## CHAPTER 2. BASIC POLICY OF THIS PLAN

### 2-1 Basic Policy concerning the Drafting of the Plan

In drafting the plan of the Government of the Republic of Paraguay to establish the national educational television, the following basic policy shall be adopted. Regarding the organization that is to conduct this television broadcast, reference shall be made in 2-2.

(1) Broadcast programs

The programs will consist mainly of educational and cultural programs and will be broadcast throughout the country. For the present, the school-broadcast programs and adult programs will constitute the core but the programs will be gradually diversified and their contents enriched, with the ultimate aim of contributing to the enhancement of the people's educational and cultural levels.

(2) Function of program production

Ultimately, stations shall be established at 11 places in the country apart from the one at Asunción.

The Asunción Station shall function as the center of program production for this educational television service. While broadcasting its own programs, it will distribute programs to local stations in the country. Local stations will produce local programs of small scale to be broadcast locally.

As to programs which require collection of local topics, an OB van attached to the Asunción Station shall be utilized to facilitate production of programs covering wide areas.

The broadcasting time shall be made three hours daily for the present, but ultimately it shall be gradually increased to six hours.

(3) Program transmission

In distributing the programs to local stations, the method of sending them in videotapes shall be adopted during the first years in view of the fact that the microwave circuits for television transmission have not yet been fully completed. In the middle phases and onwards, as the tele-communications network is expected to be put in order and developed, the microwave circuits will be introduced as the means of distributing the programs.

(4) Program utilization

Measures should be studied in order to utilize broadcast programs effectively for the sake of school education and adult education.

(5) Technical standards

For the broadcast frequency bands, "BANDA-I and II" (VHF) authorized in the Republic of Paraguay shall be used.

As to the television standards, PAL-N shall be adopted, but the studio facilities shall be made for PAL-B so as to be converted to PAL-N prior to the input to the transmitter.

(6) Establishment of station

In order to form a national network, broadcasting stations shall be established at 12 places in the country including one at Asunción as desired by the Government of the Republic of Paraguay. The priority of station establishment shall be arranged according to the wishes of the Government of the Republic of Paraguay.

As regards the transmitting station, its scale such as the transmitting power, etc., shall be determined in such a way as to cover the respective area effectively.

(7) Maintenance administration

For efficient maintenance administration of the stations in the country, the Asunción Station shall be equipped with function of a maintenance center to look after the maintenance of local stations.

(8) Buildings

The building shall be planned so as to suit the actual conditions of the Republic of Paraguay and shall be made to fill the minimum requirements. But care shall be taken to facilitate future expansions according to needs.

(9) Facilities plan

In mapping out the facilities plan, care shall be taken to design them in such a way as to ensure maximum economy, while making sure that they fulfil all the functional needs.

(10) Construction plan

The entire construction plan shall be implemented in three phases.

In the 1st phases, the Asunción Station and two local stations shall be constructed.

In the 2nd phases, while five more local stations shall be constructed, the program production facilities of the Asunción Station shall be expanded. In addition, microwave circuit facilities will be installed in the existing TV stations.

In the 3rd phases, while another four more stations shall be constructed, renewal of superannuated facilites shall be made.

## 2-2 Establishment of an Operational Body

### 2-2-1 Operation format

In order to implement the national educational television service according to the present scheme, establishment of an operational body with a format mentioned in the following is desirable.

(1) The operational body should be a public organ. Respecting the independence of education, it is desirable that the financial source of operation be entirely made dependent on the state treasury.

The format to depend on advertisement revenue for operation would be inappropriate in the present case as seen in the case of various other countries where advertisement is barred from educational broadcasts.

(2) It is desirable that "Consejo de Administración" or the administrative committee which is the operational body of the present educational television service of Paraguay be managed by the members of committee representing government authorities, the educational cricles, local cities and various other circles in the country.

(3) Subsidiary financial sources which are conceivable are the revenues from the TV receiving fees and the sales of text books, etc. As regards the revenue from advertisement, no advertisement which is deemed as being detrimental to school education should be allowed in relation to the programs intended for school.

### 2-2-2 Organization

Under the administrative committee which is "Consejo de Administración", the post of president (provisional title) shall be instituted under whom an internal organization shall be set up.

The internal organization shall be made up of the following departments for the time being as ones to be directly engaged in broadcasting service. It would be appropriate to diversify the system according to the expansion of broadcasting service.

(1) Program Department to take charge of compilation, production and control of broadcast programs.

(a) Program Production Division shall take charge of planning and production of programs.

(b) Program Control Division shall take charge of compilation, maintenance and procurement of programs, liaison with local stations, public information, publicity activities and any other businesses concerning program control which are necessary.

(2) Technical Department shall take charge of technical works concerning program production, station operation, program transmission, and maintenance administration.

(a) Engineering Division shall take charge of technical works concerning program production and station operation.

(b) Technical Administration Division shall take charge of program transmission, maintenance administration and any other necessary work concerning technical administration.
The duty of technical control and maintenance of local stations shall be assigned to this division.

(3) Administration Department shall take charge of affairs concerning finance, procurement, accounting, personnel and general affairs.

(a) Financial Division shall take charge of affairs concerning budget, procurement and accounting.

(b) General Affairs Division shall take charge of personnel affairs, training and administration. The personnel affairs of local stations shall also be administered by this division.

(4) Regarding the local stations, they shall be charged with appropriate functions according to their individual scale.

Generally, three divisions to take charge of programs, technical works and administration, respectively, shall be set up under the director of station for immediate requirements.

The organization chart is given in Figure III-IV-2.

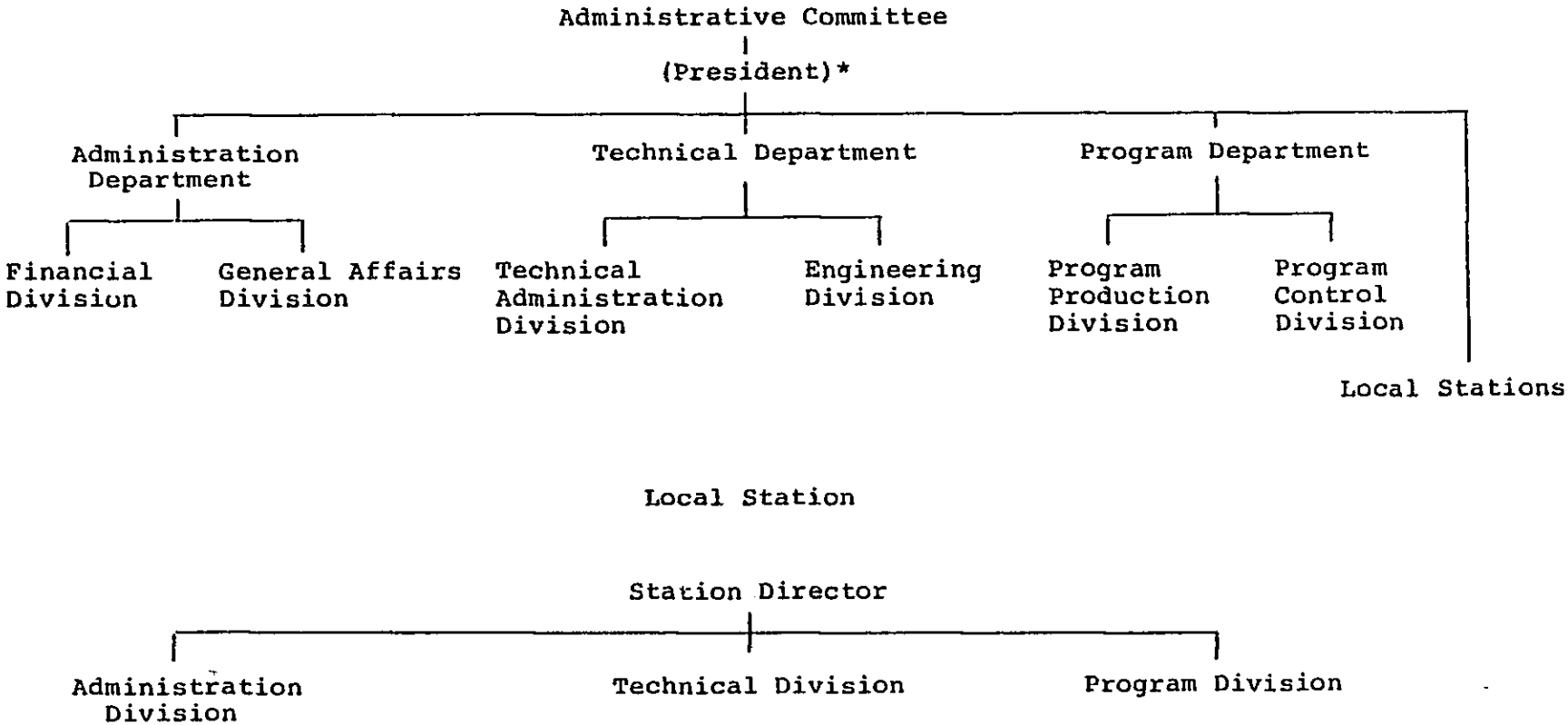
2-2-3 Legal provisions

In the Republic of Paraguay, broadcasting service is regulated by Act No.26504, "Regulations of the Radio Broadcasting Service" (Decreto Ley No.26504 Reglamento del Servicio de Radiodifusión) which is based on Act No.6422 "Telecommunication Law" (Decreto Ley No.6422 Ley de Telecomunicaciones).

With respect to the national educational television, similar laws, namely, the Act No.6422 and Act No.26504 are expected to be applied for regulation.

However, in applying the Act No.26504 to the national educational television, some appendix to the Act may have to be made.

As regards relevant legal provisions it is advised that thoroughgoing deliberation be made by the parties concerned of the Republic of Paraguay.




* Provisional title

Figure III-IV-2 Organization chart

## CHAPTER 3 FORMATION OF PLANS

### 3-1 Program Compilation Plan

The Republic of Paraguay, pays particular attention to the educational function of TV broadcasting. Under this plan, TV programs with emphasis on education and culture will be compiled as against the two existing commercial TV stations' highly entertaining programs.

#### 3-1-1 The basic idea for programming

(1) School education programs and adult education programs

Ascertaining the moves and intentions of Paraguayan educational circles, educational programs will be developed well based on reality.

(2) Cultural programs

Programs conducive to economic and social development and betterment as well as cultural promotion in the Republic of Paraguay will be developed.

(3) Information programs (News)

Programs of this category will take up problems related to national life, provide information useful for actual living and conduct various compaigns.

(4) Repeat-broadcast plan

In compiling the programs, the repeat-broadcasts of each program will be included appropriately in the programming in consideration of the users' convenience. For that purpuse, the programs will in principle be produced on videotapes.

(5) Broadcast Consultative Committee

A Broadcast Consultative Committee consisting mainly of educators and scholars will be established to determine the contents, hours and ratios of the above-mentioned groups of programs and coordinate programs.

3-1-2 School education programs

School broadcasts are for elementary school (six-year primary education) children and junior high school (three-year lower half secondary education) pupils. Broadcasts for students of senior high schools (three-year upper half secondary education) and universities are not considered in the current planning period. The reason is that the number of the students of these schools is small, and effective use of broadcasts cannot be expected. Another reason is that the subjects at these higher educational institutions are diverse and technical, and program for these levels of education will hardly evoke the interest of the general public. High school and university students had better be regarded as TV viewers of general cultural programs.

The curricula of elementary and junior-high schools are as shown in Figure III-IV-3. School education programs must naturally correspond to these curricula. However, inasmuch as TV broadcasts give diverse images, there may well be programs for pupils and students of plural or all levels of education. The major program plans are listed as follows:

(1) "Elementary Spanish Course Program"

For elementary school lower-graders, 50 percent of all school hours are used for teaching Castilian (Spanish: the official language). This program is aimed at systematically teaching Castilian from its very basics. Initially, the program will be for each of the three lower graders (from the first to the third graders), but as the study advances, the program will include those for higher graders (from the fourth to the sixth graders) as its viewers. (A program to be formulated independently.)

(2) "Comprehensive Educational Program"

This program comprehensively introduces nature, industries and living in various parts of the country and deals with science, health and sanitation, morality, labor and so on. Initially, the program is for the pupils in all grades of elementary shcool, but as the study advances, the program will branch out into those for lower graders, higher graders and junior high school pupil, respectively. (A program to be formulated independently.)

(3) "Other Programs"

The programs of this group are to be made flexibly whenever necessary, and are mainly for elementary school higher graders and junior high school pupils. They deal with matters related to science, mathematics, world geography, music, fine arts and so forth. The aim is to enrich school education. For the present, programs bought or procured from other countries will be used. (Procurement from other countries. Dubbing of some programs.)

3-1-3 Adult education programs

(1) "Illiteracy Education Programs"

These programs are for those with a low educational background like the illiterate and those who left the elementary school midway. The aim is to teach elementary and practical Castilian and increase the knowledge and capabilities needed for social life. (Programs to be made independently.)

(2) "General Education Programs"

The programs give knowledge and information on farming, stock-farming, handicraft manufacturing and other techniques of production. For housewives, there will be programs on health, childcare, nutrition and so forth to make home life sound and rich. (Programs to be made independently and those to be procured.)

(3) "Programs for School Teachers"

The programs deal with subjects and the methods of teaching and are intended to help train teachers. The programs will also give examples of using television for education and tell how to use it, thereby to help popularize education by broadcast. (Programs to be made independently.)

3-1-4 Cultural programs

The programs of this category are for the general public and are most competitive with the programs of the commercial TV stations. For the present, high-quality programs of music, movies, documentaries, animation and so on will be procured and broadcast. As the plan progresses and as the capability of program production grows, sports events will be relay-broadcast and special programs will be made to respond to the general public's expectations on educational TV broadcasting. (Programs to be procured and those to be made independently.)

3-1-5 Information programs (News)

The programs offer primarily educational and cultural information as well as commentaries on current topics. They also conduct campaigns and give publicity on TV programs. (Programs to be made independently.)

3-1-6 Repeat-broadcasts

In compiling the broadcasting schedules, the repeat-broadcasts of the programs will be systematically included. As regards the broadcasts directed to schools, the programs with a high usage rate will be scheduled for repeat-broadcasts; the same program will be broadcast both in the morning and in the afternoon and also within the same week. Plans may be formulated in such a way that a number of programs are broadcast collectively during the school vacations. Depending on the category or the nature of the program (for example, the Basics for Spanish Language), the particular program may be scheduled to be broadcast in the next

program-year. In view of the anticipated popularization of the TV receiving sets in this country, the repeat-broadcast plans, if they are established in an appropriate way, will after all prove to be convenient to the users of the programs and, for the broadcasting stations' side, they will create efficient production conditions. Similar considerations are necessary with respect to the adult education programs as well.

3-1-7 On the languages to be used

Considering the peculiarity of this country, where two languages are used, some programs should preferably contain Guarani words. Especially for the programs to be used for elementary school lower graders, for the education of the illiterate and for farm villages, this measure is absolutely necessary to make the contents of the programs familiar and easy to understand.

3-1-8 Broadcast hours and broadcast time periods

(1) Duration of programs

For independently-made programs, the broadcast duration will be 30 minutes or so for each program. For procured programs, the duration should be determined flexibly as occasion demands.

(2) Broadcast time periods

Now that the country adopts the two-shift teaching system, the school programs will be broadcast both within the morning hours (7:30 - 11:30) and within the afternoon hours (1:30 - 5:30). This does not apply to the school yearend vacation period (January - March). Adult education programs, cultural programs and information programs will be broadcast within the evening hours (6:30 - 10:30).

(3) Broadcast hours

(a) Under the first Five-Year Plan (1983 - 1987), broadcasting will be conducted for three hours a day on the average (including repeats).

(b) During the second Five-Year Plan (1988 - 1992), efforts should be made to increase the varieties of programs, and the average daily broadcast hours should be increased to six hours (including repeat broadcast hours).

(c) Under the third Five-Year Plan (1993 - 1997), the variety of programs will be further increased and the content and presentation of each program will be enriched. Special programs of large scale will also be produced. The broadcast hours will be an average of 6 hours a day (including repeats).

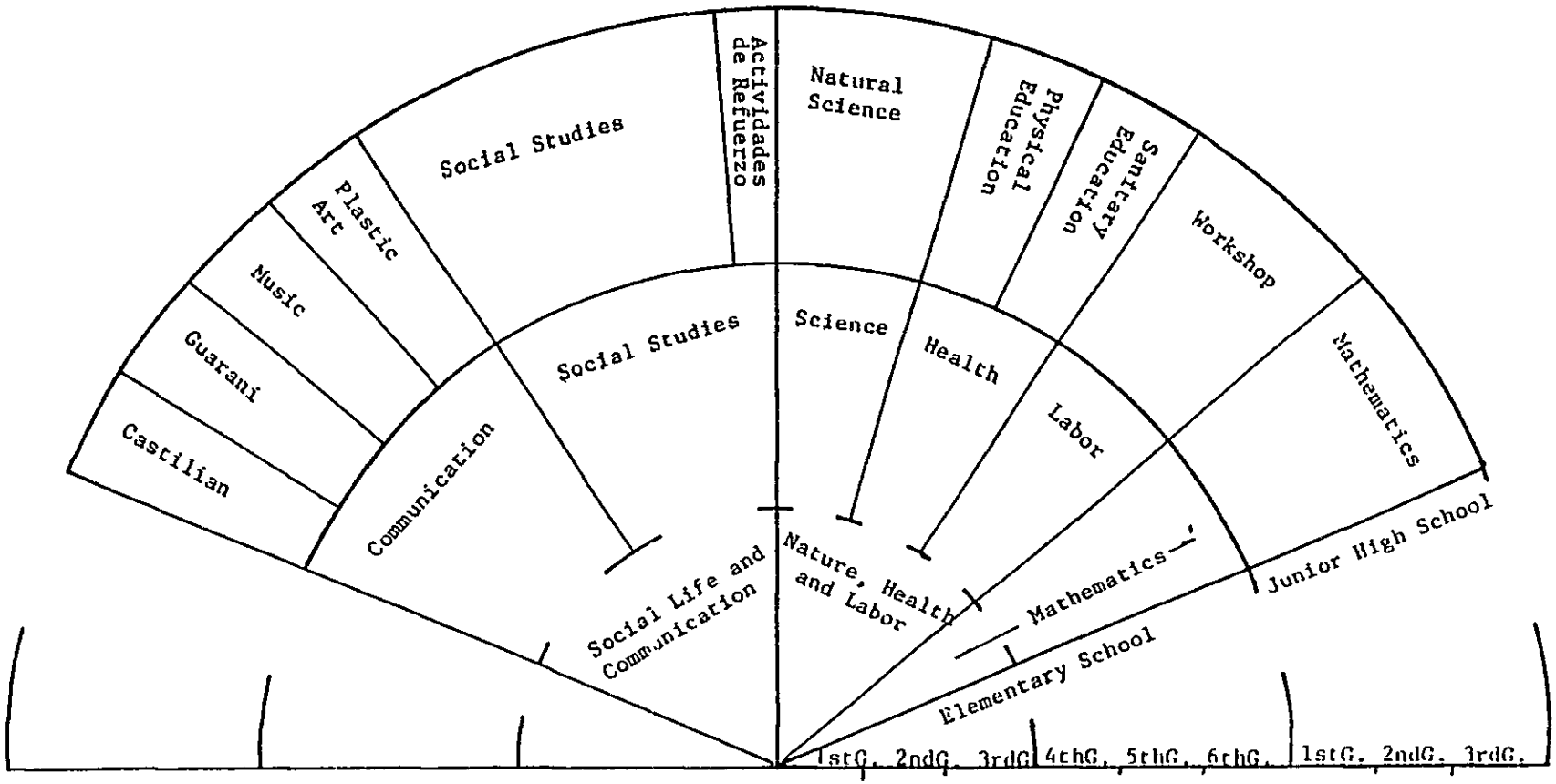



Figure III-IV-3 Curricula structure of elementary and junior high schools, Republic of Paraguay

## 3-2 Frequecy Plan

The most appropriate frequencies for the national educational television network plan of the Republic of Paraguay should be selected by taking into due consideration the conditions for the establishing of stations, on the basis of on-the-spot survey conducted at each city where the stations are proposed to be established.

### 3-2-1 Basic principles on selection of frequencies

(1) Frequencies shall be selected for the use of national educational television stations desired to be established at 12 areas of the Republic.

(2) The following provisions of the Technical Regulations concerning Television Operation (NORMAS TECNICAS PARA EL SERVICIO DE RADIODIFUSION EN TELEVISION) of the Republic of Paraguay will be applied.

a. Clause 4 of the Technical Regulations concerning the assignment and distribution of Channels. (Refer to Table III-IV-4).
However, in consideration of the popularity of television receivers etc., "BANDA I" and "BANDA II" will be designated.

b. The following matters prescribed in Clause 4 of the criteria for the determination of the minimum distance separation of TV stations.

(a) The minimum separation of stations of co-channels: 275 km.

(b) The minimum separation of stations of adjacent channels: 96 km.

(3) Regarding Service Area, the field strength will be 48 dB for "BANDA I" and 55 dB for "BANDA II" as the minimum values according to CCIR Recommendations. Althrough the rules for "the primary service area" of Republic of Paraguay provide 40 dB for "BANDA I" and 50 dB for "BANDA II", these values are deemed too low for color television and other factors.

(4) As to the required interference protection ratio, values provided by CCIR Recommendation 418-3 and Report 306-3 will be applied.

3-2-2 Method of frequency selection

(1) A usable clear channel will be selected on the basis of the result of field-strength measurement.

(2) Same frequency will be used as much as possible to ensure effective use of frequency.

(3) It will be made a principle to make selection from "BANDA II" considering the cost as well as transmitting and receiving conditions, but frequency will be selected from "BANDA I" in an inavoidable case.

(4) Selection will be made in consideration of the scale of transmission of each station provided in 3-3 Station Establishment Plan.

(5) The field strength (interference field strength) of each station producing disturbance on the areas of other stations is estimated on the basis of CCIR Recommendation 418-3, Report 306-3 (Interference Protection Ratio) and CCIR Recommendation 370-3 (Propagation Curves, refer to Fig. III-IV-4) in order to make selection so that the required interference protection ratio may be maintained.

For reference, a list of reception of foreign radio waves (refer to Table III-IV-5) and a result to field strength measurement (refer to Table III-IV-7) will be attached.

3-2-3 Result of frequency selection

The frequencies which are selected as a result of the investigation are listed in Table III-IV-6.

3-2-4 Observation of frequency selection

(1) In order to make the selected frequencies secure, there is urgent need for coordination with the neighbouring countries. It is especially so with regard to such areas as Pto. Pte. Stroessner and Salto del Guaira, where the frequency situation is very tight.

(2) In case coordination with the neighbouring countries should fail to be made by the time of submission of this Report, it might become necessary that the already selected frequencies be amended depending on the change in situation at the stage of implementation of the Construction Plan. In such circumstances, it would be appropriate to complement frequencies with "BANDA I" and "BANDA II" in objective, as mentioned in 3-2-1. But since no clear channel is possible to use in such circumstances, it may become necessary to study the possibility of using the adjacent channel to foreign radio waves or further the use of the co-channel, while maintaining the required interference protection ratio.

(3) To conveive "BANDA III" in mind as a complementary frequency is not appropriate from the following reasons:

a. In order to secure about the same size of service areas as "BANDA I" and "BANDA II", the transmitting power has to be increased, leading to swelling of the cost of transmitting facilities.

b. Because of the need for technology of higher level for "BANDA III", difficulty would arise in point of training of technicians, maintenance and operation.

b. Since reception is not possible with the existing TV receiver unless a converter is attached, or the receiver is replaced by a new one for "BANDA III", in addition to an antenna for "BANDA III", it would give extra burden on the TV viewers.

(4) In case "BANDA I" is used for a complementary frequency, more expense would require comparing to the occasion of using "BANDA II".

