REPORT ON THE SURVEY FOR IMPROVEMENT & EXPANSION PLAN OF RADIO & TELEVISION BROADCASTING IN THE PEOPLE'S REPUBLIC OF BANGLADESH

NOV. 1973

OVERSEAS TECHNICAL COOPERATION AGENCY

GOVERNMENT OF JAPAN

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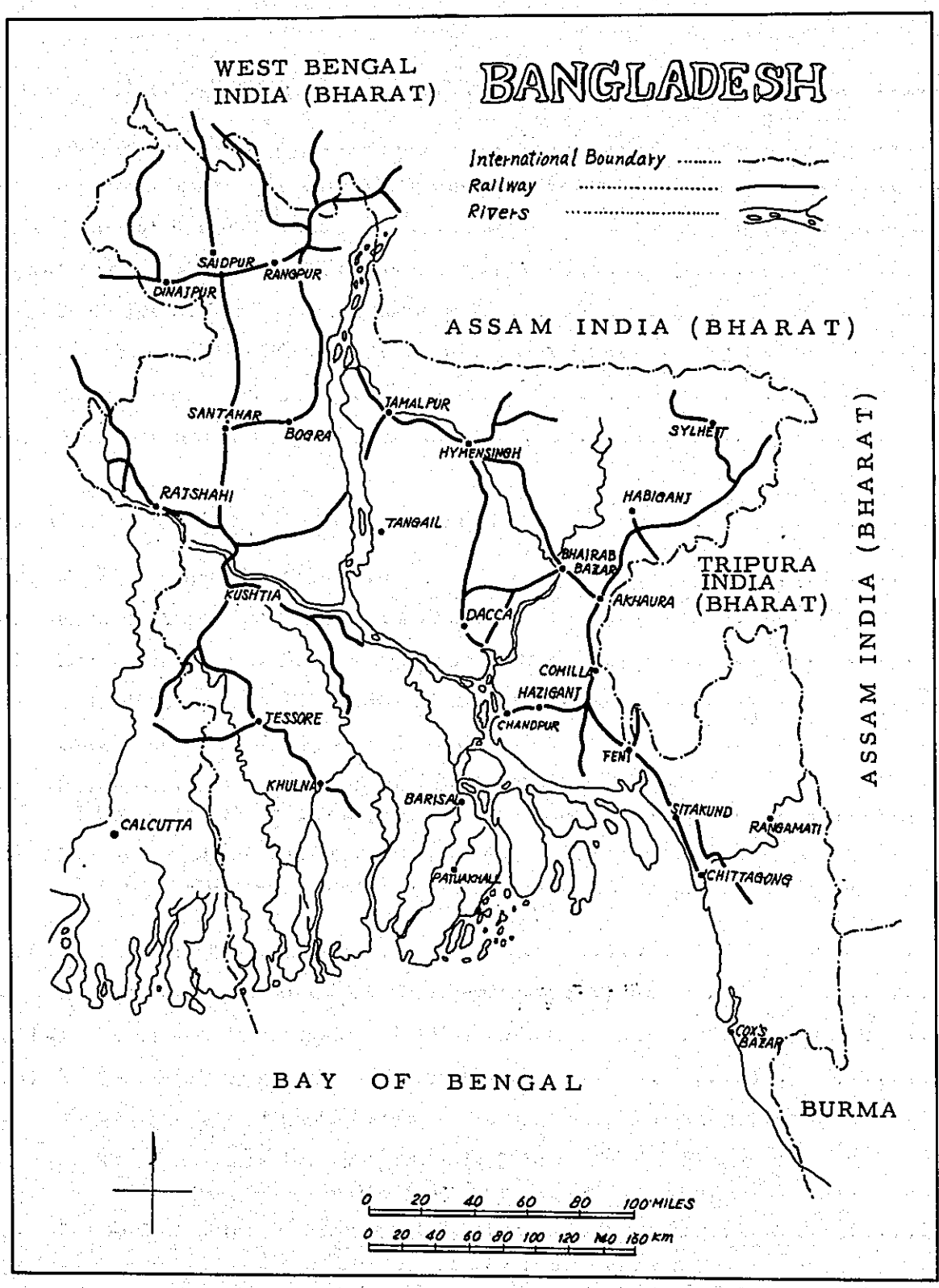
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TANGAIL
BHAIRAB BAZAR
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TESSORE
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CHITTAGONG
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BAY OF BENGAL
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Chapter I INTRODUCTION

1-1 Purpose of Survey

The survey team was organized at the request of the People's Republic of Bangladesh Government, and made a necessary survey for the synthetic and fundamental plan for improvement and expansion of the facilities and administration of television broadcasting, medium wave broadcasting and short wave external service in Bangladesh.

1-2 Process to the Dispatch of the Survey Team

This is the first dispatch of broadcasting survey team from Japan since Bangladesh became independent of Pakistan in December, 1971.

The survey team was dispatched in answer to the request of the People's Republic of Bangladesh Government to the Japanese Government to map out the rehabilitation and the expansion of facilities for television broadcasting, medium wave broadcasting and short wave external service in relation to the five-year-plan for the postwar recovery and early establishment of a new order as an independent state.

The following television broadcasting survey teams had been dispatched from Japan before Bangladesh became independent of Pakistan.

The first survey team:

In December, 1961, three specialists in Colombo Plan headed by Mr. Yoshitoshi Tanabe of Japan Broadcasting Corporation (NHK) were dispatched to make a fundamental survey necessary for the inauguration of television broadcasting service.

The second survey team:

In June, 1964, five experts in various fields of television broadcasting headed by Mr. Yoshihiko Noguchi of the Ministry of Posts and Telecommunications were dispatched to make a synthetic and fundamental plan to cover the whole sphere of television broadcasting business.

The third survey team:

In October, 1967, nine experts headed by Mr. Shinzaburo Tanaka of the Ministry of Posts and Telecommunications were dispatched and carried out detailed investigations into establishment of the prospective TV stations in the principal area in earstwhile East Pakistan and West Pakistan until February, 1968.

1-3 Scope of Survey

1-3-1 Scope of Technical Survey

(1) Television Broadcasting

(i) Fundamental survey and examination necessary for the nation-wide television broadcasting network plan

(ii) Survey of the extent of damage during the last Liberation War and of the custody condition of the remaining equipment parts for the rehabilitation plan of the four regional TV broadcasting stations

(iii) Survey of the present situation of the television studio center in Dacca now under construction for the promotion of its completion

(iv) Necessary survey for deciding the scale, basic functions, facilities, and so forth of the broadcasting house of each regional TV station.

(2) Medium Wave Broadcasting

(i) Fundamental survey and examination necessary for the expansion plan of the present medium wave broadcasting network enabling enough cyclone warning to the coastal regions

(ii) Survey of the present situation of the relay network necessary for the improvement of the programmme relay links and the expansion of the medium wave broadcasting network as well as the short wave external service

(iii) Survey of the present situation of the war-damaged facilities at Khulna Station necessary for the rehabilitation plan

(iv) Survey of the extent of damage and the present situation of the studio facilities necessary for the basic plan of their rehabilitation and modernization

(v) Survey of the present situation of the receiving center for its improvement and expansion

(3) Short Wave External Service

Survey of the present situation of the short wave broadcasting facilities necessary for the basic plan of the establishment of external broadcasting stations to cover many countries in the world

(4) Part in Common

Execution schedule of the construction plan, and rough estimation of the required cost for the construction

1-3-2 Scope of Management Survey

(1) Broadcasting system

Survey of the present broadcasting law and management system of broadcasting business

(2) The diffusion of broadcasting

Survey of the diffusion of receivers and the plans for popularization of broadcasting

(3) Financial affairs

Survey of the present financial system and revenue sources of broadcasting business

(4) Broadcasting programme

Survey of the present broadcasting hours, contents of broadcasting programme, programme planning, and so forth

Survey of personnel necessary for the present broadcasting business

1-4 Members of the Survey Team and Their Business in Charge

The Japanese survey team was organized in February, 1973, by Overseas Technical Cooperation Agency. The members and their business in charge are as follows.

Leader: MASAHIRO NOJIRI
Deputy Head of Technical Investigation Division
Radio Regulatory Bureau,
Ministry of Posts and Telecommunications
(In charge of all the survey)

Member: NOBORU TSUKAHARA
Deputy Head of Administrative Division, Broadcast Department,
Radio Regulatory Bureau,
Ministry of Posts and Telecommunications
(In charge of management survey and other business concerned)

Member: YASUO MASAKI
Staff Engineer, Studio Facilities Division,
Headquarters of Technical Administration and Construction,
Japan Broadcasting Corporation (NHK)
(In charge of technical survey)

Member: SUSUMU SHIMIZU
Staff Engineer, Planning Office,
Headquarters of Technical Administration and Construction,
Japan Broadcasting Corporation (NHK)
(In charge of technical survey)

Member: KEIZO YAMAMURO

Staff Engineer, Transmitting Equipment Engineering Department, Broadcasting Equipment Division,

Nippon Electric Comapny, Ltd. (NEC)

(In charge of technical survey)

Member: MASAHIRO KUMOMI

Coordinator, Experts Assignment Section, External Operations Division,

Overseas Technical Cooperation Agency

1-5 Survey Itinerary

The survey team arrived in Dacca on the ninth of February, 1973, and stayed in Bangladesh for 36 days until the 16th of March on which they left Dacca for Japan.

During the stay, enough discussion was had with the Ministry of Information and Broadcasting and other authorities concerned, while travelling round the northern and western regions as well as Chittagong District to make necessary survey from both technical and administrative points of view as to television and radio broadcasting.

The result of the survey was put into an interim report and presented to the Ministry of Information and Broadcasting (the Radio Bangladesh and the Bangladesh Televison respectively) on the 14th of March.

Details of Survey Itinerary are shown in Talbe 1-1.

Table 1-1 Survey Itinerary

February 9(Fri.), 1973	Arrival in Dacca, and meeting with the Japanese Embassy personnel
10(Sat.)	Courtesy visit to the Minister and the Vice-minister of Information and Broadcasting, and meeting with Radio Bangladesh, Bangladesh Television, and the Japanese Embassy as to the survey itinerary and others
11(Sun.)	Holiday; Meeting with the Japanese Embassy as to the present situation of broadcasting service in Bangladesh
12(Mon.)	Meeting with the Bangladesh Television as to the details of survey, inspection of Rampura Studio Center under construction, and investigation into the extent of damage of the equipment parts for the regional stations kept in the center
13(Tues.)	Meeting with the Radio Bangladesh as to the details of survey, and inspection of the present situation of studio facilities for radio broadcasting
14(Wed.)	Meeting with the Radio Bangladesh, and inspection of the facilities of the short wave and medium wave transmitting station at Sabar
15(Thurs.)	Meeting with the Radio Bangladesh, and inspection of the facilities of the radio receiving center at Tungi

16(Fri.)	Meeting with the Bangladesh Television	
17(Sat.)	Preparation for regional survey	
18(Sun.)	Survey in the northern and western districts (by Nojiri, Masaki, Shimizu, Yamamuro, and Kumomi), and inspection of the proposed site for TV station in Bogra	Collection of data on broadcasting administration and others from the Ministry of Information and Broadcasting, the Radio Bangladesh, the Bangladesh Television, the Ministry of Postal Services, and so forth (by Tsukahara)
19(Mon.)	Inspection of the proposed site for TV station in Natore	
20(Tues.)	Inspection of the proposed site for TV station in Jessore	
21(Wed.)	National holiday	
22(Thurs.)	Investigation into the damage of the radio station in Khulna	
23(Fri.)	Inspection of the proposed site for the high-power radio transmitting station in Khulna	
24(Sat.)	Investigation into the temporary studio facilities of the Bangladesh Television	
25(Sun.)	Holiday	
26(Mon.)	Investigation in Chittagong district, and inspection of the facilities of the Radio Bangladesh	

	27(Tues.)	Inspection of the proposed site for the high-power radio broadcasting station in Chittagong, and inspection of the proposed site for the TV station in Chittagong
	28(Wed.)	Meeting with the Radio Bangladesh, and inspection of the facilities of the short wave and medium wave transmitting station at Mirpur
March	1(Thurs.)	Meeting with the Planning Commission and T & T as to the microwave network construction plan, and meeting with the Bangladesh Television
	2(Fri.) 3(Sat.)	Drawing up of interim report, and collection of data in the Ministry of Information and Broadcasting
	4(Sun.)	Holiday
	5(Mon.)	Drawing up of interim report
	6(Tues.)	Drawing up of interim report, and observation of TV relay broadcasting site of the general election at Shere Bangla Nagar
	7(Wed.)	Drawing up of interim report, visit to the polling place, and inspection of news flash on counting of votes
	8(Thurs.)	Drawing up of interim report, and preparation for the interim meeting
	9(Fri.)	Drawing up of interim report, and meeting with the Ministry of Information and Broadcasting as to the interim meeting

10(Sat.)	Collection of data in the Radio Bangladesh and Bangladesh Television
11(Sun.)	Inspection of the medium wave 1,000 KW transmitting station under construction at Nayarhat, and inspection of the facilities of the transmitting station at Sabar
12(Mon.)	Preliminary arrangement of the interim report with the Radio Bangladesh
13(Tues.)	Preliminary arrangement of the interim report with the Bangladesh Television, and explanation of findings as well as the contents of the interim report to the Japanese Embassy
14(Wed.)	Interim meeting (the Ministry of Information and Broadcasting, the Radio Bangladesh, the Bangladesh Television, and the Japanese Embassy)
15(Thurs.)	Presentation of the interim report to the Minister of Information and Broadcasting, and preparation for return to Japan
16(Fri.)	Departure from Dacca

1-6 Acknowledgement

Through the survey we got extensive cooperation from the Ministry of Information and Broadcasting, the Radio Bangladesh, and the Bangladesh Television, and officials from these institutions attended the survey team to look after and make necessary arrangements. We had an opportunity to hear Mr. Mizanur Rahman Choudhury, the Minister of Information and Broadcasting, talk frankly about the importance of broadcasting in the new-born Bangladesh. The assistance rendered by Mr. Khurshed Alam, the Vice-Minister of Information and Broadcasting, Mr. M. R. Akhtar, the director of Radio Bureau, and Mr. Jamil Choudhury, the director of Television Bureau gave direct support to the promotion of our survey. Mr. Nurur Rahim of the Communication Department of Planning Commission and others willingly furnish us with necessary data. Mr. Oyamada, the Japanese Ambassador to Bangladesh and other officials in the embassy staff took special trouble to afford us data for the survey of the northern districts and the western districts, and people in those regional cities we visited for the field investigations provided us with data for the location of the regional stations to be established.

We express our heartfelt thanks to all these people as well as many others including Japanese residents in Bangladesh for their cooperation both private and public, and do hope this survey will serve the progress of education and culture in Bangladesh and further promote the friendly relation between Bangladesh and Japan.

P. S.

We regret to inform you that Mr. Masahiro Nojiri, Deputy Head of Technical Investigation Division, Radio Regulatory Bureau, the Ministry of Posts and Telecommunications, who headed the survey team and also played an important role in the survey and in making this report, passed away on the 10th of August, 1973.

Chapter II TELEVISION BROADCASTING

Part 1 Recommendation

1-1 Establishment of Television Stations

Television service to cover almost all territory of Bangladesh requires the establishment of nine more TV stations in Jessore-Khulna, Bogra-Rajshahi, Mymensingh, Sylhet, Haziganj-Comilla, Chittagong, Rangpur, Cox's Bazar, and Rangamati, besides the present Dacca Station.

On completion of these nine stations, more than 90 % of the whole population can be covered.

1-2 Establishment of the Programme Relaying System

The programmes produced in Rampura Studio Center in Dacca should be relayed to each regional TV station in the principal area (Jessore-Khulna, Bogra-Rajshahi, Mymensingh, Sylhet, Hazinganj-Comilla, and Chittagong) through microwave relay network, and to the supplementary area (Rangpur, Cox's Bazar, and Rangamati) through rebroadcast system.

To the establishment of the rebroadcast system, it is essential to realize the microwave network to cover the district of Bogra-Rajshahi.

Planning of the rebroadcast system requires detailed investigations in advance.

1-3 Establishment of TV Studio Center in Dacca

The completion of the TV studio center in Dacca now under construction is essential to early realization of the extension of broadcasting hours, the improvement in quality of programs, to the broadcasting of educational programs, the video tape recording of package programs for regional stations, the public entertainment by open programs, and so forth.

In order to promote the early establishment, the following steps should immediately be taken. Of these three, (1) is the most pressing.

(1) Obtaining of machines and apparatus necessary for the air-conditioning facilities, and promotion of interior decoration work and electric work (Both of them must be completed before the installation of broadcasting facilities.)

(2) Early installation of the master control equipment and facilities for the first three studios, and start of their service (These equipment and facilities manufactured in Japan before independence are now stocked in the TV studio center in Dacca.)

(3) Early arrangement and obtaining of the materials and instruments necessary for the auditorium, and promotion of the construction (The necessary materials and instruments have not yet been secured though the auditorium is now under construction together with the TV studio center mentioned in (2).)

It will be most advisable to promote early installation of the facilities in the auditorium referred to in (3) to avoid further deterioration in quality of the control equipment and facilities mentioned in (2) whose reliability is supposed to be decreased through a long period of storage.

1-4 Establishment of Regional Broadcasting Houses

It will be most reasonable to build regional broadcasting houses in the following five districts, Chittagong, Bogra or Rajshahi, Jessore or Khulna, Sylhet, and Comilla, taking the situation of the local cities of these districts and the location of TV stations into consideration.

For the time being, most of the programmes to be broadcasted by the regional stations should be relayed from Dacca, leaving only one or two broadcasting hours to each local station for broadcasting regional programmes of its own.

Every regional TV station should have an attached rest house near the studio.

1-5 Rehabilitation and Promotion of the Construction Plan of the Four Transmitting Stations

Based upon the result of the prewar investigations by the Japanese team, the construction of four rebroadcast stations in Tangail, Haziganj, Sitakund, and Bhanga to come under the mother station in Dacca and been planned and the equipment parts had already arrived in Bangladesh. But the plan was interrupted by the outbreak of the liberation war.

These equipment parts now kept in the site of Rampura in the suburbs of Dacca require an immediate checkup and supply of those missing or damaged during the war.

The way of keeping these equipment parts until construction work starts leaves room for consideration.

1-6 Execution of the Construction Plan and Cost of the Construction

Construction of television stations in the aforesaid four local cities, which is most pressing, should be in the first step of the work for the nation-wide TV broadcasting network construction plan, and that of two remaining principal stations and three supplementary stations should be in the second step.

As shown in Table 2-1-1, the construction work takes approximately three years.

Table 2-1-2 shows the cost of construction estimated on the assumption that the equipment parts for the four stations now being kept in Dacca should be used most effectively.

Table 2-1-1 Execution Schedule of the Nation-wide TV Broadcasting Network Construction Plan

Term	Preparation	The first step of the work	The second step of the work	
Year	The first year	The second year	The third year	
	Decision of the plan Drawing up of specifications Contract	Completion of the auditorium in Dacca Establishment of four regional stations and regional broadcasting houses using the equipment parts kept in the site of Rampura	Establishment of three regional stations, regional broadcasting houses, and two low output stations	

Table 2-1-2 A Rough Estimate of the Cost of the Nation-wide TV Broadcasting Network Construction

(Unit: 1,000,000 yen)

	Equipment parts	Power cable, building, and other local work
The first section of the construction work	1,012	———
The second section of the construction work	506	———
Total	1,518	———

Part 2 Detailed Description

2-1 Establishment Plan of TV Transmitting Stations

2-1-1 The Present Situation of TV Stations

It is only the principal station in Dacca that is the TV station in service in Bangladesh.

The television system of this station stands the monochrome television system-B according to CCIR Report 308-2 (New Dehli, 1970).

The main facilities of this transmitting station are listed in Table 2-2-1. The transmitting antenna was originally designed to be a 12-step superturnstile antenna 150 m above the ground level, but has been changed into the present shape in conformity with AERODROMES (INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES, ANNEX 14, TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION) according to the location of the station and the airport, and there seems to be no chance of returning it to the original design in the near future. As for the service area of this Dacca Station, the area of grade A (in which field strength higher than 55 dB is assured on the receiving antenna 10 meters above ground level) is estimated within a radius of approximately 63 km of Dacca.

Table 2-2-1 Outline of Rampura Transmitting Station in Dacca

Transmitting site	Rampura
Transmitting channel	No. 6 (Video 182.25 MHz, Audio 187.75 MHz
Transmitting output	Video 6 KW
Transmitting antenna	Dipole unit antenna, non-directional
Transmitting antenna tower	100m above the ground level (Self-supporting type)
Effective radiation power	Video 27 KW

2-1-2 Establishment of New TV Stations

Television broadcasting networks to cover almost all territory of Bangladesh require at least nine new stations as specified below besides the existing Dacca Station.

(i) Six stations in the following principal area

Jessore-Khulna region

Bogra-Rajshahi region

Mymensingh region

Sylhet region

Haziganj-Comilla region

Chittagong region

(ii) Three stations in the following supplementary area

Rangpur region

Cox's Bazar region

Rangamati region

These nine stations and the existing Dacca Station are estimated to cover more than 90 % of the whole population.

(1) Standard of Required Field Strength

In Bangladesh the field strength shown in Table 2-2-2 should be adopted as the standard of service.

Table 2-2-2 Required Field Strength in Bangladesh

	Band III	Band I	Remarks
Grade A	55 dBμ	48 dBμ	receiving antennaheight; 10 m above ground level.
Grade B	45	46	

The main reasons for the above recommendation will be summarized as follows.

i) CCIR recommends or reports the standard values of required field strength as in Table 2-2-3.

Table 2-2-3 Required Field Strength

	Band III	Band I	Remarks
A	55 dBμ	48 dBμ	CCIR Recommendation 417-2
B	49 dBμ	46 dBμ	CCIR Report 409-1

A: maximum field strength for which protection may be sought in planning a television service

B: appropriate median field strength for boundaries of the television service area in rural districts having a low population density, expecting better receivers and antenna installations

ii) Generally speaking, the suburbs in Bangladesh are thinly housed, and are considered to satisfy the condition given in CCIR Report 409-1.

iii) In the boundary region of the service area, people are supposed to use those receiving antennas whose gain is higher than expected in CCIR Report 409-1.

iv) The results of survey made from 1967 to 1968 by Japanese survey team indicates that there is no need to take city noises into consideration for the time being even in the urban districts.

(2) Channel Allocation

Frequency should be assigned to each station after due consideration on the following points.

i) It would be better not to change the existing channel of Dacca Station.

ii) There should be no mutual interference between channels of newly established stations and that of the existing Dacca Station as well as Calcutta Station (scheduled to use channel No. 4 of CCIR-B system).

iii) The transmitting channel of a translator station must not be the same as the receiving channel. And both channels should not come next to each other in order to avoid interference within the translator itself. Shown in Fig. 2-2-1 is a channel allocation plan technically best recommended, and shown in Fig. 2-2-2 is an alternative plan both to meet the condition mentioned above.

(3) Main Specifications and Transmitting Sites of the Prospective Stations

The greater part of Bangladesh is lowlands within 50 feet above the sea level except the hilly district of Chittagong where some mountins reach 2, 000 feet and Dinajpur region where the plain ascends northward from approximately 100 to 300 feet above the sea.

Outlines of TV broadcasging stations and their main specifications to meet this geographical condition and to serve people in Bangladesh most effectively as well as economically will be given as in Table 2-2-4.

The transmitter power, the transmitter site, the transmitting antenna, and so forth of each prospective TV station are stated below.

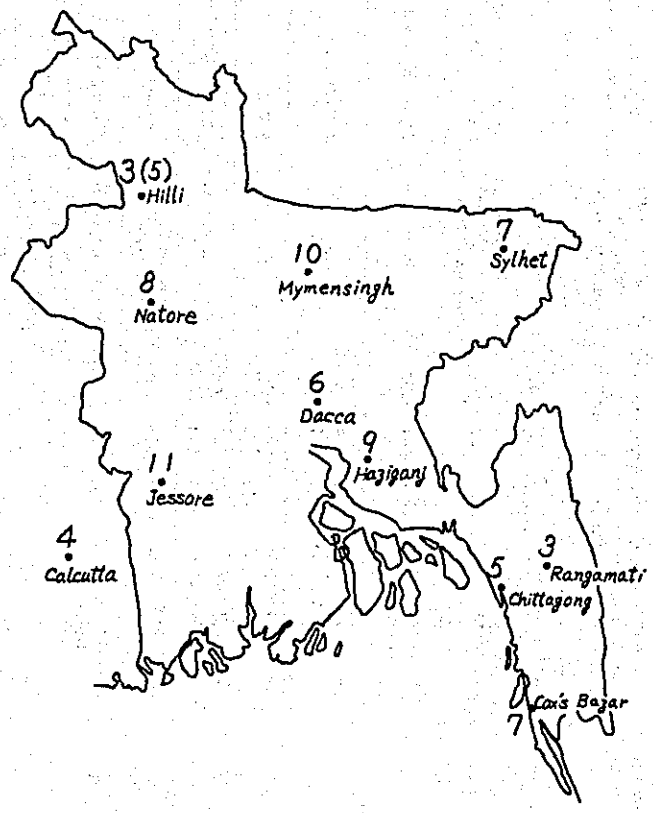


Fig. 2-2-1 TV Channel Allocation Plan No. 1

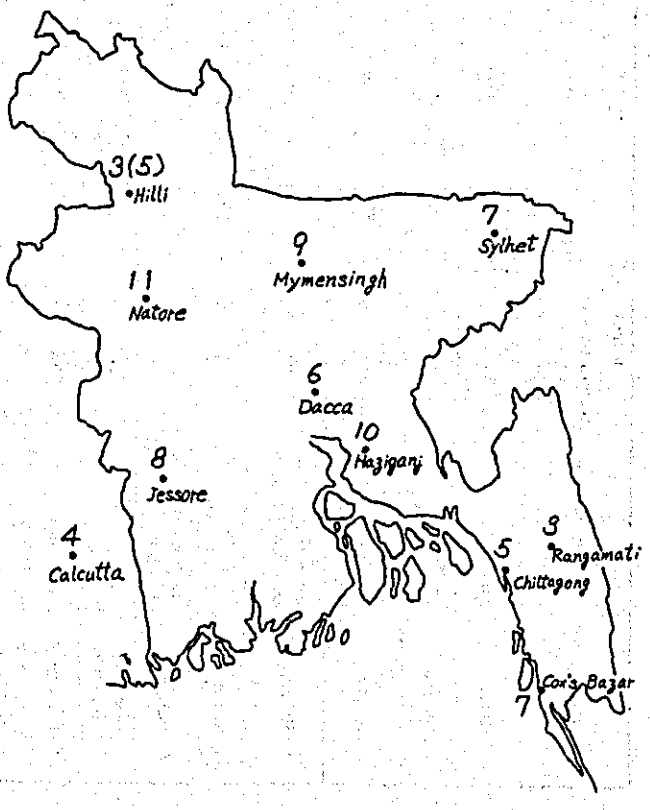


Fig. 2-2-2 TV Channel Allocation Plan No. 2 (Alternative)

Table 2-2-4 Outlines of TV Broadcasting Stations

No.	Station Name	Transmitter Site	Antenna Height		Antenna		Transmitting Channel No.	Transmitter Power (Vision) (approx. E. R. P.)	Estimated Radius of Covered Area, mile (km)		Dacca Programme Relay Link (temporary state)	Remarks (main service area)
			Antenna Height above Ground Level	Altitude	Type	Directivity			Grade A	Grade B		
			ft	approx. ft					mile km	mile km		
1	Dacca	Rampura	300	10 ~ 20		Omni	6	6 kW (27 kW, 14.3 dBk)	39 (63)	50 (80)	——	
2	Jessore	Outskirts of Jessor town	500	20	4D 3333	Omni	11	10 kW (80 kW, 19 dBk)	53 (85)	64 (102)	T & T micro-wave (packaged progamme)	Jessore, Khulna
3	Natore	Outskirts of Natore town (approx. 10km N.E.)	500	35	4D 3333	Omni	8	10 kW (80 kW, 19 dBk)	53 (85)	64 (102)	do	Bogra, Rajshahi
4	Mymensingh	Outskirts of Mymensingh town	500	40	4D 3333 Power devided	Directional	10	3 kW (40 kW, 16 dBk)	42 (68) 49 (79)	54 (87) 61 (97)	do	Mymensingh
5	Sylhet	Outskirts of Sylhet town	500	30 ~ 50	4D 1133	Directional	7	10 kW (100 kW, 20 dBk)	53 (85) 41 (65)	64 (102) 52 (83)	do	Sylhet
6	Haziganj	Outskirts of Haziganj town	500	10	4D 1330	Directional	9	10 kW (115 kW, 20.6 dBk)	47 (76) 53 (85)	59 (95) 64 (102)	T & T micro-wave	Haziganj, Comilla
8	Dinajpur Rangpur	Hilli	500	80	2D 3003	Directional	3 (5)	3 kW (22 kW, 13.5 dBk)	50 (80)	56 (89)	Rebroadcast Natore Station	Rangpur
7	Chittagong	Court Hill	150	120	2D 1111	Omni	5	10 kW (10 kW, 11.5dBk)	32 (52)	44 (70)	T & T micro-wave	Chittagong
9	Cox's Bazar						7				Rebroadcast Chittagong Station	Cox's Bazar
10	Rangamati						3				do	Rangamati

Note (1) Specifications for Cox's Bazar and Rangamati Station shall be decided after further study & field test, because of its complexed relief and lack of references.

1) *Jessore TV Station*

a) Location

The most important cities in Khulna and Jessore Districts are Khulna and Jessore respectively. The transmitting station to cover these two Districts should be established in such a place in the suburbs of Jessore not contrary to the obstruction rules regulated in AERODROMES (INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES, ANNEX 14, TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION).

The main reason for the recommendation will be summarized as follows.

i) Khulna is located in a plain from 5 to 10 feet above the sea level and Jessore in another approximately 15 to 20 feet, and neither of them has a suitable hill on which a television transmitting station to be built.

ii) The coastal region stretching from 35 miles south of Khulna is scarcely inhabited, while the rest of the territory is rather densely populated. Jessore situated in the northern part of the district, therefore, is considered to be the better place for effective service.

b) Transmitter Power and Transmitting Antenna

The transmitter power should be 10 KW, and the type of the transmitting antenna should be 4D/3333 type - 4 dipoles, 3 stacked, 4 faces - as shown in Fig. 2-2-3 so as to give sufficient field strength to two main cities of Khulna and Jessore and also to cover almost all region south of Kushtia.

This means that some part of India comes into the service area with enough field strength bestowed, but it is technically possible to suppress slightly the directivity of the transmitting antenna toward India, if necessary.

Station Jessore Site (Outskirts of Jessore town)

Type of Antenna ..... $\frac{4D}{3333}$ 3 stacked, 4 faces

Polarization ..... Horizontal

Antenna Gain ..... 9.5 dB

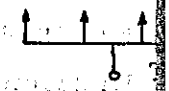
Feeder Loss ..... 0.7 dB

Type of Feeder..... WX77D or equiv.

Transmitter Power ..... 10 KW

Power Division ..... A : B : C

Null Fill IN..... more than 0.15 1 : 1 : 1



approx.

E.R.P. ..... 18.8 dBk 80 KW(For maximum direction)
(Vision)

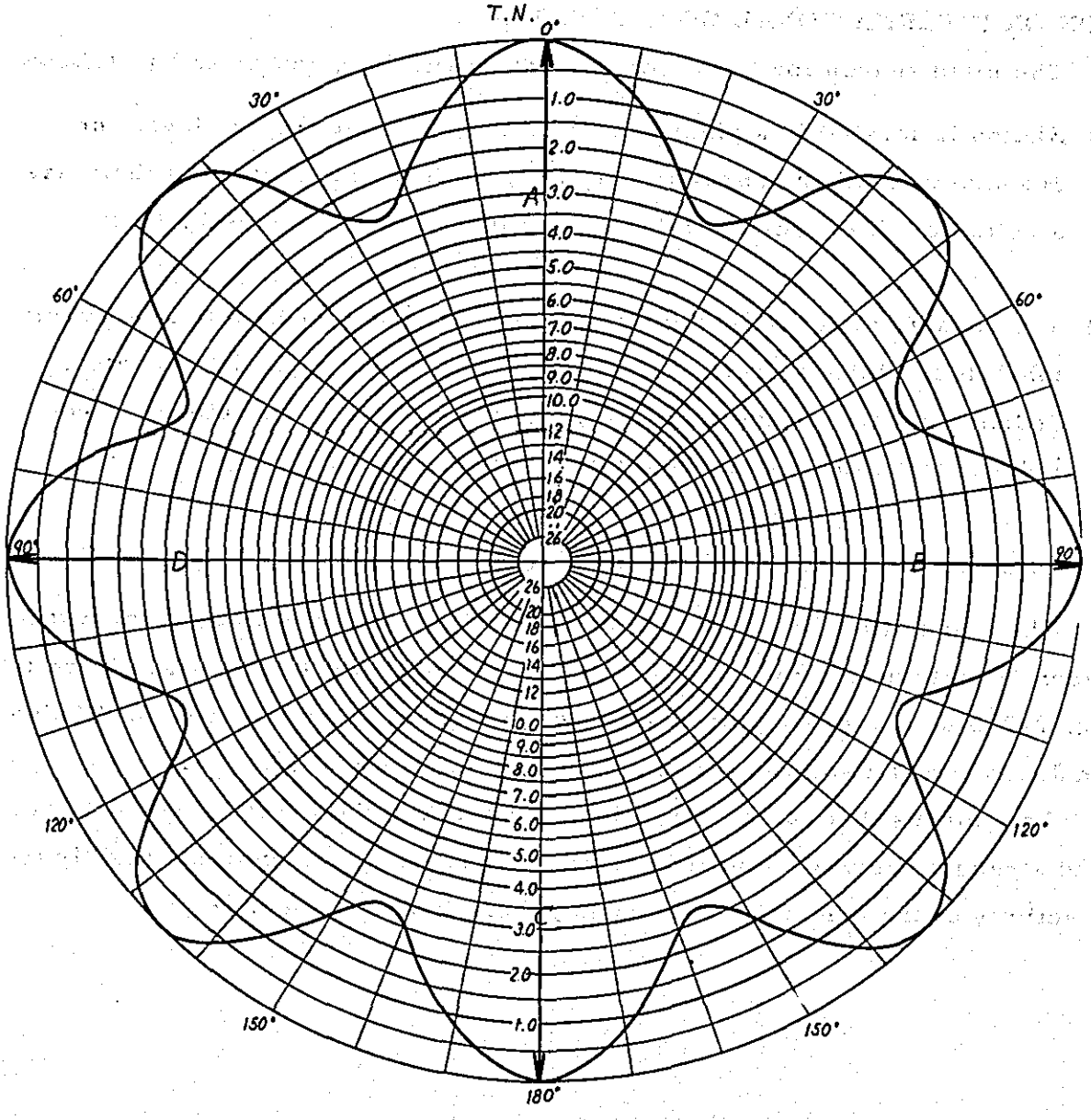


Fig. 2-2-3 Transmitter power and transmitting antenna of Jessore TV Station

2) Natore TV Station and Dinajpur TV Station

a) Location

It will be advisable to establish two transmitting stations to cover the north-western part of Bangladesh, one in the suburbs of Natore (approximately 10 km north-east of Natore) and the other in the outskirts of Hilli.

The main reason for above recommendation will be summarized as follows.

i) If only one transmitting station must cover the whole region, it should be established in the vicinity of Santahar which is situated nearly in the center of the region. But this means that all of such important cities as Kushtia, Pabna, Dinajpur, Rangpur, and so forth must come in the boundary region of the service area around which enough service cannot be expected because of fading and weak field strength.

ii) The transmitting station to cover Pabna and Kushtia districts beyond the range of service from Jessore TV transmitting station should be established in the vicinity of Natore rather than Santahar because Natore is nearer to them.

iii) Another transmitting station to cover Dinajpur district should be established in the vicinity of Hilli because it could rebroadcast Natore TV station in a satisfactory condition. The decision of the location of this transmitting station requires detailed receiving tests to check fading and receiving quality.

b) Transmitter Power and Transmitting Antenna

Transmitter power of Jessore Station and Dinajpur-Rangpur Station should be 10 KW and 3 KW respectively, and the transmitting antenna should be those shown in Fig. 2-2-4 and Fig. 2-2-5.

Station Natore Site (Outskirts of Natore town approx. 10Km N. E.)

Type of Antenna ..... $\frac{4D}{3333}$ 3 stacked, 4 faces

Polarization ..... Horizontal

Antenna Gain ..... 9.5 dB

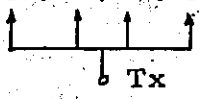
Feeder Loss ..... 0.7 dB

Type of Feeder ..... WX77D or equiv.

Transmitter Power ..... 10 KW

Power Division ..... A : B : C : D

Null Fill IN ..... more than 0.15 approx. 1 : 1 : 1 : 1



E.R.P. ..... 18.8 dBK 80 KW (For maximum direction)
(Vision)

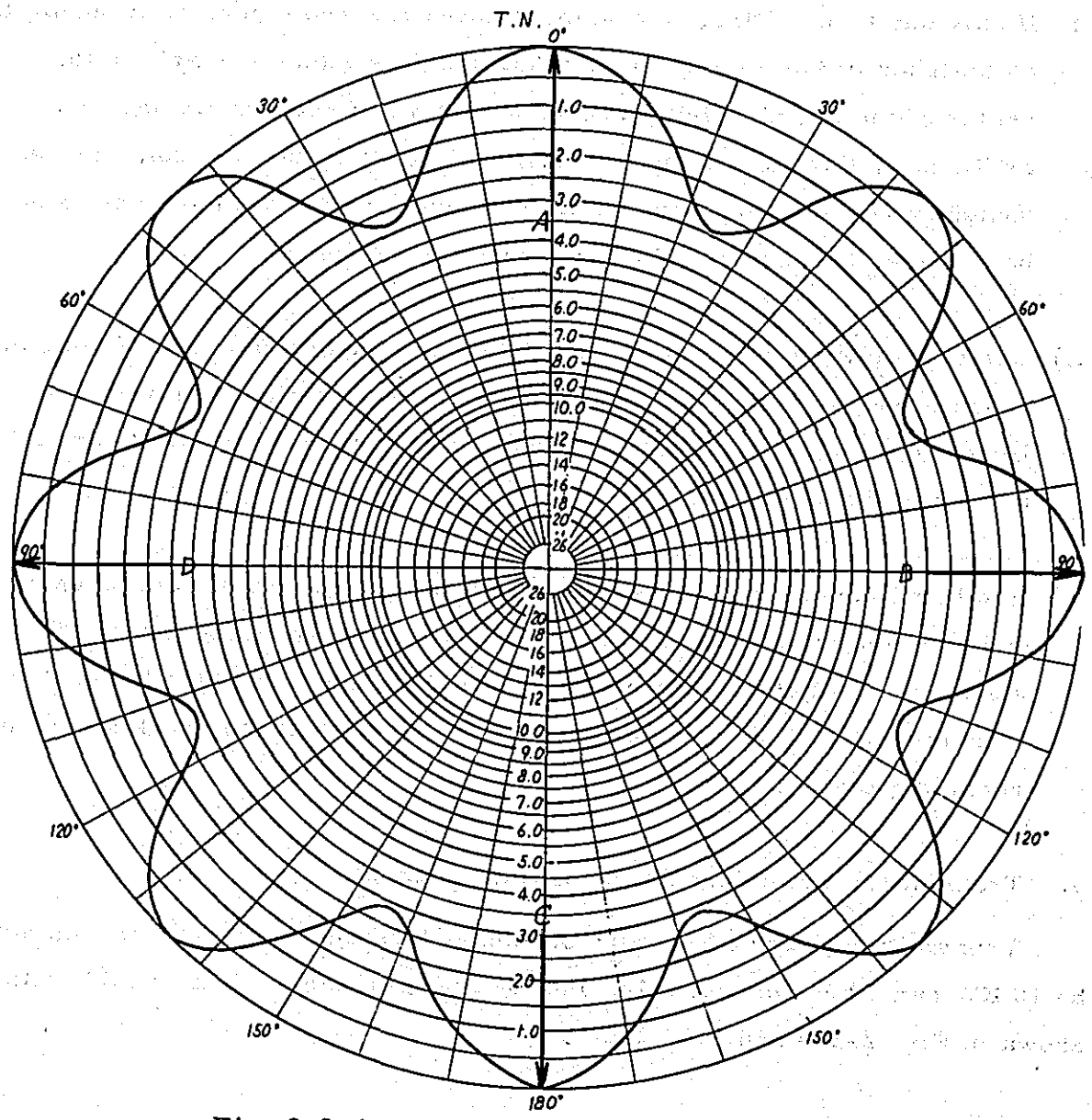


Fig. 2-2-4 Transmitter power and transmitting antenna of Natore TV Station

Station Dinajpur-Rangpur Site Hilli

Type of Antenna ..... 2D/3003 3 stacked, 2 faces

Polarization ..... Horizontal

Antenna Gain ..... 9.5 dB

Feeder Loss ..... 0.7 dB

Type of Feeder ..... WX39D or equiv. approx.

Transmitter Power ..... 3 KW

Power Division ..... A : B

Null Fill IN ..... more than 0.15 — 1 : 1 — Tx

E.R.P. .....13.5 dBK 22 KW (For maximum direction)
(Vision)

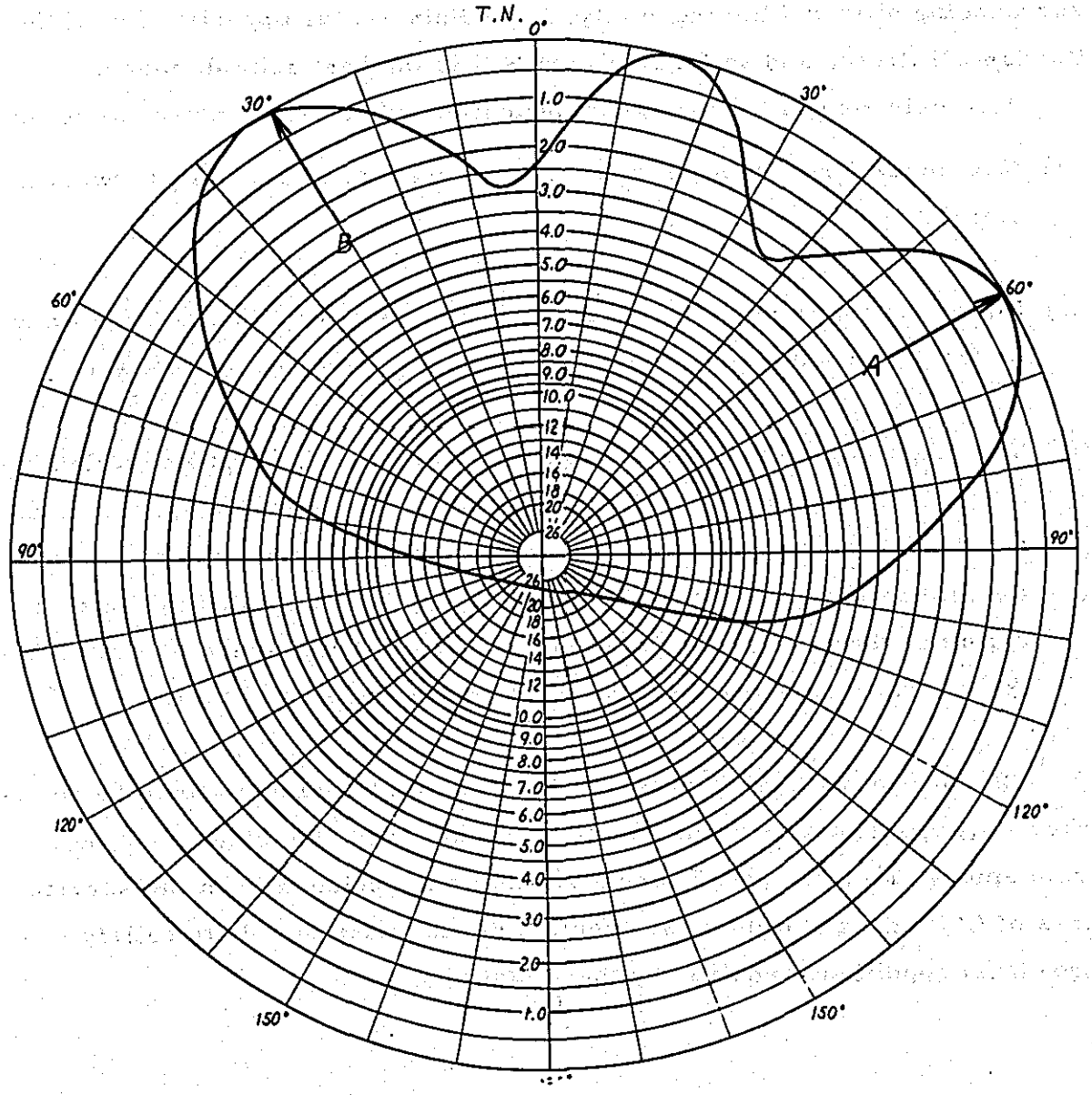


Fig. 2-2-5 Transmitter power and transmitting antenna of Dinajpur-Rangpur TV Station

3) TV Stations in Chittagong, Cox's Bazar, and Rangamati

In hilly Chittagong District and mountainous Chittagong Hill Tracts, TV stations have to be established in both Cox's Bazar and Rangamati besides Chittagong Station in order to cover the greater part of population in these regions.

a) Location

Of several sites proposed for the location of Chittagong TV station like surrounding hills of Chittagong city, Tree Point on the opposite side of the Karnaphuli River, and so forth, Court Hill is the best suitable place.

The main reason for the recommendation will be summarized as follows.

i) Next to the Tree Point, it has the least shadow area of thickly housed district.

ii) Power source is available at Court Hill more easily than at Tree Point where no facilities for electric power supply have been established yet.

iii) The programme link construction is rather easy at Court Hill which has a T & T microwave circuit terminal station nearby. The space securable for the transmitting station, however, is limited because a good part of the site on the top of Court Hill has already been occupied by the court building, though it is still possible to build a station there by contriving the transmitter house and configuration of transmitting tower.

The location of Cox's Bazar and Rangamati TV stations should be decided after Chittagong Station is inaugulated. In this case, the place must be selected from among those can cover such a region as is excluded from the service area of Chittagong Station most effectively, and must be able to satisfy re-broadcast conditions required by these stations.

Station Chittagong Site Court Hill

Type of Antenna ..... 2D/1111 1 stacked, 4 faces

Polarization ..... Horizontal

Antenna Gain ..... 1.8 dB

Feeder Loss ..... 0.3 dB

Type of Feeder ..... WX77D or equiv.

E.R.P. ..... 11.5 dBK approx, 14 KW (For maximum direction) (Vision)

Transmitter Power ..... 10 KW

Power Division ..... A : B : C : D

1 : 1 : 1 : 1

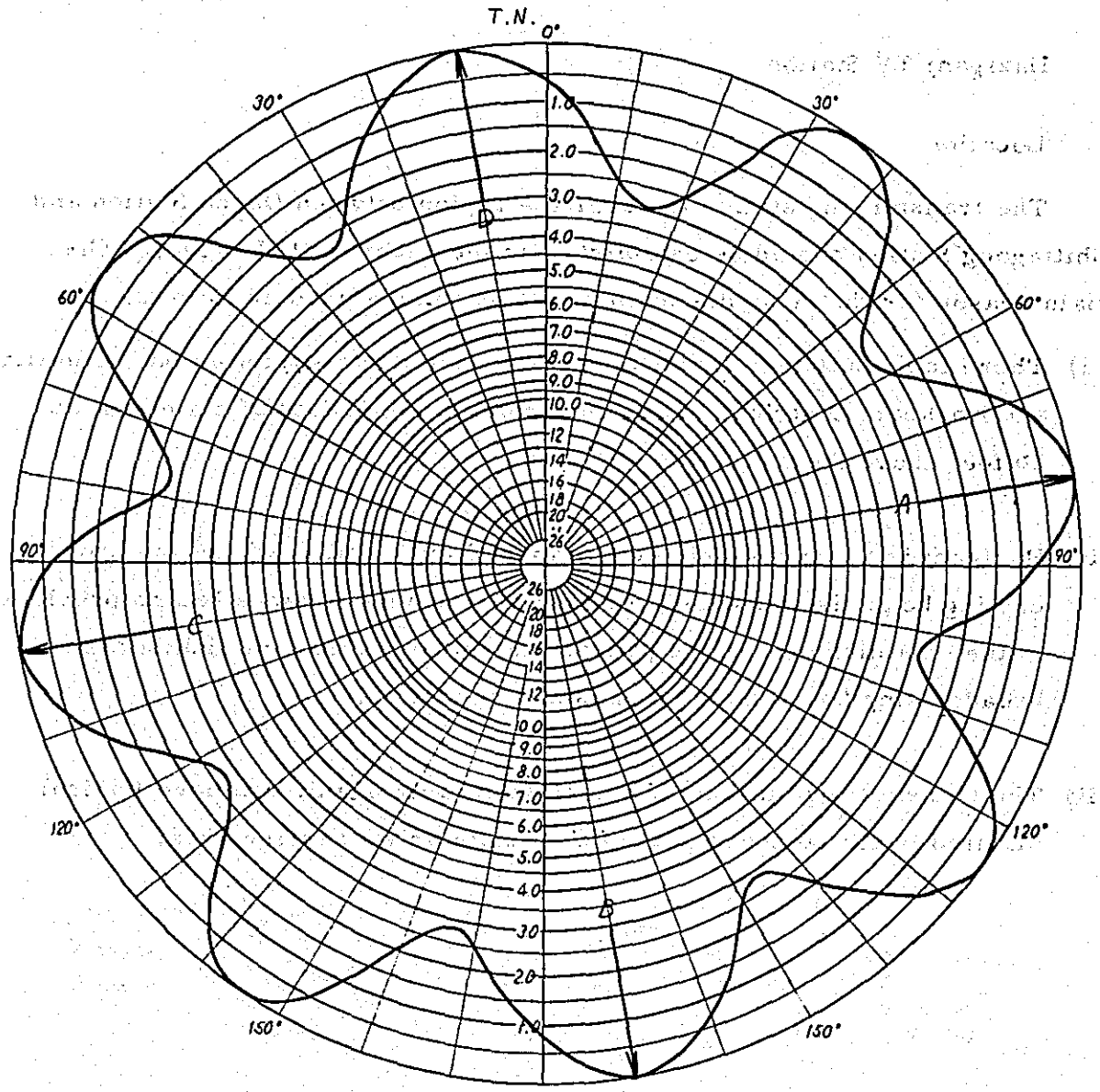


Fig. 2-2-6 Transmitter power and transmitting antenna of Chittagong TV Station

b) Transmitter Power and Transmitting Antenna

The transmitter power should be at least 10 KW to make it easy to cover as much as possilbe the shadow area from the Court Hill and to relay programmes to Cox's Bazar Station and Rangamati Station by broadcast waves.

As shown in Fig. 2-2-6, the transmitting antenna should be without null point because the service area includes a thickly housed region at the foot of Court Hill.

4) Haziganj TV Station

a) Location

The transmitting station to cover the region between Dacca Station and Chittagong Station should be established in the suburbs of Hazignaj. The main reason for the recommendation will be summarized as follows.

i) There is no suitable highland for the transmitting station in both Comilla and Noakhari District where the whole area consists of plains within 20 feet above the sea level.

ii) Haziganj is approximately 40 km apart from Comilla where the broadcasting house is scheduled to be built. But this distance has no problem to the establishment of the programme relay microwave link between the broadcasting house and the transmitting station.

iii) The transmitting station, if established in Haziganj, can have Barisal situated in the southern part of the region in its service area.

Station Haziganj Site (Outskirts of Haziganj town)

Type of Antenna ..... $\frac{4D}{1330}$ 3 stacked, 2 faces; 1 stacked, 1 face

Polarization ..... Horizontal

Antenna Gain ..... 11.3 dB

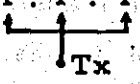
Feeder Loss ..... 0.7 dB

Type of Feeder ..... WX77D or equiv. approx.

