BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
REPLACING MEDIUM-WAVE TRANSMITTER
IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

JANUARY 1987

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan has decided to conduct a Basic Design Study on the Project for Replacing Medium-Wave Transmitter and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Bangladesh a study team headed by Mr. Kiyoshi Sato, Deputy Director of Engineering Division, Broadcast Administration Bureau, Ministry of Posts and Telecommunications from 2nd to 22nd October, 1986.

The team had discussions with the officials concerned of the Government of Bangladesh and conducted a field survey in Dhaka and Chittagong. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between the two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the People's Republic of Bangladesh for their close cooperation extended to the team.

January, 1987

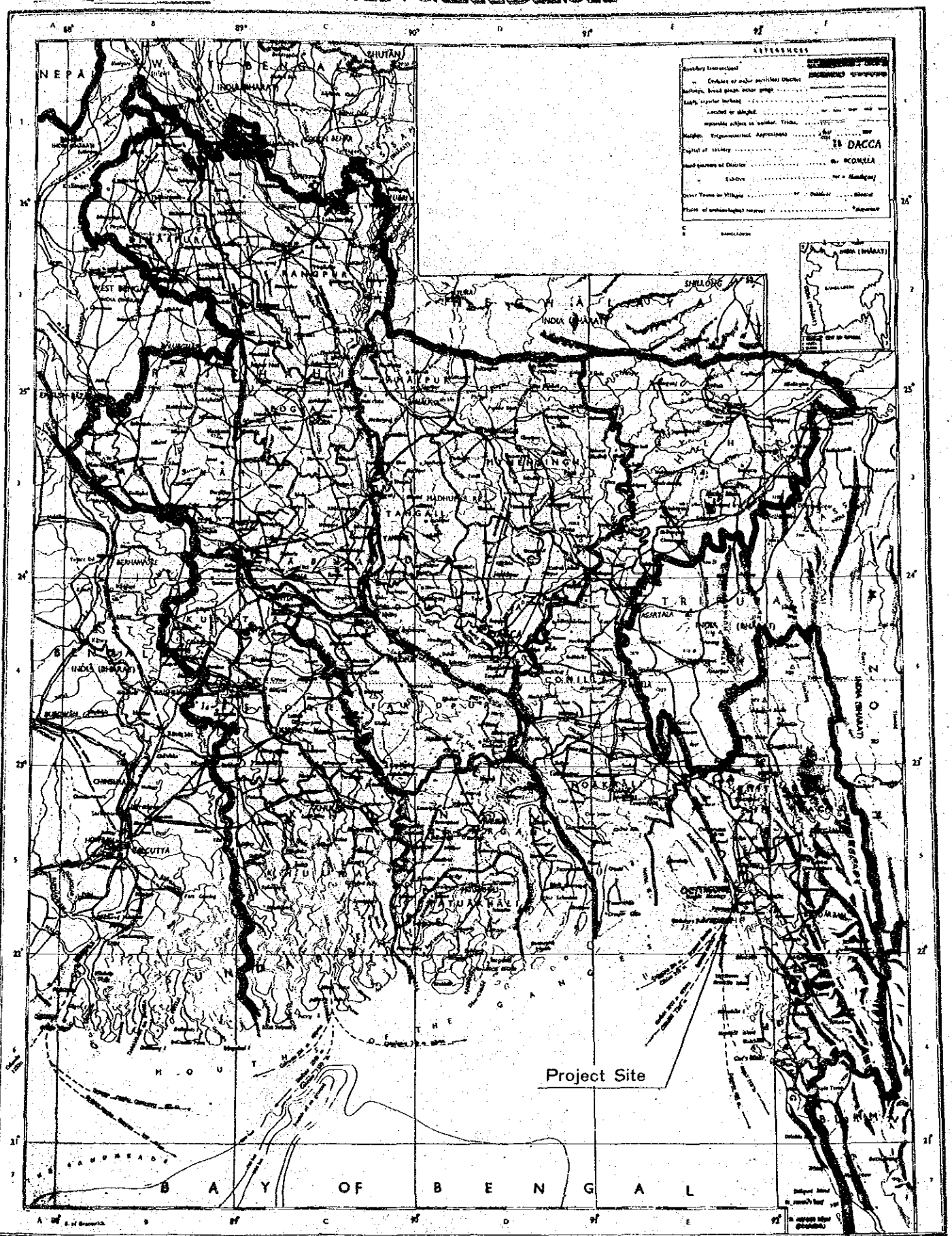
Keisuke Arita
President
Japan International Cooperation Agency