(5) With regard to areas where "BANDA I" is allocated, the receiver with an antenna for "BANDA II" is incapable of reception. Therefore, it should be thoroughly notified to the views in these areas that they should use appropriate antennas for "BANDA I" in order to ensure good reception.

Table III-IV-4 Numerical designation of television channels

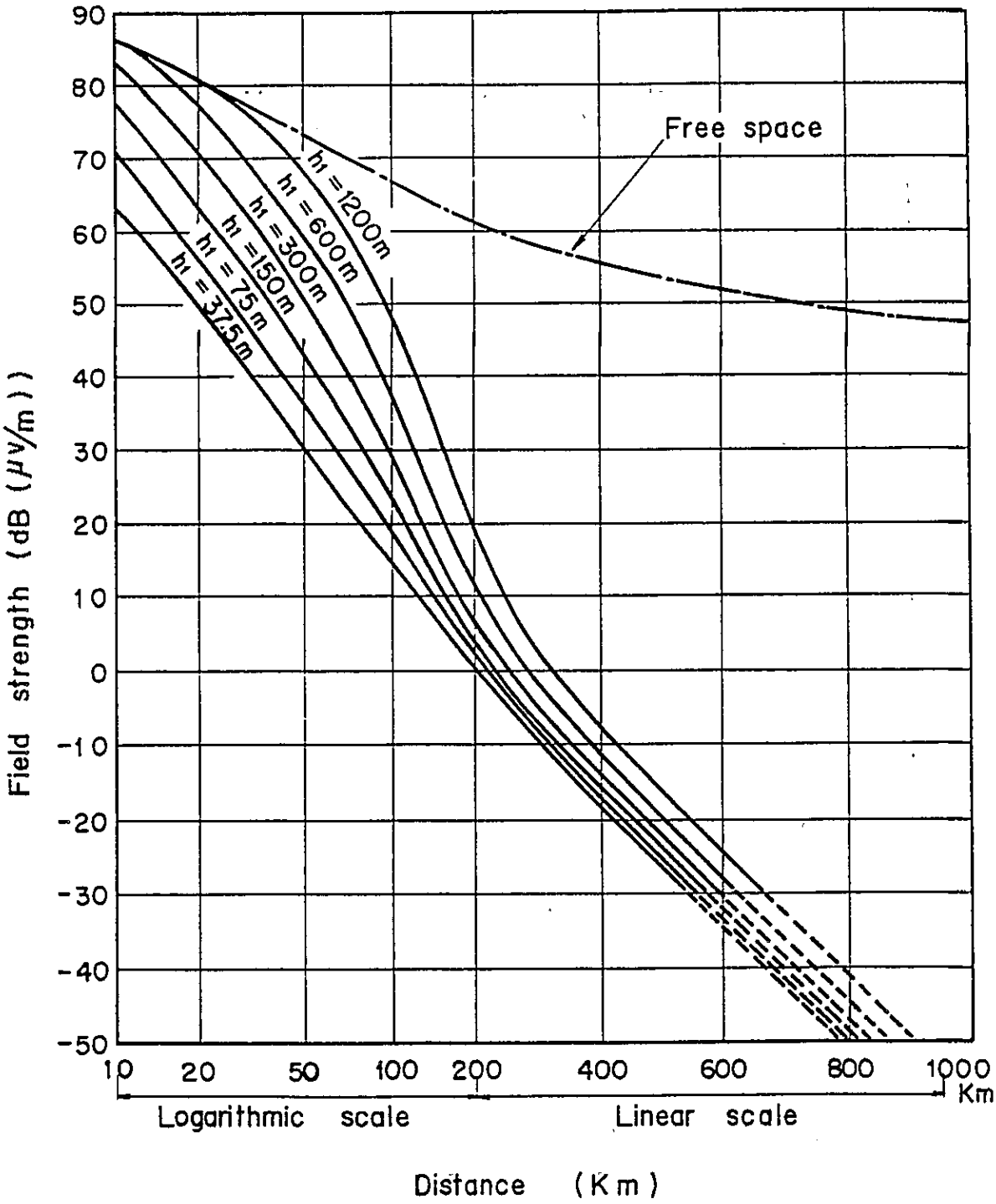
| BANDA | Channel No. | Frequency Band (MHz) |
|---|---|---|
| I | 2 | 54 ~ 60 |
| | 3 | 60 ~ 66 |
| | 4 | 66 ~ 72 |
| | 5 | 76 ~ 82 |
| | 6 | 82 ~ 88 |
| II | 7 | 174 ~ 180 |
| | 8 | 180 ~ 186 |
| | 9 | 186 ~ 192 |
| | 10 | 192 ~ 198 |
| | 11 | 198 ~ 204 |
| | 12 | 204 ~ 210 |
| | 13 | 210 ~ 216 |
| III | 14 ~ 83 | 470 ~ 890 |

Table III-IV-5 Reception of foreign radiowaves in the TV broadcasting channels

| Channel No. | Country | Channel No. | Country |
|---|---|---|---|
| 2 | Argentine<br>Brazil | 10 | Brazil |
| 3 | Argentine | 11 | Argentine<br>Brazil |
| 5 | Brazil | 12 | Argentine |
| 7 | Brazil | 13 | Argentine |
| 9 | Argentine<br>Brazil | | |

Table III-IV-6 Channel assignments of the national educational television

| Department | Region | Channel No. |
|---|---|---|
| Central | Asunción | 6 |
| Alto Paraná | Pto. Pte. Stroessner | 12 |
| Itapúa | Encarnación | 9 |
| Amambay | Pedro Juan Caballero | 12 |
| Canendiyú | Salto del Guairá | 13 |
| San Pedro | San Pedro | 8 |
| Boquerón | Mariscal Estigarribia | 7 |
| Guairá | Villarrica | 11 |
| Ñeembucú | Pilar | 5 |
| Concepción | Concepción | 10 |
| Misiones | San Juan Bautista | 8 |
| Paraguarí | Paraguarí | 3 |




Frequency: 30 to 250 MHz (Bands, I, II and III); Land, North Sea and Mediterranean region; 50% of the time; 50% of the locations; $h_2$ = 10 m

Figure III-IV-4 Field strength (dB (μv/m)) for 1 kW ERP. (CCIR REC 370-3)

Table III-IV-7 Results of measurement of field strength in the VHF-band TV channels (Vision carrier frequency)

(Unit: dB μv/m)

| Region \ Channel | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASUNCION | 52 | - | - | - | - | *1 - | - | 105 | - | 53 | - | 96 | CH 2 CH 11 Argentina |
| ENCARNACION | - | - | - | - | - | *2 | - | - | - | - | 79 | 19 | CH 12 Argentina |
| PUERTO PTE. STROESSNER | 4 | 63 | - | 84 | 16 | - | 91 | 16 | 82 | 25 | - | - | CH 3 CH 5 Brazil CH 10 |
| PILAR | - | - | - | - | - | *2 | - | 17 | - | 38 | - | 19 | CH 9 CH 11 Argentina CH 13 |
| PEDRO JUAN CABALLERO | - | - | - | - | - | 51 | - | - | - | - | - | - | CH 7 Brazil |
| SALTO DEL GUAIRA | 48 | - | 21 | 56 | 14 | - | - | 51 | - | 42 | - | 19 | |
| MARISCAL ESTIGARRIBIA | - | - | - | - | - | - | - | - | - | - | - | - | |
| CONCEPCION | - | - | - | - | - | - | - | - | - | - | - | 6 | |
| VILLARRICA | - | - | - | - | - | - | - | 35 | - | - | - | 32 | |
| SAN JUAN BAUTISTA | - | - | - | - | - | - | - | - | - | - | - | 5 | |
| CAAGUAZU | - | - | - | - | - | - | - | 11 | - | - | - | 16 | |
| PARAGUARI | - | - | - | - | - | - | - | *2 | - | - | - | 35 | |
| SAN PEDRO | - | - | - | - | - | - | - | 2 | - | - | - | 3 | |

(Note) Measured by,
Field-strength meter, Anritsu Model M-321C
Antenna height, 4m

*1 Licence permitted, but unconstructed.

*2 Not on-air at time of measurement.

## 3-3 Station Establishment Plan

### 3-3-1 Basic conception in planning of the station establishment program

In examining the program relative to such matters as the selection of the areas where the stations are to be established and the conditions of transmission etc., the following points may be considered as the basic requirements:

(1) Objective areas of station establishment

The areas where the Government of Republic of Paraguay is interested in opening television stations for its national educational television are the following 12 areas including Asunción, the capital of the Republic.

Asunción, Pto. Pte. Streoessner, Encarnación, Pedor Juan Caballero, Salto del Guairá, San Pedro, Mariscal Estigarribia, Villarrica, Pilar, Concepción, San Juan Bautista, Paraguarí.

As for Paraguarí Station, it is advisable to study the necessity of the station establishment after Asunción Broadcasting Station actually starts the operation, based on the field survey results in the service area. In the case of establishing the Paraguarí Station, it is necessary to study carefully the requirements of producing programs for determination of the ranking of station.

(2) Order of priority

The order of priority for establishing stations shall be as listed in (1). The order of areas is determined in consideration of population, the current situation of education in the respective areas, the social and cultural influences from the neighbouring countries as well as propositions on priority of the Government of Republic of Paraguay.

Besides, sufficient care needs to be taken as to security of frequencies in the border regions.

(3) Sties of TV stations

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. The TV station should be set up in the main city in the respective areas in due consideration of traffic condition, power source, and housing and environmental conditions etc. which may have bearing on the operation of station.

3-3-2 Estimation of service areas

The calculation of field strength and the determination of coverage of broadcasting stations for the estimation of service areas are carried out as follows:

(1) Required field strength

For the estimation of service areas, the minimum value of field strength should essentially be determined in order to ensure reception in a good picture quality.

The figures provided by the CCIR Recommendation 417-2 are adopted for the required field strength, as follows:

| | |
|---|---|
| "BANDA I" | 48 dB |
| "BANDA II" | 55 dB |

(2) Estimation of reception field strength

Estimation of the reception field strength shall be worked out by means of the propagation curve provided by the CCIR Recommendation 370-3. On the basis of the value thus obtained, a required effective radiated power (transmission scale) shall be worked out.

(3) Topographical features

The topography of Republic of Paraguay is generally featured by a flat land, except for the region east of Asunción where a rolling hilly land extends, presenting a topographical feature which is disadvantageous for radio wave propagation.

Determination of these topographical conditions which largely concern radio wave propagation shall be done on the basis of the on-the-spot survey result of the areas of station establishment carried by JICA Mission, although it was for a short period of time, and also through a profile study of the existing maps. Service areas are estimated with due correction on the basis of findings by JICA Mission.

3-3-3 Population distribution

The Republic of Paraguay has a population of about 2.4 million (1972), most of which is concentrated in the southeastern region of Asunción, and the northern region is sparsely populated generally.

In making estimation of the service areas, we shall map out a plan to enable effective service on the basis of a list of city populations provided by the Government of Republic of Paraguay (as of 1972).

3-3-4 Scale of transmission

The scale of transmission with respect to the 12 objective areas of station establishment has been worked out as a result of our examination as given in Table III-IV-8.

3-3-5 Observation

The coverage by the transmission scale as shown in Table III-IV-8 is approximately 45% of the population of Asunción

providing the station is established in that city, about 56% by the end of the first five-year period, about 79% by the end of the second five year period. When the stations in the entire 12 areas should have been established, the coverage is expected to reach approximately 93% of the entire population of Paraguay (based on the population data as of 1972). However, considering the fact that our survey on the spot was of a short period of time and in the present circumstances that no perfect topographical maps to give details of topographical features of the country are available, further detailed study is deemed necessary in the stage of actual implementation of the construction plan.

Since the stations will be established one by one, it is deemed also important to strive to examine an effective transmitting condition by thoroughly checking the receiving condition of the preceding stations which are already operating.

It should be noted that even if stations are actually established in these entire 12 areas, a 100% coverage is not yet to be achieved. In order to expand the service area further, there will be need for propelling establishment of complementary stations.

As for establishment plan of TV broadcasting stations, in the regions where are excluded from the service areas of planned stations, after the related broadcasting stations are established, it is advisable to establish repeater stations, cable TV systems, etc., based on the results of field survey in the service areas.

Table III-IV-8 List of transmitting scales

| Sites for station establishment | Max. Service radius (km) | Height of antenna (m) | Required ERP (dB/kW) | Transmitting scales (dB) | Channel assignments |
|---|---|---|---|---|---|
| Asunción | 120 | 250 | 25 | 73 | 6 |
| Pto. Pte. Stroessner | 80 | 150 | 22 | 66 | 12 |
| Encarnación | 80 | 150 | 22 | 66 | 9 |
| Pedro Juan Caballero | 75 | 150 | 20 | 64 | 12 |
| Salto del Guairá | 75 | 150 | 20 | 64 | 13 |
| San Pedro | 75 | 150 | 20 | 64 | 8 |
| Mariscal Estigarribia | 60 | 150 | 16 | 60 | 7 |
| Villarrica | 70 | 150 | 18 | 62 | 11 |
| Pilar | 80 | 150 | 18 | 62 | 5 |
| Concepción | 110 | 250 | 30 | 74 | 10 |
| San Juan Bautista | 60 | 150 | 16 | 60 | 8 |
| Paraguari | 45 | 100 | 2 | 46 | 3 |

[Notes]

Conditions for studies of transmitting scales

(1) Required field strength

Based on the following values as mentioned in the CCIR Recommendation 417-2:

"BANDA I" - - - - - - - - - - - - 48dB

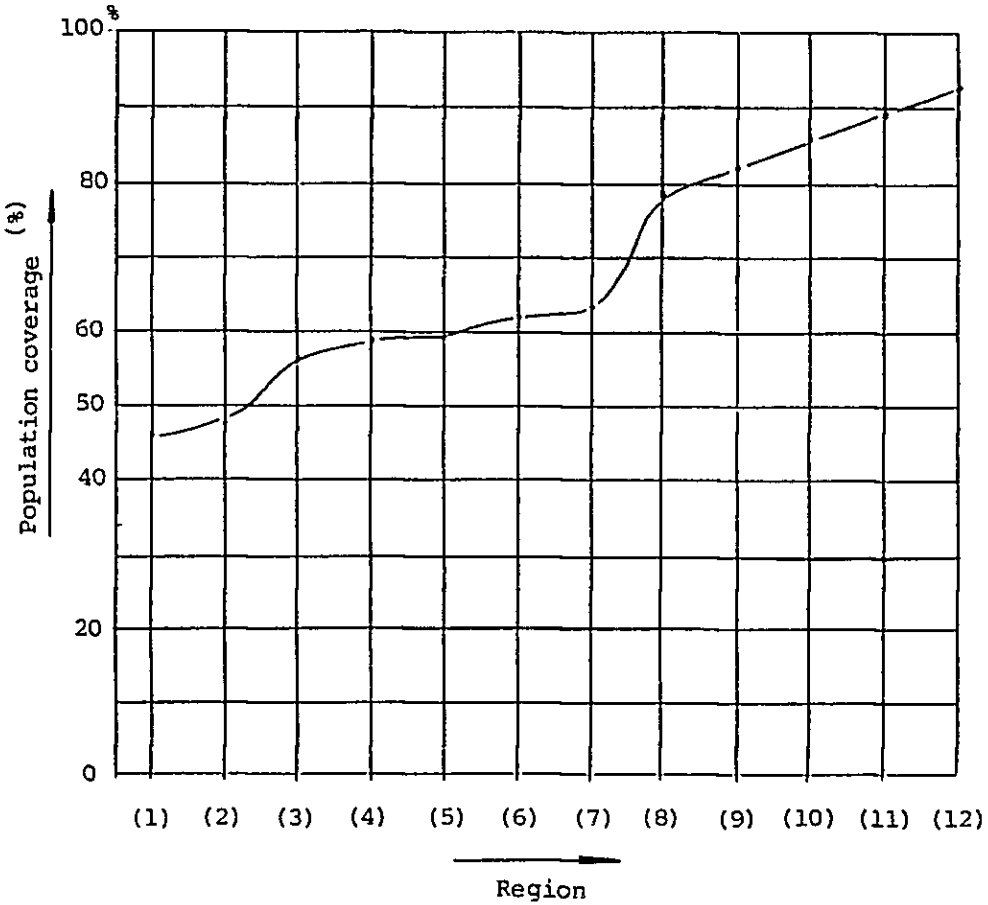
"BANDA II" - - - - - - - - - - - 55dB

(2) Radiowave propagation curve

Based on the CCIR Recommendation 370-3.

| Coverage \ Region | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population Coverage; by Region (%) | 45.2 | 3.2 | 7.8 | 2.1 | 0.9 | 2.9 | 1.0 | 15.9 | 2.5 | 4.3 | 3.3 | 3.3 |
| Accumulated Values of Population Coverage (%) | 45.2 | 48.4 | 56.2 | 58.3 | 59.2 | 62.1 | 63.1 | 79.0 | 81.5 | 85.8 | 89.1 | 92.4 |

(Population is based on the 1972 data)




(1) Asunción
(2) Pto. Pte. Stroessner
(3) Encarnación
(4) Pedro Juan Caballero
(5) Salto del Guairá
(6) San Pedro
(7) Mariscal Estigarribia
(8) Villarrica
(9) Pilar
(10) Concepción
(11) San Juan Bautista
(12) Paraguarí

Figure III-IV-5 Service coverage of the national educational television network

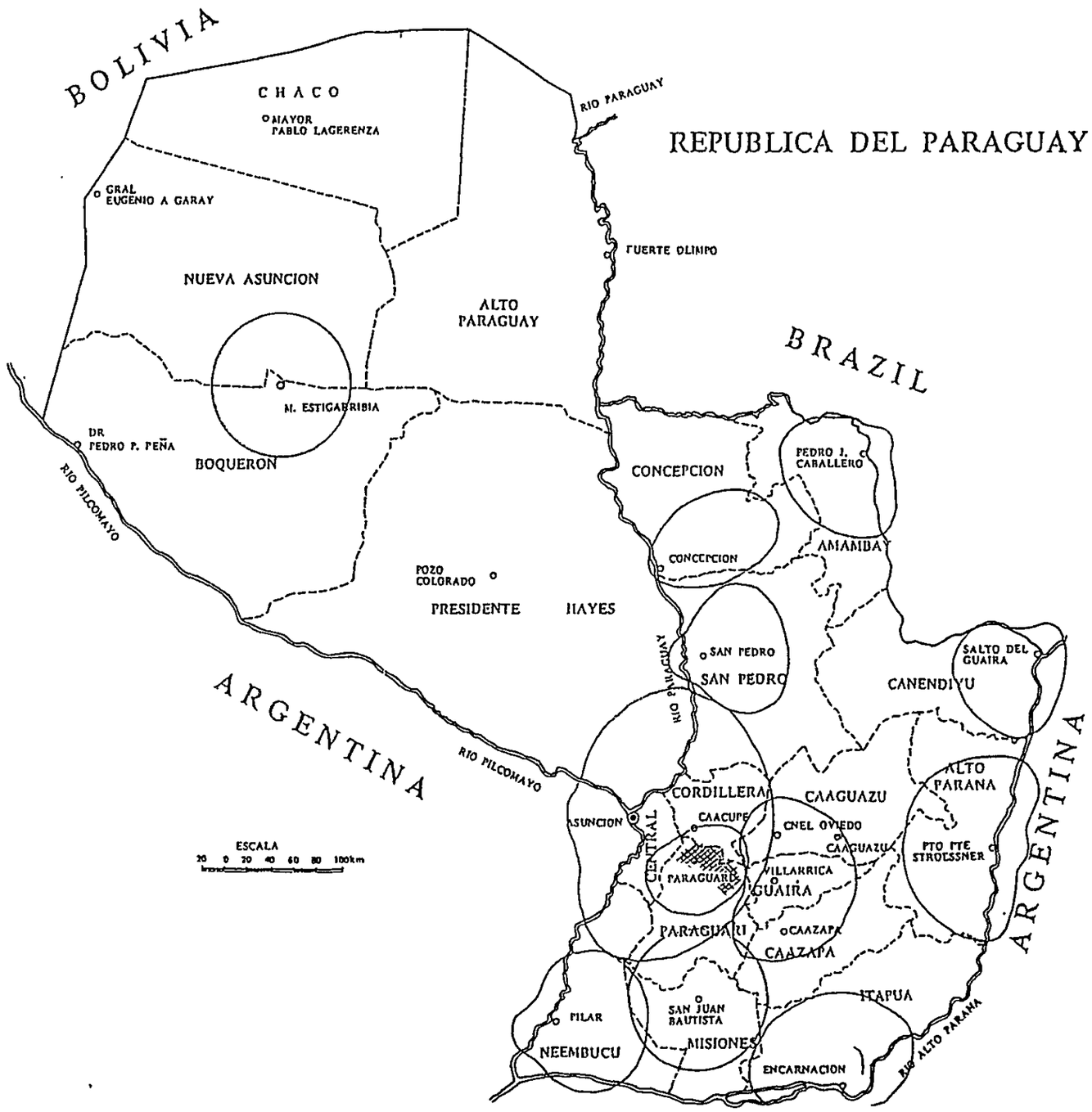



Figure III-IV-6 Service area map

Table III-IV-9 List of city populations of Republic of PARAGUAY

(As of 1972)

| | |
|---|---|
| ASUNCION | 387,676 |
| CONCEPCION | 108,567 |
| Concepción | 45,453 |
| Belén | 9,465 |
| Horqueta | 33,164 |
| Loreto | 12,624 |
| San Carlos | 2,212 |
| San Lázaro | 5,649 |
| SAN PEDRO | 137,515 |
| San Pedro | 26,092 |
| Antequera | 2,208 |
| Gral. Aquino | 18,611 |
| Itacurubi del Rosario | 10,979 |
| Lima | 6,025 |
| Nueva Germania | 4,510 |
| San Estanislao | 42,408 |
| Tacuati | 2,198 |
| Unión | 13,718 |
| Villa del Rosario | 10,766 |
| CORDILLERA | 195,048 |
| Caacupé | 22,072 |
| Altos | 10,424 |
| Arroyos y Esteros | 19,076 |
| Atyrá | 8,883 |
| Caraguatay | 18,255 |
| Emboscada | 6,651 |
| Eusebio Ayala | 15,482 |
| Isla Pucú | 8,954 |
| Itacurubí de la Cordillera | 9,558 |
| Juan de Mena | 4,433 |
| Nueva Colombia | 3,507 |
| Piribebuy | 21,971 |
| Primero de Marzo | 7,261 |
| San Bernardino | 5,527 |
| Santa Elena | 9,526 |
| Tobatí | 14,410 |
| Valenzuela | 9,058 |
| GUAIRA | 124,424 |
| Villarrica | 33,178 |
| Borja | 8,943 |
| Cnel. Martinez | 7,355 |
| Felix P. Cardozo | 5,533 |
| Gral. Eugenio A. Garay | 6,686 |
| Indeppendencia | 14,636 |
| Itapé | 6,941 |
| Iturbe | 8,994 |
| José Fassardí | 4,602 |
| Mauricio José Troche | 4,404 |
| Mbocayaty | 6,227 |
| Natalicio Talaverao | 5,811 |
| (others) | 11,114 |
| CAAGUAZU | 182,657 |
| Coronel Oviedo | 47,986 |
| Caaguazú | 38,215 |
| Carayaó | 8,868 |
| Curuguaty | 1,854 |
| Dr. Cecilio Báez | 7,802 |
| Dr. Juan Manuel Frutos | 14,818 |
| Nueva Australia | 10,223 |
| San Joaquin | 20,742 |
| San José | 15,161 |
| Ygatimi | 1,217 |
| Yhú | 12,987 |
| Ypejhú | 2,784 |

(Note) This list has been copied from the material provided by the Republic of Paraguay.