Transmitter Power ..... 10 KW

Power Division ..... A : B : C

Null Fill IN .... more than 0.15 1 : 1 : 1



E.R.P. ..... 20.6 dBK 115 KW (For maximum direction)
(Vision)

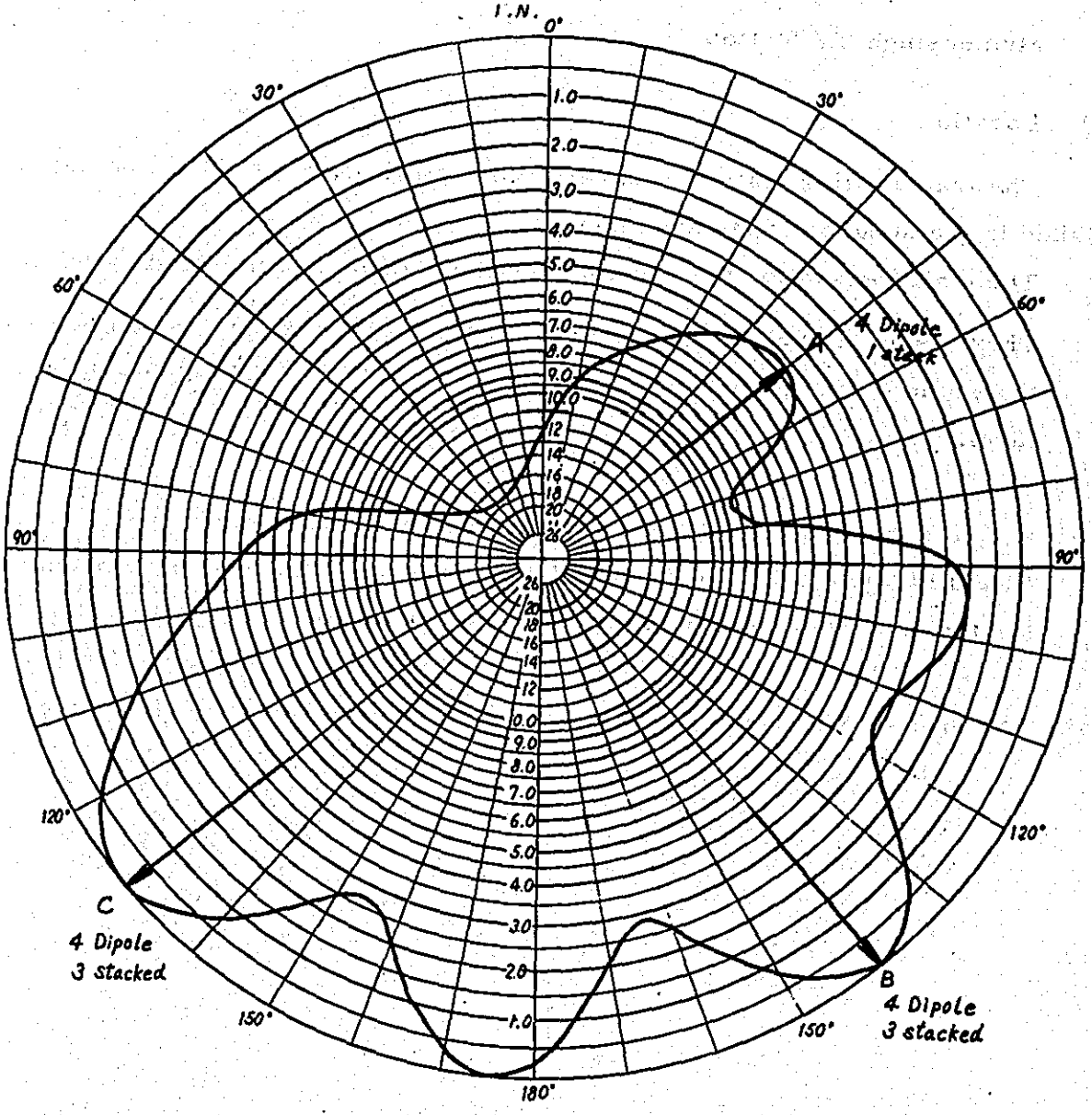


Fig. 2-2-7 Transmitter power and transmitting antenna of Haziganj TV Station

b) Transmitter Power and Transmitting Antenna

The transmitter power should be at least 10 KW so as to cover Barisal, an important town in the southern territory, and the southern coastal region, a granary of Bangladesh with rather dense population as widely as possible.

The transmitting antenna should be such a type as shown in Fig. 2-2-7 because it does not have to cover all directions since the north western part of Haziganj has already been covered by the existing Dacca Station.

5) Mymensingh TV Station

a) Location

The transmitting station to cover Mymensingh District should be established in the suburbs of Mymensingh.

The main reason for the recommendation will be summarized as follows.

i) There is no suitable hill for a transmitting station in this region because the whole extent is lowland of approximately 20 to 50 feet above the sea level.

ii) A T & T microwave network terminal station is scheduled to be established in Mymensingh in the near future, and this will provide convenience for the construction of programme relay facilities.

iii) The town of Mymensingh is situated roughly in the center of this district.

Station Mymensingh Site (Outskirts of Mymensingh town)

Type of Antenna ..... $\frac{4D}{3333}$ 3 stacked, 4 faces

Polarization ..... Horizontal

Antenna Gain ..... 12 dB

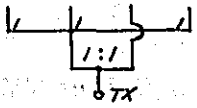
Feeder Loss ..... 0.7 dB

Type of Feeder ..... WX39D or equiv. approx.

Transmitter Power ..... 3 KW

Power Division ..... A : B : C : D

Null Fill IN ... more than 0.15 — 1 : 1 : 3 : 1



E.R.P. ..... 16 dBK 40 KW (For maximum direction)
(Vision)

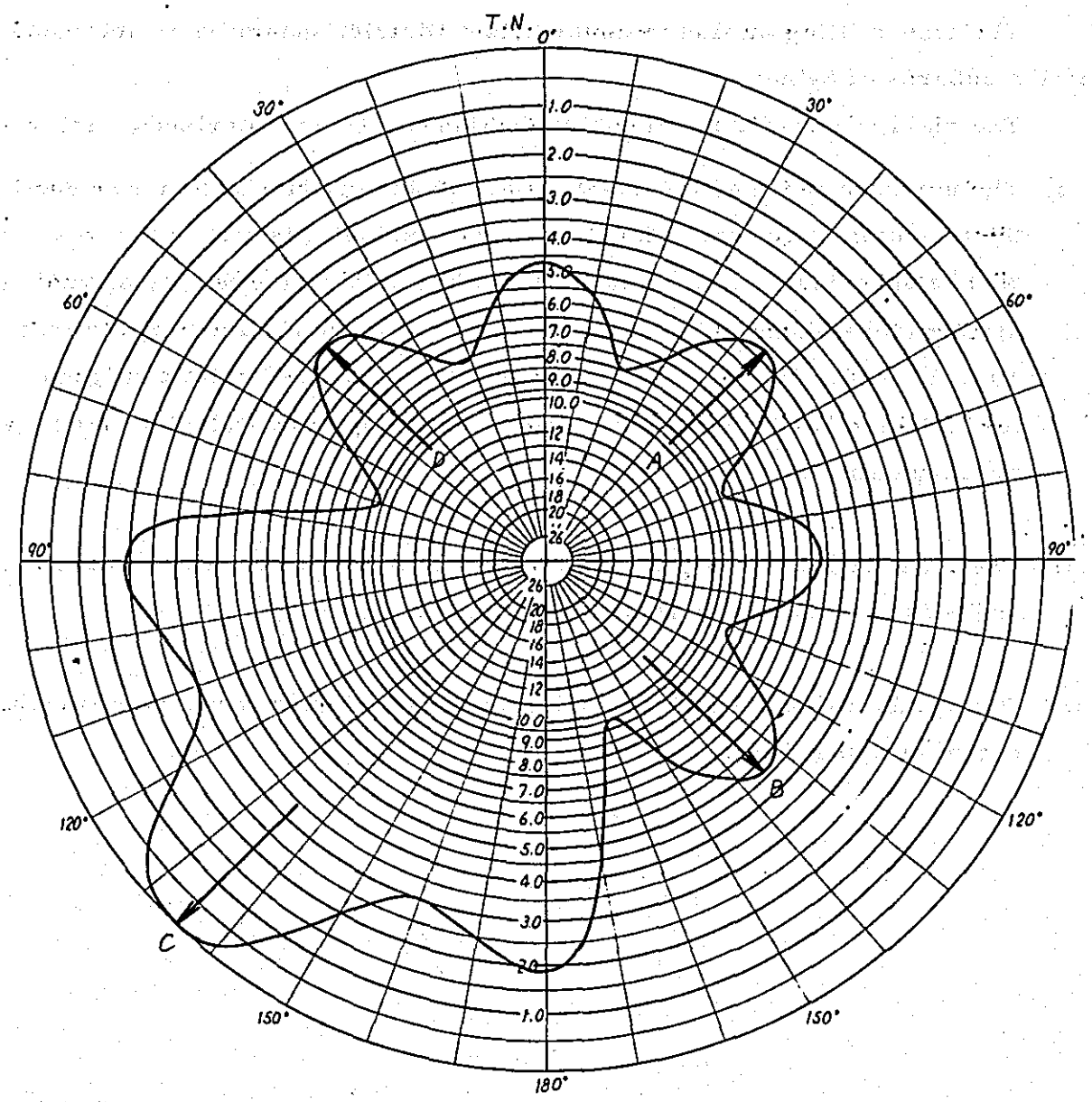


Fig. 2-2-8 Transmitter power and transmitting antenna of Mymensingh TV Station

b) Transmitter Power and Transmitting Antenna

The transmitter power required is no more than 3 KW, but the transmitting antenna must be such a type as shown in Fig. 2-2-8 in order to cover as far as Tangail which is situated in the south-western part of the district.

6) Sylhet TV Station

a) Location

The transmitting station to cover Sylhet District should be established in the suburbs of Sylhet.

The main reason for the recommendation will be summarized as follows.

i) The northern part and the eastern part of this district are surrounded by the mountains adjacent to India, and Mymensingh District in the western part is spacious. There is no suitable hill or highland for a transmitting station there since most part of the area consists of plains approximately 10 to 50 feet above the sea level except the eastern district contiguous to the Indian border where the land ascends approximately 250 feet toward the mountain region.

ii) The most important city of this district is Sylhet, and the broadcasting house is also scheduled to be constructed in the city.

iii) The transmitting station, if built in the city of Sylhet, can cover the whole extent of Sylhet District.

Station Sylhet Site (Outskirts of Sylhet town)

Type of Antenna ..... 4D/1133 3 stacked, 2 faces; 1 stacked, 2 faces

Polarization ..... Horizontal

Antenna Gain ..... 11.2 dB

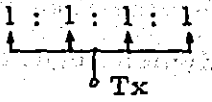
Feeder Loss ..... 0.7 dB

Type of Feeder ..... WX77D or equiv. approx.

Transmitter Power ..... 10 KW

Power Division ..... A : B : C : D

Null Fill IN ... more than 0..15 — 1 : 1 : 1 : 1



E.R.P. ...20.5 dBK 100 KW (For maximum direction)
(Vision)

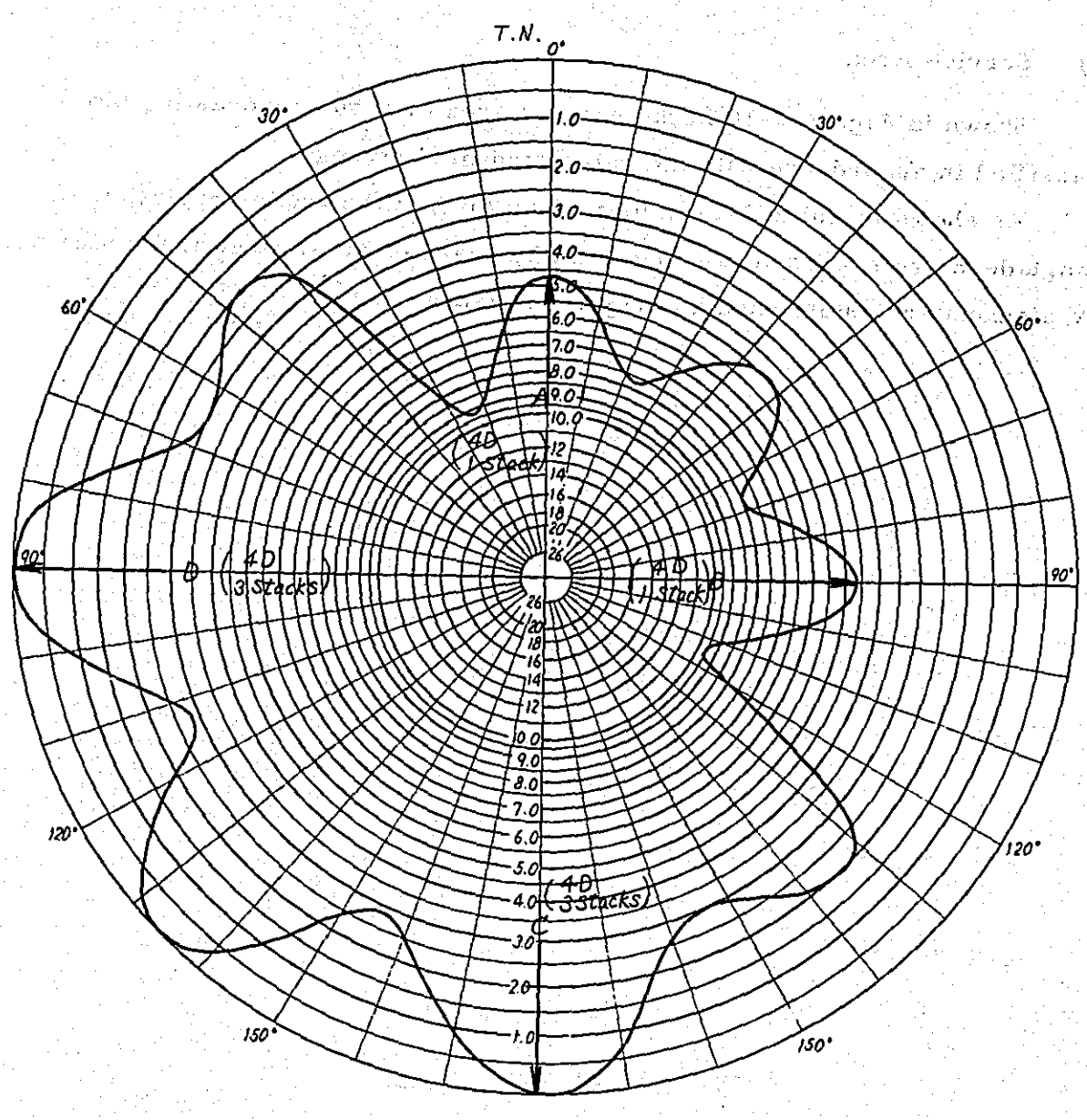


Fig. 2-2-9 Transmitter power and transmitting antenna of Sylhet TV Station

b) Transmitter Power and Transmitting Antenna

The transmitter power should be 10 KW so as to provide Habiganj in the south-western part of the region with enough field strength and to extend the service area to the south-western part covered by neither Dacca Station nor Mymensingh Station. Furthermore, the transmitting antenna should be such a type as shown in Fig. 2-2-9 in order to give greater effective radiation power to the south and the west.

(4) Service Area

Shown in Fig. 2-2-10 is the service area of each broadcasting block classified in accordance with the calculated field strength.

As shown in Table 2-2-5, more than 90 % of the whole population of Bangladesh are supposed to be covered by grade-B areas when these nine new TV stations are established as originally planned.

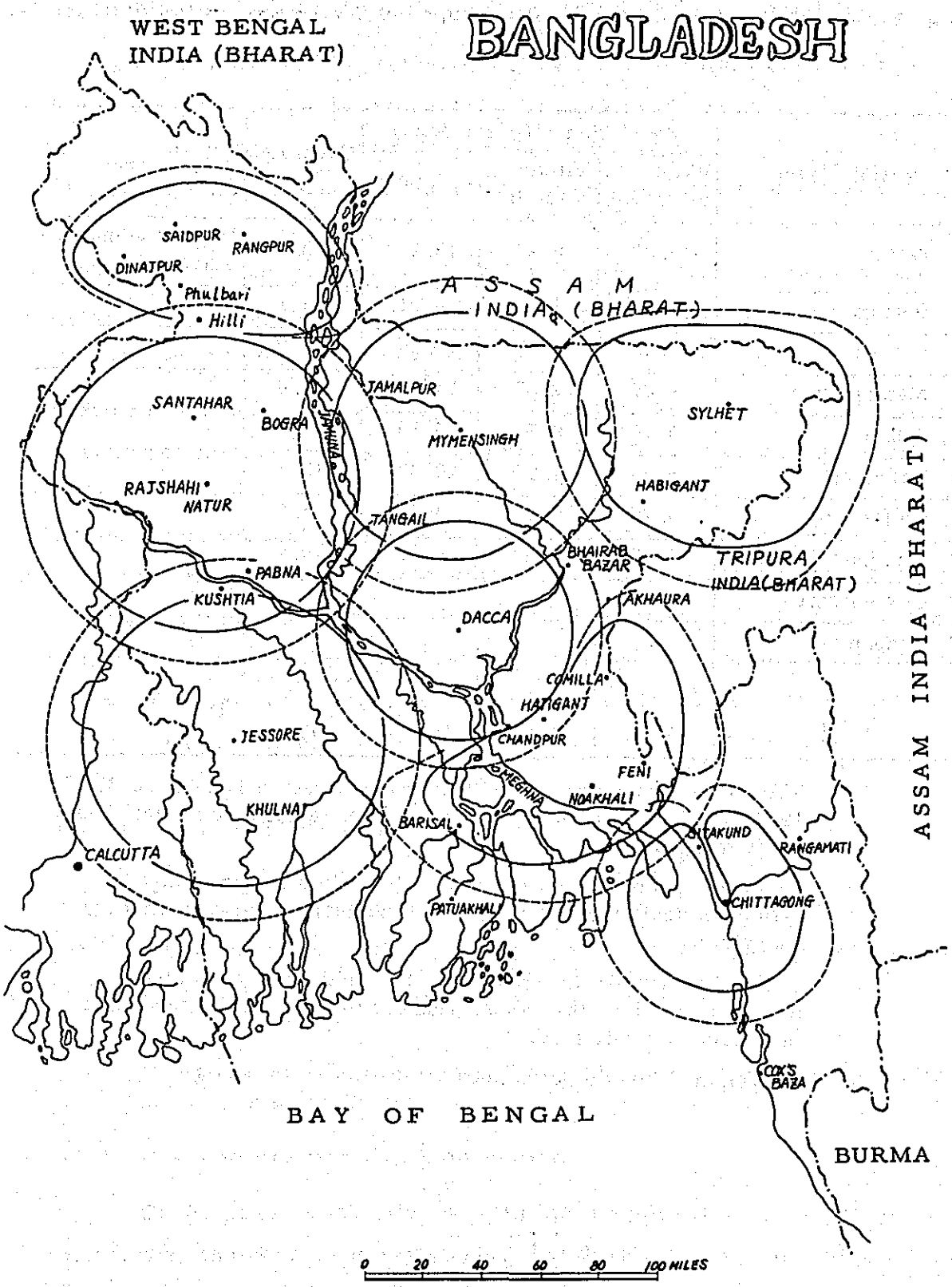


Fig. 2-2-10 Estimated TV Service Area (GradeA —— GradeB .....)

Table 2-2-5 Population Coverage for Proposed TV Broadcasting Stations

Station Name	Population *1(in millions)			Coverage (%)	Remarks
	Within grade A *2	Within grade B *3	Total		
1. Dacca	11.88	6.25	18.13	23.4	for contemporary state
2. Jessore	12.77	1.24	14.01	18.1	
3. Natore	11.43	3.55	14.88	19.2	
4. Mymensingh	9.89	2.07	11.96	15.4	
5. Sylhet	5.16	0.70	5.86	7.6	
6. Haziganj	9.40	1.07	10.47	13.5	
7. Chittagong	4.20	0.32	4.52	5.8	
8. Dinajpur-Rangpur	6.47	0.50	6.97	9.0	
9. Cox's Bazar					
10. Rangamati					
Total	*4 65.77	*4 5.64	*4 71.41	*4 92.1	

*1 This table is made based on "Statistical Digest of Bangladesh No. 7 1970 ~'71", where the total population of Bangladesh is stated as 77.60 millions.

*2 Grade A stands for the area where the field strength is higher than 55 dB (relative to 1 μv/m) and the public is to receive a fine picture.

*3 Grade B stands for the area where the field strength is higher than 45 dB but less than 55 dB (relative to 1 μv/m) and the public is to receive a fair picture.

*4 This figure shows a net amount.

2-2 Establishment of the Television Programme Relaying System

The method of relaying television programmes from Dacca Station to each regional station should finally be such system as shown in Fig. 2-2-11. In this system, programmes are relayed to the six principal stations through T & T microwave networks, and to the three supplementary stations through rebroadcast system.

The main reason why the principal stations require microwave relay networks while the supplementary stations can be covered by rebroadcast system will be summarized as follows.

i) Microwave relaying method is more suitable for the principal area which requires high quality relay of programmes than rebroadcast system.

ii) The establishment plan of T & T microwave relaying networks has partly been realized in the southern districts, and there is no less possibility of realization in the northern districts. More microwave networks than those included in the original T & T plan, if necessary for TV programme relaying, shall be established in complying with the demand of Bangladesh Television as to time and location.

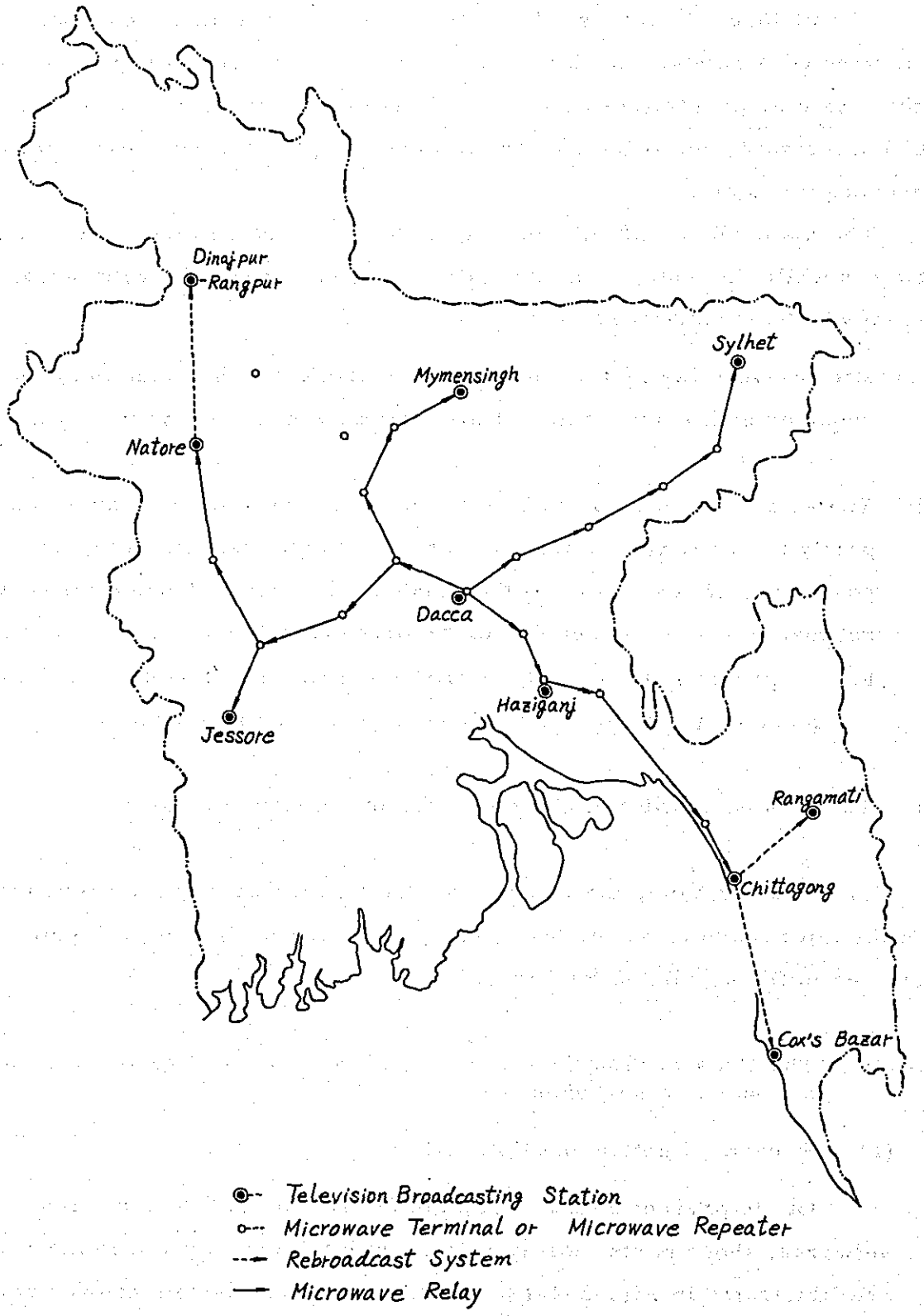
iii) There is possibility of using the microwave networks at cost.

On the other hand, the rebroadcast system which is more economical than the microwave relay method retains sufficient quality for relaying programmes to the supplementary area.

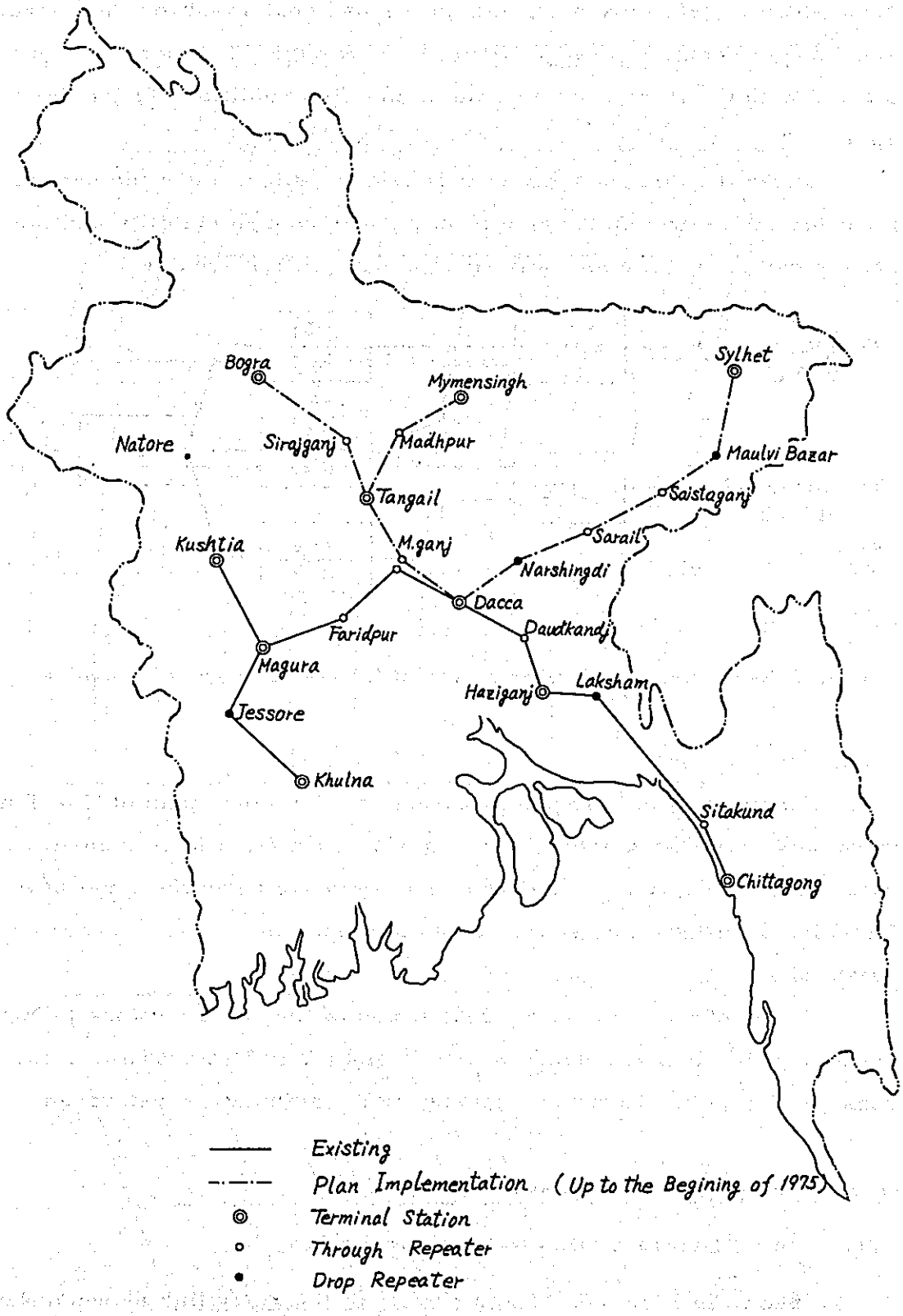
2-2-1 The Present Situation of the T & T Microwave Network and Countermeasures to be Taken

(1) Present Situation and Future Plan

Of the present situation and the future plan of T & T microwave networks, those parts closely related with television programme relaying are illustrated in Fig. 2-2-12, and the equipment system of each network



2-2-11 Television Programme Relaying Network



2-2-12 T&T's Microwave Network

in Fig. 2-2-13. The first equipment with the first priority is for the telephone service (960-channel), and the second equipment for the spare. This second equipment, however, will be used for the television service in the future, with the third equipment to be installed additionally for the common spare.

Under the circumstances, it is also possible to use the second equipment for the television service if only it has enough stability and the TV station can take some measure to cope with circuit trouble.

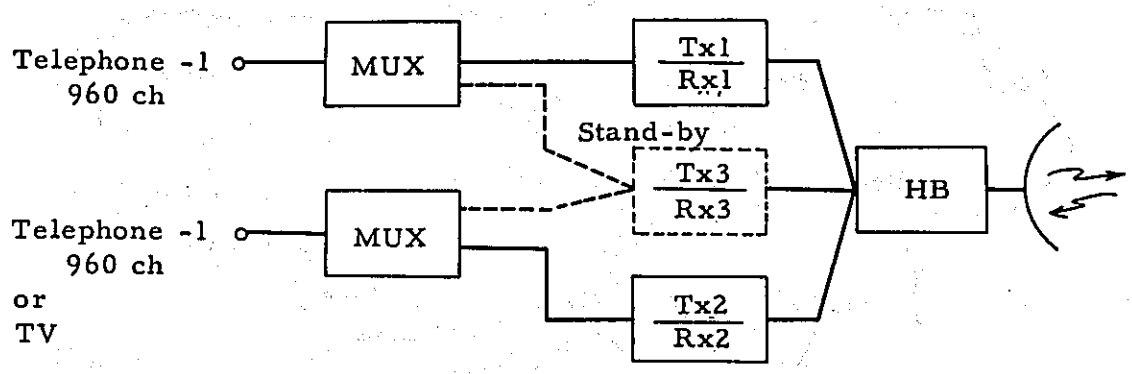


Fig. 2-2-13 System Configuration of T & T Microwave Network

(Countermeasures)

Considering the present situation and the future plan of T & T microwave networks stated above, any regional TV station to be inaugurated before the completion of these T & T microwave networks must have some facilities of programme source of its own until the T & T networks are established.

On the other hand, early realization of the relay network to Natore Station, which is not included in the original T & T microwave network construction plan, should be appealed to the authorities concerned.

2-2-2 Design of the Rebroadcast System

(1) From Natore Station to Dinajpur Station

Shown in Fig. 2-2-14 is a profile of the relay link between Natore and Hilli Point drawn by a topographical map on a reduced scale of 1/250,000.

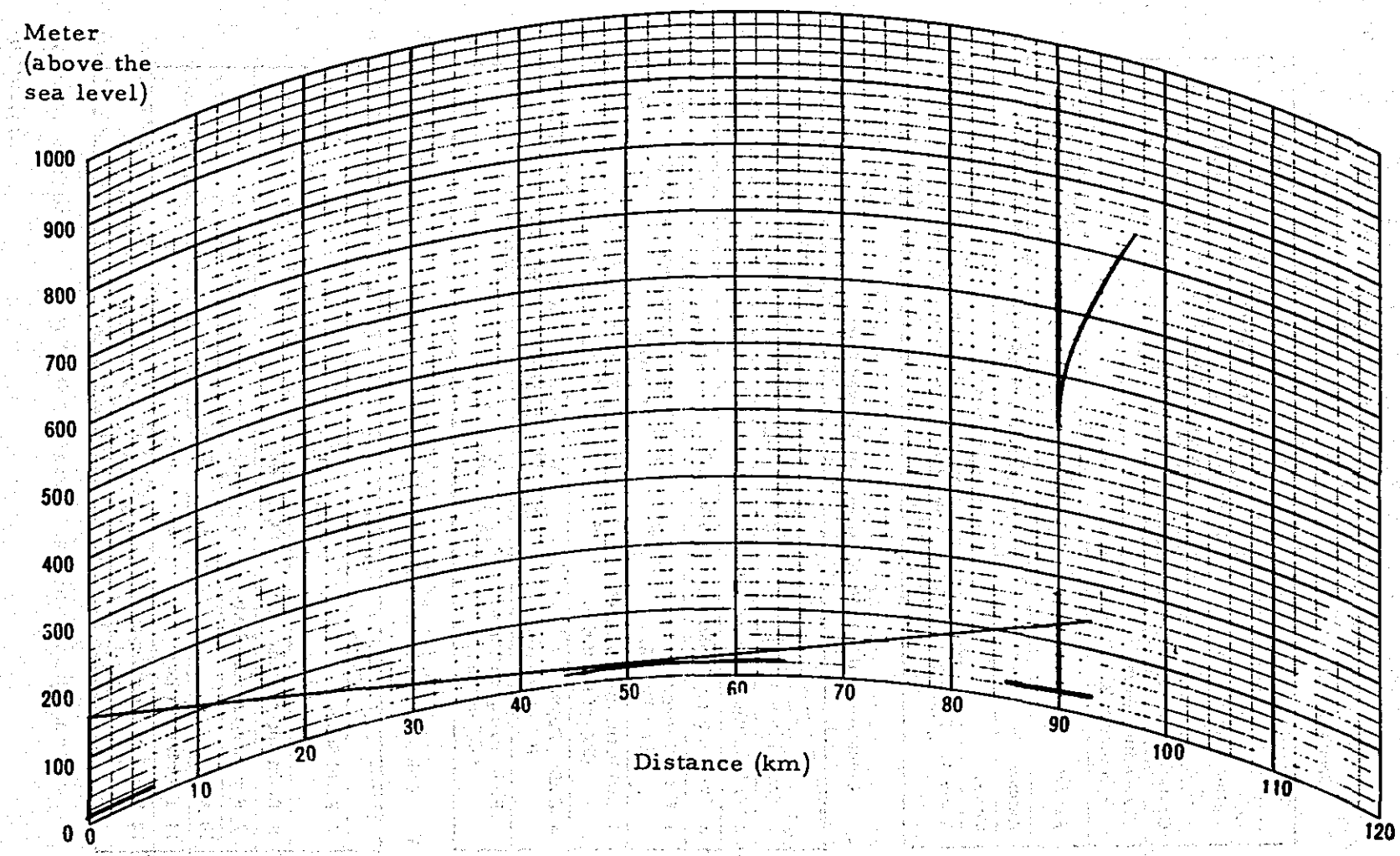


Fig. 2-2-14 A Profile between Natore (the point 10km north-east of the city center) and Hilli

Table 2-2-6 Tentative Specification for Rebroadcast System from Natore to Hilli (Transmitter site)

1. Specification

	Transmitting	Receiving
Station Name (Site)	Natore (Outskirts of Natore town, Approx. 10km NE)	(Hilli)
Operating Frequency Band	Band III High Channel	
Transmitter Power (maximum E. R. P.)	10 kW	—
Feeder	WX-77D or equiv., 500 ft	10D2V or equiv. 300 ft
Antenna	4D, 3 stacked 4 faces	12Y 2 stacked
Tower	Guyed Mast, 500 ft	
Remarks: Distance between transmitting and receiving point . . . 56 mile (90 km)		

2. Culculated Value of Field Strength at Relayed Point

			Remarks
1 Transmitter Power	10	dBK	
2 Transmitting Antenna Gain	9.5.	dB	
3 Transmitting Feeder Loss	-0.7	dB	
4 Field Strength (for 1 kW ERP)	52	dB	Transmitting Antenna Height = 500 ft Receiving " " = 300 ft
5 Field Strength Obtained (50% of the time)	70.8	dB	1 + 2 + 3 + 4
6 Fading Depth (90% of the time)	-4.5	dB	S = 1.0 for K = 4/3 E50/E90 = -6 dB for sea
7 Field Strength Obtained (90% of the time)	66.3	dB	5 + 6

3. Culculated Value of Receiver Input Level

			Remarks
7 Field Strength (90% of the time)	66.3	dB	
8 Receiving Antenna Gain	13.5	dB	
9 Receiving Feeder Loss	-7	dB	
10 λ/π	-6	dB	
11 Termination Loss	-6	dB	
12 Receiver Input Level (90% of the time)	60.8	dB	7 + 8 + 9 + 10 + 11

Given in Table 2-2-6 are specifications of facilities of Dinajpur Station and its mother station in Natore, and the calculated values of field strength at the relayed point and of the receiver input level (90 % of the time).

The required video quality will be guaranteed so long as the receiver input terminal voltage satisfies these values. As for fading expected to occure to propagation paths on the water especially in the rainy season, the extent of influence should be confirmed in advance through an actual survey.

(2) From Chittagong Station to Rangamati Station and to Cox's Bazar Station

The rebroadcast system to connect these stations should be designed through an exhaustive investigation after Chittagong station is inaugurated. (The design of this rebroadcast system has been omitted because it takes rather long to start the construction of Rangamati and Cox's Bazar stations, and no topographical map of these districts whose lay of the land is quite complicated was obtained.)

2-3 Promotion of the Establishment of Dacca Television Studio Center

The early establishment of the television studio center in Dacca is essential to the realization of the Bangladesh TV broadcasting project previously referred to.

Stated below are necessary procedures to be taken for the completion of the plan.

2-3-1 Construction Work

For the effective and smooth installation of the broadcasting equipment parts into the building now under construction, it is most advisable to finish the electric work for receiving and distributing first, and then to set about the air-conditioning work for the control rooms, and others in which the broadcasting equipment is to be installed.

This method will save time for installation, inspection, and adjustment of the broadcasting equipment.

2-3-2 Control Room and Studio Control Booth

All the equipment parts kept at Rampura to be installed in the control room and the studio control booth were produced more than five years ago.

Every unit, therefore, requires a close checkup before installation, and must be repaired if anything is wrong. Also in order to avoid unexpected operation trouble of the equipment thus stored for a long time, all the rooms should not be put into operation at a time even though they are completed about the same time. In other words, rooms should be put into operation one by one at intervals of one or two months, while using the rest under heat-run for testing and training the operators concerned.

2-3-3 Auditorium

The Auditorium is now under construction as a part of the studio center buildings.

In the mean while, specifications of the auditorium facilities should be decided so as not to require a drastic change of both equipment parts and building itself even in case of the future introduction of new technique and colour television system.

As for the scale of the facilities, it will be reasonable to equip four TV cameras inside the hall.

Fig. 2-2-15 and Fig. 2-2-16 respectively show the video and the audio block diagram of the auditorium.

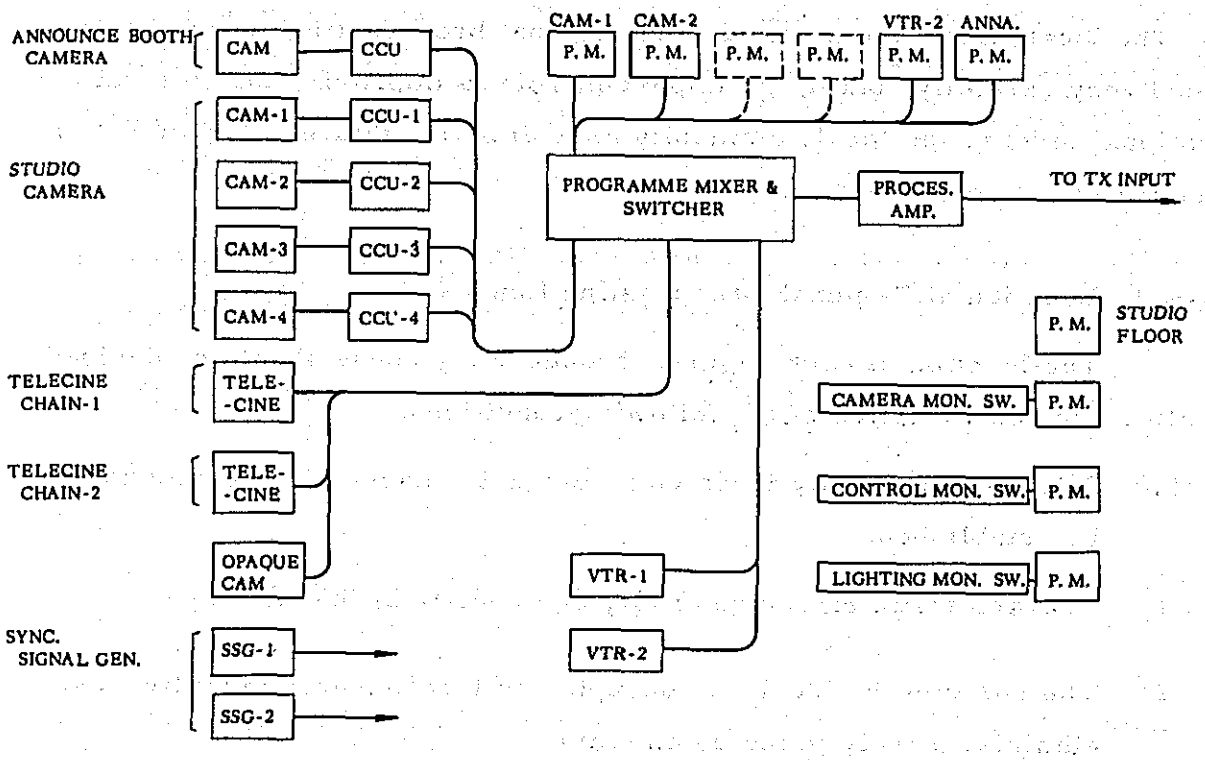


Fig. 2-2-15 Video Block Diagram of Auditorium (Dacca-TVStation)

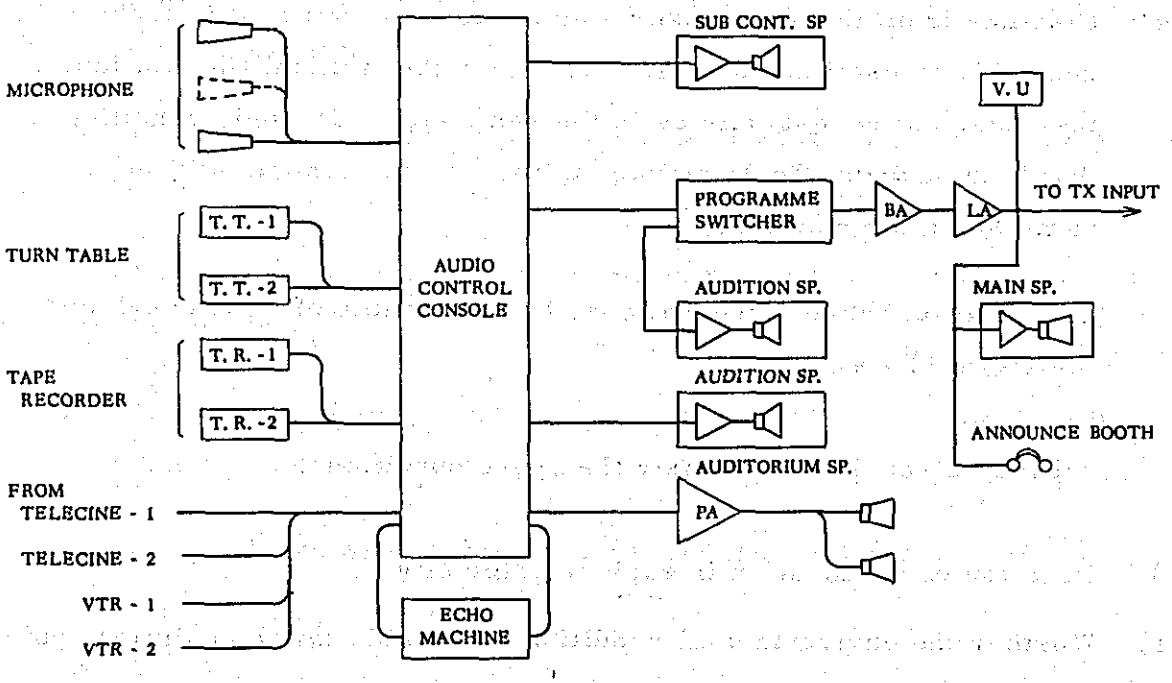


Fig. 2-2-16 Audio Block Diagram of Auditorium (Dacca-TVStation)

2-4 Establishment of Regional Broadcasting Houses

The location and the scale of each regional broadcasting house should be decided very carefully, taking its important role in improving the cultural and educational level of the local community as well as the future enlargement of the facilities into consideration.

2-4-1 Location of Regional Broadcasting Houses

The location of each regional broadcasting house should be decided after due consideration of the following conditions.

(1) Selection of the city in which a regional broadcasting house should be established.

1) Characteristic structure of city and society of the country

2) The position the local city occupies culturally, economically, and administratively in the community

3) Population

4) Distance from the TV transmitting station (Of course it is technically desirable to establish a local studio near the transmitting station, but they need not necessarily be in the same city. The only condition is that both of them should belong culturally and economically to the same local community.)

5) The relation between the National Land Planning of Bangladesh and the above 1) - 4).

All the selected cities satisfy the above conditions.

(2) Decision of the location in each selected city

1) Whether the environmental condition is suitable for the cultural center of the city

2) Whether the propagation path between the terminal station of T & T microwave networks and the regional broadcasting house is free from jamming by airplanes flying across it in case programmes from Dacca station must be relayed to the regional broadcasting house through this extended path

3) Whether it is conveniently located near the means of transportation for both performers and the audience

4) Whether power source of good quality is available near at hand

5) The relation between the future city planning and the above 1) - 4).

2-4-2 Decision of the Local Broadcasting Hours and the Scale of the Facilities

(1) Decidion of the local broadcasting hours

The length of broadcasting hours allocated to a regional TV station for its own programmes should be one to two hours a day under the present circumstances when considering the following points.

1) The priority of the popularization of television to the enrichment of local programmes

2) The future increase in quantity of local news and other local programmes

3) The ratio of required time for programme production to unit broadcasting hour

4) The transition of the ratio of investment into the studio facilities of Bangladesh Television

5) Independency of each regional TV station from Dacca station.

(2) The function and main facilities of each regional broadcasting house

The function of each regional broadcasting house will be summarized as follows.

1) It stabilizes video signals relayed from Dacca through T & T microwave networks, and sends them to the transmitting station.

2) It checks complete programmes from Dacca, and reproduces them.

3) It produces programmes of its own, and broadcasts them.

4) It broadcasts its own local programmes on a nation-wide network.

5) It broadcasts spare programmes of its own when a national network programme on the air is interrupted by a break of the microwave network or some such trouble.

The basic facilities of each regional broadcasting house required to cover the one or two broadcasting hours for local programmes referred to in (1) are shown in Fig. 2-2-17 and Fig. 2-2-18.

2-4-3 Process of Construction

The working schedule should be made up by which every process of the construction work, such as the decision of the scale of each regional broadcasting house facilities, placing an order for necessary equipment parts, construction of the building, the installation of the equipment parts and so forth, is controlled.

Each regional broadcasting house should be constructed together with the TV transmitting station. In case the construction of the permanent building of each regional broadcasting house is scheduled to be far behind the completion of the transmitting station, local news and package programmes must be broadcast by a temporary station. The facilities necessary for this temporary station are mentioned below.

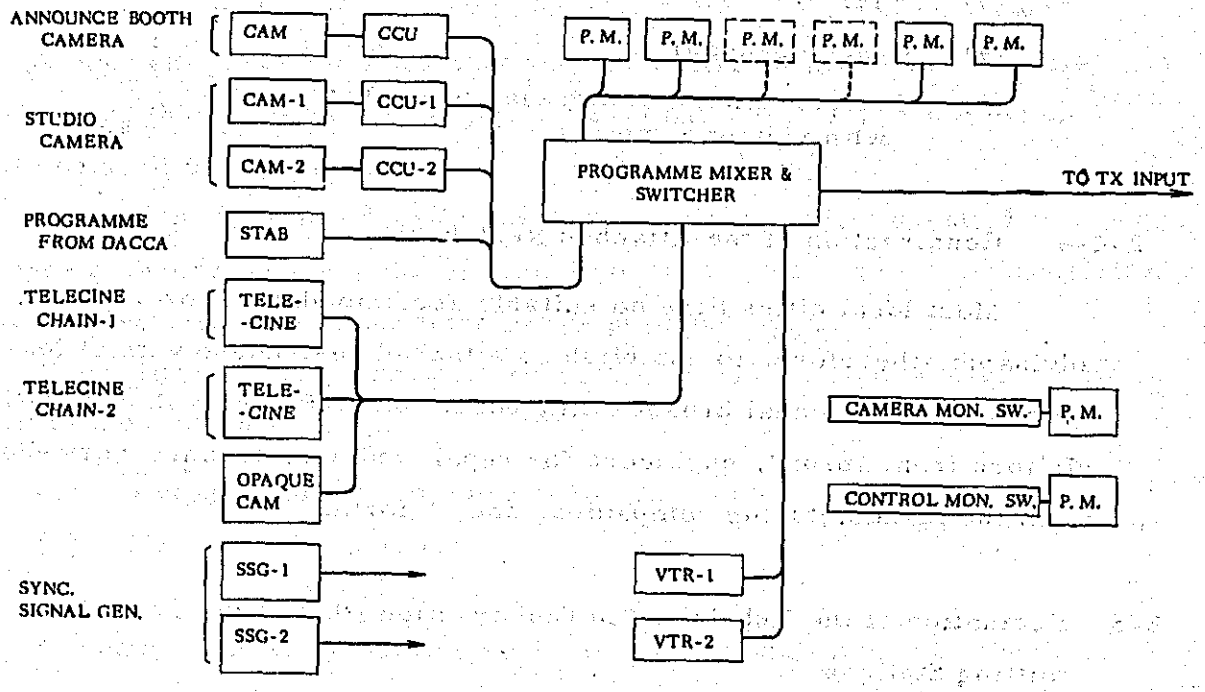


Fig. 2-2-17 Video Block Diagram of Local TV Station

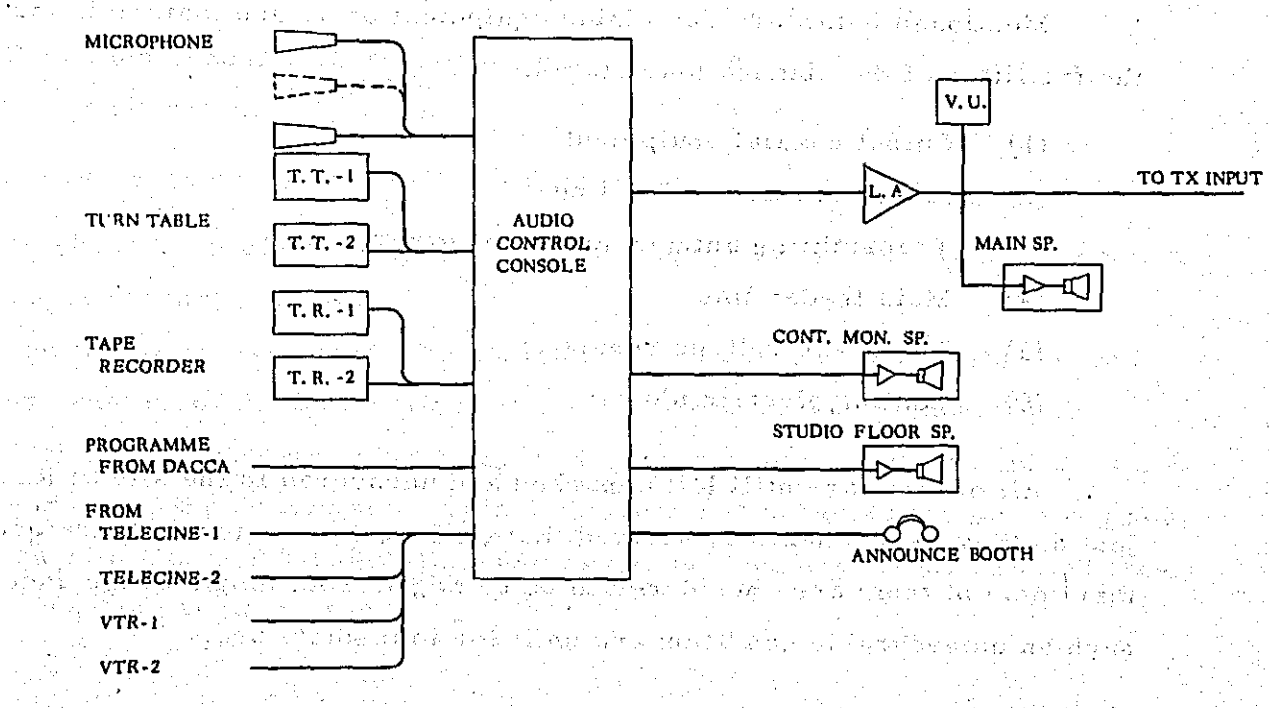


Fig. 2-2-18 Audio Block Diagram of Local TV Station

(1)	Temporary master control facilities	1 set
(2)	Camera (for bust shot of an announcer)	1 set
(3)	VTR	2 sets
(4)	Opaque scanner	1 set
(5)	Telecine Chain (16mm cine projector with vidicon camera)	1 set

2-4-4 Construction of the Attached Rest-house

Most local cities have no suitable accommodation for visitors. It is advisable, therefore, to establish an attached rest-house with at least four beds near the regional broadcasting house for staffs from Dacca Station, visitors from abroad, engineers for repair and maintenance work dispatched from the manufacturing companies, and so forth.