Scale 1:2,828,000

BANGLADESH

SECOND EDITION

7362



Refer to this map as :- MAP OF BANGLADESH SECOND EDITION

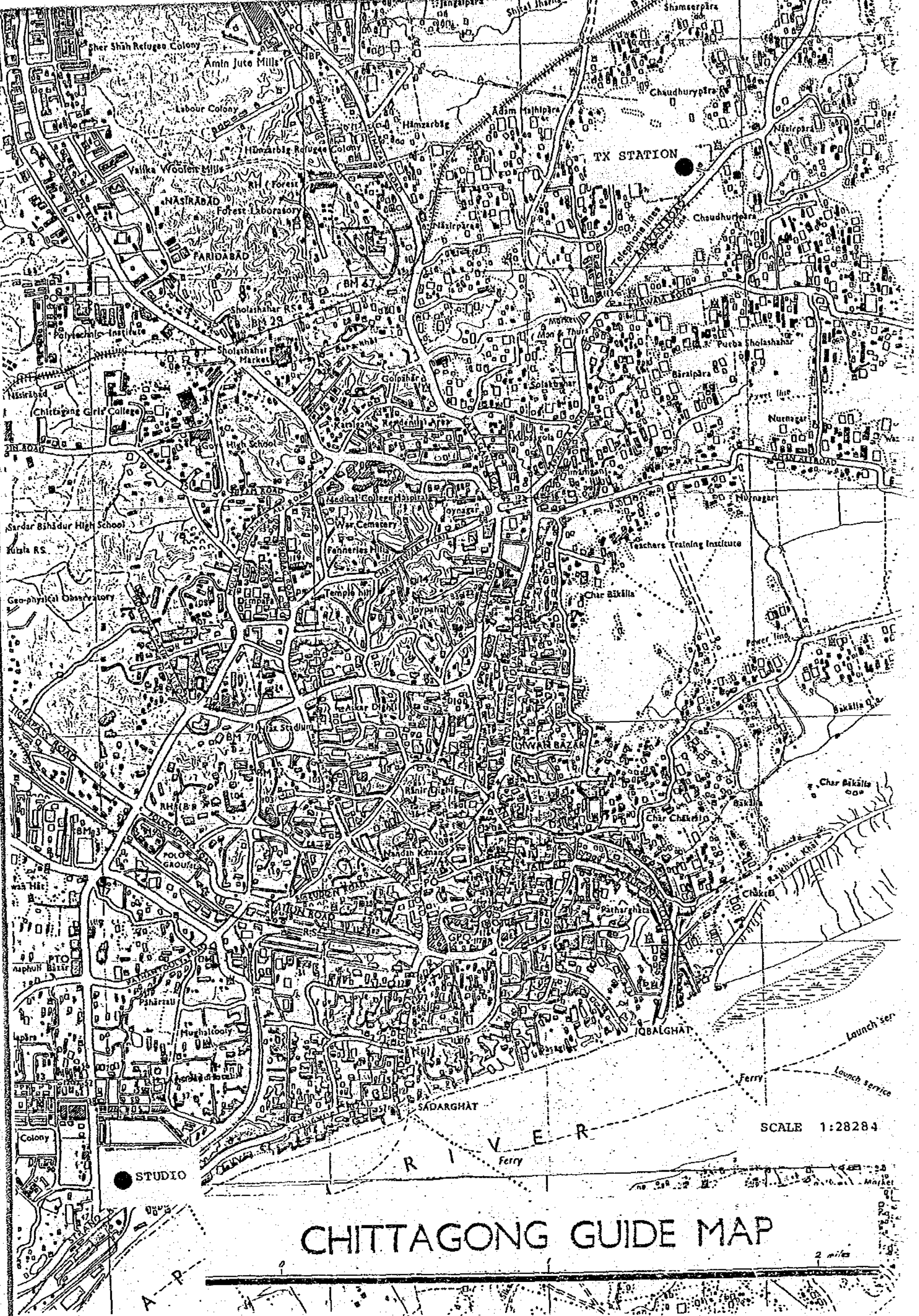
Published under the direction of H. Hubbard, Surveyor General of Bangladesh.

1982.

Scale 1:2,828,000

Single line streams and rivers are shown as blue but this is no indication that they are all perennial.

