teletypewriter (50 or 75 bps). The SP has a duplicate configuration and is operated by the hot stand-by system, automatically being switched over to the stand-by system when the on-line system goes down.

Two banks use one telephone circuit channel and several teletype circuit channels each by multiplexing them. The telephone circuit is connected to a private telephone exchange network, permitting automatic dial connections to their head office and branches throughout the world. The teletype circuits are connected to the store and forward switching equipment in the head offices, and automatic switching of messages is possible by a pre-determined message format. These banks are planning facsimile communications in the future (within 2 - 3 years) utilizing these circuits.

As is the case with international private telegraph circuits, there are no laws or regulations regulating the supply, utilization, etc. of services for international voice-grade private circuits. An encouragement is made to observe the CCITT Recommendations regarding data terminal equipment which the users use, and no other actions are taken. No legal regulations such as setting technical conditions are currently in force.

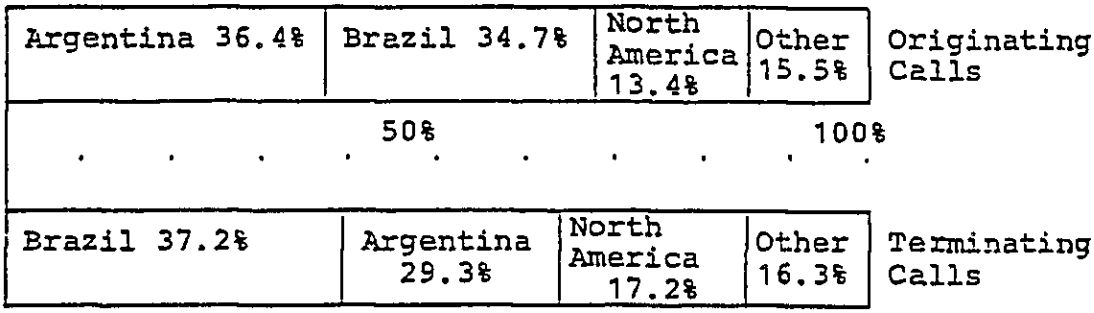


Fig. III-II-1 Distribution of international telephone traffic by region

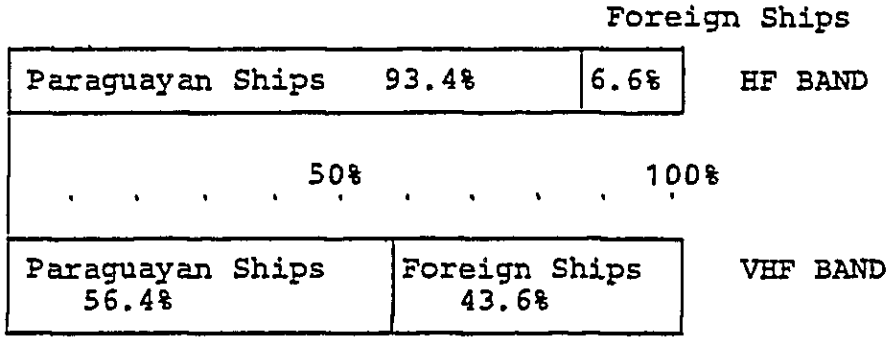


Fig. III-II-2 Proportion between Paraguayan and Foreign ship telephone traffic

Table III-II-1 International telegram traffic proportion by direct destination - 1980 (Unit : %)

Destination	Traffic Ratio
Argentina	42.0 %
Brazil	33.0 %
Chile	1.3 %
USA	10.0 %
Italy	10.6 %
Uruguay	3.1 %
Total	100.0 %

Table III-II-2 Transition of the TLX subscriber number in past 10 years

Year / Area	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Asunción	90	109	116	144	172	186	237	289	400	462
Other Area	11	12	12	22	26	36	35	31	66	109
Total	101	121	128	166	198	222	272	320	466	571

CHAPTER 2 BASIC POLICIES OF THE MASTER PLAN

2-1 Satellite Communications

According to the long-term operation plan of the INTELSAT System, the demand for satellite circuits is expected to increase at a rate of 15% a year in the future as well. In order to meet this demand increase, beginning in 1983, the INTELSAT plans to introduce the TDMA/DSI system(Note 1) in the Atlantic area. The frequency reutilization technology by beam and polarization separation and utilization of the 500 MHz in the 14/11 GHz are also considered. As satellites that succeed the V-A system, a modified version of the V system, and VI have been planned. These satellites will additionally have transponders and their frequency reutilization will be reinforced. Furthermore, the SS/TDMA system(Note 2) will be introduced, to increase their circuit capacities.

The growth of satellite communications circuits in Paraguay is prominent since the start of satellite communications. A very substantial growth is in store as well. As shown in Table III-II-3, the demand forecast made in connection with the compilation of this plan, the number will reach around 350 by the end of 1997.

The demand for satellite communications is expected to con-continuously increase, and it will be difficult to depend on the present communication techniques alone. The INTELSAT will be requesting the earth stations to meet the new technologies advance of frequency reuse as TDMA/DSI etc. of which the INTELSAT System will employ.

The plans to increase circuits will be met by increasing the facilities, as in the past. In addition, there will be need of some remodification for increment of Television transmission.

Note 1: TDMA - Time division multiple access

DSI - Digital speech interpolation

Note 2: SS/TDMA - Satellite switching/TDMA

2-2 Basic Concept for International Microwave Transmission Routes

International microwave transmission routes constitute part of the domestic microwave main lines, and its basic concept will be described in detail in the section dealing with the domestic concept. Therefore, no reference to it will be made in this section. A forecast of the circuit demand to be extended to Argentina and Brazil is shown in Table III-II-4.

2-3 Telephone

International telephone traffic is forecasted to continue to show a favourable increase in the future. Increase in operating cost is unavoidable if the present mode of operator-assisted calls is to be continued. Therefore, the international subscriber dialing service (ISD/DDI) shall be introduced as soon as possible.

Regarding to ANTELCO's basic policy, "Offering the Same Services Throughout the Country", ANTELCO adopted a pulse metering for the charging system of ISD on digital switching system. By this decision, ISD will be able to use throughout the country.

At the end of this Master Plan, local electronic switching system will come into wide use in Asunción, where about more than 80% of international calls will be originated, a detail of most ISD call will be registered at international switching office for exclusive use of ANTELCO's control.

The introduction of ISD is expected not only lower operating costs but also reduce circuit holding time, to greatly improve the circuit utilization efficiency.

The existing crossbar switch should be able to meet the circuit demand until the intermediate period of the first 5-year plan (till the introduction of ISD) through small expansion in trunk relay sets to be effected.

To prepare an appropriate circuit planing, traffic survey and and control shall be continued, and forecasted value shall be corrected every year. For this purpose, a new traffic engineering group should preferably be creasted.

Prior to the introduction of data communications, it will no longer be possible to refuse telephone subscribers from using data-type communications such as facsimile and low-speed data transmission by using acoustic couplers on the public telephone circuits. Such use is the trend of the times. Therefore, these utilization modes must be approved,

and regulatory standards are urgently required to prevent such utilization from adversely affecting other users and communication equipment. These standards will be needed from the standpoint of preventing an overload on satellite circuits also.

2-4 Non-telephony Communications

(1) International Telegrams

As described in the report covering a survey on the present status, originating and terminating international telegrams total an average of approximately 400 per weekday. However, according to the demand forecast, international telegrams are expected to decrease in number. The traffic volume and demand forecast results for domestic telegrams are the same as those for international telegrams. Furthermore, the number of destinations will not likely change drastically from six as at present. Therefore, there is hardly a justification to introduce a telegraph automatic processing system for either domestic or international telegrams.

Regarding the international GENTEX service, Argentina, with which traffic is most heavy and accounts for 42% of the entire traffic, is building a domestic international telegraph relay system called SITRAM. Therefore, Argentina will not accept the request for GENTEX service. Also, the United States, accounting for 10% of the entire traffic, does not have any plan to utilize the GENTEX service at all. Therefore, the GENTEX service will be performed for the remaining four destinations. This means mixed two systems will be in operation, and this is not desirable from the standpoint of labor saving nor administrating. It will be wise to continue the present system for international telegrams from the standpoint of their present traffic unless the other countries make strong requests for changes. However, slight improvements must be made. As a specific example, the tape punch work for international telegrams in the ANTELCO. Central Telegram Office must be streamlined, by introducing tape punch machines with a CRT display.

(2) International Telex

The demand forecast indicates that the present subscriber

circuit capacity of the present switch will reach a limit by 1986, and it will have to be replaced. According to the traffic forecast, the amount of international telex traffic will continue to steadily increase year after year. In 1990, international telex traffic will increase slightly more than four times compared with 1980. The number of telex subscribers has the same trend as that of telex subscribers has the same trend as that for the traffic. Based on these factors, fully electronic, large capacity and high performance switching systems has been ordered by ANTELCO to substitute for the existing systems to fully meet the future communications modes and expansion of communications networks, at the same time permitting the users to enjoy new services.

(3) Data Communications

The time will come in near future, ANTELCO will inevitably have to select and decide whether ANTELCO should offer data communications as ANTELCO's new services, or other communications operating agency borrowing private circuits from ANTELCO should offer data communications. It is clear that ANTELCO alone should offer public data communications in view of the future prospective and importance of data communications. However, the priority on development and facility introduction tends to be low because the demand trend of data communications is not clear. This makes it difficult to forecast balancing of income and expenditure, and restriction on investments because of the priority given to improving and substituting telephone, telex, and other presently available services.

However, it will be necessary to devise measures that can effectively cope with the increase in needs for future data communications. At present, international data communications from the Republic of Paraguay depend only on voice-grade private circuits. At this stage, regulations concerning data communications must be established. When a user

leases a private line, there must be clear-cut regulations concerning other communications parties in the user's own system, what is to be communicated, and the supply of services to third-party communications. Legal regulations must also be implemented requiring establishment of technical conditions on terminal equipment which the users use, instead of merely recommending to observe the CCITT Recommendations and on other requirements. The contents of these regulations are outside the scope of this report, and no further reference will be made.

Next, the necessity for connection to the international data communication network is estimated to arise after the third 5-year plan. This necessity will be due to the start of international teletex service. It will be realistic to cope with the needs for connection to the international public data network that will arise prior to that time by connecting to the circuit-switched data network utilizing the new telex/data switching equipment and by utilizing the existing foreign public data network for access to the packet-switched data network.

(4) Other

The international facsimile telegraph (BUREAUFAX) service is scheduled to be offered during the period of the first 5-year plan (1983 - 1987). The demand for the new service is expected to be considerably large centering on financial institutions due to an unsatisfactory postal service situation.

After the start of this new service, the days required for delivery of mail can be reduced substantially, and a new communication media lower than telegrams in cost will be able to be offered. By utilizing the dullness of international telephone circuits to transmit facsimile messages, a great improvement in circuit efficiency can be expected.

The public facsimile service rate shall be decided in accordance with the CCITT Recommendation D Series (D.70).

Table III-II-3 Estimated demand of transmission channels 1/2

Country	Destination	Svc Class	Tr Media	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Argentine	Buenos Aires	V	M	16	28	28	31	33	35	37	38	40	42	45	47	49	52	56
		V	S	7	7	12	14	15	15	16	17	18	18	20	21	22	23	24
		R	M	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		R	S					1	1	1	1	1	1	1	1	1	1	1
	Clorinda	V	U	4	4	5	5	6	8	8	10	10	10	10	10	15	15	15
	Resistencia	V	M	24	24	26	30	30	30	30	33	33	35	35	38	38	40	40
Brazil	Rio de Janeiro	V	M	21	24	24	28	31	33	35	37	38	40	42	45	49	51	52
		V	S	6	6	11	12	14	15	15	16	17	18	18	20	21	22	23
		R	M	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		R	S							1	1	1	1	1	1	1	1	1
	Curitiba	V	M	36	36	40	40	46	46	46	48	48	48	50	50	53	53	55
Bolibia	La Paz	V	S			6	6	6	6	7	7	7	8	8	8	9	9	9
Chile	Santiago	V	S	6	8	9	10	10	11	11	11	11	12	12	12	13	13	13
Colombia	Bogota	V	S								2	2	3	3	3	3	3	3
Ecuador	Quito	V	S								2	3	3	3	3	3	3	3
Peru	Lima	V	S	2	4	5	5	6	6	6	6	6	6	6	7	7	7	7
Urguay	Montevideo	V	M	5	6													
		V	S			6	8	8	8	8	8	9	9	10	11	11	11	12
		R	M	1	1													
		V	S			1	1	1	1	1	1	1	1	1	1	1	1	1
Venezuela	Caracas	V	S			4	5	5	5	6	6	6	6	6	6	7	7	7
		R	S			1	1	1	1	1	1	1	1	1	1	1	1	1
Mexico	Mexico	V	S			5	5	5	5	5	6	6	6	6	6	7	7	7
		R	S			1	1	1	1	1	1	1	1	1	1	1	1	1
Panama	Canal de	V	S	5	6	8	8	8	8	9	9	9	9	9	10	10	11	11
Canada	Montreal	V	S			6	6	6	6	6	7	7	7	7	7	7	7	7
U.S.A.	Pittsburg	V	S	20	24	28	32	33	33	35	36	38	39	40	40	41	43	44
	New York	R	S	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6
		AVR	S	4	5	5	5	6	6	6	6	6	6	6	6	6	6	6
		D	S						1	1	1	1	1	2	2	2	2	2
France	Paris	V	S	2	4	5	6	6	6	7	7	7	8	8	8	8	8	8
		R	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Estimated demand of transmission channels 2/2

Country	Destination	Svc Class	Tr Media	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Germany FDR	Frankfurt-M	V	S	10	12	12	16	16	16	16	16	16	16	16	16	16	16	16
		R	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		D	S											1	1	1	1	1
Italy	Rome	V	S	5	6	8	9	9	9	9	9	10	10	10	10	10	10	10
		R	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Spain	Madrid	V	S	14	17	20	22	22	22	23	23	24	24	24	24	24	24	24
		R	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		D	S			1	1	1	1	1	1	1	1	2	2	2	2	2
Switzerland	Zurich	V	S	2	4	5	6	6	6	7	7	7	8	8	8	8	8	8
		R	S			1	1	1	1	1	1	1	1	1	1	1	1	1
U.K.	London	V	S	4	6	7	8	8	8	8	9	9	10	10	10	10	10	10
		R	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		AVR	S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		D	S											1	1	1	1	1
Japan	Tokyo	V	S	3	4	5	5	5	5	6	6	6	6	7	7	7	7	8
		R	S		1	1	1	1	1	1	1	1	1	1	1	1	1	1

TOTAL (By Transmission media)

SATELLITE	Voice	86	108	162	183	188	190	200	210	218	226	231	237	244	249	254
	Record	9	10	16	16	17	17	18	18	18	18	18	18	18	18	18
	AVR	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7
	Data			1	1	1	1	2	2	2	2	6	6	6	6	6
	Sub Total	100	124	185	206	213	215	227	237	245	253	262	268	275	280	285
	SPADE/TDMA	12	12	12	12	12	12	12	12	12	12	72	72	72	72	72
MICRO WAVE	Voice	102	118	118	129	140	144	148	156	159	165	172	180	189	196	203
	Record	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3
	Sub Total	106	122	121	132	143	147	151	159	162	168	175	183	192	199	206
U.H.F.	Voice	4	4	5	5	6	8	8	10	10	10	10	10	15	15	15

(By Service class)

PHONE	204	242	297	329	346	354	368	388	399	413	485	499	520	532	544
MESSAGE	13	14	19	19	20	20	21	21	21	21	21	21	21	21	21
AVD	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7
DATA			1	1	1	1	2	2	2	2	6	6	6	6	6

Notice: This demand of transmission channels is an acutal modification of the static traffic forecast regarding the status of telecommunication in Paraguay and the report of INTELSAT Global Traffic Meeting (1982).

Reduction of FDM/FM voice channels after introduction of TDMA is leaved out because it shall be decided at the OR Meeting Atlantic Region in future.

Table III-II-4 Estimated international transmission route on micro wave

Destination	1987	1992	1997
Buenos Aires	5G	5G	7G
Resistencia	3G	3G	4G
Rio de Janeiro	5G	5G	6G
Curitiba	4G	5G	5G
Emargency (to Brazil)	2SG	3SG	4SG

CHAPTER 3 FACILITIES PLAN

3-1 First 5-Year Plan (1983 - 1987)

3-1-1 Satellite Communications

(1) Dual polarization operation and circuits expansion countermeasures.

By the agreement of OR meeting (1983 Montreal), Paraguay shall introduce dual polarization operation on INTELSAT VI in 1988. And for this operation, remodifications of circuits shall be necessary at HPA, LNA, RF Sub-system and Logic Units.

The existing equipment and facilities shall be expanded (including domestic link lines and facilities related to ITMC) with respect to the circuit plans to be decided at the OR (operation Representative) and Global Traffic Conference.

Specifically, GCE, MUX, and monitoring and control equipment shall be expanded for anticipated four destinations, and the earth station in connection with increases in existing circuits made for destinations, domestic link lines, and ITMC terminal equipment, and other items.

To meet increases in television transmission (receiving), one receiving system in the earth station will be expanded. Part of the monitoring console in ITC (the International Television Control) will be remodeled to meet two receiving systems.

The domestic link lines during television transmission by the two systems will be met the existing equipment.

Principal necessary equipment and modification.

i) For dual polarization operation

Transmitter (HPA)	2 units
Receiver (LNA)	2 units
Modification of RF circuit	2 units
Control Logic (for Transmitter & Receiver)	2 units

ii) For circuits expansion

GCE sub-system (reception)	4 units
Order wire equipment	4 units
MUX	1 SG system
Echo suppressors	130 units
TDM terminal equipment	1 unit

3-1-2 Telephone

(1) ISD introduction plan

The ISD service shall be introduced in all area in Paraguay which have automatic exchange, setting the goal at 1985.

The new digital switching system will be adopted for this purpose, relay sets for ISD are put on it (operator's positions do not move from crossbar switch) and shall have a interface with the existing crossbar switch to carry overflow traffic between the existing crossbar switch and installed digital switch. This digital switch shall be a main international switch in future. In addition, this digital switch has a final capacity of 5.000 terminals and its initial capacity shall over the traffic at the end of the 2nd 5-year plan. This digital switch shall be able to change office data easily and reliably, and has to taken into consideration about a variety of new services to be offered by utilizing the telephone switching network in future.