2-5 Promotion of the Rehabilitated Construction Plan of the Four TV Transmitting Stations

2-5-1 The Remaining Equipment Parts and Materials for the Four Stations

Mentioned below are remaining equipment parts and materials for the facilities of the planned four stations.

(1) Output coaxial equipment
(2) Indoor coaxial feeder line
(3) Transmitting antenna and steel tower
(4) Main feeder line
(5) Automatic voltage regulator
(6) Cooling electric blower

All of them are still left unpacked and uncovered in the site of Rampura just as they were when they arrived there. It is quite natural, therefore, that some of them are considered to be damaged from long storage under such an unfavourable condition and unfit for immediate use.

2-5-2 Effective Utilization of the Remaining Equipment Parts

Most of the remaining equipment parts and materials are considered to be usable for the television expansion plan. Blocks of equipment whose main component parts remain intact should be made a good use of for the project, and those blocks whose greater part has been lost or imperfect should be used for spare parts.

In case the new broadcasting network plan now under investigation requires a channel change, the technical possibility should also be confirmed as to channel change of these remaining equipment parts.

The following equipment may require a channel change according to the result of the present survey.

(1) Output coaxial equipment (CIN diplexer)

(2) Transmitting antenna

Quantity of these remaining equipment parts and materials should be checked in advance, and order for necessary equipment parts should be pressed so as to be delivered in time for construction or installation.

-6 Execution Schedule of the Construction Plan and the Cost Required for the Construction

(1) Execution Schedule of the Construction Plan

As shown in Table 2-2-7, the completion of the whole construction requires approximately three years.

The first step, to include the completion of the auditorium in Dacca and the construction of the four regional stations with attached regional studios for which part of the remaining equipments can be used, requires approximately two years, and the second step, to include the construction of the three regional stations with attached broadcasting houses and the two low-output regional stations, requires another year.

In order to carry out the whole project smoothly and to finish the work on schedule, a careful plan for the administration of the whole construction programme should be made in advance, after due consideration of the rainy season peculiar to Bangladesh during which construction work is supposed to encounter various kinds of difficulty.

Table 2-2-7 Execution Schedule of the Nation-wide TV Broadcasting Network Construction Plan

Term	Preparation	The first step	The second step
Year	The first year	The second year	The third year
Auditorium in Dacca	Specification, Contract — Preparation of equipment, Construction		
Four regional stations and regional studios	Specification, Contract — Preparation of equipment, Construction		
Three regional stations and regional studios	Specification, Contract		Preparation of equipment, Construction
Two low output stations		Specification, Contract	Preparation of equipment, Construction

(2) The Cost Required for the Construction

The estimated cost required for the nation-wide television broadcasting network construction plan and for the facilities of the auditorium in Dacca is shown in Table 2-2-8. This is a rough estimation of the delivery cost after installation, adjustment, and inspection in each site. The cost of electric work, building work, road construction, land readjustment of the proposed sites, and other local work is excluded from this estimation considering the sharp fluctuation in prices after the war in Bangladesh.

The construction cost of the four regional stations is calculated on the assumption that among the remaining principal equipment parts and facilities, most of the steel towers and the transmitting antennas are reusable, and the transmitters are not reusable.

Table 2-2-8 The Cost Required for the Nation-wide TV Broadcasting Network Construction Plan

(Unit: 1,000,000 yen)

Section of the work	Contents of the construction plan	Equipment	Power source, building, and other local work	Total
The first step	Rehabilitation of 4 stations	242		1,012
	4 regional studios	528		
	Auditorium in Dacca	242		
The second step	4 regional stations	330		506
	1 regional studio	132		
	2 low output stations	44		

Chapter III MEDIUM WAVE BROADCASTING

Part 1 Recommendation

1-1 Increase of Transmitter Power of Medium Wave Broadcasting Stations

Increase of transmitter power of those stations in Chittagong, Khulna, Sylhet and Dacca-B is essential to the enlargement of the coverage of the present medium wave broadcasting network as well as to the effective cyclone warning to the coastal districts over the air.

1-2 Rehabilitation of the Damaged Khulna Broadcasting Station

Considering the superannuation of the transmitter and the other studio equipment used for the temporary station, the reduction of the service area due to insufficient output power of the transmitter, difficulty in producing local programmes with inadequate facilities of the studio, and so forth, the rehabilitation of the Khulna Station is one of the most pressing problems to be settled. Under the present circumstances, it is desirable to restore at first the same output transmitter (10 KW) as before the damage, in the old station buildng still remaining there.

When the 100 KW transmitting station now under planning is completed, these 10 KW transmitting facilities should be used for spare or utilized in other station.

As the Khulna Station is very important, its studio should immediately be rehabilitated in the same site with the transmitter, and at the same time, the facilities should be started to be improved to the same functional level as of Chittagong Station and Rajshahi Station.

1-3 Improvement of the Programme Relaying System

The current system of programme transmission from Dacca to each regional station is a rebroadcasting system of medium-wave or short-wave broadcasting from Dacca. This system is suitable for economical relay network

constitution, but not for maintaining high transmission quality and reliability. It is desirable, therefore, to be switched to the relaying system by T & T micro-wave network when it is completed and becomes usable.

It is also difficult to use T & T network of high quality and high reliability for the programme relaying between each regional broadcasting house and the transmitting station. So each regional station should have a VHF or UHF relaying link of each own.

1-4 Rehabilitation and Improvement of the Studio Facilities

Most of the studio facilities of each regional station have already been superannuated. Some of them do not stand any further use and others require early treatment to recover from damage by the war.

Anyway some measures should immediately be taken to rehabilitate or improve the function of these studio facilities to a required level.

New technique for a higher functional standard should be introduced in every renewal of the studio facilities, and replacement of them with new ones at regular intervals should also be planned.

The present studio facilities of Sylhet station and Rangpur station, which are poor and rather anomalous, should be improved to the same level as of Chittagong station and Rajshahi station through the next rehabilitation work.

1-5 Rehanilitation and Expansion of the Receiving Center

At present, the facilities of the receiving center in the suburb of Dacca consist of several communication receivers, amplifiers, and receiving antennas. Most of these equipment parts have already been superannuated, and some do not stand any further use.

These deteriorated facilities, therefore, should be renewed in the near future to regain the original function of the receiving center.

1-6 Establishment of the National Broadcasting House

The programme production and broadcasting to cover three systems of medium wave domestic service and four systems of short wave external service

planned or being carried out by Radio Bangladesh is supposed to require another broadcasting center at least of the same scale with the broadcasting center in Dacca now being enlarged.

This is where the establishment of a new national broadcasting house with 25 to 30 studios comes under consideration. The realization of this plan requires sure prospects into the future, and time, people, and money for the promotion and the management.

So, further close investigation into the execution schedule will be necessary.

1-7 Execution Schedule of the Nation-wide Medium Wave Broadcasting Network Construction Plan and the Cost Required for the Project

It will take approximately four years to complete the construction project of the nation-wide medium wave broadcasting network.

It will be advisable to divide these four years into two steps of the work; one for the increase of transmitter power of the existing stations and the renewal of the present studios, and the other for the rehabilitation and expansion of the broadcasting programme relaying network and the receiving center.

On the other hand, an establishment plan of the National broadcasting house should be drawn up after further detailed examination.

Given below are the execution schedule of each section of the work and the estimated cost of the construction.

Table 3-1 Execution Schedule of the Nation-wide Medium Wave Broadcasting Network Construction Plan

Term	Preparation	The first step of the work		The second step of the work	
Year	The first year	The second year	The third year	The fourth year	
	Decision of the plan Drawing up of specifications Contract	Rehabilitation of the damaged stations Work of increase in transmitter power Renewal of the studio facilities		Decision of the plan Drawing up of specifications Contract	Expansion & improvement of the programme relay network and the receiving center

Table 3-2 The Estimated Cost Required for the Nation-wide Medium Wave Broadcasting Network Construction Project

(Unit: 1,000,000 yen)

	Equipment	Power cable, building, and other local work
The first step of the construction work	793	
The second step of the construction work	-	
Total	(793)	

Part 2 Detailed Description

2-1 Plan of Increase of Transmitter Power of Medium Wave Broadcasting Stations

2-1-1 The Present Situation of Medium Wave Broadcasting Stations

At present, there are two medium wave broadcasting stations in service in Dacca, one for programme A and the other for programme B, and one each in Chittagong, Khulna, Sylhet, Rajshahi, and Rangpur for single programme broadcasting.

Shown by 1.5 mV/m contour in Fig. 3-2-1 is estimated coverage of these medium wave broadcasting stations in the dry season, and Fig. 3-2-2 in the rainy season. This indicates that the service area is sharply narrowed in the dry season and that there still remains some area whose field strength is insufficient for service either by Dacca Stations or any other regional station despite no less density of population. It also shows that each regional station cannot cover the whole extent of its region even in the rainy season. As shown in Table 3-2-1, approximately 58 % of the total population is served by Dacca Station-A and other regional stations in the dry season, and approximately 99 % in the rainy season.

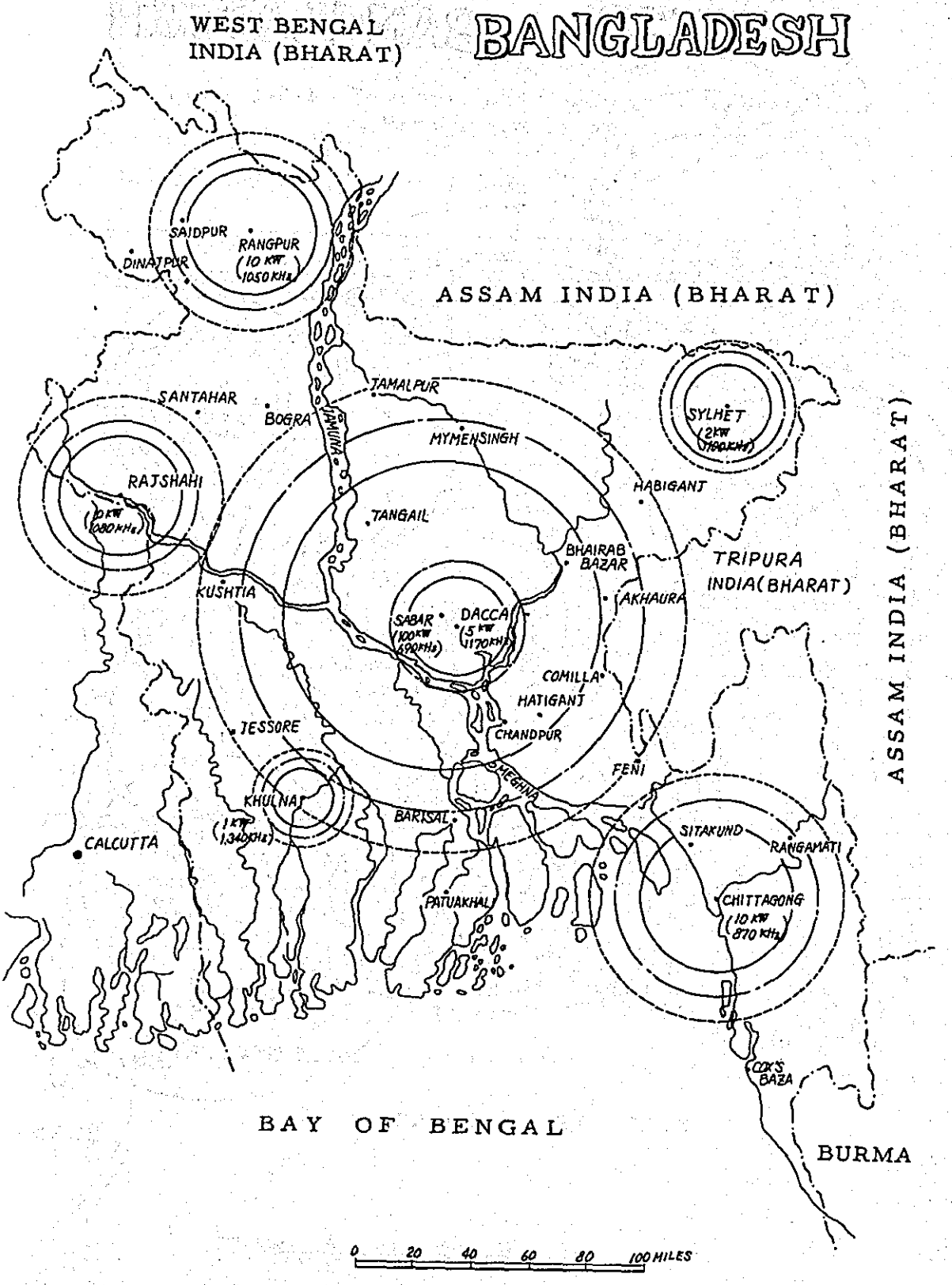


Fig. 3-2-1 Estimated MW Coverage in the Present State for Dry Season

1 m mv ..... $\varepsilon = 4$

1.5 ---

3 ——— $\sigma = 3 \times 10^{-3}$ U/m

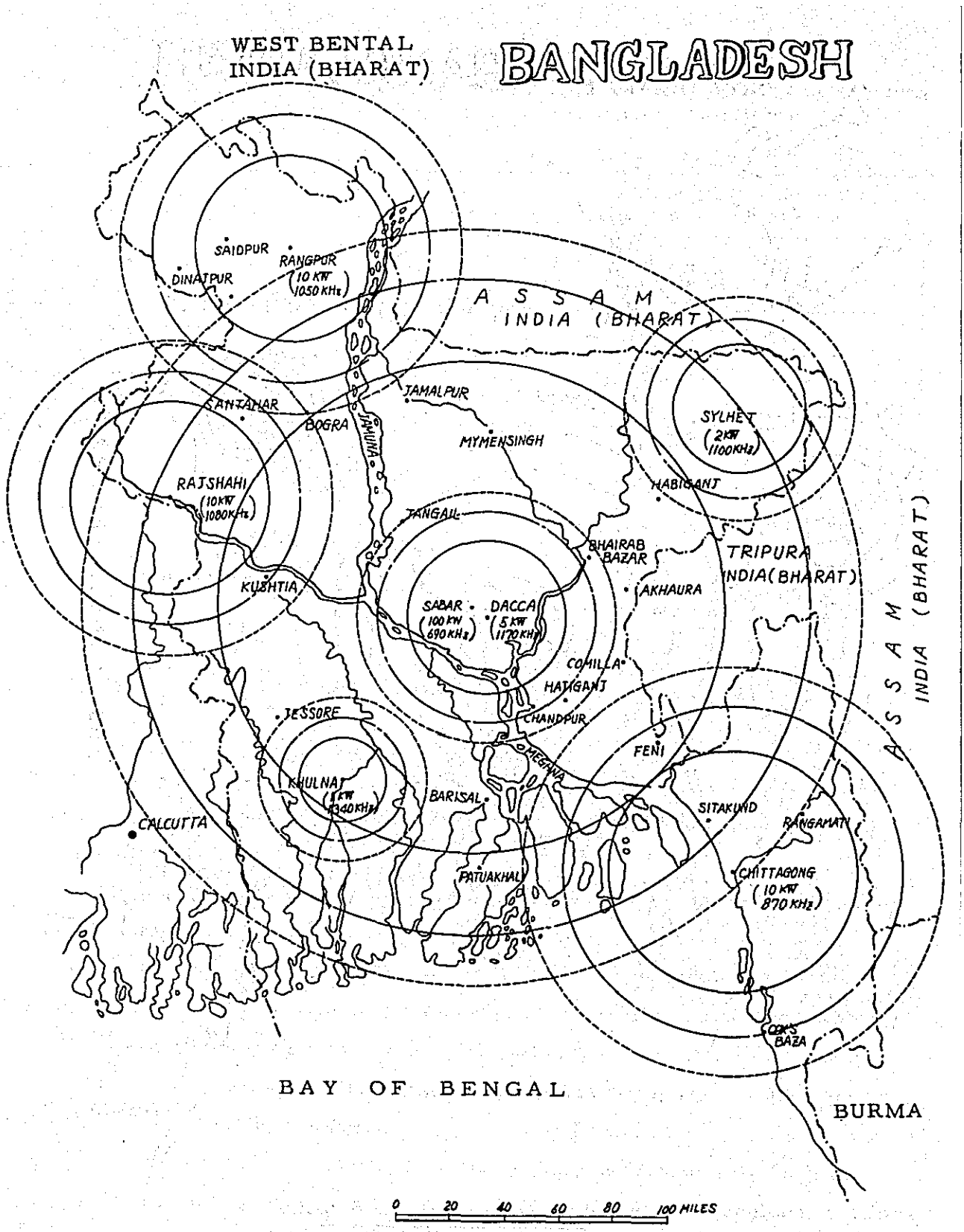


Fig. 3-2-2- Estimated MW Coverage in the Present State for Rainy Season

1 m mv ..... $\varepsilon = 4$

1.5 —·— ($\sigma = 10 \times 10^{-3} U/m$)

3 ——

Table 3-2-1 Population and Coverage in the Service Areas of Present MW Broadcasting Stations

(1) *Dacca-A and Other Regional Stations*

Station Name	Dry Season		Rainy Season	
	Population (in millions)	Coverage (%)	Population (in millions)	Coverage (%)
Dacca-A *1	30.27	39.0	66.03	85.1
Chittagong	4.08	5.3	7.38	9.5
Rajshahi	2.15	2.8	6.81	8.8
Sylhet	2.13	2.7	3.72	4.8
Rangpur	5.19	6.7	8.50	11.0
Khulna	1.50	1.9	3.19	4.1
Total	*2 45.31	*2 58.4	*2 76.89	*2 99.1

(2) Dacca-B

Dacca-B *1	6.23	8.0	13.49	17.4

Note: *1 Transmitting frequencies of Dacca stations are;
Dacca-A ..... 690 KHz
Dacca-B ..... 1,170 KHz

*2 This figure shows a net amount.

The field strength here was estimated as follows.

1) Minimum field strength required

. The minimum filed strength required was set to 1.5 mV/m taking the following fact into consideration.

. Of many regions in Africa most part of which belongs to the tropical zone, those in the same latitude as Bangladesh adopt 61 dB. (Please refer to FINAL ACTS OF THE AFRICAN LF/MF BROADCASTING CONFERENCE, 1966, GENEVA, ITU.)

. At present, 1.5 mV/m is being used in Bangladesh.

2) Ground-wave propagation curves

The ground-wave propagation curves were set in accordance with CCIR Recommendation 368-1 (GROUND WAVE PROPAGATION CURVES FOR FREQUENCIES BETWEEN 10 KHz AND 10 MHz)

3) EARTH CONSTANT

The values in Table 3-2-2 are set as earth constant in Bangladesh based upon the findings of serveys in various parts of the country, referring to that in Japan.

Table 3-2-2 EARTH CONSTANT in Bangladesh

	ε	σ ($\mho$/m)
Dry season	4	3×10^{-3}
Rainy season	4	10×10^{-3}

2-1-2 Increase of Transmitter Power of Existing Stations

(1) The Present Situation of Those Stations Whose Transmitter Power is Scheduled to be Increased

Of the medium wave broadcasting stations already in service, those in Dacca (5 KW, Mirpur), Khulna (1 KW), Chittagong (10 KW), and Sylhet (2 KW) are scheduled to increase their transmitter power when the transmitters are renewed.

From the following points of view, the transmitting facilities of these four stations are considered to be unequal to excellent quality of broadcasting without taking immediate measures.

i) The facilities of these four stations have already been superannuated, since all of them were built more than ten years ago (the oldest was built 32 years ago).

ii) Supply of vacuum tubes and other spare parts is difficult or impossible.

iii) Especially in case of the Khulna station, the service area has extremely been diminished from the previous coverage because they have been using a mobile 1 KW transmitter since the original 10 KW transmitter was destroyed in the last Liberation War.

(2) Scale of Trnasmitter Power Increase and New Coverage

Table 3-2-3 shows the scale of transmitter power increase planned by Radio Bangladesh.

The estimated new MW coverage of these four stations after power increase is shown in Fig. 3-2-3 (in the dry season) and Fig. 3-2-4 (in the rainy season).

Table 3-2-3 The Scale of Transmitter Power Increase

Station name	Present transmitter output	Transmitter output after power increase	Transmitting frequency
Dacca (B)	5 (kW)	20 (kW)	1,170 (kHz)
Khulna	1	100	1,340
Chittagong	10	100	870
Sylhet	2	20	1,100

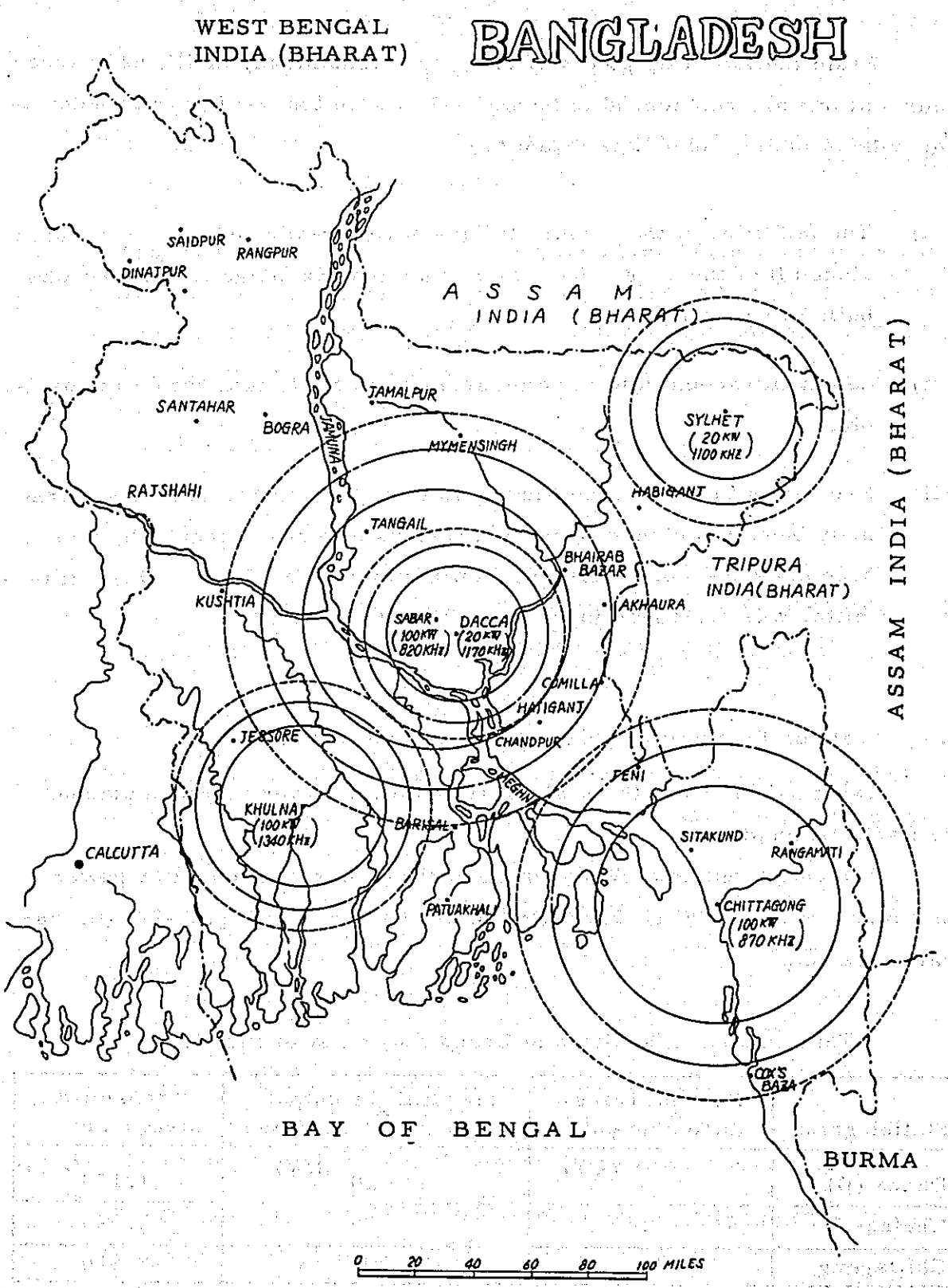


Fig. 3-2-3 Estimated MW Coverage of 4 Stations in Dry Season

1 m v/m ····· $\varepsilon = 4$

1.5 —·—·— ($\sigma = 3\times10^{-3}$ U/m)

3 ———

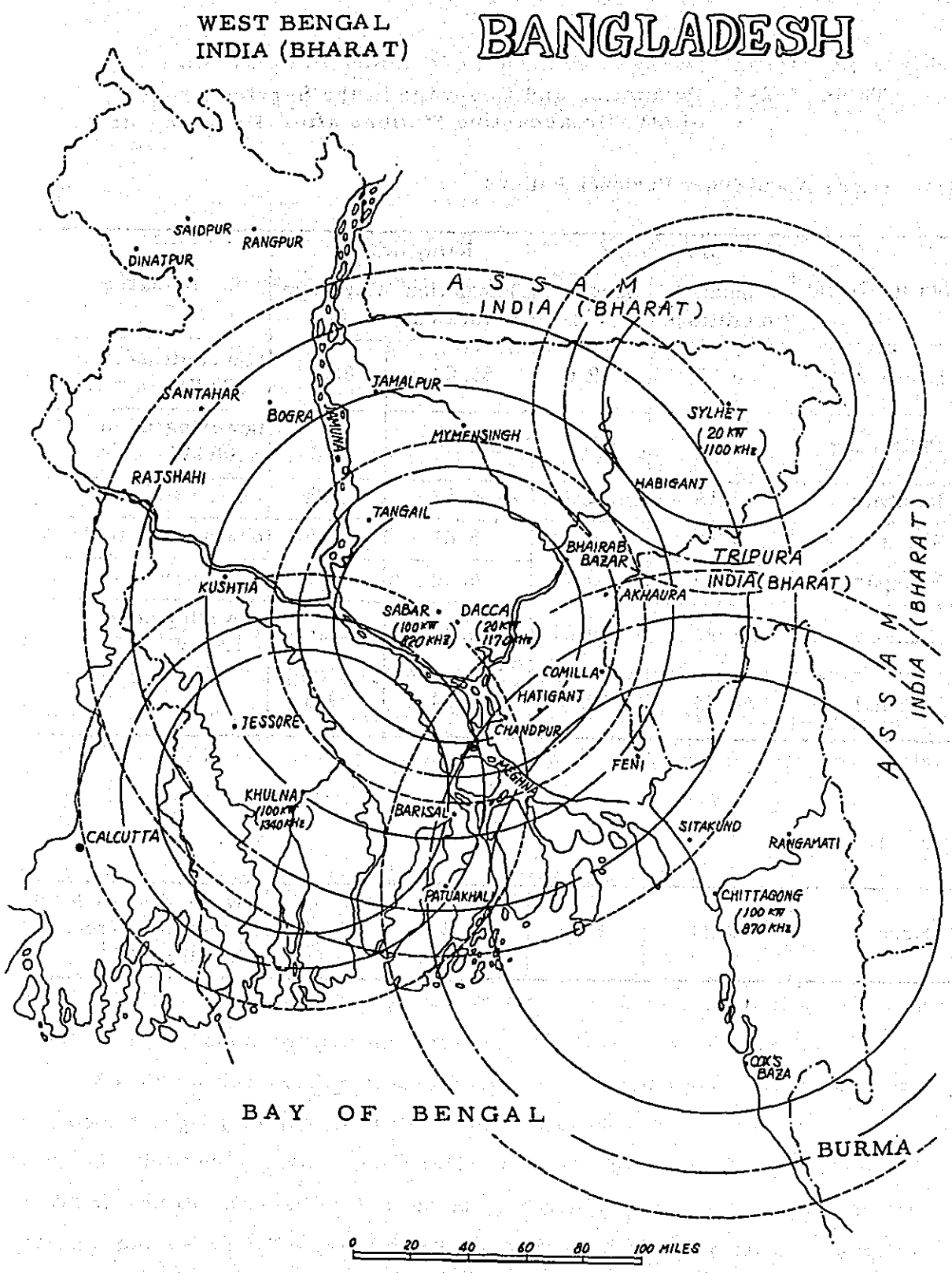


Fig. 3-2-4 Estimated MW Coverage of 4 Stations in Rainy Season

1 m v/m ..... $\varepsilon = 4$

1.5 —·— ($\sigma = 3 \times 10^{-3} U/m$)

3 ——

Table 3-2-4 Population and Coverage in the Service Areas of MW Broadcasting Stations after Powering-up

(1) Dacca-A and Other Regional Stations

Station Name	Dry Season		Rainy Season		Remarks
	Population (in millions)	Coverage (%)	Population (in millions)	Coverage (%)	
Dacca-A	30.27	39.0	66.03	85.1	transmitting freq. 690 KHz
Chittagong	6.36	8.2	17.33	22.3	powering up to 100 kW
Rajshahi	2.15	2.8	6.81	8.8	
Sylhet	3.56	4.6	5.81	7.5	powering up to 20 kW
Rangpur	5.19	6.7	8.50	11.0	
Khulna	7.97	10.3	16.74	21.6	powering up to 100 kW
Total	* 56.25	* 72.5	* 77.14	* 99.5	

(2) Dacca-B

Dacca-B	9.28	12.0	21.52	27.7	powering up to 20kW transmitting freq. 1,170 KHz

From the following points about estimated service areas, the scales of power increase of these four transmitters are considered to be quite reasonable.

i) The new service areas of these four stations can cover almost all regional area allocated to each, even in the dry season in which the effective coverage is usually diminished.

ii) The estimated service areas do not overlap excessively with each other in the dry season.

iii) These prospective stations in Khulna and Chittagong can cover most part of the coastal area which requires cyclone warning.

(3) Coverage after Power Increase

Table 3-2-4 shows the estimated coverage in the rainy season and in the dry season respectively after the scheduled increase of transmitter power. According to this table, approximately 72 % of the total population of Bangladesh is covered by Dacca-A Station and the other regional stations in the dry season, and more than 99 % in the rainy season.

2-2 Rehabilitation of the Damaged Khulna Station

2-2-1 The Present Situation

The 10 KW medium wave transmitter and the studio equipment have been broken almost completely with a hand-axe or some such thing.

So far as this station is conerned, it is impossible to make use of the remaining equipment parts for the rehabilitation.

As the feeder lines, the impedance matching circuit, the antenna towers, and the wooden station building remain intact, they continue service using a makeshift 1 KW mobile transmitter, a portable mixing amplifier, and other superannuated equipment with much difficulty.

The main facilities of the station, including those destroyed, are listed below.

① Transmitting facilities: (Damaged except outdoor facilities)

10 KW medium wave transmitter	1 unit
Feeder line, tuning room, transmitting steel tower	1 set

② Studio facilities: (Completely damaged)

Studio and studio control booth	2 systems

Itemization:

Control console	1 set
Disc reproducer	2 sets
Tape recorder	2 units
Microphone	2 - 3 sets
Monitor speaker	2 - 3 sets

③ Attached facilities: (Not usable except part of the receiving facility, outside of building)

Material store house:	Recording tapes
	Spares
Workshop:	Standard signal generator
	Braun tube oscillograph
	Frequency counter
Monitor room:	Communication receiver

2-2-2 Rehabilitation Plan

As mentioned above, both transmitting facilities and studio facilities now in use are makeshift facilities consisting of superannuated equipment. So the rehabilitation plan should be promoted very urgently.

For the time being, the rehabilitation of the previous 10 KW station should be hurried making use of the remaining outdoor facilities (feeder lines, the impedance matching circuit, and the steel towers) since it is usable as a spare transmitter or in some other station when the 100 KW transmitter station now under consideration is completed.

As specified in 1-2, the final studio facilities should not be inferior to those of Chittagong station and Rajshahi station after the rehabilitation.

2-3 Improvement of the Programme Relaying System

2-3-1 Relay Link between Dacca and Each Regional Broadcasting House

Under the present circumstances, it may be unavoidable to use the medium wave broadcasting network or the short wave broadcasting network for programme relaying, but finally the up-line and the down-line of T & T microwave network should be used.

The broadcast wave relay link should be kept as an emergency link even if the T & T microwave network becomes usable for programme relaying.

At least one fixed telephone circuit for order wire should be established between the two stations mentioned below.

1. Dacca - Sylhet
2. Dacca - Chittagong
3. Dacca - Khulna
4. Dacca - Rajshahi-Rangpur

2-3-2 Relay Link between Dacca and Peripheral Facilities

The present programme relay link consists of two waves of VHF link and several lines of T & T open wire circuit.

Signal transmission by open wire, however, is not free from noises, and the present number of circuits is insufficient for transmitting different programmes to different transmitters. The recommendable countermeasures to this situation will be summarized as follows.

i) From a view point of effective utilization of channels in general, the link should be UHF radio link.

ii) The circuit constitution should be as follows.

- High quality circuits to be substituted for the current open wire circuits
- Renewal of VHF circuits
- Newly established circuits to cover the short wave transmitting station and other facilities now under consideration
- Rehabilitated circuits between the receiving center and the broadcasting center

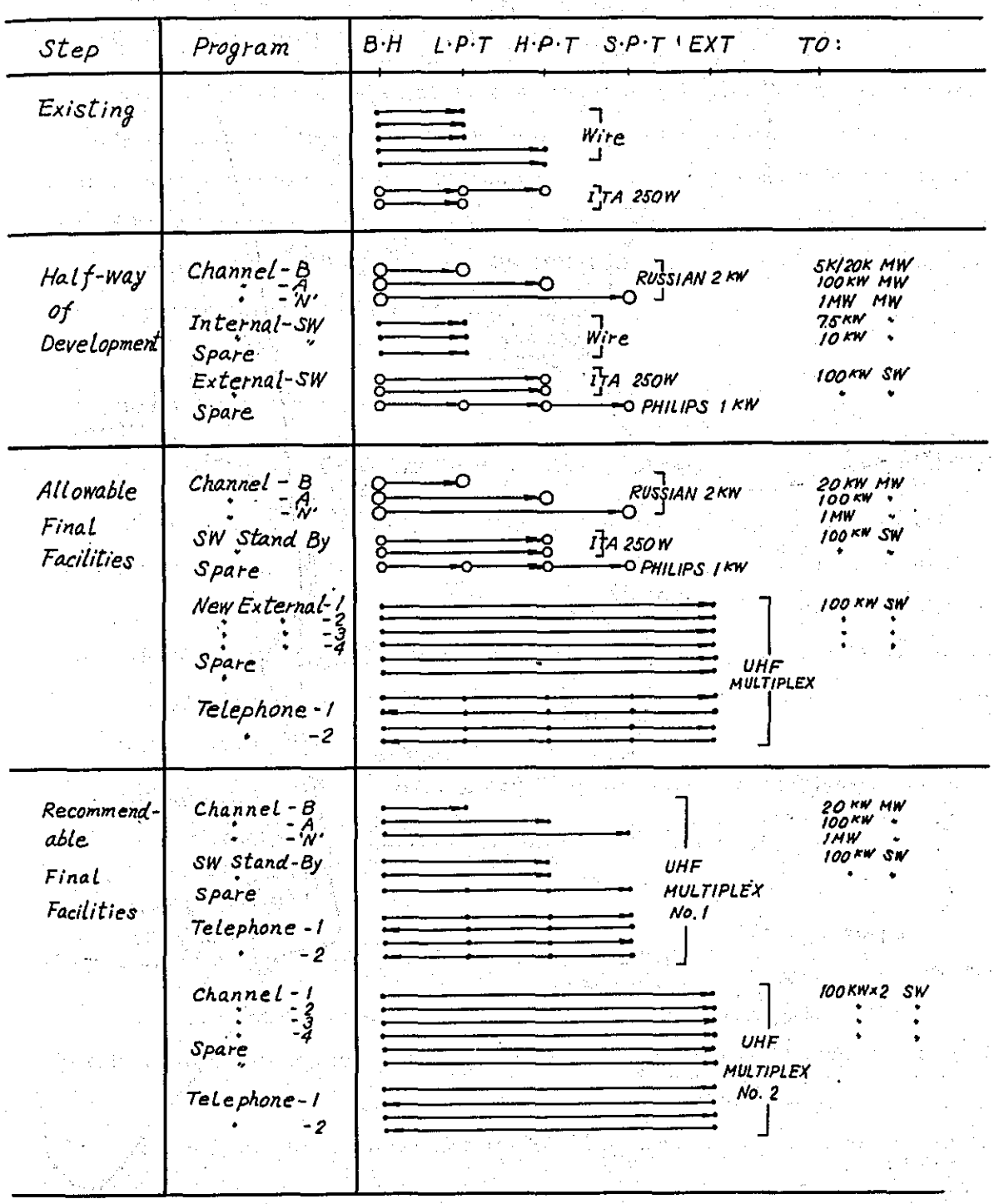
The number of transmitters used between the broadcasting house and each transmitting station should be diminished by introducing multi-input modulation system with improved reliability, and the down-signal of the narrow-band telephone circuit for mutual communication between them should be added to the multi-input, supplying each transmitting station with a narrow-band telephone signal transmitter to cover the up-line circuit.

This same idea should be introduced also into the received programme transmission from the receiving center to the broadcasting center. In this case, the modulation signal band-width of the transmitter to cover the telephone circuit between the broadcasting center and the receiving center should be wide enough to allow multiple transmission of control signals, taking the remote control systems expected to be introduced in the near future into consideration.

Shown in Fig. 3-2-5 and Fig. 3-2-6 are the present situation, the developing stage, and the expected final stage of the peripheral programme relay networks of Dacca station.

2-3-3 Relay Link between Each Regional Broadcasting House and the Transmitting Station

The same principle specified in 2-3-2 should be applied also to the establishment of programme relay links and communication telephone circuits between each regional broadcasting house and the transmitting station.



B.H : Broadcasting House
L·P·T : Low Power Transmitting Site
H·P·T : High Power Transmitting Site
S·P·T : Super Power Transmitting Site
EXT : New External Service Site
Channel-'N' : National-Channel for Nation-Wide Broadcasting

Fig. 3-2-5 Programme Relay Link

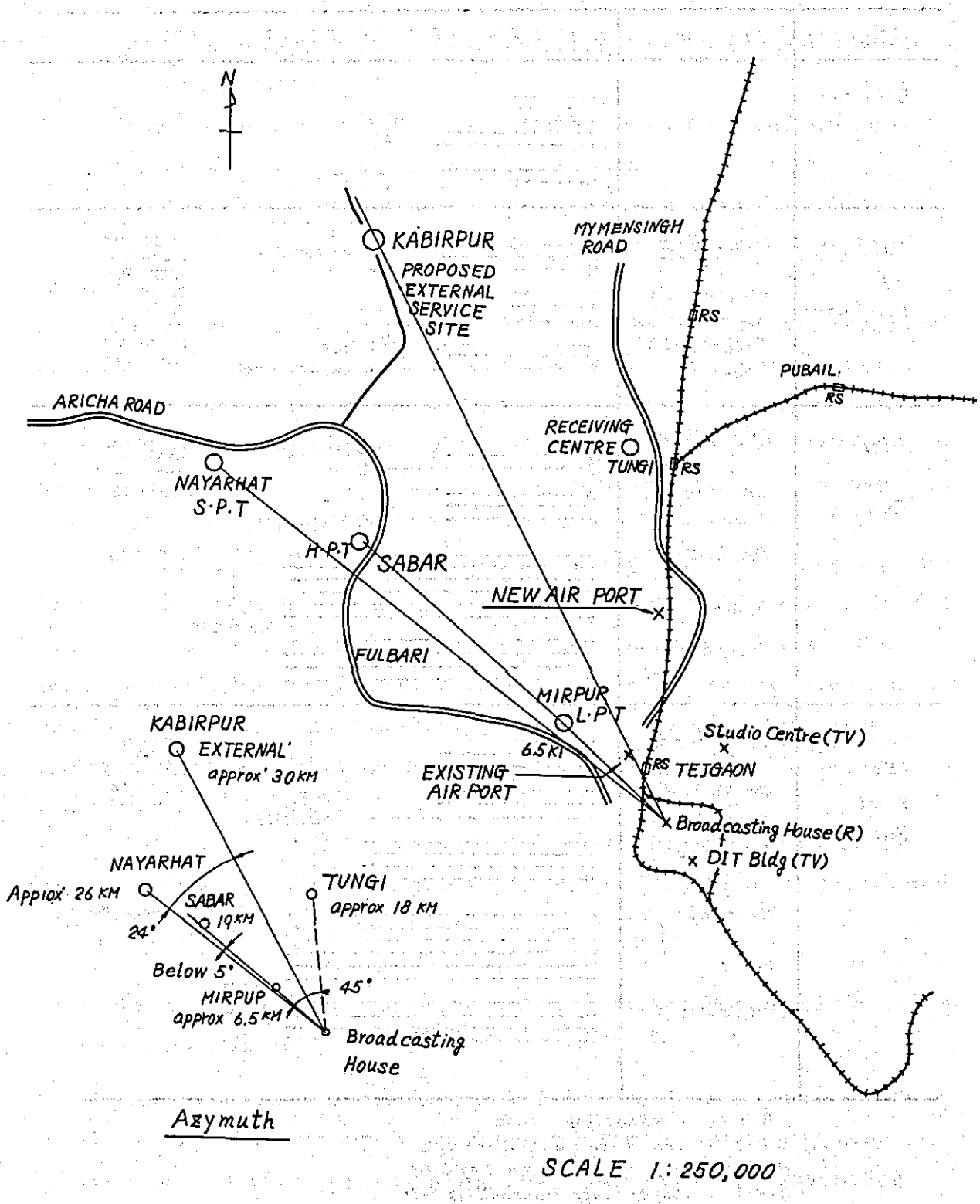


Fig. 3-2-6 Map for Studio to Transmitter Link Radio Bangladesh

2-3-4 Radio Equipment for Relaying Outdoor Programmes and Portable Radio Transmitter

Each local station should have at least one system of bothway radio transmitter and receiver for relaying outdoor programmes and portable radio transmitter for mutual communication between the station and the spot of broadcasting, so as to react very quickly to unexpected accidents or happenings, to enlarge the sphere of action, and to relay the scheduled outdoor programmes without trouble.

2-4 Rehabilitation and Improvement of the Studio Facilities

2-4-1 Rehabilitation of the Studio Facilities

Many studio facilities of Khulna Station, Chittagong station, Rajshahi station and so forth damaged in the liberation war, though the buildings themselves narrowly escaped destruction. The studio facilities of the Khulna station, for instance, have been deadly damaged. At present, those regional stations continue their service through temporary facilities with the remaining poor equipment.

The rehabilitation of these damaged facilities should be promoted very urgently in close connection with the improvement plan mentioned below in 2-4-2.

2-4-2 Improvement of the Studio Facilities

Life of studio facilities depends upon the operation and maintenance condition, but generally speaking, the maximum life is approximately 10 years.

The recent survey analizes the probable result of further continual use of the studio facilities of each station which were installed 10 to 15 years ago and have already been superannuated as follows.

1) The functional deterioration will make further progress.

2) Maintenance will become difficult as replacement parts become more and more unobtainable.
(This tendency is observed even now.)

3) The required functional level has been raised compared with the pre-war time due to a change in operating condition. (In other words, regional stations as well as the central Dacca station have risen to a higher level of functional capacity.)

Early and systematic renewal of studio facilities, therefore, is essential to smooth and effective service hereafter.

Listed below are those studio facilities which have already been superannuated and require immediate renewal.

Disc reproducer
Magnetic tape recorder/reproducer
Studio control console
Main control equipment
Measuring instruments
Monitoring receiver

2-5 Rehabilitation and Expansion of the Receiving Center

The current receiving facilities of Radio Bangladesh are the Dacca receiving center's and some attached facilities to the regional stations. These facilities are mostly superannuated and damaged. Most of them should be rehabilitated.

In order to rehabilitate current facilities, following scheme may be appropriate.

i) Dacca receiving center should be rehabilitated and should be added new facilities for meeting increasing functions after independence.

ii) Facilities attached to the regional stations should be rehabilitated as the same scale as existing facilities.

Dacca receiving center should have following functions from point described at i). Shown below is an equipment list as a guide-line.

Main Functions:

i) Reception of broadcasts abroad to catch foreign news and collect diplomatic informations.

ii) Collection of data to show the propagative conditions of short wave transmission.

iii) Correction of domestic standard time by foreign frequency standard service.

iv) Check of broadcast quality (sound quality, frequency accuracy, etc.)

Main Facilities:

i)	All wave communication receivers	5
ii)	Receiving antennas (with distributors)	8 sets
iii)	Magnetic tape recorder/reproducer*	5
iv)	Multi channel program relay link (w/telephone)	1 set
v)	Frequency counter (low level use)	1 set
vi)	Standard time clock*	1 set
vii)	Power distribution facilities	1 set

* Further study be required on the places where above main facilities should be installed.

2-6 Establishment of the National Broadcasting House

The national broadcasting house Radio Bangladesh has in mind will be one of the first-class broadcasting house in the world.

Radio Bangladesh is planning to extend its service network to three medium waves of domestic broadcast and four short waves of external service in the near future, and to produce all the programmes to cover these seven waves of service network in Dacca station. Considering their broadcasting hours (planned to be 18 hours a day), it will be not unreasonable that the national

broadcasting house is going to have 25 to 30 studios only for the production of various programmes.

The realization of this project, however, requires much man-power and money. So detailed investigation should be made into the following points before entering into actual planning.

1) Perspective estimation of the volume of programmes and work according to the broadcasting schedule for the future

2) Investigation into correlation between characteristic of each division of work and configuration of buildings

3) Consideration of building extension required by future expansion of business

4) Others

Anyway, perspective study is most essential to the promotion of this project from both technical and architectural points of view.

2-7 Execution Schedule of the Construction Plan and the Cost Required for the Construction

(1) Execution Schedule of the Construction Plan

As shown in Table 3-2-5, the construction work of the medium wave broadcasting network requires approximately four years.

The first step - to include the rehabiiitation of the damaged broadcasting station in Khulna, the increase of transmitter power of those stations in Khulna, Chittagong, Sylhet, as well as Dacca-B Station, and the renewal of the studio facilities of these broadcasting stations-requires approximately three years and a half, while the second step to include the improvement of the programme relay links to each station and the expansion of the receiving center requires another one and a half year.

In order to carry out the whole project smoothly and to finish the work on schedule, a careful plan for the administration of the whole construction programme should be made in advance, after due consideration of the rainy season peculiar to Bangladesh during which construction work is supposed to encounter various kinds of difficulty.

(2) The Cost Required for the Construction

The required cost for the medium wave broadcasting network establishment plan estimated in Table 3-2-6 only cover the rehabilitation of the damaged broadcasting station in Khulna, the increase of transmitter power in Chittagong, Khulna, Sylhet, as well as Dacca-B station, and the nenewal of the studio facilities of these transmitting stations.

Considering the sharp fluctuation in prices after the war in Bangladesh, the cost of electric work, building work, road construction, land readjustment of the proposed sites, and other local work is excluded from this estimation. Also excluded is the cost for the establishment of the national broadcasting house, the improvement of the programme relay network, and the expansion of the receiving center (all of them belongs to the second step), which require further detailed examination as to the execution schedule and the way of using these facilities.

Shown in Table 3-2-6 is a rough estimation of the delivery cost after installation, adjustment, and inspection in each site.

Table 3-2-5 Execution Schedule of the Nation-wide Medium Wave Broadcasting Network Establishment Plan

Term	Preparation	The first step of the work		The second step of the wo
Year	The first year	The second year	The third year	The fourth ye
Transmitting and studio facilities of damaged stations	Contract Preparation of equipment, Construction			
Increase of transmitter power, studio facilities of regional stations	Specification, Contract Preparation of equipment, Construction			
Expansion of the relay net work and the receiving center			Specification, Contract	Preparation o equipment, Construction

Table 3-2-6 Cost Required for the Nation-wide Medium Wave Broadcasting Network Establishment Plan

(Unit: 1,000,000 yen)

Section of work	Contents of the construction plan	Equipment	Power source, building, and other local work	Total
The first step	Two 100 KW transmitters, and studio facilities of 3 stations	463		793
	Two 20 KW and one 10 KW transmitters, and renewal of studio facilities of 3 stations	330		
The second step	Expansion of the programme relay network and the receiving center			

Chapter IV SHORT-WAVE EXTERNAL SERVICE

Part 1 Recommendation

1-1 Establishment of the Station of Short-wave External Service

Short-wave external service to cover many countries in the world requires the establishment of another short-wave broadcasting station with substantial facilities besides the existing broadcasting stations at Mirpur and Sabar.

1-2 Establishment of Studios

At present, the short-wave external service shares the programme producing facilities with the medium-wave broadcasting (domestic service), and the capacity of programme processing is not sufficient.

The external service (up to four programmes simultaneously transmittable) under consideration requires at least five live programme broadcasting studios each with independent studio sub-control facilities and some general purpose studios for producing package programmes.

Apart from those studios for live programme broadcasting, the number of studios for general purposes, rehearsal rooms, tape editing rooms, and so forth should be decided on the assumption that they are shared with the domestic service.

1-3 Establishment of the Programme Relay Links between Broadcasting House and Transmitting Station for the Short-wave External Service

The programme relay links between broadcasting house and transmitting station for the short-wave external service must have enough capacity to cover the maximum number of programmes simultaneously transmittable, and a both-way telephone line must be accompanied with for mutual communication between them.

In case of those transmitting facilities attached to a transmitting station for the medium-wave domestic broadcasting, the communication telephone line

should be shared but the constitution of the relay line should be decided according to the synthetic relation with the medium-wave transmission.

1-4 Execution Schedule of the Construction Plan and the Cost Required for the Construction

The time required for the completion of the short-wave external service facilities should be estimated at approximately five years. And it will be reasonable to divide the whole construction work into two steps; one for the completion of those facilities to broadcast two waves simultaneously at 200 KW in every direction of the world, and the other for the completion of simultaneous broadcasting facilities for the third and the fourth waves.

The execution schedule of the construction plan is shown in Table 4-1-1, and the required cost for the project in Table 4-1-2.

Table 4-1-1 Construction Schedule for the Short-wave External Service

Term	Preparation	The first step	The second step
Year	The first year	The second and the third year	The fourth and the fifth year
	Decision of the plan Drawing up of specifications Contract	Construction of the transmitting facilities for the first two waves	Construction of the transmitting facilities for the second two waves

Table 4-1-2 Construction Cost for the Short-Wave External Service

(Unit: 1,000,000 yen)

	Equipment	Power source, building, and other local work
The first step	1,310	—
The second step	1,110	—
Total	2,420	—

Part 2 Detailed Description

2-1 Basic Idea of External Service in the Future

2-1-1 Point of the Future Plan

From the basic attitude of Radio Bangladesh toward the external service in the future, and from the present situation and the future trend of the short-wave external service in the world, the point of this project will be summarized as follows.