The national boundaries of Bangladesh have been shown in accordance with the best information at present available. They have not been fully surveyed or demarcated and their alignment on this map is not necessarily authoritative.



CHITTAGONG GUIDE MAP
SCALE 1:28284
TX STATION
STUDIO
0
1
2 miles
Sher Shah Refugee Colony
Amin Jute Mills
Labour Colony
Hamzarbag
Hamzarbag Refugee Colony
Valika Woolen Mills
NASIRABAD
Forest Laboratory
FARIDABAD
Sholashahar RS
Polytechnic Institute
Sholashahar Market
Chittagong Girls College
Govt High School
Sardar Bahadur High School
Geo-physical Observatory
Medical College Hospital
War Cemetery
Tanneries Hills
Temple hill
Joypahar
Joynagar
Katalganj Residential Area
Golpahar
Chaudhurypara
Nazirpara
Adam Hajhipara
Shamserpara
Purba Sholashahar
Baralpara
Nurnagar
Teachers Training Institute
Char Bakalia
Bakalia
Char Chaktai
Chaktai
Patharghata
Nandan Kanan
Ranir Dighi
Laldighi
Andar Kila
Stadium
Polo Ground
Station Road
Pahartali
Mughaltooly
Sadarghat
Iqbalghat
Colony
Ferry
Launch service
RIVER

SUMMARY

SUMMARY

Radio broadcasting in the People's Republic of Bangladesh, as in many other countries, is the most effective and popular mass communication medium and its importance is emphasized in the national long term development plan, the Third Five Year Plan, 1985 - 1990.

The Radio Bangladesh of the National Broadcasting Authority under the Ministry of Information, a unique organization in the radio broadcasting field and also the Executing and Responsible Agency of this Project, has a 47-year history dating back to the period of British India and East Pakistan. The Radio Bangladesh also implemented, with Japan's grant aid, the project for constructing of the National Broadcasting House at metropolitan Dhaka from 1981 to 1983 and is operating it successfully. In addition, the Radio Bangladesh has a rich experience of construction, operation and maintenance of 3 big high power transmitting stations in metropolitan Dhaka and Khulna, the third largest city in the country, and also has formulated a long-term plan for staff assignment and training.

With relation to programme production, the Radio Bangladesh has been gathering and editing weather information in close collaboration based on a memorandum with Bangladesh Meteorological Department. The Radio Bangladesh also produces various programmes referring to audience's opinions. As a result, a rating of a popular programme has risen up to 40% of the population.

However, the existing radio transmitter at Chittagong, the second largest city in the country following the capital city, Dhaka has been used for more than 20 years since its installation, and the quality of transmission has considerably deteriorated due to ageing and the lack of spare parts which the manufacturer has ceased their production.

Moreover, due to co-channel and adjacent channel interference by high power transmitters in neighbouring countries, the reception condition beyond several ten kilometres from Chittagong has become poor during daytime and worse at night.

As per final acts of the Regional Administrative LF/MF Broadcasting Conference (ITU) held in Geneva in 1975, it was decided to establish a 100 kW MW transmitter in Chittagong with its frequency channel and output

power, which have to be utilized by 1989, otherwise the assigned frequency channel will have to be surrendered for use by other countries.

This Project is to replace and upgrade the transmitter of the Kalurghat Transmitting Station, Chittagong, the second largest city following Dhaka.

Direct effect of this Project is the expansion of the coverage.

Chittagong Division is composed of 15 zillahs including Chittagong, Comilla and Sylhet and situated splitting from north to south the eastern part of Bangladesh. Sylhet district in the north and Comilla district in the middle are covered by a 20 kW transmitter and 10 kW one respectively. In addition, the relevant parts of these two districts are also covered by the Super High Power Transmitting Station (1000 kW) and the High Power Transmitting Station (100 kW), Dhaka. Therefore, in case of replacing the existing 10 kW transmitter with the new high power 100 kW one, the coverage of the Chittagong Station is estimated, on an average of the difference of propagation during day and night time through dry and rainy season, as follows:

Coverage	Existing 10 kW TX	New 100 kW TX
Population	24%	92%
Land	35%	95%

Thus, the coverage for the respective zone of Chittagong Division centreing Chittagong City will expand into about 3.8 times in population and about 2.7 times in land. The broadcasting of the various programmes closely connected with the relevant region, especially weather informations including cyclone causing serious disaster every year, produced by the Chittagong Radio Station having the high rate of about 82%, a coefficient of programming of local programmes, will give plenty of benefit to the habitants in the relevant region.