| | |
|---|---|
| CAAZAPA | 102,605 |
| Caazapá | 22,108 |
| Abai | 8,160 |
| Buena Vista | 3,122 |
| Dr. Moisés S. Bertoni | 3,598 |
| Gral. Higinio Morínigo | 6,470 |
| Maciel | 4,862 |
| San Juan Nepomuceno | 18,281 |
| Tabaí | 3,345 |
| Yegros | 7,834 |
| Yuty | 24,825 |
| ITAPUA | 201,561 |
| Encarnación | 41,088 |
| Bella Vista | 10,448 |
| Cambyretá | 7,284 |
| Cápitán Meza | 17,080 |
| Capitán Miranda | 8,412 |
| Cap. Vicente A. Matiauda | 7,290 |
| Carmen del Paraná | 5,783 |
| Coronel Bogado | 13,126 |
| Fram | 13,945 |
| General Artigas | 13,036 |
| General Delgado | 6,811 |
| Hohenau | 5,008 |
| Jesús | 5,621 |
| Obligado | 6,376 |
| San Cosme y Damián | 6,272 |
| San Pedro del Paraná | 30,080 |
| Trinidad | 3,901 |
| MISIONES | 69,210 |
| San Juan Bta. de las Misiones | 12,340 |
| Ayolas | 2,554 |
| San Ignacio | 15,993 |
| San Miguel | 4,907 |
| San Patricio | 2,558 |
| Santa Maria | 6,204 |
| Santa Rosa | 18,045 |
| Santiago | 5,280 |
| Villa Florida | 1,329 |
| PARAGUARI | 210,592 |
| Paraguarí | 13,765 |
| Acahay | 16,134 |
| Caapucú | 7,781 |
| Caballero | 9,403 |
| Carapegúa | 27,163 |
| Escobar | 6,243 |
| La Colmena | 5,043 |
| Mbuyapey | 10,925 |
| Pirayú | 10,914 |
| Quindy | 16,372 |
| Quyquyhó | 7,802 |
| R. González de Santa Cruz | 12,505 |
| Sapucai | 8,437 |
| Tebicuary mí | 5,321 |
| Yaguarón | 19,317 |
| Ybycuí | 25,629 |
| Ybytimí | 7,838 |
| ALTO PARANA | 90,312 |
| Hernanderias | 34,385 |
| Dr. Juan L. Mallorquín | 10,451 |
| Irala | 2,659 |
| Itakyry | 5,935 |
| Juan E. O'Leary | 8,028 |
| Ñacunday | 2,366 |
| Pto. Pte. Stroessner | 26,488 |

| | |
|---|---|
| CENTRAL | 309,956 |
| Areguá | 11,202 |
| Capiata | 26,513 |
| Fernando de la Mora | 36,774 |
| Guarambaré | 6,781 |
| Itá | 25,204 |
| Itauguá | 20,249 |
| Lambare | 31,651 |
| Limpio | 12,751 |
| Luque | 40,598 |
| Mariano R. Alenso | 7,400 |
| Nueva Italia | 5,941 |
| Ñemby | 6,882 |
| San Antonio | 7,244 |
| San Lorenzo | 36,754 |
| Villa Elisa | 4,750 |
| Villeta | 13,357 |
| Ypacaraí | 10,454 |
| Ypané | 5,451 |
| ÑEEMBUCU | 73,001 |
| Pilar | 17,193 |
| Alberdi | 4,444 |
| Cerrito | 5,654 |
| Desmochados | 3,206 |
| Gral José E. Diaz | 4,071 |
| Guazú Cuá | 2,953 |
| Humaitá | 2,769 |
| Isla Umbú | 3,903 |
| Laureles | 5,077 |
| Mayor José de Jesús Martinez | 4,941 |
| Paso de Patria | 1,360 |
| San Juan Bta. de Ñeembucú | 6,508 |
| Tacuaras | 3,265 |
| Villa Franca | 1,342 |
| Villa Oliva | 3,408 |
| Yabebyry | 2,907 |
| AMAMBAY | 66,174 |
| Pedro Juan Caballero | 49,371 |
| Bella Vista | 6,597 |
| Capitán Bado | 10,206 |
| PTE. HAYES | 37,679 |
| Villa Hayes | 31,185 |
| Benjamín Aceval | 6,494 |
| BOQUERON | 26,285 |
| Mcal. Estigarribia | 24, 185 |
| Puerto Pinasco | 2,100 |
| OLIMPO | 5,528 |
| Fuerte Olimpo | 5,528 |

## 3-4 Studio Facilities Plan

### 3-4-1 Policy for the planning

(1) Standard system for color television

The standard system for color television in Paraguay is PAL-N. In the circumstances, however, that PAL-B is being adopted in a number of countries and also jointly for studio facilities of commercial stations in Paraguay itself (Channels 9 and 13), and considering the conveniences of the supply and purchasing of broadcast programs, PAL-B standards shall be adopted for the studio facilities to be devised so that it be converted to PAL-N system before the input to the transmitter.

As regards the VTR, too, it would be appropriate to have it devised in such a way as to enable reproducting of NTSC recordings in view of the scope of the supply and purchasing of programs from the United States and Japan, etc.

(2) Drafting of the plans

In drafting the plans for this project, it will be appropriate to give comprehensive considerations to the broadcasting time, the number of programs to be produced and the staff training. It should be noted especially that the production of programs largely depends on the working staff (both the engineering and the program production staffs) with respect to the production capacity, quality and contents of the program.

For these reasons, it would be appropriate to proceed with arrangements in accordance with the Table III-IV-10 which shows the policy for each stage.

### 3-4-2 Selection of main items of equipment

(1) Studio facilities

The scale and individual facilities of a television studio should differ according to the type of programs to be produced. Table III-IV-11 shows some general examples.

As mentioned in 3-1: Program Compilation Plan, the present plans are meant for telecasting of educational, cultural and news programs. Hence, it would be appropriate to constitute the Asunción Broadcasting Center with a general purpose studio of 200 $m^2$ class and a news studio of 50 $m^2$ class, and the local stations with a news studio of 50 $m^2$ class each.

(2) Color television cameras and VTR

With regard to the color television cameras, small adjustment-free handy cameras are popular today, resulting in the practical use of ENG (Electronic News Gathering) in combination with a portable VTR over the past several years. Of these, it will be appropriate to compose the ENG system with a 3-tube camera of ENG type which satisfies the broadcast specifications and which can also be used as a studio camera.

Regarding the VTR, currently popular are a 1-inch VTR capable of slow-motion reproducing and easy to edit (C-format), 3/4-inch VTR (U-matic standard), also small type, easy to edit and highly operative, and a 1/2-inch VTR (VHS & Betamax standards), small and low-cost and capable of long-hour recording and reproducing, though it is meant primarily for home use. Table III-IV-12 shows a comparison of the performance and price, etc., among these three kinds of VTR. It is appropriate to use a 3/4-inch type in composing a VTR system.

Incidentally, in this particular field, as result of technological innovations, everything is moving towards small/lightweight and high operatability. In the near future, a VTR camera which is a combination of a TV camera and a VTR is expected to come into practical use.
Also, there is every sign of a video disc being merchandised and spread. When this commodity will have spread, the TV programs will have sold at low price and used effectively in broadcasts. For these reasons, it will be appropriate to determine the types of equipment to be adopted in line with the technological trends, although such types of equipment as mentioned above have been designated in the present plan.

3-4-3 Scale and outline of stations

The national educational television is to be made up of the Asunción Broadcasting Center and 11 local stations. In Paraguay, there is little regional difference in culture or customs and, consequently, there is little need of producing and broadcasting a different program for each region, inasmuch as the present project aims at spreading education throughout the country. Therefore, it would be appropriate to designate the scale and function of each station in accordance with the following principles.

(a) The facilities and the staff for program production are to be concentrated in the Asunción Broadcasting Center in order to efficiently produce and broadcast programs of high quality and to send those programs to local stations by means of videotape or of TV transmission microwave circuits (Refer to 3-8: Program Transmission Plan).

The center is to be provided with OB vans and ENG equipment to go round the locals for program production.

(b) The local stations are to be provided with the facilities for reproducing the videotaped programs sent from the Asunción Broadcasting Center. Also, small-scale facilities will be installed for use in broadcasting news and publicity programs. With these as the basis, the structure of the national educational television and the operational form will be shown in Fig. III-IV-7.

(1) Asunción Broadcasting Center

The outlines of facilities at the Asuncion Broadcasting Center are shown in Fig. III-IV-8 and Table III-IV-14. Furthermore, the program types as explained in 3-7 (Program Production Plan) and their relationship with the program utilization facilities are shown in Table III-IV-13.

The program production by filming is expensive and requires the process of film development. Besides, it tends to make the picture quality uneven. For these reasons, it is being gradually replaced by ENG. Hence, the program production by filming is ruled out here. However, it would be appropriate to install telecine equipment only in the Asunción Broadcasting Center to ensure effective use of the films already owned or those additionally purchased.

(2) Local stations

The organizational setup and the general description of facilities of local stations are shown in Fig. III-IV-9 and Table III-IV-15.

3-4-4 Implementation plan

In line with the policies as mentioned in the 3-4-1 (2) concerning the Drafting of Plans, the Table III-IV-16 has been drawn up to show the expansion plan for studio facilities in each construction stage. In the 3rd stage, it will become necessary to consider the renewal of the superannuated facilities which were installed in the 1st construction stage. Those to be

renewed in the 3rd stage will include, among the facilities installed in the lst stage, the VTRs for transmission of programs, the ENG equipment and the VTR editors, all of whose usage conditions are very severe.

Table III-IV-10 Policy for implementation plans

| Work of stages | Number of Broadcasting Hours *1 | Number of Programs Produced *1 | Asunción Broadcasting Center | Local Broadcasting Stations |
|---|---|---|---|---|
| 1st stage | 3 hrs./day | 1-2 programs/day | The minimum necessary level of program production and transmission facilities to start the broadcasting service shall be installed. | One set of studio facilities shall be installed in time for the opening of the respective stations |
| 2nd stage | 6 hrs./day | 4-5 programs/day | In order to extend the broadcasting hours, program production facilities including studios and OB vans shall be additionally installed.<br>Microwave network will be used partially. | |
| 3rd stage | 6 hrs./day | 6 programs/day | In order to enrich the program contents, the OB vans shall be additionally procured, while part of the facilities which are superannuated shall be renewed.<br>Microwave network will be used. | |

*1 Refer to 3-1 (Program Compilation Plan)

Table III-IV-11 An example of the scale of studio

| Factors / Kind of Programs | Studio space (m2) | Studio Control Room (m2) | Number of Cameras | Lighting Facilities | | |
|---|---|---|---|---|---|---|
| | | | | Number of Battens | Power Capacity (kVA) | Dimmer Capacity (kVA) |
| News, Announcements | 15 - 35 | 40 - 50 | 1 | 1 | 10 | Non dimmer |
| Educational Programs, Interviews | 150 - 250 | 40 - 50 | 2 - 3 | 20 | 150 | 150 |
| Dramas | 350 | 40 - 50 | 3 - 4 | 45 | 200 | 200 |
| Drama, Music, Variety shows | 500 - 1000 | 40 - 50 | 4 - 5 | 60 - 80 | 200 - 300 | 200 - 300 |

Table III-IV-12 Comparison of various types of VTRs

| Evaluation items / VTR | Price | Performance | Editing/Dubbing | Maintenance | Spread | Overall Evaluation |
|---|---|---|---|---|---|---|
| 1-inch VTR | × | Broadcast standard | o | × | o | Δ |
| 3/4-inch VTR | Δ | Broadcast standard | o | Δ | o | o |
| 1/2-inch VTR | o | Family-use standard | × | o | o | × |

Notes: o Appropriate

Δ Fairly appropriate

× Inappropriate

Table III-IV-13 Operation of program production facilities

| Type of Programs *1 / Equipments | A*2 | B, C & D | E | F | G |
|---|---|---|---|---|---|
| General Purpose Studio | | O | O | | |
| News Studio | O | | | | |
| OB Van | | | | O | |
| ENG | O | | O | | O |
| Editing System | O | | | | O |
| Telecine | O | O | O | | |
| Announcing Studio | | | | | O |

*1 Refer to 3-7 Program Production Plan and Table III-IV-21

*2 Programs of A type only can be produced at local stations

Table III-IV-14 General description of facilities at Asunción Broadcasting Center

| Rooms | Purpose | Equipments |
|---|---|---|
| General Purpose Studio | Production and VTR recording of studio programs, Live broadcast from Studio | Studio(200m2), Studio Control Room(50m2), Color-camera 3 Lighting Equipment 2, Video Control Equipment 2, Audio Control Equipment 2. |
| VTR Telecine Room | Program transmission by VTR, Program production by film- & slide-projector (insert to General Purpose Studio) | VTR for reproducing 2, Telecine 2. |
| Editing Room | Editing of programs produced by ENG or in studio. Sound dubbing on VTR, VTR dubbing, Tape storage. | Announce Studio 1, Audio Control Equipment 1, VTR Editing system 6. |
| Master Control Room | Program control, Live broadcast from News Studio. | News Studio(50m2), Color-camera 1, Video Control Equipment 1, Audio Control Equipment 1, Master Control Equipment 1. Microwave Link Equipment 1. |
| Maintenance Room | Maintenance of equipments. Storage of ENG equipment. | Measuring equipment 1, ENG system 6. |
| OB Van | Program production in the field, Outside Broadcast (live broadcast) | OB van 2. |

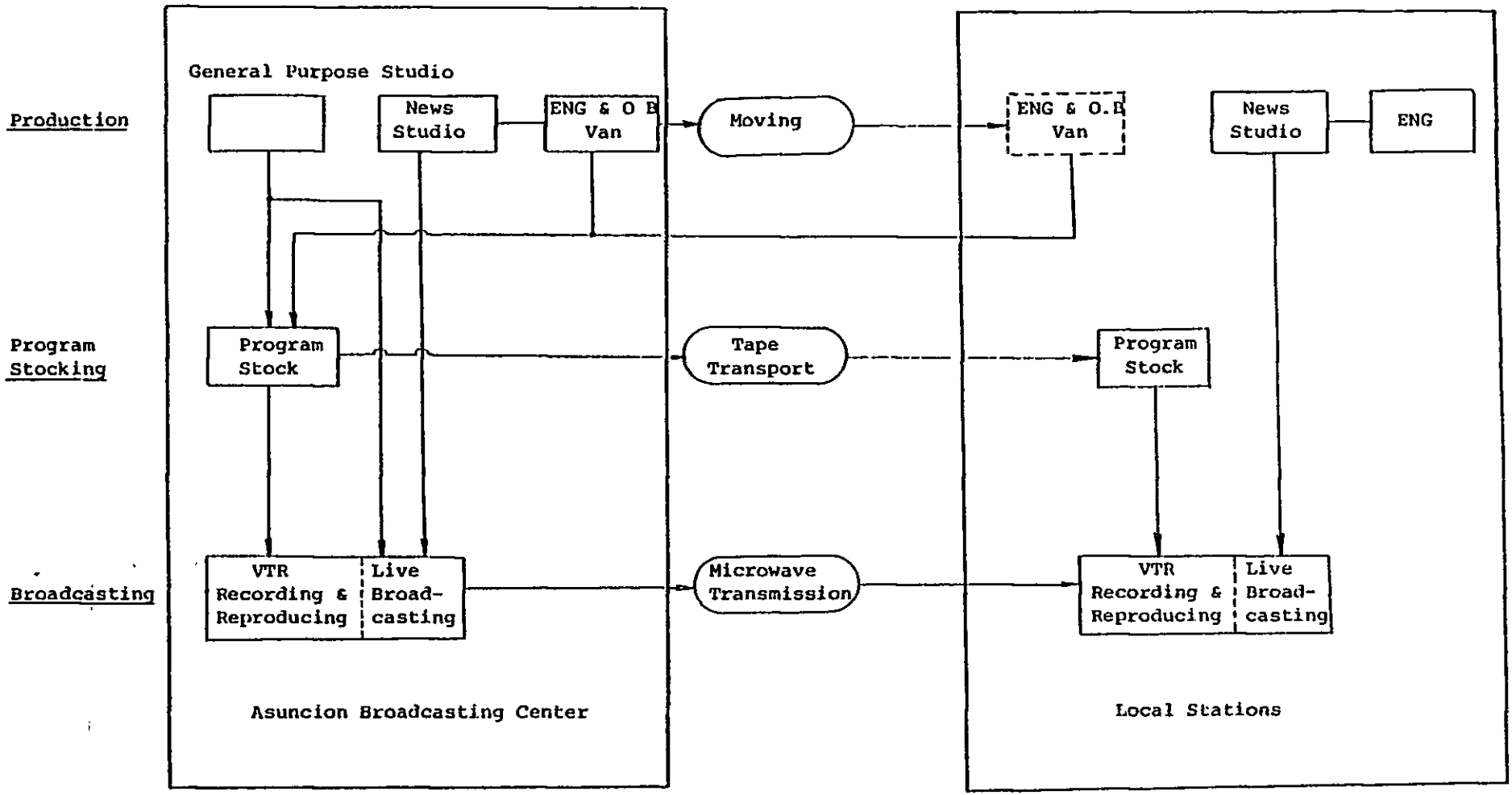



Figure III-IV-7 Broadcasting system of the national educational television

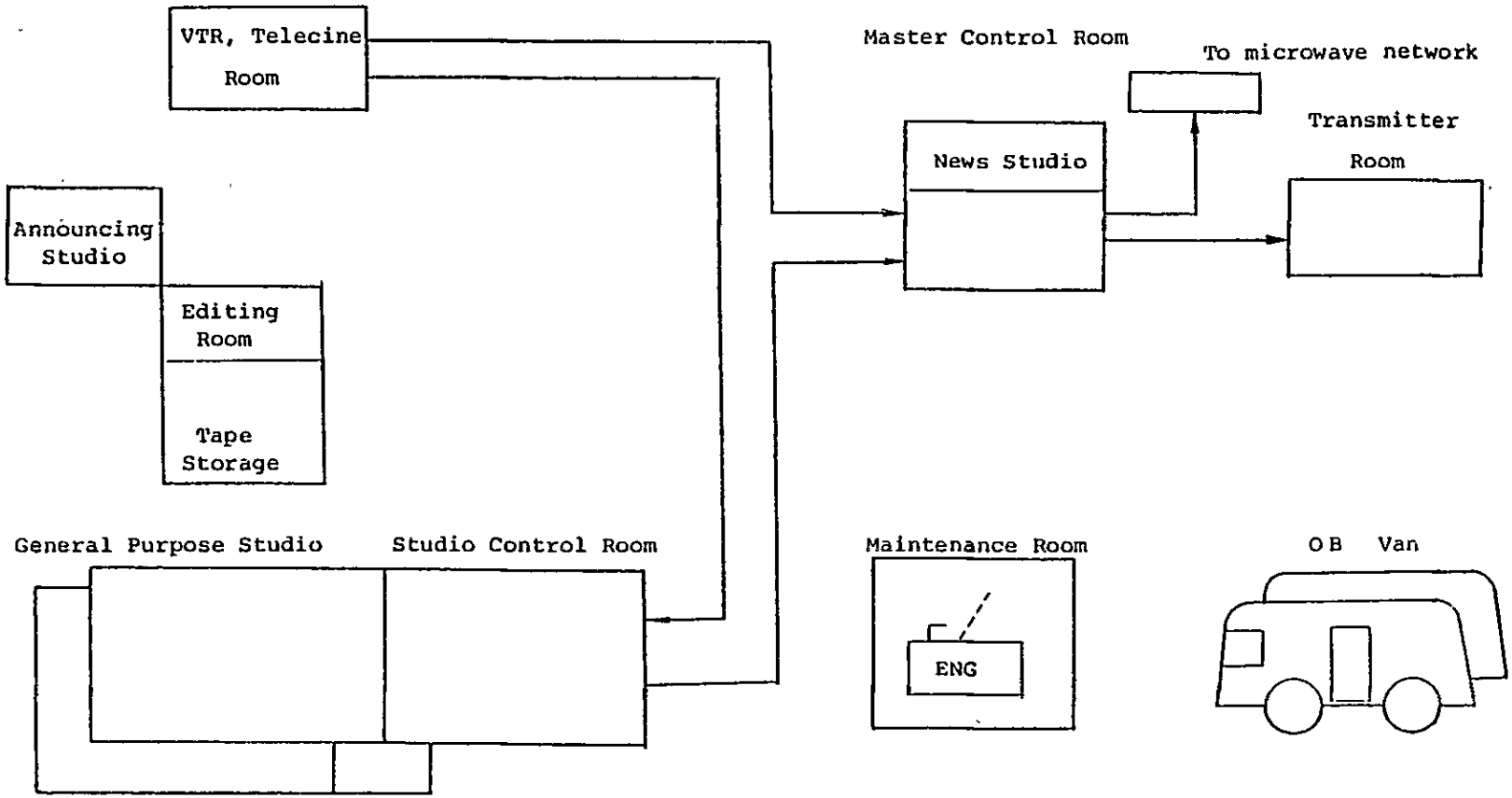



Figure III-IV-8 The Organizational set-up of Asunción Broadcasting Center

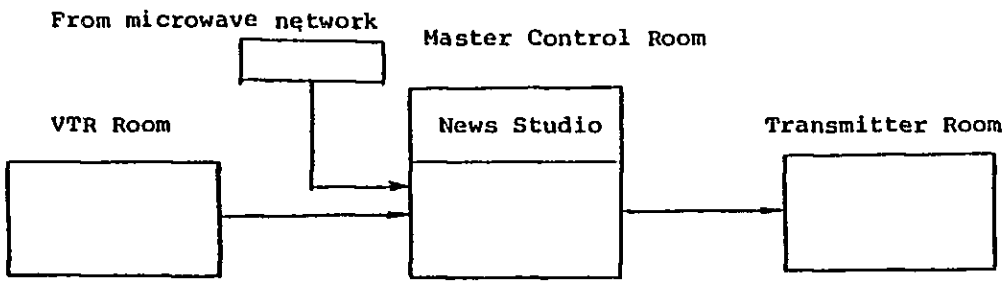



Figure III-IV-9 Composition of a local station



| Room | Purpose | Equipments |
|---|---|---|
| VTR Room | Program transmission by VTR. | VTR for reproducing 2. |
| Master Control Room | Switchover of programs,<br>Live broadcast from News Studio,<br>VTR editing. | News Studio($50m^2$), 1, Color-camera 1, Video Control equipment 1, Audio Equipment 1.<br>Microwave equipment 1. |

Table III-IV-15 General description of facilities at a local station

Table III-IV-16 Implementation plan (Facilities)

| Facilities / Stage of Work | Asunción Broadcasting Center | | | | | | Facilities at Local Stations *2 |
|---|---|---|---|---|---|---|---|
| | VTR Telecine | Master Control | General Purpose Studio | ENG | VTR Editing System | OB Van | |
| Stage I | 1 | 1 | 1 | 2 | 2 | | 2 |
| Stage II | | | 1 | 4 | 4 | 1 | 5 |
| Stage III | | VTR for transmis-sion 2*1 | | 2*1 | 2*1 | 1 | 4 |
| Total | 1 | 1 | 2 | 6 | 6 | 2 | 11 |

*1 Renovation of obsolete equipment

*2 The number of studio facilities at local stations is based on the Station Establishment Plan

## 3-5 Transmitting Facilities

### 3-5-1 Transmitter

While the transmitter should be made up of equipment of high stability and high reliability, it needs to be operated under a proper maintenance and control system.

(1) Redundant system for the transmitter of each station

In designing the transmitter system for each of the stations according to the Station Establishment Plan, the following three redundant systems are comparatively examined, since the redundant system constitutes an important factor for reliability, maintenance and economic reasons.