(i) Establishment of a station for the short-wave external service to cover a large extent of the world including the Middle East, Europe, South-east Asia, the Far East, U. S. S. R., and Africa

(ii) Realization of service to cover these areas with 3 to 4 waves (two waves at first) simultaneously in each direction for the convenience of the receivers

(iii) Establishment of service to the principal area with field strength of approximately 60 dB under a good propagative condition

2-1-2 Basic Idea of the Facilities Plan

Careful selection of the constitution of the transmitter as well as the type of antenna and its constitution is essential to the realization of the future plan mentioned above. Forthermore, the equipment parts and facilities must be suitable for easy and economical daily operation with less expensive construction and maintenance cost, and must satisfy the geographical condition (high humidity, cyclone hitting, and so forth especially in the rainy season) of Bangladesh as well as the political and social condition.

For the time being, the existing short-wave broadcasting facilities should continue their service as they are, and should be improved at a proper time in the future.

2-1-3 Gradual Execution of the Plan

The scale of this project is rather huge and its realization requires much money, so the whole programme should be divided into the following three stages for effective execution.

(Thr first stage)

In this stage, purpose of the external service should be limited to covering all directions of the world with 1 to 2 waves broadcasted simultaneously in each direction, and necessary facilities for this purpose should be installed. On the other hand, preparations for the sites, the transmitting station buildings, power supply facilities, and so forth should also be made in accordance with the final scale in mind for easy execution of the programme in the following stages.

(The second stage)

In this stage, the number of transmitters and transmitting antennas should be multiplied so as to secure good reception with 3 to 4 waves transmitted simultaneously in each direction.

(The third stage)

In this stage, adjustment and additional installation of necessary facilities should be made so as to improve unfavourable receiving conditions like interference, insufficient field strength, and so forth (or so as to expand service to new areas).

2-2 Outline of the Necessary Facilities

2-2-1 Transmitting Station Facilities

(1) Required Field Strength, Transmitter Output Power, and Antenna Gain

Shown in Table 4-2-1 to Table 4-2-3 are calculated values of field strength to reach from Dacca to various principal cities in the world at a proper time. The combination of required antenna gain and transmitter

Table 4-2-1 Calculated Field Strength from Dacca to the Far East and Southeast Asia

(BST=Bangladesh Standard Time)

direction	local city	distance of great circle course	SSN	seasons	local time	freq. (MHz)	field strength (db)
FAR EAST	Tokyo	4,900 (km)	15	summer	21°00′	17	66
				equinox		15	67
				winter		9	68
			52~71	〃	(12°00′ GMT)	21	67
						21	67
						17	68
			105	〃	(18°00′ BST)	21	66
						25	67
						21	68
	〃	〃	15	〃	11°00′	17	51
						17	54
						21	63
			52~71	〃	(02°00′ GMT)	17	48
						25	61
						25	64
			105	〃	(08.00 BST)	21	54
						25	60
						25	64
SOUTH EAST ASIA	Sydney	8,700	15	〃	22°00′	9	57
						11	60
						17	60
			52~71	〃	(12°00′ GMT)	9	57
						15	60
						25	60
			105	〃	(18°00′ BST)	15	59
						21	60
						21	60
	〃	〃	15	〃	12°00′	15	22
						17	29
						21	44
			52~71	〃	(02°00′ GMT)	21	42
						21	41
						25	47
			105	〃	(08°00′ BST)	21	39
						25	44
						25	45

Table 4-2-2 Calculated Field Strength from Dacca to U.S.S.R. and Europe

direction	local city	distance of great circle course	SSN	seasons	local time	freq. (MHz)	field strength (db)
USSR	Moscow	5,500 (km)	17	summer	19°00′	17	65
				equinox		11	66
				winter		7	66
			52~71	〃	(16°00′ GMT)	17	65
						15	66
						7	66
			105	〃	(22°00′ BST)	17	64
						17	66
						9	66
	Omsk	3,400	17	〃	20°00′	15	70
						11	71
						7	71
			52~71	〃	(14°00′ GMT)	17	70
						17	71
						9	71
			105	〃	(20°00′ BST)	17	70
						21	71
						11	71
EUROPE	London	7,900	17	〃	20°00′	11	58
						9	60
						7	60
			52~71	〃	(20°00′ GMT)	17	59
						11	60
						6	60
			105	〃	(02°00′ BST)	17	59
						11	60
						7	60
	Madrid	8,300	17	〃	19°00′	11	59
						11	60
						7	60
			52~71	〃	(18°00′ GMT)	17	59
						11	60
						7	60
			105	〃	(00°00′ BST)	15	59
						15	60
						7	60

Table 4-2-3 Calculated Field Strength from Dacca to the Middle East and Africa

direction	local city	distance of great circle course	SSN	seasons	local time	freq. (MHz)	field strength (db)
MIDDLE EAST	Cairo	5,800 (km)	17	summer	20°00′	11	65
				equinox		11	65
				winter		9	65
			52~71	〃	(18°00′ GMT)	17	65
						15	65
						11	65
			105	〃	(00°00′ BST)	17	65
						17	65
						15	65
	〃	〃	17	〃	08°00′	17	44
						17	46
						9	14
			52~71	〃	(06°00′ GMT)	21	51
						25	56
						25	59
			105	〃	(12°00′ BST)	21	49
						25	54
						25	58
AFRICA	Johannes-burg	8,900	17	〃	20°00′	9	63
						15	63
						15	63
			52~71	〃	(18°00′ GMT)	9	63
						17	63
						21	63
			105	〃	(00°00′ BST)	9	63
						25	63
						25	63
	Accra	9,700	17	〃	18°00′	11	57
						11	58
						11	58
			52~71	〃	(18°00′ GMT)	15	57
						17	58
						17	58
			105	〃	(00°00′ BST)	17	57
						21	58
						21	58

power can be decided in accordance with them.

These values of field strength are calculated on the following assumption.

(i) The transmitting station is to be established in the suburbs of Dacca.

(ii) Except a few special cases, the transmitting time is set between 17 and 24 o'clock (local time) during which the propagative condition of electromagnetic waves is good and many people are supposed to listen to the radio.

(iii) The transmitter output is 100 KW.

(iv) The gain of transmitting antenna is 15 dB.

(v) Optimum Working Frequency (FOT) is used as transmitting frequency for each SSN, season and time.

(2) Type of the Transmitting Antenna

Curtain beam antenna, log periodic antenna, and rhombic antenna are three most typical antennas for short-wave transmission. The characteristic features of them are specified in Table 4-2-4. Of these three antennas, the rhombic type is considered to be best suitable in Bangladesh. The main reason for the recommendation will be summarized as follows.

(i) The rhombic type is supposed to stand the high humidity in the rainy season of Bangladesh.

(ii) The rhombic type is less expensive and more easy to operate, and can cover a vast range of areas quite economically because it is wide-band.

(iii) The rhombic antenna allows the inversion of directivity, and good effect is expected of this reversed directivity in Bangladesh.

(iv) The rhombic type having a wide range of directivity is most suitable for the service to U. S. S. R. which has huge directional dimension.

(3) Transmitter System

Judging from the calculated field strength under the most favourable propagative condition, a rhombic antenna requires only 100 to 200 kw of transmitter power.

The applicable system configuration here is parallel operation of two 100 kw transmitters (separate operation is possible) or single operation of one 250 kw transmitter. Of these two systems, the former should be adopted in Bangladesh for the following reasons.

(i) There is no practical problem in quality, becuase the field strength by the 100 kw parallel system is inferior to that by the 250 kw only by 1 dB.

(ii) In case of parallel system, one transmitter can continue the service at 1/2 of normal output (the field strength down by 3 dB) even if the other gets out of order and disconnected, while in case of the latter, the whole system stops if the single 250 kw transmitter gets into trouble. The former system, therefore, is far more effective in case no spare transmitter is installed.

(iii) There is little difference between the construction cost of 100 kw parallel system and that of 250 kw single, even taking into account the cost of the output coupler in the former system.

(4) Main Facilities of the Transmitting Station

The main facilities of the transmitting station required for broadcasting three waves simultaneously in the same direction are summarized in Table 4-2-5. (Vide appendix for brief specifications of the main facilities.)

Table 4-2-4 Comparative Table Antennas for Short-wave Broadcasting

Type/Item	RHOMBIC ANTENNA	LOG PERIODIC ANTENNA	CURTAIN BEAM ANTENNA	
			Number of elements: 2 x 2 (4 dipoles)	Number of elements: 4 x 4 (16 dipoles)
Required area of the site	Approx. 44,000 m^2	Approx. 16,500 m^2	Approx. 45,000 m^2	Approx. 60,000 m^2
Price The ratio to the cost of RHOMBIC ANTENNA	1 (Approx. ¥13,800,000)	2.5 times (Approx. ¥25,400,000)	3 times (In cast of those with directivity inverter: 5 times as high as the price of RHOMBIC ANTENNA)	5 times (In case of those with directivity inverter: 8.5 times as high as the price of RHOMBIC ANTTENA)
Performance				
(1) Gain	18 - 23 db	10 - 13 db	13 - 16 db	20 - 22 db
(2) Frequency range	The whole H.F. band covered by 2 sets	The whole H.F. band covered by 1 set	Each band requires 1 set	Same as left
(3) Efficiency	Approx. 1/2 of the transmitting power consumed in absorption resistance because of a progressive wave antenna	All transmitter power radiated	Same as left	Same as left
(4) Change of directivity	Changing with frequency a) The beam width of the horizontal pattern b) The radiation angle of the vertical pattern	Both horizontal and vertical patterns fixed irrespective of frequency	Changing with frequency a) The beam width of the horizontal pattern b) The radiation angle of the vertical pattern	Same as left
(5) Beam width	Horizontal: 3dB down, 18-35° Vertical :	Horizontal: 3dB down, approx. 60° Vertical : 3dB down, approx. 60°	Horizontal: 3dB down, 30-38° Vertical:	Horizontal: 3dB down, 25-32° Vertical:
(6) Maintenance	Simple structure Usable even in high humidity because of no porcelain insulator supporting the high voltage section	Complicated structure Not suitable for use both in high temperature and high humidity because of many porcelain insulators supporting high voltage terminals	Complicated structure Applicable to high power transmitters because power equally distributed to each element At least 4 antennas of different bands needed to cover the whole bands Free arrangement of radiation patterns	Same as left

Table 4-2-5 Main Facilities of the Prospective Transmitting Station

		The first step	The second step	Total	
Short-wave transmitter		100kWx2Parallelsx2Systems	100kW x 2 parallels x 2 Systems	8 100kW transmitters With no spare transmitter	
Transmitting antenna (Rhombic type)	The Far East	With directivity inverter, B type and E type installed on common poles (50° 69° 88° / 230° 249° 268°) x 2 6 faces in total	Same as left (Same as left) x 1 3 faces in total	9 faces in total	21 faces in total
	Africa				
	Southeast Asia	With directivity inverter, B type and E type installed on common poles (116° 135° / 296° 315°) x 2 * 4 faces in total	(Same as left) x 1 * 2 faces in total	6 faces in total	
	The Middle East				
	U. S. S. R.	Wide angle type directive antenna 347° x 2 2 faces in total	Wide angle type directive antenna 347° x 1 1 face	3 faces in total	
	Europe	A type and C type installed on common poles 315° x 2 2 faces in total	A type and C type installed on common poles 315° x 1 1 face	3 faces in total	
Station Building		Approx. 4,000 m^2 (The ground floor .. 2,500m^2 The first floor .... 1,500m^2)			
Power supply facilities		4,000KVA (66kV) (Power should be supplied through two different systems.)			
Area of the station site		Approx. 1,300,000m^2			

* The 315° transmitting antenna for the Middle East is also applicable to Europe.

(5) Conditions of Location of the Transmitting Station

From economical and administrative points of view, the transmitting station should be constructed collectively in one place. The site of the transmitting station should generally satisfy the following conditions.

(i) Topographical and geological features

a) The site must be suitable both topographically and geologically for construction of the station building, the antenna, and so forth. (It must not be sandy soil, extremely swampy ground, places liable to inundation in the rainy season, and so forth.)

b) The difference of attitude near the antenna must be within 20 meters.

c) There must not be hills or mountains nearby whose elevation angle is more than 7 degrees.

d) The ground must have enough electric conductivity for easy earthing of the facilities.

e) There must be no obstacle to radio wave propagation in the vicinity of the site.

f) It will be convenient for the transportation of equipment parts and construction materials, if roads run nearby.

(ii) Meteorologic conditions

a) The site should be as free as possible from storm, flood, thunder, and so forth.

b) The site should be inland enough to be free from salty winds.

c) The site must not be a windy place.

(iii) Electric power source

a) There must be a large capacity electric power substation nearby from which power is supplied quite easily.

b) Incoming power must be approximately 4,000 kVA, and voltage stability and frequency stability must be within ± 10 % and ± 1 Hz respectively.

(iv) Water source

a) Evapolation cooling water for the transmitter, and water for the output coupler, the generators, and so forth as well as drinking water must be available near the site.

(v) Communication lines

a) The site must be located favourably for easy construction of the programme relay links (STL) between studio and transmitting station.

b) The site must be in such a place in which the telephone circuit for mutual communication between studio and transmitting station can be secured with ease.

(vi) Radio wave interference

a) There must be no facilities (especially VHF receiving facilities) nearby liable to radio wave interference.

b) The site must be far enough away from a short-wave receiving station to avoid interference.

2-2-2 Facilities of the Broadcasting House

Radio Bangladesh is planning to develop the external service into 4 programme simultaneous broadcasting system in the near future. This 4 programme concurrent transmission requires master control facilities separate from those of medium wave broadcasting. Details of the broadcasting house and other facilities are stated in Clause 1-2.

However, the temporary 2 programme simultaneous broadcasting system does not necessarily requires independent master control facilities or separate master control room operation.

Even if the broadcasting house now under extension is completed, it will be difficult to secure many studios for the exclusive use of the short-wave external service. Some measures should be taken, therefore, to lighten the burden of those studios shared with domestic service or to use them most effectively. Utilization of the rehearsal rooms after a proper sound absorbing treatment will be one of them.

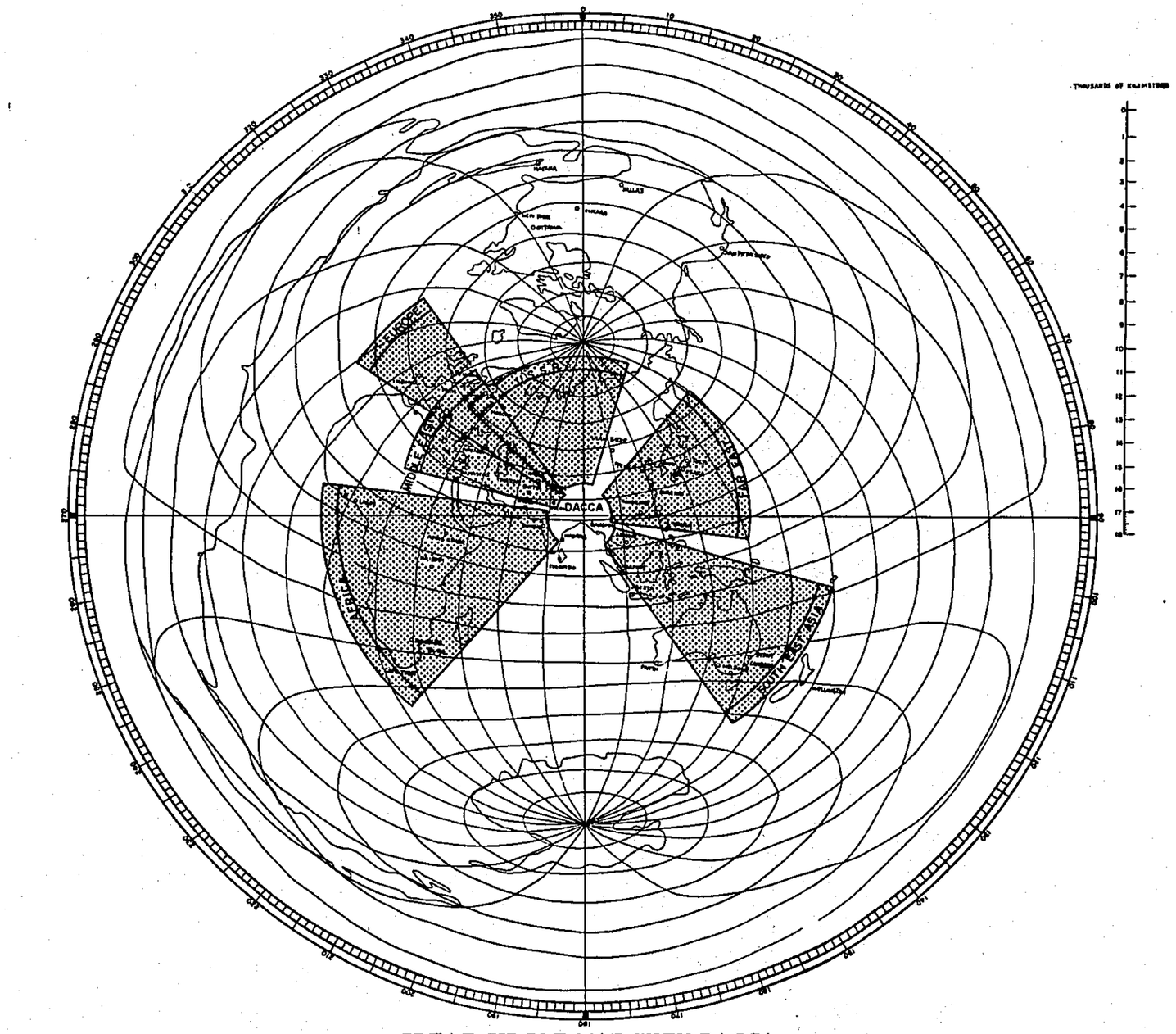
2-2-3 Programme Relay Link between Broadcasting House and Transmitting Station

In order to secure this relay link of multiple programme simultaneous broadcasting for the future and to avoid interference by transmitted radio waves, the frequency to be used for this relay link to the short-wave transmitting station should be UHF or SHF.

Especially in case of short-wave external service, a private telephone circuit for order wire should be secured between broadcasting house and transmitting station because each change of frequency and service direction requires mutual communication between them. The constitution of these programme relay link and telephone communication circuit is shown in the section of medium wave domestic service.

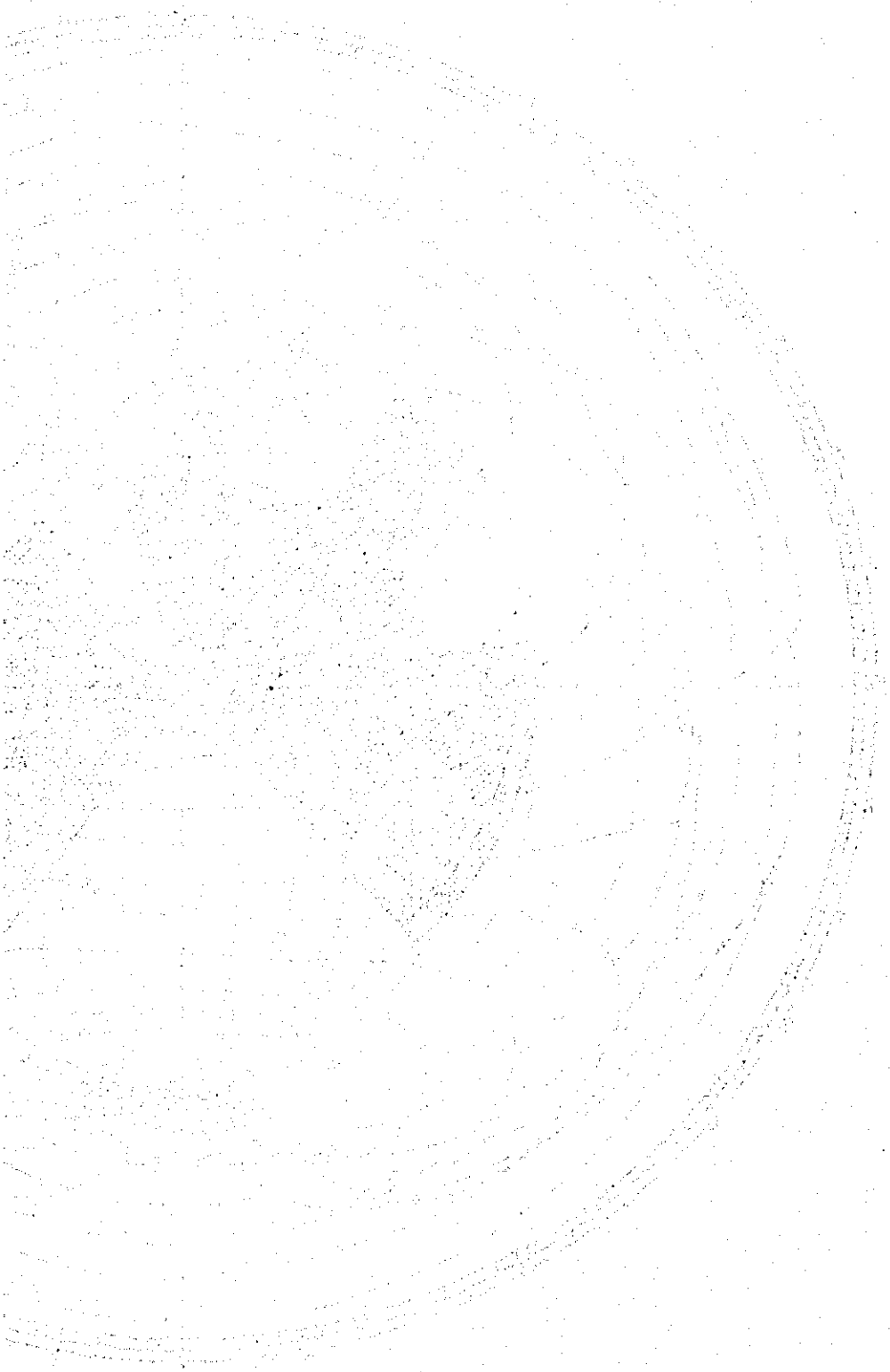
2-3 Conceptual Service Area

The conceptual map of service area is shown in Fig. 4-2-1. (In case one rhombic antenna is used in different transmitting frequencies, the directivity



GREAT CIRCLE MAP WITH DACCA
AS CENTER

Fig. 4-2-1 Conceptual Map of Service Area



characteristic varies with each frequency. Shown in Fig. 4-2-1 are those areas to be covered by half power angle in the lowest frequency in each direction. In case of the highest frequency, the field strength at the right and left boundary in each direction in Fig. 4-2-1 is weaker than that of the right opposite direction by the amount given in Table 4-2-6.

Table 4-2-6 Deterioration of Field Strength

Direction	Deterioration of field strength (dB)
FAR EAST / AFRICA	14 db
SOUTH EAST ASIA / MIDDLE EAST	14
EUROPE	7
USSR	-

2-4 Execution Schedule and Required Cost for the Construction Plan

(1) Execution Schedule of the Construction Plan

As shown in Table 4-2-7, the completion of the whole construction work requires approximately five years.

The first step, including the installation of antennas with two faces in each direction and four systems of 100 kw transmitter, requires approximately three years. The completion of these facilities makes it possible to broadcast two waves simultaneously in each direction at 200 kw, and to broadcast four waves simultaneously in each direction at 100 kw, if necessary.

The second step including the completion of each additional antenna in each direction and additional four systems of 100 kw transmitter requires approximately another two years.

Making up of a detailed execution plan taking into account the rainy season of Bangladesh during which the construction work is practically impossible and careful administration of it are essential to smooth promotion of the whole project as well as the completion of programme on schedule. (Vide Table 4-2-5 for

the division of the construction work.)

Table 4-2-7 Construction Schedule for the Short-wave External Service

Term	Preparation	The first step	The second step
Year	The first year	The second and the third year	The fourth and the fifth year
Contents of the construction plan	Decision of the plan Drawing up of specifications Contract	Construction of the transmitting facilities (4 systems)	Construction of the transmitting facilities (4 systems)

(2) Cost Required for the Construction

Estimated in Table 4-2-8 is the required cost for the construction of short-wave external broadcasting facilities classified into two steps. This is a rough estimation of the total cost including installation, adjustment, and inspection at the site.

The cost of electric work, building work, road construction, land readjustment of the proposed site, and other local work is excluded from this estimation, considering the sharp fluctuation in prices in the postwar Bangladesh. The cost of the programme relay link and studio facilities is also excluded from this estimation because further detailed investigation into the sharing of these facilities with the medium wave broadcasting is considered to be necessary.

Table 4-2-8 Construction Cost for the Short-wave External Service

(Unit: 1,000,000 yen)

Section of the work	Contents of the construction plan	Equipment	Power supply, building, and other local work	Total
The first step	4 system of 100 kw transmitter and required facilities	614	-	1,310
	Antenna facilities	473		
	Power supply facilities	223		
The second step	4 system of 100 kw transmitter and required facilities	614	-	1,110
	Antenna facilities	273		
	Power supply facilities	223		

Chapter V MANAGEMENT

Part 1 Recommendation

1-1 Broadcasting System

Considering the serious influence of broadcasting upon people in general, the consolidation of the broadcasting law is necessary.

Under the present circumstances, it is considered proper to keep broadcasting business under government management, but in the future, it should be desirable to be transferred to the hands of a public service corporation on its own responsibility and freedom of operation.

1-2 The Diffusion of Broadcasting

The expansion plan of the facilities for radio and television broadcasting should be promoted together with the plans for the diffusion of radio and television receivers.

But under the present circumstances, quick diffusion of receivers seems to be difficult. So the Government should take positive measures to promote the popularization of broadcasting, for example, by furnishing schools and other public institutions or places with radio and television receivers.

1-3 Financial Affairs

It is considered possible to cover the managing expenses of broadcasting business with broadcast receiving license fees and incomes from commercial broadcast in the future. The financial basis, therefore, should be put on these two sources of revenue. As for the financial system, a special account system on a self-paying basis should be adopted rather than a general account system.

In this case, a grant-in-aid from the Government should be circumscribed within expenses of the external service, programmes for school education, and so forth.

1-4 Broadcasting Programme

In order to keep or improve the quality of broadcasting programmes, the organization of a Broadcasting Programme Council, the establishment of programme standards and their checking organization, and so forth are required.

Increase of broadcasting hours should be planned in both radio and television broadcasting, and broadcasting programmes should be organized after due consideration of their service ability for educational purposes.

1-5 Personnel

Needed personnel should be trained according to the expansion plan of broadcasting facilities, and the staff should be re-trained so as to acquire new technique since broadcasting has been making rapid technical progress.

Training facilities required for this purpose should immediately be established.

Part 2 Detailed Description

2-1 Broadcasting System

2-1-1 Broadcasting Law

(1) Necessity of the Broadcasting Law

The only law to regulate broadcasting in Bangladesh is The Wireless Telegraphy Act legislated in 1933. The contents of this law are only the license system of the installation of radio facilities, receivers, and so forth, and the penal clauses against its violation. The substantial part is left to the regulations.

A broadcasting station falls under the category of "radio station" since broadcasting requires radio stations, but characteristically a broadcasting station is quite different from other radio station because broadcast waves are intended for direct receipt by the general public. On the other hand,

broadcasting requires radio waves, and radio waves are not limitless. Radio waves used for broadcasting have their limits, and everybody cannot use them freely. Furhtermore, broadcasting is an excellent mass medium and has a great influence upon people in general. This is where broadcasting differs from other radio communication and requires a special law.

(2) *Contents of the Broadcasting Law*

The following items should be stipulated in the Broadcasting Law.

(a) The purpose of the Broadcasting Law should be of clarifying the importance of broadcasting not only to the attainment of the national purpose but also to the promotion of the welfare of the people. Broadcasting has various functions such as news report, education, culture, entertainment, advertisement, and so forth, but actual service sometimes leans too much upon entertainment and causes the deterioration in quality of programmes. The Broadcasting Law should, therefore, lay stress on educational and cultural functions of broadcasting, and also make clear the serviceability of broadcasting to the elevation of the educational level of the people through educational and cultural programmes.

(b) Management System

The Broadcasting Law should stipulate such fundamental items as organization, finance, business, and so forth, not to mention whether broadcasting business should be operated by the state, a public corporation, or a private enterprise.

(c) Technical Administration of Broadcasting Stations

Technical standards of broadcasting stations, the examination system of broadcasting stations, and so forth should be stipulated in the Broadcasting Law, but details of technical standards and others should be left to the regulations.

(d) Criteria of Broadcasting Programme, and Others

Competence and responsibility in broadcasting programme editing, criteria (confined to fundamental points) of broadcasting programme editing, obligation of programme standards establishment, and so forth should also be stipulated in the Broadcasting Law.

2-1-2 Management System of Broadcasting

(1) The Present Management Systems in Other Countries

The present management systems of broadcasting in various countries in the world are roughly classified into the following five categories.

(a) State Operation
USSR, East Germany and other countries in the Eastern Europe, India, and so forth

(b) Operation by public corporations
France, Italy, West Germany, and so forth

(c) Operation by private enterprises
U.S.A., Mexico, and so forth

(d) Coexistence of the operation bye the government and private enterpirses
Spain, Portugal, Brazil, Philippines, and so forth

(e) Coexistence of the operation by public corporations and private enterprises
Canada, Australia, Japan, and so forth

It is very difficult to way which one of these systems is best suitable, because each of them has merits and demerits and each country has its own political, economical, historical, and cultural background and purpose of broadcasting no method of judgement can ignore. In other words, the best suitable system of broadcasting management in each country should be

decided after due consideration of its own political and social conditions, history, tradition, customs, purpose of broadcasting, and so forth.

(2) Management System of Broadcasting in Bangladesh

In Bangladesh, radio broadcasting has been state-operated from the very beginning, while television broadcasting was changed from mixed operation by the government and civilian contribution into state operation in September, 1972. At present, the Radio Bangladesh for radio broadcasting service and the Bangladesh Television for television broadcasting service both belong to the Ministry of Information and Broadcasting.

Of these five systems of operation mentioned in 2-1-2, (d) and (e) should be left out of consideration because broadcasting operated by a private enterprise does not seem to be proper in Bangladesh as explained later and the same kinds of broadcasting operated by more than one managing agencies does not seem to pay under the present circumstances.

The management system of broadcasting in Bangladesh should, therefore, be chosen from amont (a) to (c) in the above 2-1-2.

Merits and demieits of these three systems will be summarized as follows.

(a) State Operation

It goes without saying that state operation is one of the best suitable systems of management for the stability of operation and the serviceability of broadcasting to the national purpose, because broadcasting is directly managed by the government. However, broadcasting business costs a great deal for the construction of broadcasting facilities, the production of broadcasting programmes, and so forth, and state operation often falls into generous operation when the rationalized management is required. For economy in expenditure, in this system, is of no private concern.

Furthermore, this system does not seem to be superior to the following (b) and (c) viewed in the light of originality expected of broadcasting programmes regarded as high cultural products.

(b) Operation by Public Corporations

From the viewpoint of the stability of operation and the public mission of broadcasting, operation by public corporations has various advantages because public organizations have secured sources of revenue and stand in a favourable position concerning the tax rates.
On the other hand, more independent, rational, and creative management can be expected of operation by public corporations than state operation if only the mannerism of management usual with operation by public organizations can be avoided.

(c) Operation by Private Enterprises

In case of private operation, the management expenses are generally covered by income from advertisement. Operation by private enterprises, therefore, requires some kind of stabilized economic basis. Private operation seems to be the best suitable system of management for rational and creative operation of broadcasting business, but it sometimes worries too much about programme rating in pursuit of profits and impairs the public mission of broadcasting. Usually stress is laid upon big cities, and the construction of nation-wide networks is not assured.

In conclusion, management system of broadcasting in Bangladesh should start with state operation and should be transferred to operation by public corporations in the future.

Even in case of state operation, a self-supporting accounting system should be adopted as soon as the broadcast receiving license fees and income from commercial broadcasting increase enough to cover the managing expenses, because an autonomous accounting system helps to encourage an enterprising spirit, rationalizes the management, and contributes to the development of broadcasting.

The main reason for the recommendation will be summarized as follows.

(a) In Bangladesh, industrial and economic bases are unstable yet, and any private enterprise whose main source of revenue is advertisement rates from sponsors does not seem to pay since big enterprises have been placed under government management after the war.

(b) In case of operation by private enterprises, early establishment of the nation-wide network necessary for both radio broadcasting and television broadcasting seems difficult.

(c) In the postwar Bangladesh, broadcasting is expected to play an important role in solving such urgent problems as the development of industry, the re-establishment of economy, the diffusion of family plan, popularization of knowledge on health and sanitation, the spread of education, countermeasures against calamities, and so forth. Operation by private enterprises, however, does not seem to be able to answer these demands satisfactorily.

(d) For the time being, therefore, managing expenses of broadcasting business should be defrayed out of the national treasury.

2-2 The Diffusion of Broadcasting

2-2-1 The Present Situation of the Diffusion

Approximately 500,000 sets of radio receiver and 12,000 sets of television receiver are estimated to be used now in Bangladesh.

In Bangladesh, radio broadcasting started in 1939, and the first radio broadcasting station was established in Dacca. Since then, regional radio stations have been established one after another, and now radio broadcasting can be received almost in every part of the country. Radio receivers, therefore, are considered to be popularized not only in the urban districts but also in rural districts.

On the other hand, television broadcasting had started in Bangladesh in 1964, and the first TV station was established in Dacca. The diffusion of television receivers is limited to Dacca and its outskirts because this has been the only TV station for these ten years.

The population of Bangladesh is estimated at 75,000,000 and the diffusion rates of radio receivers and television sets to this population are both extremely low. The diffusion of these receivers together with the expansion and improvement of the radio and television broadcasting networks should be promoted quite positively.

The greatest reason for delay in the diffusion of receivers in this country is small income (According to Statistical Digest of Bangladesh No. 7: 1970-71, annual income for each person in 1969 is 308 taka) and poor purchasing power, but scarcity of electric power supply to private homes (According to Statistical Digest of Bangladesh No7:1970-71, total number of consumers in 1969 is 206,378) is another grave factor to prevent the smooth diffusion of receivers in the future. Some measures, therefore, should also be taken to settle this problem.

2-2-2 Necessity of the Diffusion of Receivers

The newly-born Bangladesh has many pressing problems such as the development of industry, the re-establishment of economy, the promotion of agriculture and fishery, the diffusion of knowledge about family plan and sanitation, the spread of education, the establishment of traffic and communication networks and so forth.

Bangladesh is situated in the delta of the Ganges, the Jumna, and other big reivers accompanied by reticulated small rivers, and she lacks traffic facilities especially in the rainy season.

Moreover, Bangladesh is also remarkable for frequent disasters, and suffers serious damage from floods, cyclones, and so forth.

It goes without saying that radio and television broadcasting will help to solve these problems most effectively.

Therefore, it is considered to be quite reasonable that Bangladesh is planning to expand and improve the radio and television service networks.

Also from the present situation of the diffusion of such mass media as newspapaers, magazines, and so forth as well as the spread of education, this expansion and improvement plan should be promoted by all means.

However, the point to be remembered is that this expansion and improvement plan of the radio and television service networks must go together with the promotion of the project for the diffusion of receivers. For the establishment of broadcasting stations without no diffusion of receivers will make no sense.

The expansion and improvement plan of the service networks should, therefore, be promoted in parallel with the project for the diffusion of receivers.

2-2-3 Measures for the Diffusion of Receivers

As stated above, the diffusion rate of radio and television receivers in Bangladesh is extremely low. Unless this situation is improved, the radio and television service networks, even if expanded, will have no effect.

Although it is difficult to estimate the future diffusion of radio and television recievers, the essentials of effective diffusion are;

(1) The establishment of enough service networks to cover as large an extent as possible with many hours of attractive and good quality programmes.

(2) The increase in the national income to an enough level to purchase radio and television receivers.

(3) Supply of low-priced radio and television receivers.

(4) Supply of electric power to each private receiver

Considering these problems, the early diffusion of radio and television receivers in Bangladesh is not so easy. The following measures, therefore, should be taken to promote the diffusion most effectively.

(1) Installation of receivers in public facilities or institutions

A radio receiver is usually less expensive and not so hard to obtain, but a television set is too expensive for private use.
So far as television receivers are concerned, therefore, it may be effective both for publicity and management to install them in such public places as schools, stores, and so forth where people gather. This method, if necessary, should be included in the programme to be promoted by the government.

(2) Promotion of joint purchase

Common reception of radio broadcasting as well as television broadcasting is possible. And also, joint purchase is an easier way of obtaining receivers than private purchase. Some measures, therefore, should be taken to promote this joint purchase of receivers.

(3) Supply of low-priced receivers

Supply of low-priced receivers is essential to the quick diffusion of receivers. Whether they should be manufactured in Bangladesh or not must be decided after due consideration of the future demand and other factors because home-made receivers cost relatively dear unless mass production is allowed. The tax upon them should be lightened as much as possible though it is probably one of the most important sources of revenue.

(4) Completion of the power supply facilities

Both radio and television receivers require power source. However, the diffusion rate of electric service to private homes in Bangladesh is extremely low, and the only limited part of the country can enjoy it. A radio receiver is operative on dry cells if the cost is ignored, but a television set is not.
Therefore, use of proper mini-generators in those areas which has no power supply facilities should also be considered, while promoting

the early establishment of electric service facilities to private homes very eagerly.

2-2-4 Others

Repair system is another problem to be settled for the smooth diffusion of receivers. Every receiver is not free from trouble even under proper care and maintenance.

So, there must be an established system of repairing defective receivers easily and perfectly. In the urban districts where receivers have already come into wide use, there seems to be no problem because each shop has acquired enough repairing technique. However, in the rural districts and others in which television broadcasting is going to start, the establishment of repair system is considered to be essential to the smooth diffusion of receivers.

The establishment of training centers or some such facilities is also desirable for the technical advancement of repairers of receivers. The Radio Bangladesh and the Bangladesh Television should play a leading part in the training of repairers and the advancement of repairing technique.

On the other hand, repair service of receivers by the undertaker of broadcasting business should also be considered. Repair service by the undertaker means repair service of receivers in the seat of each broadcasting station or periodical repair service by travelling repair teams. In this case, some measures must be taken to adjust the conflicting interests between the undertaker and the existing selling agencies.

2-3 Financial Affairs

2-3-1 Financial System

In Bangladesh, broadcasting business is administrated by the Ministry of Information and Broadcasting.

In other words, the Radio Bangladesh now undertaking radio broadcasting and the Bangladesh Television undertaking television broadcasting are both subordinate agencies of the Ministry of Information and Broadcasting.

Those persons who installed broadcasting receivers are obliged to pay the broadcast receiving license fees. Advertisement broadcasting has been continued on radio since 1961 and or television from the very beginning.

At first, the management expenses of television broadcasting were covered by broadcast receiving license fees, advertising rates, and government grants, since television broadcasting was originally operated by a company on joint investment from the government and the civilian party. On the other hand, the radio broadcast receiving license fees and the advertising rates of radio broadcasting go to the national treasury, and the management expenses of radio broadcasting are covered by the budget of general account.

Judging from the present number of licensed receivers, the broadcast receiving license fees and the advertising rates are insufficient to cover all of the expenses required for the management of broadcasting business, and require financial aid from the national treasury.

As an enterprise, broadcasting business costs a great deal, and as a cultural enterprise, it calls for energetic spiritual activities and full swing of originality.

As stated in 2-1-2, the most desirable system of management for broadcasting business in the future is operation by public corporations. The financial system, therefore, should be switched from general account to special account system on a self-paying basis when the foundation of broadcasting business is established with the promotion of the broadcasting facilities expansion plan and the diffusion of receivers.

This seems to lead to the prosperity of broadcasting business because a self-supporing accounting system will encourage the staff to secure necessary income when business is not so profitable, and will promise them to raise their pay and to improve the quality of broadcasting when business is profitable. This system, therefore, is very effective for both the upsurging of enterprising spirit and the economical operation of broadcasting business.

Broadcasting facilities require proper annual depreciation for the prospective renewal due to functional deterioration. Of course, they must

be renewed if they get out of date, but under the normal condition of management and maintenance, approximately 10 years is their cycle of renewal.

2-3-2 Financial Resources

Broadcasting business costs a great deal for the establishment of service facilities, the management of business, the production of broadcasting programmes, and so forth.

Therefore, how to secure the source of revenue to cover the managing expenses is one of the most important problems to decide the broadcasting policy.

The source of revenue of broadcasting business is roughly classified as follows, though the way of raising varies a little with each system of operation.

(1) Broadcast receiving license fees
(2) Advertising rates
(3) Government grants
(4) Contributions

In Bangladesh, all the expenses of broadcasting business are now being defrayed out of the general account, and broadcast receiving license fees and advertising rates go directly to the national treasury.

As already mentioned, the present broadcast receiving license fees and advertising rates are insufficient to cover the management expenses of broadcasting business, and the operation requires financial aid from the government.

On the other hand, the desirable system of management of broadcasting business in the future is operation by a public corporation, and yet the current financial system should be switched to special accounting system as early as possible.

Mainly discussed below, therefore, is the desirable financial system of broadcasting business operated upon self-paying basis in the future.

As shown above, there are four sources of revenue of broadcasting business. Of these four, the broadcast receiving license fees and the advertising rates should be the basic financial resources of broadcasting business.

For too much reliance upon government grants is apt to invite excessive interference of the government and to prevent the sound development of broadcasting business. And contiributions are too unstable to rely upon when compared with the stability of broadcast receiving license fees and advertising rates expected to increase with the spread of broadcasting.

On the other hand, government grants for the external service, school education programmes, and so forth should be accepted, though they must not be the main sources of revenue for the operation of broadcasting business.

Stated below are brief comments on the broadcast receiving license fees and the advertising rates in Bangladesh.

(1) Broadcast receiving license fee

The law obliges every receiver to pay the following broadcast receiving license fee.

Classification	Private use (Annually)	Business use (Annually)
Radio receiver	10 taka	25 taka
Television set	50 taka	200 taka

Judging from the present situation of broadcasting service, this license fee is considered to be quite reasonable.

However, it should be revised if broadcasting hours are increased in the future.

At present, the broadcast receiving license fees for radio receivers are paid at post offices, and those for television receivers at banks. For the convenience of the payers, the broadcast receiving license fees for television receivers should also be payable at post offices when the nation-wide

television service networks are established in the future.

(2) Advertising rates

Commercial broadcast comes in two categories, spot announcement and sponsor programme.

Broadcast advertising rates usually vary with the programme rating, and the higher is the programme rating, the higher become the advertising rates.

For the time being, however, neither radio broadcasing nor television broadcasting has established grading of time-zone in accordance with the programme rating. The early grading of them will be necessary for the future.

(Reference materials)

An Example of Advertising Rates of Private Broadcasting in Japan

ADVERTISING RATES OF RADIO BROADCASTING

(1 taka = 40 yen)

Time rates

		A	B	C
		taka	taka	taka
	30 minutes	1,250	1,125	1,000
	25 minutes	1,125	1,000	875
	20 minutes	1,000	875	750
	15 minutes	875	750	625
	10 minutes	750	625	500
	5 minutes	625	500	375
Spot rates	20 seconds	200	150	100
	10 seconds	150	100	75
	5 seconds	100	75	50

Repetition discount rates of time spot

	More than 3 months	More than 6 months	More than 12 months
Once a week	5 %	5 %	10 %
Twice a week	5 %	10 %	15 %
More than three times a week	10 %	15 %	20 %
Five times a week	10 %	15 %	25 %
Six times a week	15 %	20 %	25 %
Seven times a week	15 %	20 %	30 %

Time division

5.00	6.00	9.30	8.30	11.00	12.00	13.00	18.00	23.00	0.00
C	B	A	B	A	B	A	B	C	
Sunrise corner	Morniting corner 9.00		Living corner		Rest corner	Driver's corner	Youth corner		

* The number of households in the service area is 460,000, and most of them have radio receivers.

ADVERTISING RATES OF TELEVISION BROADCASTING

Time rates (basic rates)

Time / Class	A	Special B	B	C
30 minutes	8,750 taka	7,000 taka	5,250 taka	3,750 taka
25 minutes	8,000	6,000	4,750	3,250
20 minutes	7,000	5,250	4,250	2,750
15 minutes	6,000	4,750	3,750	2,500
10 minutes	5,250	4,250	3,250	2,000
5 minutes	4,750	3,750	2,750	1,750

Spot rates (Station break)

Time / Class	A	Special B	B	C
15 seconds	3,000 taka	1,7500 taka	1,250 taka	1,000 taka
10 seconds	2,250	1,2500	1,000	750
5 seconds	1,500	1,000	750	500

Spot rates (Announcement commercial)

Time / Class	A	Special B	B	C
10 seconds	1,250 taka	750 taka	625 taka	500 taka
5 seconds	875	625	500	375

Repetition discount rates

The number of times	More than 13 times	More than 26 times	More than 52 times	More than 104 times
Time	5 %	10 %	15 %	20 %
Spot	- %	5 %	10 %	15 %

Time division

	7.00	9.30	12.00	2.00	4.00	6.00	7.00	10.30	11.00	11.30	0.00
Weekday	C	B	C	Special B	B	C	Special B	A	Special B	C	
Saturday	C	B	C	B			A		B	C	
Holiday	C	B		Special B			A		Special B	C	

* The number of households in the service area is 140,000, and most of them have television sets.

2-4 Broadcasting Programme

2-4-1 Measures to be taken for the rationalization of broadcasting programmes

Broadcasting is one of the most excellent mass media, and has great influence upon people in gneral.

However, it is not so easy to fulfill the mission of broadcasting business to supply good quality programmes contributable to the welfare of the people, the prosperity of the society, the advance of culture, and so forth.

On the other hand, the freedom of programme editing is also important since broadcasting programmes are fruits of culture and require originality.

It goes without saying that every undertaker of broadcasting business must try to make broadcasting truly useful to the general public, because broadcasting business often becomes monopolistic since the usable radio waves are limited.

In order to retain or imporve the quality of broadcasting programmes, the following measures should be taken.

(1) Establishment of the Broadcasting Programme Council

The Broadcasting Programme Council of men of learning and experience in the field of education, culture, science, industry, and so forth should

be organized to give advice to the undertakers of broadcasting business concerning the basic problems of broadcasting programme. In this case, the members of the Council must be the third persons independent of the undertakers of broadcasting business.

This Broadcasting Programme Council should be established per each station (excluding relay station) of radio broadcasting and television broadcasting, and organized by approximately fifteen members.

(2) Establishment of the Programme Standards

As mentioned in 2-1-1 (d), the rules of broadcast programme editing should be established to regulate broadcasting. But the mere rules are not so helpful to actual production of programmes and their broadcasting.

Therefore, more concrete and detailed standards useful for the production of programmes and their broadcasting should be established.

These programme standards should be submitted to the Broadcasting Programme Council.

(Reference Materials)

STANDARDS OF NHK'S DOMESTIC BROADCAST PROGRAMMES

NHK was founded on the basic policy of serving the nation as its public service broadcasting medium without intervention from any other sources, zealously safeguarding its stand of being a non-partisan and independent organization, maintaining its code of upholding the freedom of speech and expression, and to exert its utmost towards the presentation of affluent and wellknit broadcasts, thus promoting the welfare of the public and exerting the best possible efforts towards the elevation of the nation's cultural standards.

On the basis of this realization, the Japan Broadcasting Corporation hereby defines the scope and the purpose of all domestic radio broadcasts under these set standards:

1. Broadcasts shall be conducted in such a manner as to contribute to the realization of the ideals of world peaces as well as the welfare of mankind.
2. Basic human rights shall be respected and the spirit of democracy definitely instilled.
3. To be of service in improving the character building of the people through the promotion of cultural and moral levels and the fostering of rational attitudes.
4. The preservation of the outstanding national cultures of the past and the upbringing of the newer phases in culture and its diffusion to the general public shall be effected.
5. With the aim of sustaining the dignity of a public broadcast facility and in order to meet the requirements of the public at large as a basic principle, the following standards for the compilation of domestic broadcast programmes are provided hereunder.

Article I. General Broadcast Programme Standards

Section 1. Human Rights, Character, Honour

a. Human rights shall be safeguarded and personal character respected.

b. No broadcast shall be detrimental or injurious to the honour and dignity of an individual or organization, nor shall it bring discredit and loss of reputation in society.

c. No boradcast shall cause professional prejudice.

Section 2. Race, People, International Relations

a. No broadcast shall be such as to create racial or national prejudice.

b. No broadcast shall be made to obstruct international amity.

Section 3. Religion

Broadcasts pertaining to religion shall respect the freedom of worship and be treated with unprejudiced fairness.

Section 4. Politics, Economics

a. Broadcasts shall maintain impartiality in politics.

b. All political candidates appearing on radio and television in accordance with the Public Office Election Act to broadcast their campaign speech and their respective biographic sketches shall each be given an equal opportunity to voice their views on the air.

c. Broadcasts on various economic issues having a possible vital repercussion on the public shall be given special caution and discretion.

Section 5. Disputes, Litigations

a. Where there is a wide difference in the opinion of the public over an issue, as many angles of arguments shall be clearly set forth and shall be given utmost unbiased treatment.

b. In any legal case which is currently on court trial, no broadcast shall be made that would interfere with proper legal adjustment.

Section 6. Community Life

a. Broadcasts are aimed at easing the national livelihood and espouse the sprit at mutual assistance.

b. No broadcast, either directly or indirectly, shall be detrimental to public safety and public interests.

Section 7. Home

Marriages shall be treated with solemn seriousness while home and family life be duly respected.

Section 8. Customs and Manners

a. Human life shall not be treated with contempt nor the act of suicide glorified.

b. Problems relating to sex shall be treated with seriousness and shall maintain dignity at all times.

c. The unwholesome relationship between the male and female shall not be treated with glamour, nor its expressions treated approvingly.

Section 9. Crime

a. In reference to crime, the law shall be upheld and the criminal shall not be given the impression of an attractive character nor shall the acts of crime be treated approvingly.

b. In portraying the methods and the actual processes of the acts of crime, such portrayal shall not be given to details any more than is necessary.

c. The acts of gambling and its related subjects shall not be treated approvingly nor shall it be portrayed to give it an impression of glamour.

d. The use of opiates other than for medical purposes shall not be referred to except as a detrimental factor.

Section 10. Expression

a. Expression should be understandable and the correct and proper use of words should be encouraged.

b. Broadcasting words shall be spoken basically on the standard dialect, but when using a provincial dialect, precaution and care should be exercised.

c. Avoid or minimize as much as possible the use of coarse languages and incident words and actions.

d. Avoid expressions that tend to arouse fear, uneasiness or unpleasantness.

e. The detailed descriptions of physical torture and savage treatment or the suggestions of elaborating such acts shall not be broadcast.

f. Every consideration shall be made for the convenience of the listener's time best suited for in compiling the contents of the broadcast and the expression used.

g. In the use of news, flash news, official items, weather reports in dramatic programmes as effects, every caution should be given to differentiate such items from the actual and the fiction.

Section 11. Advertisement

a. Commercial advertising or broadcasts designed to publicize the mentions of names for the purpose of propaganda is not used in any form.

b. In mentioning the names of a specific individual or organization or its professional status, or the mention of trade marks, or the name of merchandise, an impartial decision shall be made to determine whether these are required on the programme.

Section 12. Prizes

a. Any programme designed to attract the listeners merely for the object of the prizes and remunerations, or those that stimulate unnecessary speculative spirit shall be avoided.

b. In all prize-awarding programmes, every step shall be taken to give the contestants a fair judgment and that the prizes be based in accordance with the merit of the skill displayed.

c. In any solicitation for radio and television manuscripts, the full details of the basis of the competition and the prize shall be made known distinctly.

Section 13. Corrections

In the event a broadcast is found to be counter to the fact, an immediate retraction or an amendment shall be made as quickly as possible.

Article II. Specific Broadcast Programme Standards

Section 1. Cultural Programmes

a. The objective is to elevate the cultural aspect in general and to bring about an uplift in the cultural level.

b. The requirements of not only the majority should be met, but every effort to satisfy the demands of the various class levels should be made.

c. Efforts shall be made to promote social and community interest and to further the knowledge on the cultural phase of general livelihood.

d. In making public an academic study and in all broadcast pertaining to expert matters, the integrity and importance of such a subject shall be duly respected and shall be based on ethics and professional standards.

Section 2. Educational Programmes

a. The specified listener audience shall be made clear and the contents of the programme shall be appropriate and beneficial.

b. In order to obtain the best educational results, it shall be well organized and continuous.

c. Equal opportunity in education shall be publicized through broadcast.