This digital switch should also have a provision for a position sub-system for future use. To fully utilize the features of a digital switching system, installation of short-hall PCM digital direct trunks with the local office installed with digital switching system is preferred.

The existing crossbar switch will no longer be able to meet the increases in the circuit number and traffic in the middle of the first 5-year plan. Therefore, an expansion of seven CCITT No. 5 both-way relay sets to be effected.

(2) Proposal regarding circuit demand

Blocking of the partially-blocked SPADE circuits will be returned to service when the expansion of the No. 5 both-way relay sets of the telephone switching equipment are completed. At the same time, SPADE utilization shall be discussed with the countries that have direct circuits at present so that SPADE can be used as a final alternate route of the concerning destinations. Thus, the increase in pre-assignment circuits of satellite communications is minimized, it means reduction of the cost of transmission line.

During the first 5-year paln, traffic data broken down by country is enhanced for both telephone and telex by reason of introduction of the new switching system. These data are surely increased the accuracy of the traffic forecast for the second 5-year plan.

3-1-3 Non-telephony Communications

(1) Telex

To cope with the obsolescence of the existing telex switching equipment, the limit of subscriber line capacity, and user needs for new services, a necessity of replacing the switching equipment has become an issue. When replacing the existing switching equipment, it will be necessary to introduce a large-capacity, all-electronic, and high-performance switching system to sufficiently meet the future communication modes and expansions of communication network.

ANTELCO is planning to install a new telex/data switching system along the line of this concept.

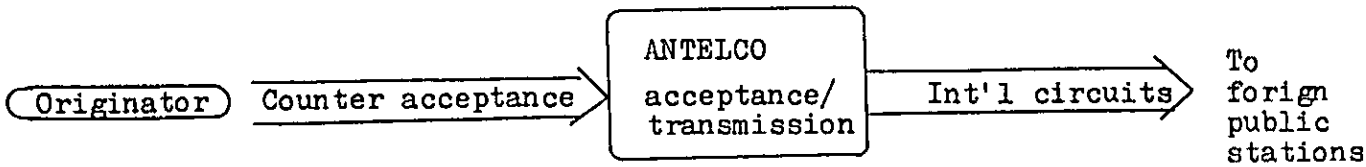
(2) International public facsimile telegram (BUREAUFAX) plan

This is a facsimile transmission service between international public stations. In this service, public stations accept and deliver facsimile telegrams. Figure III-II-3 shows the flow from acceptance to delivery. International public telephone networks are used as transmission lines. Figure III-II-4 shows the circuit formation.

Judging from the current situations in foreign countries where this service is available, the type of terminals to be used is recommendable CCITT G3 type with likely speed at 2,400 bps or 4,800 bps. Initially, ANTELCO shall set up five units of the G3 facsimile terminal for both transmission and reception to all destinations.

This service shall extend to cities in the countryside in the future in accordance with increase in demand in Paraguay.

(a) A call going out from Paraguay



(b) A call coming into Paraguay

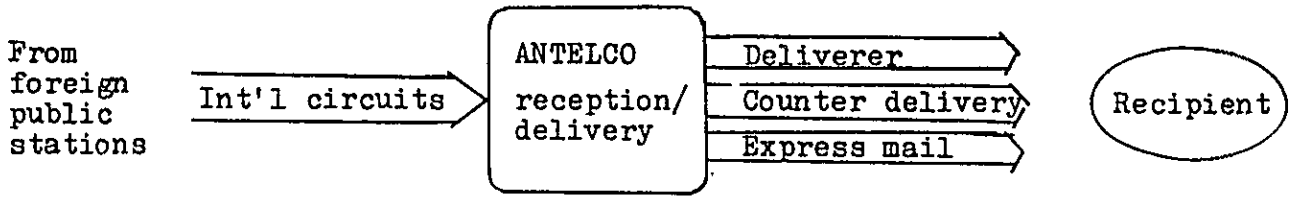


Fig. III-II-3 Flow from acceptance to delivery

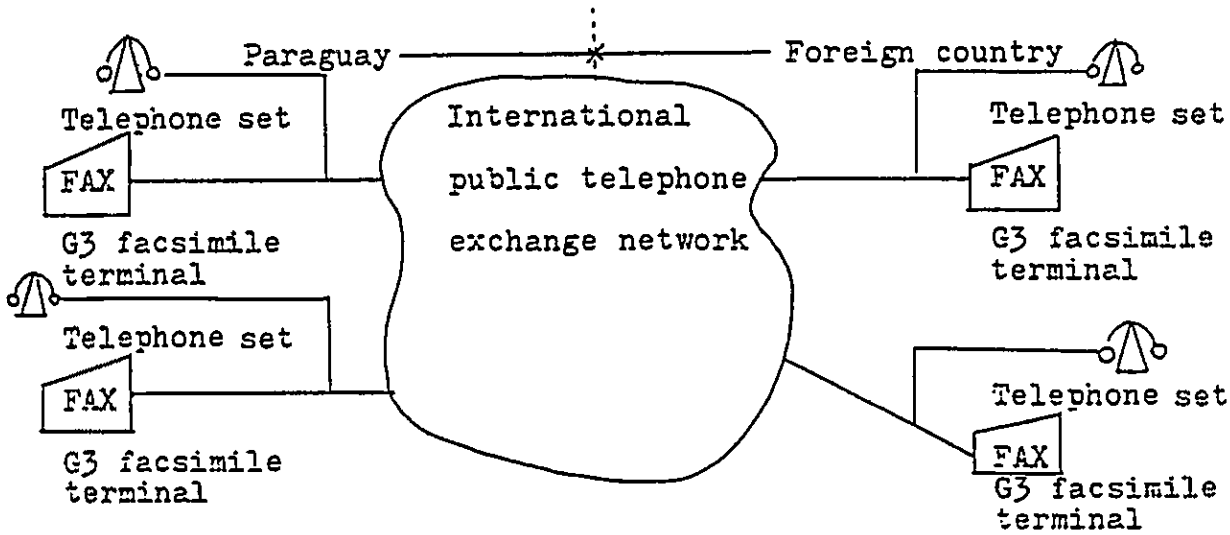


Fig. III-II-4 BUREAUFAX service circuit formation

3-2 Second 5-year Plan (1988 - 1992)

3-2-1 Satellite communications

(1) Circuit expansions

A forecast of the satellite circuit demand at the end of the current plan will be 265 circuits with an increase of 2 destinations. The principal equipment to be increased during the current plan shall be as indicated in the following, considering an increase of access channels equal to about 60 channels during the introduction of TDMA in the third 5 year plan, and to allow a margin in the increase in destinations in addition to that contemplated under the current plan:

GCE sub-system (reception)	3 units
Order wire equipment	3 units
MUX	2 SG units
Echo suppressors	60 units
TDM terminal equipment	4 units

(2) Areguá Earth Station consolidation plan

The equipment in the Areguá earth station has several operating and maintenance problems. These problems directly affect the degradation of the transmission quality in transmission on high-speed data communications, etc., and countermeasures must be taken prior to the introduction of public data communication services.

Examples of principal problems and countermeasure proposals are given in the following. In implementing these steps, studies of electrical conditions. construction during mounting, and other items will be necessary.

1) GCE (Ground Communication Equipment)

o Base Band Switcher (Transmission)

Circuits are interrupted during switching between the common stand-by and individual transmission systems in the case of facility maintenance. As a countermeasure, signal branching circuits will be inserted on the output side of the terminal equipment as shown in Figure III-II-5. Also, circuits to permit one direction of signals to always be connected to COM STBY GCE through switches will be installed. COM STBY and individual SYS's will be connected by relays through buttons or key switches. Circuits to prevent double connection with the individual systems will be installed.

o Base Band Switcher (Reception)

Circuits are interrupted during switching between the common stand-by and individual receiving systems in the case of facility maintenance. As a countermeasure, circuits to mutually switch 1 and 2 of GCE COM STBY and individual GCE system outputs through relays will be installed as shown in Figure III-II-6.

COM STBY is selected using a relay through a button or key switch as is the case with the transmission system. Lock out prevention and sequential transfer functions are also provided.

o Frequency Converter for Common Stand-by (Reception)
A transfer switching function is not so effective, because a synthesizer type local oscillator is not equiped at a one of two common stand-by units. The countermeasure is the substitution of the local oscillator section with a synthesizer type.

2) High frequency power amplifier subsystem

o Stand-by Side Transmitter

Operating condition (normal/abnormal) can not be monitored as input signals are lacking.

As shown in Figure III-II-7, the countermeasure is the installation of a signal branching unit on the output side of RF COMB, and signals are input to the stand-by side transmitter as on the active side. To provide maintenance to HPA without affecting active communications, a "U" link for signal intermittence, or a coaxial switch, is installed.

o Transmitting Carrier Power Detector

The existing equipment has no interchangeability of panels between Units 1 and 2. As a countermeasure, modification of wiring in Unit 2 is performed to match to Units.

o Waveguide Circuit

No directional coupler for power adjustment is installed in the transmitter output section, and power setting on the stand-by side cannot be performed. A modification as shown in Fig. III-II-7 by revamping as shown in Figure III-II-5.

3) Power supply

The commercial power supply has large voltage variations, and the input voltage of the earth station equipment sometimes exceeds the allowable input range.

As a countermeasure, LVR (load Voltage Regulator) is installed to compensate voltage variations.

4) Spare parts, etc.

Equipment fault restoration supplies to increase transmission line and equipment reliability, equip-

ment for appropriate operations and monitoring, maintenance equipment, operation spare supplies, etc. are needed to operate the earth station.

Examples of items that seem to be lacking at present among those items listed above are shown in the following. Various other items can be considered, and necessary steps must be taken after studying them.

o Fault Restoration Items

For TV sound adapter
ZAS-D-101C S/V SEP

For AC-No-Break
N462352P

o Monitoring Facilities

Picture monitors (monochrome and color)
Waveform monitor

o Measuring Instruments

Frequency counter
Sweeper
Power meter (microwave)
Level meter

o Operation Spare Parts

HPA spare valves
Power supply and antenna supplies
Various lamps and fuses

(3) The 2nd Areguá Earth Station construction plan

The design life of the antenna facility of Areguá earth station will come to an end in 1992, when new technology is to be introduced to the INTELSAT system. Since the existing facility may not be able adapt to this new communication system, a second facility will be constructed in Areguá.

The facility to be constructed is basically as follows. Figure III-II-8 shows the block diagram of the second facility communication system.

1) The second facility shall satisfy the requirements of Standard A Earth Station of the Intelsat system and also adapt to VI-satellite and its successors.

2) An antenna shall be based on the wheel-on-track system and built adjacent to the existing station building.

3) A transmission and reception amplifying subsystem shall adapt to the future expansion of frequency band of satellite transponder and a transmitter shall possess power capable of transmitting TDMA waves.

4) The distance between the existing station building and the antenna pedestal shall be covered by flexible waveguide transmission.

5) As for the GCE (Grand Communication Equipment) subsystem and the terminal subsystem, the existing facilities shall be used.

6) TDMA/DSI equipment shall be set up.

7) GCE subsystem which adapt to Major Path will be prepared.

8) The facilities for the second television receiving path will be installed.

(4) The multiplex terminal room in I.T.M.C. expansion plan

The multiplex terminal room in I.T.M.C. is narrow and in order to ensure space for expanding the office in the future, consideration shall be given to setting up a new end office room by separating the existing one from facilities related to the domestic system or moving such facilities.

3-2-2 Telephone

(1) International telephone switching system

In this 5-year plan, international telephone switch will not need any expansion because it will have sufficient capacity to the end of second 5-year.

(2) Proposal regarding traffic management

As in the previous term, the increase in pre-assignment circuits of satellite communications should be restricted through the utilization of SPADE. For this reason, placing emphasis on SPADE circuit traffic management, expansions shall not be made for destinations whose whose overflow traffic go SPADE circuits is below a standard level (2% as a goal).

A review of the traffic forecast shall be made based on traffic data accumulated during the first 5-year plan period broken down by country. After reviewing the data, policies for the introduction of TDMA/DSI can be decided.

3-2-3 Data communications

No large demand for data communications is forecasted for the forthcoming fifteen years, and a network special for data communications will not be built. As far as equipment is concerned, the same switching equipment as that for telex messages will be applied to offer the following services:

1) Anisochronous data switching service up to 1200 bps based on the CCITT Recommendations X.20 and X.70 signaling system.
2) Synchronous data swigching service for 2400 bps based on the CCITT Recommendations X.21 and X.71 signaling system.

Connection to the circuit-switched data network shall be initially considered regarding access to the international public data network. Equipment (a protocol converter, etc.) needed for connection shall be installed when a necessity for connection to the packet-switched network arises in the future.

Considering the offering of the teletex service in the future, the switching system must have a telex/teletex conversion function to permit mutual connection between the telex and teletex services.

In the following, the functions, features, etc. of the new switching system are described.

(1) Circuit/Terminal interface

1) Domestic terminal telex interface
2) Domestic anisochronous data terminal interface (CCITT X.20)
3) Domestic synchronous data terminal interface (CCITT X.21)
4) International telex circuit interface
5) International data transmission circuit interface (CCITT X.70: Anisochronous)
6) International data transmission circuit interface (CCITT X.71: Synchronous)

(2) Functions for offering additional services

1) Abbreviated dialing
2) Camp-on service
3) Mail box service
4) Multi-address message delivery

5) Online traffic measuring and statistics
(batch processing)

6) Charge announcement

The concept of the new telex/data switching system is shown in Figure III-II-9.

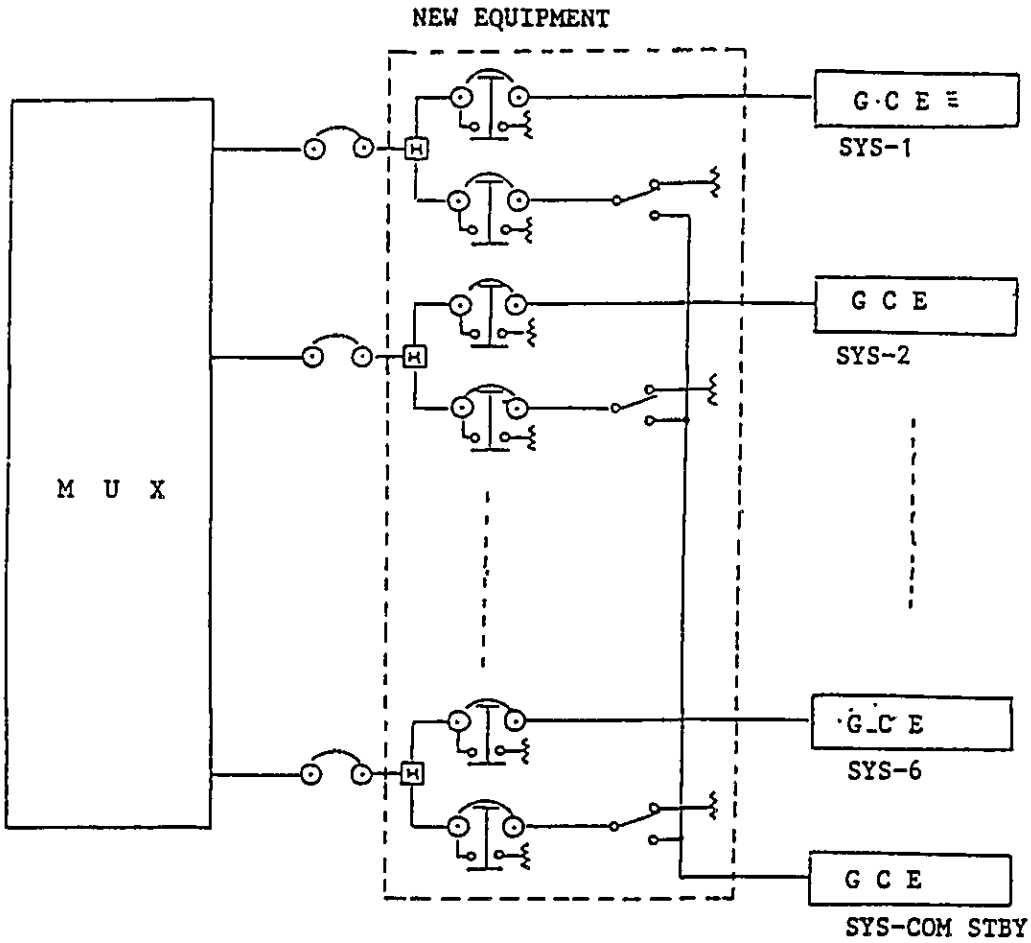


Fig. III-II-5 Baseband switcher (Transmission)

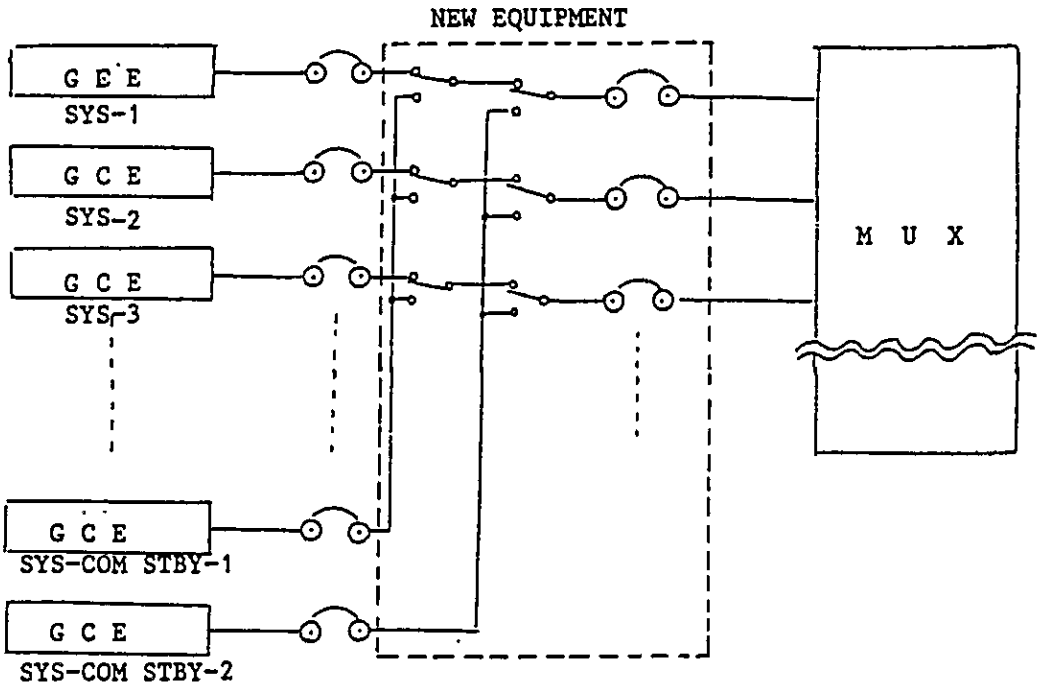


Fig. III-II-6 Baseband switcher (Reception)