One set of Medium-wave Radio Transmitting Equipment will be provided by Japanese side. Principal equipment include the following:

Items	Specifications	Quantity	Remarks
Transmitting equipment			
MW radio transmitter	100 kW (50 kW x 2)	1 set	parallel running
Ancillary equipment		1 set	
Power supply equipment		1 set	
Engine generator	350 kVA	1 set	
Ancillary equipment of the existing antenna		1 set	for reinforcement
Measuring equipment		1 set	
Air conditioner	4 tons	1 set	for TX room
Installation Material		1 set	
Spare parts		1 set	

Construction works borne by Bangladesh side include:

- Extension works of a transmitter room, substation room, engine generator room, office rooms and other attached rooms
- Construction works of a new antenna tuning hut
- Erection of feeder poles
- To lead in electric power from Power Development Board
- Dismantlement of the old 10 kW transmitter

The Project Cost to be borne by Bangladesh side for the execution of above responsibilities is estimated about 210 million yen.

The installation period after conclusion of the Exchange of Notes between both Governments is to be 0.5 months for detailed design, 1.5 months for tender work, 6 months for manufacture of equipment, 1.5 months for transportation, 2.5 months for installation, adjustment and inspection of equipment, and 12 months in total.

After the execution of this Project, the Kalurghat Transmitting Station of the Chittagong Radio Station, as well as 100 kW the High Power

Transmitting Station, Noapara, the Khulna Station, will be raised to a higher status as an "independent station" placed under the supervision of a Resident Engineer in the organization of the Radio Bangladesh. The number of the staff is 36. The office block for all the staff will be constructed together with a room for the new 100 kW transmitter.

Of the total 36, 19 persons are the technical staff on duty of operation and maintenance, who are experienced engineers and technicians transferred from the Super High Power Transmitting Station, Dhamrai, Dhaka, and the High Power Transmitting Station, Savar, Dhaka, and the High Power Transmitting Station, Noapara, Khulna. The total man power will be adequate to operate the new station. Their capabilities will be raised by the regular despatch of staffers for overseas trainig.

As mentioned above, there seems no problem on the part of Bangladesh side, which might hinder the execution of this Project.

The implementation of this Project will inevitably give plenty of benefit to the habitants in the relevant region and greatly contribute to the social and economic development of the People's Republic of Bangladesh.

PREFACE
MAPS
SUMMARY

INDEX

CHAPTER I INTRODUCTION

CHAPTER 1 INTRODUCTION

The People's Republic of Bangladesh gained independence from Pakistan on 16 December, 1971 and joined the United Nations as the 138th nation in 1974.

The country faces the Bay of Bengal on the south and is bounded by India on the east, north and west. There is a small strip of frontier with Burma on the southeastern edge. The land area is 143,998 square kilometres, corresponding to 38% of that of Japan. Most of the area is flat, alluvial and deltaic, and crisscrossed by four mighty rivers and their numerous tributaries and distributaries.

Bangladesh is a country of abundant water.

Total population was 87.12 million persons according to the national census in 1981. The Ministry of Health & Population Control, assuming declining fertility and mortality based on the census, estimates population derivatives during the Third Five Year Plan, 1985 - 1990, to be 99.2 million in 1985, 107.7 million in 1986 and 11.7 million in 1990. The rate of increase is 2.8% a year. Density of population is 689 persons per square kilometre in 1985, more than two times of 320 persons per square kilometre of Japan.

Bangladesh is also a country of human beings.

The inhabitants are the Bengali of mixed parentage of an Austro-asian race who first inhabited this area, the Dravidians from Western India, the Aryans from Central Asia and the Mongolians.

The official language is Bengali. English is frequently spoken as a foreign language. The four major religions are Islam, Hinduism, Buddhism and Christianity. The Muslims constitute 86.6% of the total population. However, the Government emphasizes communal peace and harmony as a prerequisite to social and economic development in the country.

In Bangladesh, radio broadcasting is the most effective and popular mass communication medium and its importance is emphasized in the Third Five Year Plan.

Radio Bangladesh of the National Broadcasting Authority, an unique organization in the radio broadcasting field, has 47 years' experience including the period of British India and East Pakistan. Radio Bangladesh also implemented, with Japan's grant aid, the construction project of National Broadcasting House at metropolitan Dhaka from 1981 to 1983 and is operating it very well. In addition, Radio Bangladesh has a rich experience of construction, operation and maintenance of 3 big high power transmitting stations of metropolitan Dhaka and Khulna, the third largest city in the country, and also has a long term plan on staff assignment and training.