Section 3. School Broadcast Programmes

a. Every effort shall be expended towards the basic plan of compiling a school educational programme that can be done only through broadcast.

b. Grade school children's study attitude shall be given consideration along with the development of their mind and body.

c. Seek means of improving the teaching methods for the teachers.

Section 4. Children's Programmes

a. Considerations shall be given for the reaction on the minds of the children. Strive to infuse wholesome spirit and cultivate abundant sentiments.

b. Avoid programmes that would be imitated by the children to their detriment or those that would be easily misinterpreted by them.

c. Avoid expressions that would cause abnormal fear in the children.

d. Superstitions that may bring harm to the children shall not be referred to.

Section 5. News Programmes

a. Uphold the freedom of speech and report the facts.

b. In the news, the facts shall be treated objectively and shall not be twisted, concealed nor used for purpose of agitation.

c. In inserting a certain opinion inside a news item, the facts, and the opinion shall be distinctly set apart.

d. In the event of disaster and other major emergencies, the news shall be disclosed at once and the lives of the people in the disaster area be given every protection and thus contribute to the prevention of further casualties and property damage.

e. All news commentaries and general comments shall be distinctly separated from the news itself.

Section 6. Sports Programmes

a. The infusion of a spirit of clean sports and the advancement of physical culture shall be promoted.

b. In handling amateur sporting events the spirit and the objective shall be duly respected. Special precaution and care shall be exercised in handling events involving the younger people.

Section 7. Entertainment Programmes

a. Strive for the better class of entertainments and thus nurture the noble sentiments of life.

b. Efforts to preserve the classic entertainment and the nurture of various types of programmes shall continue unabated.

c. Pioneer a new artistic field that would be available only through the medium of broadcast.

d. In the presentation of an artistic subject, respect and common sense shall prevail at all times.

Section 8. Recreation Programmes

a. Brighten the homes and strive for a wholesome, full and happy life.

b. If references must be made to physical deformities, particular care shall be exercised.

c. When using provincial dialects and colloqualism consideration shall be given for the feelings of the people of that area and avoid antipathy and unpleasant reactions.

(3) Establishment of the Checking Organization

Broadcasting is a direct means of communication to the general public, and has a serious influence upon society. On the other hand, broadcasting is a means of momentary communication, and radically different from such printed mass media as newspapers and so forth.

Incorrect, improper, or misleading broadcast sometimes causes social confusion.

Such trouble must be avoided, and incorrect broadcast, if actually occurred, must be corrected immediately. This is where the early establishment of the checking organization is required.

This organization is supposed to check the contents of broadcast programme in advance by the manuscript, preview, and audition, and to monitor them when each programme is on the air.

(4) Survey of Broadcast Programme Receiption

It is essential to the effective and quality service to know how the receivers react to programmes and what kind of demand or opinion they have to the broadcast.

It is also essential to the production of broadcast programmes and the programme editing to know what kinds of people are the receivers and what programme rating is estimable on them.

An exact grasp of the actual condition of the receivers requires periodical researches. So a large number of programme monitors should be commissioned to continue the survey.

2-4-2 Basic Plan of Broadcast Programme Editing

Broadcasting is an excellent mass media, and has various functions such as news report, education, amusement, advertisement, and so forth. However, broadcasting is restricted by time, while newspapers and magazines can give limitless information by increasing their pages if necessary.

And it goes without saying that broadcasting is quite useless without actual reception, however excellent broadcast programme may be.

Considering this character, the broadcast programme editing is very important work.

The point of broadcast programme editing is to supply the receivers with useful and attractive programmes in time-zones best suitable for them.

Mentioned in this section are only the programme editing for medium wave radio broadcasting and television broadcasting, and the programme editing for short-wave broadcasting is excluded.

(1) *Broadcasting Hours*

In Bangladesh, only Dacca and its peripheral area can receive two bands of medium wave radio broadcasting, and all the other districts can receive only one band.

However, if the 1000 kw medium wave radio station now under construction in the suburbs of Dacca is completed, almost every district can enjoy two bands of medium wave broadcasting.

The present service hours of medium wave broadcasting vary a little with each day and station. The minimum is 9 hours and 40 minutes a day, and the maximum 14 hours and 25 minutes.

At present, Dacca Station is only one television broadcasting station in service in Bangladesh, and the service hours are approximately four hours a day.

The present service hours of both radio and television broadcasting are not sufficient and should be extended, but the present capacity of programme production does not allow immediate extension. Therefore, the studios for the radio and television broadcasting now under construction should be completed as early as possible.

The longer the broadcasting hours, the better service is expected, but the increase of broadcasting hours requires the increase of studios, staffs for programme production, production cost, and so forth. So the final service hours should be decided after due consideration of the relative conditions.

Under the present circumstances, the following service hours seem to be proper for radio and television broadcasting.

Radio broadcasting (Dacca Station A): 18 hours a day
Television broadcasting (Dacca Station): 8 hours a day

A regional television station cannot secure the same broadcasting hours as of Dacca Station because programmes from Dacca cannot be relayed to each regional station over the microwave network for the time being, while radio broadcasting can be relayed simultaneously over the nation-wide network.

(2) Classification of Broadcast Programmes

Broadcast programmes are roughly classified into the divisions of report programme, educational programme, cultural programme, amusement programme, and commercial programme. This classification is applicable to both radio broadcasting and television broadcasting. Shown below are particulars of each division.

Report programme:	News, News commentary, Publicity programme of the government
Educational programme:	School education programme, Vocational education programme
Cultural programme:	Discussion programme, Lesson programme for housewives, Religious programme
Amusement programme:	Music, Relay sportscast, Drama
Commercial programme:	Commercial, Information programme, Campaign

Broadcast programme editing requires careful attention to the programme percentage.

(3) Broadcast Programme Editing

(a) Programme Percentage

The desirable programme percentage for radio broadcasting and television broadcasting in Bangladesh is as follows.
The first programme here means the radio broadcasting over the existing network, and the second programme, over the 1000 kw network now under construction.

(Radio Broadcasting)	The first programme	The second programme
Report programme	15 %	10 %
Educational programme	10 %	50 %
Cultural programme	20 %	20 %
Amusement programme	50 %	15 %
Commercial programme	5 %	5 %

(Television Broadcasting)	
Report programme	10 %
Educational programme	20 %
Cultural programme	20 %
Amusement programme	45 %
Commercial programme	5 %

These programme percentages are decided after due consideration of the following situations.

(i) Special stress should be laid upon broadcasting, considering the present situation of the traffic facilities and other means of communication such as newspapers, magazines, and so forth.

(ii) The established facilities for both school education and social education are so insufficient that broadcasting must be used positively for this purpose.

(iii) Amusement is a very important part of broadcasting as well as education and culture, and it seems necessary to entertain people who have only insufficient source of wholesome recreation.

(iv) Advertisement is essential to the prosperity of enterprises and the development of industry and economy. Like newspapers and magazines, broadcasting has an excellent advertising function, and should be used positively as an effective advertising medium.

(v) Unlike television broadcasting, radio broadcasting has two service newworks. And it seems proper to lay special stress upon report programmes and educational programmes for the second network, since the first network requires impartial and synthetic programme editing.

(b) The Object of Broadcast

Some broadcast programmes are intended for the general public, and others for the special public.

Amusement programmes are usually intended for the former, and school education programmes, vocational education programmes, and so forth are usually for the latter.

The special public also includes various people with different ages, sexes, occupations, educational backgrounds, and so forth.

It is essential, therefore, to the right programme editing to define the object of broadcast before assigning each programme to the best suitable timezone.

(c) Nation-wide Network Programme and Local Programme

Some programmes are broadcast over the nation-wide network, and others over the local network.

In Bangladesh, radio broadcast has already had so-called local programmes, and the percentage of local programmes are not so low.
It is necessary for each regional radio station and television station to produce local programmes through its own facilities for programme production in order to answer the local demand and develop the local culture.
In other words, each local district has its own manners and customs, tradition, culture, and so forth to provide unique materials for local programmes. And local news and weather forcasts cannot exist without a regional network.
On the other hand, no broadcast can be contributable to the cultural advancement without the creation of art, the preservation of culture, and the training of artists through the production of broadcast programmes.
The development of local culture, therefore, cannot be expected without the improvement of local programmes.
However, the improvement of local programmes requires facilities, money, and excellent staffs.
Especially for television broadcasting, the improvement of local capacity for programme production should be promoted systematically.

(d) The Point of Broadcase Programme Editing
(Report Programme)
Broadcasting is superior to the other reporting mass media for its promptness.
And this characteristic feature should be displayed in report programmes. Enough reporting staffs and facilities, therefore, must always be ready for happenings.
Especially in Bangladesh where natural disasters such as floods, cyclones, and so forth are frequently observed, report programmes must be contributable to the prevention of disasters, the recovery from damage, the saving of human lives, and so forth.

(Educational Programme)

In Bangladesh, special importance is attached to the educational function of broadcasting by the people concerned for the following reasons.

(i) Both facilities and teachers for school education are poor.

(ii) Vocational education and technical training on agriculture and fishery are required for the development of industry and the re-establishment of economy.

(iii) The early diffusion of knowledge of health, sanitation, family plan, and so forth is essential to the wholesome family life.

(iv) Broadcasting is one of the most economical means of setting these problems.

Mentioned below are the points to be remembered in educational programme editing.

(i) The contents of each educational programme should be systematic and consecutive.

(ii) The contents of each educational programme should be carefully examined by specialists in education, and each programme should be produced under their direction.

(iii) School education programmes should be subject to the official course of study and the principle of school education.

(iv) Texts should easily be available for both teachers and students of the broadcast programme.

(v) The broadcast schedule should be made public in advance.

(Cultural Programme)

Cultural programmes must be contributable to the advancement of the cultural level of the general public.

Such programmes as will give political, economical, social, and cultural knowledge and information, and will introduce local manners and customs, religious programmes, and so forth, therefore, fall under this category.

And especially those political problems on which public opinions are divided should be treated very carefully from as many different angles as possible in order to make the point clear.

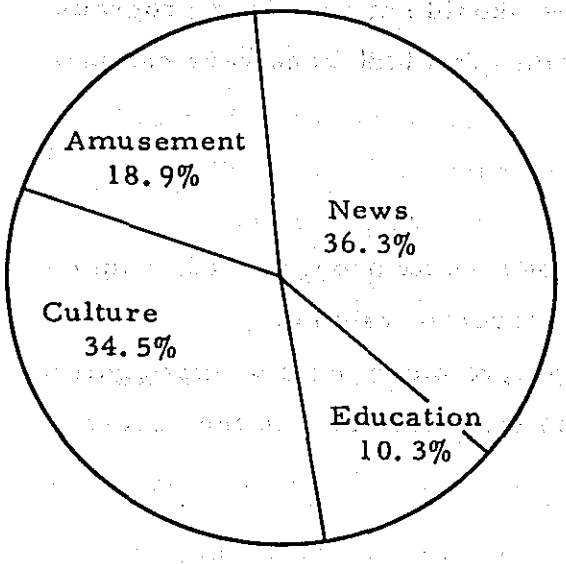
(Amusement Programme)

Amusement programmes constitute the main part of broadcasting. As previously mentioned, broadcast has five basic functions, news reports, education, culture, amusement, and advertisement.

(Reference Materials)

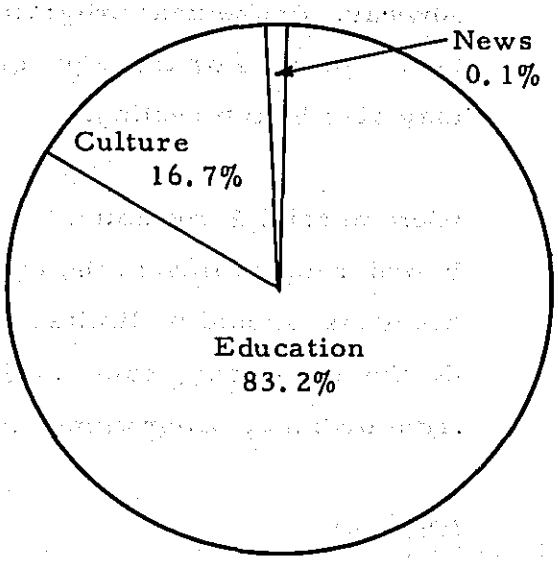
Percentage of Broadcasting Hours by Categories
(NHK) (1972) (1972.4 - 1973.3)

General TV Network



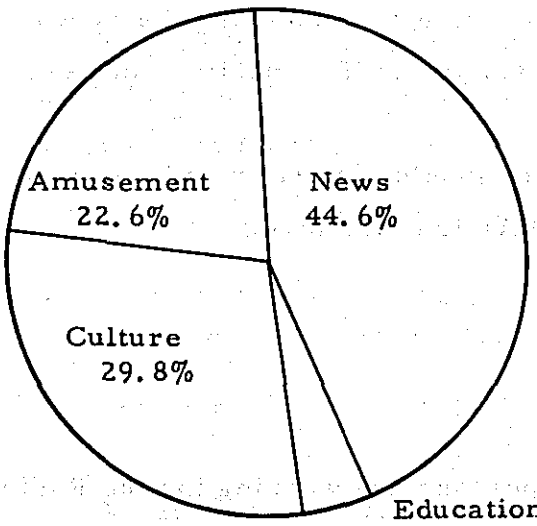
Total broadcasting hours = 6,611 hours

Educational TV Network



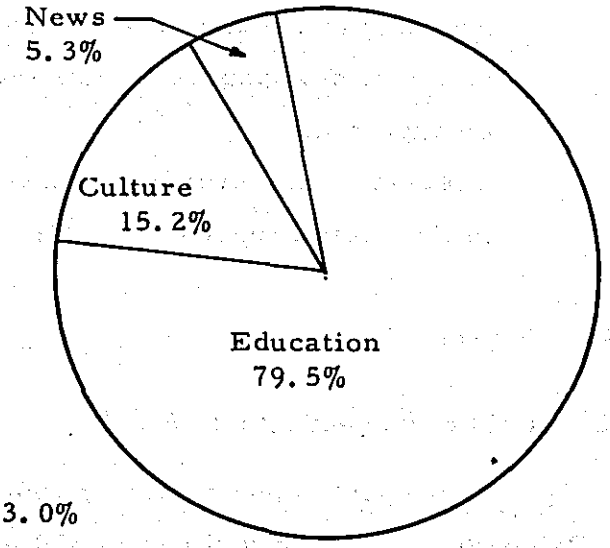
Total broadcasting hours = 6,570 hours

Radio 1st Network



Total broadcasting hours = 6,994 hours

Radio 2nd Network



Total broadcasting hours = 6,752 hours

Of these five, amusement is undoubtedly the most favorite with the public.

Supply of many attractive and wholesome amusement programmes will promote the quick diffusion of receivers.

Anyway, amusement programmes should not be vulgar programmes.

Series dramas or those programmes in which receivers can take part may also be interesting.

(Commercial Programme)

In order not to impair the effect of regular programmes, commercial broadcast should be limited to a moderate volume.

On the other hand, commercial programmes must be distinguishable from ordinary programmes not to give false idea to the receivers.

(Others)

The schedule of broadcast must be made public in advance because people will miss the broadcast, what an excellent programme it may be, unless the schedule is previously known to them.

The best way of making the broadcast schedule known to the public is probably to release it in a newspaper, but considering the presnet diffusion of newspapers in Bangladesh, the perfect publication can not be expected.

Therefore, the broadcast schedule should also be introduced mutually in the radio broadcast and the television broadcast.

2-5 Personnel

2-5-1 The Present Situation

At present, approximately 1000 persons are working for the Radio Bangladesh, and approximately 300 persons for the Bangladesh Television.

Each broadcasting staion requires engineers and specialists in various fields of broadcasting business.

Shown below are numbers of main personnel.

Radio Broadcasting	
Radio Engineer	101
Programme producer	47
Programme organizer	43
Television Broadcasting	
Engineer (Maintenance, Television)	21
I. O. camaeraman	10
Producer (News, Programme, Script)	25

And there are many other engineers and specialists.

2-5-2 Supply of Required Personnel

In accordance with the expansion of radio and television broadcasting facilities, a large more number of engineers, specialists, and operators of machines must be employed.

On the other hand, introduction of new devices requires furhter training of engineers and operators.

For the time being, it is difficult to estimate how many staffs are required for the final stage of the present expansion plan. But the number of required staffs should be finally decided by the following factors.

(1) Operation hours of the broadcasting station

(2) Quantity of broadcasting programmes produced in the station, and the required staffs for the production

(3) The extent of the introduction of automated broadcasting equipment

So far as radio broadcasting is concerned, there will be no trouble in replenishment of staffs according to the expansion of the broadcasting facilities because the radio broadcast has a long history and the foundation has already been established.

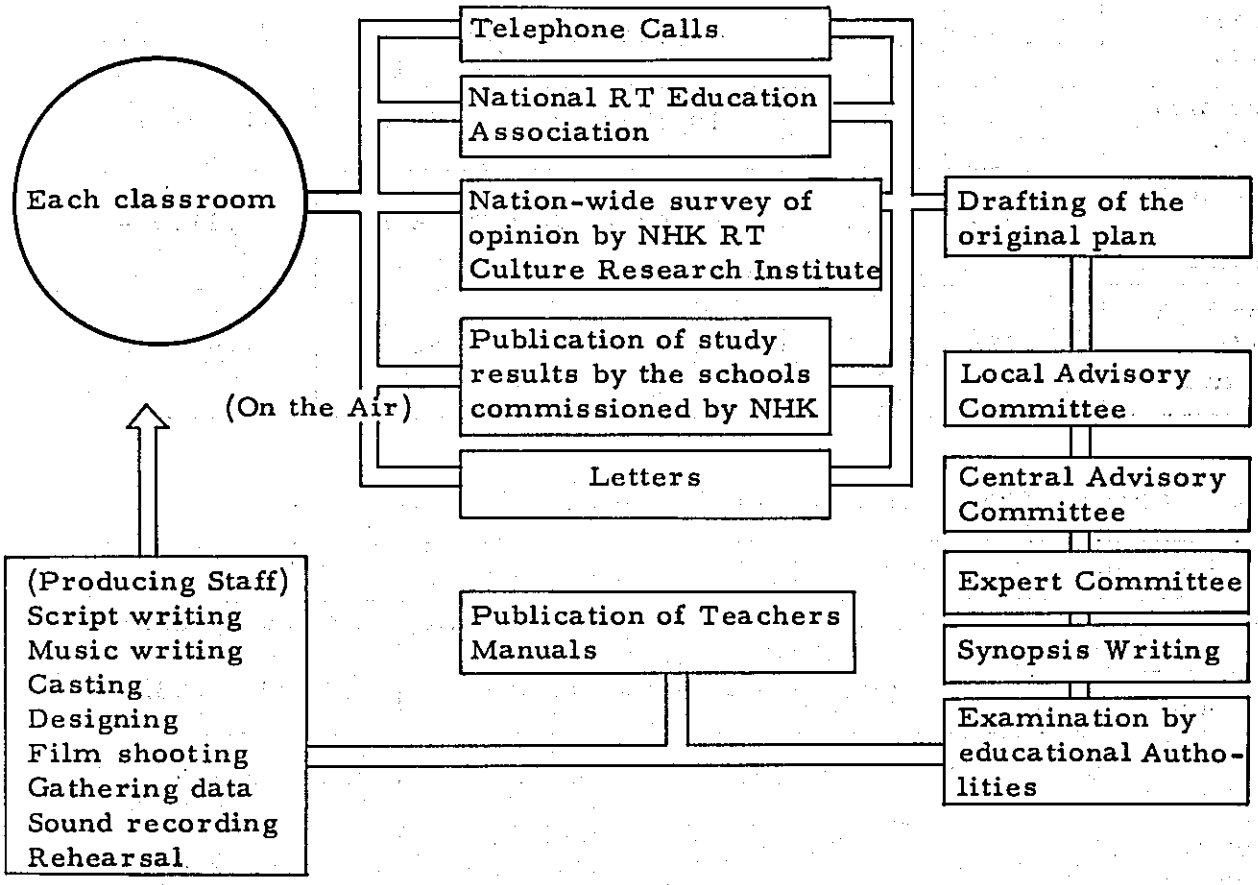
But it will be rather difficult to secure the necessary staffs for the television broadcasting because the completion of the Rampra Studio and the relay stations now under construction in various parts of the country means a too drastic change of the management scale since the existing facilities are only one staion and one studio.

Personnel requires preliminary training before they become serviceable.

Therefore, an early start of securing necessary staffs and their training based upon the established personnel supply plan seems essential to the smooth promotion of the expansion plan of the broadcasting facilities.

(Reference Materials)

NHK How do school programe take shape?



The Present Situation of School Broadcast in Japan

(1) Diffusion rate of receiving facilities — Investigated by NHK, in 1972

Classification	Total number of schools	Television		Radio	
		Diffusion rates (%)	Estimated number of schools with receiving facilities	Diffusion rates (%)	Estimated number of schools with receiving facilities
Kindergarten	11,296	95.5	10,793+148	81.3	9,181+280
Nursery schools	14,182	98.6	13,972+ 92	73.4	10,416+343
Primary schools	24,784	99.5	24,653+ 77	95.8	23,755+214
Junior high schools	10,991	92.6	10,173+172	94.6	10,397+148
Senior high schools (Full time)	4,292	93.7	4,023+ 57	95.8	4,111+ 47
Senior high schools (Part time)	1,776	76.0	1,350+ 40	81.7	1,452+ 36

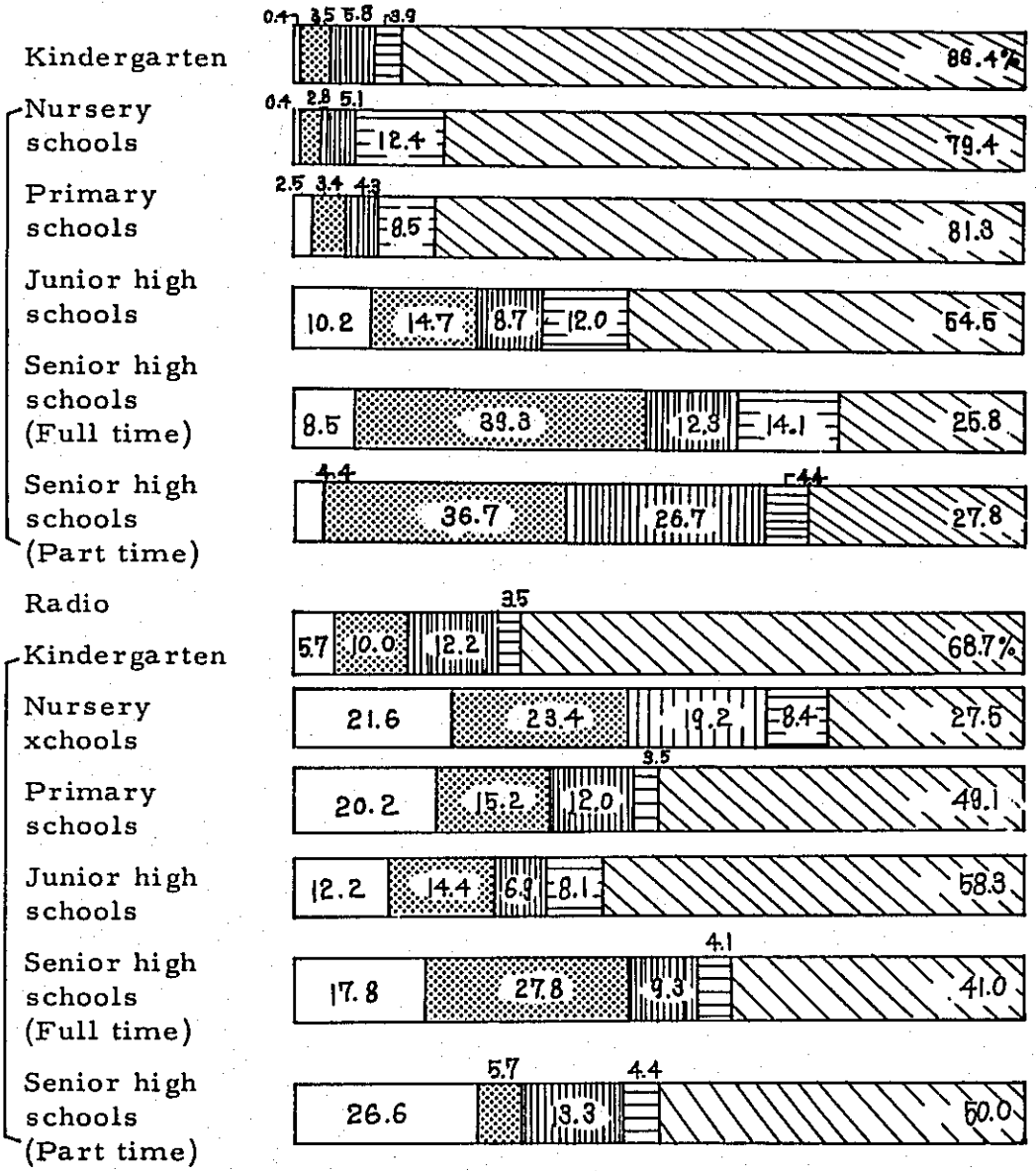
(2) Change of the utilization percentage

Television	1968	1969	1970	1971	1972
Kindergarten	84.5 (91.1)	84.5 (88.1)	82.0 (88.1)	75.9 (80.7)	83.9 (87.8)
Nursery schools	90.5 (96.8)	92.8 (96.4)	91.9 (95.0)	80.6 (90.7)	93.3 (91.6)
Primary schools	87.5 (88.4)	88.9 (89.6)	89.4 (80.9)	89.3 (80.7)	92.1 (22.5)
Junior high schools	32.6 (33.7)	32.4 (33.9)	35.5 (37.4)	34.3 (36.0)	40.0 (43.2)
Senior high schools (Full time)	21.2 (32.7)	24.9 (36.4)	27.4 (29.0)	29.1 (31.3)	42.2 (45.0)
Senior high schools (Part time)	11.2 (14.5)	7.5 (10.2)	9.2 (11.6)	7.3 (9.4)	12.6 (16.5)

(3) The percentage of the classes utilizing school broadcast

100 % = Schools utilizing television school programme or radio school programme

Less than 20% of the whole classes are utilizing
Less than 40% of the whole classes are utilizing
Less than 60% of the whole classes are utilizing
Less than 100 % of the whole classes are utilizing
The whole classes are utilizing



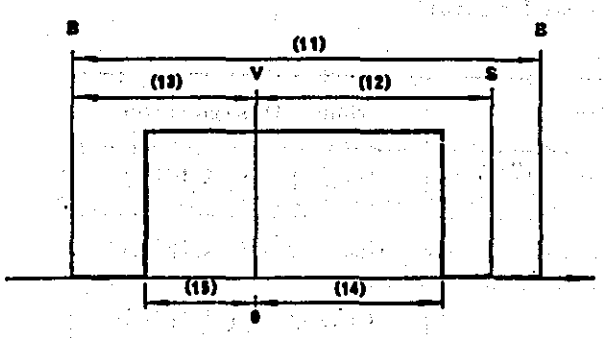
Chapter VI APPENDIX

Part 1 Television Broadcasting

1-1 Standard System of Television Broadcasting

The television broadcasting system adopted in Bangladesh is the monochrome television system B upon CCIR-Report 308-2 (New Delhi, 1970), whose characteristics are summarized in Table 6-1-1.

Table 6-1-1 Characteristics of Monochrome Television System-B



Significance of items 11 to 15 of Table I. The numbers in the diagram correspond to those of the items

B: channel limits
V: vision carrier
S: sound carrier

1	Number of lines per picture (frame)	625
2	Field frequency (fields/second)	50
3	Interlace	2/1
4	Picture (frame) frequency (pictures/second)	25
5	Line-frequency and tolerance when operated non-synchronously (lines/second)	15 625±0·1%
6	Aspect ratio (width/height)	4/3
7	Scanning sequence (Line) (Field)	Left to right Top to bottom
8	System capable of operating independently of power supply frequency	Yes
9	Approximate gamma of picture signal	0·5
10	Nominal video bandwidth (MHz)	5
11	Nominal radio-frequency channel bandwidth (MHz)	7
12	Sound carrier relative to vision carrier (MHz)	+ 5·5
13	Nearest edge of channel relative to vision carrier (MHz)	— 1·25
14	Nominal width of main sideband (MHz)	5
15	Nominal width of vestigial sideband (MHz)	0·75
16	Minimum attenuation of vestigial sideband (dB) (*)	20(—1·25MHz) 20(—3·00MHz) 30(—4·43MHz)
17	Type and polarity of vision modulation	A5C negative
18	Synchronizing level as percentage of peak carrier	100
19	Blanking level as a percentage of peak carrier	72·5-77·5
20	Difference between black level and blanking level as a percentage of peak carrier	0-2
21	Peak white level as a percentage of peak carrier	10-12·5
22	Type of sound modulation	F3, ± 50 kHz 50 μs pre-emphasis
23	Ratio of effective radiated powers of vision and sound (*)	10/1 (*)

(*) In some cases, low-power transmitters are operated without vestigial sideband filters.
(*) The values to be considered are:
— *the r.m.s. value of the carrier at the peak of the modulation envelope for the vision signal;*
— the r.m.s. value of the unmodulated carrier for amplitude-modulated and frequency-modulated sound transmissions.
(*) The Austrian Administration may continue to use a 5/1 power ratio in certain cases where necessary.

1-2 Frequency for Television Broadcasting

1-2-1 Frequency Allocation

According to the Radio Regulations (Geneva, 1959), the frequency bands for television broadcasting in Bangladesh belonging to Region 3 are allocated as in Table 6-1-2.

Table 6-1-2 Frequencies for Television Broadcasting Service in Region

Frequenay Range	Band Designation
44~50, 54~68 (MHZ)	Band I (VHF)
87~108	Band II (VHF)
170~216	Band III (VHF)
470~585	Band IV (UHF)
610~960	Band V (UHF)

1-2-2 Selection of Frequency Bands

Of these allocated frequency bands, Band III should be used with top priority. In case Band III is not proper due to insufficient channel capacity or some such special reason, Band I, Band IV, or Band V should be used from the view points mentioned below.

(i) Band I requires large-size transmitting and receiving antennas, and their installation costs a great deal, without any special convenience in operation. Moreover, it is not free from abnormal propagation caused by sporadic E layer reflection, and is apt to be affected more by city noises than any other band. (However, Band I is sometimes more advantageous than Band II to V, especially in those areas topographically complicated and involve much propagation over the mountains.

(ii) Band II is now being used in many countries for FM broadcasting, and part of it is already being used for it also in Bangladesh.

(iii) Band III, which has the largest channel capacity in its frequency range, is being used in every country only for television broadcasting.

(iv) Band IV and Band V cost a little more for the construction and operation of the transmitting and receiving facilities than the others, and require higher techniques.

1-2-3 Channel Number and Frequency

Given in Table 6-1-3 are channel numbers and frequencies of Band I and Band III of the monochrome television system B upon CCIR Report 308-2 (New Delhi, 1970) usable in Bangladesh.

Table 6-1-3 Channel No. and Frequency

Band Designation	Channel No.	Frequency Band	Carrier Frequency Vision	Carrier Frequency Sound
		MHZ	MHZ	MHZ
Band I	3	54~ 61	55.25	60.75
	4	61~ 68	62.25	67.75
Band II	5	174~181	175.25	180.75
	6	181~188	182.25	187.75
	7	188~195	189.25	194.75
	8	195~202	196.25	201.75
	9	202~209	203.25	208.75
	10	209~216	210.25	215.75

1-3 Calculation of Field Strength

Geographically, Bangladesh is level land except the hilly districts in and around Chittagong, and electromagnetic waves are considered to propagate mostly over the spherical level ground. Given below are calculation methods of field strength under the typical propagative condition of electromagnetic waves.

(1) · Propagation over the spherical level ground

In this case, field strength should be calculated according to the curves in Fig. 6-1-1 to Fig. 6-1-5 used in Japan rather than to CCIR Recommendation 370-1 or Rules and Regulations (FCC, §73, 684), taking the geograhical condition of Bangladesh into consideration. The field survey made by the former Japanese survey team in 1967 to 1968 indicates that the field strength calculated in this Japanese method closely coincides with the actually measured values as shown in Table 6-1-4.

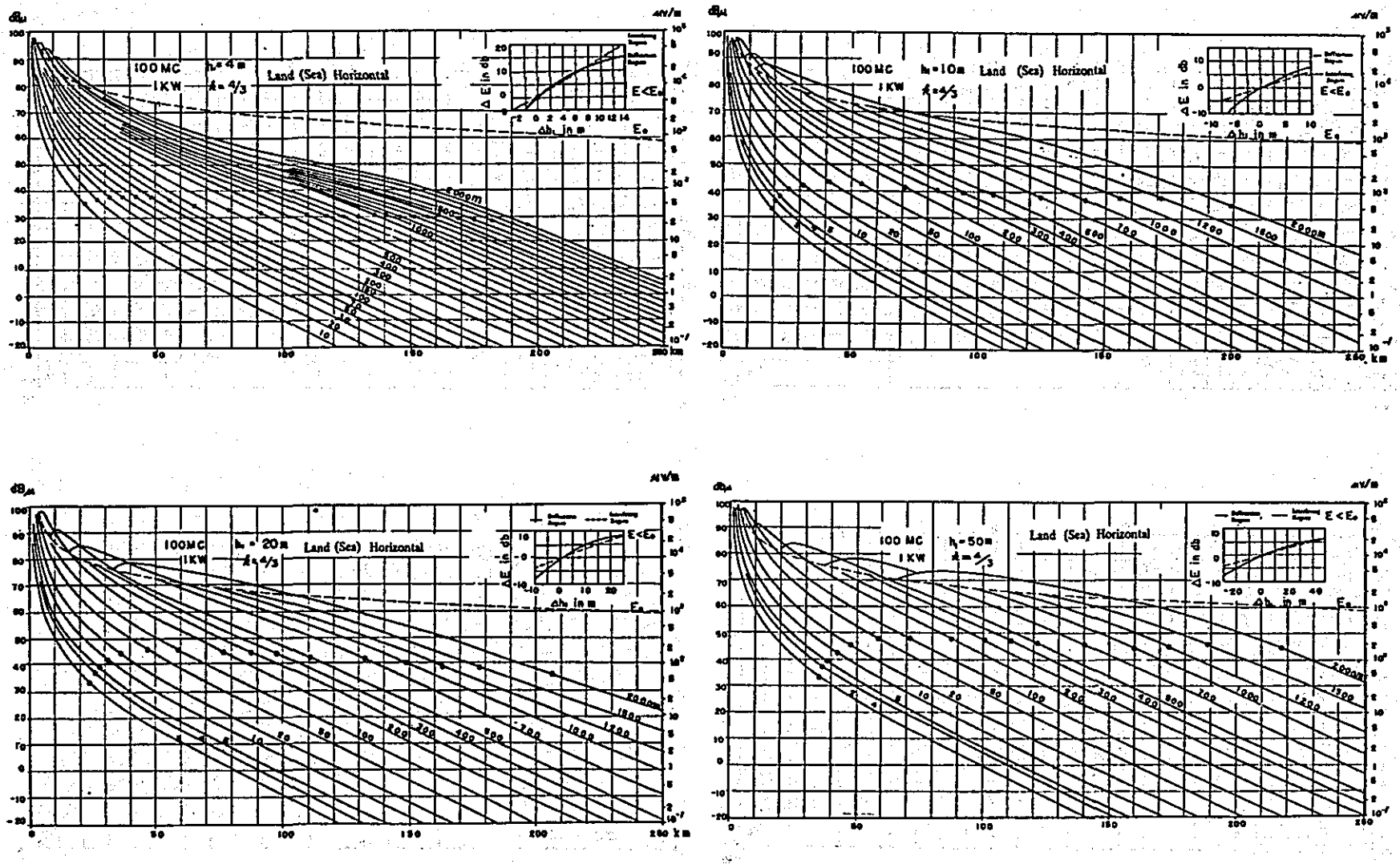


Fig. 6-1-1

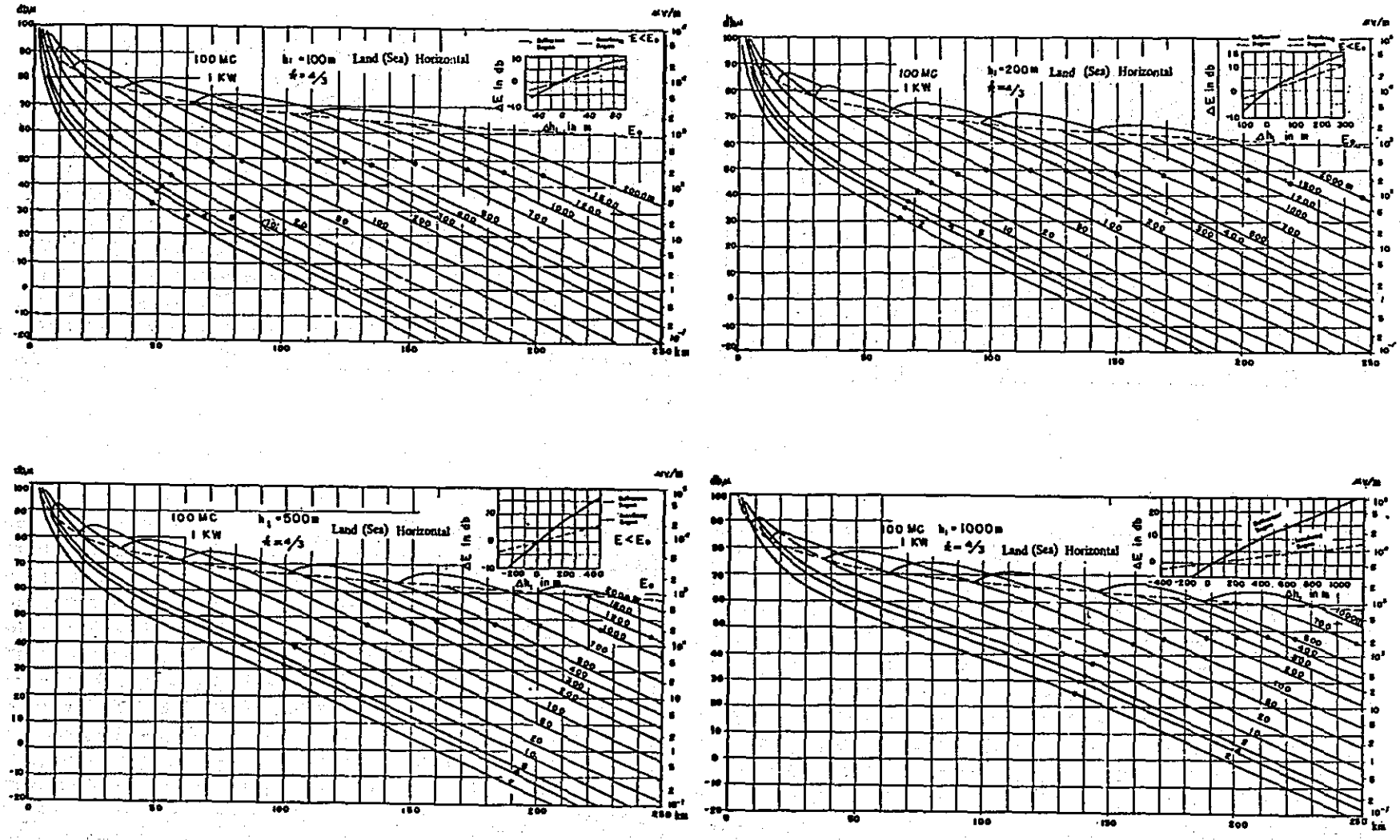

100 MC
1 KW
h₁ = 100 m
Land (Sea) Horizontal
k = 4/3
E < E₀
ΔE in db
Δh₁ in m
E₀
h₁ = 200 m
h₁ = 500 m
h₁ = 1000 m
km

Fig. 6-1-2

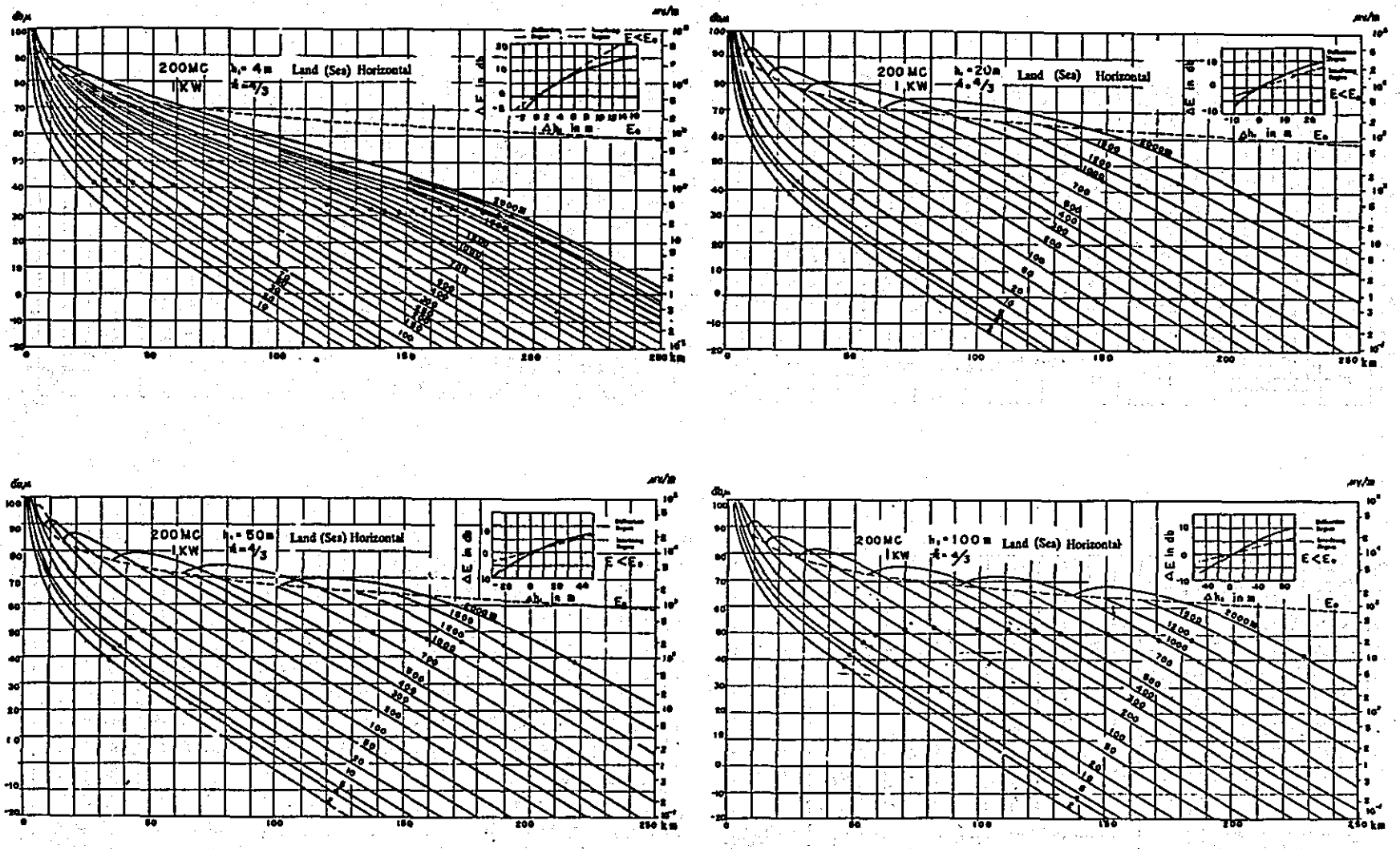

200MC
1KW
h₁= 4 m
k=4/3
Land (Sea) Horizontal
E<E₀
ΔE in db
Δh₁ in m
E₀
200MC
1KW
h₁=20m
k=4/3
Land (Sea) Horizontal
E<E₀
ΔE in db
Δh₁ in m
E₀
200MC
1KW
h₁=50m
k=4/3
Land (Sea) Horizontal
E<E₀
ΔE in db
Δh₁ in m
E₀
200MC
1KW
h₁=100m
k=4/3
Land (Sea) Horizontal
E<E₀
ΔE in db
Δh₁ in m
E₀

Fig. 6-1-3

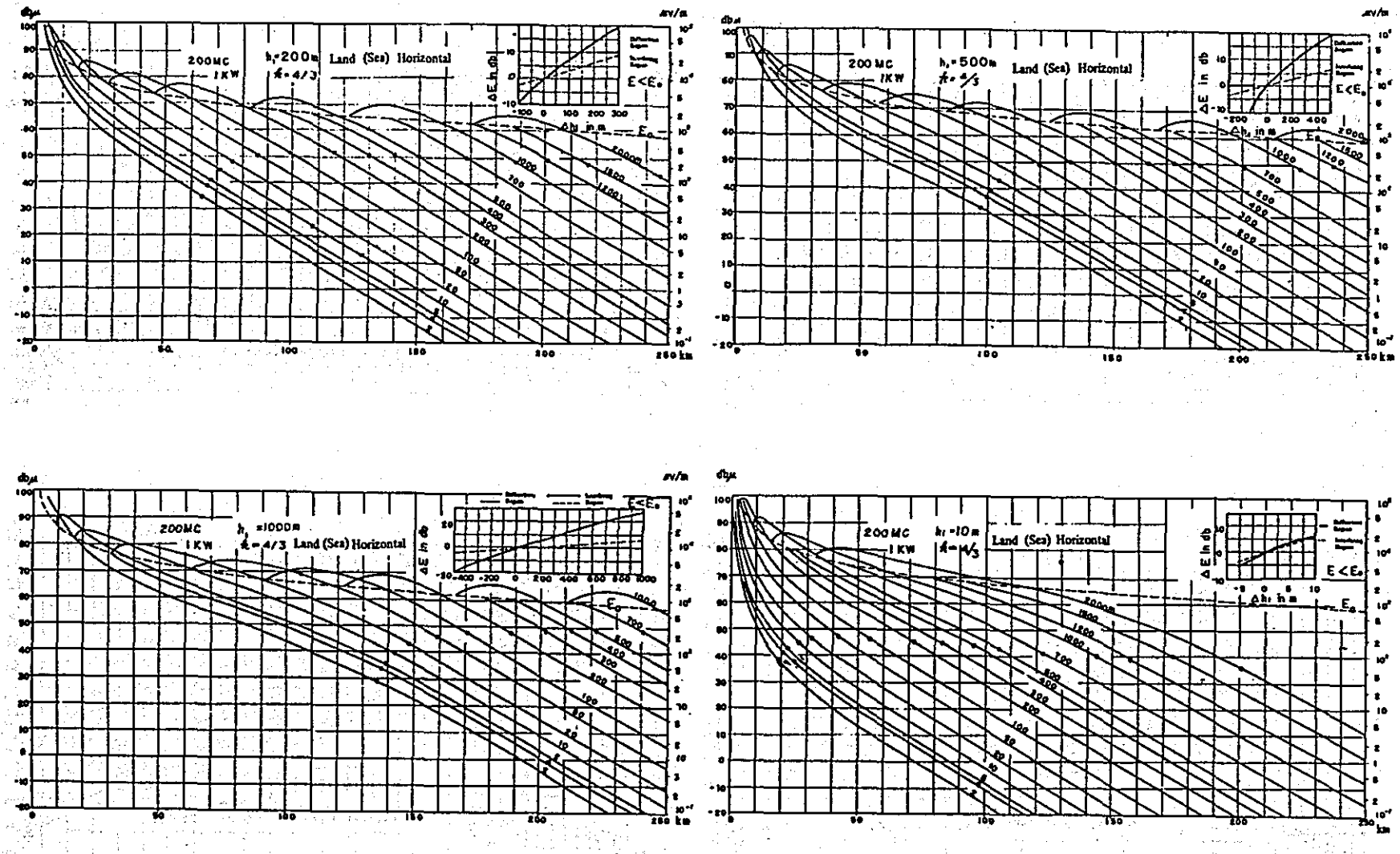
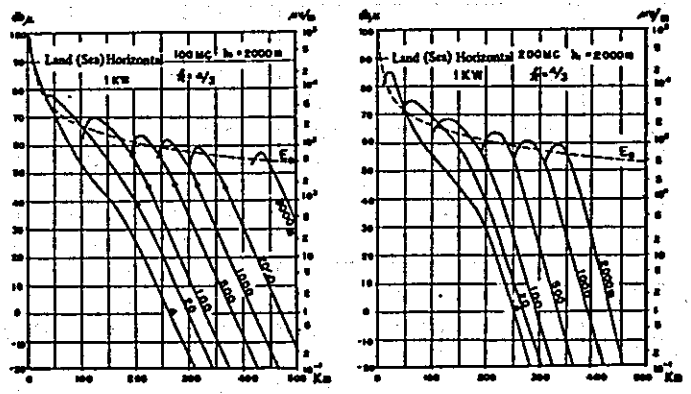
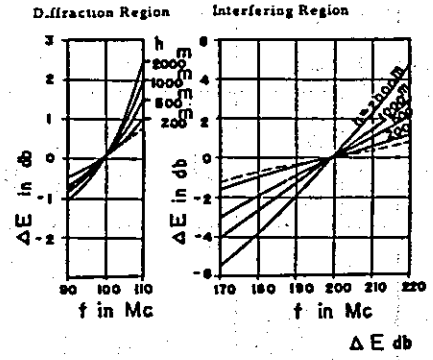
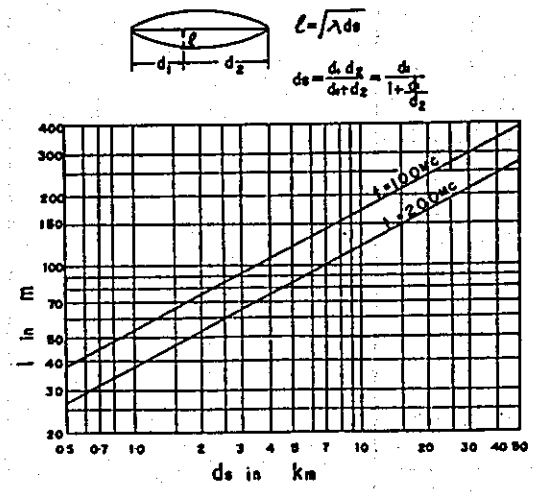
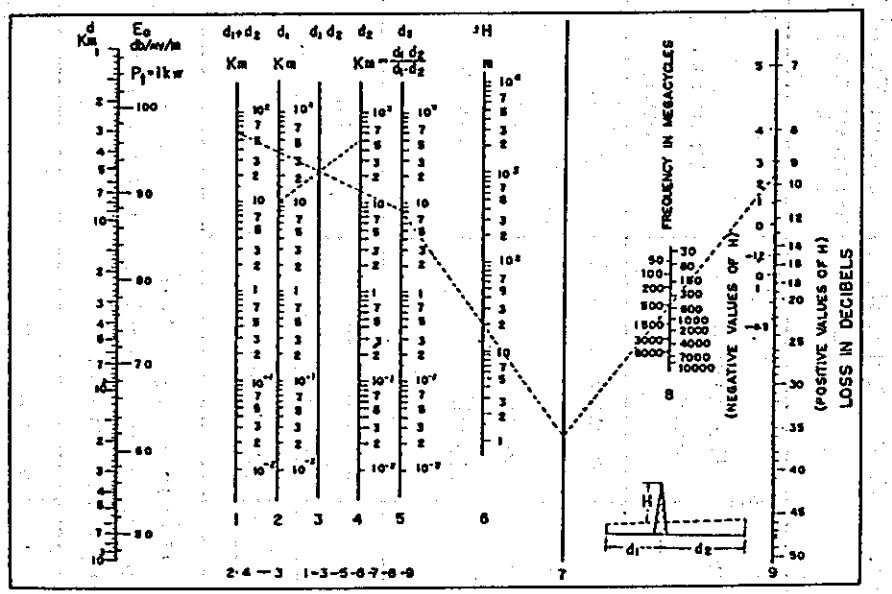

200MC
1KW
h₁=200m
k=4/3
Land (Sea) Horizontal
E<E₀
Δh in m
200MC
1KW
h₁=500m
k=4/3
Land (Sea) Horizontal
E<E₀
Δh in m
200MC
1KW
h₁=1000m
k=4/3
Land (Sea) Horizontal
E<E₀
Δh in m
200MC
1KW
h₁=10m
k=4/3
Land (Sea) Horizontal
E<E₀
Δh in m

Fig. 6-1-4









Nomograpk for Diffraciton Loss

Fig. 6-1-5

Table 6-1-4 Actually Measured Field Strength and Calculated Values (In Case of Propagation over the Spherical Level Ground)

Transmitting point	Receiving point	Distance (km)	Actually measured value (dBμ)	Calculated value (dBμ)		
				Japan	CCIR	FCC
Dacca TV Station	Northwest	6.3	87	88	-	73
	North	19.5	62	65.5	55	54
	North	29.5	53	57	45	46
	Tangail	75	29	28	23	18
Sitakund	2 points in Haziganj	110	30	34	28	27
Tree Point in Chittagong	Chittagong	9	84	82	72	65

Note: ERP = 1kw, h_R = 10m
The wave line (——) denotes a calculated value almost equal to the actually measured value.