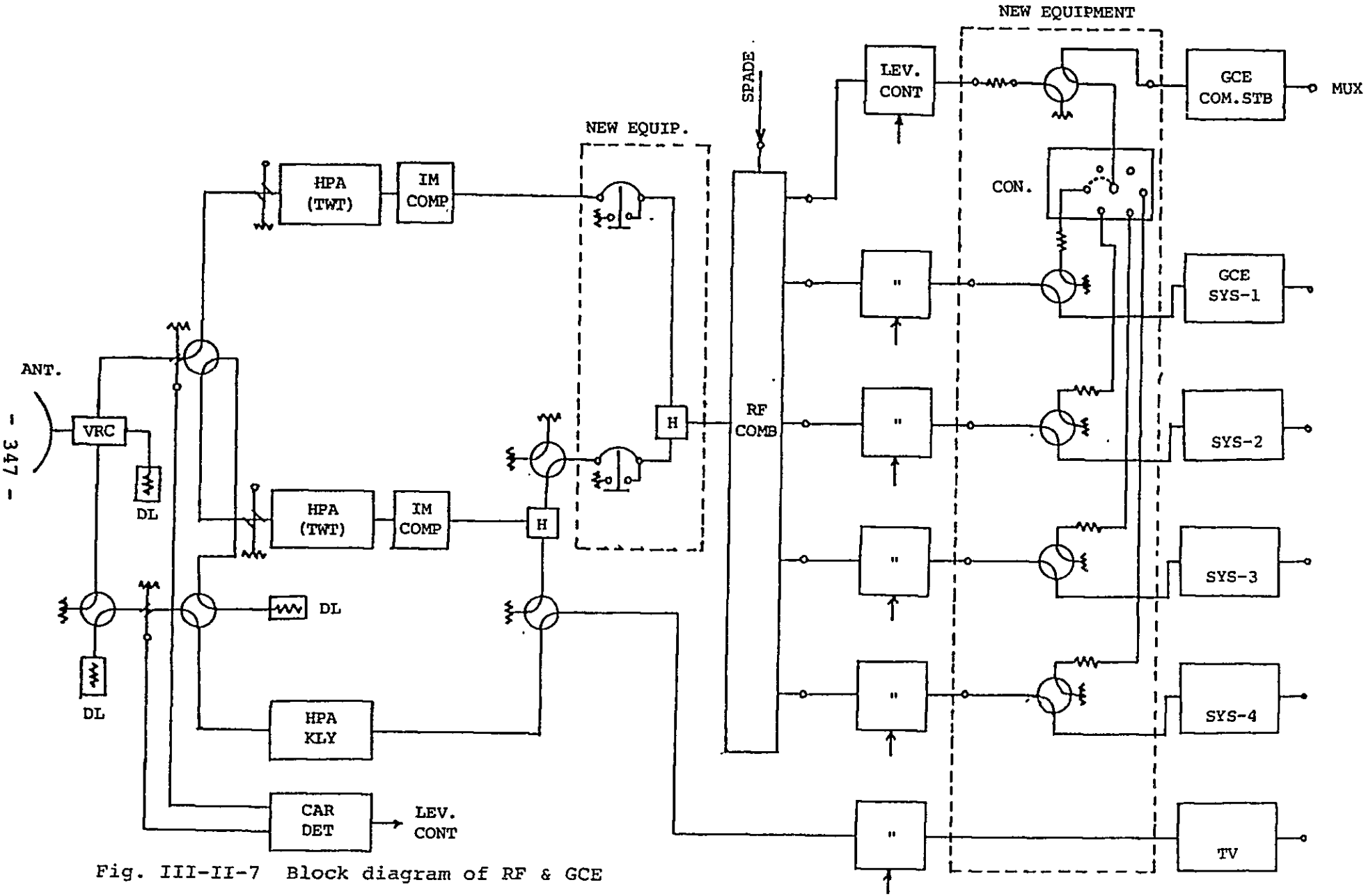


Fig. III-II-7 Block diagram of RF & GCE equipment (Transmission)

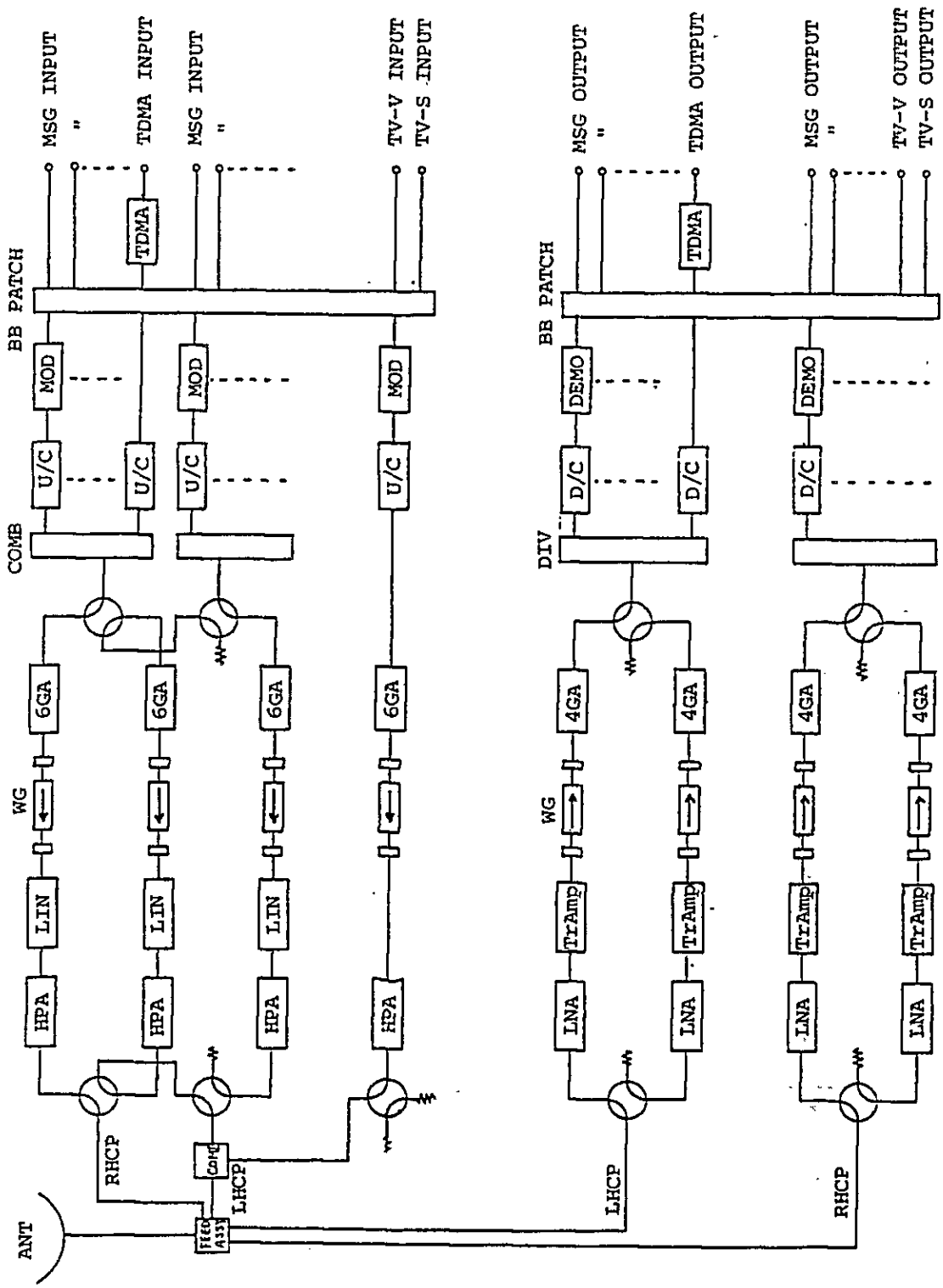


Fig. III-II-8 Block Diagram of Eath Station

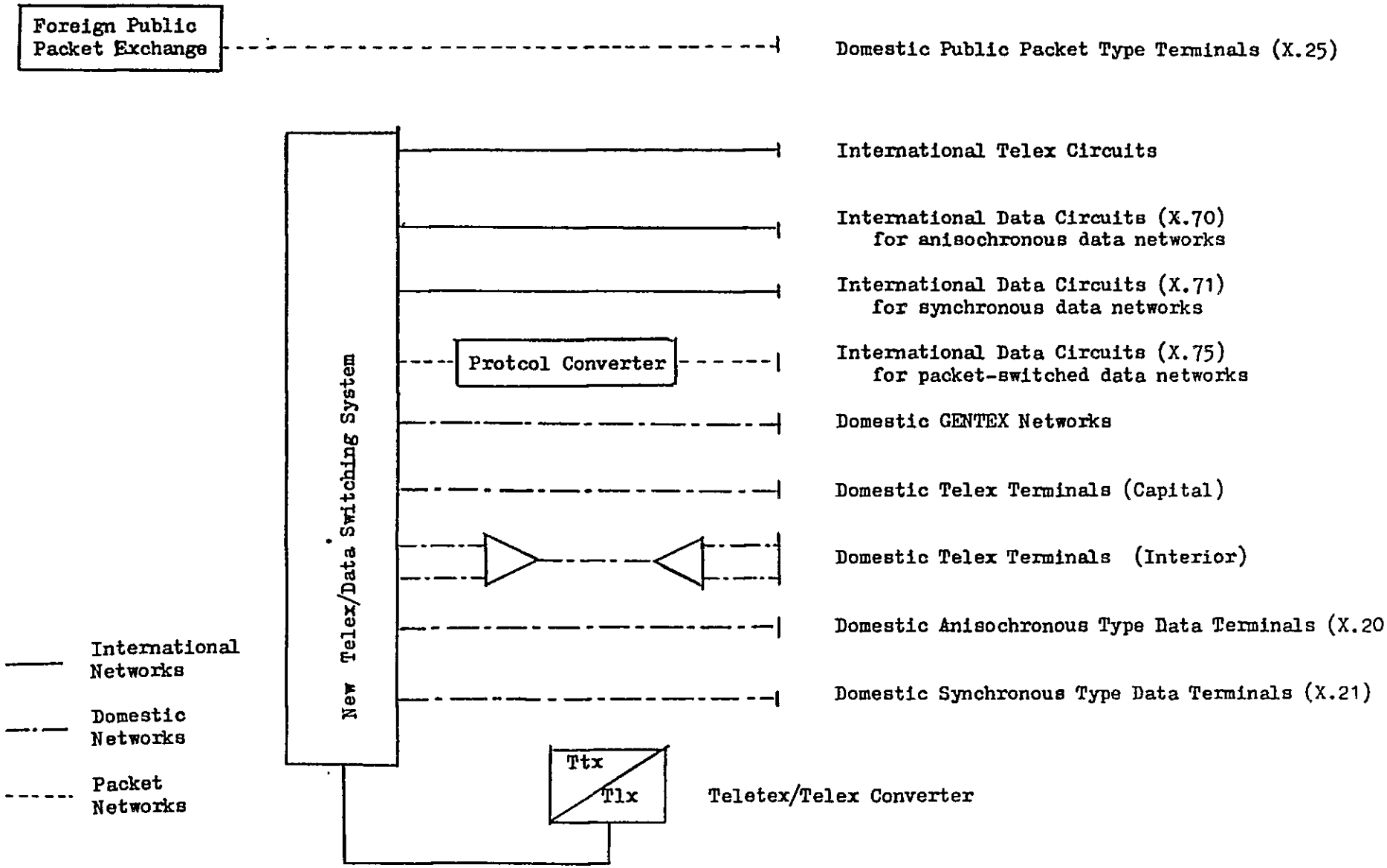


Fig. III-II-9 Simplified Schema of Telex/Data Switching System

3-3 Third 5-year Plan (1993 - 1997)

3-3-1 Satellite communications

(1) Circuit expansions

During this plan tenure, TDMA will be introduced, increasing access channels equal to 60 channels. On the other hand, a considerable number of pre-assignment channels will be reduced. The final scale will be discussed at OR meetings in the future. It is not logical to make decisions at this time when full-scale operation of TDMA have not yet been carried out. Therefore, the Master Plan does not count a reduction in the number of circuits.

Principal Equipment for Expansion

MUX	1SG*
Echo Suppressors	60 units*
TDM Terminal equipment	4 units

*Note: Decided by introduction program of TDMA

(2) First Areguá Earth Station

A communications satellite, succeed the INTELSAT VI satellite, is anticipated to be placed in service during the first half of the 1990s. However, the new technology to be used in this satellite has not yet been clarified. Therefore, no specific countermeasures for the earth station with respect to the satellite will be included in the Plan.

A second antenna will have been installed during the second 5-year plan period. Therefore, during the current plan tenure, a status survey of the first antenna will be made to repair insufficient functions and to remodel to meet the introduction of future technology.

3-3-2 Telephone

Digital international switch will be expanded to cover the traffic for next 10 years.

CHAPTER 4 PERSONNEL PLAN

4-1 Satellite Communications (Including the Transmission End of the I.T.M.C.)

Both the earth station and the I.T.M.C. are properly manned in view of the present number of their facilities and stability of these facilities. However, as is mentioned in the section on manpower development, it is necessary to take adequate steps to maintain technical levels. Therefore, the number of personnel should be commensurate with the number of facilities and circuits as well as the amount of work both at the I.T.M.C. and the earth station. Furthermore, the personnel shall be made available to help improve technical standards of employees and to train and develop successors. As for non-technical personnel, ANTELCO has its own plans and we do not discuss it here.

(1) Earth station

In the first five-year plan, the increase in the number of earth station facilities is small and so no personnel increase to cover facility increase shall be made. However, around 5 new employees shall be hired to fill vacancies for training aimed at technical transfer. These new people shall be part of those who shall be employed for the second facility in the future. In the second five-year plan, 6 new persons shall be employed for the construction of the second facility, TDMA, and their maintenance after its completion.

(2) I.T.M.C.

International circuits will increase about four fold by the end of 1977 but as the total facilities will not increase proportionately, only 3 persons shall be added to the present number of personnel. One person for each five-year program period.

4-2 Telephone

(1) Maintenance Personnel

Regarding maintenance personnel for the introduction of I.S.D. scheduled for 1985, as was described in the Feasibility Study Report, 4 persons (2 for hardware and 2 for software) shall be assigned to the maintenance of computerized facilities.

As for the maintenance and operation management of the all-electronic switching systems to be introduced in the second five-year program, the number of personnel shall be increased by 2.

(2) Traffic engineer

The introduction of I.S.D. gives a good opportunity for reinforcement of telephone and telex traffic engineering. Two persons will be assigned for this purpose.

(3) Operation personnel

When introducing I.S.D., no personnel increase shall be made in the first half of the third five-year plan period.
The present number of personnel is sufficient to cover work, such as guidance, that is to be generated in introducing I.S.D. In this period, it is expected that even a natural decrease in the number of employees would not require supplementation. In the latter half of the third five-year period, an increase of around 10 employees is planned to meet an increase in the number of manual calls.

4-3 Non-telephony Communications

(1) Maintenance personnel

Most of the maintenance work for new telex switching systems to be introduced in the first five-year program shall be conducted by replacing all personnel now in charge of switching system maintenance. However, 3 men shall be added to fill vacancies during replacement training. These members shall cope with expansion of facilities and circuits after the completion of new switching system. Maintenance of facsimile terminal equipment to be used for international public facsimile telegrams shall be consigned to the trader and ANTELCO shall not arrange maintenance personnel.

(2) Operation personnel

It is estimated that demand for international telegrams will not go beyond the current level in the future and that most telex calls will be automatically connected, and so there will be no need to greatly increase the number of operation personnel. In order to cope with expected increases in traffic and inquiries, 3 men shall be added in the middle of the second five-year period.

Table III-II-5 Personnel staffing

Not include a person filled up a vacancy

Item \ Year	1st. Five-year					2nd. Five-year					3rd. Five-year					±
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
Maintenance Multiplex Terminal			(1)					(1)					(1)			+3
Maintenance Earth Station				(5)												+5
Maintenance 2nd. Earth Station								(6)								+6
Maintenance I.N.T.S.		(4)							(2)							+6
Telephone Operator														(10)		+10
Maintenance Telex Exchange		(3)														+3
Telex Operator								(3)								+3
Traffic Engineering					(2)											+2

( ): Number of persons

SECTION III. RADIO REGULATION AND MONITORING

OUTLINE

1. Necessity of Strengthening Control and Supervision of Radio Regulation and Monitoring

Radio communication is very important in the overall telecommunications network serving as a part of the essential foundations of modern society; that is why the strengthening of this service is attempted as a part of the national plans.

Reflecting the development of modern means of communications, the radio communication network is under rapid expansion as a means to connect the metropolitan areas and adjacent localities. Particularly in metropolitan area, the radio stations are so congested that it is now difficult to provide additional frequency allocation for its growing demand.

In the above situation, the radio communication network will further expand in line with the pace of development of the economy, which necessitates the further strengthening of radio regulation.

In order to eliminate radio interferences which are physical characteristics of radio communication, the technical and operational conditions are internationally regulated and the detailed regulations are laid down about using limited radiowaves effectively.

Accordingly, it is very essential to expand monitoring functions of various radio stations by strengthening the enforcement of communication laws and regulations.

2. Forecast of Radio Stations Number

In preparing this plan, we have based our forecast on the statistis for the number of radio stations existing in the period from 1970 to 1978 and also in 1982. Our forecast from 1983 to 1997 is as shown in Table 1 below:

Table 1

Item \ Year	1983	1988	1993	1997
No. of radio stations	(stations) 5,300	(stations) 8,800	(stations) 14,500	(stations) 21,600

3. Guidelines for the Improvement Planning of Radio Regulatory System

The guidelines for the improvement planning of radio regulatory system are as follows:

One point should be emphasized here that despatching of the country's technical and administrative staffs for training overseas and also receiving of foreign experts on long term basis would go a long way for promoting the implementation schedule and elevating the administrative capabilities of officials in charge in this country.