(a) Full stand-by system

This system calls for installation of a stand-by transmitter exactly the same as the primary one in the station. In other words, it is a system in which each transmitter has its own reserve in the station. This system ensures high reliability against troubles because of independent reserve units. As to maintenance, it excells, too, as each transmitter allows maintenance independently. Economically, however, this system is inferior to others, because it requires dual units of the same transmitter.

(b) Parallel operation system

This is a system which aims at gaining a required transmitting power by the operation of two transmitters connected in parallel. Since the output of one transmitter needs to be only a half of the required power, it is economically superior to the above system (a) i.e. Full Stand-by System. Even if one of the transmitters in combination should fail to operate, transmission can be kept up continuously with the other one, even though with less power,

one quarter or a half of the normal effective radiated power. It is a shortcoming of this system naturally that the service area tends to be narrowed down in the consequence, as much as the depression of the effective radiated power. Additionally, a slightly higher technical skill is required in maintenance because the control device is more complex than other systems.

(c) Reduced power full stand-by system

This is a system which calls for also a reserve transmitter to be equipped along with the primary one. But the power of this auxiliary one is a half or a quarter of the primary transmitter because of economic reasons. While it shares the merits of the Full Stand-by System mentioned in (a), it has a demerit in that the service area is narrowed down in time of troubles in the primary one as the effective radiated power decreases to 1/2 or 1/4 of the normal time.

As a result of our study of the above three systems, we have come to a conclusion that we recommend a transmitter system for each station based on either 'Full Stand-by System' or 'Reduced Power Stand-by System' in consideration of the service area and transmitting condition in the respective areas and the required level of maintenance. For the switch-over from the primary transmitter to the auxiliary one in time of trouble, an automatic switch-over function should be installed.

(2) Composition of transmitters for each station

The composition of transmitter systems for respective stations is given in Table III-IV-17. It is arranged according to requirements on the basis of the Station Establishment Plan, Program Production Facilities Plan and Program Transmission Plan on one hand and also in consideration of topographical features of the respective localities, patterns of population distribution, service areas and also economic needs, etc.

## 3-5-2 Antenna systems

### (1) Selection of polarization for TV transmission

For the Television broadcasting, either horizontally or vertically polarized wave is used. Which of these is to be used should be decided on the basis of transmitting conditions, topographical features, and reception by the viewer as well as in relation to the polarization of radio wave of the existing television station.

In comparison between horizontal polarization and vertical polarization, the latter, i.e. vertical polarization, is liable to cause 'ghost image' on the receiving screen due to reflection, and the former, i.e. horizontal polarization is more resistive to ignition noise of vehicles, which is the main source of man-made interference.

According to the Frequency Plan, there is no station in view which would require the utilization of polarization effect in order to secure the interference protection ratio against the co-channel or the adjacent channel. And the existing television stations employ horizontal-polarization wave. Taking these factors into account, all the stations of the national educational television shall employ horizontal-polarization wave.

### (2) Antenna composition of each station

The type, number of sections and the main transmitting feeder of the antenna for respective stations are designed in consideration of the following factors. The antenna compositions of each station are outlined in Table III-IV-17

(a) The antennas of horizontal polarization are characterized by uniformity in horizontal directivity in all directions, and have confirmed merits of high reliability both in the construction and performance. Three kinds of antennas shall be used: Super Turnstile, 2-Dipole and 4-Dipole.

(b) As the section is increased to step up the antenna gain, it would increase also the weight of the antenna itself, which might affect the required strength of the supporting tower to the disadvantage of cost.

(c) The more the number of section of an antenna, the sharper becomes the vertical directivity of the antenna, which tend to create a zone of poor reception in the proximity of the station.

(d) In consideration of the climatic condition in which the daily temperature changes in the range of 25°C., the coaxial cable is deemed most appropriate for the main feeder, because of this superb flexibility, light weight and resistivity to external pressure, and economically, too. In consideration of reliability and economy, no stand-by feeder shall be provided.

3-5-3 Power source facilities

(1) Automatic voltage regulator facilities

With regard to an all-solid-state transmitter and a high power transmitter which comprises all-solid-state transmitter and transmitting tubes, no AVR is required when the input power voltage regulation remains at ±10% because stabilized power sources are built in the transmitter circuit. However, considering the power situation of Paraguay as at present, AVR would ensure more satisfactory operation of transmitter. At the same time, a power transformer would enable to prevent failure due to lightning surge by the multiple function with AVR. Therefore, AVR shall be equipped to the stations which operate on commercial power.

The standards of the AVR capacity in respect to the transmitting power of transmitters are given in Table III-IV-18 (1).

(2) Engine generator

The engine generator system of each station are outlined as follows (Refer to Table III-IV-17).

(a) In the station where commercial power is available, one set of power generator shall be equipped for emergency.

(b) As regards the station where no commercial power is available, operation has to depend on its own engine generator. Such station, therefore, shall be equipped with a redundant system of dual power generator.

(c) At the station which operates on commercial power, an automatic starting and switch-over device shall be installed for power switch-over from commercial power to own power.

(d) At the station which operates on own power generation, a manual operating device shall be installed for switch-over of power from the primary generator to the stand-by generator.

The capacity standards of engine generator according to the scale of each transmitter are given in Table III-IV-18(2). A total capacity for both studio facilities and for miscellaneous uses is devised as 30 kVA excluding the consumption for studio lighting.

3-5-4 Supervisory equipment

The operational setup of the station which is the prerequisite for organizing transmission supervisory system shall be based on the Operation and Maintenance to be stated in 3-9 Operation Control & Maintenance Plan.

Since the stations are basically manned stations, the overall control and supervision shall be conducted from the transmitter room.

Table III-IV-17 (1/2) The composition of transmission facilities

| | | Asunción | Pto. Pte. Stroessner | Encarnación |
|---|---|---|---|---|
| Transmitter | Composition | 25kW<br>25kW | 20kW<br>10kW | 20kW<br>10kW |
| Antenna | Transmitting antenna | 4·4D x 4 | 4·4D x 4 | 4·4D x 4 |
| | Transmitting feeder | $3\frac{1}{8}$" (77D)270m | $3\frac{1}{8}$" (77D)170m | $3\frac{1}{8}$" (77D)170m |
| Power source | A V R | 80 kVA | 70 kVA | 70 kVA |
| | Own power generator | 110 kVA x 1 | 100 kVA x 1 | 100 kVA x 1 |

| | | Pedro Juan Caballero | Salto del Guairá | San Pedro |
|---|---|---|---|---|
| Transmitter | Composition | 5kW<br>2kW | 5kW<br>2kW | 5kW<br>2kW |
| Antenna | Transmitting antenna | 4·4D x 4 | 6·4D x 2<br>4·4D x 1 | 6·4D x 2<br>4·4D x 1 |
| | Transmitting feeder | $3\frac{1}{8}$" (77D)170m | $3\frac{1}{8}$" (77D)170m | $3\frac{1}{8}$" (77D)170m |
| Power source | A V R | — | — | — |
| | Own power generator | 60 kVA x 2 | 60 kVA x 2 | 60 kVA x 2 |

| | | Mariscal Estigarribia | Villarrica | Pilar |
|---|---|---|---|---|
| Transmitter | Composition | 5kW<br>2kW | 5kW<br>2kW | 5kW<br>2kW |
| Antenna | Transmitting antenna | 4·4D x 4 | 4·4D x 4 | 4·4D x 2<br>2·4D x 1 |
| | Transmitting feeder | $3\frac{1}{8}$" (77D)170m | $3\frac{1}{8}$" (77D)170m | $3\frac{1}{8}$" (77D)170m |
| Power source | A V R | — | — | — |
| | Own power generator | 60 kVA x 2 | 60 kVA x 2 | 60 kVA x 2 |

Table III-IV-17 (2/2)

| | | Concepción | San Juan Bautista | Paraguarí |
|---|---|---|---|---|
| Transmitter | Composition | 20kW<br>10kW | 5kW<br>2kW | 1kW<br>1kW |
| Antenna | Transmitting antenna | 6·4D x 1 | 4·4D x 4 | 2·ST |
| | Transmitting feeder | $3\frac{1}{8}$" (77D) 270m | $3\frac{1}{8}$" (77D) 170m | $1\frac{5}{8}$" (39D) 120m |
| Powe~ source | A V R | — | 30 kVA | 10 kVA |
| | Own power generator | 100 kVA x 2 | 60 kVA x 1 | 40 kVA x 1 |

Table III-IV-18 (1) Required AVR capacity

| Transmitter Power | AVR Capacity |
|---|---|
| 1 kW | 10 kVA |
| 5 kW | 30 kVA |
| 10 kW | 40 kVA |
| 20 kW | 70 kVA |
| 25 kW | 80 kVA |

Table III-IV-18 (2) Required capacity of engine generator

| Transmitter Power | Engine Generator Capacity |
|---|---|
| 1 kW | 40 kVA |
| 5 kW | 60 kVA |
| 10 kW | 70 kVA |
| 20 kW | 100 kVA |
| 25 kW | 110 kVA |

## 3-6 Broadcasting Station Buildings and Structures

The location of the broadcast station shall be selected so as to cover a large service area and be near a major city in the service area.

### 3-6-1 Broadcasting station buildings

As mentioned in 3-9 (Operation Control and Maintenance Plans) of this Report, the designing of the broadcasting station buildings in Asunción and other regional cities have been studied with the basic aims of concentrating the functions of broadcasting operations, the enhancing of the efficiency of such functions, and ensuring efficiency of the expenditure for the construction work.

(1) Construction sites

Since securing of construction site is easy in the Republic of Paraguay, it was decided that the transmitting towers of triangular section guyed mast would be adopted at every station because of their low cost of construction. As a result, the areas of the sites required, as shown below, have been determined according to the type of tower to be erected. Incidentally, for the sake of safety, consideration should be given so that the station building may not be constructed under the guy-wires. (See Fig. III-IV-10: Outline of Building Arrangements within the Site):

| | | | |
|---|---|---|---|
| Site for a | 250-meter | class tower ..... | 300m x 330m |
| " | 150-meter | " ..... | 180m x 200m |
| " | 100-meter | " ..... | 120m x 140m |

(2) Outline of the station buildings

The station buildings which are to be constructed at 12 locations shall be planned according to two standardized plans; one for the Asunción station which will function as a center and the other for the local stations. A station building will roughly be divided into two blocks, viz., the studio block centering around the studios and the transmitter block, in such a way that these two blocks may be organically linked together. The building to house an independent power plant will be constructed separately from the main building to prevent the noise and the vibration.

(a) As outlined in 3-4 Studio Facilities Plan, the Asunción station will be planned as a building consisting of the main block which houses basic facilities required for producing, sending-out and transmitting programs and the office block which accommodates administrative functions. It will contain the facilities required to commence the first stage of TV broadcasting operations and will be restricted to the necessary minimum. The layout, however, will be made in such a way that extension of the studio, office and other areas may easily be done to cope with the future expansion of TV broadcasting.

(b) Each local station will be planned as a building which mainly comprises facilities required for producing, sending-out and transmitting programs on a small scale.

(c) The Asunción station will be planned as follows, according to four different functions into which the system of the station may roughly be divided:

- The administrative block, including the office of the President (provisional title), to accommodate the administrative functions.

- A general-purpose TV studio with a floor space of 200 $m^2$, a 50 $m^2$ TV studio to be used exclusively for news telecast, a 30 $m^2$ studio to be used exclusively for sound, and the accessory rooms for these studios (Stage-props store-room, performers' waiting room, make-up room, etc.)

- Technical rooms, such as, sub-control rooms, master control rooms, VTR-telecine rooms, maintenance/repair rooms, transmitter rooms and OB van garages, as well as the offices for the technical staff.

- Offices for use by program production staff, the editing room, videotape store-room, library, and conference rooms.

- As mentioned before, the building to house the independent power generator (and power reception and distribution device) will be constructed separately from the main building.

The functional rooms as listed above will be positioned organically in the building which will also contain such facilities as entrance hall, toilets and corridors for common use. Taking all these factors into consideration, the building scale shall be about 3,000 $m^2$ in total floor space.

As the building facilities, the airconditioning will be designed for the offices where people work daily, for the studios and the technical rooms. Since the studios will have to be kept at low noise level, the aricondi-tioning device will be installed in a separate room so as to fend off the noise and vibration, but for other rooms a system will be adopted to install an aircondi-

tioner for each room in an appropriate manner. As to the electrical facilities, the station buildings will be equipped with the power supply systems, lighting and plug-socket facilities, fire-alarm facilities, telephone systems, pipings and wiring ladders for broadcasting equipment, and earthing for equipment and facilities. The buildings will also be equipped with make-up rooms, as well as the water-supply/drainage facilities for toilets.

The station building will be of reinforced concrete rigidframe structure. In constructing the building, the building materials and building method that are in general use in the Republic of Paraguay will be adopted. For example, the partitioning walls will be constructed with bricks, the material that is easily obtainable in this country. In the construction of a studio, the materials and method that satisfy the sound characteristics will be used, such as the soundproof fixtures, so as to ensure proper sound treatment. The finish of the interior of the rooms will be done with mortar painted on the walls and with mortar painted and vinyl-tiles laid on the floor.

(d) The building of a local station shall be of about 500 $m^2$ in scale and shall be equipped with technical rooms such as a 60 $m^2$ TV studio, a master control room, a VTR room, a maintenance/repair room and a transmitter room, office rooms and conference rooms. As to the building facilities, building sturucture and the finish, they shall be designed in much the same way as that for the Asunción station building.

(e) As mentioned before, the building housing the independent power generator will, from the viewpoint of fending off the noise and the vibration, will be separated from the main building by more than 10 m. In the building housing the generator, there will be installed the reception and distribution panels for power from commercial sources, and the change-over panel, as well as the independent power generator itself. The building structure will be of reinforced concrete, with the walls built by piling up the bricks over which the mortar will be painted. The lighting and ventilating facilities will be provided inside the room. The main building and the generator-building will be connected with a concrete trench. The independent-power generator building will be a maximum of 6 m x 8 m in scale, with a floor space of about 48 $m^2$.

3-6-2 Structures

A total of 12 transmitting antenna towers will be erected for the broadcasting stations. Analysis of the tower construction and designing of the towers are executed using Japan's Building Standards Act and the allied laws and the various structure designing standards set up by the Architectural Society.

The height of the towers will be divided into three levels, including the 250-meter class, 150-meter class and 100-meter class towers. For each broadcasting station, the height of the tower will be selected from the above three types in accordance with the transmitting scale, topography of the site and the height of the existing TV tower of the commercial broadcasting station.

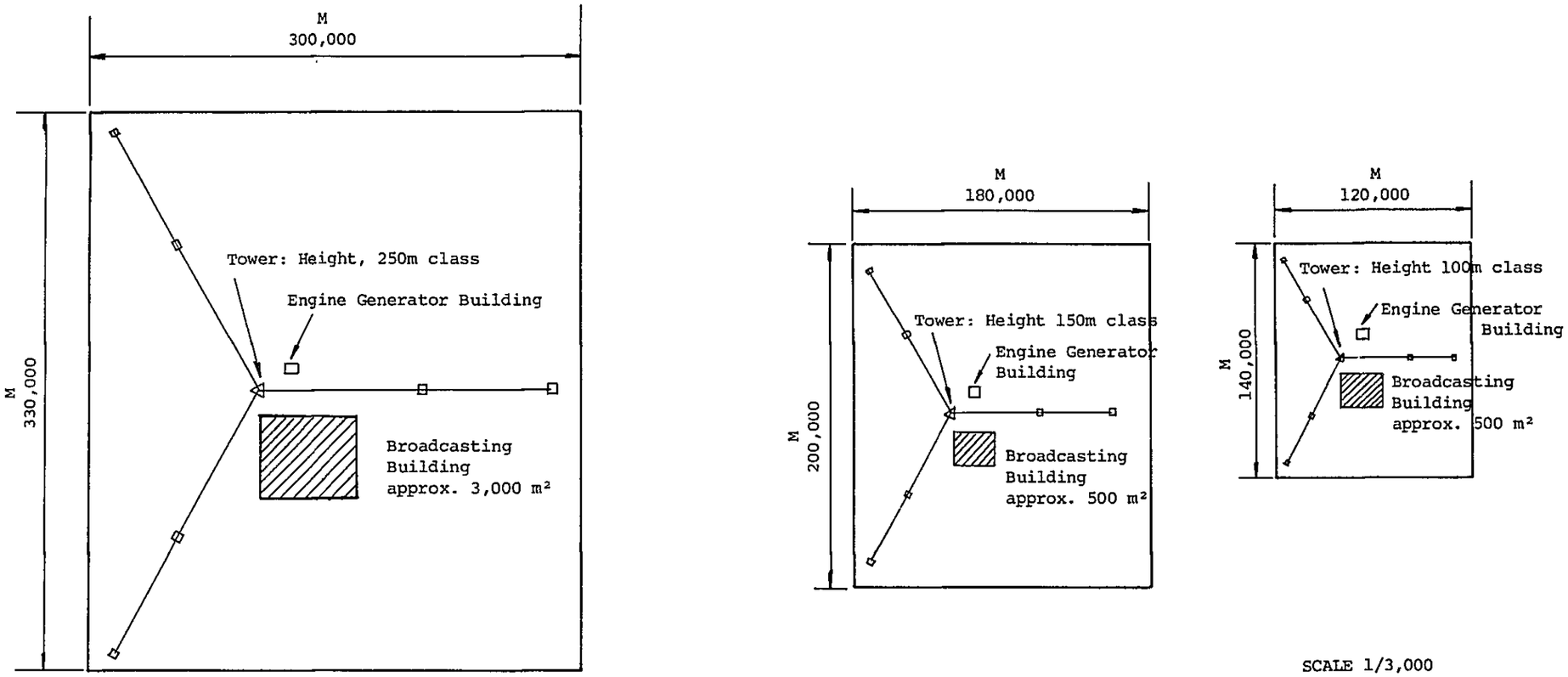
Giving priority to economy, the tower of triangular section guyed mast has been chosen. The foundation of the tower will be of ferro-concrete.

Structural design against the wind pressure has been executed on the basis of the results of meteorological observations of past 40 years in the Republic of Paraguay. The tower will be designed with the maximum instantaneous wind velocity of 41 m/s (148 km/h) used as standard. Structural reinforcement against earthquakes will not be considered.

As the bearing capacity of soil at the building sites have not been measured during the survey period, soil surveys such as boring will be made for each building site so as to make sure before final designing. With regard to an abstract of the result of looking into the tower erection for each broadcasting station, see Table III-IV-19 "List of TV Towers" and Fig. III-IV-11 "Outline of TV Towers".

Table III-IV-19 List of TV towers

| Construction Sites | Altitude (m) | Height (m) | Antenna (Type) (Section) (Face) |
|---|---|---|---|
| Asunción | 150 | 250 | 4D . 4 . 4 |
| Pto. Pte. Stroessner | 200 | 150 | 4D . 4 . 4 |
| Encarnación | 100 | 150 | 4D . 4 . 4 |
| Pedro Juan Caballero | 650 | 150 | 4D . 4 . 4 |
| Salto del Guairá | —— | 150 | 4D . 4 . 4 |
| San Pedro | 80 | 150 | 4D . 6 . 2<br>4D . 4 . 1 |
| Mariscal Estigarribia | —— | 150 | 4D . 4 . 4 |
| Villarrica | 150 | 150 | 4D . 4 . 4 |
| Pilar | 50 | 150 | 4D . 4 . 2<br>4D . 2 . 1 |
| Concepción | 80 | 250 | 4D . 6 . 1 |
| San Juan Bautista | 100 | 150 | 4D . 4 . 4 |
| Paraguari | 180 | 100 | ST . 2 . |