Pindi Point of Mt. Murree	9 points in Peshawar	165	39.5 - 51	49	33	46
	13 points in Islamabad	32	76 - 88.5	79	77	75
	Gujrat	161	39.5	36	33	31
	2 points in Guj- n-	207	34.5	35	24	30
Khairi Murat	6 points in Islamabad	40	71.2 - 73.7	72	58	64

(2) Propagation over the spherical surface of the earth beyond the line-of-sight distance

In this case, field strength should be calculated as follows.

$$E\ (V/m) = 56 \times 2^{1/4} \times \frac{(Ka)^{5/4} \cdot W^{1/2} \cdot (h_T h_R)^{9/8}}{\lambda^{1/2}\ d^4}$$

or

$$E\ (dB) = -40.3 + 10\log_{10} W\ (KW) + 225\log_{10}(h_T h_R) - 10\log\lambda - 80\log_{10} d\ (\text{Unit: } 100\ km)$$

Notes: E: Field strength

K: Effective radius of the earth (usually 4/3)

a: The radius of the earth

W: Effective radiation power from transmitting point to receiving point

h_T: Transmitting height

h_R: Receiving height

λ: Wavelength

d: Distance between transmitting point and receiving point

This calculation method has been confirmed by the aforesaid result of the survey shown in Table 6-1-5.

Table 6-1-5 Actually Measured Field Strength and Calculated Values (In case of propagation over spherical surface of the earth beyond the line-of-sight distance)

Transmitting point	Receiving point	Distance (Km)	Actually measured value (dB_{μ})	Calculated value (dB_{μ})
Dacca TV Station	Tangail	75	29	30
Sitakund	Hazigani	110	30	34

ERP=1 kw, h_R=10 m

(For reference)

Pindi Point of Mt. Murree	Lahore	270	43	44

h_R=100 m

(3) Propagation over the Mountains

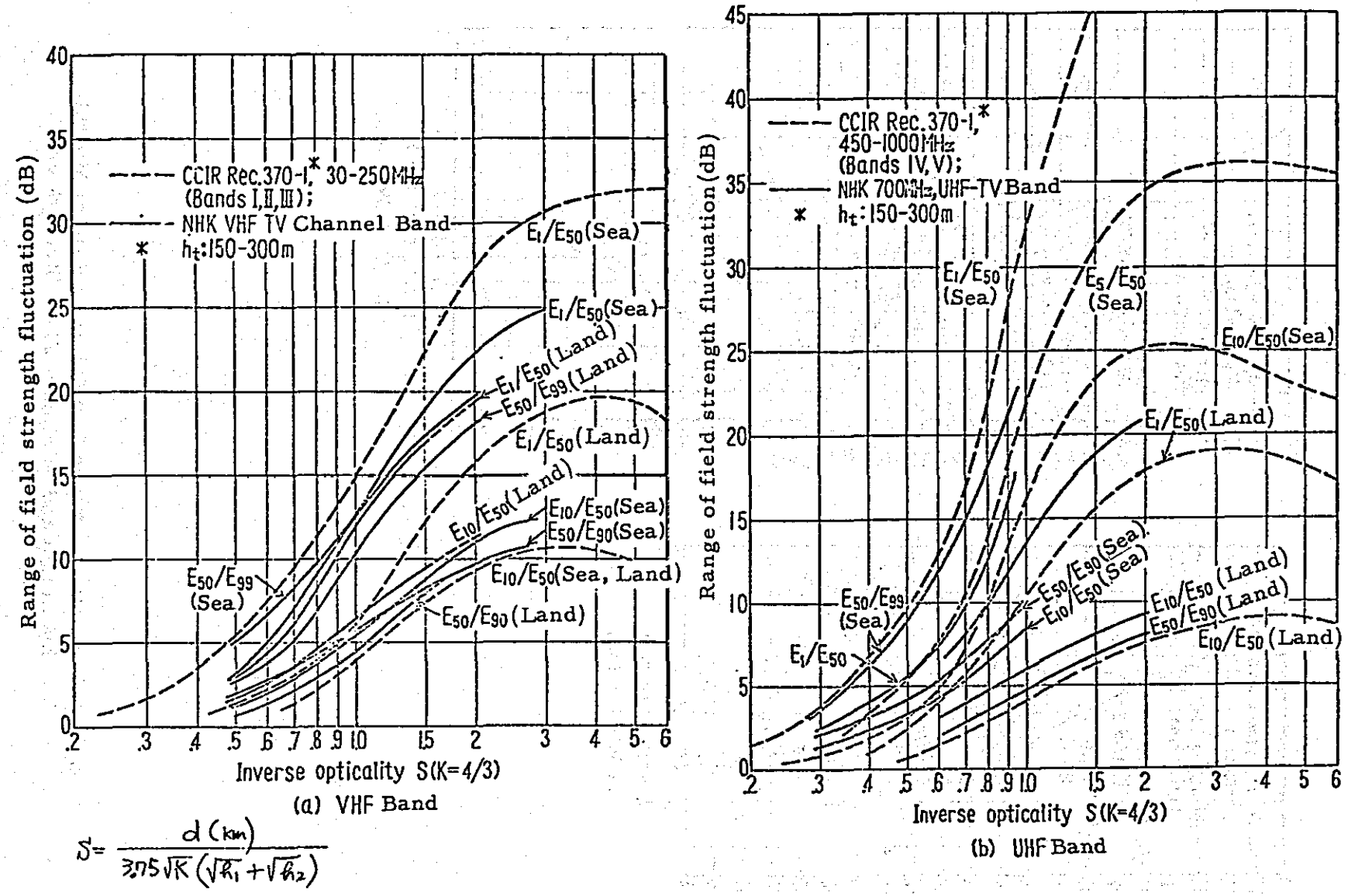
In this case, field strength is calculated according to the knife edge diffraction theory.

1-4 Estimation of the Range of Field Strength Fluctuation

Long distance propagation as well as propagation over the waters generally involves the problem of fading.

Especially in those areas liable to inundation in the rainy season of Bangladesh, the rebroadcast system as well as broadcasting service must be designed after due consideration of this fading problem. Given in Fig. 6-1-6 to Fig. 6-1-8 are reference data of field strength fluctuation under general propagative conditions investigated by Technical Research Laboratories of Japan Broadcasting Corporation (NHK).

In some cases, planning of rebroadcast system requires a detailed field survey.



$$S = \frac{d\,(km)}{3.75\sqrt{K}\left(\sqrt{h_1}+\sqrt{h_2}\right)}$$

Fig. 6-1-6 Relation between Long Period Fluctuation of Field Strength and S

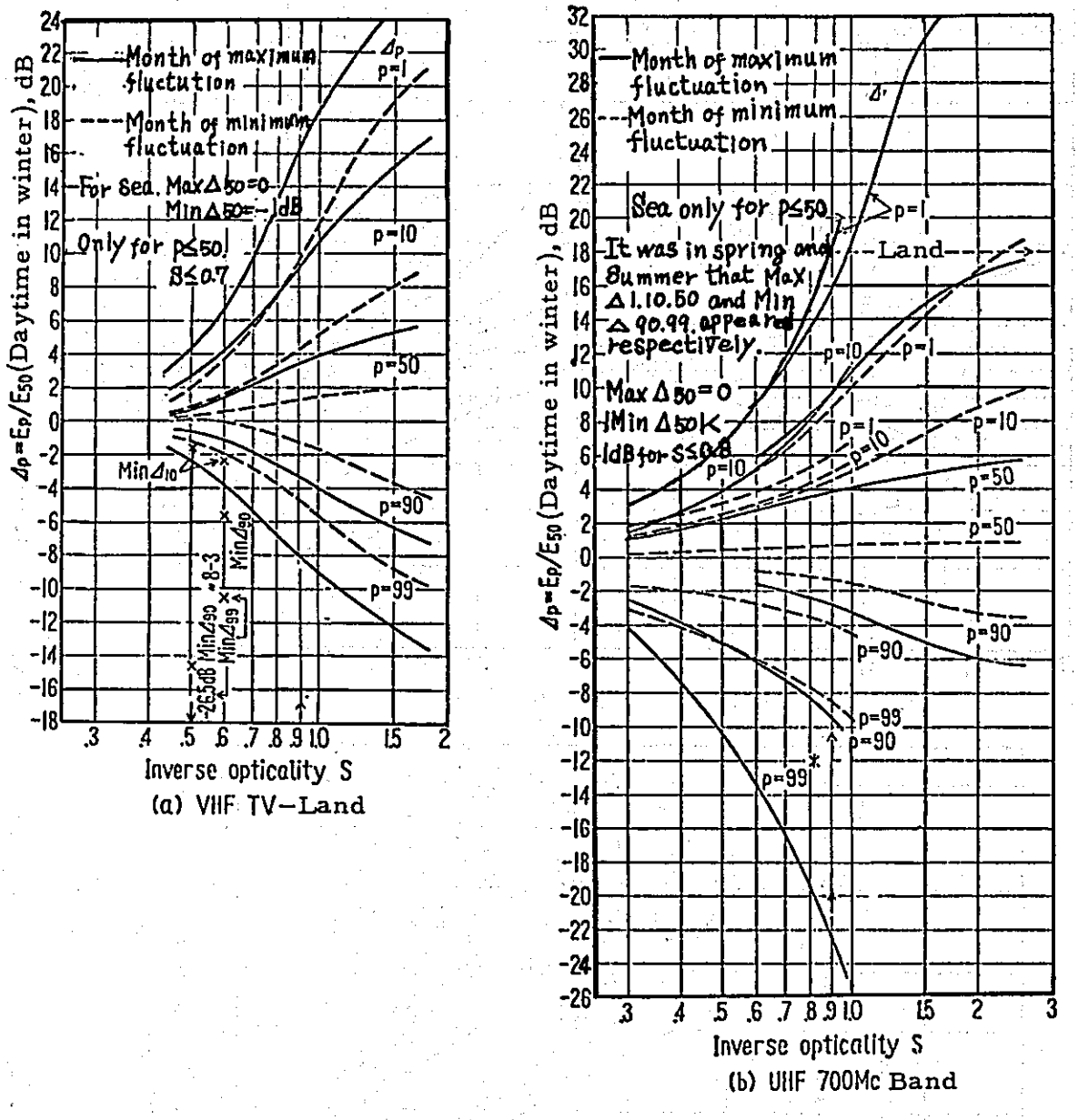


Fig. 6-1-7 Relation between Typical Hour Rate of Monthly Maximum and Minimum Field Strength and S

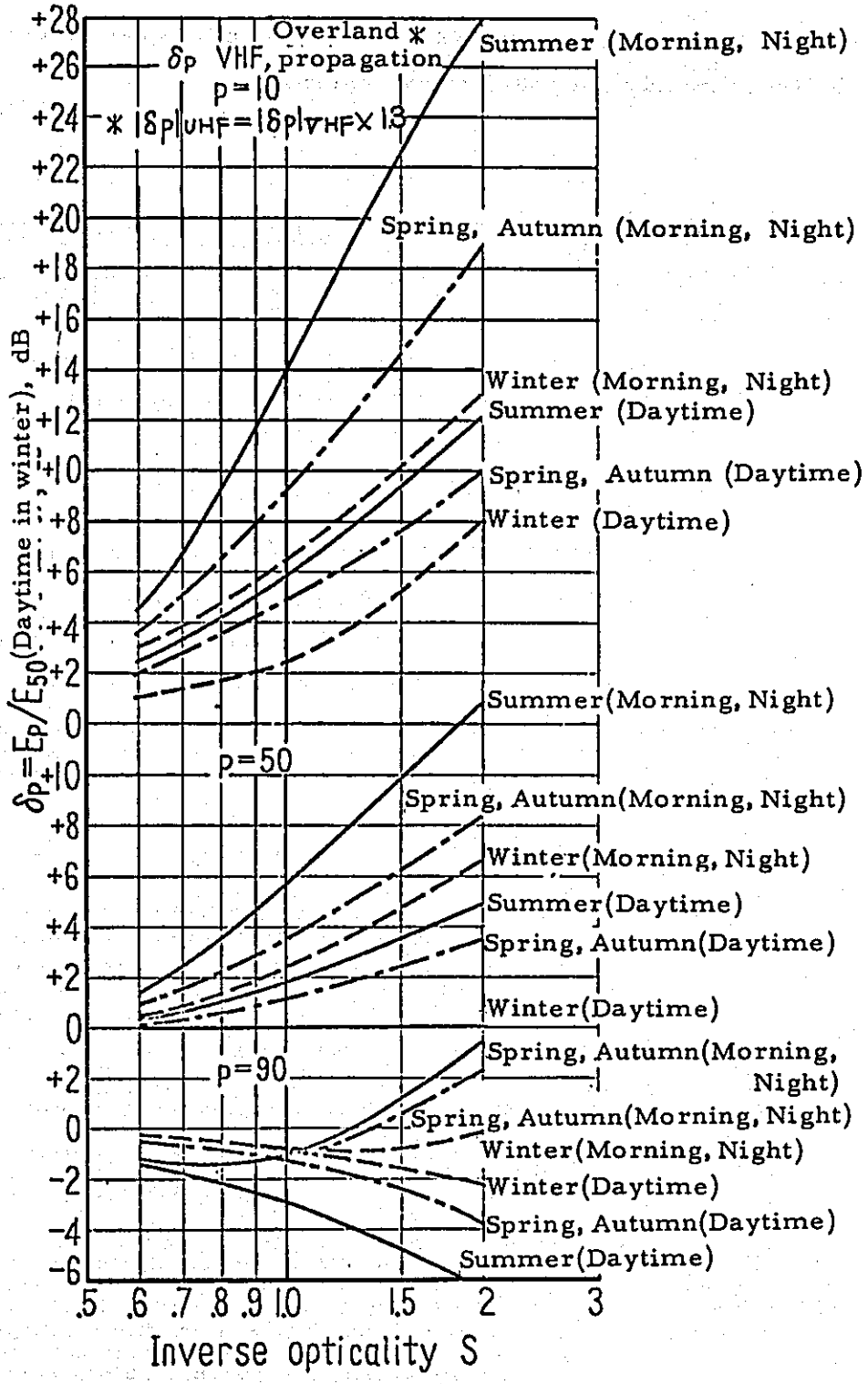


Fig. 6-1-8 Relation between S and Field Strength Level Difference in the Morning, at Night, and during the Daytime in Winter

Part 2 Medium Wave Broadcasting

2-1 Ground-wave Propagation Curves

In this report, medium wave field strength is calculated according to CCIR Recommendation 368-1 shown below.

RECOMMENDATION 368-1

GROUND-WAVE PROPAGATION CURVES FOR FREQUENCIES BETWEEN 10 kHz AND 10 MHz

(Question 3/5)

(1951 – 1959 – 1963 – 1970)

The C.C.I.R.,

CONSIDERING

(a) that ground-wave propagation curves for an extended range of frequencies are of continued importance for all types of radiocommunication, including navigational aids;

(b) that such curves are needed for a range of conductivities if they are to apply to the varying conditions met with in practice along land paths,

UNANIMOUSLY RECOMMENDS

that the curves in the Annex be used for the determination of ground-wave field strength at frequencies below 10 MHz under the conditions stated.

ANNEX

The attached curves apply to propagation at frequencies below 10 MHz.

The following points are to be especially noted with regard to them:

1. they refer to a smooth homogeneous earth;

2. no account is taken of tropospheric effects at these frequencies;

3. the transmitter and receiver are both assumed to be on the ground. Height-gain effects can be of considerable importance in connection with navigational aids for high-flying aircraft, but it has been decided not to include them at the present time;

4. the curves refer to the following conditions:

   — they are calculated for the vertical component of electric field from the rigorous analysis of van der Pol and Bremmer;

   — the transmitter is an ideal Hertzian vertical electric dipole to which a vertical antenna shorter than one quarter wavelength is nearly equivalent;

   — the dipole moment is chosen so that the dipole would radiate 1 kW if the Earth were a perfectly conducting infinite plane, under which conditions the radiation field at a distance of 1 km would be 3×10^5 μV/m;

   — the curves are drawn for distances measured around the curved surface of the Earth;

   — the inverse-distance curve *A* shown in the figures, to which the curves are asymptotic at short distances, passes through the field value of 3×10^5 μV/m at a distance of 1 km;

5. the propagation loss defined in Recommendation 341 for ground-waves may be determined from the values of the field strength in dB relative to 1 μV/m given in the attached curves by the use of equation (19) of Report 112;

6. the curves should, in general, be used to determine field strength, only when it is known that ionospheric reflections at the frequency under consideration will be negligible in amplitude— for example, propagation in daylight between 150 kHz and 2 MHz and for distances of less than about 2000 km. However, under conditions where the sky-wave is comparable with, or even greater than, the ground-wave, the curves are still applicable when the effect of the ground-wave can be separated from that of the sky-wave, by the use of pulse transmissions, as in some forms of direction-finding systems and navigational aids;

7. this Recommendation should continue in use until such time as any revision can be made in accordance with the suggestions made in Report 428.

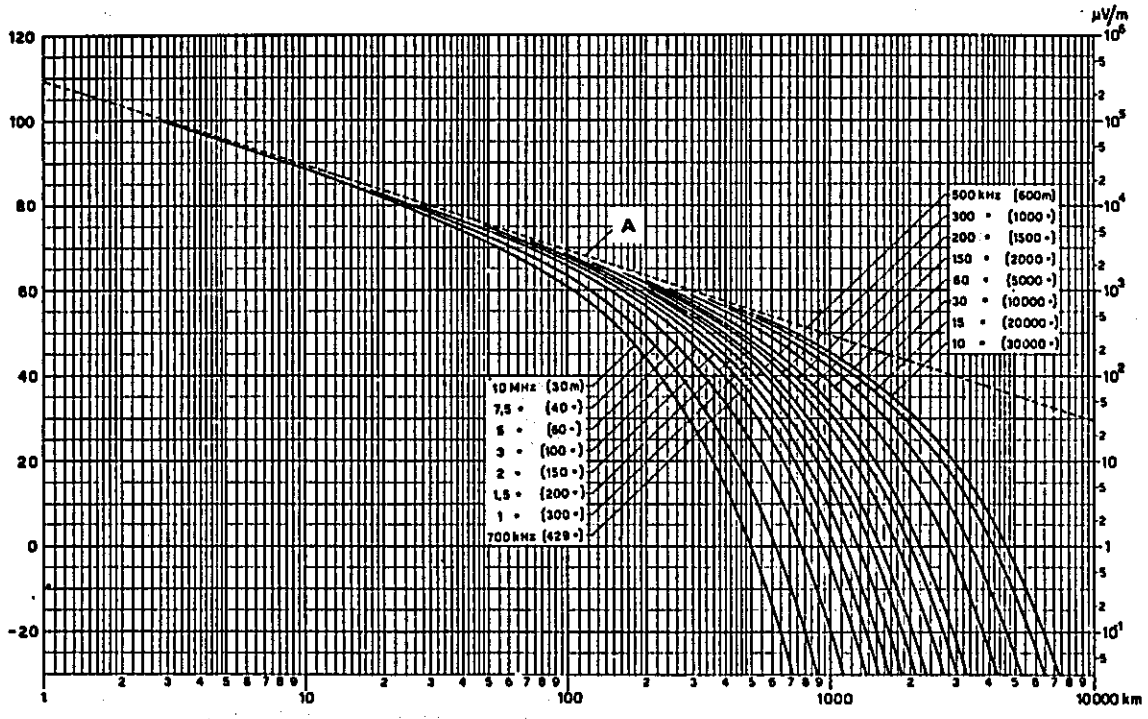


FIGURE 1

Ground-wave propagation curves: Sea, σ = 4 mho/m, ε = 80
A: Inverse distance curve

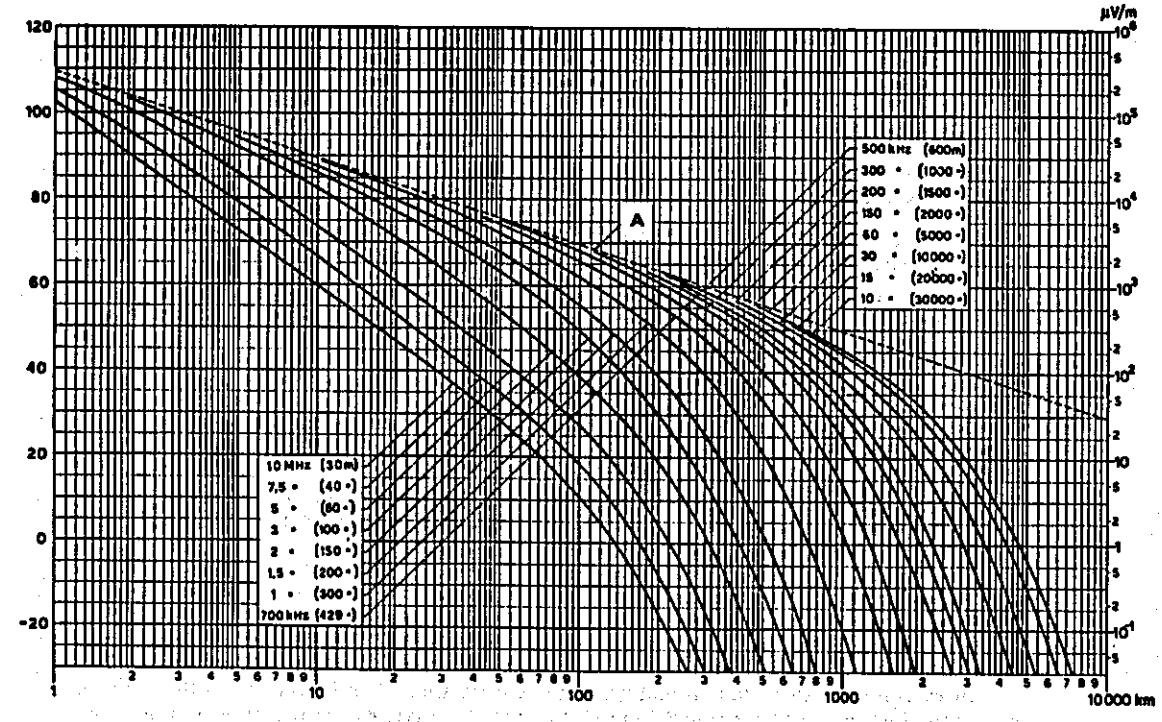


FIGURE 2

Ground-wave propagation curves : Earth, σ = 3 × 10⁻³ mho/m, ε = 4
A: Inverse distance curve

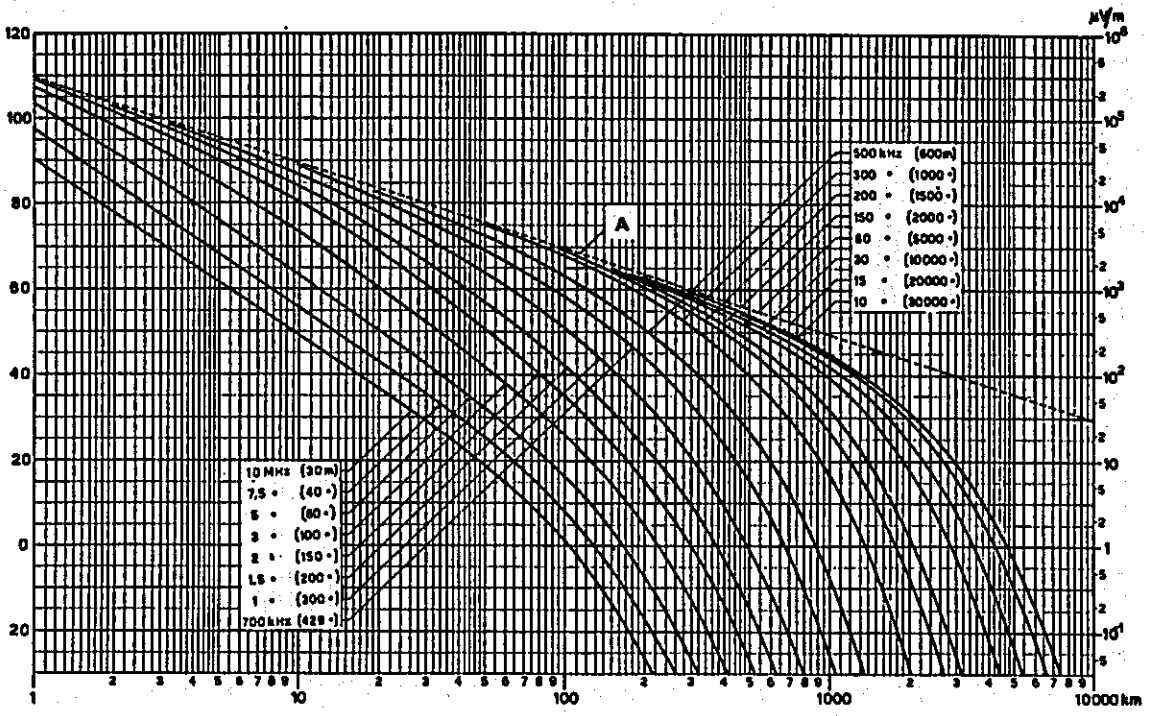


FIGURE 3

Ground-wave propagation curves; Earth, $\sigma = 10^{-3}$ mho/m, $\varepsilon = 4$
A: Inverse distance curve

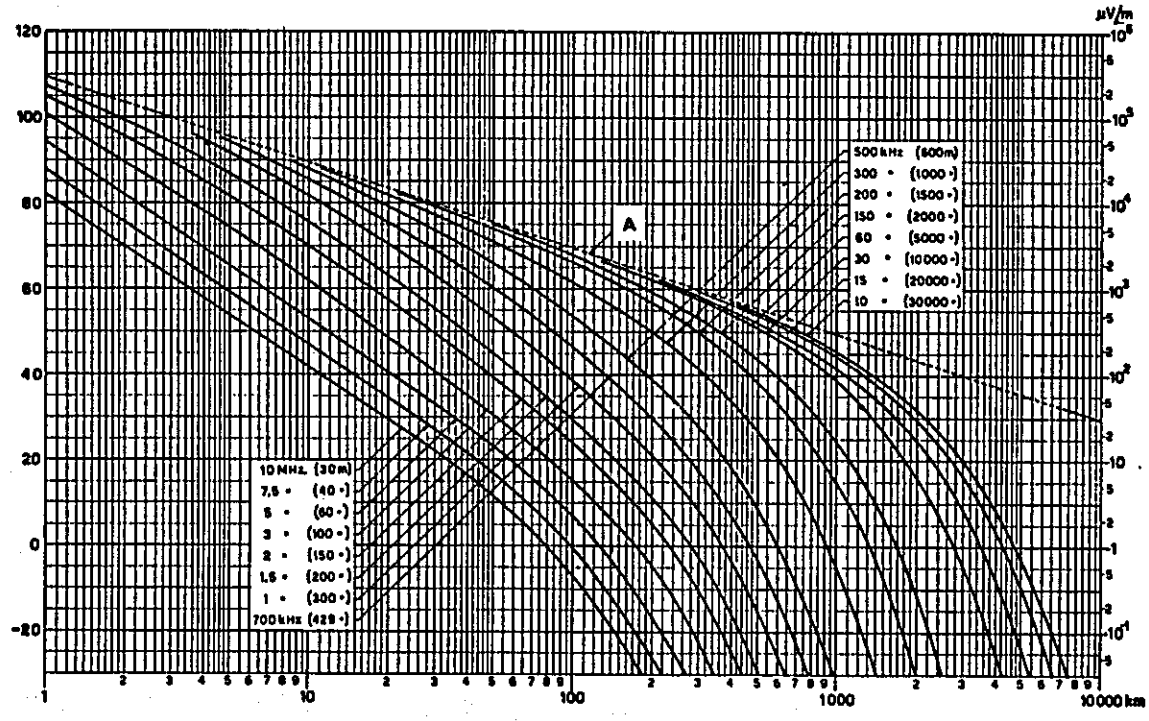


FIGURE 4

Ground-wave propagation curves; Earth, $\sigma = 3 \times 10^{-3}$ mho/m, $\varepsilon = 4$
A: Inverse distance curve

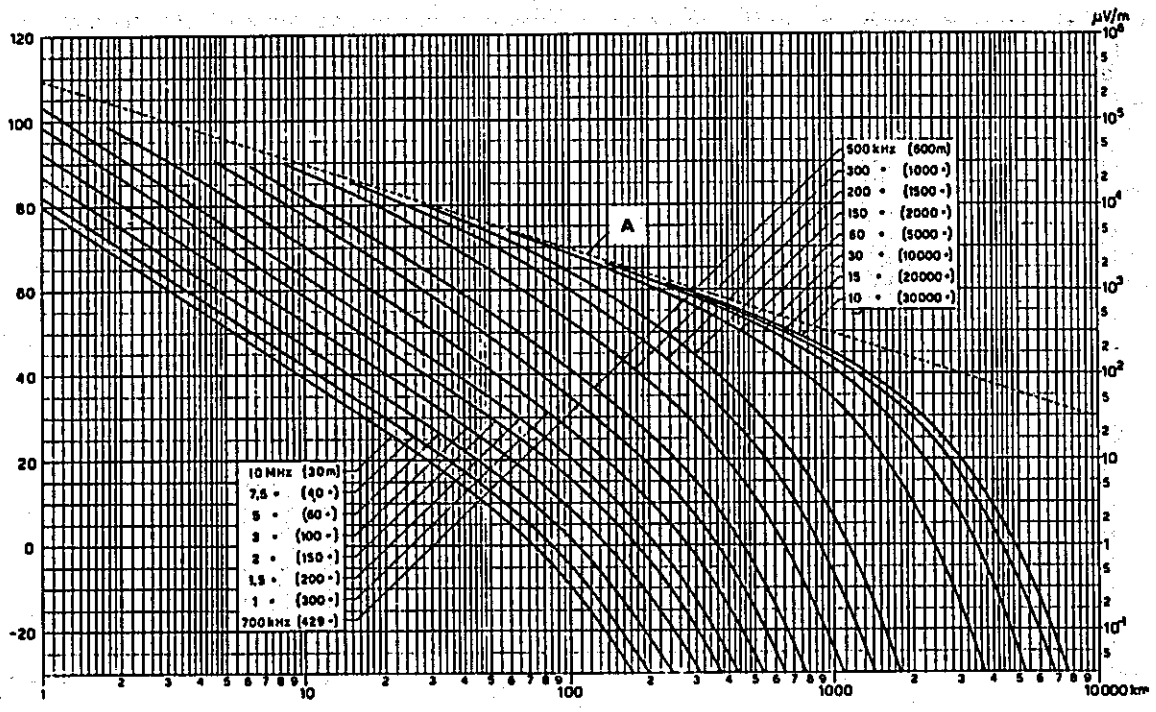


FIGURE 5

Ground-wave propagation curves; Earth, $\sigma = 10^{-3}$ mho/m, $\varepsilon = 4$

A: Inverse distance curve

2-2 Minimum Field Strength to be Protected

According to the FINAL ACTS OF THE AFRICAN LF/MF BROADCASTING CONFERENCE (GENEVA, 1966, ITU), the minimum field strength to be protected is specified as follows. Bangladesh is situated in latitude between approximately 26°30' N and 20°50' N.

Minimum field strength to be protected

The minimum field strengths to be protected were based upon information contained in C.C.I.R. Report 322 which gives the values of atmospheric noise for the four seasons of the year and for six daily time blocks. The values used were the averages of the average yearly values for the time blocks 1600-2000 and 2000-24000 hours.

These average values for the three different zones in Africa defined in Figure 6, converted to dB relative to 1 μ V/m, are as follows:

Zone A	(Africa N of approximately 20°N)	2 dB
Zone B	(Africa between approximately 20°N and 15°S)	15 dB
Zone C	(Africa S of approximately 15°S)	8 dB

These values are for 1 kc/s bandwidth and for the frequency of 1 Mc/s. These average figures were converted to upper decile values by adding a correction factor, also derived from C.C.I.R. Report 322.

The value of minimum field strength to be protected at 1 Mc/s is given by the following formula:

$$E_s = E_n + 10 \log \beta + D_u + S/N$$

where

E_s = minimum field strength to be protected in dB relative to 1 μ V/m

E_n = noise field strength in dB relative to 1 μ V/m for 1 kc/s bandwidth at 1 Mc/s

β = overall effective noise bandwidth of the receiver. A value of 5 kc/s was used for the reference receiver

D_u = yearly average of the ratio of the upper decile to the mediam values of noise field strength noise for the time blocks 1600-2400 hours (12 dB)

S/N = desirable ratio of RF carrier signal to the median hourly r.m.s. value of atmospheric noise, taken to be 40 dB.

Consequently the values of E_s, in dB relative to 1 μ V/m, adopted for the three zones were as follows:

Zone A	61 dB
Zone B	74 dB
Zone C	67 dB

The correction factors, also derived from C.C.I.R. Report 322, to be applied to the minimum field to be protected for frequencies other than 1 Mc/s are indicated in Figure 7.

Part 3 Short-wave External Service

3-1 Frequency Bands for Short-wave Broadcasting

Of the frequency bands for short-wave broadcasting allocated to Region 3 according to Radio Regulations, those usable for external broadcasting service are shown in Table 6-3-1.

Table 6-3-1 Frequency Bands for Short-wave External Service Allocated to Region 3

Frequency band (MHz)	Frequency range (KHz)
6	5,950 - 6,200
7	7,100 - 7,300
99	9,500 - 9,775
11	11,700 - 11,975
15	15,100 - 15,450
17	17,700 - 17,900
21	21,450 - 21,750
25	25,600 - 26,100

3-2 Calculation of Short-wave Field Strength

There are several ways of calculating short-wave field strength, but none of them is especially recommended by CCIR.

Stated below is a rather precise way of calculation upon ionospheric data, used in this survey and is one of the most popular method in Japan.

(i) Lay a transparent world map (Fig. 6-3-1) upon a great circle chart (Fig. 6-3-2), and slide the world map right and left along the equator solid line to trace a great circle path of connecting the transmitting point and the receiving point. Then write down the great circle path thus selected on the transparent world map.

(ii) Mark the focus on the propagation path drawn in (i) in case the distance between the transmitting point and the receiving point is less than 3,000 km. In case the distance between the transmitting point and the receiving point is more than 3,000 km, divide the propagation path into (n) equal sections so that the length of each section (called "dn") becomes between 1,500 km and 3,000 km, and mark the focus of each section on the propagation path.

(iii) Choose required one from among those K-charts (Fig. 6-3-3 to Fig. 6-3-14), and lay the world map already marked in (ii) on it, and set the time by sliding it right and left along the equator line. Then read the K-value of each "dn" from the chart, and calculate the sum of Kn of (n) sections.

$$\left(\sum^{n} kn\right)$$

(iv) Pick up Γ_1 min on Fig. 6-3-15 corresponding to the frequency and "dn".

(v) Read Q on Fig. 6-3-16 correspondint to "γ" estimated by annual change or separately given.

(vi) Calculate Γ_1 by the following formula.

$$\Gamma_1 = \Gamma_1 \min Q \sum^{n} kn$$

(vii) Calculate p = f/MUF using MUF formally calculated.

(viii) Read F Layer reflection probability corresponding to "p" on Fig. 6-3-17.

(ix) Calculate the total length of the overland propagation path "dE", and read Γ_E corresponding to the "dE" on Fig. 6-3-18.

(x) Read "Eo" on Fig. 6-3-19 corresponding to the distance between the transmitting point and the receiving point, and calculate the field strength (E) at the receiving point by the following formula.

$$E = Eo' + P + G - \Gamma_1 - \Gamma_E \text{ (dB)}$$

Where each symbol used here stands for as follows.

E	Field strength (dB rel. 1μV/m) of incoming wave
Eo	Field strength (dB rel. 1μV/m) without any ionospheric attenuation $Eo = Eo' + P + G_T$
Eo'	Eo for P = 0(dB) and G = 0(dB)
P	Transmitter power (dB rel. 1kw)
G_T	Effective gain (dB) of the transmitting antenna relative to the single half-wave length antenna
Γ	*Attenuation (dB) of the first kind*
Γ min	Γ of the wave whose total attenuation is the least among many multiple waves
γ	Relative sunspot number
n	Number of ionospheric reflections of the radio wave
K	Damping coefficient of the attenuation of the first kind at the zenith angle of the sun
Q	*Damping coefficient of the attenuation of the first kind at "γ"*
f	Frequency of the radio wave
p	Frequency ratio (p = f/MUF)
Γ_E	Reflection coefficient (dB) of the radio wave at the ground
d_E	The total length (km) of the overland sections of the propagation path

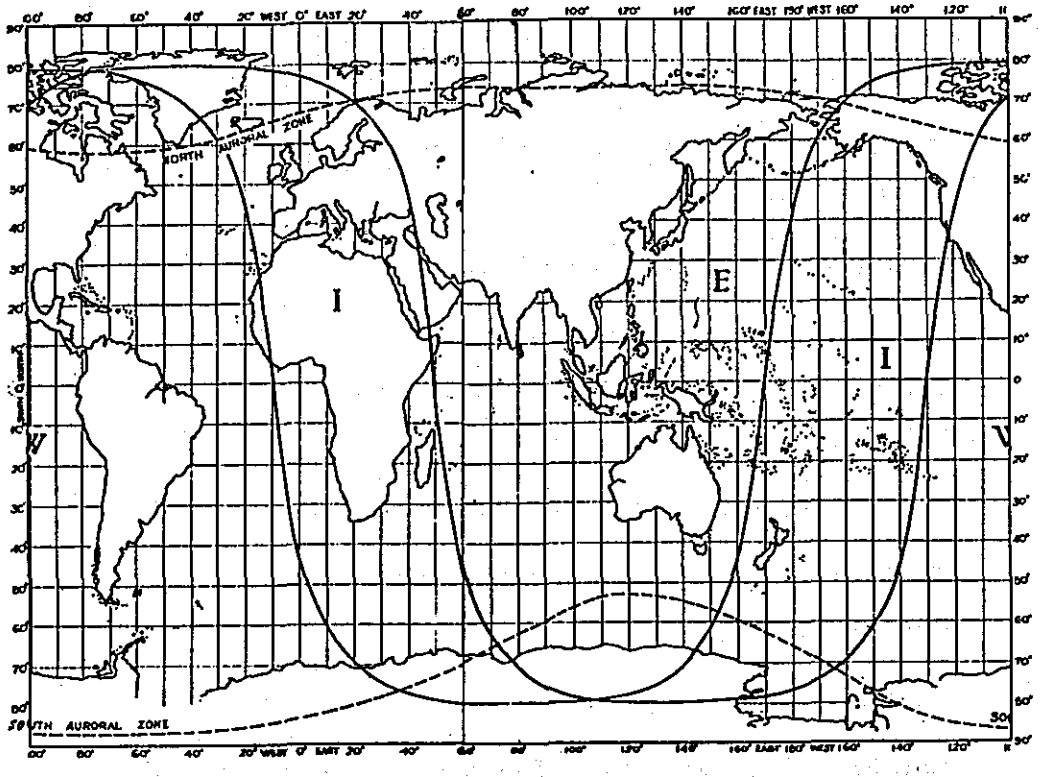


Fig. 6-3-1 World Map Showing Zones by Predicted and Auroral Zones

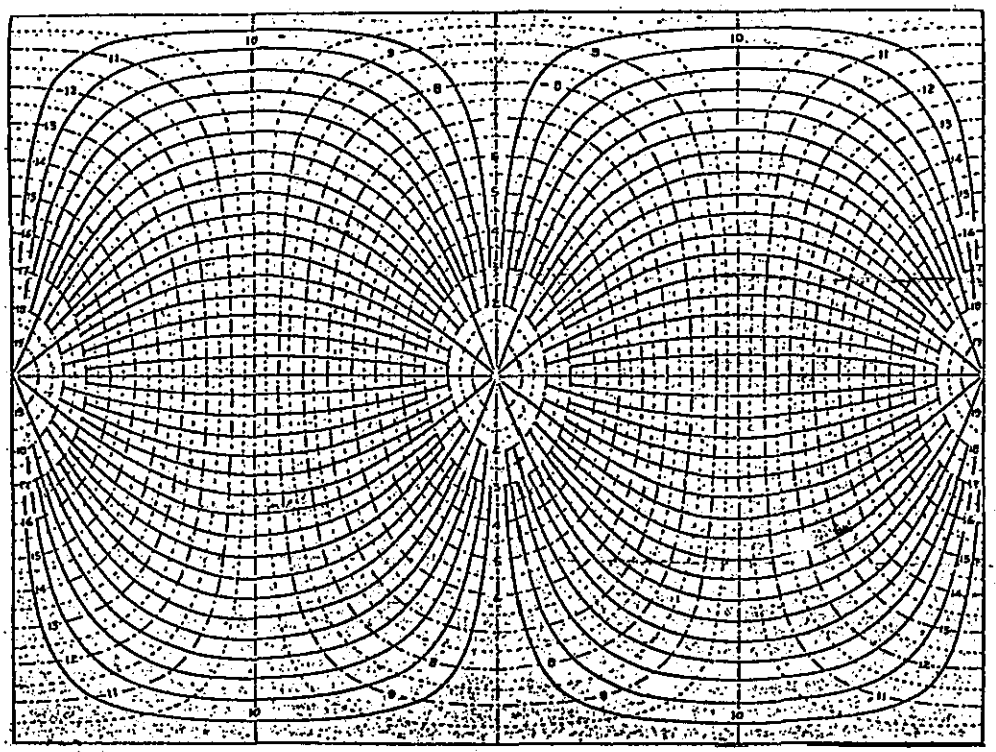


Fig. 6-3-2 Great Circule Chart Centered Equator. Solid Lines Represent Great Circies. Numbered Dot-Dash Lines Indicate Distances in Thousands of Korometers.