3-1 Organization and management of radio frequencies

(1) The Radio Regulatory Bureau must of necessity regulate all the radio frequencies used by radio stations if the efficiency of regulation is to be assured.

(2) In order to manage radio frequencies systematically, it is desirable that a frequency management department be newly set up within the organization of the Radio Regulatory Bureau.

(3) It is appropriate for such a frequency management department to undertake tasks as mentioned below:

a. Laying down the procedures for regulation based on international agreements, and consultations with foreign government offices in charge of radio frequency allocation.

b. Forecasting on future domestic frequency demand, and establishing plans for allocation and designation of frequencies to radio stations.

Three sections are considered desirable to be set up under the radio frequency management department, for the purpose of conducting the entrusted business smoothly, i.e., Planning Section, International Section and Allocation Section.

3-2 Provision of statutory regulations

All rules and regulations relative to the radio regulation will have to be integrated.

The following items are particularly desired to be regulated by laws and regulations:

(1) Definition of terminology

(2) Basic standards regarding establishment of radio stations

(3) Licensing regulations for radio stations

(4) Rules and regulations for operating radio stations

(5) Licensing regulations for radio operators

(6) Technical standards for radio equipment and facilities

3-3 Licensing of radio stations and their regulation

(1) Licensing standards for granting licenses to radio stations and technical standards for radio equipment and facilities are necessary to be established in order that disposition of applications for radio stations may be standardized and expedited.

(2) For proper regulation and administration of radio stations, it is also necessary to include the administration for defence, public security aeronautic, maritime and public telecommunication system.

(3) The inspection system for radio stations should also be established. For this purpose, inspection equipment and facilities including vehicles will have to be provided.

3-4 Radio operators regulating system

For avoidance of radio interference and effective operation of radio communication, it is necessary to allocate qualified radio technicians and staffs not only at internationally obligatory radio stations but also at other radio stations.

4. Provision and Maintenance Plan for Radio Monitoring Facilities

Provision and maintenance of radio monitoring facilities should preferably be practiced as follows:

4-1 Organization

A VHF monitoring station to monitor frequencies higher than 25 MHz should be set up within Monitoring Section of Engineering Division.

4-2 Key elements of monitoring

It is not economically feasible to monitor all frequencies and all stations. Therefore, it becomes necessary to decide upon key points of radio monitoring in consideration of the real situation of radio stations. The range of frequencies to be monitored at the present time should preferably be 100 kHz to 1500 MHz.

4-3 Functions of monitoring

The following monitoring functions are desired to be incorporated:

(1) Measuring functions of the quality of radio waves

(2) Auditing function of operations

(3) Functions to investigate radio emission status

(4) Functions to investigate interferense

(5) Detecting function of unlawful radio stations

(6) Operation planning function of the monitoring system

1) Data filing function of radio stations under monitoring

2) Evaluation and filing function of monitored results

3) Presentation function of monitored result

4-4 Configuration of the monitoring system

It is desirable for a monitoring system to provide for such a configuration as shown in Fig. 1.

(1) The monitoring center will control the whole monitoring system.

(2) One HF fixed monitoring station should be necessary, preferably to be located at the present facility in Luque City.

(3) One VHF/UHF fixed monitoring station should be necessary, preferably to be located at the Asunción City.

(4) For the HF direction finding system, one fixed direction finder station and two mobile direction finder vehicles should be necessary.

(5) In order to prevent a dead area under the VHF/UHF band monitoring system, one mobile radio monitoring vehicle to work concurrently as the VHF/UHF mobile direction finder should appropriately be provided.

(6) In order to provide for a service channel for information exchange in case of mobile monitoring a base station can be set up in the fixed monitoring station to take care of both long and near distance communications. In the case of long distance, it is desirable to utilize the SSB of HF and in the case of short distance the FM of VHF.

(7) In future, it would be advisable to centrally control the whole monitoring system by adopting a remote monitoring and control system.

A private telephone channel could appropriately be utilized to take care of the remote monitoring and control operation.

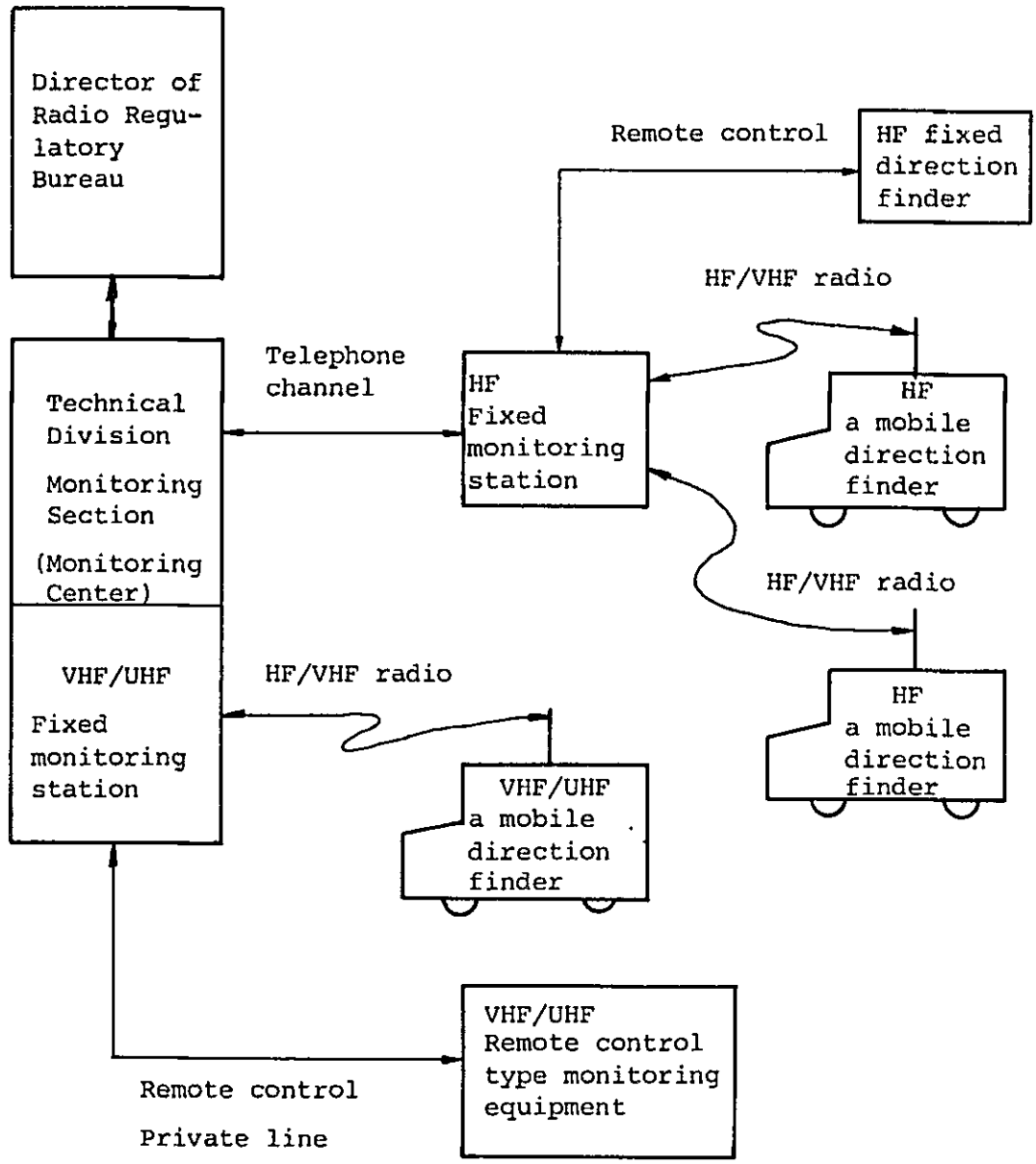


Fig. 1 A monitoring system configuration

4-5 Equipment planning

Due to the urgency of providing the monitoring system, it is desirable to complete setting up a monitoring system during the four years between 1983 and 1986.

Particularly, the monitoring facilities for bands over a VHF should preferably be established ahead of the HF band. Table 2 shows the equipment planning, the summary of which is as follows:

(1) 1st stage

1) In the initial year, monitoring antennas and a monitoring room for the fixed monitoring station should be provided. The existing facilities should quickly be levelled up.

2) In the second year, the monitoring equipment for the fixed monitoring station, along with the VHF/UHF mobile direction finders, should be provided in order to establish a monitoring system fro bands upwards of VHF band.

3) During the 3rd, 4th and 5th years, the HF band monitoring system should be established.

(2) 2nd stage

In the 2nd 5-year plan, the monitoring system should be more rationalized by introducing a remote monitoring and control system.

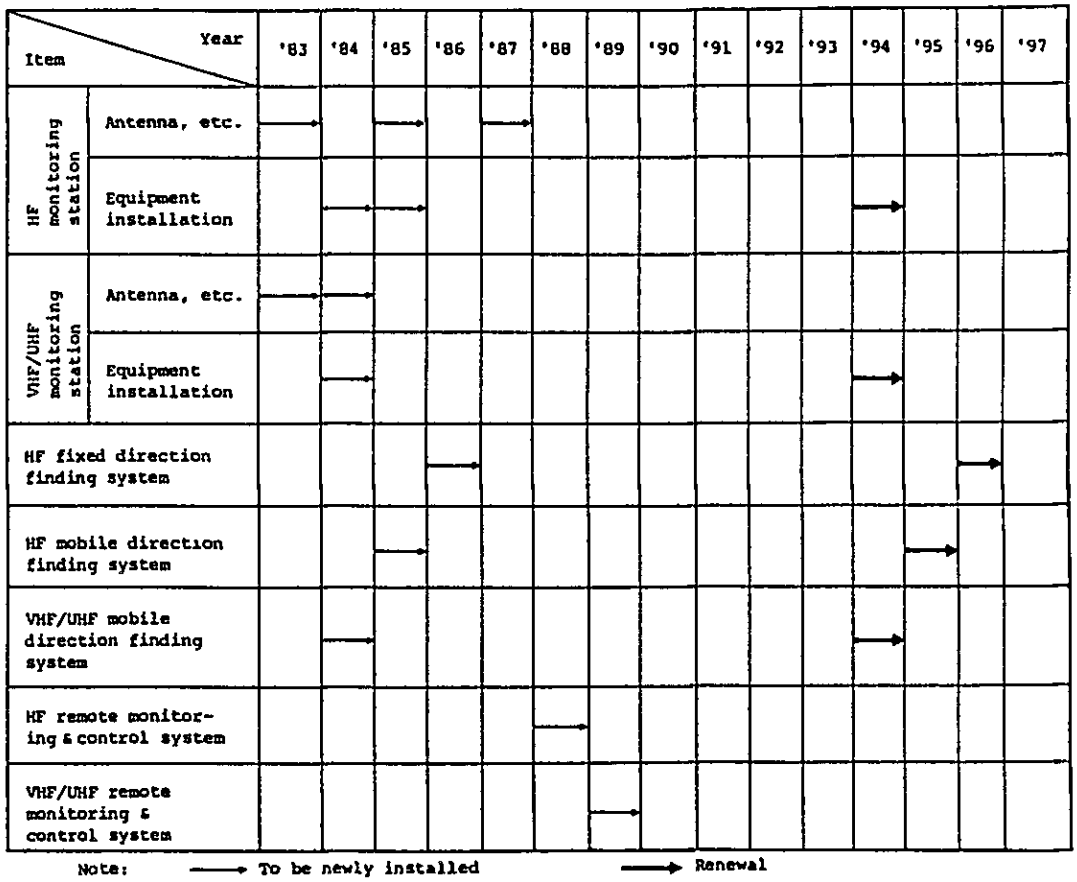
(3) 3rd stage

Levelling up of the performance and expansion of the functions of the monitoring system should be aimed at by replacing the outdated equipment through introduction of more advanced equipment.

(4) Contingency

Provision for contingent expenditures should be made for acquiring additional equipment and facilities which are likely to become necessary in such cases as a) introducing a new method in the field of utilization of radio which would render the existing facilities unusable or b) when new technologies are developed.

Table 2 Equipment planning



4-6 Maintenance facilities

In order to maintain the facilities in good order, it is necessary to equip proper maintenance equipment and facilities including calibration devices, which may also be utilized for maintaining the inspection equipment and facilities.

It is also essential to provide trianing for maintenance personnel.

5. Personnel

Year-to-year workforce expansion program is shown in Table 3. The number of personnel at the final year of this plan is estimated to be 74, which is 2.2 times the number at the present time.

Average yearly growth rate of the personnel is 2.8 persons only, but we presume the training of qualified personnel for radio regulation and monitoring can well be accommodated within the limit of the normal scale of workforce.

Table 3 Year-to-year personnel expansion plan

Year / Item	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	Total
Personnel	34	13	2	2	1	2	2	2	2	2	2	1	2	2	2	3	74

Note: The number shown for 1982 indicates the present number of personnel; other numbers shown indicate the yearly incremental increase.

6. Social and Economic Effect

6-1 The increase of the allocated frequencies due to the improvement of frequency administration makes it possible to respond to the increasing demand for national and private radio telecommunication service and contribute to the enhancement of radio wave utilization.

6-2 Expansion of information distribution goes side by side with the quality elevation of the national living standing and development of economy as well as the elevation of business profit and capital turnover.

6-3 Smooth flow of social and cultural information through the broadcasting network will cater to improvement of the living standard in general.

6-4 Detection of location of illegal radio stations through radio monitoring will contribute to the maintenance of security and the law and order of the country.

6-5 Investigation of frequency spectrums now used will be helpful for administering the country's effective frequency utilization as well as securing radio wave rights.

6-6 Effective management of radio wave supervision will go hand in hand with the effective avoidance of radio interference.

CHAPTER 1. PRESENT STATUS OF RADIO REGULATION AND MONITORING

1-1 Organization for Radio Regulation

(1) In the Republic of Paraguay, radio regulation and monitoring is undertaken in accordance with LEY No. 1296 by the Administración Nacional de Telecomunicaciones (hereinafter refered to as ANTELCO), which is under the control of the MOPC. ANTELCO has the Radio Regulatory Bureau in charge of radio regulation and monitoring.

(2) Pursuant to the Resolution No. 518 and through the in-house organizational reform in April 1981, the Radio Regulatory Bureau now has been divided into two departments and eight sections, as shown in Fig. III-III-1.

It is staffed with 34 personnel, and has no regional chapters.

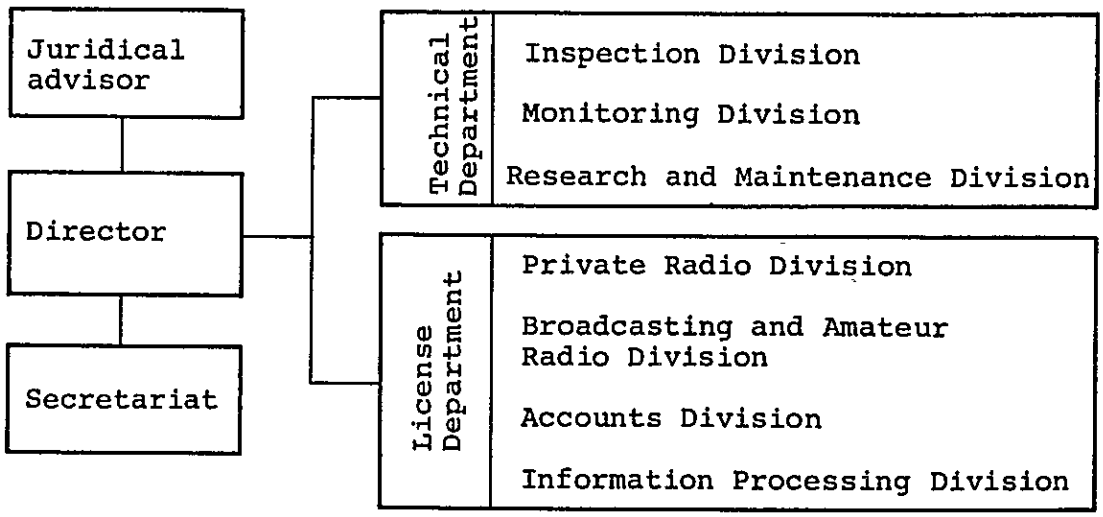


Fig. III-III-1 Organization of the Radio Regulatory Bureau

1-2 Laws, Regulations and Codes concerning Radio Communication

The basic law concerning radio communications is the Telecommunications Law (Law No. 6422, Dec. 1944). To supplement this, there are various laws, regulations, rules and resolutions governing the installation, operation and technical requirements of radio stations and their services.

(1) DECRETO-LEY No. 6422

Por el cual se establece la legislación en materia de telecomunicaciones de la Republica del PARAGUAY

(2) LEY No. 1296

Organica para la Administración Nacional De Telecommunicaciónes

(3) LEY No. 26504

Por la cual se reglamenta el servicio de rediofusion

(4) LEY No. 23378

Por la cual se aprueba el pliego de bases y condiciones para la instalación y funcionamiento de estaciones de radiodifusión multiplexada en frecuencia modulada

(5) RESOLUCION No. 16 C.A.

Por la cual se aprueba el reglamento de estaciones de radiodifusión sonora con modulación de frecuencias (FM) en la banda de 88 - 108 MHz.

(6) RESOLUCION No. 341 C.A.

Por la cual se aprueba la nueva distribución de frecuencia para las estaciones de radiodifusión en frecuencia modulada y se establece un plazo de seis (6) meses para que las estaciones que deban cambiar de frecuencia lo hagan

(7) RESOLUCION No. 132 C.A.

Por la que se establecen las normas que regulan el servicio de las estaciones radioeléctricas de aficionados en banda ciudadana

(8) RESOLUCION No. 459 C.A.

Por la que se fija un periodo dentro del cual se podra hacer modificaciones a los estaciones radioeléctricas de interes privado

(9) RESOLUCION No. 1013/77

Pol la cual se modifica la resolución No. 519 C.A. del 26 diciembre de 1973 y se fijan las nuevas escalas de multas a ser aplicadas a las estaciones radioeléctricas de ineres privado y aficionados

(10) RESOLUCION No. 1012 C.A.

Pol la cual se modifica la resolución No. 475 C.A. de 1973 y se establecen especificaciones tecnicas a que deben ajustarse los equipos de las estaciones radioeléctricas de interes privado

(11) RESOLUCION No. 518 C.A.