This Project is to replace and upgrade the transmitter of Kalurghat Transmitting Station, Chittagong, the second largest city following Dhaka. At the completion of this Project, the coverage zone in Chittagong Division centreing Chittagong city will expand into about 3.8 times in population and about 2.7 times in land area. Broadcasting of various locally produced programmes (comprising 82% of the total programmes), especially weather informations including cyclone causing serious disaster every year, will give plenty of benefit to the habitants of the relevant region.

Radio Bangladesh offered the Project Proforma, a proposal for replacing the existing 10 kW transmitter with a new high power 100 kW one and the Government of Bangladesh requested the grant aid assistance to the Government of Japan in 1985. In response to the request, the Government of Japan decided to conduct a Basic Design Study and the Japan International Cooperation Agency sent the Team headed by Kiyoshi Sato, Deputy Director of Engineering Division, Broadcast Administration Bureau, Ministry of Posts and Telecommunications, from 2nd October to 22nd October, 1986. The Team confirmed the items requested and the undertakings of the recipient side and held discussions with responsible counterparts, and conducted surveys of present principal facilities of Radio Bangladesh and present situation of the Project site.

This Report has been prepared as the report on the basic design study including the basic design, installation plan, implementation schedule, project evaluation, recommendation and so on.

And annexes have collectively contained Minutes of Discussions, formation of the Team, itinerary of the survey and so on.

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2-1 Profile of the People's Republic of Bangladesh

(1) Topography

Bangladesh is a deltaic plain of 143,998 square kilometres crisscrossed by mighty rivers like the Padma, Jamuna, Meghna and Karnaphuli and their numerous tributaries and distributaries. With a population of nearly 90 million (1981 census), the country is fenced by the Bay of Bengal on the south and by India on the east, north and west. There is a small strip of frontier with Burma on the southeastern edge. Most of the area is flat and alluvial. Hills and ridges also abound here. The Jaintia in Sylhet district and the Lushai in Chittagong Hill Tracts district are the tailpieces of the long Himalayan Range. The highest peak in the country (1,052 m) is at the southeastern extremity of the hill tracts district.

The temperature is equable. In the winter it fluctuates between 9.8°C and 13.4°C and in the summer between 25.5°C and 26.0°C. The mean maximum temperature varies from 24.1°C to 25.8°C in January and 29.9°C to 31.8°C in July. The annual rainfall varies from 1,270 mm inches in the west to 2,540 mm in the northeast and to 5,080 mm in the submontane region in Sylhet district. Rains are sometimes accompanied by tropical cyclones and storms.[1)]

The project site is located at Chittagong, the nation's second largest city next to the capital city Dhaka. The following is a brief review of Chittagong:[2)]

Chittagong, the "sleeping beauty emerging from the mists and water" on the coast of the Bay of Bengal guarded by the river Halda, Karnaphuli, the Bay and dotted with hillocks is the city. A small fishing village in the ancient kingdom of Tippera, Tsit-Ta-Gung of the buddhist king of Arakan, Chittagong of British India, had changed hands several times before it

---

1) MEET BANGLADESH, Department of Films and Publications, Ministry of Information, P. 10 - 13.

2) Source : A. INTRACO TOURS AND TRAVELS, Chittagong

became the second largest urban centre of the independent and sovereign Bangladesh. It is the principal sea-port of the country and major centre for wholesale trade and industrial activities. In a beautiful natural set-up of sea, river, hills, green valleys and flat land, all within the urban area, this city of saints has blended the natural calm with the humming industrial and trading activities centreing round the Port. The only oil refinery and automobile assembly plants of the country and the first Export Processing Zone of Bangladesh are here along with a host of other heavy, medium and light industries dealing with jute, cotton, chemicals, tobacco, timber and other engineering products.

A small city of only twenty thousand people in 1901 Chittagong is now the administrative headquarters of a Division that covers 31% of the national territory. It is a metropolis that accommodates 1.71 million people (1981 census), which is 13% of the total urban population of the country. It is the country's second largest centre for higher education and specialized education.