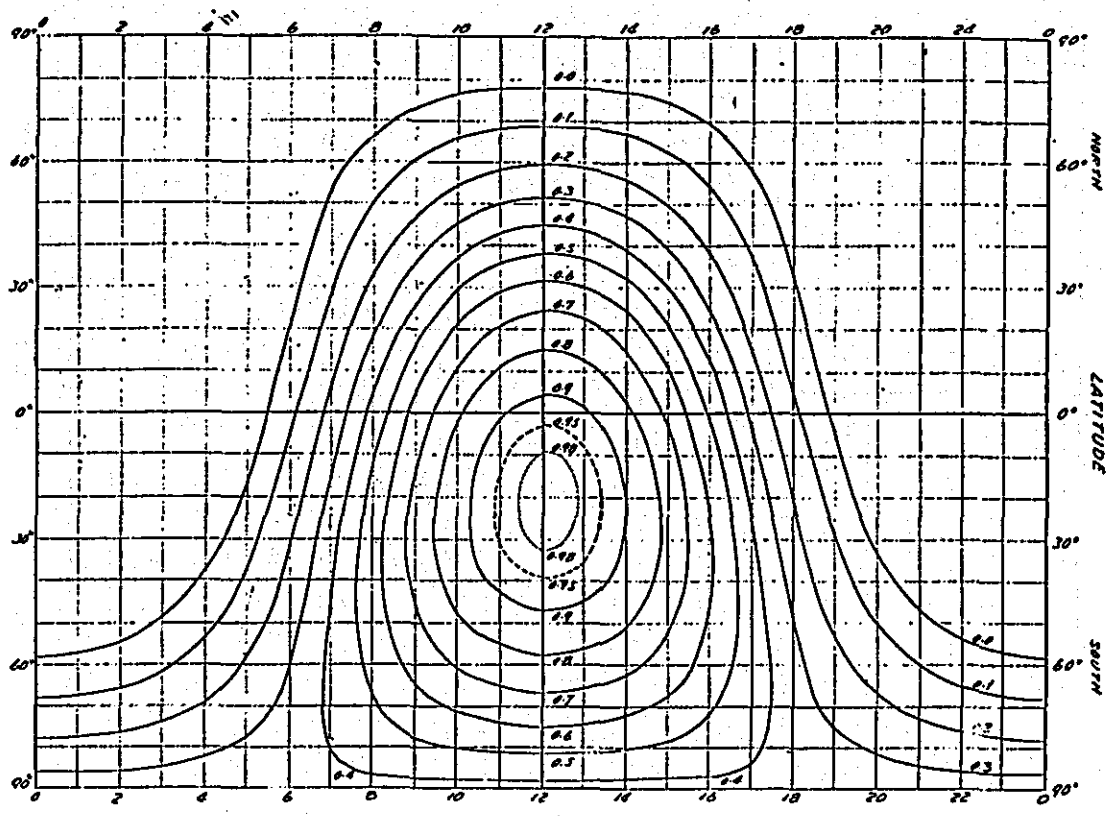


Fig. 6-3-3 Absorption Factor: K. For January

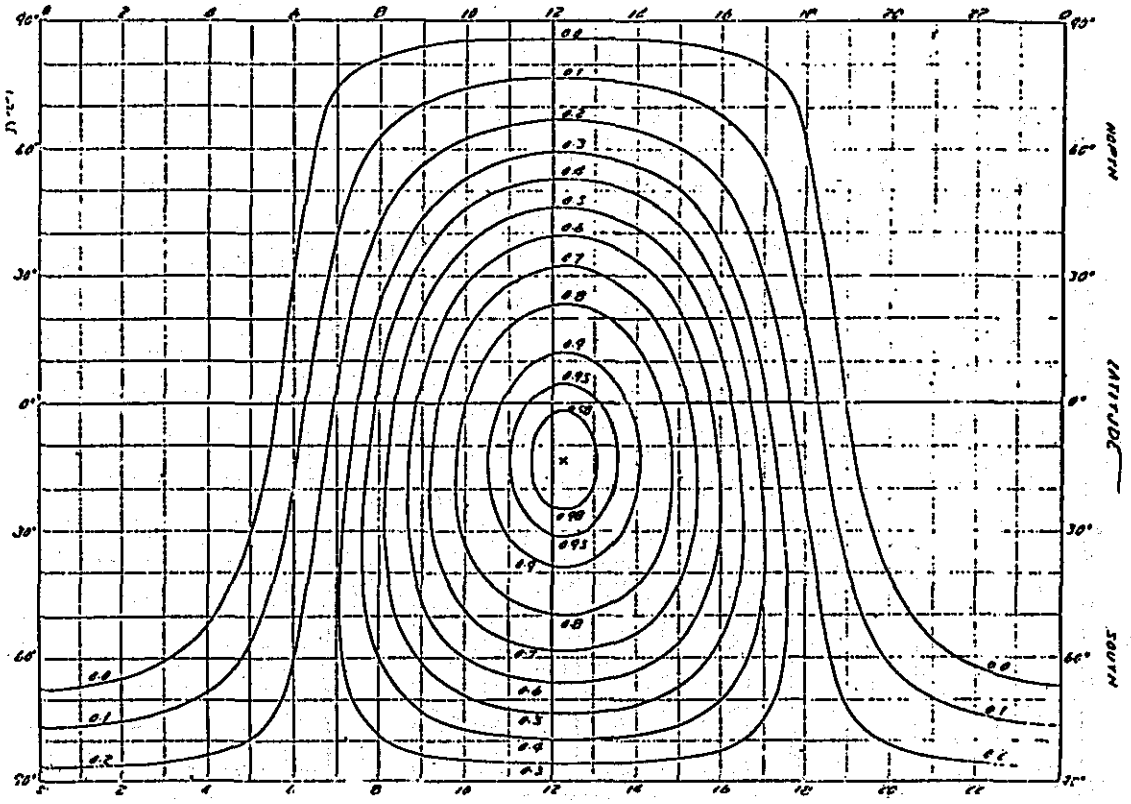


Fig. 6-3-4 Absorption Factor: K. For February

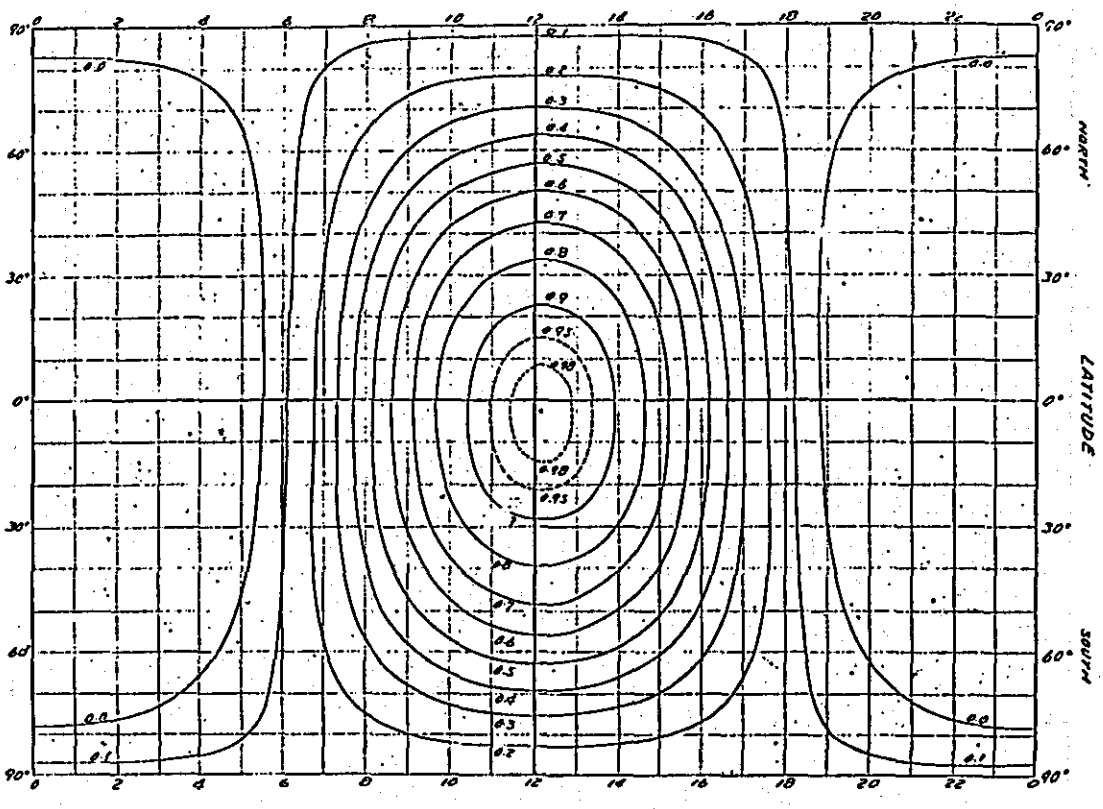


Fig. 6-3-5 Absorption Factor: K. For March

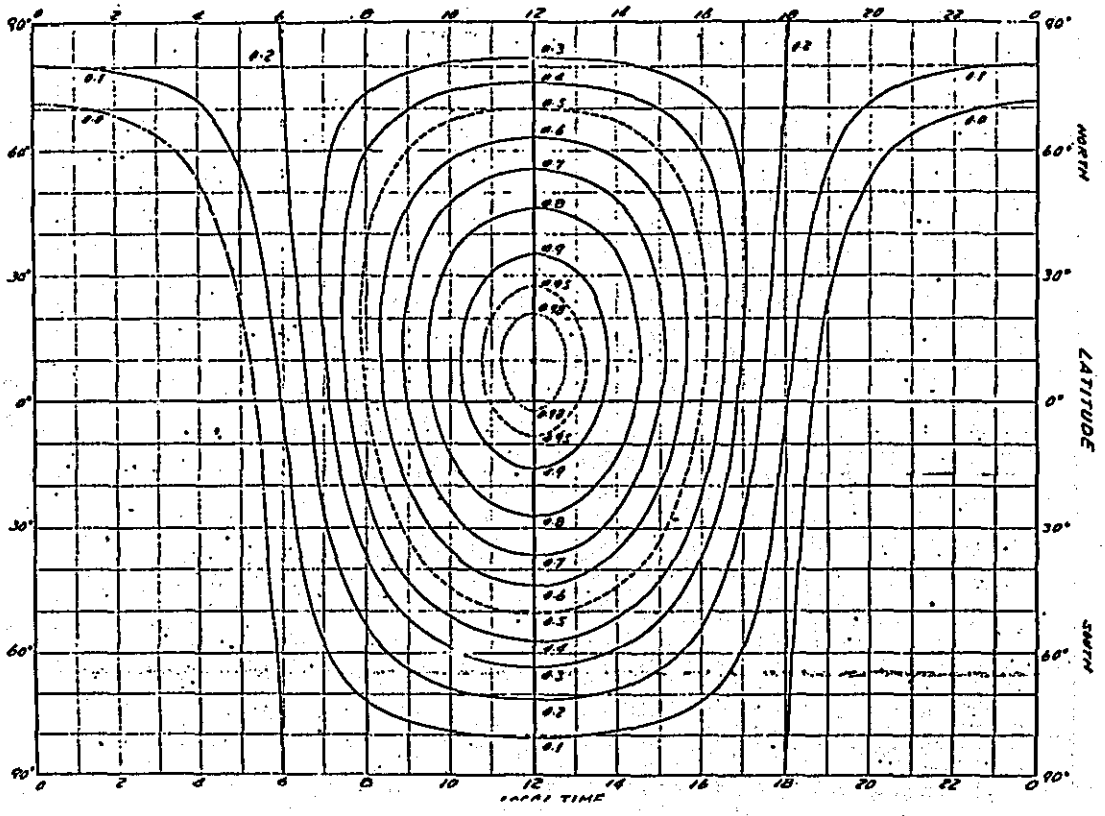


Fig. 6-3-6 Absorption Factor: K. For April

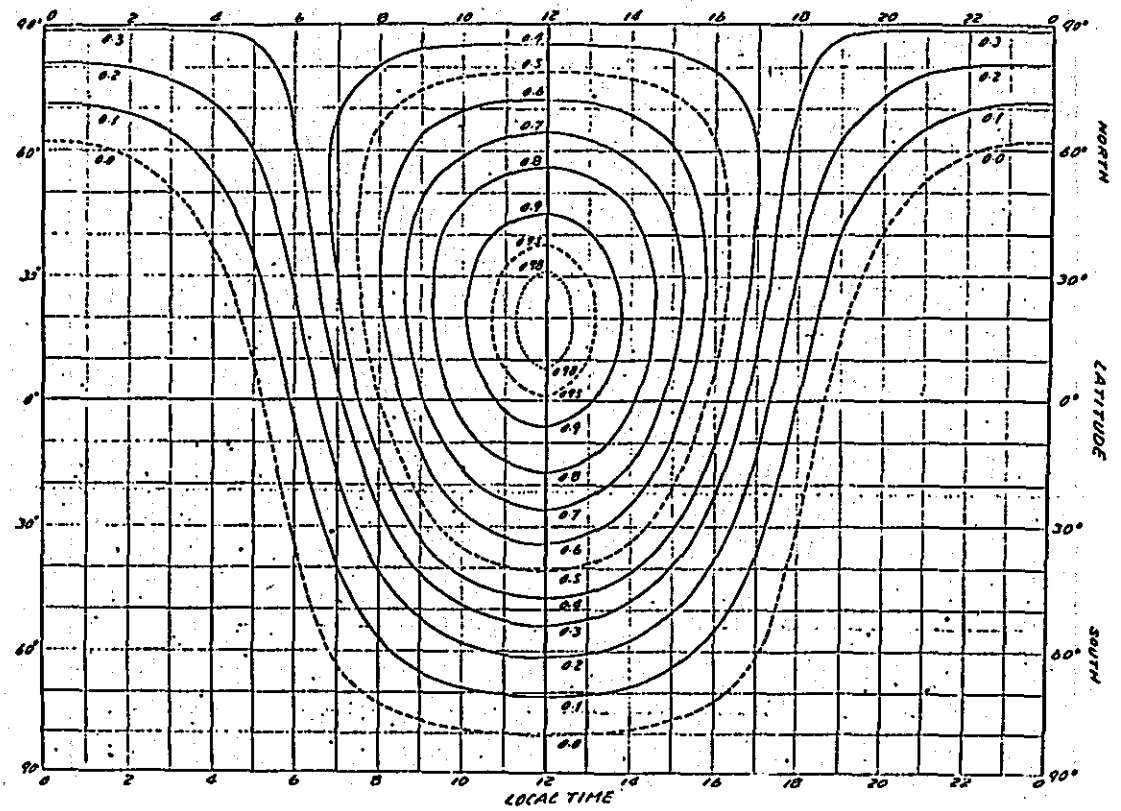


Fig. 6-3-7 Absorption Factor: K. For May

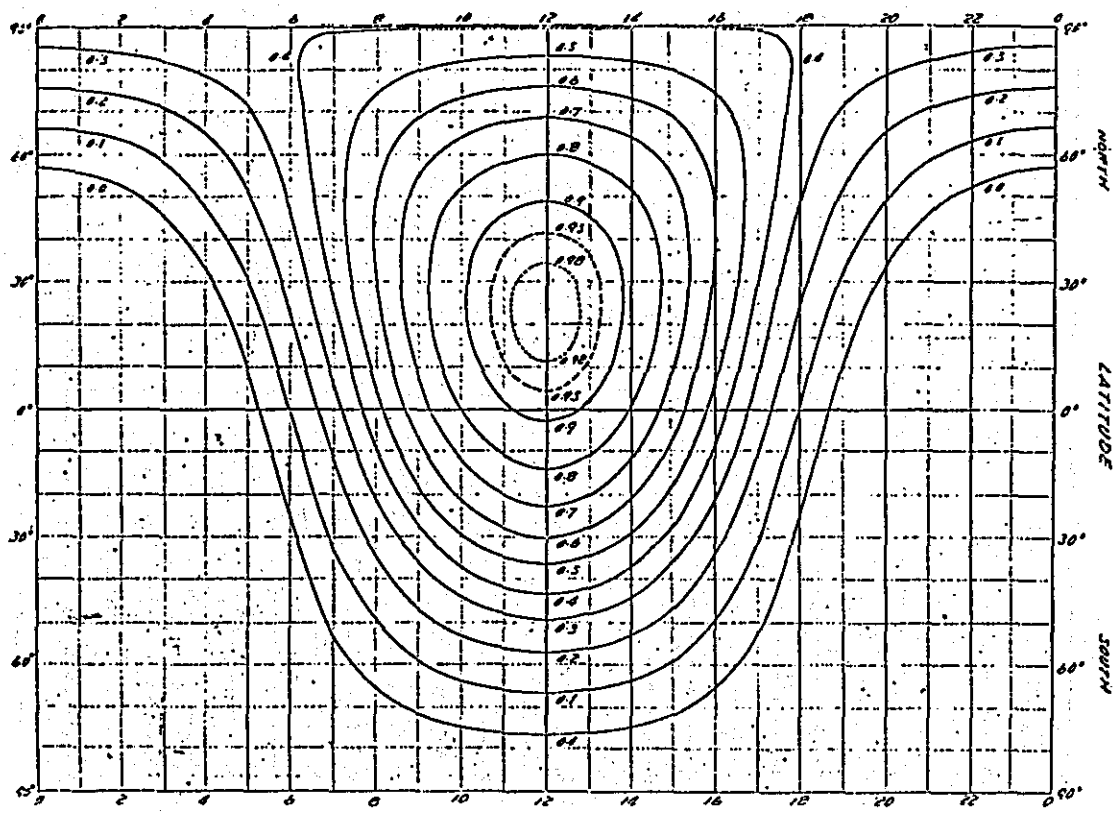


Fig. 6-3-8 Absorption Factor: K. For June

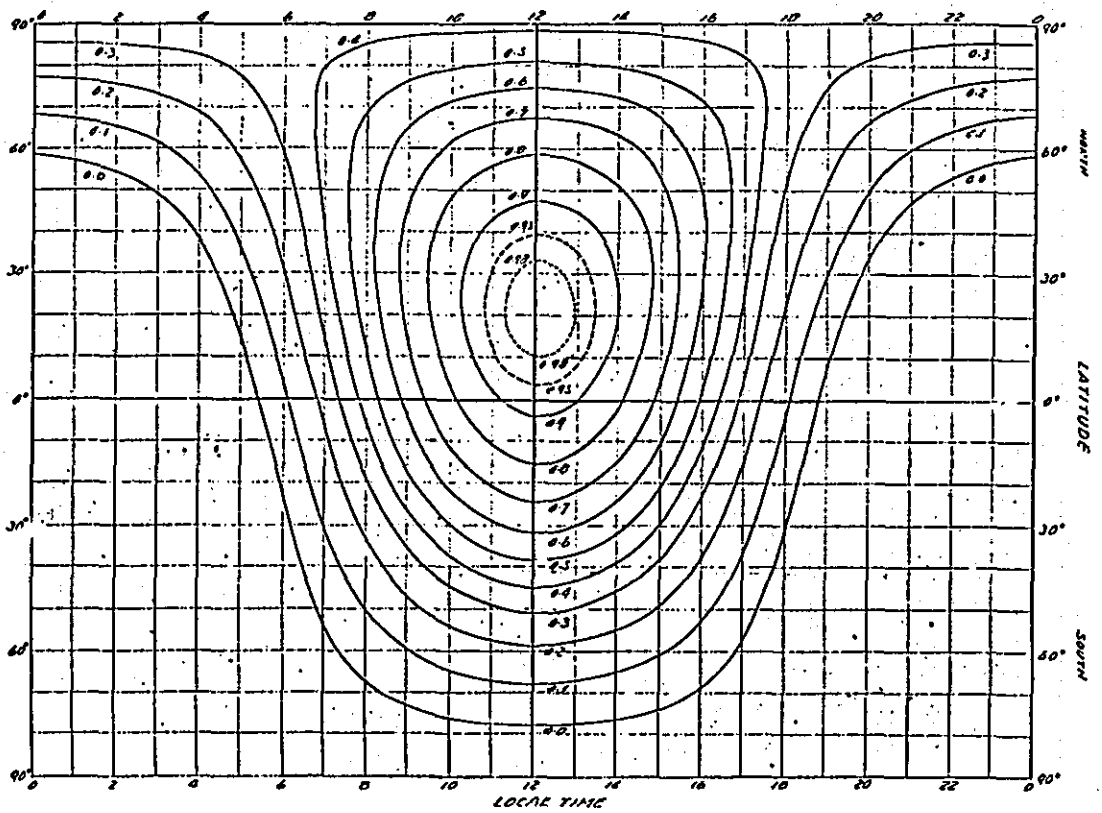


Fig. 6-3-9 Absorption Factor: K. For July

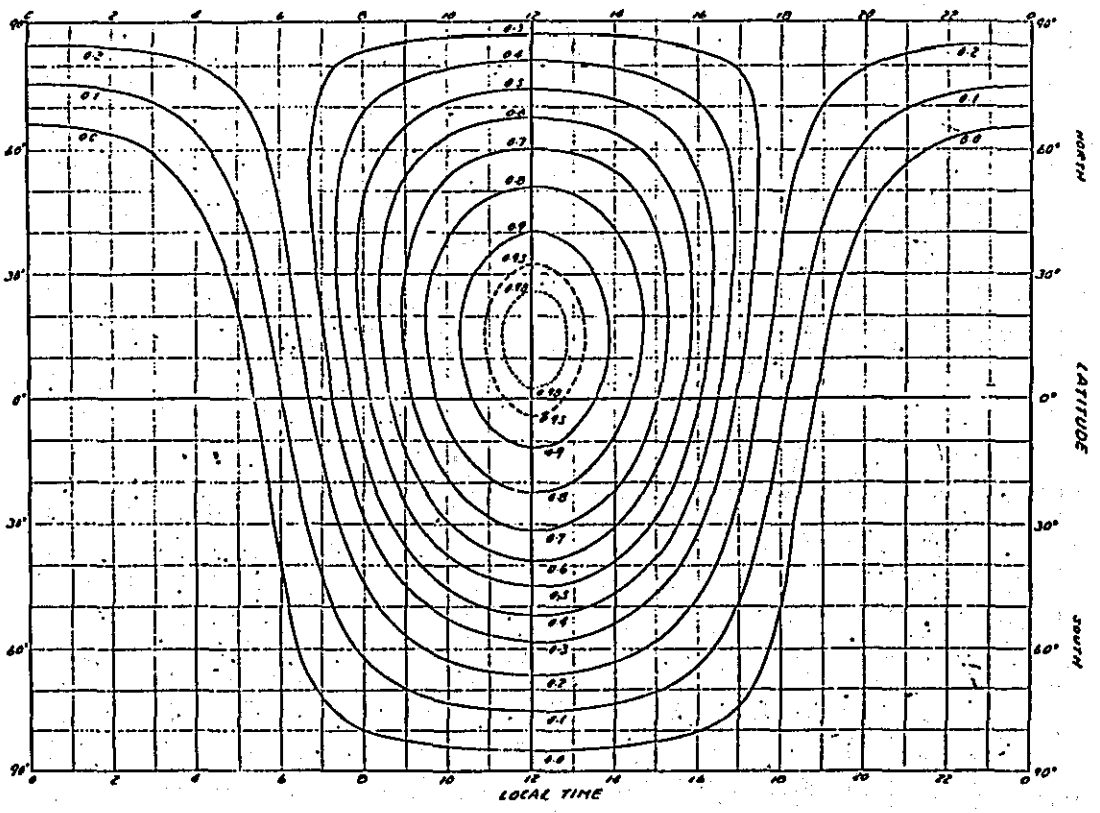


Fig. 6-3-10 Absorption Factor: K. For August

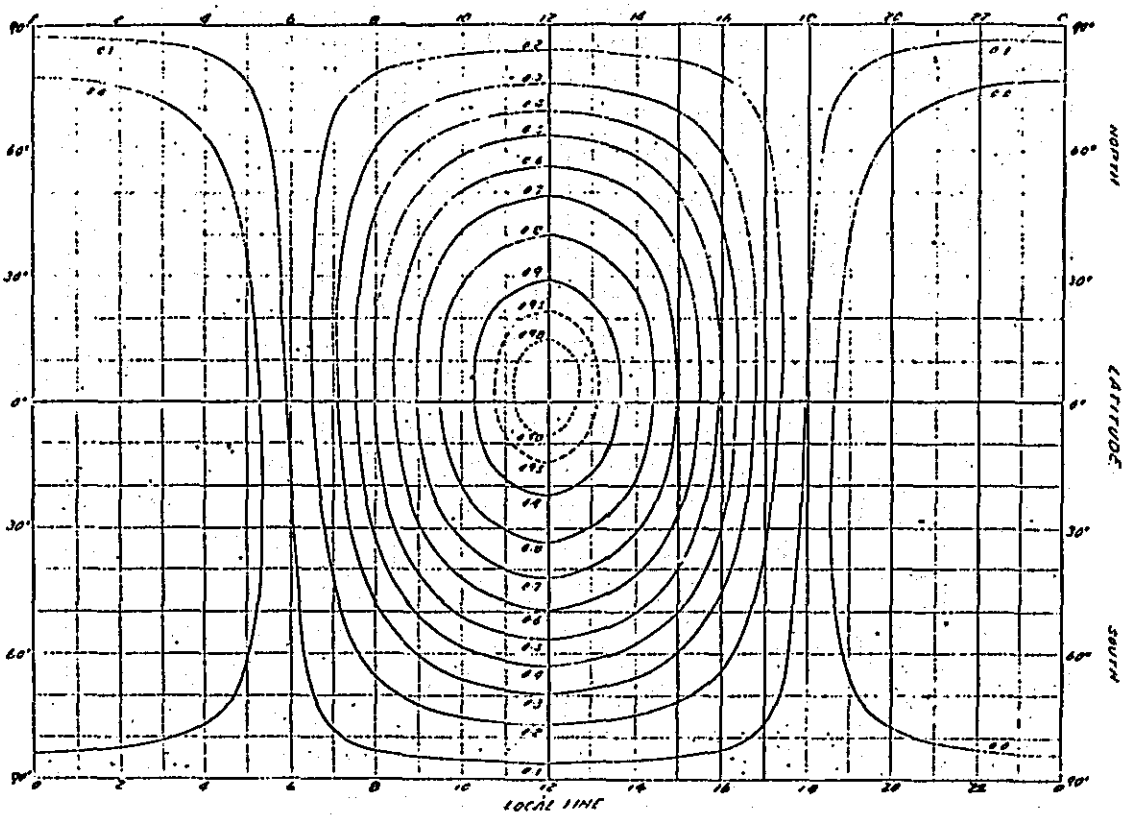


Fig. 6-3-11 Absorption Factor: K. For September

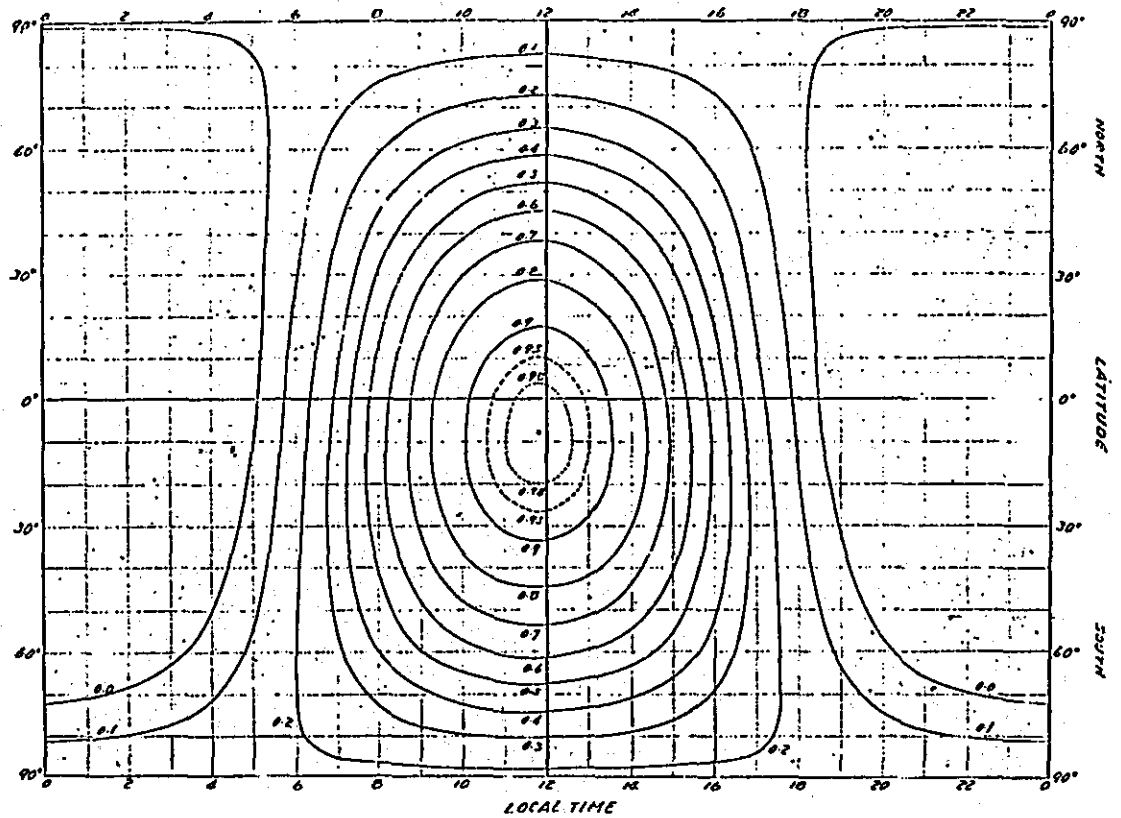


Fig. 6-3-12 Absorption Factor: K. For October

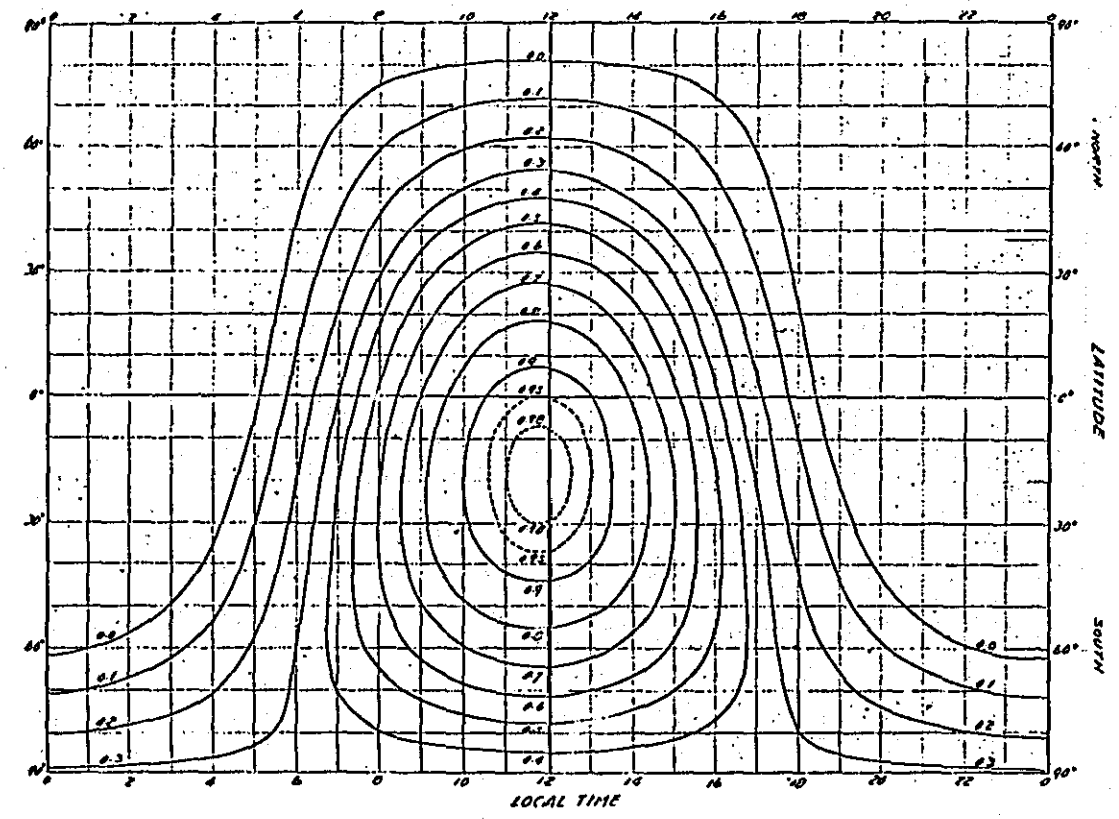


Fig. 6-3-13 Absorption Factor: K. For November

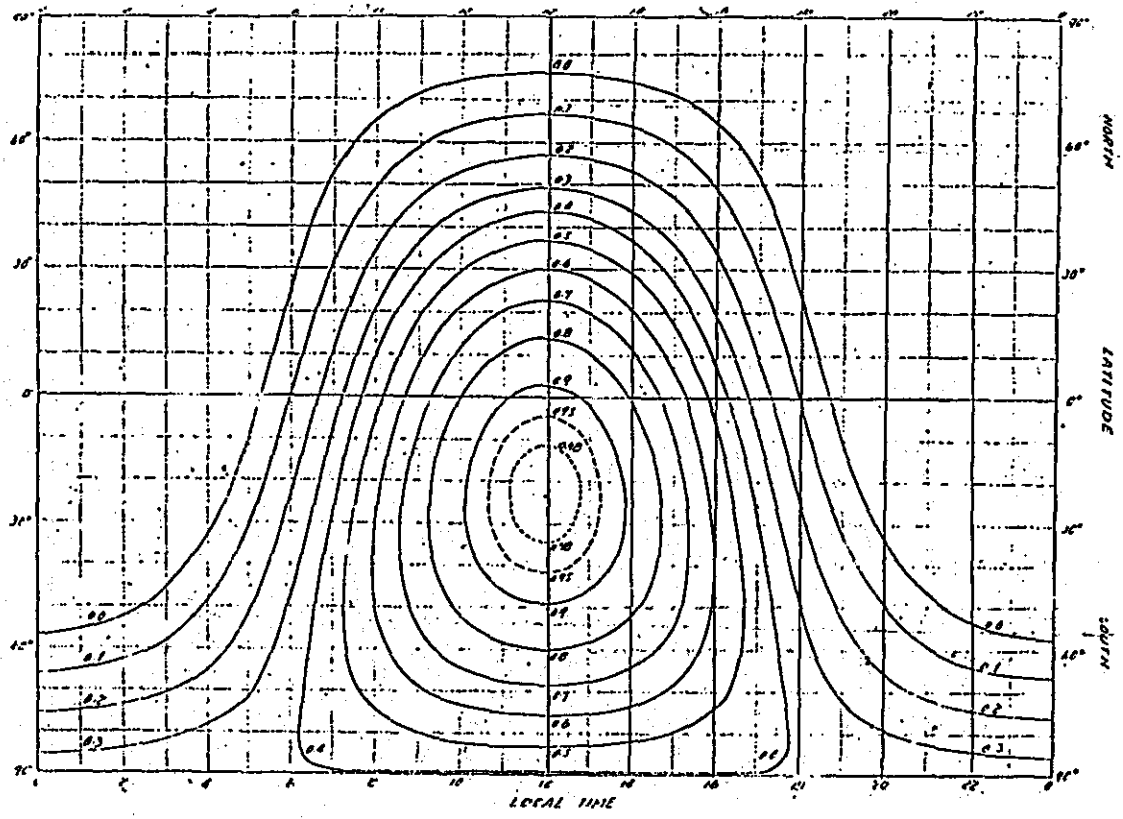


Fig. 6-3-14 Absorption Factor: K. For December

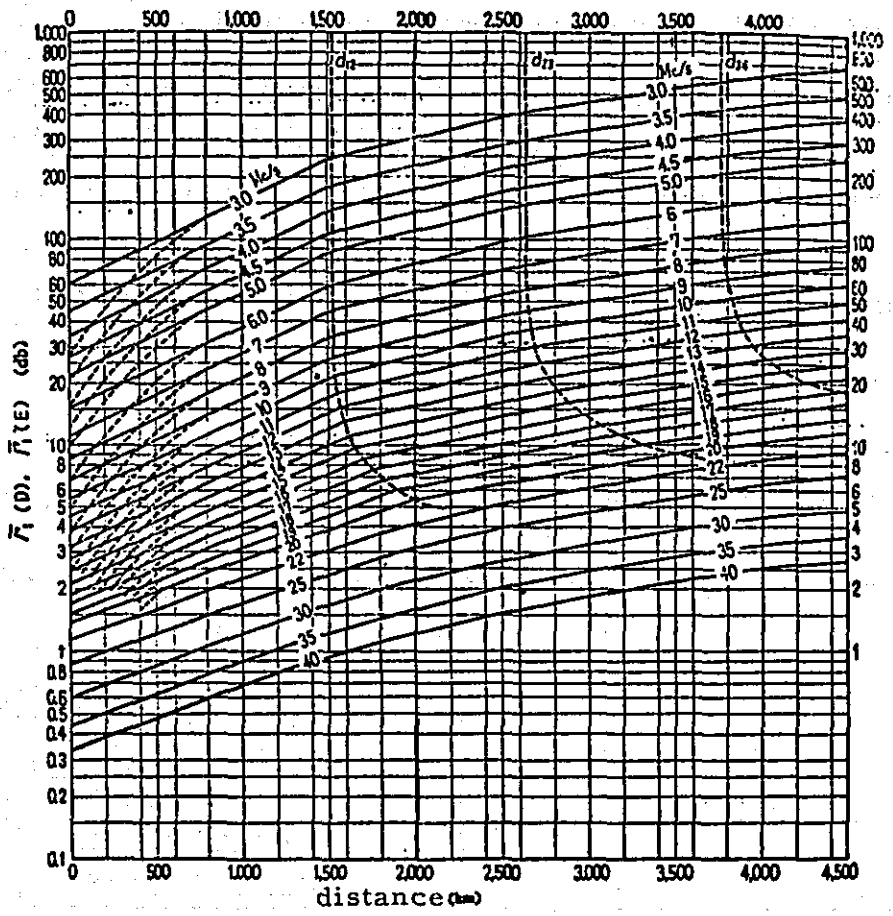


Fig. 6-3-15 Attenuation of the First Kind

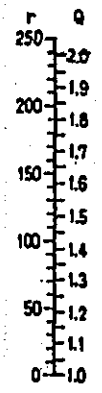


Fig. 6-3-16
Solar Activity
Characteristic

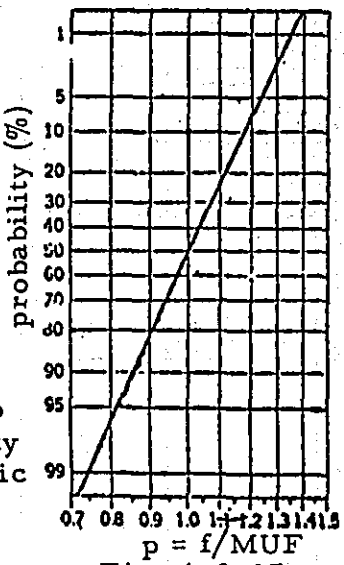


Fig. 6-3-17
F Layer Reflection
Probability

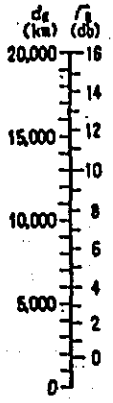


Fig. 6-3-18
Ground
Reflection Loss

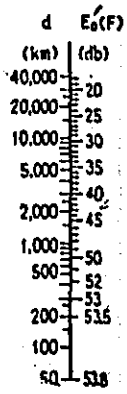


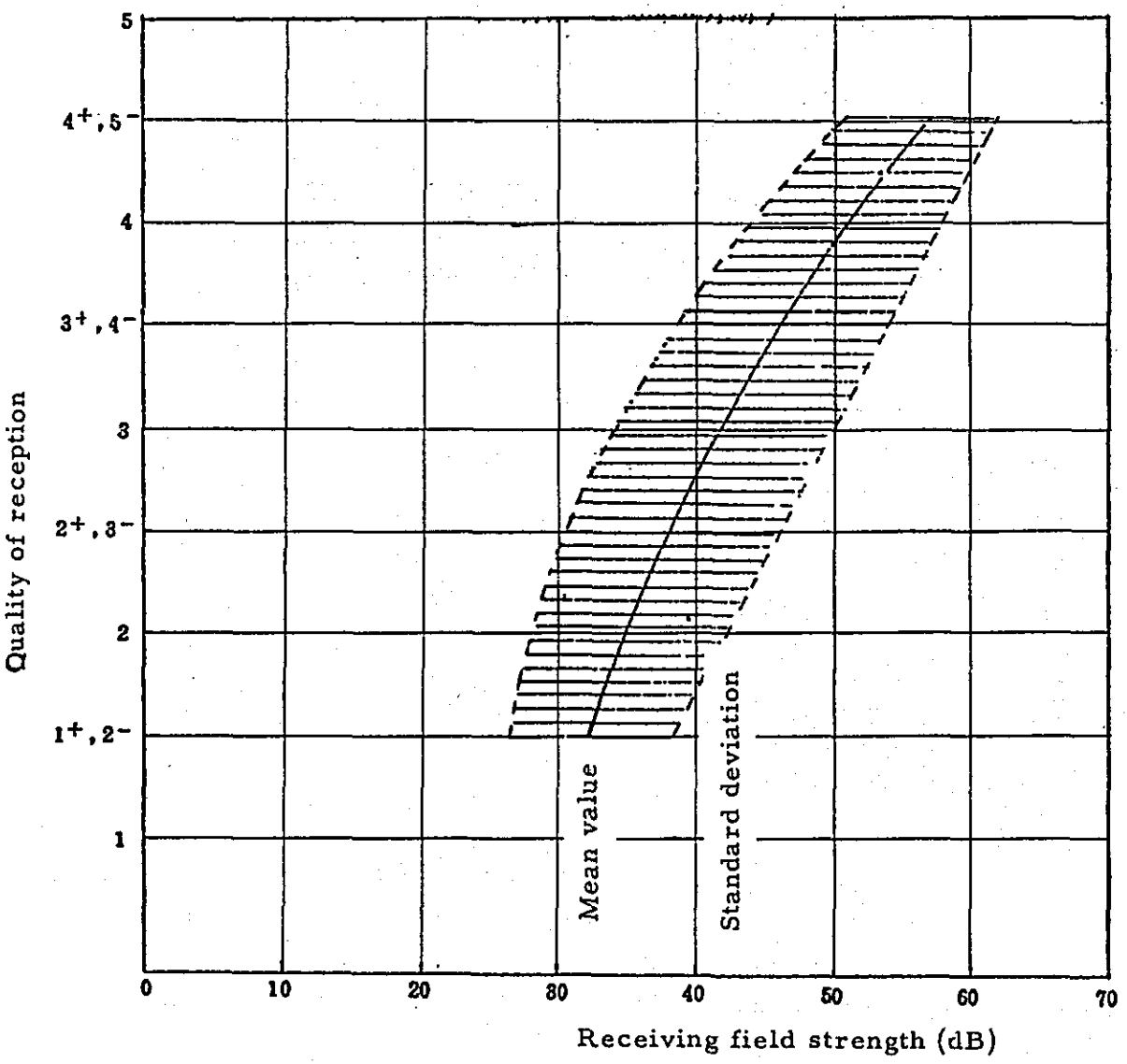
Fig. 6-3-19
Field Strength
without Attenuation

3-3 Receiving Field Strength and Quality of Reception

Required field strength at the receiving point for serviceable receiving quality varies with frequency, environmental condition, type and installing condition of the receiving antenna, quality of the receiver, and so forth.

Shown in Fig. 6-3-20 is an example of the relation between field strength at the receiving point and quality of the reception to the result of a survey made in Japan.

Fig. 6-3-20 Receiving Field Strength and Quality of Reception



Outline of the used facilities

Facilities	Outline of specifications
Receiving antenna	Vertical dipole antenna, 5m above the ground level (Yachiho Receiving Station in Nagano Prefecture, Japan)
Receiver	Sensitivity ..... 5μV Output 500mW S/N = 10 dB Modulation 400Hz 30% Selectivity ..... Full band width of 6 dB attenuation 150Hz-5KHz Full band width of 60 dB 12KHz-20KHz Manufactory ... JRC (NMR-240N)

3-4 Optimum Working Frequency (FOT) for Each Direction, SSN, Season, and Hour

The optimum working frequency (FOT) from Dacca to principal cities in the world is shown in Table 6-3-2 to Table 6-3-13, where optimum working frequency is calculated referring to the following material.

Handbook for CRPL
Ionospheric Predictions Based on Numerical Method of Mapping.
National Bureau of Standards Handbook 90.
Issued December 21, 1962; 6 Calculation of MUF and FOT
(Propagation by E- and F-Layers)

Table 6-3-2 FROM DACCA TO EUROPE (1/2)

[number] = Frequency (Band) of Optimum Traffic in MHz

GMT / BST	18 / 0	20 / 2	22 / 4	24 / 6	2 / 8	4 / 10	6 / 12	8 / 14	10 / 16	12 / 18	14 / 20	16 / 22	18 / 24	20 / 2	22 / 4	24 / 6	
SSN = 17																	
							6	8	10	12			18	20	22	24	..... Standard Time in England
							11(15)	15	15	11(15)			11(15)	11	11		Summer
	London						11	15	15	15			9(11)	9(11)	7		Equinox
							9(11)	17	17	11			7	7	7		Winter
													19	21	23	1	..... Standard Time in France
													11(15)	11	11		
										Paris			9(11)	9(11)	7		
													7	7	7		
SSN = 52 ~ 71																	
							15	15(17)	15(17)				17	17	11(15)		
	London						15(17)	17	17(21)				11	11	9		
							11	21	25				7	6(7)	7		
													17	15(17)	11(15)		
										Paris			15	11	9		
													7	7	7		
SSN = 105																	
							17	17	17				17	17	15		
	London						17	21	21				11(15)	11	11		
							11(15)	25	25				7	7	7		
													17	17	15		
										Paris			15	11	11		
													7	7	7		

Table 6-3-3 FROM DACCA TO EUROPE (2/2)

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	
SSN = 17													19	21	23	1	..... Standard Time in Italy
											Summer		11(15)	11	11		
											Equinox		9(11)	9(11)	7(9)		
								Rome			Winter		7	7	7(9)		
													19	21	23	1	..... Standard Time in Spain
													11(15)	11(15)	11		
								Madrid					11	11	7(9)		
													7	7	7(9)		
SSN = 52 ~ 71													17	15(17)	15		
													11(15)	11	11		
								Rome					7	7	7(9)		
													17	15(17)	15		
								Madrid					11(15)	11	11		
													7	7	7		
SSN = 105													17	17	15(17)		
													15	11(15)	11		
								Rome					9	9	9		
													15	17	15(17)		
								Madrid					15	11(15)	11		
													7(9)	9	9		

Table 6-3-4 FROM DACCA TO USSR

[number] = Frequency (Band) of Optimum Traffic in MHz

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4

SSN = 17

		19	21	23	24	1	..... Moscow Standard Time
Moscow	Summer	17	11(15)	11			
	Equinox	11	9(11)	9			
	Winter	7	7	7			

	18	20	22	24	..... Omsk Standard Time
Omsk	11(15)	15(17)	15		
	15	11(15)	11		
	9(11)	7(9)	7		

SSN = 52 ~ 71

Moscow	17	17	15
	15	11	11
	7	7	7
Omsk	17	17	17
	21	17	11(15)
	15	9(11)	7

SSN = 105

Moscow	17	17	17
	17	11(15)	11
	9(11)	7	7(9)
Omsk	21	17(21)	17
	25	21	15
	17(21	(11(15)	7(9)

Table 6-3-5 FROM DACCA TO AFRICA (1/2)

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4	
SSN = 17													18	20		.... Standard Time in Ghana
												Summer	11	11		
											Accra	Equinox	11	11		
												Winter	11	9(11)		
													19	21	23	.... Standard Time in Ethiopia
											Addis Ababa		17	11	11	
													15(17)	11	11	
													15(17)	11(15)	11	
SSN = 52 ~ 71													15(17)	15		
											Accra		17	17		
													17	15		
													17(21)	15	11(15)	
											Addis Ababa		21	17(21)	17	
													25	21	17(21)	
SSN = 105													17	17		
											Accra		21	17(21)		
													21	17		
													21	17	17	
											Addis Ababa		17	25	21	
													25	25	25	

Table 6-3-6 FROM DACCA TO AFRICA (2/2)

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4	
SSN = 17												18	20	22	.....	Standard Time in South Africa
											Summer	11(15)	9	7		
							Johannesburg				Equinox	17	15	11		
											Winter	17	15	11		
SSN = 52 ~ 71												15	9	7		
												21	17(21)	15(17)		
												21(25)	21	21		
SSN = 105												11	9	7(9)		
												25	25	21		
												25	25	25		

Table 6-3-7 FROM DACCA TO NORTH WEST OF AMERICA

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4
SSN = 17															
									16	18 ..... Standard Time in San Francisco					
									11	11				Summer	
				San Francisco					11(15)	11(15)				Equinox	
									9(11)	11				Winter	
SSN = 52 ~ 71															
									11	11(15)					
									17	17					
									11	17					
SSN = 105															
									15	15					
									17	17(21)					
									11(15)	21					

Table 6-3-8 FROM DACCA TO RAWALPINDI

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	
Rawalpindi		2	4	6	8	10	12	14	16	18	20	22	24	
SSN = 17	9	7(9)					11	15	15			9(11)	◄- - - -	Summer
	7	7					17	17	17(21)			7	◄- - - -	Equinox
	6	6					15(17)	17	15(17)			6(7)	◄- - - -	Winter

Table 6-3-9 FROM DACCA TO FAR EAST

[number] = Frequency (Band) of Optimum Traffic in MHz

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	
BST*	0	2	4	6	8	10	12	14	16	18	20	22	24	
SSN = 17	Tokyo				9	11	13	15	17		21	23	1	..... Japan Standard Time (JST)
	[11 9(11) 9(11) 7(9) 7 7(9)]				[17 17 17 17 21 17 17(21) 21 21 21 15 21 21 21 17(21)]						[17 11(15) 11 15 9(11) 9(11) 9 7 7]			
											20	22	24	2 ..... Peking Standard Time
									Peking		[17 15 11 17 11 7(9) 9 7 7]			
SSN = 52 ~ 71	Tokyo													
	[15(17) 11(15) 11(15) 11 7(9) 7(9)]				[17 17(21) 21 21 25 21 25 25 25 25 17(21) 25 25 25 25]						[21 17 17 21 15(17) 15 17 11 7]			Tokyo
									Peking		[17(21) 15(17) 15 21 15 11 17 11 7]			
SSN = 105	Tokyo													
	[17 17 17 11(15) 9(11) 7]				[21 21 21 25 25 25 25 25 25 25 21 25 25 25 25]						[21 21 21 25 21 17 21 21(25) 9(11)]			Tokyo
									Peking		[21 17 17 25 17(21) 15 21 15 11]			

* BST = Bangladesh Standard Time

Table 6-3-10 FROM DACCA TO MIDDLE EAST (1/2)

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4	
SSN = 17												18	20	22	24	.... Standard Time in Turkay
										Summer		17	11(15)	11(15)		
							Ankara			Equinox		11	9(11)	9(11)		
										Winter		7(9)	7	7(9)		
												18	20	22		.... Standard Time in Syria
												17	11(15)	11(15)		
							Damuscus					11	11	11		
												9	7	7		
			0	2		6	8	10	12	14		18	20	22		.... Standard Time in U. A. R.
			11	11		17	17	17	21	21		17	11(15)	11(15)		
	Cairo		11	7(9)		17	17(21)	21	25	25		11(15)	11	11		
			7(9)	7		15	9(11)	21	25	21		9(11)	9	7		
SSN = 52 ~ 71												17(21)	17	17		
									Ankara			17	11(15)	11		
												11	9	7		
									Damuscus			17(21)	17	15(17)		
												17	15	17		
												15(17)	11	7(9)		
			11(15)	11		17	21	21	25	25		17(21)	17	15(17)		
	Cairo		11	9(11)		21	25	25	25	25		17(21)	15	15		
			11	7		21	25	25	25	25		17	11	11		

Table 6-3-11 FROM DACCA TO MIDDLE EAST (2/2)

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4

SSN = 105

Ankara

18	20	22
17	17	17
17	15	15
15	9	9

Damuscus

18	20	22
17	17	17
17(21)	15	15
17	11	9

Cairo

0	2
17	17
11(15)	11
11	7

6	8	10	12	14
21	21	21(25)	25	25
25	25	25	25	25
21	25	25	25	25

18	20	22
17	17	17
21	17	15(17)
21	15	11

Table 6-3-12 FROM DACCA TO SOUTH EAST AISA (1/2)

number = Frequency (Band) of Optimum Traffic in MHz

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	
SSN = 17					10	12	14	16	18	22	24	2	4	6	..... Sydney Standard Time		
	Sydney				17	15(17)	15	15(17)	17	9 MHz	7(9)	7(9)	7(9)	7			
					17	17	17	17(21)	21	11	11	9(11)	7(9)	7			
					17	21	17(21)	21	21(25)	17	17	11(15)	11	7(9)			
										19	21	23	1	..... Djakarta Standard Time			
	Djakarta									21	15	9(11)					
										21(25)	21	17					
										17(21)	17	15					
SSN = 52 ~ 71					21	21	17(21)	21	21	9	9	9	7(9)	7			
	Sydney				21	21	21	21	21(25)	15	15(17)	11(15)	9(11)	7(9)			
					21	25	21(25)	21(25)	25	25	21	21	17	15			
										21(25)	21	15(17)					
	Djakarta									25	25	21					
										21	21	17(21)					
SSN = 105					21	21(25)	21	21	21	15	11	11	11	9(11)			
	Sydney				25	25	21	21	25	21	17(21)	15(17)	11(15)	11			
					21	25	25	21(25)	21(25)	21	21	21	17(21)	17			
										25	25	21					
	Djakarta									25	25	25					
										21	21	21					

Table 6-3-13 FROM DACCA TO SOUTH EAST ASIA (2/2)

number = Frequency (Band) of Optimum Traffic in MHz

GMT	18	20	22	24	2	4	6	8	10	12	14	16	18	
BST	0	2	4	6	8	10	12	14	16	18	20	22	24	
SSN = 17														
											20	22	24	2 ..... Manila Standard Time
									Summer		21	11(15)	9(11)	
								Manila	Equinox		21	11	11	
									Winter		15(17)	11	11	
SSN = 52 ~ 71														
											21	15	15	
								Manila			25	21	17	
											25	21	17	
SSN = 105														
											25	21	17(21)	
								Manila			25	25	25	
											25	25	25	

3-5 Periodic Chart of SSN

The periodic chart of sunspot numbers (SSN) is shown in Fig. 6-3-21.

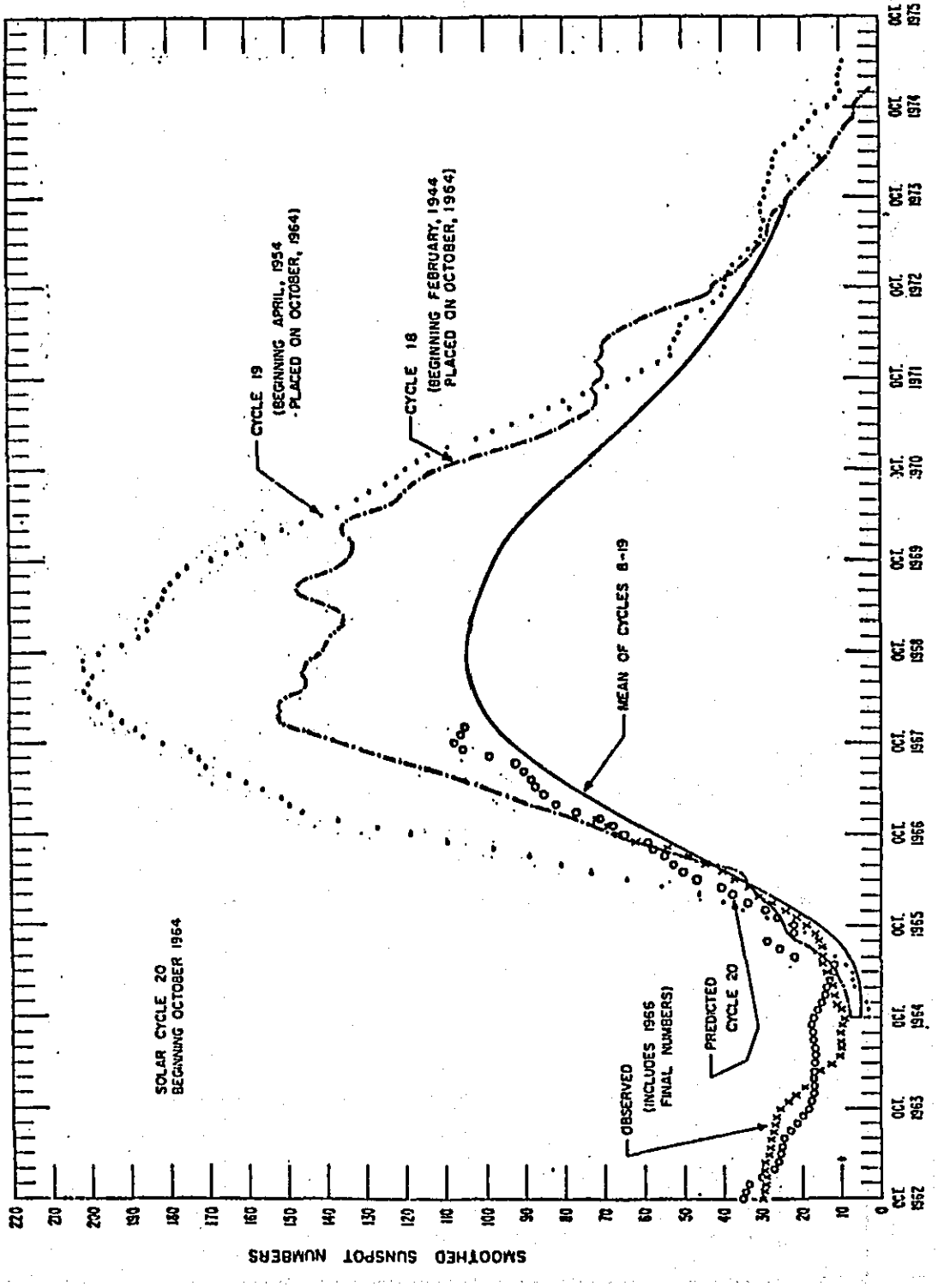


Fig. 6-3-21 Periodic Chart of SSN

3-6 Outline of the Prospective Transmitting Facilities and Broadcasting Hours

Broadcasting hours of the new facilities in each direction are not fixed without deciding how to use the facilities.

Shown in Table 6-3-14 is an relation between facilities and broadcasting hours at the end of the first step of the construction plan, considered to be helpful in the course of study to decide the details of operation.

Table 6-3-14 Rough Relations between Facilities and Broadcasting Time at the end of the 1st Phase

Transmission	Pair of Transmitters & Antenna				Major Countries	Major Cities	Broadcasting Time at Dacca Station (Local Time)
	TX		Ant.				0 2 4 6 8 10 12 14 16 18 20 22 24
	Power	TX NO.	Direction	Ant. NO.			
Far East	100kW ≀ 200	Q_1 (Q_2) ≀ Q_1/Q_2	50°/69°/88°	RH-1/2/3 x 2	Japan	Tokyo	21 22 23 24
					Korea	Seoul	21 22 23 24
					China	Peking	20 22 24
					Philippines	Manila	20 22 24
South East Asia	200kW	Q_3/Q_4	116°/135°	RH-4/5 x 2	Australlia	Sydney	20 24
					Indonesia	Djakarta	19 20 22 24
					Malaysia	Singapore	20 22 24
					Vietnam	Saigon	20 22 24
					Thai	Bangkok	19 20 22 24
USSR	200kW	Q_1/Q_2	347°	RH-7 x 2	USSR	Omsk	18 20 22 24
						Moscow	23 24 / 19 20 21
Europe	200kW	Q_3/Q_4	315° (315°)	RH-6 x 2 (RH-5')	Norway, Sweden	Oslo	20 22 24 / 18 19
					Germany, France	Bonn, Paris	19 20 22 24
					Italy, Spain	Rome, Madrid	19 20 22 24
					England	London	18 20 22 24
					Greece	Athens	20 22 24 / 18 20
Middle East	200kW	Q_3/Q_4	315°/295°	RH-5'/4' x 2	Turkey	Ankara	20 22 24 / 18 20
					Iran, Iraq		21 22 24 / 18 20
					Syria	Damuscus	20 22 24 / 18 20
Africa	200kW	Q_1/Q_2	230°/249°/268°	RH-1'/2'/3' x 2	U. A. R.	Cairo	20 22 24 / 18 20
					Ghana	Accra	18 20 22 24
					Ethiopia	Addis Ababa	21 22 24 / 19 20
					South Africa	Johannesburg	20 22 24 / 19 20

Local Time at Target Area

3-7 Proposed Specifications of the Short-wave Transmitting Facilities for External Service

Stated below are outlines of the proposed specifications of the principal transmitting facilities for the new short-wave external service.

3-7-1 System of the Transmitting Station

Shown in Fig. 6-3-22 is a system flowchart of the main facilities of the transmitting station.