Pol la que se reestructura la dirección de radiocomunicaciones y administración de frecuencias dependiente de la administración general

(12) Normas tecnicas para el servicio de televisión

(13) Normas tecnicas para el servicio de radiodifusión en televisión

(14) Normas tecnicas para el servicio de radiodifusión en frecuencia modulada

(15) Manual para la opración de estaciones de interes privado

(16) Administración de frecuencias

1-3 Radio Regulation

(1) The Radio Regulatory Bureau is a cognizant body of all and any radio stations to be installed and operated in Paraguay, performing supervision, control and licensing (approval of national radio stations) of radio stations.

(2) At present, the radio stations licensed by the Radio Regulatory Bureau are classified as follows.

1) Private stations

2) Miscellaneous stations	:	Amateur station Citizen's band station Aviation mobile station Aviation fixed station Maritime mobile station Maritime fixed station
3) Broadcasting stations	:	Medium wave broadcasting station Shortwave broadcasting station FM broadcasting station TV broadcasting station

(3) The number of licensed and approved radio stations is 4,432 as of 1982.

(4) The applications for licences of private radio stations are undertaken by the agencies (TECNICO) authorized by the Radio Regulation Bureau.

(5) The performance of the applicant's radio equipment is checked on the technical specifications and/or data submitted by the applicant (or agency).

(6) The licensed radio station is obliged to update its licence every fiscal year.

(7) The licensing and updating services are onerous.

(8) The maritime and aviation radio stations, broadcasting stations and amateur radio stations are obliged to be attended by qualified radio operators.

The qualified radio operators for maritime radio stations are trained by ANTELCO, and those for aviation radio stations by the Defense Ministry.

The radio operators for the broadcasting stations are those who were graduated from IPT or the technical schools (accredited by the Ministry of Education or the municipal governments) and were authorized by ANTELCO.

The radio operators for amateur radio stations are required to be qualified by qualification tests (three-grade system) at the time of application for the licence.

(9) The frequencies used for domestic communication are managed by ANTELCO. The allocation of frequencies to radio stations is carried out in accordance with the laws, regulations and rules established for specific types of radio stations pursuant to the International Telecomunication Convention.

Registered with the International Frequency Registration Board are the frequencies used by the broadcasting stations, coastal stations and aviation fixed stations, and shortwave public telecommunication frequencies.

1-4 Radio Monitoring

(1) The radio monitoring service belongs to the Technical Department of the Radio Regulatory Bureau, and is staffed with 10 personnel.

(2) The radio monitoring station is installed at Luque about 15 km away from Asunción, and is monitoring HF radio signals.

(3) The major tasks of the radio monitoring station are as follows:

1) Measurement of technical characteristics (mainly frequences) of domestically operated private stations with respect to frequencies ranging from 0.5 MHz to 30 MHz.

2) Controlling the private stations' communication activities pursuant to the current laws, regulations and codes and the conditions under which they have been licensed.

3) Detection and finding of illegal radio stations.

4) Supervision, control and guidance so that the licensed radio stations will not interfere, or will not be interfered by, other stations.

(4) Luque monitoring station conduct radio monitoring for 24 hours continually.

(5) The majority of HF-band radio stations in the country can be monitored by Luque monitoring station.

(6) For want of the facilities for monitoring a increasing number of radio stations operating on VHF or higher frequencies, the monitoring station is unable to control the interference problems and the cropping-out of illegal radio stations.

CHAPTER 2. GUIDELINES FOR IMPROVEMENT PLANNING OF RADIO REGULATION SYSTEM

The guidelines for the improvement planning of the radio regulation system are as summarized below.

For the purpose of promotion of the radio regulation system improvement plan suggested herein and for the cultivation of the administrative abilities of the staff, the dispatch of the staff for training abroad, invitation of experts from abroad on a long-term engagement basis, etc. should preferably be considered.

2-1 Growth Forecast of Radio Stations Number

(1) The population density, the degree of concentration of population in cities, GDP, car holdings, the number of business establishments, etc. may be among the factors having to do with the growth of radio stations number. But, because of the sigularities of radio communications, these factors are remotely related with the growth of radio stations number. Thus, it will be proper to forecast it from the past tendency.

(2) In view of this, the growth forecast has been made according to the statistics (Table III-III-1) obtained from ANTELCO and ANTELCO's letter of answers to the questions asked by the Japanese Mission in 1982. These data have been statistically processed to forecast the growth of radio stations number during the period from 1983 to 1997. The results are as summarized below. (See Fig. III-III-2)

1983	5,300 stations
1984	5,900 stations
1985	6,500 stations
1986	7,200 stations
1987	8,000 stations
1988	8,800 stations
1989	9,700 stations

1990	10,800 stations
1991	11,900 stations
1992	13,100 stations
1993	14,500 stations
1994	16,000 stations
1995	17,700 stations
1996	19,600 stations
1997	21,600 stations

It should be noted, however, that the growth of the radio stations will be swayed largely by the national plans concerned, and therefore that the forecast may have to be reviewed and corrected if necessary.

Table III-III-1 Statistics on the number of radio stations (ANTELCO)

Classification		1970	1971	1972	1973	1974	1975	1976	1977	1978	1982
Private station	Class 1	51	60	64	76	170	296	342	342	622	Unknown
	Class 2	808	810	845	948	961	2,034	2,067	1,568	1,427	Unknown
	VHF Class 1	14	13	14	21	36	47	95	128	289	Unknown
	VHF Class 2	10	10	6	3	2	7	12	-	-	Unknown
Miscellaneous	Amateur	422	432	439	493	628	718	900	582	801	1,221
	Citizen's band	21	18	28	29	23	17	41	63	36	Unknown
	Aviation mobile	21	19	19	7	15	15	16	19	17	25
	Aviation fixed	9	9	10	10	56	56	56	58	62	Unknown
	Maritime	28	28	28	30	28	28	22	25	35	24
	Coastal	4	3	3	2	3	3	3	4	4	4
	News press	3	3	2	2	3	3	3	2	6	Unknown
	FAX	2	2	2	2	-	-	-	-	-	Unknown
Broadcasting station	MW	18	21	25	25	25	27	30	30	30	38
	HF	7	7	10	7	7	7	7	11	11	7
	FM	3	3	6	6	5	7	13	15	15	22
	TV	1	1	1	1	1	1	2	2	2	4
	Total	1,422	1,439	1,502	1,662	1,963	3,266	3,609	2,849	3,357	4,432

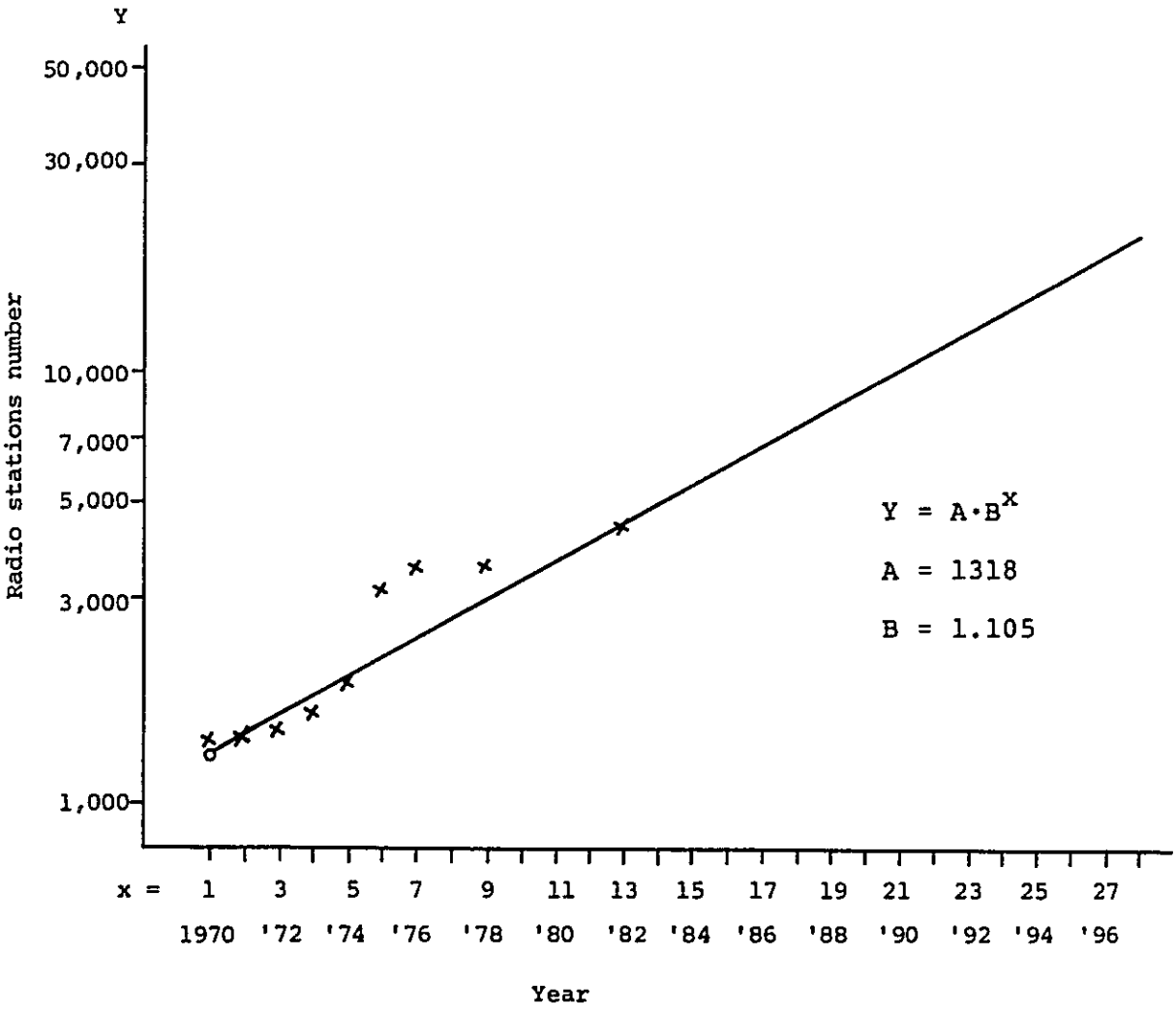


Fig. III-III-2 Growth forecast of radio stations number

2-2 Radio Regulation

2-2-1 Frequency management plan, and its effects

(1) For effective management of the limited frequency resources, all the frequencies including those used for national defense forces, security services, airlines, maritime services and public telecommunication services, should be put under the control of the Radio Regulatory Bureau.

This unitary system of frequency management makes it possible to utilize the frequency resources effectively, negotiate smoothly with the foreign authorities, and ensure the national interests in radio services.

(2) Although a fundamental frequency allocation plan has already been established, it has yet to be complemented with well-rounded and specified frequency assignment by laws and standards.

It is therefore recommended to formulate pertinent rules and programs for frequency assignment. These rules and programs should reflect the current state of the art in radio equipment and frequency demands.

(3) The formulation of frequency allocation programs will enable the Radio Resulatory Bureau to meet the frequency demands in an answer way, fight off interference problems, and utilize the frequencies in a more efficient way.

(4) For the purpose of systematic frequency management, it is recommended to establish a frequency administrative department in the Radio Regulatory Bureau.

(5) The major functions of the Frequency Administration Department is to follow the procedures agreed upon in the international treaty, make arrangements with the foreign telecommunication authorities in connection with frequency assignment, forecast domestic frequency demand, work out

frequency allocation programs, and assign frequencies to radio stations.

To perform these tasks in a smooth way, it is recommended to install a planning division, international division and an assignment division within the Frequency Administration Department.

2-2-2 Reorganization of legislation

(1) The laws, regulations, codes and rules indispensable for radio regulation should be reviewed and reorganized into a uniform system.

Preperation should be made in keeping with the developments of radio technologies and the actual status of radio communications.

(2) It is preferable to codify the following.

1) Definitions of technical terms
2) Basic requirements for the installation of radio stations
3) Radio station licensing standards
4) Radio station operation standards
5) Radio operator qualification standards
6) Radio equipment technical standards

2-2-3 Programs concerning the licensing and control of radio stations, and their effects

(1) The conditions and requirements under which a radio station is licensed should be established in a clear form.

Particularly, it will be necessary to restrict the opening of those radio stations to certain degree in case they can use public telecommunication channels.

(2) It is also necessary to establish the standards for the examination of the applications for a license to open a radio station for the purpose of standardizing and streamlining the application and licensing procedures.

(3) The radio stations engaged in national defense, security services, aviation services, maritime services and public telecommunication services, should also be put under the supervision and control of the Radio Regulatory Bureau. Even when it is required to delist the radio stations from supervision and control, it is necessary for such stations to observe the technical standard which is required by the Radio Regulatory Bureau.

By supervising and controlling all these stations, it will be possible to protect the high-priority radio channels and at the same time to solve the interference problems quickly.

(4) In order to supervise and control the radio stations in an effective way, it is desirable to establish a radio station inspection system.

The inspection of a radio station should be conducted when it is to be licensed, when the radio equipment is to be changed or whenever it is necessary to do so from the administrative viewpoint.

(5) The inspection system should be reinforced with the measuring instruments. Particularly, the following should be procured as soon as possible.

1) Frequency meter
2) Spectrum analyzer
3) Power meter
4) Percentage modulation measuring instrument
5) Inspection vehicle

For the efficient use of the inspection resources, the monitoring equipment and maintenance equipment should also be used for the inspection purposes.

(6) It is necessary for Radio Regulatory Bureau to authorize the qualified TECNICO registered by ANTELCO to install the radio facilities for the smooth implementation of radio regulation.

2-2-4 Radio operator qualification system, and its effects

(1) For efficient operation of radio stations without interference problems, qualified radio operators should be assigned to the following stations as well as those required by the international treaty.

1) Broadcasting stations

2) Fixed stations

3) Base stations

4) Amateur stations

(2) It is desirable to codify the qualifications and scope of activities of the radio operators.

(3) The radio operators should preferably be limited to those graduated from the educational institutions accredited by the Radio Regulatory Bureau and those who have passed the national qualification examinations.

(4) The costs and expenses required by the radio operators to obtain a license should be borne by the beneficiaries.

(5) The radio operator qualification system will bring about various benefits. Firstly, the radio stations will be operated and managed as required by law. Second, the troubleshooting of faulty radio equipment or services will be expedited. Third, the radio communications are put into smooth, truly working order.

The system will also expand the employment opportunities and disseminate and promote the knowledge of radio engineering and electronics within the country.

CHAPTER 3. RADIO MONITORING FACILITY IMPROVEMENT PLAN

The following shows summary guidelines for the improvement of radio monitoring facilities.

When promoting the improvement plan, it is recommended to offer meaty technical training courses to the monitoring staff, engage experts for extension of education and training to the staff on a long-term basis, and review the plan occasionally.

3-1 Radio Monitoring system

The radio monitoring system should preferably be organized as recommended below.

(1) Besides an HF fixed monitoring station a VHF/UHF fixed monitoring station should be installed within the Monitoring Section of the Engineering Department.

(2) A remote control monitoring system stated in the Second Five-Year Plan will necessitate the reorganization of the existing monitoring system, including the consolidation of HF and VHF/UHF fixed monitoring stations.

3-2 Radio Monitoring Facility Deployment Plan

(1) The HF band (up to 25 MHz) and VHF band (25 MHz up) should be monitored separately because their radio wave propagation characteristics differ largely.

(2) One HF fixed monitoring station will be needed. In view of the man-made noise level, the facility existing in Luque will be best fit for it.

In the Second Five-Year Plan, the Luque facility is supposed to become an unmanned station under remote control monitoring system from Asunción

(3) The HF direction finding system will be composed of one fixed direction finding station and two mobile direction finding stations. The fixed direction finding station will be unmanned and controlled from the HF fixed monitoring station.

The mobile direction finding stations will belong to the HF fixed monitoring station.

(4) One VHF/UHF fixed monitoring station will be necessary, preferably in Asuncion in view of the distribution of the radio stations to be monitored.

(5) One VHF/UHF mobile direction finding station will be necessary for the purpose of monitoring those stations which locate in dead area or subtle area, from the VHF/UHF fixed monitoring station because of the propagation characteristics of the waves involved. The mobile station will belong to the VHF/UHF fixed monitoring station.

(6) Where it is required to monitor local radio stations operating on VHF or higher frequencies on a long-term basis, a remote monitoring station controllable from the VHF/UHF fixed fixed monitoring station.

(7) The communication between the monitoring stations should be established by HF SSB radio system, VHF/UHF radio system, leased telephone lines and/or subscriber's telephone lines.

(8) The siting of the fixed monitoring stations and HF direction finding stations should be made in accordance with the provisions specified in Chapter 2 of CCIR Monitoring Handbook.

(9) It is recommended to organize the radio monitoring system as illustrated in Fig. III-III-3.

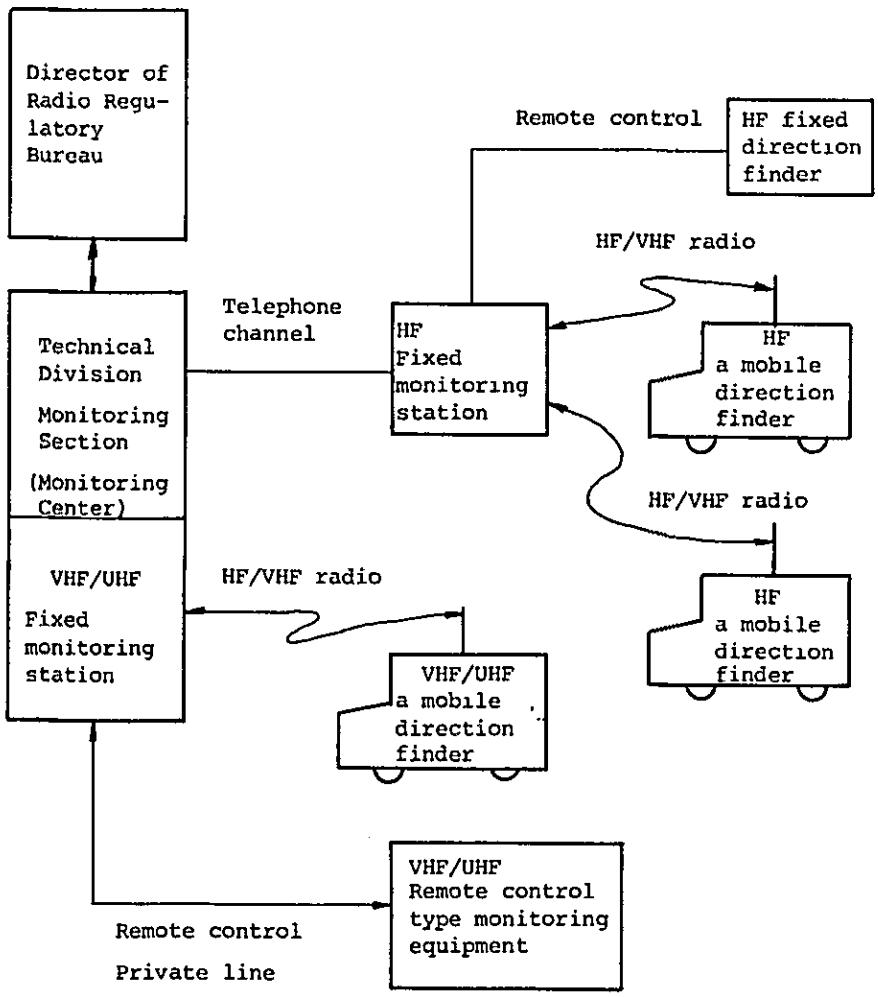


Fig. III-III-3 Configuration of radio monitoring system

3-3 Functions of Monitoring Systems

The monitoring system should preferably have the following functions.