SCALE 1/3,000

Figure III-IV-10 Layout of building and tower

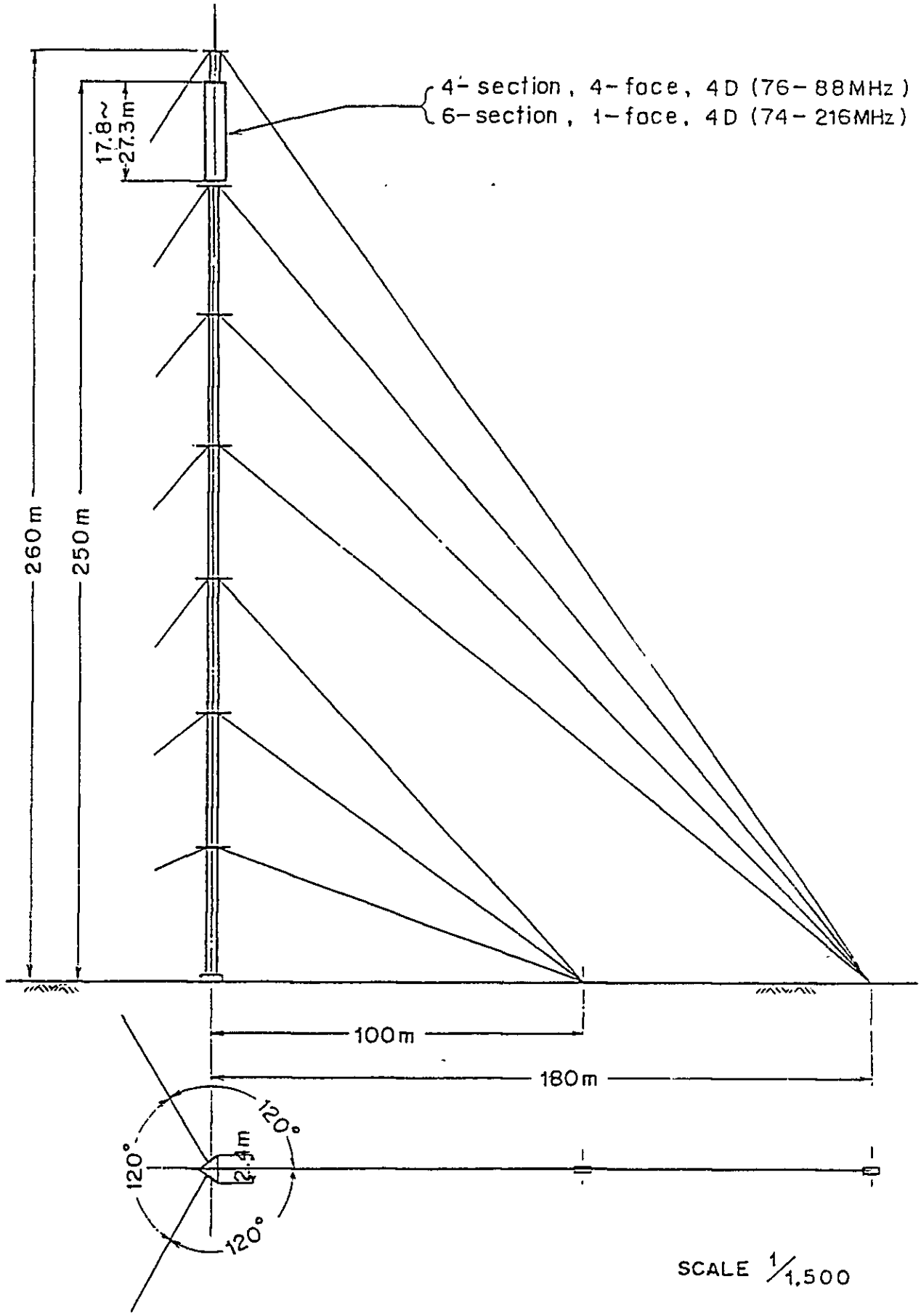



Figure III-IV-11 Outline of TV tower

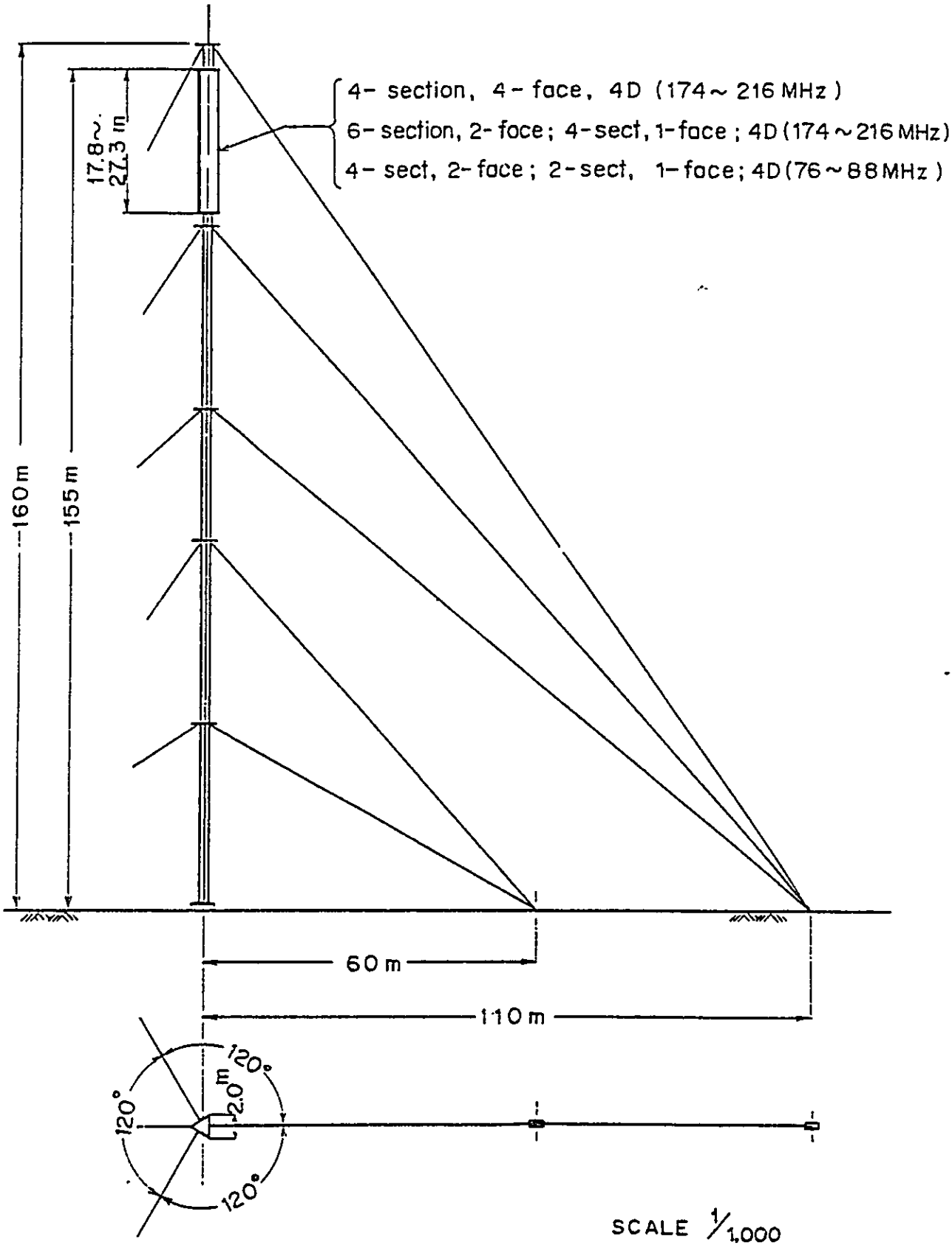



Figure III-IV-11 Outline of TV tower

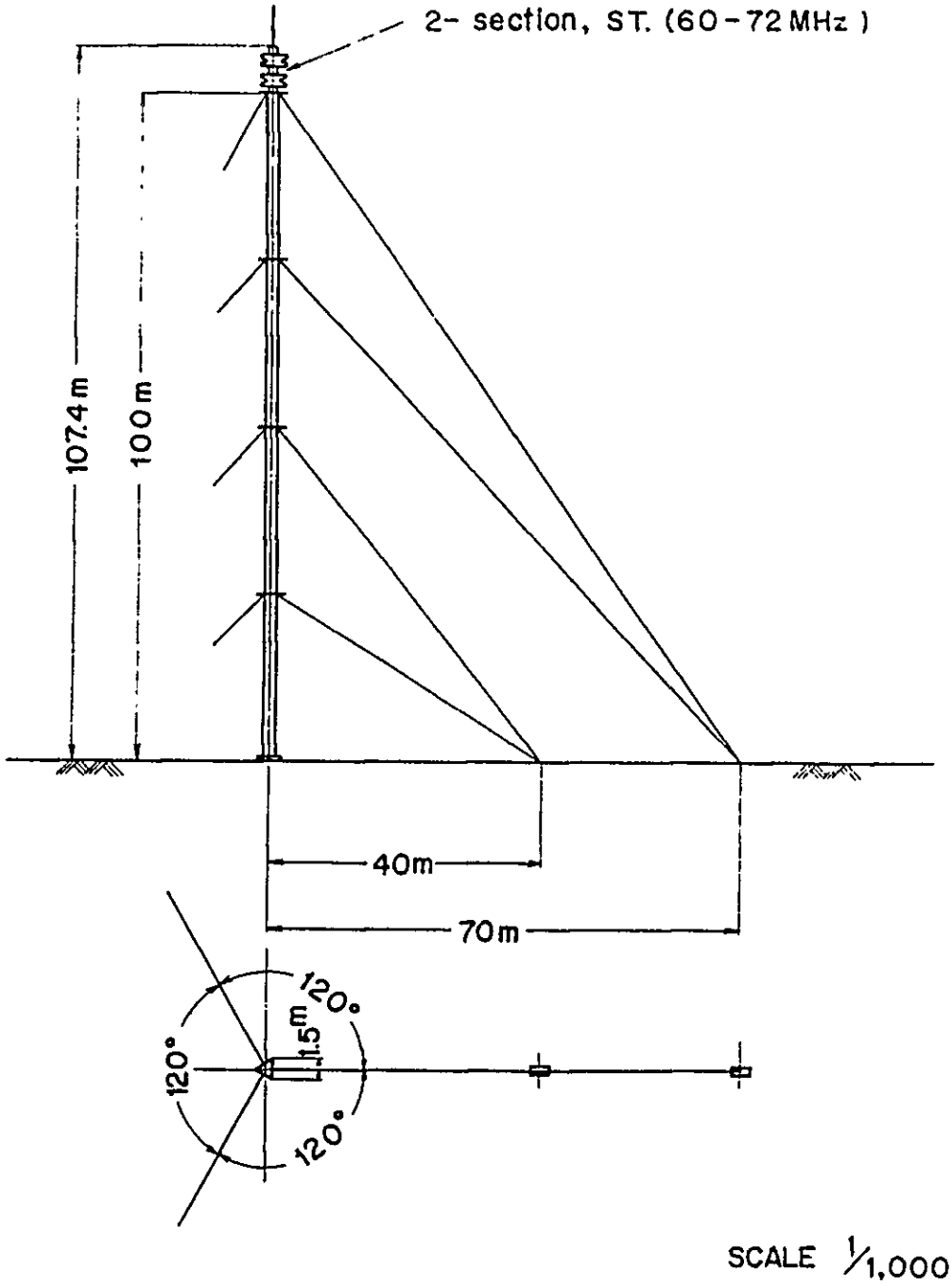



Figure III-IV-11 Outline of TV tower

## 3-7 Program Production Plans

### 3-7-1 Policy for the plans

(1) Videotape recording

In accordance with the repeat-broadcast plans (3-1-6) and the plans to send the programs to the local stations (3-8-1), it is necessary for the programs, in principle, to be videotaped in advance. Such programs, however, do not include the information programs (news) and live relay programs.

(2) Number of programs to be produced

The number of various types of programs to be produced according to the Program Compilation Plans (3-1) shall be increased along with the increase in the number of production personnel and the improvement in the production skills of such personnel.

In the present project, it will be appropriate to carry on the plans according to the policy stated in Table III-IV-20.

### 3-7-2 Classification of programs by presentation format

Each program is produced with a form of presentation suited to the aim and content of the program. For this reason, it is necessary to be ready to adopt a different production format for each program. The Table III-IV-21 gives the examples of programs produced by some of the major presentation formats.

### 3-7-3 Presentation formats and the length of time the facilities and equipment are used

The length of time the studios and other facilities and equipment are used differs slightly according to the content of the program being produced. In the present project, however, the standard length of time the facilities and equipment are used is shown in Table III-IV-22(1) for each of the different presentation

formats. This Table has been prepared with the aim of ensuring production of programs that maintain a certain level of quality.

Also, a standard schedule for the studio work that constitutes the basis of program production is shown in Table III-IV-22(2).

### 3-7-4 Personnel for program production

The personnel required for program production may be divided roughly into production personnel and technical personnel. The required numbers of such personnel will be given in the Personnel Plans (CHAPTER 4).

Table III-IV-20 Plans concerning the number of programs to be produced per day

| Stages of Plans | Number of Programs to be produced per day |
|---|---|
| Stage I | 1 - 2 |
| Stage II | 4 - 5 |
| Stage III | 6 |

Table III-IV-21 Classification of TV programs by presentation format

| Format | Content | Examples of programs |
|---|---|---|
| A | Presented in a news studio with one announcer | ° News ; Publicity programs |
| B | Presented in a studio with one performer; consisting mainly of "talk", such as commentary and lecture. | ° Programs for teachers<br>° Adult-education programs |
| C | A program which is produced and completed mainly with the studio facilities alone, such as, discussions by two or more persons, an educational program with 2-3 persons appearing therein, and a music program with a small number of musicians performing | ° Programs broadcast to schools<br>° Adult-education programs |
| D | Dramas, variety shows and other types of programs which are produced within a studio | ° Programs intended for general audience |
| E | A program which is to be completed by insertion, into the studio-produced program, of the materials shot outside the studio by ENG(electronic news gathering) system | ° Overall instructional programs<br>° Adult-education, cultural programs |
| F | A program which is completed by the use of live or recorded coverages made outside the studio with an O.B. van. (an editing is sometimes done in the process) | ° Sports programs<br>° Programs for teachers (introduction of classes) |

| | | |
|---|---|---|
| G | A program which is completed by editing the materials shot outside the studio by ENG and putting them through the dubbing process (adding narrations or other voices and sounds, such as, music) | ° Specially planned programs intended for general audience |
| H | A program purchased from abroad and which requires dubbing of dialogues | ° Programs for general audience<br>° Programs for schools |

Table III-IV-22(1) Direct work hour per program

| Format | Studio work | ENG recording | OB van recording | VTR editing | Dubbing work |
|---|---|---|---|---|---|
| A | 1.0 hr. | 5.0 hrs. | | 2.0 hrs. | |
| B | 5.0 hrs. | | | | |
| C | 5.0 hrs. | | | | |
| D | 7.0 hrs. | | | | |
| E | 5.0 hrs. | 1 day | | 1 day | |
| F | | | 1 day | (1 day) | |
| G | | 2 weeks | | 1 week | 2.5 hrs. |
| H | | | | | 2.5 hrs. |

Notes: (1) The figures given in this table are the numbers of direct work hours(days, weeks) required and do not include the hours of planning, consultations or preparations.

(2) The numbers of hours(days, weeks) given in relation to ENG and O.B. van operations, the traveling times are not included.

Table III-IV-22(2) Studio work schedule

(1) In the case where the studio work lasts for 5 hours

| 1 hr. | 1.5 hrs. | 1 hr. | 1.5 hrs. |
|---|---|---|---|
| Putting up the settings in the studio | Consultations with technical staff; preparations for lighting, etc. | Camera rehearsal | Videotaping; auditioning |

(2) In the case where the studio work lasts for 7 hours

| 2 hrs. | 2 hrs. | 1.5 hrs. | 1.5 hrs. |
|---|---|---|---|
| Putting up the settings in the studio | Consultations with technical staff; technical preparations | Camera rehearsal | Videotaping; auditioning |

(3) In the case where the studio work lasts for 8 hours; two programs are recorded consecutively, in and after the stage II

| 1 hr. | 1.5 hrs. | 1 hr. | 1.5 hrs. | 0.5 hr. | 1 hr. | 1.5 hrs. |
|---|---|---|---|---|---|---|
| Putting up the settings in the studio | Technical preparations | Camera rehearsal (1) | Videotaping; auditioning (1) | Recess | Camera rehearsal (2) | Videotaping; auditioning (2) |

## 3-8 Program Transmission Plan

### 3-8-1 Method of program transmission

As mentioned in Clause 3-4-3 of Studio Facilities Plan in 3-4, the national educational television adopts the system that the programs are produced at the Asunción Broadcasting Center to be distributed to each local station for broadcast.

In this clause, the method of program transmission from the Asunción Broadcasting Center to the local stations is to be anticipated.

In this connection, two methods may be considered. One is the utilization of the television transmission microwave circuit of ANTELCO, and the other is one to transport the recorded videotape.

These methods have merits and demerits which are as follows:

(a) The comparison with respect to the cost as at present is shown in Table III-IV-23. In point of cost, the recorded videotape is superior because it can be rebroadcast by simply replaying it.

(b) However, it can not live up to the merit of simultaneity of television broadcast, which is especially essential in the case of newscasts.

(c) In the case of distributing the programs in videotapes through dubbing, there inevitably will arise the deterioration in picutre quality.

(d) At present, the television transmission microwave circuit of ANTELCO is being operated only connecting Asunción with Encarnación, Stroessner, and Pilar. And there exists only one circuit, which is leased to a commercial station (Channel 9) between 20:00 and 24:00 hours. Therefore, the possibility of a complete utilization of the microwave

circuit depends on the development of the telecommunication network in the future.

On the basis of the comparative studies made above, the plans shall be drawn up in accordance with the following policy:

(1) As far as the transmission costs at the present stage is concerned, the method of sending the programs by videotapes is advantageous, and in view of the current situation in this country where the microwave circuits for TV transmission have not yet been fully completed, the videotape method shall be adopted.

(2) In the Stage II, however, the plan calls for enrichment in the variety and contents of programs (Refer to 3-1: Program Compilation Plan) and, at the same time, the need of simultaneity is expected to rise. And since the development of telecommunication network is anticipated, with the result that the microwave circuits for TV transmission will be further developed, the expansion of the use of such microwave circuits for TV transmission shall be gradually expanded as from the latter half of stage II.

The local cities to be selected as the ones that will be linked by microwave circuits shall be those which are already linked or are scheduled to be linked in the future by microwave circuits. However, when the time comes for the national educational television to acutally use the microwave circuits to send television programs, competitions with the commercial TV services is anticipated to occur. So, in such a case, it will be desirable to make appropriate adjustments in tariff and the time periods and, if necessary, to provide preferential treatments to the national educational television.

Taking the above into consideration, the Table III-IV-24 has been prepared to show the program transmission method for each stage of this project.

While neither the domestic communication satellite nor the broadcasting satellite has been taken into account in the present project, it will be appropriate for the Republic of Paraguay to examine the feasibility of transmission of programs by satellite, if the future technological developments in this country make it possible to utilize the satellite for television transmission in the Republic.

### 3-8-2 Implementation plan

Under the present project, the microwave facilities to be installed for program transmissions in the Republic shall be those between the ANTELCO and the stations. During the latter half of Stage II, the microwave facilities will be installed in the following six (6) stations : Asunción, Pto. Pte. Stroessner, Encarnación, Pedro Juan Caballero, Salto del Guairá, and San Pedro. In Stage III, the microwave facilities will be installed in the following six (6) stations when building respective broadcast stations : Mcal. Estigarribia, Villarrica, Pilar, Concepción, San Juan Bautista, and Paraguarí.

Table III-IV-23(1) Comparison of costs

| Method of Transmission | | Cost per 30 min. (in Guarani) |
|---|---|---|
| Videotape *1 | | 3,290 |
| Microwave Circuit (ANTELCO) | Temporary Use | 12,720 |
| | Long-term Lease (over 10 min. a day) | 7,650 |
| | " (over 1 hr. a day) | 6,360 |
| | " (over 4 hrs. a day) | 5,070 |

*1. Cost of tape only. Cost of transportation and that of dubbing are not included.

Calculated on the basis of the conversion rates of 1US$ = 230 Yen = 126 Guarani.

*2. ANTELCO RESOLUCION No.6930A, No.497C.A.

Following is the comparison of costs (at current rates) of sending the TV programs to Encarnación, Pto. Pte. Stroessner and Pilar; by microwave network for TV transmission and by sending the videotapes. The broadcasting hour shall be assumed as 6 hours/day. But in the case of using the method of sending the programs in videotapes, a repeat-broadcast shall be made each day.

Table III-IV-23(2) Comparison of costs

| | |
|---|---|
| Recorded videotape | 7 million Guarani a year *1 |
| Microwave network | 56 million Guarani a year *2 |

*1 3,290 G/30 min. x 6 programs x 365 days = 7,205,100

*2 5,070 G/30 min. x 12 programs x (1+1+1/2) x 365 days =55,516,500

Table III-IV-24 Program transmission plan

| Work Stage | Method of Program Transmission |
|---|---|
| Stage I | Videotape |
| Stage II | During the 1st-half period<br>---- Videotape<br>During the 2nd-half period<br>---- TV transmission microwave network In the case microwave network to those cities has already been well developed. |
| Stage III | TV transmission microwave network |

## 3-9 Operation Control and Maintenance Plans

### 3-9-1 Broadcasting station system

(1) System formation of broadcasting facilities

Beginning with the Asunción Broadcasting Station, which serves as the key to national educational television, the system provided for the various other broadcasting stations must have the following three roughly classified functions:

(a) Program production function.

(b) Program sending-out function

(c) Transmitting function.

When the economic and operational aspects of the broadcasting station construction and management are taken into account, the facilities having the three functions should preferably be set up in the same building at each broadcasting station. In short, advantages, such as those cited below, arise from concentrating all the functions in a single building, and these promote saving in the cost of broadcasting station construction and higher efficiency in the operation and maintenance.

(a) Economizing effect in facilities investment can be achieved through such possibilities as adoption of the common-use system with respect to the power supply equipment, etc.

(b) In the operation of equipment and maintenance thereof, systematic and efficient equipment and personnel line-up becomes possible.

(2) Technical personnel organization

In order to operate and maintain the technical equipment of the broadcasting station, technical personnel capable of operating and maintaining the program production equipment, program sending-out equipment and transmitting equipment respectively are needed. And it is necessary for each broadcasting station to post these personnel in such a way as to achieve efficient and effective operation and management. As this personnel-assignment policy ensures effective on-the-job training of the personnel, it is considered a useful means of developing national educational television smoothly by setting up broadcasting stations one after another.

(3) Ranking of central (Asunción) and local broadcasting stations

The broadcasting station established in Asunción, the capital of the Republic of Paraguay, will naturally play the key role in the nationwide network of national educational television. For this reason, it is necessary to follow the system that will allow the broadcasting station in Asunción to control and coordinate the local broadcasting stations so as to achieve smooth operation of the nationwide network.

3-9-2 Operation control and maintenance

With respect to operation control and maintenance, it is essential to adopt some system that will allow attainment of objective efficiently and effectively in forms compatible with the broadcasting station system described in the preceding section.

(1) Organization at the Asunción Broadcasting Station

As the Asunción Broadcasting Station is the key station that will control all the local broadcasting stations in the country, an organization will enable it to give

full play to the operation control and maintenance functions. In other words, the Asunción Broadcasting Station will not only operate broadcasting on its own but also will serve as the program production center and the technical center for undertaking unified and systematic maintenance of technical equipment including those of the local stations. For such purposes, the following functions are necessary:

(a) By concentrated assignment of program production equipment and capable personnel, it will produce and broadcast programs effectively and concentratedly and also will distribute the programs to local stations.

(b) Maintaining a staff of technical specialists, it will undertake centralized maintenance of equipment for local stations also.

(c) Maintaining spare parts and reserve equipment for common use with the local stations, it will endeavor to execute speedy and steady restoration of normalcy at the time of trouble.

(2) Organization at local broadcasting stations

As scheduled maintenance work and maintenance for trouble shooting are undertaken coordinatedly and systematically by the technical specialists of the Asunción Broadcasting Station, which is the central station, the local broadcasting stations will be managed by a small-scale program production staff and minimum number of personnel needed for program sending-out, transmitter and technical work. It is considered better for the local station personnel to engage in routine checking and minor repairs of equipment.

As the latest equipment are largely of solid-state construction, troubles with equipment are likely to arise at random, excepting the case of some devices like pickup and transmitting tubes that definitely deteriorate with passage of time. In the circumstances, trouble preventive effect from routine maintenance work can hardly be expected. As a consequence, it should be sufficient for routine maintenance work to check the operating condition, etc., for the most part.

And with regard to the pickup and transmitting tubes, etc., which detriorate with passage of time, the method of maintenance involving replacement of such devices systematically after the passage of a certain period of time will be appropriate.

With respect to the methods of repair at the time of trouble, the following may be considered.

- o The equipment can be restored to normal state by replacing the defective parts with spare parts on site.
- o Replace the faulty unit with the spare unit to complete repair work and send the faulty unit to the manufacturer for repair.

Incidentally, it is necessary to introduce equipment of the same type as far as possible so as to improve interchangeability, thus promoting speedier dealing with troubles and economical use of reserve equipment for common purposes.

### 3-9-3 Operational cost

In the operation of a broadcasting station, it is necessary to budget annually the personnel cost, program production cost, operating cost of technical equipment, etc.

Technical equipment operating cost that will be necessary will include the following:

° Power charges

° Fuel cost for home power generation

° Spare transmitting and pickup tube costs

° Cost of spare parts

° Maintenance and repair cost

Details of the above fund requirements will be given in PART IV.

## 3-10 Developing of the TV Audience

### 3-10-1 Basic policy for the spreading of TV broadcasting

In order to spread the broadcasting by the national educational television and to enhance the effect of its use on education, it is necessary to take the following measures with regard to the spreading of the ownership of television receivers and the promotion of the use of broadcast programs:

(1) Measures to spread ownership of TV receivers

(2) Designation of model facilities that utilize the broadcast programs

(3) Promotion of the activities to utilize various types of programs

### 3-10-2 Measures to spread ownership of TV receivers

(1) It is necessary to promote reduction in the market price for TV receivers. In Paraguay, the average domestic market price for a color TV receiver is 150,000 Guarani, a level that is much too high for the general public to purchase a color TV set. This makes it next to impossible to promote the spreading of the ownership of color TV sets among the class of people who are in particular need of educational programs. Hence, there is the urgent need of bringing the price of TV receivers down, and to do so, some special measures will have to be taken, as for example, the promotion of home production of TV receivers and also of reduction in import and other taxes on TV receivers.

(2) With regard to TV receivers purchased with the purpose of using them at educational institutions including schools, it will be necessary to give them the benefit of tax-exemption.

(3) To schools and other educational facilities that are expecting to utilize the educational programs as soon as the broadcasting stations of the national educational television are established, it is desirable that the facilities to receive color television broadcasts are allocated by the time the broadcasting stations are constructed. Hence, there is the need of adopting measures to include, in the construction plans for the broadcasting stations, the budget to cover the expenses of allocating the TV receiving facilities required.

3-10-3 The television receiving facilities to be allocated and included in the construction plans for broadcasting stations

(1) Facilities to which the TV receivers are to be allocated

The allocation of television receiving facilities shall be carried out mainly with respect to the following facilities, etc., which are within the service area, but, as for the model facilities as provided for in 3-10-1(2), it will be necessary to allocate the TV receiving facilities according to a priority order.

° Public elementary schools (Primaria Oficial)

° Regional education centers (Centro Regional)

° Adult-education centers (Centro de Alfabetización y Educación de Adultos)

° Normal schools (Instituto de Formación Docente)

° Higher normal school (Instituto Superior de Educación)

(2) Number of facilities to be allocated

Using the numbers shown in Table III-IV-25 as reference data, a total of 3,000 TV receivers shall be included in the construction plans and shall be allocated as the broadcasting stations are completed one after another.