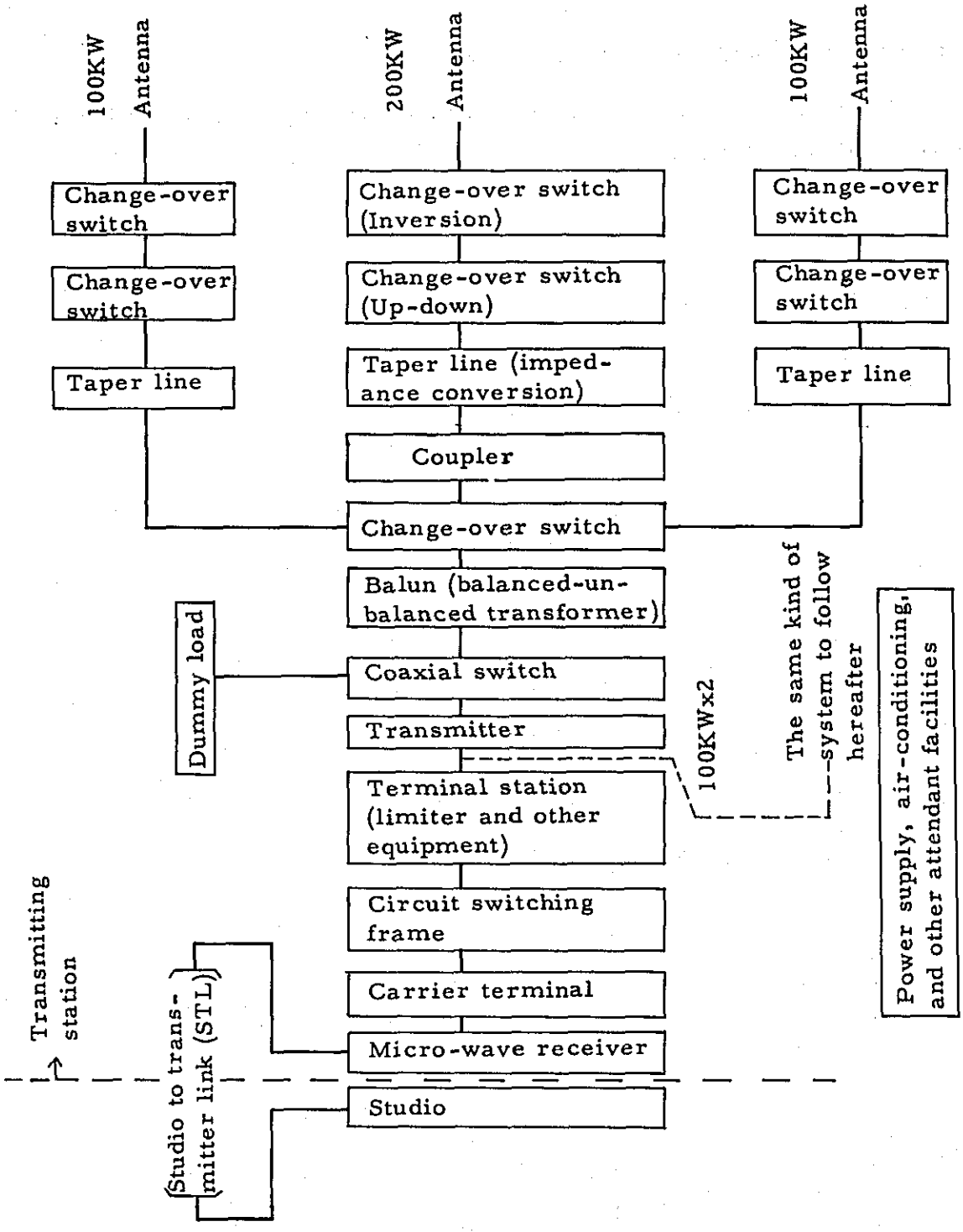


Fig. 6-3-22 System Flowchart of the Transmitting Station Facilities for External Service

3-7-2 Antenna Facilities

(1) Configuration of Antennas

General view of the antenna configuration is shown in Fig. 6-3-23.

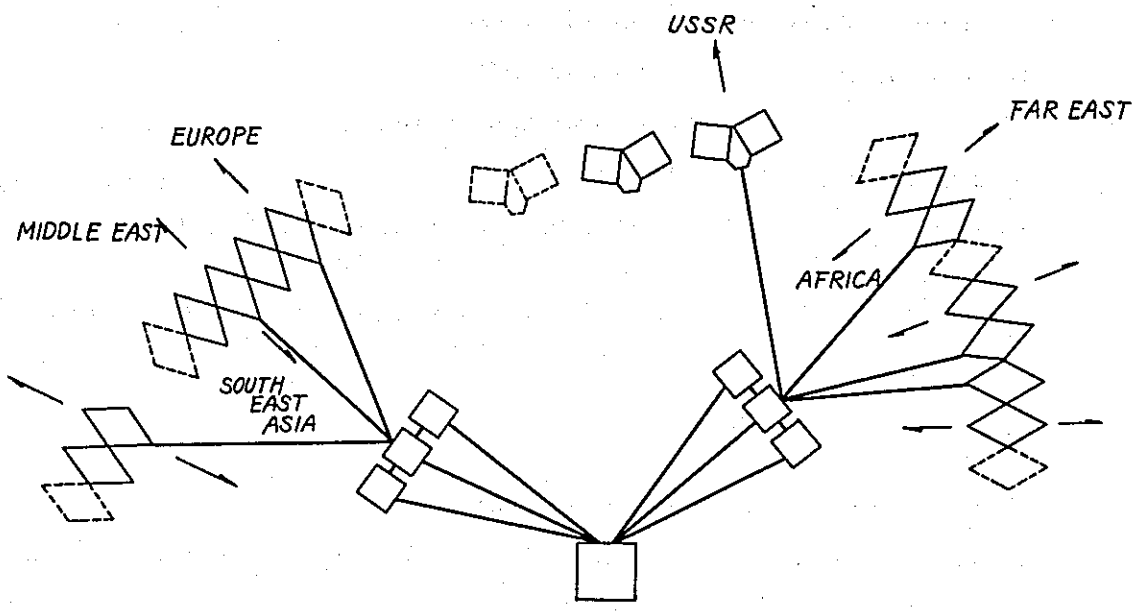


Fig. 6-3-23 General View of the Antenna Configuration
(The first step ... Solid line
The second step ... Dotted line)

(2) Specifications of Antennas

a) The Far East and Africa

Used frequency	9 MHz-25 MHz
Type	Rhombic type antenna
Radiation angle	10°-15°

Bearing	50°/230° 69°/249° 88°/268°	Equipped with bilateral directivity inverter
Installation	Each bilateral antenna to be set on common poles shared by type B and type E	

b) Shoutheast Asia and the Middle East

Used frequency	9 MHz-25 MHz	
Type	Rhombic type antenna	
Radiation angle	10°-15°	
Bearing	116°/296° 135°/315°	Equipped with bilateral directivity inverter
Installation	Each bilateral antenna to be set on common poles shared by type B and type E	

c) USSR

Used frequency	7 MHz-17 MHz
Type	Rhombic type wide-angle directive antenna
Radiation angle	10°-15°
Bearing	347°(Unilateral)

A wide-angle directive antenna is made of two shunt excited antennas with different main directions, and is suitable for those service areas with wide-angle (in this case, approximately 60°).

d) Europe

Used frequency	7 MHz-17 MHz
Type	Rhombic type antenna
Radiation angle	10°-15°
Bearing	315°(Unilateral)
Installation	Each to be set on common poles shared by type A and type C

(3) Specifications of Rhombic Type Antennas

Specifications of the rhombic type antennas are shown in Table 6-3-15.

Table 6-3-15 Specifications of Rhombic Type Antennas

	Type A	Type B	Type C	Type E
Element length	140 m	120 m	120 m	80 m
Half power width	20°-5°	20°-5°	15°-5°	15°-5°
One half of the interior side angle of rhombus	65°	65°	70°	70°
Gain	More than 15 dB	More than 15 dB	More than 15 dB	More than 15 dB
Height	35 m	35 m	20 m	15 m

The gain in the above table is subject to the following condition.

	Radiation angle	Frequency range
Type A	10°	7.5MHz-13.5MHz
	15°	6.5MHz-10.3MHz
Type B	10°	8.5MHz-15.3MHz
	15°	7.2MHz-10.8MHz
Type C	10°	11.5MHz-24.0MHz
	15°	9.5MHz-17.0MHz
Type E	10°	16.5MHz-25.0MHz
	15°	13.7MHz-25.0MHz

(4) Structure of the Wide-angle Directive Antenna

Structure of the wide-angle directive antenna is shown in Fig. 6-3-24.

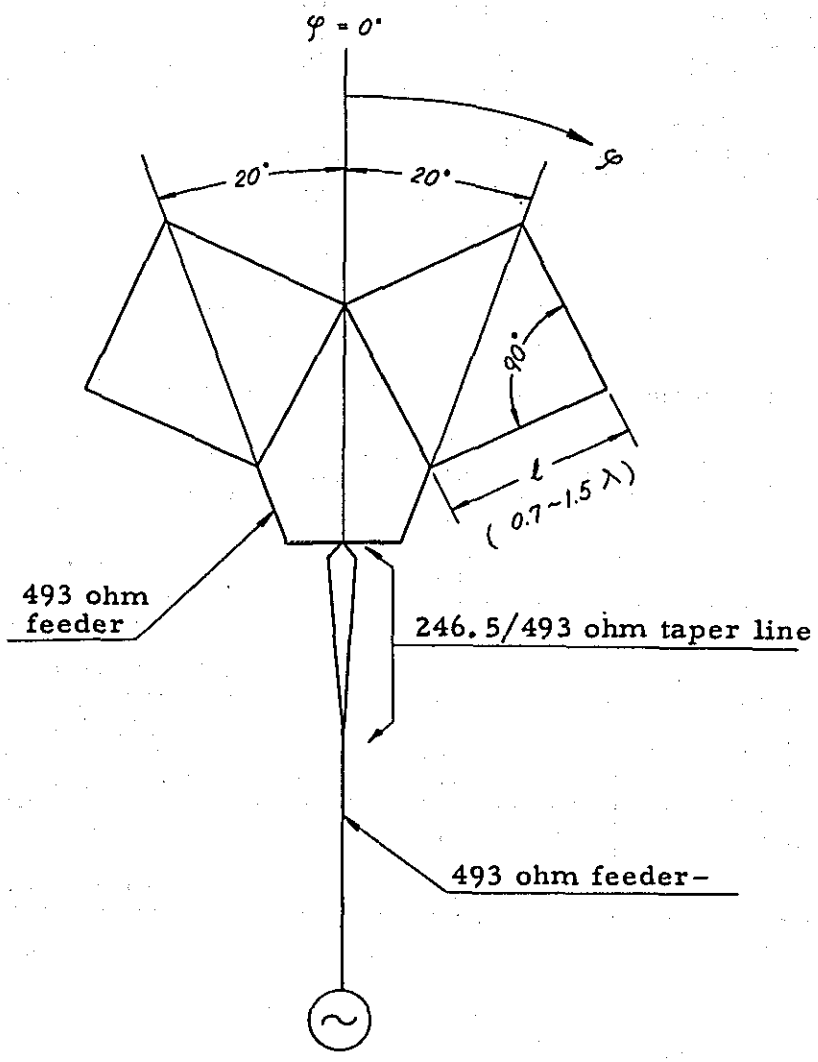
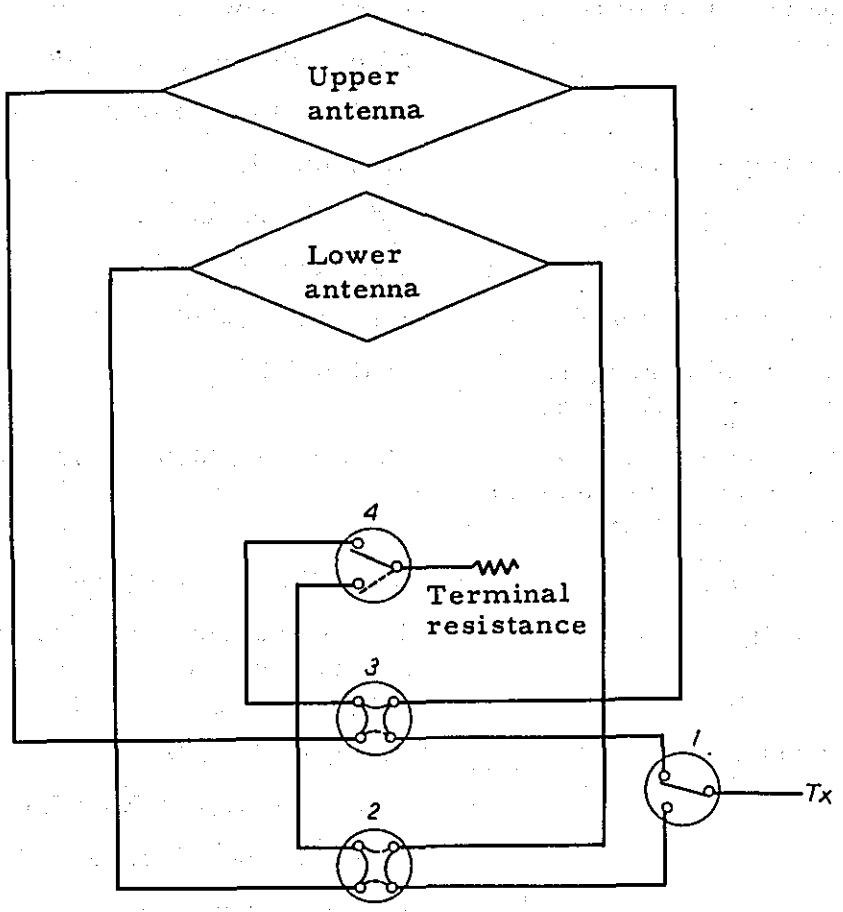


Fig. 6-3-24 Structure of the Wide-angle Directive Antenna

(5) Configuration of the Bilateral Antennas on Common Poles

Configuration of the bilateral antenna on common poles is shown in Fig. 6-3-25.



1. Change-over switch of the upper and lower antennas (Interlocked with 4)
2. Inversion switch
3. Inversion switch
4. Change-over switch of terminal resistance (Interlocked with 1)

Fig. 6-3-25 Configuration of the Bilateral Antennas on Common Poles

3-7-3 Feeder System

As shown in Fig. 6-3-25, the feeder system consists of several HF 100 kw balanced-unbalanced converters and switches.

(1) Balanced-unbalanced converter

Frequency range	5.9-26.1 MHz
Maximum transmission power	Carrier power: 100 kw Modulation degree: 100 % VSWR: Less than 3.0
Input impedance	50Ω, unbalanced
Output impedance	305Ω, balanced
VSWR	Less than 1.1
Input/output coupling	Less than (-)40 dB
Unbalanced degree of output terminal voltage	Within ± 5 %
Insulation resistance between innder conductor and outer conductor	More than 2,000 MΩ(1,000 V megger)
Input plug	WX-222D coaxial plug
Output terminal	Twin-lead type terminal of 25.4 mm in diameter and 160 mm in center gap length
Components	Flanged WX-222D Converter tube WX-290D Flanged coaxial copper pipe WX-290D 8-step transformer

(2) Switch

Frequency range	4.7 MHz-25 MHz
VSWR	Less than 1.05 (6-22 MHz) Less than 1.07 (Less than 6 MHz or more than 22 MHz)
Withstand voltage	
Line	More than 32 KV (AC50 Hz)
Ground	More than 16 KV (AC50 Hz)

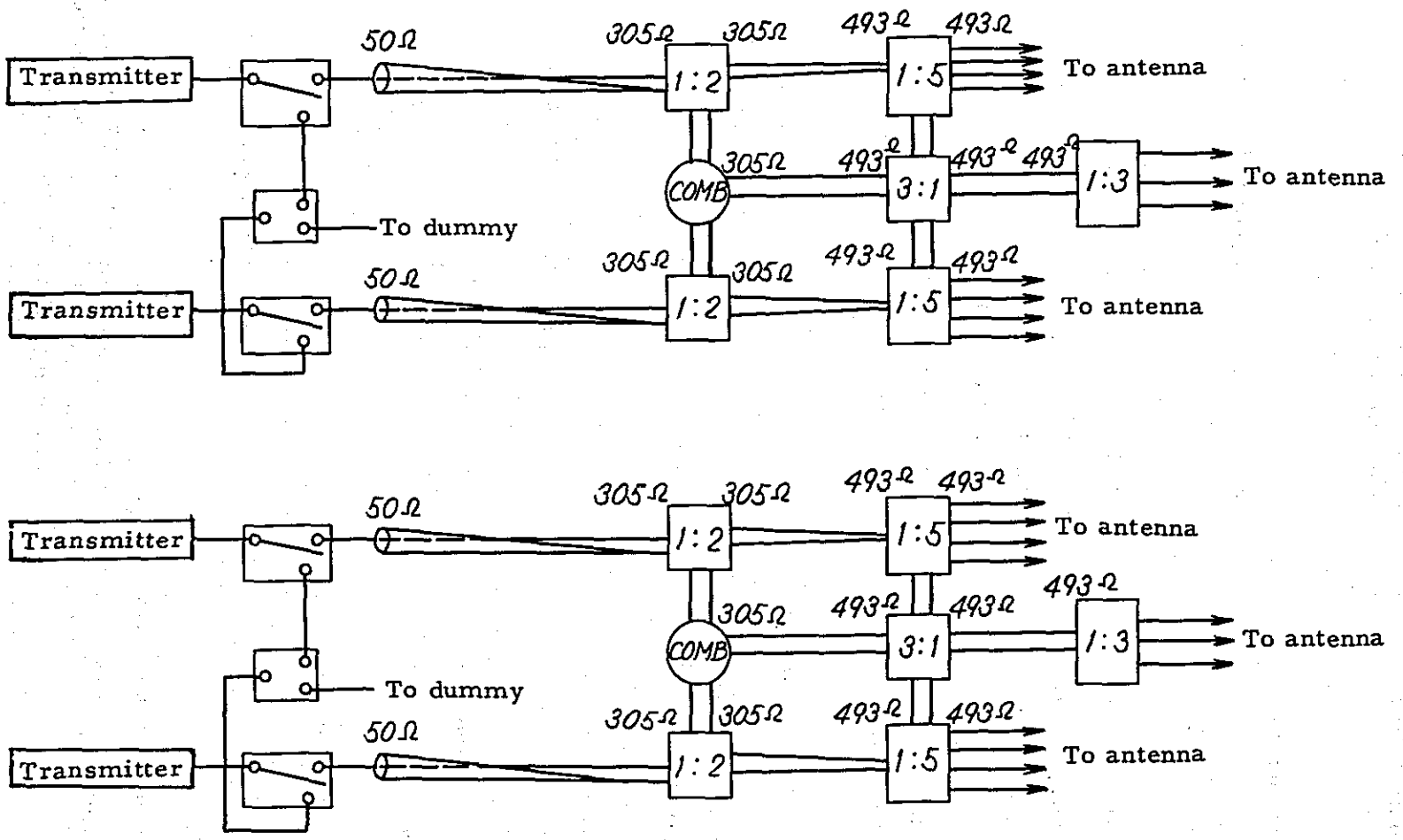


Fig. 6-3-26 Connection Diagram of the Feeder System

Insulation resistance	More than 200 MΩ (1,000V megger)
Input-output impedance compensation	By the attached compensating coil of 15mmφ copper tube

(3) Coaxial Switch

Type	Single-circuit 3-terminal automatic switch
Impedance	50Ω
Connector	230 D
Frequency range	5-30 MHz
Rated power	100 kw
VSWR	Less than 1.07
Leakage	Less than -60 dB
Switching time	Within 5 seconds (per terminal)

3-7-4 100 KW DSB Transmitter

(1) Amplifier Section

Frequency range	5.9 MHz-26.1 MHz
Type of radio wave	A3
Carrier output power	100 KW
Number of built-in frequencies	10 waves preset, automatic switching possible
Output impedance ce	50Ω, unbalanced
Frequency stability	Less than 1×10^{-5}

(2) Modulator Section

Modulator input impedance	600Ω, balanced
Modulator input level	1 mw at 1 kHz 100 % modulation

(3) General Characteristic

Frequency characteristic	Deviation within ± 1.5 dB at normal output under 1 kHz 50 % modulation in a range of 50 Hz to 10 kHz

Distortion	Less than 3 % at normal output under a standard modulation up to 80 % in a range of 100 Hz to 5 kHz
Signal-to-noise ratio	More than 57 dB under modulation within 100 %
Carrier output power regulation	Less than 5 % under 1 kHz 80 % modulation, standardizing normal output without modulation
Supurious power	Less than 50 mw
Stability of power source	All the electrical condition should be free from fluctuation within ± 10 % in supply voltage and 1 Hz in power source frequency.
Continuous operation	24 hours of continuous operation must be free from trouble under the condition of 0° to 40°C in room temperature and 40 % to 80 % in relative humidity.

(4) Power Source

Input power source	Three-phase, 50 Hz
Power-factor	More than 90 %
Overall efficiency	More than 50 % under 100 % modulation

(5) Block Diagram

Block diagram of the transmitter is shown in Fig. 6-3-27.

(6) Structure

Structure	The structure must be quake-proof (to be fixed to the floor), non-combustible, closed, and noise-proof.
Mechanically moving element	Component parts used for the mechanically moving elements must have enough reliability to promise a long period of stable operation, and structure easy to repair.
Automatic tuner	Digital servomechanism to be most desirable
Frequency switching time	Should be within 1 minute.

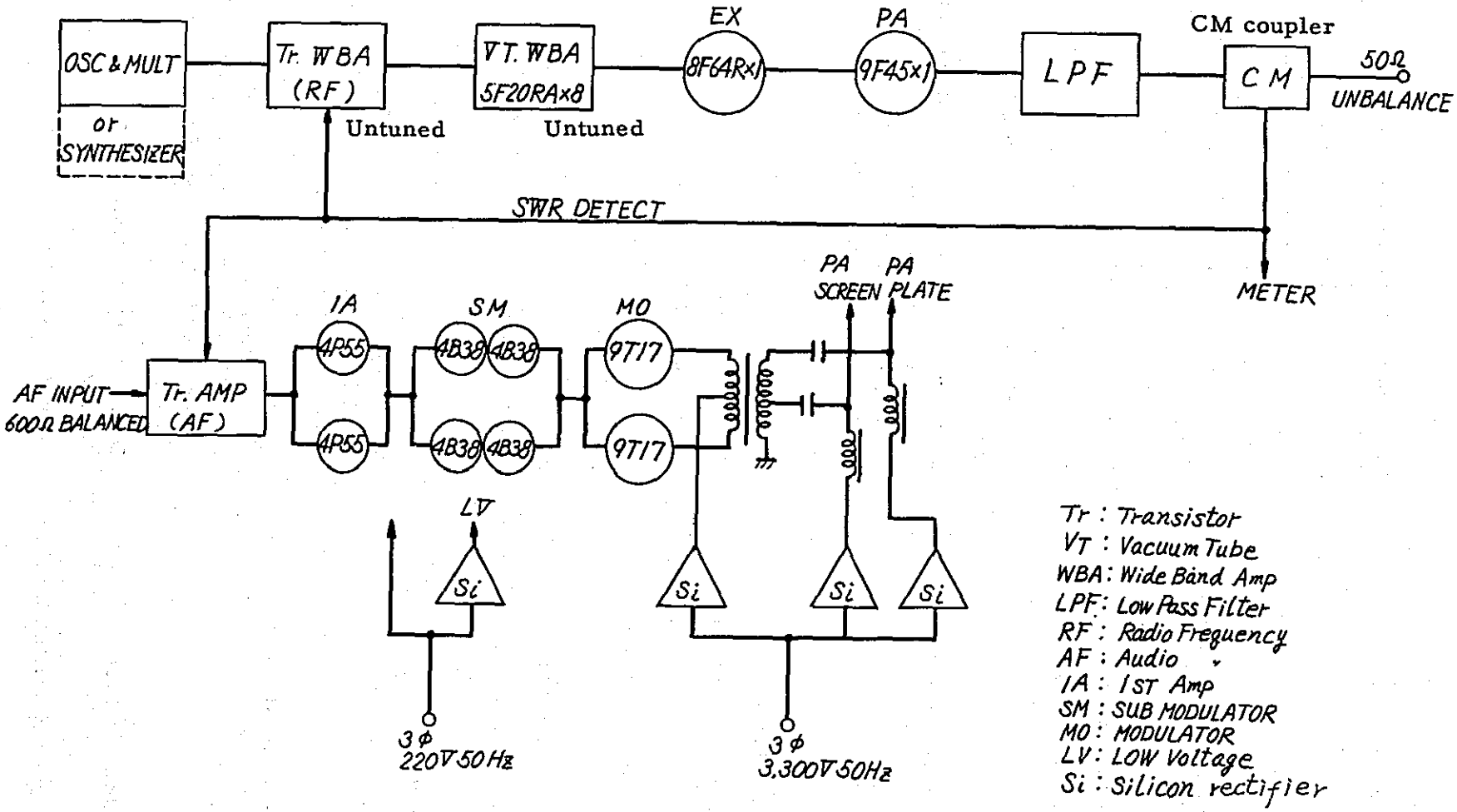


Fig. 6-3-27 Block Diagram of 100kw DSB Transmitter

Rectifier	Silicon rectifier devices should be used under enough protection.
Cooling	Component parts for high power devices require cooling.
VSWR trip unit	In order to protect the transmitter, a VSWR trip unit must be installed.

(7) Operation and Control

(i) The control frame of the transmitter must be installed in both the transmitter room and the control room so that the transmitter can be controlled from either of them.

(ii) The operation and control frame for the coaxial switch, the 1:2 switch, and the antenna switch must be installed also in the transmitter room so that each of them can be controlled also from the transmitter room.

(iii) The transmitter system must have such a configuration as is to operate in 50 kw output power through the power coupler without any hit and also is able to be switched into 100 kw, when one of the transmitters in 200 kw parallel operation stops.

3-7-5 Short-wave Power Coupler

Built-in frequency range	5.9 MHz-26.1 MHz
Normal output power	200 kw in parallel operation, 50kw in one-way operation

One-way operation means transmittion by one transmitter when either of the two transmitters in 200kw coupled operation stops. In this case, half of the 100 kw transmitter output is consumed for dummy load in the coupler, and only the remaining 50 kw becomes coupler output without any hit.

Number of built-in frequencies	10 waves, automatically to be switched
Input impedance	305Ω, balanced

VSWR is less than 1.1 whether the other input terminal is opened or terminated.

Output impedance	305Ω, balanced

3-7-6 Water-cooled Dummy Load

(1) Characteristic

Frequency range	5.9 MHz-26.1 MHz
Withstanding power	Average power more than 150 kw
Input impedance	50Ω, unbalanced (VSWR≤1.1 in the above range of frequency)

(2) Structure

(i) The resistor must be cooled by water. (In case no cooling water of good quality is available, the secondary cooling system should be applied.)

(ii) The indicator section of the resistor, the flow meter, and the thermometer must have such structure as is able to monitor the working condition of dummy load from without.

(iii) The input-output connectors of the colling water circuit must have suitable structure for easy connection with the external pipes.

(iv) It must be equipped with an earth terminal connectable with the external earth.

(v) The coaxial type CM wattmeter must be easily connected and disconnected.

3-7-7 Station Building and the Attendant Facilities

(1) Station Building

The ground floor of the two-storied station building must be of reinforced concrete, and the first floor of construction equivalent to a penthouse. The

general view of the equipment configuration in the station building is shown in Fig. 6-3-28.

(i) Indoor facilities of the station building

The ground floor	Transmitter, transmitter power supply, main power distributer, air-conditioning facilities, water purifying equipment, coaxial switch, operation and control equipment, terminal station, measuring instruments, and so forth
The first floor	Coupler, blower, steam condenser, secondary cooling equipment, antenna switch, and so forth

(ii) Required floor space

The ground floor	2,300 m^2-2,700 m^2
The first floor	Approximately 1,200 m^2
Total:	3,500 m^2-4,000 m^2

In case the capacity of the Diesel-engine generator becomes large, it must be installed in a separate building.

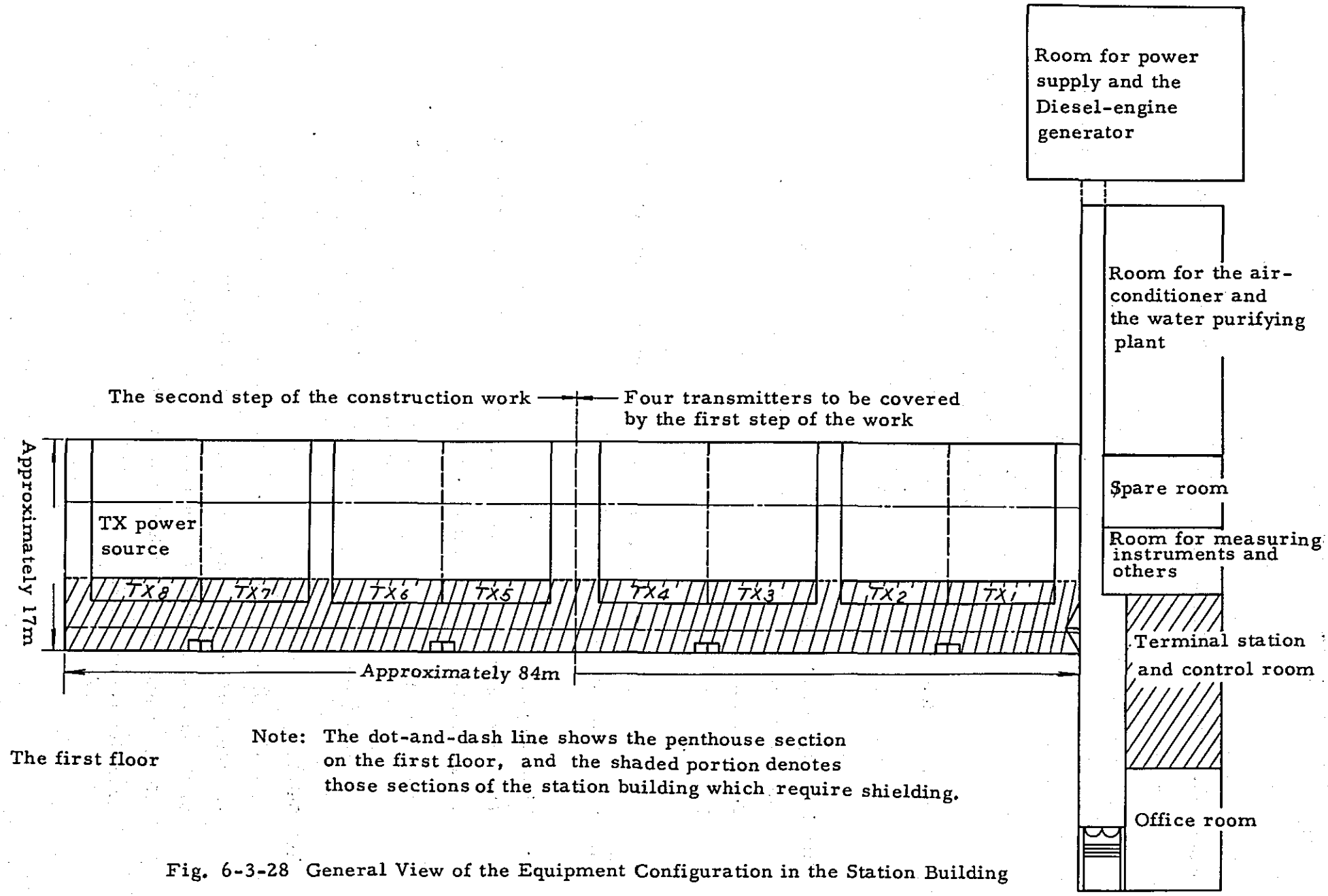
(iii) Floor Strength

The building must have such enough floor strength, for instance, as to satisfy the Building Standards Law in Japan.

The ground floor	Point load : More than 2 tons Drawing load : More than 1 ton
The first floor	Approximately 500 kg/m^2

(iv) Shielding

The transmitter room, the terminal station room, and so forth require shielding effect more than 50 dB. The ducts, the doorways, and so forth must be of such structure as causes no deterioration of shielding effect. Those sections which require shielding must be covered with grounded copper nets.



Note: The dot-and-dash line shows the penthouse section on the first floor, and the shaded portion denotes those sections of the station building which require shielding.

Fig. 6-3-28 General View of the Equipment Configuration in the Station Building

(v) Air-conditioning

The air in the station building should be controlled to lower than 35°C in temperature and less than 60 % in humidity. The decision of the capacity of the air-conditioner, however, requires further examination because the effect of air-conditioning varies with the environmental condition.

(vi) Piping

The station building must be designed taking the pipe arrangement for ducts and wiring into account from the beginning.

(2) Attendant Facilities and Others

(i) The terminal equipment should be furnished with a limiter amplifier and so forth considering the protection of the transmitter and the trapezoidal wave modulation.

(ii) The station building should be furnished with fire alarms by smoke sensor or others in order to prevent a fire.

(iii) The station building must be equipped with intraoffice telephone facilities and clocks.

(iv) The station must be furnished with a water purifying plant and a water tank. The capacity of them should be finally decided after due examination.

3-7-8 Power Supply Facilities

The system diagram of the power supply facilities is shown in Fig. 6-3-29. Outlines of the facilities are as follows.

(1) Receiving System

Power should be supplied through two receiving systems so as not to stop broadcasting service even if one of them gets into trouble.

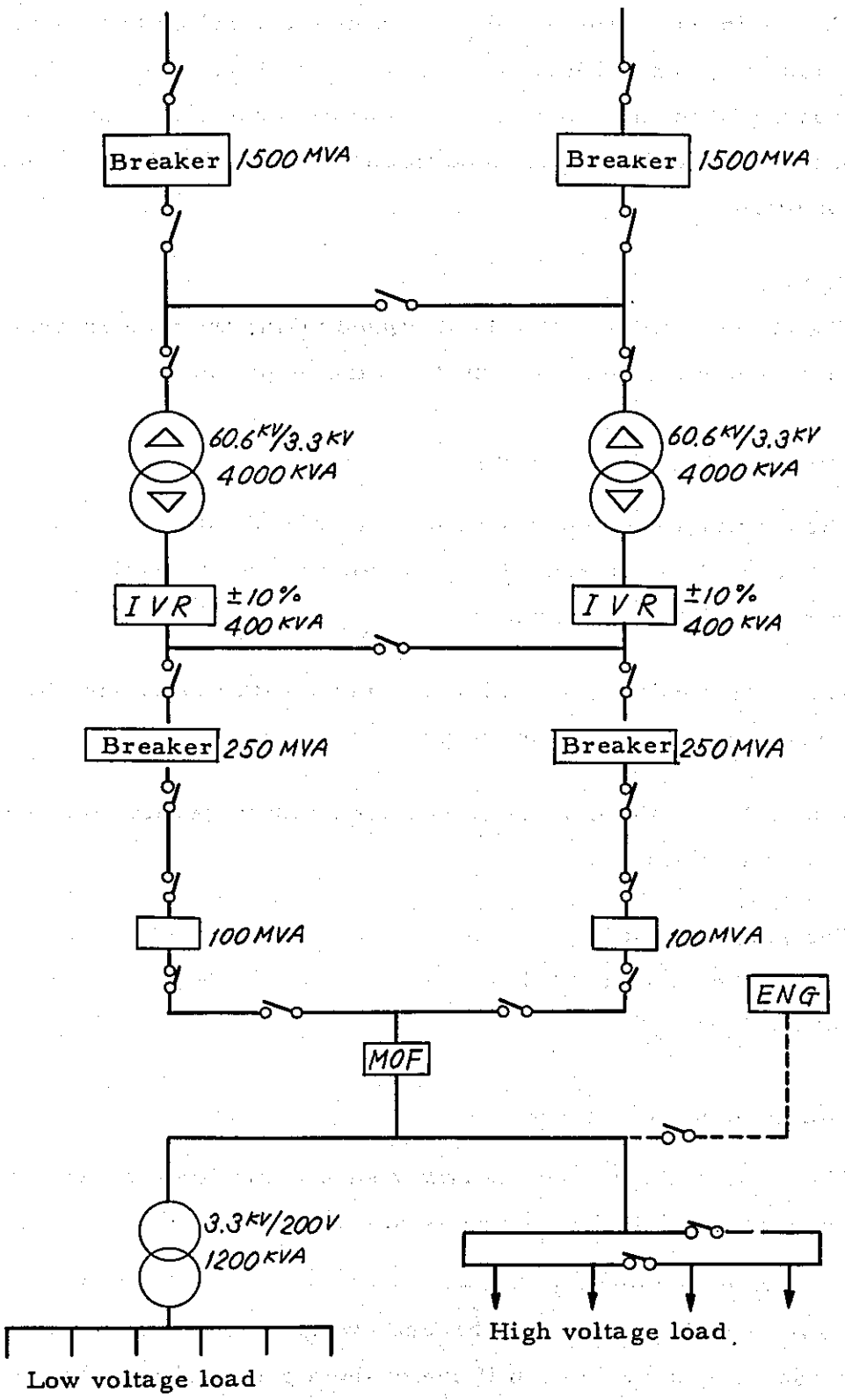


Fig. 6-3-29 System Diagram of the Power Supply Facilities

(2) Receiving Voltage

Extra-high voltage

(3) Extra-high Voltage Substation Facilities

Extra-high voltage breaker	Capacity 1,500 MVA, 2 units
Main transformer	Capacity 4,000 kVA, 2 units
Induction regulator	Capacity 400 kVA, 2 units Voltage regulation range ± 10 %
High voltage breaker	Capacity 250 MVA, 2 units
Disconnecting switch	For extra-high voltage and high voltage
Control panel	
Switch board	

(4) Control System

The receiving systems should be switched by remote control in the station building.

(5) Alarm Device

The control room must be furnished with a centralized alarm panel to monitor the extra-high voltage substation facilities and the station building power facilities.

(6) Indoor Power Facilities

Breaker	Receiving breaker, 2 units Distribution breaker, 4 units
Transformer	3.3 kV/200V 1,200 kVA, 1 unit

(7) Others

Power source for equipment operation	DC 100V
Power source for the attendant facilities	DC 24V/48V

3-8 Topographical Condition of the Antenna Site

The short-wave antenna should be installed on level land because it is so designed as to also make use of reflected waves on the ground surface.

The shaded portion in Fig. 6-3-30, for example, shows the required space of level land for a rhombic type antenna whose side length is 120 m and height 30 m above the ground level.

There must be no obstacle to the ground reflection waves in front of the antenna (in case it is equipped with a directivity inverter, both in front and at the back of it) because the electromagnetic waves are radiated at a radiation angle of 7.5° to 17.5°.

Such a place which has a slope in front making a right angle with the radiating direction as shown in Fig. 6-3-31 is not suitable for the antenna site since all the reflected waves are deflected into such an overall directivity as shown in Fig. 6-3-32.

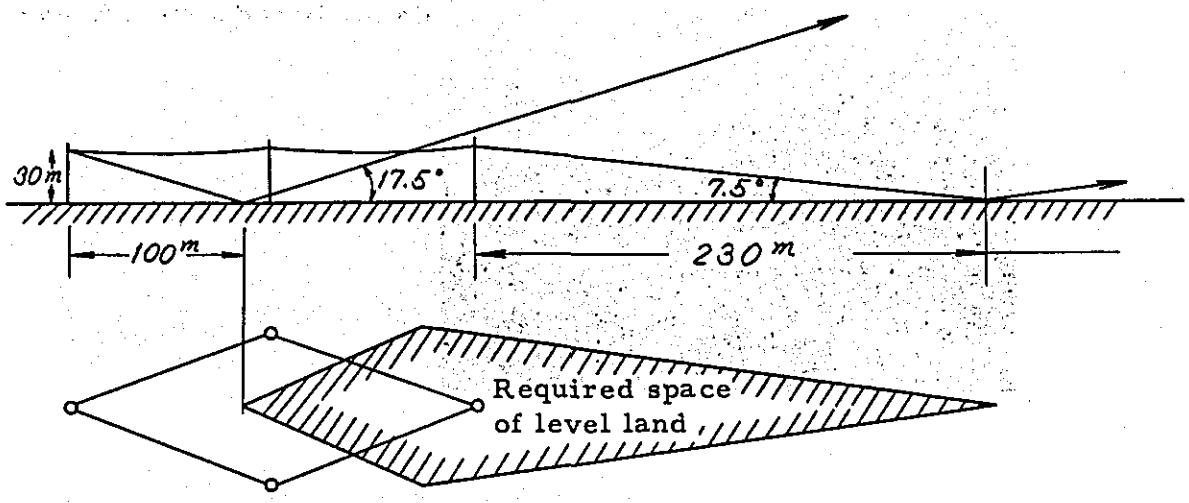


Fig. 6-3-30 Required Space of Level Land near the Antenna Site

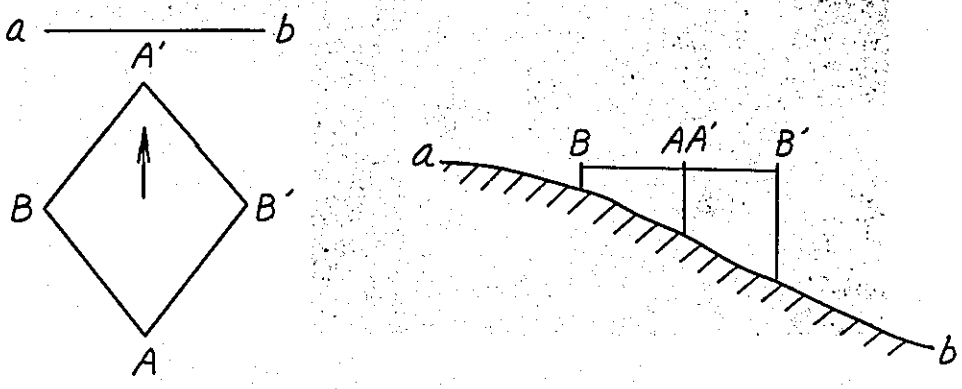


Fig. 6-3-31 Lay of the Land Sloping at Right Angles to the Radiating Direction in Front of the Antenna Site

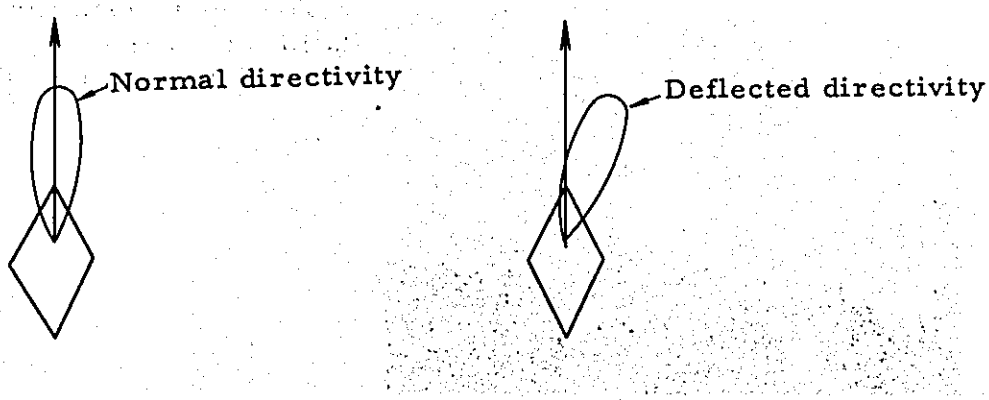
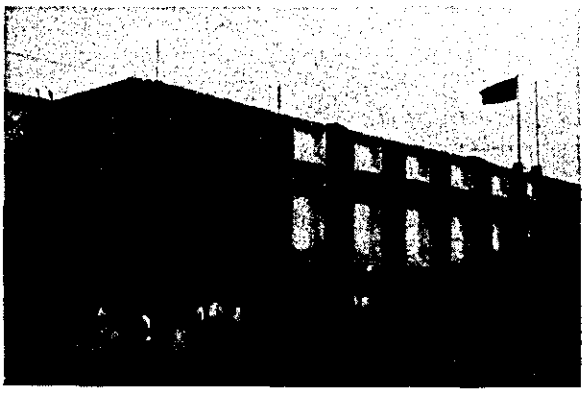


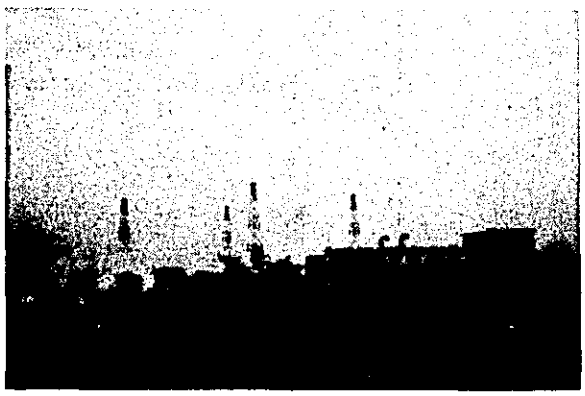
Fig. 6-3-32 Combined Directivity Deflected by a Slope

THE PRESENT SITUATION OF THE MEDIUM WAVE AND THE SHORT WAVE BROADCASTING FACILITIES



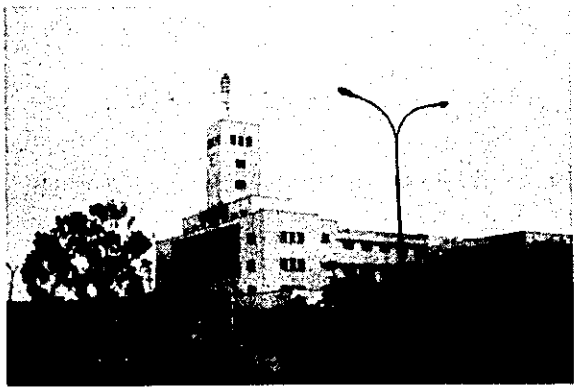
Dacca Broadcasting House

Medium wave transmitter of Chittagong Station (10 kw)

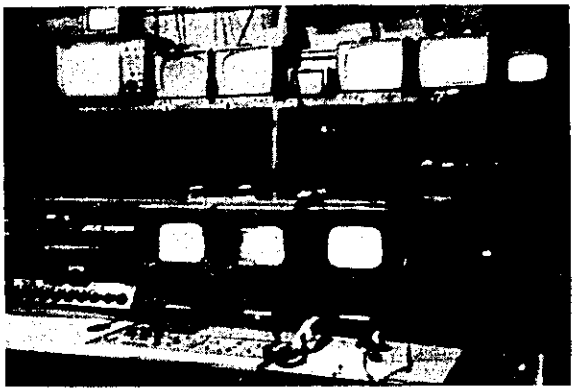


Short-wave transmitting station at Sabar in the suburbs of Dacca (100 kw)

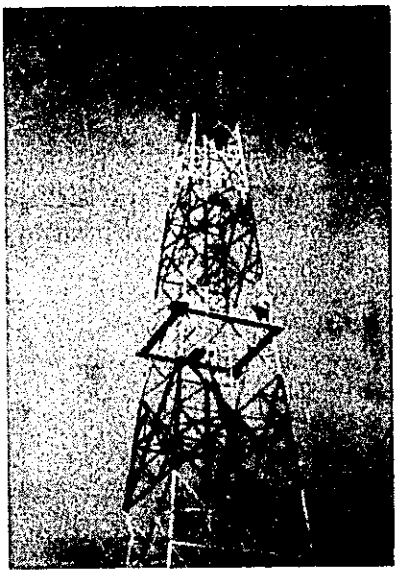
THE PRESENT SITUATION OF THE TELEVISION BROADCASTING FACILITIES



The whole view of DIT Building in which the temporary facilities now in service are installed

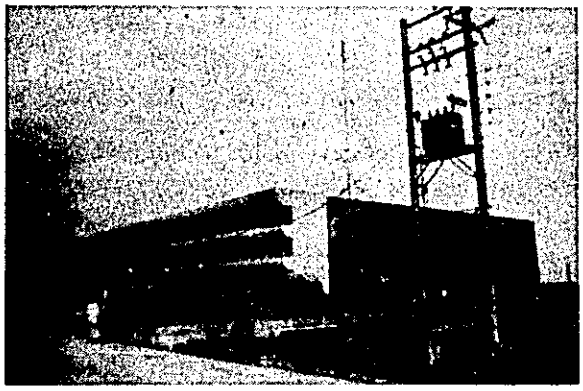


Part of the temporary studio equipment parts



The transmitting tower of Rampura Transmitting Station

DACCA TELEVISION STUDIO CENTER NOW UNDER CONSTRUCTION (RAMPURA)



The whole view

Inside of a studio

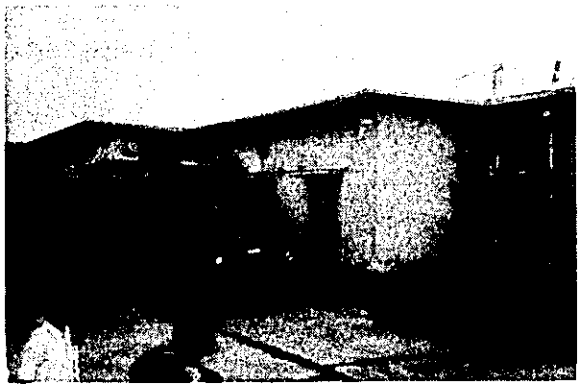
Installation of air-conditioning ducts

CUSTODY CONDITION OF THE EQUIPMENT PARTS FOR REGIONAL TV STATIONS

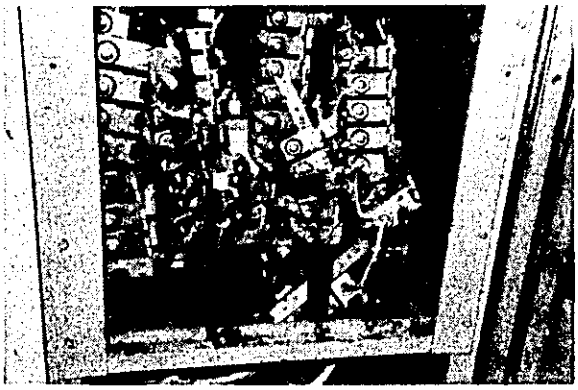
Transmitting antenna elements

Cables and transmitting tower members

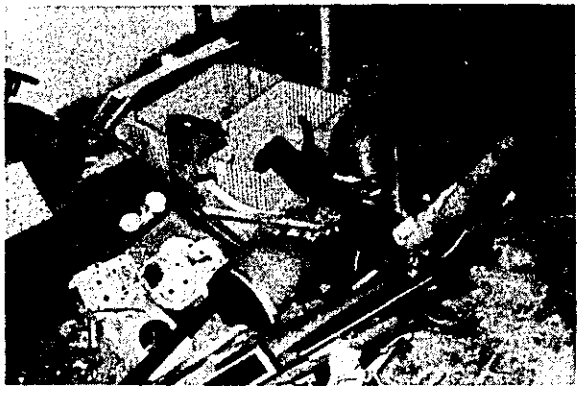
DAMAGED KHULNA RADIO STATION



Mobile medium wave transmitter used temporarily (1 kw)

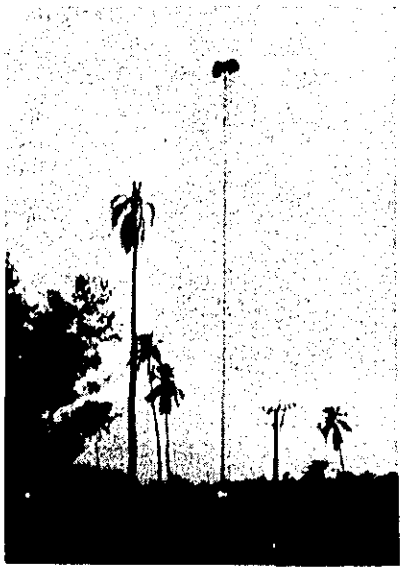


Part of the damaged medium wave transmitter (10 kw)

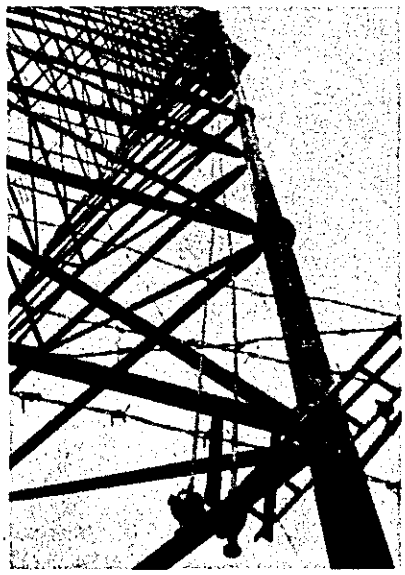


Damaged folk musical instruments

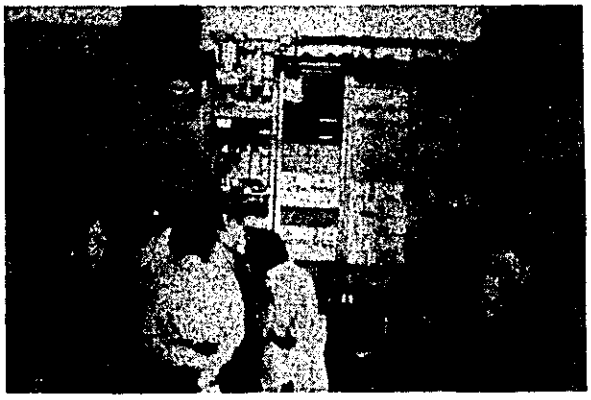
THE PRESENT SITUATION OF THE MICROWAVE FACILITIES



Jessore relay station



Transmitting tower of
Chittagong terminal station



Chittagong terminal station

TRAFFIC AND ACCOMODATION FACILITIES IN BANGLADESH

Ferryboat

Accommodation facility at Natore

Accommodation facility of WAPDA at Bogra station