(1) Measurement of radio wave quality

A function to measure the quality of radio waves (frequency, spurious emission ratio, occupied frequency bandwidth) emitted from the radio stations to be monitored.

(2) Monitoring of radio station operation

A function to monitor whether the radio stations are operated and managed as required by laws and regulations.

(3) Spectrum analysis of radio waves

A function to conduct spectrum analyses of radio waves emitted into space.

(4) Interference survey

Functions to investigate the severity of interference, to identify the causes of interference, and to provide measures against interference problems.

(5) Detection of illegal radio stations

A function to detect and identify illegal radio stations.

(6) Planning of monitoring system operations

The following functions to operate the monitoring systems in an efficient and planned manner.

1) Filing of data concerning the radio stations to be monitored

A function to keep the records of the subject stations with respect to frequency, type of radio wave, occupied frequency bandwidth, antenna output, location (cruising radius in case of mobil station), etc.

2) Assessment and filing of monitoring results

A function to evaluate and check the results of monitoring with statutory requirements and to file the evaluated results as classified by radio stations.

3) Retrieval of monitored results

A function to retrieve and submit the results of monitoring to the government authorities concerned without delay.

3-4 Radio Stations to be monitored, and the Frequency Range

All the radio stations in the country should be monitored. But from a standpoint of monitoring efficiency, the monitoring should be carried out selectively.

Considering the frequencies actually assigned to the radio stations and the technical requirements of the monitoring equipment, the frequencies to be monitored will be limited to the range of 100 kHz to 1,500 MHz for the time being.

3-5 Equipment Plan

The buildup of the radio monitoring equipments will be better achieved in the following way.

3-5-1 HF fixed monitoring station

The HF fixed monitoring station should be arranged as specified in Fig. III-III-4. More specifically, it will necessitate the following.

(1) Construction of antenna towers, etc.

1) It is necessary to install short-range HF-band long-wire antennas and inverted-L antennas for the purpose of HF-band monitoring. Namely, two antenna towers will have to be installed.

2) VLP antenna work
It is recommended to install a vertical logarithmically periodic (VLP) antenna for long-range monitoring.

3) Construction of antenna for field strength measurement
An antenna for the measurement of field strength should be constructed.

4) Radio communication antenna
HF duplex antenna (dipole antenna) and VHF duplex antenna (rotary Yagi antenna) should be constructed.

(2) Construction of monitoring room

The monitoring room should be provided with four monitoring positions with all necessary wiring.

The monitoring positions are as follows.

1) Quality monitoring position

2) Operation monitoring position

3) Automatic spectrum recording position

4) Field strength measuring position

A direction finding position will be provided separately.

(3) Monitoring facilities

The following monitoring facilities should be provided.

1)	Integrated radio monitoring equipment	2 sets
2)	Monitoring receiver	2 sets
3)	Automatic spectrum recorder	1 unit
4)	Field strength meter	1 unit
5)	Direction finder	1 unit
6)	Tape recorder	2 units
7)	Standard signal generator	1 unit
8)	Level meter	1 unit

(4) Radio communication equipment

1)	HF SSB transceiver	1 unit
2)	VHF FM transceiver	1 unit

(5) The functions and performance of all these facilities should preferably be as follows.

1) Integrated radio monitoring equipment

A integrated radio monitoring equipment is a system consisting of a spectrum analyzer and a receiver for the measurement of radio wave quality in an efficient manner. Its principal specification should preferably meet the following.

a) Receiving frequency range
10 kHz to 30 MHz

b) Class of emission received
AM, USB, LSB, CW

c) Minimum receiving sensitivity
Analyzer system: 0.2 μV or smaller
Audio system : 30 μV or smaller

d) Spurious response
60 dB or better

e) Stability of master oscillator
5×10^{-8}/day or better

2) Monitoring receiver

The monitoring receiver is high-stability receiver equipped with a digital synthesizer. It is provided with a monitoring frequency preset and scanning functions, and should preferably show the following performance.

a) Receiving frequency range
100 kHz to 30 MHz

b) Class of emission received
AM, USB, LSB, CW

c) Minimum receiving sensitivity
A3J, 3 μV or smaller

d) Spurious response
60 dB or better

3) Automatic spectrum recorder

The automatic spectrum recorder is a device to automatically record on a chart the frequency-to-time distribution of incoming frequencies which fall within a specific sweeping range. It should preferably be provided with the following performance.

a) Recording frequency range
100 kHz to 500 MHz

b) Overall frequency stability
5×10^{-7}/ day or better

c) Recording input level
6 μV or less

d) Spurious response
50 dB or better

4) Fieldstrength meter

The fieldstrength meter is an instrument for measuring the intensity of interference waves or noises, and should preferably show the following performance.

a) Measuring frequency range
0.15 MHz to 30 MHz

b) Measuring input level
0 to 104 dB

c) Measuring accuracy
±2 dB

5) Tape recorder

The tape recorder is capable of recording audio signals for 12 straight hours, and should preferably show the following performance.

a) Track type
4-track 2-channel

b) Tape speed
2.38 cm /sec

6) Standard signal generator

The standard signal generator is used for testing the various radio facilities and for providing reference radio-frequency voltages. It should preferably show the following performance.

a) Carrier frequency range
50 kHz to 1,040 MHz

b) Output range
-30 dB to 130 dB

c) Internal modulation
0.3, 0.4, 0.5, 1, 2 and 3 kHz

d) Stability
3 Hz/hr or better

7) Level meter

The level meter is used for the measurement of receiver sensitivity, and should preferably show the following performance.

a) Measuring frequency range
20 Hz to 15 MHz

6) Measuring level range
-60 to +20 dBm

3-5-2 VHF/UHF fixed monitoring station

The configuration of the VHF/UHF fixed monitoring station should preferably be as specified in Fig. III-III-5. More specifically, it should be equipped as follows.

(1) Antenna towers

1) Discone antenna

For the purpose fo short-range monitoring, there should be installed three wide-band omini-directional discone antennas as classified by frequency bands.

2) VLP antenna

For long-range monitoring, there should be installed a wide-band, directional, rotary VLP antenna.

3) Radio communication antenna

HF duplex antenna (dipole antenna) and VHF duplex antenna (rotary Yagi antenna) should be constructed.

(2) Antenna duplexer

For the purpose of using the antennas efficiently, antenna duplexer should be installed.

(3) Construction of monitoring room

Similar to HF fixed monitoring room

(4) Monitoring facilities

1)	Integrated radio monitoring equipment	2 sets
2)	Monitoring receiver	2 sets
3)	Automatic spectrum recorder	1 unit
4)	Field strength meter	1 unit
5)	Portable direction finder	1 unit
6)	Tape recorder	2 units
7)	Standard signal generator	1 unit
8)	Level meter	1 unit

(5) Radio communication equipment

1)	HF SSB transceiver	1 set
2)	VHF FM transceiver	1 set

(6) The functions and performance of the equipment should preferably be as follows.

1) Integrated radio monitoring equipment

Same as the HF integrated radio monitoring equipment with the exception of the following.

a) Reception frequency range
100 kHz to 1,500 MHz

2) Monitoring receiver

Same as the HF monitoring receiver with the exception of the following.

a) Recording frequency range
25 MHz to 1,500 MHz

b) Class of emission received
AM, FM, USB, LSB, CW

3) Automatic spectrum recorder

Same as HF automatic spectrum recorder.

4) Field strength meter

Same as the HF field strength meter with the exception of the following.

a) Measuring frequency range
25 MHz to 1,700 MHz

b) Measuring input level
25 dB to 95 dB/μV

5) The tape recorder, standard signal generator and level meter are just the same as specified for the HF monitoring system.

3-5-3 HF fixed direction finder station

The HF direction finder station should preferably meet the following requirements.

(1) The direction finding system should be of the goniometer type using a Roche antenna.

(Roche antenna consists of a pair of Adcock antennas <usually four-element type each for north, south, east and west, each pair being coupled parallel and its output being supplied to the goniometer.)

Compared with the equally-spaced 4-element rectangular Adcock antenna, this system shows smaller maximum theoretical errors (span error, octantal error), has a wider measuring frequency range, and has nearly twice as much antenna sensitivity.

(2) The direction finding system should be able to display the incoming direction of radio wave digitally and at the same time to display the same on a CRT.

(3) The direction finding system should be capable of covering the frequency range from 100 kHz to 30 MHz.

(4) The direction finding system should be equipped with a remote control function.

(5) The direction finding system should be provided with a averaging function and an automatic cabliration function.

(6) The performance requirements of the direction finding system are as summarized below.

1) Measuring frequency range
400 kHz to 30 MHz

2) Measurable minimum input voltage level

400 kHz to 1 MHz	:	45 μV or less
1 MHz to 4 MHz	:	10 μV or less
4 MHz to 30 MHz	:	2 μV or less

3) Direction indicating error
Within ±1 deg.

3-5-4 HF mobile direction finding station

The HF mobil direction finding station should preferably meet the following requirements.

(1) General requirements

1) The mobile direction finding station is intended primarily for finding illegal radio stations, and should be disguised as an ordinary motor vehicle for the purpose of secret service.

2) The motor vehicle should be equipped with an oversized spare fuel tank for a long-distance roving and for an extended period of power generation.

3) The power generator should be a low-noise diesel generator.

(2) Equipment to be carried on the HF mobile direction finding station

1)	Portable HF direction finder	1 unit
2)	Portable approach direction finder	2 units
3)	HF SSB mobile transceiver	1 set
4)	VHF FM mobile transceiver	1 set
5)	Portable VHF FM transceiver	2 sets

(3) Performance

1) Measuring frequency range should be 100 kHz to 30 MHz.

2) The direction finding antenna should be a rectangular loop antenna.

3) The measurable wave types should be CW, DSB, SSB (USB, LSB).

4) The lowest measurable field strength should be 2 μV or less.

5) The measuring error should be less than ±2 deg.

6) The portable approach direction finder should be small in size and light in weight, and should be given a direction finding function and a field strength measuring function, both being enough for practical purposes.

3-5-5 VHF/UHF mobile direction finding station

The VHF/UHF mobile direction finding station should preferably meet the following requirements.

(1) The general requirements are just the same as the HF mobile direction finding station.

(2) Equipment to be carried on the mobile station

1)	Mobile direction finder	1 unit
2)	Portable direction finder	1 unit
3)	portable approach direction finder	2 units
4)	Mobile HF SSB transceiver	1 set
5)	Mobile VHF FM transceiver	1 set
6)	Portable VHF FM transceiver	2 set

(3) The functions and performance of the mobile direction finding station should preferably meet the following requirements.

1) The mobile station should preferably be equipped with an integrated radio monitoring equipment as a direction finding receiver so that it can serve not only as a mobile direction finder, but also as a mobile monitoring station.

2) The measuring frequency range should preferably be 25 MHz to 1,000 MHz.

3) The antenna for direction finder use should preferably be an 8-element Adcock one. It may be a combination of antennas which are changed over depending on frequency bands.

4) The measurable types of waves should preferably vertically polarized CW, DSB and SSB (USB and LSB).

5) The direction finding error should be less than 5 deg.

6) The lowest measurable field strength should preferably be 30 μV or less.

7) The power supply should be AC 220 V, and should be a combination of a diesel power generator (which can be operated while the station is running) and a 24 V DC-AC inverter.

8) The portable approach direction finder should preferably be small in size and light in weight, and should be capable of direction finding and field strength measurement with practically high accuracy.

9) The portable direction finder is carried by the mobile direction finding station to any desired place, and is installed at that place for a period required.

10) The mobile direction finding station should preferably be equipped with a telescopic antenna pole to ensure a sufficient reception height gain.

3-5-6 Remote control system

(1) Remote control of HF fixed monitoring station

The remote control system for the HF fixed monitoring station should preferably be as follows.

1) A controller should be installed in the VHF/UHF fixed monitoring station in order to remote-control two receivers in the HF fixed monitoring station. The remote control functions should include the setting of reception frequency, selection of the type of radio wave, setting of reception pass bandwidths, adjustment of high-frequency attenuator, and adjustment of audio output, etc.

The data to be transmitted include the received frequency, demodulated audio signal, etc.

2) Equipment required

a)	Remote-controlled receiver	2 units
b)	Remote-controlled controller	2 units
c)	Remote-controlled MODEM	1 set

3) The remote-control circuit should be a telephone circuit.

(2) Remote-controlled monitoring of VHF/UHF bands

In the remote-control of the VHF/UHF bands, a remote-controlled receiver is installed at an desired place, and is sugjected to remote control from the VHF/UHF fixed monitoring station just the same way as the remote-controlled monitoring of the HF band.