3-10-4 Model facilities for utilization of broadcasts

(1) In order to promote collective use of educational TV broadcasts, the Ministry of Education will select the "model facilities" from among the schools and other educational facilities. The model facilities shall systematcially incorporate the reception of TV broadcasts in their guidance plans so as to ensure continuous utilization of the broadcasts. The model facilities shall regularly study the contents of the programs, measure the educational effects of the broadcasts and make other related studies, and report the results regularly to the Ministry of Education and to the broadcasting stations concerned.

(2) The model facilities shall be designated one or more in each Departamento and will each cover the spheres of elementary, junior high schools and adult education. A model facility shall play the leading role in promoting education by broadcast in each region. In other words, it is to be the central organ entrusted with the task of promoting and spreading the education by broadcast.

Six of the Centro Regional de Educación, or some of the facilities of similar nature, shall be designated.

3-10-5 Study Meetings of Teachers on Education by Broadcast

It is desired that, with a view to studying and promoting education by broadcast, study meetings are organized for participation by teachers and others who are concerned with education.

(1) Content and objectives of the studies

(a) The content of broadcasts shall be examined so as to clarify the conditions for desirable types of teaching materials.

(b) Studies shall be conducted as to what will be the most effective guidance method in the utilization of broadcasts.

(c) The educational effects of broadcasts shall be measured and the reactions and opinions of pupils shall be collected to be summarized and sent to the broadcasting stations concerned as materials for use in improving the programs.

(2) Organization of the Study Groups on Education by Broadcast

(a) This Study Group on Education by Broadcast shall be entrusted to those concerned with education to be run autonomously.

(b) The study activities shall be carried on with respect to each of the various educational spheres covered by the broadcasts. A secretariat shall be set up in each Departamento, and liaison organs shall be established in such a way that the study activities may be developed over a nationwide system.

3-10-6 Publicity activities

In order to enhance people's interest in education by broadcast and to promote effective use of broadcast programs, the publicity activities shall be conducted along the following lines:

(1) Publicity by broadcast

(a) Short broadcasting periods shall be reserved within the broadcasting hours of each day for use in informing the TV audience of the broadcasting schedules (program contents and hours of broadcasts).

(b) In order to demonstrate the effectiveness of education by broadcast, some examples of broadcasts being used effectively at remote regions or at schools may be taken up and introduced to the TV audiences in the form of a TV documentary.

(2) Publicity through the media

(a) An arrangement should be made with the Radio Nacional, which at present broadcasts the educational radio programs produced by the Ministry of Education, to have them conduct the type of publicities as mentioned in (1) above on their radio network.

(b) Request the leading newspaper companies to carry the broadcast program schedules in their daily issues. The newspaper companies should also be asked to publish in their papers summaries of some of the programs and some articles introducing the programs.

(3) Planning of exhibitions, etc.

Music festivals for participation by general citizens, art exhibitions and other events may be organized and TV programs covering such festivals and exhibitions may be produced and broadcast. Similar events may be organized occationally in local cities as well.

Table III-IV-25 Nationwide distribution of educational facilities to which receiving equipment may be allocated

| DEPARTAMENTO | Total | Primaria Oficial | | | P/CR | Alf/Ed Ad | IFD | ISE |
|---|---|---|---|---|---|---|---|---|
| | | Sub Total | Urban | Rural | Sub Total | Civil | Sub Total | Sub Total |
| ASUNCION | 127 | 76 | 76 | - | - | 47 | 3 | 1 |
| CONCEPCION | 182 | 169 | 17 | 152 | 1 | 11 | 1 | - |
| SAN PEDRO | 230 | 222 | 18 | 204 | - | 7 | 1 | - |
| CORDILLERA | 248 | 222 | 30 | 192 | - | 24 | 2 | - |
| GUAIRA | 209 | 188 | 23 | 165 | 1 | 19 | 1 | - |
| CAAGUAZU | 338 | 301 | 21 | 280 | - | 37 | - | - |
| CAAZAPA | 170 | 166 | 13 | 153 | - | 4 | - | - |
| ITAPUA | 363 | 351 | 36 | 315 | 1 | 10 | 1 | - |
| MISIONES | 114 | 107 | 15 | 92 | - | 6 | 1 | - |
| PARAGUARI | 310 | 296 | 31 | 265 | - | 13 | 1 | - |
| ALTO PARANA | 157 | 148 | 10 | 138 | 1 | 8 | - | - |
| CENTRAL | 228 | 196 | 38 | 158 | 1 | 30 | 1 | - |
| ÑEEMBUCU | 136 | 132 | 21 | 111 | - | 3 | 1 | - |
| AMAMBAY | 92 | 78 | 5 | 73 | 1 | 12 | 1 | - |
| CANENDIYU | 65 | 58 | 5 | 53 | - | 7 | - | - |
| PRESIDENTE HAYES | 57 | 52 | 4 | 48 | - | 5 | - | - |
| ALTO PARAGUAY | 19 | 15 | 4 | 11 | - | 4 | - | - |
| CHACO | 3 | 1 | - | 1 | - | 1 | 1 | - |
| NUEVA ASUNCION | 1 | 1 | - | 1 | - | - | - | - |
| BOQUERON | 6 | 6 | 1 | 5 | - | - | - | - |
| | 3,055 | 2,785 | 368 | 2,417 | 6 | 248 | 15 | 1 |

Notes:

P/CR: Primaria - Centro Regional

Alf/Ed.: Centro de Alfabetización y Educación de Adultos

IFD: Instituto de Formación Docente

ISE: Instituto Superior de Educación

CHAPTER 4 PERSONNEL PLAN

## 4-1 Estimation of the Number of Personnel needed for Each Type of Job

The personnel needed for the operation of the Broadcasting Station (Asunción Broadcasting Center and its local stations) will be determined by dividing the personnel into program personnel, technical personnel and administrative personnel. These groups of personnel will be further divided into the following rankings, and the number of personnel needed for each type of job will be calculated:

(1) Ranking 1
Chief producer, engineer, and senior clerk

(2) Ranking 2
Producer, technician, and junior clerk

(3) Ranking 3
Assistant, and operator

The program personnel, being related to the number of programs to be produced, will be estimated pertaining to each type of job, on the basis of the number of programs mentioned in "3-7 Program Production Plan", and the result will be shown in Table III-IV-26. The technical personnel are divided into those for maintenance and those for operation. Their number will be estimated on the basis of each group's volume of work and necessary jobs, and its result will be shown in Tables III-IV-27 and III-IV-28. The personnel for maintenance is so arranged as to enable the Asunción Broadcasting Center to do the maintenance work concentratedly. The number of operators to engage in the operation business is subject to the number of facilities to be coordinated. So, their number must be increased according to the broadcasting implementation plan. As for the administrative personnel, the number of personnel needed for each type of job is shown in Table III-IV-29.

Even if various types of work increase as the plan is implemented and even if it becomes necessary to review the number of personnel estimated as above, the size of personnel should be restricted to the minimum.

## 4-2 The Number of Personnel for Each Plan Year

The number of personnel to be secured for each plan year on the basis of the broadcasting implementation plan and the calculation of the necessary personnel in the preceding paragraph is shown in Table III-IV-30. The training period before the opening of the broadcasting station is necessary, so the estimation is based on the following:

(1) Personnel to be secured one year before the opening of the broadcasting station:

All personnel of all types of jobs of Rankings 1 and 2;
Some one half of the program and technical personnel of Class 3 ranking.

(2) Personnel to be secured at the time of opening the broadcasting station:

The remaining half of the program and technical personnel of Class 3;
All administrative personnel of Class 3.

(3) Concerning the Asunción Broadcasting Center, the personnel of Class 1 (supervisory level) will be secured two years before opening the station allowing for the period of time needed for the establishment of the structure of the national educational television.

Table III-IV-26 Numbers of program personnel required

| Stations; Stages / Functional Ranking / Occupational Category | | Asunción Broadcasting Center | | | Local Stations |
|---|---|---|---|---|---|
| | | Stage I | Stage II | Stage III | |
| Director, Program Dept. | 1 | 1 | 1 | 1 | 0 |
| Manager, Program Control Div. | 1 | 1 | 1 | 1 | 0 |
| Chief, Administration | 2 | 0 | 1 | 1 | 0 |
| Administrative Staff | 2 | 3 | 4 | 5 | 1 |
| Assistant | 3 | 3 | 4 | 4 | 1 |
| Manager, Program Productions Div. | 1 | 1 | 1 | 1 | 1 |
| Program Productions Chief | 1 | 1 | 2 | 3 | 0 |
| Producer *1 | 2 | 20 | 44 | 57 | 3 |
| Assistant | 3 | 3 | 6 | 10 | 2 |
| Stage-prop Staff | 2 | 1 | 2 | 3 | 0 |
| Assistant | 3 | 2 | 4 | 4 | 0 |

*1 Concurrently acting as announcer

Table III-IV-27 Numbers of technical personnel required at the Asunción Broadcasting Center

| Occupational Category / Functional Ranking / Category of Work | | Maintenance | | Operation | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Operation/ Maintenance of Transmitting Facilities | Maintenance of Studio Facilities | Master Control | Transmission VTR | News Studio | General Purpose Studio | ENG & VTR Editing | OB Van |
| Director of Engineering | 1 | 1 | | | | | | | |
| Manager, Technical Control Div. | 1 | 1 | | | | | | | |
| Maintenance Staff | 1 | 1 | 1 | | | | | | |
| | 2 | 2 | 4 *1 | | | | | | |
| Manager, Engineering Div. | 1 | | | 1 | | | | | |
| Technical Director | 2 | | | 2 *1 | | | 2 | 3 | |
| Operator | 3 | | | 2 | 2 | 3 | 7 *2 | 1 *2 | 5 *2 |
| Master Control Personnel | 3 | | | 2 *1 | | | | | |
| Switcher | | | | | | 1 | 1 | | 1 |
| Mixer | | | | | | 1 | 1 | | 1 |
| Cameraman | | | | | | | 3 | 1 | 2 |
| VTR Operator | | | | | 2 *1 | 1 | 1 | | 1 |
| Light-man | | | | | | | 1 | | |

*1 Working on two-shifts

*2 Number of personnel per unit facility

Table III-IV-28 Estimation of the required number of technical personnel at a local broadcasting station

| Occupational Category \ Work / Functional Ranking | | Operation & Maintenance Work | | | |
|---|---|---|---|---|---|
| | | Operation/ Maintenance of Trans-mitting Facilities | Operation of Master Control Facilities | Operation of Transmission VTR | Operation of News Studio |
| Manager, Engineering Div. | 1 | 1 | | | |
| Personnel in charge of Maintenance/Operation of Transmitting Facilities | 2 | 4 *1 | | | |
| Technical Director | 2 | | 2 *1 | | |
| Operator | 3 | | 2 | 2 | 3 |
| Master Control Personnel | 3 | | 2 *1 | | |
| Switcher | | | | | 1 |
| Mixer | | | | | 1 |
| Cameraman | | | | | 1 |
| VTR Operator | | | | 2 *1 | |

*1 2-shift work

Table III-IV-29 Estimation of required number of administration personnel

| Work / Functional Ranking / Occupational Category | | Asunción Broadcasting Center |
|---|---|---|
| | | Administrative Work |
| Director, Administration Dept. | 1 | 1 |
| Manager, Finance Div. Manager, General Affairs Div. | 1 | 2 |
| Clerical & Managerial Personnel | 2 | 3 |
| Clerical Personnel | 2 | 5 |
| Clerical Personnel | 3 | 5 |

| Work / Functional Ranking / Occupational Category | | Local Broadcasting Station |
|---|---|---|
| | | Administrative Work |
| Director, Local Station | 1 | 1 |
| Managerial Personnel | 2 | 1 |
| Clerical Personnel | 3 | 3 |

Table III-IV-30 Estimation of the number of personnel to be newly secured each year

| Personnel \ Year | | '83 | '84 | '85 | '86 | '87 | '88 | '89 | '90 | '91 | '92 | '93 | '94 | '95 | '96 | '97 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Personnel | Ranking 1 | | | (4) | | 2 | 1 | 1 | 1(1) | 1 | 1 | 1 | 1(1) | 1 | 1 | | 17 |
| | Ranking 2 | | | | (24) | 8 | 4 | 4 | 4(27) | 4 | 4 | 4 | 4(15) | 4 | 4 | | 110 |
| | Ranking 3 | | | | (4) | 4(4) | 4 | 3 | 3(3) | 3(3) | 3 | 3 | 3(2) | 3(2) | 3 | 1 | 51 |
| | Sub total | | | | | | | | | | | | | | | | 178 |
| Technical Personnel | Ranking 1 | | (1)*1 | (5) | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 17 |
| | Ranking 2 | | (3)*1 | | (13) | 12 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | 82 |
| | Ranking 3 | | | | (8) | 8(8) | 10 | 7 | 7 (13) *2 | 7(11) | 7 | 7 | 7 (4) *2 | 7(2) | 7 | 3 | 123 *2 |
| | Sub total | | | | | | | | | | | | | | | | 222 |
| Administration Personnel | Ranking 1 | | (1)*1 | (3) | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 15 |
| | Ranking 2 | | (1)*1 | | (8) | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 20 |
| | Ranking 3 | | | | (3) | 4(2) | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 38 |
| | Sub total | | | | | | | | | | | | | | | | 73 |
| Total | | | | | | | | | | | | | | | | | 473 |

Notes

( ) : Asunción Personnel

Others : Local Station Personnel

*1 : Project Administration Staff

*2 : Including one Driver/OB Van

Total: 473 *2

Ranking 1 = 49

Ranking 2 = 212

Ranking 3 = 212 *2

## CHAPTER 5 CONSIDERATIONS IN IMPLEMENTING THE PROJECT

### 5-1 Establishment of an Operational Body

This project starts with the establishment of an operational body which is to be in charge of management of the national educational television. It is, therefore, necessary to determine the governmental policies of the Republic of Paraguay as soon as possible.

### 5-2 Securing of Sources of Revenue

Construction and operation of an educational television network require such a tremendous amount of expenses that it is extremely important to know as soon as possible how to secure funds necessary for construction and operation.

### 5-3 Securing of Frequencies for Broadcasting

After necessary adjustments are made with neighboring countries, it is of vital importance to secure a channel for the national educational television according to this Frequency Allocation Plan.

Frequencies are limited in their availability and each country has the right to make an equitable use of the frequencies. It is, therefore, desirable to secure and maintain a frequency allocation plan through adjustment with neighboring countries.

As for the radio administration of the Republic, priority should be given to this national educational television in allocating the channel, in view of its great contribution to the public welfare. Policies should be established in such a way as to guard against other services being given priority in the frequency allocation.

## 5-4 Measures to Spread TV Receiving Sets

The market price of a receiving set is very expensive for the TV viewers, as compared with their average income.

It is, therefore, extremely difficult to promote the spread of TV sets unless adequate measures are taken to facilitate their purchase. It is also an indispensable condition for the spread of TV receivers to endeavor toward expansion and maintenance of the network of electric supply so that areas without power source may be eliminated.

## 5-5 Securing of Personnel

In order to maintain an excellent broadcasting service, great effort must be made in securing adequate number of personnel of high capabilities.

Particular attention should be paid to prevent the experienced personnel leaving the television service.

## 5-6 Appointment of Overseas Experts

In order to promote this project effectively, it is necessary to receive advice from experts in the advanced countries overseas, to employ consultants and to take other positive measures.

## 5-7 Review of the World Trend in Technical Development and This Project

There is something truly remarkable about the development in electronic knowhow in the 1980's. It is necessary to follow this trend closely and to review this project as occasion demands after a thorough study of social and environmental changes in the Republic of Paraguay.

## 5-8 Television Standards for Transmission of Color Television

The standard television system for transmission of color television in the Republic of Paraguay is the PAL-N system, but the studio facilities are adopting the PAL-B system.

This is quite a complicated system, and is rarely seen in foreign countries.

On the occasion of constructing the nationwide broadcasting network for the national educational television, it is desirable to take into consideration the problems ranging from transmitting side to the receiving side versatilely, especially the state of popularization of receivers, regulatory problems related to radio waves, and reconsider which kind of standard would be optimal for the Republic of Paraguay.

SECTION V. MANPOWER DEVELOPMENT

CHAPTER 1. NECESSITY AND BASIC POLICY FOR MANPOWER DEVELOPMENT

## 1-1 Present Manpower Development by ANTELCO

At the end of 1981, ANTELCO had a staff of slightly more than 3,000 persons as shown in Table III-V-1. Reflecting its recent endeavors for improvement and expansion of the facilities, the number of its staff members has shown an increase of 5 - 10% each year.

ANTELCO's manpower development at various levels, ranging from the higher management level to the field level, is now conducted according to the training scheme described below.

Table III-V-1. Staff composition of ANTELCO (End of 1981)

| | |
|---|---|
| Directors | 13 |
| Advisors | 47 |
| Planning sector | 68 |
| Construction sector | 280 |
| Maintenance & operation sector | 1,671 |
| General affairs & accounting sector | 564 |
| Assistants | 407 |
| IPT | 84 |
| Total | 3,134 |

### 1-1-1 Training at IPT

The Paraguayan Institute for Telecommunications (Instituto Paraguayo de Telecomunicaciones; IPT was separated from ANTELCO's technical bureau in 1951 to become an independent institute. Since that time, it has been provided with the reinforcement of its

facilities, and with expert services in various areas such as radio transmission, telephone switching, outside plant and broadcasting from International Telecommunication Union (ITU), United Nations Development Program (UNDP), and Governments of Japan and West Germany. At present, it plays a central role in ANTELCO's manpower development.

IPT made a start as an intra-enterprise training institute of ANTELCO. In 1973, it was expanded in scale by the establishment of an technical high school annexed to it for the purpose of training Paraguayan telecommunication technicians. It was scaled up further in 1975 when ANTELCO reached an agreement with Asunción University to institute a Department of Electronics with IPT.

Under this agreement, the first-year students of the newly established department were enrolled in 1976. The courses offered by IPT are based on the official educational system in Paraguay. Thus, IPT now functions as an integrated manpower development institute providing the intra-enterprise training course, technical high school course, and college education course.

### 1-1-2 General/Group training in overseas countries

The Paraguayan Government has been positive in participating in various training courses and seminars for key management personnel and group training courses for engineers organized by the government of advanced industrialized countries. By sending trainees to these overseas training courses and seminars at regular intervals, Paraguay has introduced advanced telecommunication technologies from overseas. There has also been a large number of Paraguayan students majoring in telecommunications who studies abroad on scholarships.

### 1-1-3 Individual training in overseas countries

Training in domestic and international telecommunications, radio regulation and monitoring, TV broadcasting, etc. is conducted by making use of the individual training courses offered by the governments of advanced industrialized countries or inaugurated on a contract basis to meet the purpose of each individual develop-

ment project. These overseas individual training courses are intended to upgrade the capabilities of those who are to play a leading part in the national development of Paraguay.

1-1-4 Domestic training outside IPT.

The OJT (on-the-job training) constitutes the main part of training service for those who are assigned to the actual operation and maintenance of newly introduced instruments and equipment.

In the manpower development associated with each project, stress is placed on the development of practical techniques and skills. Specifically, when a project is to be implemented, Paraguayan technical experts and workers participate in contract-based group training and acceptance tests to acquire practical skill in the operation of actual instruments and equipment, or receive OJT in operation and maintenance from instructors dispatched to Paraguay on a contract basis.

## 1-2 Basic Concept of Manpower Development

When the present Master Plan is finalized, approved and put in operation, it will result in the introduction of new telecommunication equipment, radio regulation and monitoring equipment and broadcasting equipment which are far more complex and elabroate than the existing ones. To maintain these new equipment in perfect, faultfree service condition for a long time, it is essential to secure qualified and skilled Paraguayan workers for their satisfactory operation and maintenance as well as the services of Paraguayan engineers with high technical capabilities who are to serve as the leaders and managers of these workers. Thus, training of technical experts for smooth technology transfer is one of the important contributing factors to the success of the Telecommunications and Broadcasts Development Project.

Training in existing technologies is also essential in view of the expected increase of facilities and the resultant need to secure a greater number of workers for their satisfactory operation and maintenance. Hence, training should be conducted not only for the workers to be newly recruited but also for those already in service in order to enable them to acquire the necessary technical level. For this reason, it is recommended that a longterm, integrated manpower development plan, aimed at enhanced training in both existing and new technologies, be formulated with specific consideration given to the following points.

### 1-2-1 Organization expansion of IPT

IPT has played the central role in ANTELCO's manpower development activities, gaining nation-wide recognition in Paraguay. It is therefore desirable that IPT will continue playing the same important role in the manpower development in the areas of telecommunications and electronics not only for ANTELCO but for the entire nation, as strongly hoped for by competent Paraguayan authorities.

At the moment, however, IPT lacks greatly in training facilities and professorate and is unable to meet the growing

demand for training. The situation demands that top priority must be given to IPT's expansion in both facilities and organization.

### 1-2-2 Reinforcement of OJT

The technical level of engineers and technicians who are to engage in the operation and maintenance of newly introduced equipment is an important factor that directly affects the quality of telecommunication services. Accordingly, it should be given the greatest importance from the viewpoint of ANTELCO's business activity.

Considering the present manpower availability of ANTELCO, however, it will not be possible to secure all necessary maintenance and operational personnel even if concentrated efforts are made for manpower development in the future by expanding IPT's training facilities and teaching staff. To offer a solution to this problem, it is necessary to scale up OJT to be conducted by instructors trained abroad or at IPT by utilizing all available facilities to the extent of causing no hindrance to their normal operation and customer service. It will also be necessary to secure the services of operation and maintenance instructors on a contract basis whenever new equipment is introduced in order to acquaint field workers with advanced technologies.

### 1-2-3 Necessity for systematic manpower development

Manpower development can never yield any successful result unless it is closely linked with ANTELCO's management policies and carried out systematically from a long-term point of view.

For this reason, the long-term manpower development plan presented in this Master Plan is based on the long-term personnel plan in various development sectors and on the future demand forecast of electronics engineers and technicians in the whole country.

Successful implementation of the manpower development plan pre-supposes, among all other things, well-planned, systematic,

company-wide approaches. All fundamental matters pertaining to manpower development, including long- and short-term training policies, training targets, training programs, training demand, plans for training facilities consolidation and organizational improvement, budgetary appropriation, etc. should be subjected to a company-wide examination for authorization and made known to all the parties concerned before put into operation.

It is also important to acquire a firm and constant grasp of the training history of each individual trainee. By thus accumulating chronological training data, it will become possible to formulate an efficient long-term training program and an adequate personnel assignment plan as well as to select training instructors and to keep capable engineers and technicians in ANTELCO in an effective, systematic manner.

## 1-3 Positioning of IPT and Its Role

In May 1977, the Planning Office of the President formulated the "National Socio-Economic Development Plan" in accordance with the provisions of Article 94 of the Constitution of the Republic of Paraguay, and it was approved by the Government. The Plan, though under reexamination at present, provide the basic guiding principles for Paraguay's socio-economic development.

In the National Development Plan, it is expressly stated that one of the development objectives of the transport and communication sector is "to promote the development of human resources in both quality and quantity in the field of telecommunications and electronics by improving, expanding the facilities of IPT."

Referring to the development targets of the educational sector, it is also stated in the Plan that "The implementation of largescale bilateral hydroelectric power development projects has accelerated the pace of national development, resulting in an increasing demand for skilled labor force. It is therefore necessary to increase the number of professional schools, vocational schools and vocational training centers in places within commutation distance from the farming areas, and to expand the scope of public services for qualifying examination, professional education, and vocational training."