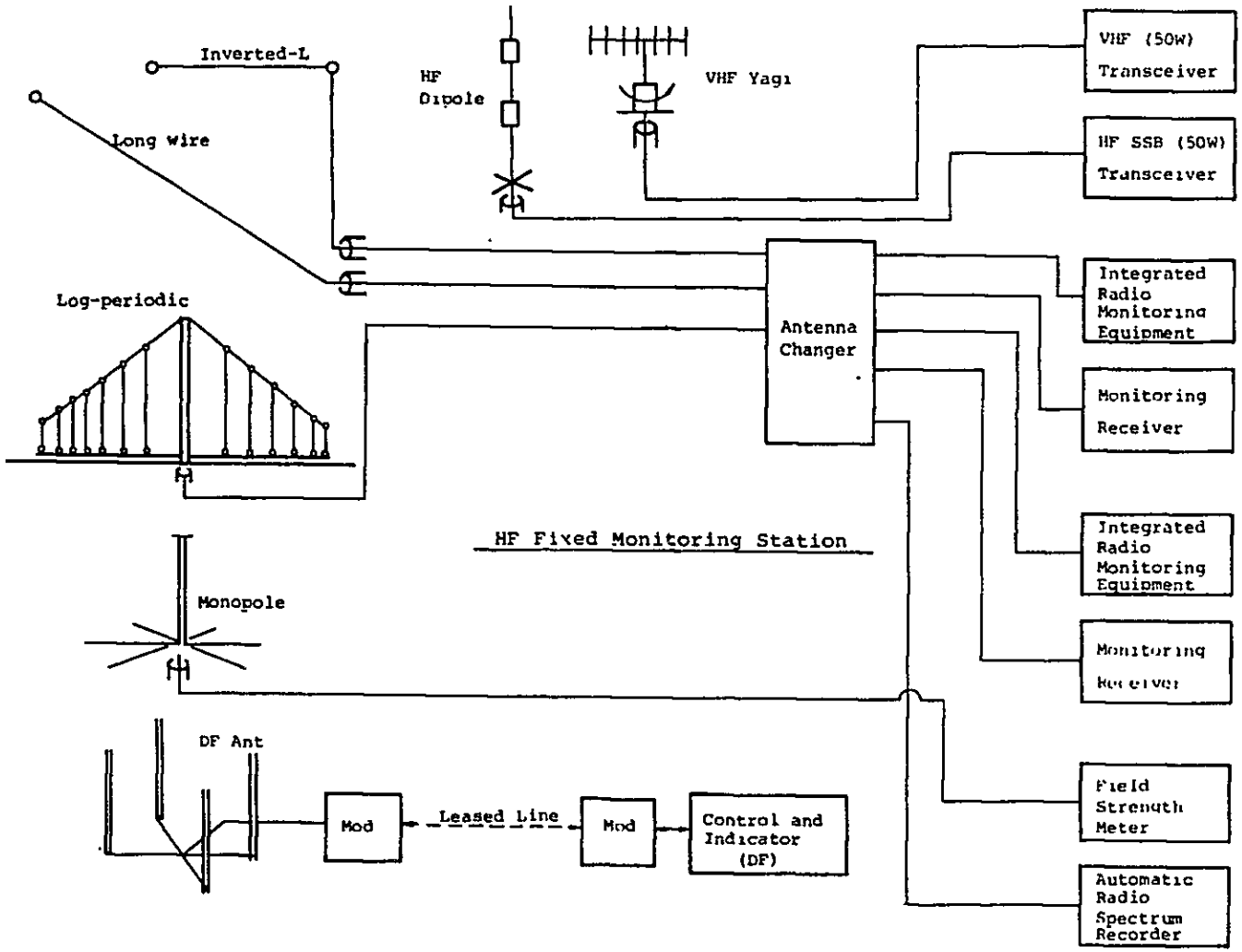


Fig. III-III-4 Configuration of HF fixed monitoring station

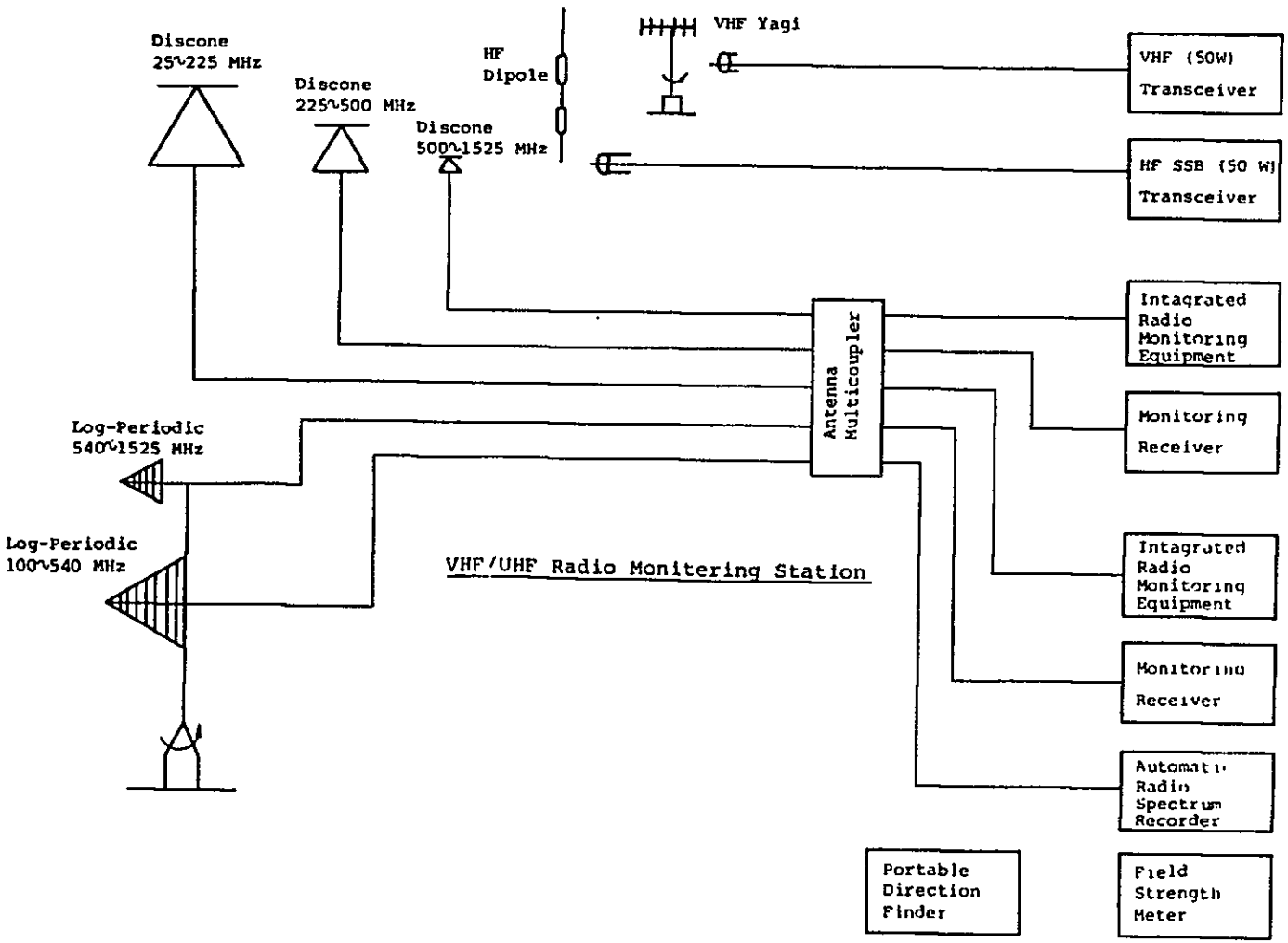


Fig. III-III-5 Configuration of VHF/UHF fixed monitoring station

3-6 Monitoring Service Standards

It is desirable to establish the following standards in connection with the performance of monitoring duties and responsibilities.

(1) The scope of monitoring duties and responsibilities should be specified, and the legal procedures for handling the violating stations should be established.

(2) The probation standards for the violating stations to which administrative guidance has been extended should be established.

(3) The penal standards for illegal radio stations should be established.

(4) The methods of measuring radio wave quality and the measuring errors should be specified.

3-7 Radio Monitoring System Operation and Administration

The operation and administration of the radio monitoring system should be conducted with due attention paid to each of the following.

3-7-1 Functions of Monitoring Division

The monitoring division should preferably serve not only as the hub of the monitoring system to process the monitored data, but also as an organization to manage the entire monitoring system in an efficient way.

3-7-2 Monitoring system operation paln

The monitoring division should formulate plans for the operation of fixed monitoring stations, mobile direction finding stations and all other monitoring system functions for the purpose of operating and managing the entire monitoring system in an efficient way.

3-7-3 Collection and administration control of monitored data

The monitoring division should collect data from the monitoring stations, and at the same time should keep on record the inspection results of radio stations and the measured results of radio wave quality.

The monitoring division should also make efforts to improve the monitoring system through long-term appraisal of inspection logs, and analysis and appraisal of the operation and management of the monitoring system.

3-7-4 The radio monitoring system administrative organization is shown in Fig. III-III-6.

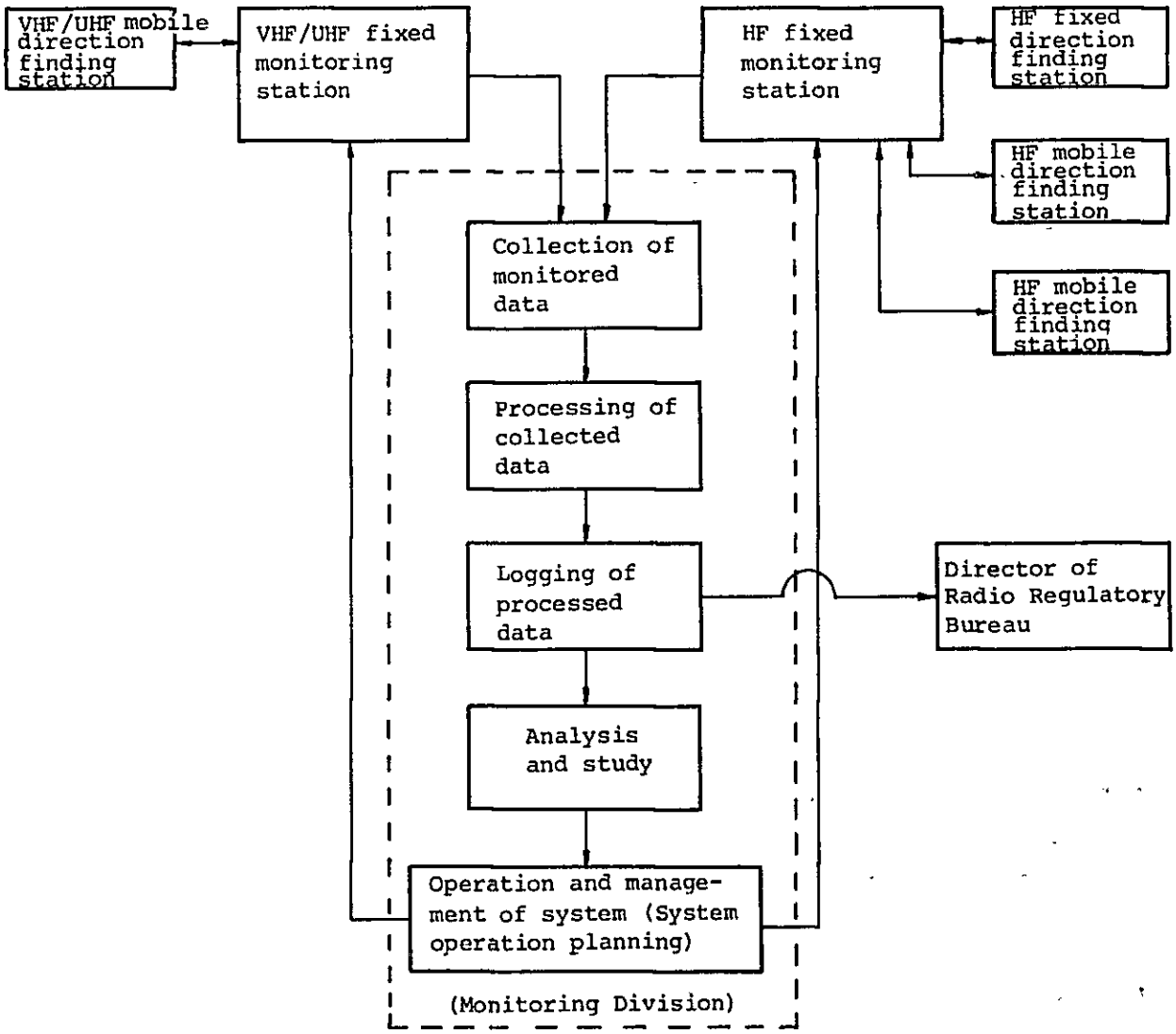


Fig. III-III-6 Administrative organization for radio monitoring system

3-8 Maintenance

What should be borne in mind for equipment maintenance is as follows.

(1) The equipment should be operated logically by those who are well conversant with its performance, characteristics and functions. Thus, the equipment operators should be trained to have a full knowledge of the equipment and the skill to use it. Skilled maintenance engineers should be assigned to troubleshoot and maintain regularly the major facilities.

(2) The measuring instruments should be calibrated at regular intervals for the purpose of ensuring their accuracy.

(3) For the purpose of facilitating the troubleshooting services, the following measures should be provided.

   1) To rear up and build up the skilled engineering force, and to offer meaty training and education for maintenance crew.

   2) To buildup the maintenance equipment.

   3) To prepare equipment for which manufacturer's maintenance service is readily available.

   4) To keep the equipment service manuals available readily whenever they are required.

   5) To purchase at least two units of the same model in order to facilitate the troubleshooting service as it is possible to compare a faulty unit with a right one and to keep the replacement parts and units on hand.

   6) To establish check points for each piece of equipment for routinizing the logging of data such as voltage, current and level.

7) To prepare maintenance equipment capable of standing voltage variation and temperature changes without losing its performance integrity. It should also be provided with pertinent measures against lighting.

(4) Maintenance equipment

What is needed most for maintenance service includes:

1) Standard signal generator

The standard signal generator is used for checking the performance of receiver, etc. It should generate a wide range of frequencies stably.

2) Audio-frequency generator

The low-frequency generator is used as a modulating signal source for the standard signal generator, and should be designed for use for the measurement of audio-frequency characteristics of receiver, etc.

3) Level meter

The level meter should be one designed for use for the measurement of noise and signal levels in the receiver audio-frequency outputs.

(5) Equipment for calibration use

It is desirable to prepare the following calibrating instruments.

1) HF-band standard magnetic field generator

This instrument is used for the calibration of HF-band field strength meter.

2) VHF-band standard electric field generator

This instrument generates standard levels of electric field for the calibration of field strength meter.

3) Calibrating receiver

This receiver is used for the calibration of standard signal generator output level, attenuator, etc.

For the calibration of the frequency meter, it is recommended to calibrate the standard oscillator of the frequency meter by receiving standard waves by making use of a HF receiver.

3-9 Benefits of Radio Monitoring System Improvement

(1) Prompt detection and prosecution of illegal radio stations is quite important for the national security and orderly use and management of radio waves.

(2) The investigation of frequency spectrum is intended for the collection of data used as a basis for efficient use of frequencies. By analyzing the collected data, the uses of radio frequencies both at home and abroad can be taken stock of, and it is possible to provide useful data for vindicating national interests and rights to the radio frequencies against the foreign countries.

(3) Detection of interference sources, clearing-up of the causes of interference, and quick removal of such causes are of overriding importance for assurance of high-quality telecommunication.

(4) The supervision and control of the operation and management of the radio stations and their wave quality are very important for rigorous enforcement of the spirit of the law, assurance of high-quality telecommunication and prevention of interference.

CHAPTER 4 PERSONNEL PLAN

4-1 Standards for Calculation of Manpower Requirements

(1) Administrative demand and manpower

The demand for public radio regulatory services is governed by the growth tendency of radio stations and the way the radio regulation and monitoring are carried out within the framework of radio regulatory policies.

In the Master Plan, the manpower required by the expansion of physical systems and administrative loads due to rise in the number of radio stations has been estimated to add to the existing manpower.

The recruitment should be carried out in phase with annual demand. The employment of engineers should also be carried out in close coordination with the radio regulatory organization.

(2) Requirements of staff

The radio regulatory service is technical and the staffers to be employed should preferably be those with a technical knowledge or those having gone through with disciplined studies and training courses.

(3) Monitoring crew

The personnel requirements for the monitoring crew have been planned on condition that the monitoring operations will be carried out on an around-the-clock basis. It is desirable to give a tight control on the increase of maintenance crew by effective use of automatic monitoring systems.

(4) Maintenance crew

The personnel requirements for the maintenance crew have been planned for the maintenance and servicing of inspection, calibration and monitoring facilities.

4-2 Personnel Plan

A personnel plan for the period from 1983 to 1997 is shown in Table III-III-2.

It is required to review the personnel plan when the standards for manning have been changed.

Table III-III-2 Annual personnel plan

Classification \ Year		1982	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	Total
Director		1																1
Suridical advisor		1																1
Secretariat		1																1
Frequency Administration Department	General Manager		1															1
	Planning Division		6	1	1						1				1			10
	International Division		3							1							1	5
	Frequency Allocation Division		3			1		1				1				1		7
Engineering Department	General Manager	1																1
	Inspection Division	6					1				1				1			9
	Monitoring Division	10					1					1					1	13
	Study Administration Division	3		1	1					1						1		7
License Department	General Manager	1																1
	License Division	6						1					1				1	9
	Information Processing Division	2							1					1				4
	Accounts Division	2							1					1				4
Total		34	13	2	2	1	2	2	2	2	2	2	1	2	2	2	3	74

CHAPTER 5 CONSIDERATIONS IN IMPLEMENTING THE PROJECT

5-1 Radio Regulation

(1) The amendment of the laws, regulations and codes should be predicated upon close arrangements with the government authorities concerned.

(2) With the improvement of the frequency administrative system, the manpower should be increased, which will be accompanied by an increase in labor cost.

(3) The introduction of a new frequency allocation program should be protected by a law which vests the government with the power to order the radio stations to change the allocated or permitted frequency, antenna power, etc.

(4) When allocating the VHF and UHF frequencies to the radio stations on the frontiers, close arrangements with the neighboring countries should be made.

(5) The technical standards for radio equipment should be established as soon as possible.

(6) Before making it mandatory that each land radio station be attended by a qualified radio operator, a system of national qualification tests for radio operators should be introduced.

(7) It is advisable for Radio Regulatory Bureau to take necessary measures to check and approve the import of radio equipments in order to prevent the increase of illegal radio station and to upgrade the quality of radio equipments.

5-2 Radio Monitoring

(1) For the construction of HF fixed direction finding station, a proper site should be procured. Legal measures should be provided for the purpose of protecting the monitoring stations and direction finding stations.

(2) The radio communication system for the monitoring service should be provided with secrecy measures for the purpose of obviating the leakage of communication data and information.

SECTION IV. NATIONAL EDUCATIONAL TV BROADCASTING

OUTLINE

1. Necessity of Natioal Educational TV Broadcasting

The Paraguayan Government takes it critically important as a foundation for the development of national economy to upgrade the educational and cultural level of all the people in the country. In view of this, the Paraguayan Government is contemplating to reticulate the entire country with educational TV broadcasting network.

Considering the fact that the school attendance rate and the adult literacy rate are inadequate, the role to be played by the educational TV broadcasting will be invaluable. The Paraguayan Government's plan to construct a national educational TV broadcasting network is highly appreciated and indispensable as instrumental to the promotion of education and culture throughout the country.

2. Master Plan for National Educational TV Broadcasting

2-1 Basic concept

A production center having principal functions of TV program production will be established at Asunción, and TV broadcasting stations will be established in twelve sites in the country, including Asunción.

(1) Operating body and management foundation

It is necessary to establish, as soon as possible, a principal body administering, operating and managing the national educational television.

The principal body should be a public organization which is established with a view to promoting national culture and upgrading educational level.
An administrative committee (Consejo de Administración), made up of the representatives of government authorities, the field of education, local municipalities, and other fields, etc. should manage this public body.

The construction and operation of the national educational television will necessitate a vast sum of fund, and it is of high importance to make sure of financial resources for it. The national educational television should, at least for the present, be financed totally from the government coffers, and must in no way be supported by income from advertisements and sponsored programs considering the objectives of education.

(2) TV programs

In accordance with the Paraguayan Government's plan, the TV programs will mainly be the educational programs for schools and adults, cultural programs, and news.

The TV programs, for the most part, will be produced at the Asunción Production Center.

It will be planned that the local TV stations will be able to produce news programs and other small-scale local programs.

At Asunción, the TV programs will be broadcast from the transmitting station in the Production Center. Initially the local TV stations will broadcast videotaped programs distributed from the Asunción Production Center. In the future, the transmission over microwave circuits of TV programs will be phased in keeping with the growth of national telecommunication network.

(3) Technical standards

Technical standards will be in accordance with the Paraguayan TV Service Technical Rules and CCIR Recommendations. The TV broadcasting frequencies will be selected from band I (Banda-I) and band II (Banda-II).

Considering the TV sets state of popularization in Paraguay, the standard color TV transmission system will be PAL-N.

The studio facilities will be standardized into PAL-B system which is widely used in the world, and will be converted into PAL-N.

(4) An approach to project implementation

The project period is 15 years from 1983, and will be divided into three stages for phased implementation.

First off, basic facilities necessary for the program production and operation and a transmitting station will be installed at Capital Asunción. Then, local TV broadcasting stations will be installed sequentially in major local cites by the last year of the project. In the middle stage of the network expansion, Asunción Production Center will expand its facilities to permit expanding TV broadcasting hours and to improve the quality of TV programs.

2-2 Programming, and use of programs

(1) Basic concepts of programming

1) At first, the length of the daily broadcasting time will be about 3 hours. It will be extended to about 6 hours toward the end of the project.

2) Programming will consist of mainly the educational programs for schools, educational programs for adults, educational programs for educators, cultural programs and news. For the convenience of users, repeat-broadcasts will be interlaced within the broadcasting hours in a planned manner. In principle, therefore, the programs will be videotaped.

3) As the double-shift schooling system is employed in Paraguay, the school programs will be telecast during morning and afternoon classes. Other programs will be broadcast in the evening.

4) The contents, hours, and ratios of the TV programs as classified by genres will be discussed and determined by a broadcast consultative committee consisting of educators and scholars for the purpose of keeping the TV programs well balanced.

(2) Contents of program

1) Educational programs for school

The educational programs for school will be designed for elementary school (6-year primary education) children and junior high school (first half of 6-year secondary education) pupils.