Thus, the importance of manpower development is stressed and necessary measures are enforced on the national level along with the rapid socio-economic development in the country. IPT is the only institution currently providing the college and high school level technical education (including practical training) in the field of electronics. The significance of the technical education it conducts is so highly appraised in Paraguay that special mention is made of IPT in the National Development Plan. Although there are a few other institutions for training electronics experts, they can hardly be compared to IPT in technical level. At present, IPT is the national training center for electronics engineers and technicians.

The Master Plan covers a number of development fields including domestic telecommunications, international telecommunications, radio regulation and monitoring, and national educational TV broadcasting, and its smooth implementation calls for satisfactory operation and maintenance of newly introduced instruments and sufficient number of Paraguayan engineers and technicians. IPT is expected to play a central role in providing basic theoretical and practical training in new technologies as well as in conducting group training and retraining in existing technologies.

It is to be noted that IPT is expected to train professional experts as a national educational institution besides the above-mentioned services indispensable to the training institution of ANTELCO which is a public enterprise. To cite one example, it is expected that the number of higher and middle class electronics engineers needed in Paraguay will increase at a phenomenal pace with the progress of the two gigantic hydroelectric power development projects now implemented at ITAIPÚ and YACYRETA at the stake of Paraguay's national prestige, and IPT is the only national institution which can possibly cope with the increasing demand for engineers and technicians. This is one of the reasons why the repletion of IPT is so urgently required on the national level.

## CHAPTER 2. PATTERNS AND METHODS OF TRAINING

### 2-1 Training Patterns

Training can be broadly classified into overseas training and domestic training. To promote the training of engineers and technicians, it is necessary to make positive use of all means of training including the group training courses offered by advanced industrialized countries, IPT's training courses, new, contract-based training, and the Government-based individual training courses. These training courses should be followed by well-planned, systematic OJT in order to assure that new technologies will be transferred smoothly and take firm root in Paraguayan soil.

(1) Overseas training

Training of key personnel who are to take the lead in the national development should be promoted by positive participation in seminars and group training courses sponsored by the governments of advanced countries and by conducting the Government-sponsored or contract-based training courses according to the peculiar technical needs.

(2) Domestic training

Existing training facilities and courses including those of IPT should be made use of to the maximum extent for basic theoretical education and practical training. In addition, efforts should be made to improve practical techniques and skills by promoting the participation in mass training and acceptance tests carried out on a contract basis for the project implementation and by accelerating the OJT in operation and maintenance to be offered by the instructors sent to Paraguay on a contract basis.

## 2-2 Training Methods

Training for the introduction of new technologies should be basically conducted in the following sequence.

Basic theoretical studies and practical training ——→

Specialized theoretical studies and practical training in each specific technical area/system to be introduced ——→

Practical training in the field or compatible with the field requirements

For this purpose, the following steps should be taken for the phased progress of training.

1) First IPT and the like should provide, as far as possible, basic courses in the new technology to be introduced.

2) This should be followed by overseas training in the theoretical and practical aspects of the new technology. For this training, the minimum required number of personnel who are to guide or lead the actual operation and maintenance should be screened out and sent abroad.

3) Training centering on the practical aspect should be planned and conducted for the largest possible number of relevant personnel during the construction period.

4) OJT should be conducted through participation in the acceptance tests of the construction work and under the guidance of instructors in the equipment operation and maintenance to be dispatched from abroad according to the contract after the commencement of the equipment operation.

## CHAPTER 3. CONTENTS AND CHARACTERISTICS OF MANPOWER DEVELOPMENT PLAN BY EACH FIELD

In this chapter, only essential training plan and training equipment are explained in accordance with the features of each field, which are described in each Section. Accordingly, the detailed plan is not necessarily fully specified and all the required equipment is not always mentioned.

### 3-1 Domestic Telecommunications

#### 3-1-1 Patterns and contents of training

To maintain and upgrade the technical level of operational and maintenance personnel, the following training should be conducted.

(1) Training for introducing new technologies

This training should be conducted for maintenance and operational personnel directly concerned with the application of new technologies and for those who are responsible for their supervision and management.

(2) Training for existing technologies

Training of personnel to be newly recruited to meet the increased demand for maintenance and operational service or to fill up the vacancies in such service should be conducted, in addition to the training of existing personnel to upgrade their technical capabilities.

As for the pattern of training, choice can be made from among the Government-based overseas training, contract-based overseas training, contract-based domestic training, training at IPT and OJT.

Training for the introduction of new technologies should be conducted in the following sequence.

Basic theoretical studies → Specialized theoretical studies on the specific system/technology to be introduced → Practical training

Basic patterns of training are shown in Table III-V-2, and the actual training courses can be planned and offered by suitably combining these basic patterns.

The contract-based domestic training includes the training through participation in the acceptance tests of the construction work and OJT to be offered by instructors specializing in operation and maintenance who will be dispatched to Paraguay according to the equipment maintenance contract.

Table A V-1 in the Annex show the annual training plan for each new technological area. This table shows the training plan at the time of introducing new technologies but does not include the subsequent OJT and other training to be conducted after the commencement of equipment operation.

Table III-V-2 Basic training patterns in domestic telecommunications field

| Classification | Trainees | Basic theoretical studies ⇒ | Specialized theoretical studies on new system/ technology ⇒ | Practical training |
|---|---|---|---|---|
| Training for introduction of new technologies | Upper class engineers (chief engineers) | ° Training at IPT<br>° Overseas training (Government basis) | ° Overseas training (Contract basis)<br>° Domestic training (Contract basis or IPT) | ° Overseas training (Contract basis)<br>° Domestic training (Contract basis or IPT) |
| | Middle class technicians (general workers) | ° Training at IPT | ° Domestic training (Contract basis)<br>° Domestic training (IPT or OJT) | ° Domestic training (Contract basis)<br>° Domestic training (IPT or OJT) |
| Training for existing technologies | Newly recruited personnel (those employed to augment the work force or fill vacancies) | ° Training at IPT | ° Domestic training (IPT or OJT) | ° Domestic training (IPT or OJT) |
| | Existing personnel | - | ° ditto | ° ditto |

Note: Actual training courses should be planned by suitably combining the training patters shown in the table.

### 3-1-2 Training of operation and maintenance personnel for non-telephone service

Consideration should be given to the following points in planning the training for non-telephone services to be introduced on a full scale in the future, although fundamental approaches to such training should be the same as proposed in Table III-V-2.

(1) Telex switching

Electronic telex switching system is expected to be installed in Paraguay in the 1983 - 1984 period. Training in the operation and maintenance of these switching system should be conducted according to the plan which is reported to have been already formulated by ANTELCO on a contract basis. If additional maintenance personnel are to be recruited owing to the increase of the lines, they should be given the upgrading training for the existing technologies.

(2) Facsimile equipment

Training in the operation and maintenance of the domestic public telegraph and facsimile service network should be based on the method proposed in Table III-V-2, although the plan for introducing new models has not been finalized yet.

(3) Telex terminals

It is expected that the Paraguayan technicians will be able to provide satisfactory operation and maintenance service because 50 b/s equipment will constitute the greater part of the terminals at the outset. As for 1200 b/s switching service, the training for MODEM will suffice because the terminal equipment will be installed exclusively for private operation.

(4) Data communication

While ANTELCO's data communication service is planned to be initiated after 1997, it is quite likely that the demand

for such service will arise earlier than 1997 owing to the rapid progress of socio-economic development and internationalization.

In preparation for such early demand for data communication service, it is advisable to induce the engineers and technicians to acquire the hardware and software technologies of digital switching through the operation and maintenance of the existing telex switching system, and to acquiaint them with the routine service such as command operation and new subscriber registration through the system operation. The engineers should be encouraged to pay attention to CCITT recommendations and the reports of its working committee to keep themselves well informed of the trends and changes in the world data communication service, and to acquire new technologies relating to the packet switching service which will be introduced in Paraguay in the future as well as the knowledge about teletex and videotex terminals to be used for packet switching.

3-1-3 Training expenditure

The contract-based training expenses will be appropriated for training in the domestic telecommunications field as the cost of main training facilities is expected to be included in the budget for IPT's expansion. Details of the training expenditure are shown in Table A V-2 in the Annex by year and currency.

## 3-2 International Telecommunications

### 3-2-1 Basic concept of training

Operation and maintenance training was conducted for present international communications personnel in 1977 in the course of building the central station and other facilities. Of these personnel, many of the employees in charges of the facilities shifted to other companies because of the increased demand for telecommunication engineers and technicians in Paraguay and even among the remaining employees a considerable number of people wish to change their jobs. This tendency is expected to become more and more pronounced when modernization of the facilities progresses in the future.

Meanwhile, technical training of ANTELCO at IPT is unable able to satisfy all the needs arising on the field despite the efforts by the people concerned. Training in such a special field as satellite communications is especially difficult. Also at ANTELCO, almost no training has been given to the employees for technical improvement, nor has technical transfer been covered with the beginners in daily operations. Therefore, if things are left as they are now, it is feared that the maintenance technique level will be lowered in the future.

For the reasons cited above, the following trainings should be carried out actively.

(1) Basic training at IPT

- o Elements of computers
- o Elementary knowledge required for wide-band communications
- o Elements of microwave transmission
- o Elements of digital transmission
- o Elementary traffic control
- o Elementary switching technique
- o Elementary knowledge of data processing (software and hardware)

(2) Training entrusted to outside ANTELCO

Experienced people are chosen among the engineers and technicians to participate in training in foreign countries.

(3) Technical transfer in ANTELCO

Training is conducted in each bloc for the operation, maintenance, new techniques, etc. Senior engineers and also those who have had overseas training instruct the trainees with advice given by the foreign experts.

3-2-2 Training program for the introduction of new service facilities

(1) I.S.D. transmission service facility maintenance

As for the training required for the introduction of I.S.D. service, which is scheduled to begin in 1985, the following should be conducted.

o Training for local exchanges

The training should be conducted with emphasis on the practical exercise in operation sequence on the premise that the maintenance and operation procedure of local exchange facilities are simplified. Since there will be a large number of trainees, it is advisable to conduct the training repeatedly for a group of 12 - 13 trainees by selecting about 5 persons from each exchange. It will be possible to attain a greater effect for the trainees by participating in the in-plant test at each local exchange.

o Training for international exchanges

a) Exchange facilities

Since the new facilities will be fundamentally the same as the existing exchange facilities, the training should be conducted to introduce an outline of exchange facilities including the new ones. For this

purpose, the training should be conducted twice for about 12 persons. Trainee participation in the in-plant test is advisable.

b) Computer facilities

The switching maintenance personnel should undergo training in the structural and functional outline of computer facilities as well as practical training in their trouble shooting procedure.

Training of personnel specializing in computer facilities should be focussed on the acquisition of new technologies and knowledge required for the operation of ANTELCO's computer facilities as well as on the cultivation of hardware/software experts to lessen the dependence on the dispatched experts or manufactures. For this reason, the training for these personnel should include the participation in the manufacturers' basic training courses. A period of about 6 months will be required for this training which is to be conducted at the manufacturers' training institutions and in Asunción for 4 trainees.

(2) New international telephone switching facility maintenance

Regarding new international telephone switching facilities to be introduced in the second five-year program;

Engineers ----- 8 weeks at the training institute of the contractor concerned

Technicians --- 2 weeks in Paraguay

In either case, trainees must finish elementary computer courses at IPT or possess similar levels of knowledge on computers before receiving this training.

Table III-V-3 shows an outline of the training plan for the international telecommunications field.

Table III-V-3 Training plan for international telecommunications field

Not include persons filled up vacancies

| 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 | | | xxxxx→ (1) | | | | | xxxxx→ (1) | | | | | xxxxx→ (1) | | | +3 |
| Maintenance Earth Station | | | | xxxxxx→ (5) | | | | | | | | | | | | +5 |
| Maintenance 2nd. Earth Station | | | | | | | | xxxxxxx----→ (6) | | | | | | | | +6 |
| Maintenance I.N.T.S. | | ----→ (4) | | | | | | xxxxxxx | ----→ (2)+(present persons) | | | | | | | +6 |
| Telephone Operator | | | | | | | | | | | | | | xxxx→ (10) | | +10 |
| Maintenance Telex Exchange | | xxxxxx----→ (3)+(present persons) | | | | | | | | | | | | | | +3 |
| Telex Operator | | | | | | | | xxxxx----→ (3) | | | | | | | | +3 |
| Traffic Engineering | | | | | xxxxxx (2) | | | | | | | | | | | +2 |

Notes: xxxx Basic training at IPT (for trainees having no basic knowledge)

---- Training outside/OJT —→ On duty

( ) Number of trainees

## 3-3 Radio Regulation and Monitoring

### 3-3-1 Training for newly reruited personnel

As shown in the personnel plan, the number of personnel required for the radio regulatory and monitoring administration is expected to be doubled by an increase of 42 persons at the end of the period covered by the Master Plan. This means that the annual recruitment demand is 2.8 persons, which can be satisfied by employing IPT's new graduates without resorting to any specific measure. (cf. Table III-III-2)

### 3-3-2 Outline of training

(1) Training will consist of the courses provided overseas and those conducted in Paraguay.

(2) Overseas training includes training seminars organized by ITU and seminars planned under multilateral and bilateral agreements. It is important to participate in these overseas seminars positively by scrutinizing the objective and content of each seminar and selecting suitable and qualified trainees to attain the highest training effect.

(3) Those having completed overseas training should make best efforts to disseminate the knowledge and technologies they have acquired through the active guide in the training programs in Paraguay.

(4) Domestic OJT should be conducted to improve the trainees' technical capabilities and broaden their knowledge about laws and regulations pertaining to their service.

(5) Newly recruited personnel should receive training in the basic knowledge of radio regulation and monitoring service.

(6) Domestic training should be conducted in a systematic, well-planned manner after a close consultation with IPT about the content of training.

(7) A staff member or members in charge of manpower development should be appointed within the Technical Department for the purpose of smooth, efficient implementation of the training programs.

(8) The training result should be evaluated according to the following criteria.

1) Trainees' reactions in the classroom.

2) Test achievements

3) Teaching method

4) Trainees' field/shop-level performance

5) Final training target of the competent authorities.

The result of evaluation should be used for improvement and reexamination of the content of training.

Since the training effect is greatly influenced by the instructor's quality and capabilities, it is necessary to appoint experts specializing in the evaluation of the instructors of training method as well as in the control, management, analysis and design of training courses, selection of teaching materials, and evaluation of training effect.

(9) Details of the annual training plan are shown in Table III-V-4.

(10) Training equipment and training expenditure

It is desirable that the basic facilities shown in Table A V-3 in the Annex be provided for the training. The cost estimate for the installation of such facilities is shown in Table A V-4 in the Annex.

Table III-V-4 Training plan for radio regulation and monitoring field

Training period :
- Seminar for key personnel ..... 30 days
- Training in radio regulation and monitoring service .... 60 "
- Training for newly recruited personnel ..... 90 "
- Retraining for engineers and technicians ..... 30 "

| Classification of training \ Year | '83 | '84 | '85 | '86 | '87 | '88 | '89 | '90 | '91 | '92 | '93 | '94 | '95 | '96 | '97 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overseas seminars for key personnel | 1 | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | 6 |
| Overseas training in radio regulation and monitoring | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 20 |
| Domestic training of newly recruited personnel | 8 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 35 |
| Domestic retraining of engineers and technicians | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 45 |
| Total | 13 | 7 | 6 | 5 | 7 | 6 | 6 | 7 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 106 |

Total number of days of training ..... 5,880 days
Number of training days per person ..... 55.5 "
Annual average number of trainees ..... 7.1 persons

## 3-4 National Educational TV Broadcasting Sector

### 3-4-1 Patterns and contents of training

Training in this field, which is conducted for the program personnel and technical personnel, consists of domestic training, overseas training (Government- and contract-based), and practial training at the broadcasting station. Domestic training is conducted by IPT for the technical personnel and by the Institute concerned for the program personnel. It is advisable to combine the above three patterns of training effectively according to the position and service category of the trainees.

Table III-V-5 shows the basic patterns of training. The term "guidance" appearing in this table means the training service (domestic training and practical training) offered for lower ranking personnel by those who have completed domestic and overseas training while performing their daily duties. Details of the annual training plan formulated to secure the necessary number of personnel are shown in Table A V-5 in the Annex.

Table III-V-5 Basic training patterns for educational TV broadcasting field

| Process of training / Trainee job ranking | Domestic training | Overseas training (Government or contract basis) | Practical training | Guidance service |
|---|---|---|---|---|
| 1 | ° Basic theoretical training in broadcasting technologies<br>° Theories of pedagogy | ° Advanced basic theories<br>° Practical training in the operation and maintenance technologies<br>° Theoretical and practical training in program production and compilation | Practical training in operation and maintenance and in program production using actual studio facilities under the guidance of experts dispatched to Paraguay at the time of construction | Lectures and practical training at IPT, the Institute concerned and Asunción Broadcasting Center for trainees of 2nd and 3rd job ranking |
| 2 | ° Basic theoretical training in broadcasting technologies<br>° Practical training in the operation and maintenance technologies<br>° Theories of pedagogy<br>° Program production | ditto (For key personnel only)<br>——— | Practical training in the operation and maintenance and in program production using actual facilities at Asunción Broadcasting Center | Practical training at broadcasting station for trainees of 3rd job ranking |
| 3 | ——— | ——— | Practical training using actual facilities at local broadcasting stations | ——— |

° Subject for technical personnel training course

° Subject for program personnel training course

3-4-2 Domestic training

(1) IPT

IPT will provide engineers and technicians with theoretical training in baisic television and practical training in operation and maintenance technologies. The practical training is intended to enable the trainees to acquire the equipment adjustment and maintenance techniques and skills. For This purpose, training equipment (cameras VTRs, etc.) and measuring instruments of the same specifications as those installed at Asunción Broadcasting Center should be made available. However, transmitting facilities and studio facilities should not be prepared separately for the training purpose, but those of Asunción Broadcasting Center can be used.

IPT's staff members will take the leading part in the technical personnel training,but maintenance engineers and technicians of Asunción Broadcasting Center trianed in overseas countries will also serve as instructors.

IPT's staff members who are to provide the training service will be given overseas training according to the schedule shown in Table A V-5 in the Annex.

(2) The Institute concerned for program personnel training

The Institute concerned, offers theoretical training in pedagogy and presentation of broadcast programs, and practical training in program production for the chief producers and producers. The practical program production training calls for the availability of actual program production facilities. For this purpose, the studio facilities and OB vans of Asunción Broadcasting Center can be used, but it is advisable to make VTR editing system and ENG equipment available for the exclusive purpose of program training personnel.

The Institute's staff members will take the leading part in the training, but chief producers of Asunción Broadcasting Center trained in overseas countries will also serve as instructors. The Institutes staff members who are to provide the training service will be given overseas training according the schedule shown in Table A V-5 in the Annex.

3-4-3 Training facilities and expenditure

The facilities required for training technical and program personnel for national educational television will be selected according to the following criteria.

(1) The trainees will be limited to technical and program personnel required for the national educational television and the quantity, specifications and other particulars of the facilities will be determined according to the actual demand.

(2) The studio facilities, OB vans and transmitting facilities of Asunción Broadcasting Center will be used for training.

(3) Accordingly, the facilities required for training technical and program personnel will consists of individual equipment (cameras, VTRs, etc.), measuring instruments, and audio-visual materials and equipment. These facilities will be of the same specifications as those used at Asunsión Broadcasting Center.

The training facilities to be thus selected and their costs are shown in Table A V-6 in the Annex.

# CHAPTER 4. IPT EXPANSION PLAN

## 4-1 Historical Background and Existing State of IPT

### 4-1-1 Historical background

In June 1982, IPT attained the 24th anniversary of its existence. In the early period of its operation, IPT consolidated its training courses and facilities with the cooperation and assistance from ITU and UNDP. The assistance from these international organizations was closed in 1976 and at present, technical assistance is provided by JICA.

West Germany, which is known to have maintained close relations with Paraguay for many years, is providing extensive technical and economic assistance in many areas including telecommunications, as evidenced by the use of EMD switching system at all domestic exchanges. Under a technical cooperation agreement between Paraguay and West Germany, a technical advisory mission sent from the West German Ministry of Postal Service and Telecommunications was stationed at ANTELCO, providing various service and cooperation not only to ANTELCO headquarters but also to IPT.

In the course of its 23-year long operation, IPT sent out hundreds of engineers, and many of them now hold important posts in ANTELCO. Some of them acquired more elaborate professional knowledge in overseas countries, and some are still studying abroad.

In 1973, an technical high school of electronics was annexed to IPT with the formal approval of the Paraguay Ministry of Education. Since it sent out the first graduates in 1975, this school has been turning out 40 - 50 new graduates each year.

In 1975, a college-level electronics course was inaugurated within IPT, and this was also approved by the Ministry of Education as a Department of Electronics of the National Asunción University. The classwork of this newly established electronics department was started in May 1976, and the first graduates were

turned out at the end of 1978. The department offers the only college-level electronics course in Paraguay, and enjoys a very high reputation in the country.

4-1-2 Existing state of IPT

(1) Organization and positioning

As seen in Fig. III-V-1 showing the organization of ANTELCO, IPT is positioned at the same level as other bureaus, which indicates that it is rated high within ANTELCO.

As shown in its organization chart (Fig. III-V-2), IPT is divided into the college electronics course and the technical high school/intra-enterprise training courses, and its laboratories and service facilities are designed for the common use of all courses.

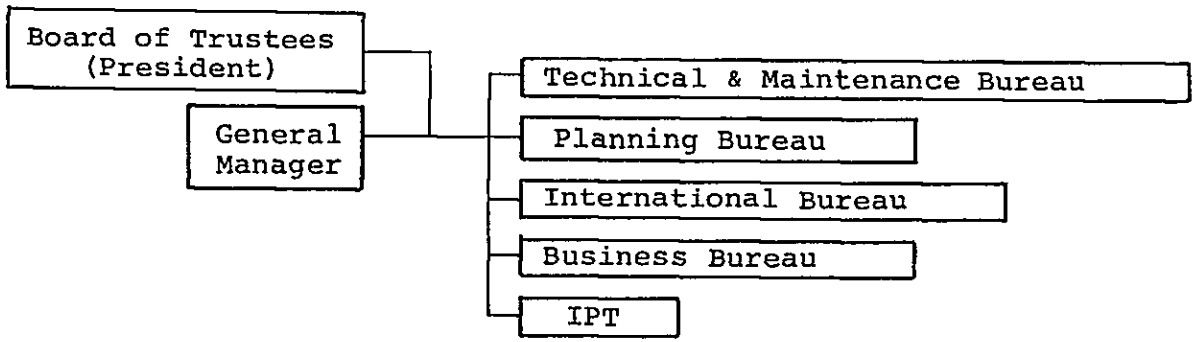
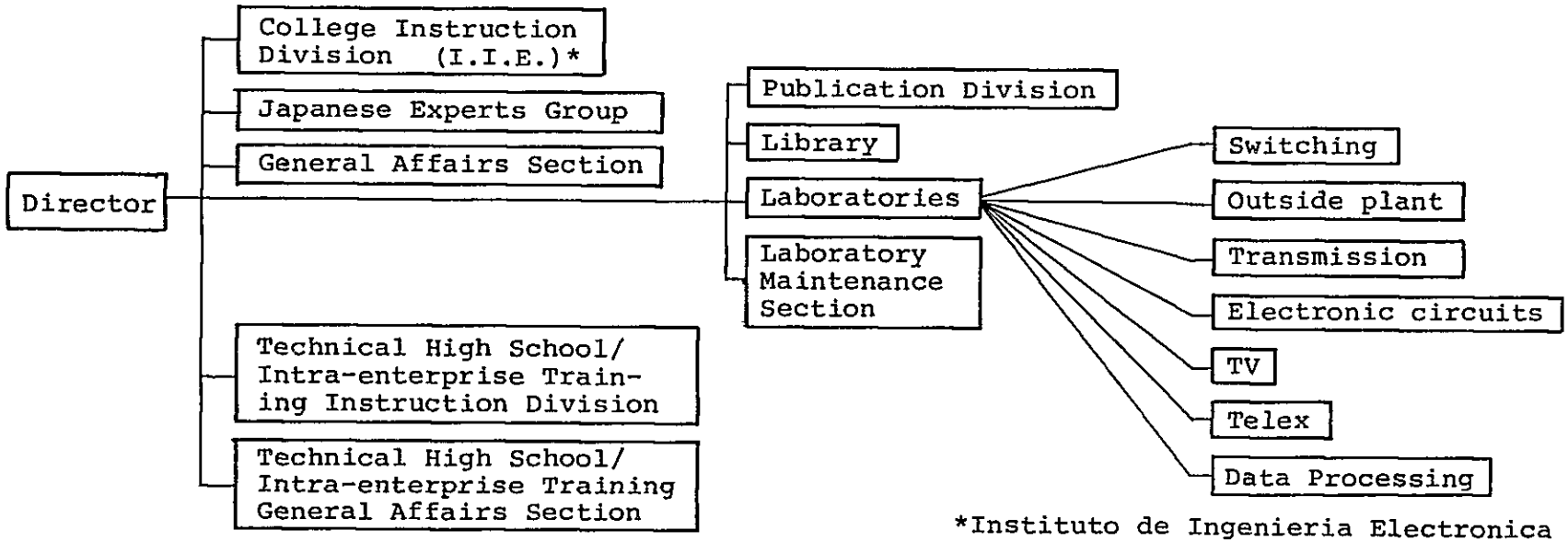



Fig. III-V-1 Organization of ANTELCO






*Instituto de Ingenieria Electronica

Fig. III-V-2 Organization of IPT

(2) Present courses, and number of students

1) Intra-enterprise training courses

The inter-enterprise training is subject to change in the kind of course and period according to the requirements of ANTELCO's operation sectors. Table III-V-6 shows the main training courses offered at present.