2) Educational programs for adults

For the adults, the programs for illiterates, the technical programs for farmers and other producing workers, etc., and the general education programs for housewives, etc. will be offered.

3) Educational programs for educators

The programs concerning curricular study, teaching methods, etc., programs concerning examples of using television for education, methodology, etc. will be offered to the educators.

4) Cultural programs

For the purpose of cultivating the general public, high-grade programs of music, dramas, documentaries, animation pictures etc. will be procured and televised. With the progress of the project and with the development of production capabilities, sports events will be telecast, and self-sustained specials, etc. will be offered.

5) News programs

News commentaries with center on education and culture, campaign programs, and notice of TV programs, etc. will be offered.

(3) Language used

As two languages are used in Paraguay, part of the programs will have to be run in Guarani, particularly where the programs are slanted for low graders, illiterates, and farming communities.

(4) Extension of educational programs

Various measures will be needed for the purpose of promoting education on the leverage of educational TV system.

1) Measures to promote TV receivers

For the educational institutions which are looking for educational programs as soon as the TV station is opened, color TV sets will be distributed under the project in keeping with the opening of the TV stations concerned.

2) Development of methods for using the educational TV programs

So as to encourage the masses to use the educational TV programs, model educational institutions will be designated for continued, systematic promotion of using television for education.

2-3 TV station siting plan

In order to cover the major areas of Paraguay, including Asunción, twelve TV stations will be established. The order of establishment of these stations is determined according to the priorities set by the Paraguayan Government.

(1) Frequency allocation plan

A frequency allocation plan has been formulated according to the technical standards and the results of field survey conducted in September 1981. The channels proposed for the national educational television should be earmaked out of the frequencies available in Paraguay first. As regards the frequencies of those TV stations which are located to border on the neighboring countries, the Paraguayan Government should negotiate with the relevant governments for agreement.

(2) TV station siting plan

All the sites proposed for TV stations are on a flat terrain, and there are no proper hilly sites commanding service areas. Thus, it will be necessary to install a TV station equipped with transmitting and studio facilities in a single building and a transmitting antenna tower of a required height. The TV station building will be constructed in an urban area.

As regards Asunción, a 250 m-high antenna with transmitter output of 25 kW will cover a radius of 120 km.

The local TV stations with an antenna height of 100 to 150 m and a transmitter output of 1 to 20 kW will cover a radius of 45 to 120 km.

The population coverage will be about 45% by the establishment of Asunción Station, about 56% by the end of the first five-year period, about 79% by the end of the second five-year period and about 93% when all the twelve stations have been completed.

(3) Facilities for transmitting station

Every TV station will be provided with a standby transmitter for high-reliability TV broadcasting service and for ease of maintenance.

For those stations served with commercial power, one set of generating facilities will be furnished for emergency power supply. For those TV stations which are expected to be stinted of commercial power for some time now (about seven TV stations will come under this category so far as ANDE's 1981-85 electrification plan is concerned), two sets of generating facilities will be installed.

2-4 Studio facilities

(1) Asunción TV Station

The major studio facilities at the Asunción Production Center will include two 200 m^2-class general purpose studios, one 50 m^2-class news studio, VTR & telecine room, editing room, master control room, and maintenance room, etc., and will be given the functions of program production, video-taping, and program execution. In addition, an ENG equipment and OB vans will be furnished.

The television camera will be of the ENG type with three-tube, and the VTR will be a compact 3/4" type for high operatability.

(2) Local TV stations

The local TV station will be equipped with a 50 m^2 - class studio permitting the production of news programs and others on a small scale. The camera and VTR, etc. will be standardized with Asunción's.

The transmission of programs from Asunción to local TV stations will be gradually switched over from videotapes to direct real-time forwarding over microwave circuits.

2-5 Station buildings and structures

The transmission antenna mast will be of an economical guyed type. The space requirements for TV station will be 300 m by 330 m each for Asunción and Concepción, and 180 m by 200 m through 120 m by 140 m for each of local TV stations. The aggregate floor space of the TV station building will be about 3,000 m^2 for Asunción and about 500 m^2 each for local TV stations. The engine generator, which generates the noise and the vibration, will be accommodated in a separate building.

2-6 Operation and maintenance plan

The daily operation of the broadcasting equipment in each TV station will be undertaken by the engineering staff assigned to that station. Asunción's specialist engineers will organize an integrated maintenance system to cover all the broadcasting facilities of both Asunción and local TV stations. All the necessary spares, which are reckoned in the construction cost, will be stored at Asunción and/or local stations.

3. Personnel Plan

For the purpose of keeping the national educational television in good working order, utmost efforts should be made to keep human resources in terms of both quantity and quality.

(1) Manpower requirements

The personnel necessary in the final stage of the project is estimated to number 178 for the programing, 222 for engineering and 73 for administration, 473 in total.

(2) Ranking by profession

For each profession, the personnel is largely classified into three rankings as follows

Ranking 1:	Chief producer, engineer, senior clerk	49 persons in all
Ranking 2:	Producer, technician, junior clerk	212 persons in all
Ranking 3:	Assistant, operator	212 persons in all

4. Costs

(1) Construction costs

The construction costs will amount to US$51.62 million (6,505 million guaranies) of which the foreign currency component will be US$45.89 million and domestic currency component 722 million guaranies.

(2) Operation and maintenance costs

The operation and maintenance costs by the year 1997 will amount to US$46.62 million (5,874 million guaranies).

1) The operating costs will amount to US$25.78 million (3,248 million guaranies) of which US$1.39 million will be accounted for by foreign currency component and 3,073 million guaranies by domestic currency component.

2) The personnel expenses will amount to US$20.84 million (2,626 million guaranies) wholly borne by domestic currency component.

(3) Construction costs for training facilities

The training facilities for personnel to be engaged in the national educational television are required to compare well in terms of both scale and quality with the actual operating facilities in a national educational TV station. The facilities for the program staff will cost US$0.24 million in foreign currency and those for engineering staff will cost US$0.67 million in foreign currency.

5. Implementation Plan

The fifteen-year project will be implemented in three stages to construct national educational TV stations in twelve sites sequentially.

(1) In the first stage, the Asunción TV station and two major local TV stations will be constructed. In the second stage, five local TV stations will be constructed, along with the expansion of Asunción Production Center studios and some production equipment. In addition, microwave circuit facilities will be installed in the existing TV stations. In the third stage, four local TV stations will be constructed, and the cameras, VTRs and other specific equipment furnished to the Asunción Production Center in the first stage will be renewed.

(2) For effective implementation of the project, it is recommended to seek counsel from experts in the advanced countries and employ the service of consultants in this field.

6. Evaluation of Socio-Economic Impact

Television is the most powerful of the mass media available today. The underlying purpose of the national educational television planned by the Paraguayan Government is to upgrade the educational level of the Paraguayans through school education and adult education.

The features of TV as an educational tool and its socio-economic impact in Paraguay may be summarized as follows.

(1) TV can easily communicate a variety of information with rapidity. On the other hand, the written educational tool, such as textbook, takes at least three to four years from preparation to distribution.

(2) TV programs can demonstrate by far more voluminous information in more detail than any textbook, understandably and systematically.

(3) So far as the current population growth stands, what the future holds in store for the compulsory education in Paraguay is an additional teaching load of about 80,000 pupils, the construction of 80 additional schools and employment of 3,000 additional teachers. This means the vast sums of money must be invested in the school education. In view of this, the national educational television is highly spoken of for its educational instrumentalities.

(4) A total 60,000 of immigrants and indigenous people with cultures and mores all their own live together. The frontiers are under strong influence of foreign TV broadcasts. The Paraguayan Government places much hope on the educational effects of TV for cultural fusion of the people of different roots and protection of the cultural environments of the country.

(5) TV broadcasting is most effective not simply for adult education, but also as media for lifetime education of the general public. Considering that the socio-economic growth of a country hinges on the educational level of its people, the importance of the national educational television will be even more amplified.

CHAPTER 1 EDUCATION AND BROADCASTING IN PARAGUAY

1-1 Educational Situation

1-1-1 Educational institutions

In the Republic of Paraguay, 6-years of primary education, secondary education which consists of the first three years and the latter three years, and teacher's school as well as senior teacher's school come under the jurisdiction of the Ministry of Education, while universities are independent. Primary education is compulsory and the division of the general course and vocational course takes place from the secondary education onward. The institution of school education is shown on Figure III-IV-1.

At present the Republic of Paraguay sees a rapid increase of school-age children, which urges the construction of school buildings. So the campaign under the slogan "Una Escuela mas" or "One More School" has been going on. In 1977 a loan of 8 million dollars was obtained from the World Bank for the construction of local primary schools. Appeals have also been made to remind the urgent necessity of training teachers.

The number of school buildings, students and teachers in 1979 is shown on Table III-IV-1.

1-1-2 Content of education

A considerable revision of educational courses was made in 1973, which has been maintained up till now. What should be noted is a subject formation for primary school children which is designed to give general subject guidance including everyday life matters. For the lower graders (from the first to third), three-subject system is adopted. They are "science, health and labour", "social life and communication" and "mathematics". "Communication", in particular, is allotted with many hours; about 50% for lower graders and 25% for upper classes, where Spanish, the official language of Paraguay, is taught. This is

due to the unique language situation in this country. It is at secondary school that Guarani is taught. One class consists of 40 or so pupils but there is a considerable shortage of books, pictorial records and educational materials and tools. For instance, there were practically no tools for scientific experiments nor apparatuses for audio-visual education. There was a great difference in the situation between the capital and local cities.

1-1-3 Spread of school education

Because of the social tendency to value educational background which virtually decides the amount of wages and social status, interest in education is generally keen. But since the economy depends on labour of the minors, an increasing number of children stop going to school from the latter half of compulsory education. The number of students on the register at different grades in 1979 is shown on Table III-IV-2.

In considering the problem of drop-outs, apart from that of poverty, one of the causes is the difficulty of an examination for an upper class which is given even at primary school. Also, monotony of the class which depends largely on the blackboard could well be a cause.

1-2 Education and Broadcasting

1-2-1 Department of Correspondence Education (Departamento de Teleducación)

Established within the Ministry of Education in 1972, the department is designed to spread education through mass communication media with main emphasis on children in remote areas who are unable to attend school and also adults who have had no chance to attend school.

(A) Radio

At present, a program called "Primary Education for Rural People" or "Radio Primaria Rural" is being broadcast from Radio Nacional (Radio Nacional del Paraguay) and four local stations. The number of programs that were broadcast in 1980 totals 1080 including re-plays of those produced in the previous year. Program content is along the lines with primary school education courses with addition of comments on folk culture, agricultural know-how and so on, which are taught in Guarani as well. Texts are published and evaluation and qualification are acknowledged. From 1978 to 1980, about 4,000 people used this system, 3/4 of which were those above 16 years old.

(B) Television

Live broadcasting began in 1972 at a commercial TV station Channel 9 (Cerro Corá) in Asunción by chartering the studio equipments and technicians. Business flourished and in 1980 it went so far as to broadcast twice a week or 80 programs a year but since 1981 when Channel 9 stopped its cooperation, the project has been canceled. Program content had a wide range including those for children and highly educational ones. However, 50% of the programs had their main focus on social science for pupils in upper primary school. In order to conduct group watching and examine educa-

tional effect, a TV center or Tele Centro was set up at 10 places which, however, are not functioning at present.

1-2-2 Department of Illiteracy and Adult Education (Departamento de Alfabetización y Educación de Adultos)

Policies to promote adult education have been vigorously talked about and put into force since the end of 1950's along with the demand on national development. Since Department of Illiteracy and Adult Education was established in the Ministry of Education in 1972, its activity has become especially systematic.

Its greatest objective is to eliminate illiterate persons. According to the statistics of 1972, the number of the so-called illiterate people and those who were unable to speak the official language totaled about 260,000. And there was an urgent need for counter measures. At present, educational centers are found at various parts of the country to teach the official language as well as basic subjects like mathematics and social science with addition of health and hygiene, production know-how and folk culture. The situation in 1979 is shown in Table III-IV-3.

Due to bad condition of transportation systems, adult education methods are largely dependent on mass communication media.

(A) Radio

A program called "The World of Adults" (El Mundo del Adulto) produced by the Department of Illiteracy and Adult Education has been broadcast four times a week (including replays) from Radio Nacional. With the cooperation from the Ministry of Agriculture and Dairy, Health and Welfare Ministry and other related governmental agencies, the program is of wide-range formation and Guarani is partly used in the broadcasting. Group watching at the center is recommended.

(B) Television

A program called "Toward a Better Tomorrow" (Hacia un Mañana Mejor) was broadcast with the support of Channel 9, as in the case of the Department of Correspondence Education. In 1980 when the series ended, 80 programs were produced to be broadcast three times a week. Because of their broadcasting hour, the programs were intended for housewives and dealt with matters deeply related to household affairs.

1-3 Newspapers and Commercial Broadcasting

Some of the leading daily newspapers in the Republic of Paraguay include "La Taribuna", "ABC", "Ultima Hora" and "Hoy", all of which have 24 to 28 pages in color print and tabloid. "ABC" and "Ultima Hora" weekly attach an 8-page supplement which carries materials on history, mathematics and science for school education as well as practical articles on health, life and agriculture with photographs and illustrations. They are often found pasted on the walls of primary shcools or play a significant role in promoting an educational campaign for the public.

There are two TV stations in Asuncion; "Televisión Cerro Corá" (Channel 9) and "Teledifusora Paraguaya" (Channel 13), both of which are commercial enterprises relying on commercial fees. They broadcast in color 13 hours for week days and 15 hours for Sundays, 80% of which is occupied by foreign programs. A typical independent domestic program is an hour-long news show, broadcast every night except Sunday. A program called "Miss Rosary" (Mboehara Rosali), weekly broadcast from Channel 9 is rare and note-worthy in that it is a children's program which is jointly using Guarani. Most of the procured programs are old movie films which are repeatedly replayed.

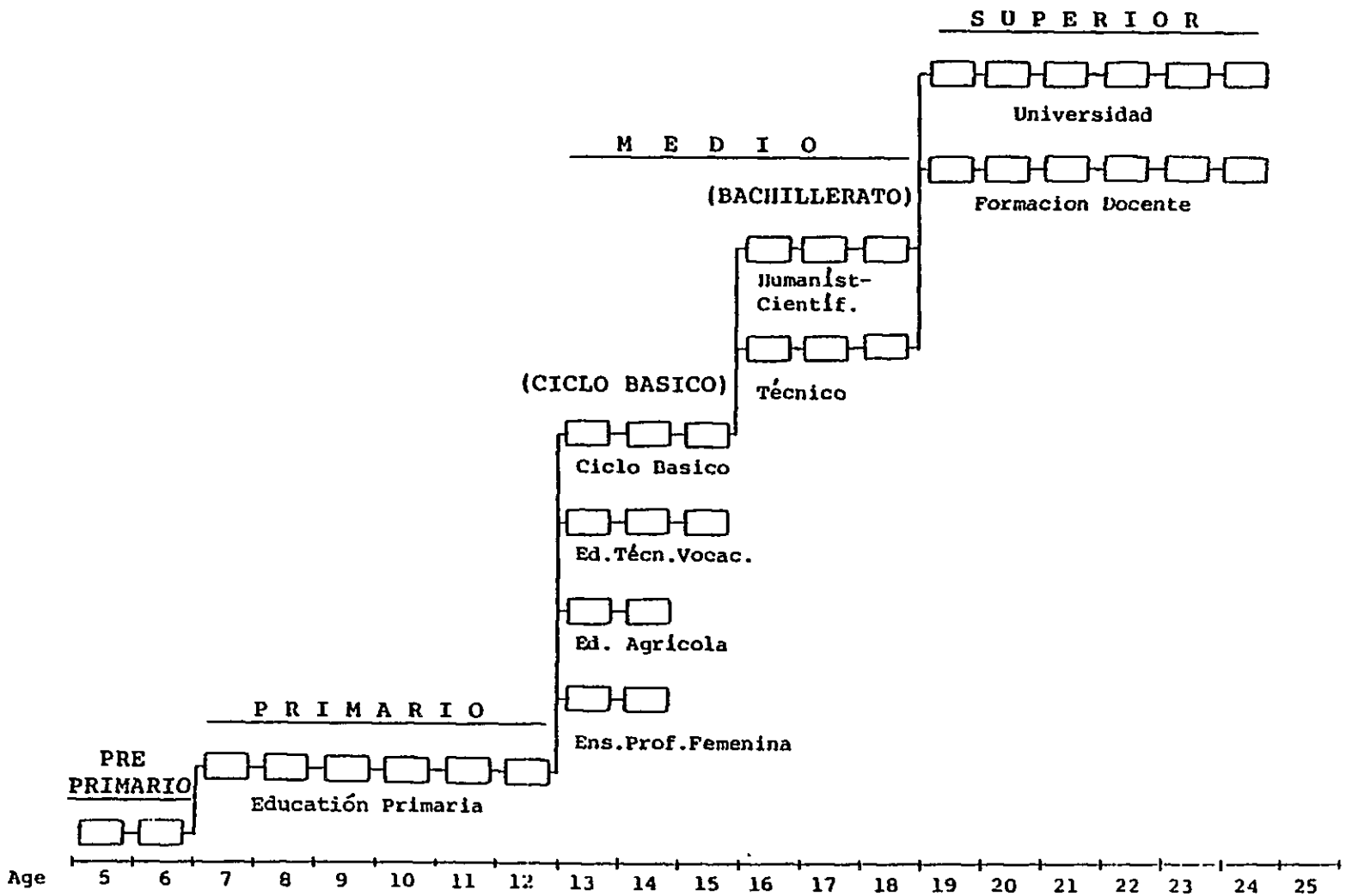


Figure III-IV-I Structure of the formal education system

Table III-IV-1 The number of schools, students and teachers in the Republic of Paraguay (1979)

	The number of schools	The number of students	The number of teachers
Primary school	3288	504377	21514
Junior high school Senior high school	519	110095	8300 *1
Teachers' school	15	1407	
Superior Institution of Education	1	1733 *2	
University	2	22291	

*1 Estimated

*2 Including the study and training of present teachers

Table III-IV-2 The number of students on the register according to the grades (1979)

Grade	1	2	3	4	5	6
The number of students	132501	109937	90307	71035	56041	44556

Table III-IV-3 Illiteracy and Adult Education Center (1979)

The number of centers	The number of instructors	The number of students
287	1074	17374

(Including the centers established by the army and police)