Table III-V-6 Training courses of IPT

| Course | Period | Number of Students |
|---|---|---|
| (Long-term Courses) | | |
| Transmission & radio communication | 1 year | 30 |
| Telephone switching | 1 " | 30 |
| Color TV | 1 " | 20 |
| Telephone operator | 1 " | 30 |
| (Short-term Courses) | | |
| Microwave | 3 months | 20 |
| Carrier transmission | 6 " | 20 |
| Teleprinter | 3 " | 10 |
| Outside plant maintenance | 4 " | 12 |
| Telex operation | 2 " | 25 |
| Rate charging & collection | 5.5 " | 25 |
| Crossbar switching | 3 " | 12 |
| Power maintenance | 4 " | 12 |
| Supervision | 5 " | 25 |
| English language | 5 " | 30 |
| International telephone operator | 2 " | 12 |
| Others | - | - |

2) Technical high school course

The technical high school course is intended to bring up technicians specializing in electronics. As it is approved by the Secondary and Vocational Education Bureau of the Ministry of Education, the course is conducted within the framework of secondary education system which lasts for six years, the first three years alloted to basic education and the remaining three years to professional education. IPT offers the three-year course in professional education to the students who have completed the first three-year course in basic education.

As of 1982, the technical high school has a student enrollment of 161, which is broken down by grade as follows.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4th graders: | 60 | students | (42 | males | and | 18 | females) |
| 5th graders: | 40 | " | (33 | " | and | 7 | " ) |
| 6th graders: | 61 | " | (48 | " | and | 13 | " ) |

3) College electronics course

ANTELCO has provided the professorate and all training facilities including classrooms, library, laboratories, etc. since the supreme board of trustees of the National Asunción University agreed to establish this course at IPT in 1975 as its electronics department.

The course requires six years of education to complete just as other colleges, the first three years for general cultural education and the remaining three years for professional education. However, IPT offers only the three-year professional education to the students who have completed three-year general educational course at the Department of Science of the National Asunción University or equivalent colleges.

Inaugurated in 1976, the course has so far sent out 16 graduates and has a student enrollment of 47 at present.

(3) Present situation of IPT's professorate

Between 1970 and 1976, IPT reinforced its professorate and consolidated its training facilities such as laboratory equipment and measuring instruments with the assistance from ITU. After ITU's assistance was closed in 1976, the Japanese Government has sent many experts to IPT through JICA under a technical cooperation program. The services of these Japanese experts, who help upgrade the quality of their Paraguayan counterparts conducting different courses at different levels, are of great importance to IPT's activities.

For the purpose of intra-enterprise training, IPT now has nine full-time professors and three Japanese experts from JICA. These professors are assisted by ANTELCO's technicians (6 - 8) in the maintenance of training facilities and preparations for lectures and training.

The technical high school course has a teaching staff of 13 members, and the college electronics course has a professorate comprising a total of 25 professors. To raise the efficiency of the expected manpower development, IPT will have to make ceaseless efforts to strengthen its full-time teaching staff including lecturers and instructors.

(4) Present situation of IPT's facilities

At present, IPT covers a plot area of about 1,100 $m^2$ and has two blocks of school buildings, one used for the technical high school/intra-enterprising training courses and the other for the college electronics course.

The effective building area is about 1,380 $m^2$ which is divided as shown in Table III-V-7.

Table III-V-7 IPT's Facilities

| | |
|---|---|
| Class rooms | 360 $m^2$ |
| Lecture hall | 100 $m^2$ |
| Library | 60 $m^2$ |
| Professors' room | 80 $m^2$ |
| Electronic circuit laboratory | 125 $m^2$ |
| Transmission & radio communication laboratory | 140 $m^2$ |
| TV laboratory | 55 $m^2$ |
| Switching laboratory | 50 $m^2$ |
| Outside plant laboratory | 60 $m^2$ |
| Instruction and general affairs offices | 350 $m^2$ |
| TOTAL | 1,380 $m^2$ |

## 4-2 Long-term IPT Expansion Scheme

As described already, IPT is expected to play a vital role in the manpower development essential to ANTELCO's long-term expansion plan as well as in the training of electronics experts on the national level.

Considering the magnitude of national expectations for its manpower development service, it cannot be denied that IPT has many problems that call for drastic measures for solution.

First of all, the buildings are just too narrow to achieve its training and educational purposes. Its curricula and annual student enrollment are limited owing to the small number of class rooms and laboratories. The growing national demand for IPT's training function shows that the increase of the class rooms and laboratories is indispensable.

Furthermore, in order to provide a full-fledged specialized training keeping up with the rapid progress in telecommunications technologies, it is imperative to consolidate and update the training equipment and instruments.

The professorate of IPT, which includes many part-time instructors, is not satisfactory either. Unless it is strengthened greatly with specific efforts to increase full-time instructors, it will perhaps become difficult to organize the necessary training curricula.

Thus, IPT now faces a diversity of problems such as the expected increase of trainees, the growing demand for opening new courses, and the necessity to increase its classrooms and laboratories and strengthen its full-time professorate. Considering the limited lot area and small buildings currently available, it is absolutely necessary to relocate IPT in a suitable new place to solve all these problems.

In working out the relocation plan of IPT, consideration should be given to the heavy fund requirement for constructing buildings and training facilities and to the anticipated rapid

development of telecommunication technologies. It is not practical to map out a plan based on a distant future prospect and implement it all at once, not by stages.

For this reason, the long-term IPT expansion plan should be formulated with specific consideration given to the following points.

(1) Relocation of IPT should be realized at an earliest possible date to provide for the future long-term expansion of its facilities. The existing IPT building should be diverted to common use of ANTELCO's other bureaus.

(2) The new plot area should be large enough to meet the long-term demand (for least 15 years).

(3) The new school buildings and facilities should be expanded by stages. Specifically, the first relocation/expansion work should be followed by the second and third phase expansion work to be undertaken at five-year intervals.

(4) The professorate should be reinforced with emphasis on the increase of full-time professors and instructors, by taking into consideration the phased expansion of school buildings and facilities.

## 4-3 Curriculum

Table III-V-8 shows the new training courses to be inaugurated according to the trend of new technologies which will be introduced in Paraguay in the future and the progress of the long-term IPT expansion plan. Needles to say, the actual curriculum should be determined on a yearly basis according to the requirements of relevant parties including ANTELCO and Asunción University, taking account of the past training achievements.

It is also to be noted that certain limits will have to set to the content of training because IPT is required essentially to put priority to the basic theoretical and practical training in the newly introduced technologies.

Formulation of curricula based on a long-range future prospect does not meet the practical purpose because of the rapid technological progress in telecommunications and electronics. Accordingly, the training courses should be determined on yearly basis by comprehensive judgement of the newly introduced technologies and the number and technical level of newly enrolled students.

Table III-V-8 New Courses to be Inaugurated at IPT

(1) Intra-enterprise training courses

- o Digital telephone switching course
- o Rural telephone course
- o Optical fiber transmission course
- o Mobile radio telephony course
- o Basic computer course
- o Data processing course
- o Data transmission course
- o Telex course
- o Facsimile course

- o Satellite communication technology course
- o Radio regulation and monitoring course
- o TV equipment operation and maintenance course

(2) Technical high school course

Introduction of the following subjects is desirable.

- o Basic computer technology
- o Basic digital communication technology
- o Basic optical fiber communication technology

(3) College electronics course

Subjects which are associated with high technologies in the areas of telecommunications and electronics (e.g., optical fiber communication technology), especially those allied to the technologies to be newly introduced in Paraguay should be included in the curriculum, although it is not advisable to limit the subject-area.

## 4-4 Facilities Expansion Plan

### 4-4-1 Future demand prospects of electronics expert

Considering the national significance of IPT's role, its facilities reinforcement plan should be formulated on the basis of future demand prospects of electronics experts in the whole country. Forecasting such a future demand involves great difficulties, but it was found that this task has already completed by Paraguayan Center of Engineers (Centro Paraguayo de Ingeneros), as shown in Table III-V-9.

Judging from the existing state of IPT, it is neither possible nor practical that IPT trains all electronics engineers and technicians shown in Table III-V-9. It will therefore be necessary to assume, as a provisional target, that IPT will supply a certain portion of the required number of engineers and technicians in 15 years, or at the last year of the Master Plan, about 1/2 of all engineers (college graduates) and about 1/3 of all technicians (technical high school graduates). As for the remaining demand for electronics engineers and technicians, there will be no choice but to recruit the students currently studying abroad, graduates from the private electronics colleges expected to be shortly established in Paraguay, foreign engineers and technicians, and graduates from other high schools and vocational training centers.

It goes without saying, however, that IPT should maintain its long tradition and prestige as the country's top level educational institution in the areas of electronics and telecommunications.

Table III-V-10 shows the estimated number of graduates from IPT to be mobilized for the attainment of the said provisional target. The long-term IPT Expansion Scheme should be based on this forecast of manpower development.

Table III-V-9 Number of electronics engineers & technicians required in Paraguay

| YEAR / LEVEL | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ENGINEER | 60 | 80 | 100 | 150 | 200 | 200 | 200 | 250 | 250 | 250 | 300 | 300 | 300 | 350 | 350 |
| TECHNICIAN | 300 | 600 | 700 | 1000 | 1000 | 1500 | 1500 | 2000 | 2000 | 2500 | 3000 | 4000 | 4000 | 4500 | 4500 |

Table III-V-10 Number of estimated graduates from IPT

| YEAR / LEVEL | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingeniería Electrónica | 13 | 20 | 30 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 125 | 140 | 155 | 170 | 180 |
| Bachillerato Técnico | 60 | 100 | 120 | 140 | 150 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 350 |
| Curso Técnico | 25 | 25 | 30 | 40 | 50 | 50 | 60 | 70 | 85 | 100 | 100 | 110 | 145 | 160 | 180 |
| Others | 350 | 350 | 400 | 450 | 500 | 500 | 550 | 600 | 650 | 700 | 700 | 750 | 850 | 900 | 1000 |

Table III-V-11 Number of professors & instructors in electronics required in Paraguay

| ITEM \ YEAR | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of professors & instructors | 170 | 170 | 180 | 180 | 200 | 200 | 200 | 250 | 250 | 250 | 300 | 300 | 300 | 350 | 350 |

Table III-V-12 Number of professors & instructors required at IPT

| LEVEL \ YEAR | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingeniería Electrónica | (9) | (11) | (13) | (15) | (17) | (20) | (25) | (25) | (27) | (27) | (27) | (28) | (30) | (30) | (30) |
| | 28 | 32 | 35 | 38 | 40 | 43 | 50 | 52 | 55 | 55 | 57 | 60 | 65 | 65 | 65 |
| Bachillerato Técnico | (5) | (7) | (8) | (9) | (10) | (12) | (15) | (15) | (16) | (16) | (17) | (17) | (20) | (20) | (20) |
| | 15 | 18 | 20 | 23 | 25 | 28 | 30 | 30 | 32 | 32 | 32 | 33 | 35 | 35 | 35 |
| Curso Técnico & others | (10) | (13) | (15) | (15) | (16) | (17) | (20) | (20) | (20) | (21) | (22) | (22) | (25) | (25) | (25) |
| | 40 | 45 | 50 | 52 | 54 | 56 | 60 | 60 | 62 | 64 | 66 | 66 | 70 | 70 | 70 |
| TOTAL | (24) | (31) | (36) | (39) | (43) | (49) | (60) | (60) | (63) | (64) | (66) | (67) | (75) | (75) | (75) |
| | 83 | 95 | 105 | 113 | 119 | 127 | 140 | 142 | 149 | 151 | 155 | 159 | 170 | 170 | 170 |

4-4-2 Selection of new IPT site

In selecting the construction site of new IPT, careful attention should be paid to various environmental conditions. While efforts should be made to find a site which is free from city sounds, industrial pollution, and bustle of entertainment centers, consideration should also be given to the convenience of commutation of IPT's staff members and students. Availability of public service facilities including electricity, gas, water and telephone service is also an indispensable factor. In addition, there should be provided a playground which can be put in 15 - 20 years of continuous service.

As a site satisfying all these requirements at present, ANTELCO can offer a plot of its shortwave transmission station which covers an area of 367,500 $m^2$. About 100,000 $m^2$ of this area will still be used for the shortwave and UHF transmission stations in the future, but the remainder is secured for the construction of new IPT. IPT should be relocated to this new plot.

4-4-3 School buildings and facilities

Considering the financial restraints, the need to maintain the continuity of existing IPT's operation and the rapid advance in electronics, it is not practical, as described already, to formulate the construction plan of school buildings and facilities on the basis of long-term demand prospect. The 15-year manpower demand prospect shown in Table III-V-9 should be used as a criterion in formulating the plan for phased expansion in three stages at five year intervals.

The first-phase construction plan, shown in detail in Fig. A V-1, A V-2 and Table A V-7 in the Annex, consists of the following six items.

1) Main building for common use
2) College building (electronics course)
3) Technical high school building

4) Auxiliary service facilities

5) Special-purpose buildings

6) Others

The detail of the second and third phase expansion plans are not presented in this Master Plan because all the details including the scale of expansion and layout of each building should be determined after the careful review of utilization condition of existing facilities.

Judging from the predicted manpower demand, however, it is likely that the expansion in the second and third phases will be just about the same in scale as the first phase construction and expansion plan.

### 4-4-4 Training equipment and instruments

The installation of new equipment and measuring instruments required for the training should be carried out in three stages at five year intervals along with the construction of school buildings and auxiliary facilities.

The details of the first phase installation plan of training equipment and instruments are shown in Table A V-8 in the Annex. The details of the second and third phase plans should be determined after due consideration of the progress of long-term training plan and the trend of new technology introduction. Both the second and third expansion plans are expected to be nearly the same in scale as the first phase installation plan, though no details are furnished in this Master Plan.

## 4-5 Operation and Maintenance Plan

### 4-5-1 Professorate reinformcement

The reinforcement of the professorate is just as important as the facilities expansion to achieve the objective of long-term manpower development. While the present Master Plan is based on the long-term demand prospect of electronics experts shown in Table III-V-9 and the estimated number of graduates from IPT shown in Table III-V-10, the demand prospect shown in these two tables presuppose the availability of professors shown in Tables III-V-11 and III-V-12.

To conduct its college and high school courses, for example, IPT requires instructors in the following areas, and this means that it will have to resort to technical assistance from advanced countries for the services of such instructors.

1) Electronic telephone switching
2) Carrier transmission (incl. optical fiber transmission)
3) Microwave transmission
4) Outside plant maintenance (incl. optical fiber cables)
5) TV equipment and TV transmission
6) Computer technology
7) Satellite communication
8) Power maintenance

The projected technology transfer also calls for an increase of at least ten full-time Paraguayan professors and instructors, and the remaining part of the professorate (which will have to consist mainly of part-time instructors) must be greatly strengthened.

### 4-5-2 Auxiliary service facilities

Compared with the similar telecommunication training institutions in Central and South American countries, IPT has relatively well-consolidated ancillary service facilities and makes considerable efforts to secure the budget for their improvement. One of the focal points to be considered in promoting the long-term IPT expansion plan in the future is the stock enrichment of its library. In the field of electronics and telecommunications, most textbooks, periodicals, study results and reports are written in English, and it is economically difficult for individual instructors and students to own them in their private library. Not many of these books, periodicals and reports are written in Spanish, and all of them should be included in the library stock because IPT aims at manpower development in a wide range of areas.

## CHAPTER 5. RELATIONS BETWEEN FIELD-WISE MANPOWER DEVELOPMENT PLAN AND IPT EXPANSION PLAN, AND CONSIDERATIONS FOR IMPLEMENTATION

The field-wise manpower development plan (CHAPTER 3) and the IPT expansion plan (CHAPTER 4) are closely related with each other. Inauguration of regular training courses in important new technologies (such as digital switching technology and optical fiber communication technology) and training in other advanced technologies by enrichment of existing courses or by initiation of new, short courses, which will be positioned as a part of intra-enterprise training, is the share which IPT is expected to fulfil in the field-wise manpower development scheme.

Smooth implementation of long-term, large projects like the IPT expansion plan and the sector-wise manpower development plan, calls inevitably for the proper and powerful guidance of ANTELCO's top management and for the support and understanding of all the related bureaus. It is also to be noted that ANTELCO's management policies bear very closely on both the long-term manpower development plan and the annual training program.

For this reason, it is necessary to organize a "training advisory committee" which will examine and make recommendation to the top management on the following matters under the direct control of ANTELCO's top management. It is advisable that the director of IPT and other bureaus concerned be appointed as the committee members.

1) Training policy, and long-term and annual training plan
2) IPT's building construction and facilities expansion plan
3) Budgetary procedure/appropriation for training
4) Policy for curriculum formulation and textbook preparation
5) Teaching staff reinformcement plan

With all these important matters examined and discussed by the training advisory committee, both the manpower development plan and the IPT expansion plan should be carried out in an integrated, uniform manner by the consensus of opinion of the entire ANTELCO organization. The local currency budget appropriation which is indispensable for the IPT expansion plan should also be examined and discussed by the advisory committee.

It is important to secure the services of trained personnel from a long-term national point of view, because there have been not few cases where the overseas training conducted at national expense resulted only in an outflow of brain from Paraguay. For the assurance of domestic service of personnel trained under the manpower development plan, it may as well be proposed, for example, to make it compulsory for IPT's graduates to work for a certain period for public enterprises including ANTELCO, or accord them preferential treatment.

# SECTION VI MASTER PLAN INTER-FIELD COORDINATION

## CHAPTER 1 INTER-FIELD COORDINATION AND BASIC CONCEPT

### 1-1 Master Plan Inter-field Coordination

The Master Plan (M/P) - covering Domestic Telecommunications, International Tecommunications, Radio Regulation and Monitoring, National Educational Television Broadcasting and Manpower Development - conforms to the terms stated in the Scope of Work (S/W), and also provides inter-field coordination in terms of the basic policies and contents.

The Master Plan inter-field coordination will be important also in the later implementation planning stages based on each individual Master Plan.

This Section describes:

(1) Major items of the inter-field coordination and the relevant considerations which were takne,

(2) Considerations necessary for the future implementation of the Master Plan and

(3) Releated references.

### 1-2 Basic Concept of Inter-field Coordination

The Master Plan inter-field coordination was carried out under the basic concepts given in the following terms reflecting the opinions furnished by the Paraguayan authorities. These terms may be applied to another inter-field coordination to be conducted in the Master Plan implementation stages as well.

(1) The Master Plan shall be compatible with the existing projects and conform to the project policies specified by the Government of Paraguay and ANTELCO.

(2) The Master Plan shall take into account the general development trend of telecommunications and broadcast, and the correlation with the equivalent plans in other countries.

(3) The Master Plan shall place its emphasis on the necessary revision and amplification of the fundamental telephone network plan as the basis of all telcommunication plans.

(4) Adequate coordination shall be made between the domestic and international telcommunications Master Plans in terms of services and facilities introduction programs, taking also network reliability into consideration.

(5) Adequate coordination shall also be made between the educational TV broadcasting and the domestic or international telecommunications Master Plans and between the radio regulation & monitoring and telecommunications & broadcasting Master Plans, in terms of their individual projects.

(6) The organizational and managerial systems as well as the manpower development needed for implementing the Master Plan shall be schemed adequately in line with the development of services and technologies.

The coordinations concerning the manpower development and the social and economical analysis are detailed in their respective Parts or Sections.

Of the above terms, the terms (1), (2), (3) and (6) are common to all Master Plan fields, whereas the terms (4) and (5) are concerned only with the relevant field. Therefore, the inter-field coordination was conducted by observing the common terms in a multi-lateral manner, and by concluding agreements on the mutually relevant terms in a bilateral manner.

Considerations taken for the Master Plan inter-field coordination and those deemed to be needed for the future coordination are described in Chapters 2 through 4 and 7 for the common terms, and in Chapters 5 and 6 for the mutually relevant terms.

## CHAPTER 2 CONFORMITY TO POLICIES SPECIFIED BY ANTELCO

### 2-1 Policies of ANTELCO

The following gives the major policies provided by ANTELCO, which the Master Plans for each field should be based upon:

(1) The first five year period (1983 to 1987) of the Master Plan shall include the three introduction projects (for the International Subscriber Dialling Telephone System (ISD), Digital Telephone Switching System (DTS), and Rural Telephone System (RT)) based on the result of the Feasibility Study on Telecommunications Development Project which was completed in December 1981, and the 1983/87 Development Project (for the development of automatic telephone system, introduction of an electronic telex/data switching system, expansion of trunk transmission lines, etc.) for which contracts were concluded in 1981. The Master Plan shall be framed base on these projects implementations with certain modifications necessarily applied to.

(2) The exchange for the International Subscriber Dialling Telephone System mentioned above shall be a digital switching system, and its charging system shall be a metering pulse method, in order to provide ISD service also for the 'interior' subscribers.

(3) During the term of the Master Plan (up to 1997), the telephone network digitization shall be limited to the local exchanges and junctions in the Asunción area. It will not be extended to the 'interior' local exchanges other than Asunción, any trunk exchanges, nor long-distance transmission lines.

(4) During the term of the Master Plan, the demands for data transmission shall be fulfilled by circuit switching service using the electronic telex/data switching equipment and also by leased line service. Packet switching services will be reserved until demand arises.

(5) Telecommunications services shall, in principle, be provided equally for both the capital and 'interior' areas.

(6) In all field of the Master Plan, a full consideration shall be taken for the training and education of the staffs required for the implementation of the Master Plan.

## 2-2 Reflection of ANTELCO Policies to Master Plan

The policies of ANTELCO described in the preceding paragraph have been completely reflected on the Master Plan in every field, especially in both the domestic and international telecommunications fields. For other important items such as the future demand for telephone service in the 'interior' area or the expected number of international communications circuits, the Master Plan has been framed based on the latest forecast policies given by ANTELCO.

The Master Plan implementation program for the TV broadcasting is also framed fully taking into account the requirements made by the related authorities of Paraguay.