(2) Movement of Population

Bangladesh is featured by a large population. Based on a result of the national census in 1981, the Ministry of Health & Population Control showed the projected population derivatives during Third Five Year Plan, 1985 - 90 as follows.[3)]

Year	Population
1981	87.1 million (census)
1985	99.2 million
1986	101.7 million
1987	104.1 million
1988	106.6 million
1989	109.1 million
1990	111.7 million

Incremental coefficient is 2.8% a year. Density of population is 605 persons per square kilometre in 1981, getting up to 775 persons per square kilometre in 1990.

3) 1984-1985 Statistical Yearbook of Bangladesh, P. 925

Considering the distribution by age, population of school age (5-24 years) occupies 46.9% of the total. Participation rate is 72.87% for primary schools (5-9 years), 22.17% for secondary schools (10-14 years) and 2.03% for Higher education (College, Institute, University, 15-24 years).

Number of schools, Colleges or Institutes and Universities and respective teacher-student ratio are as follows:

	Number	Teacher-student-ratio
Primary school	43,865	1:52
Secondary school	8,551	1:27
College (general)	657	1:30
College or Institute (polytechnic, vocational, Madrasha, other)	3,548	
University	6	1:16

Literacy (5 years and over) and adult literacy (15 years and over) rates are 23.8% and 29.2% respectively.

Total Government budget appropriation for education was Tk. 365 crore in 1983 - 84, but its actual expenditure Tk. 116 crore. The Government total development expenditure on the whole sectors was Tk. 3,483.86 crore in the same year.[4)]

In Bangladesh, as mentioned in Chapter 1, the four major religions are Islam, Hinduism, Buddhism and Christianity. The Muslims constitute 86.6% of the total population. Institutes, as said above, include 3,312 Madrashas, providing Islamic education with science and arts subjects.

On the other hand, a comparatively large number of Buddhists dwells in Chittagong Hill Tracts, near to a frontier with Burma, accounting for 55% of the population thereof 580 thousand.

---

4) aforesaid 3), P 715, 913, 1983-84

5) *aforesaid 1), p.29*

The Bangladesh Government emphasizes communal peace and harmony as a prerequisite to social and economic development in the country and the members of the minority communities are adequately represented in the government, trade, commerce and industries.[5)]

2-2 Present Situation of Broadcasting in the People's Republic of Bangladesh

2-2-1 Radio Broadcasting

Radio broadcasting began in 1939, in the period of British India.

Present Radio Bangladesh, passing the next period of the eastern wing of Pakistan (1947 - 1971), was launched as a Government organization in September, 1972 after Bangladesh had won independence. However, most of its broadcast facilities had been destroyed with liberation struggles.

The Government of Bangladesh, recognizing the importance of radio broadcasting for stability and development of the country, made an effort to reconstruct its facilities through the First Five Year Plan (1974 -1979) and the Second Five Year Plan (1980 - 1985). In February, 1973, based on the request of the Government of Bangladesh, a governmental mission for the expansion project on radio and television broadcasting was despatched by OTCA (Overseas Technical Cooperation Agency, the predecessor of JICA) in order to conduct a technical cooperation. Successively, the construction project of National Broadcasting House at metropolitan Dhaka was picked up with a grant aid by Japanese Government. It was completed in June, 1983, five years after despatching the basic design study team in October, 1978.

At present, Radio Bangladesh operates 8 transmitting stations including 3 high power transmitting stations: 1000 kW Super High Power Transmitting Station, Dhamrai, Dhaka, 100 kW High Power Transmitting Station, Savar, Dhaka, and 100 kW High Power Transmitting Station, Noapara, Khulna.

Number of diffused radio receivers, according to the estimation by Bangladesh Bureau of Statistics, was 2,333,343 sets (1981), but the number of receivers actually used might be far more than the number aforesaid.

The cost of a radio receiver is 345 Taka for 1 - band and 757 Taka for 3 - band. (1986)

Table 1 shows the outline of medium-wave transmitting stations of RB.

Table 1 Medium-wave Transmitting Stations

Name	Commencement	Frequency	Power	Remarks
Dhaka (Savar)	1963	819 kHz	100 kW	
Dhaka (Dhamrai)	1974	693 kHz	1000 kW	
Chittagong	1954	873 kHz	10 kW	100 kW up planning
Khulna	1970	558 kHz	100 kW	
Rajshahi	1954	1080 kHz	10 kW	
Syhlet	1961	963 kHz	20 kW	
Rangpur	1967	1053 kHz	20 kW	
Comilla	1984	1413 kHz	10 kW	

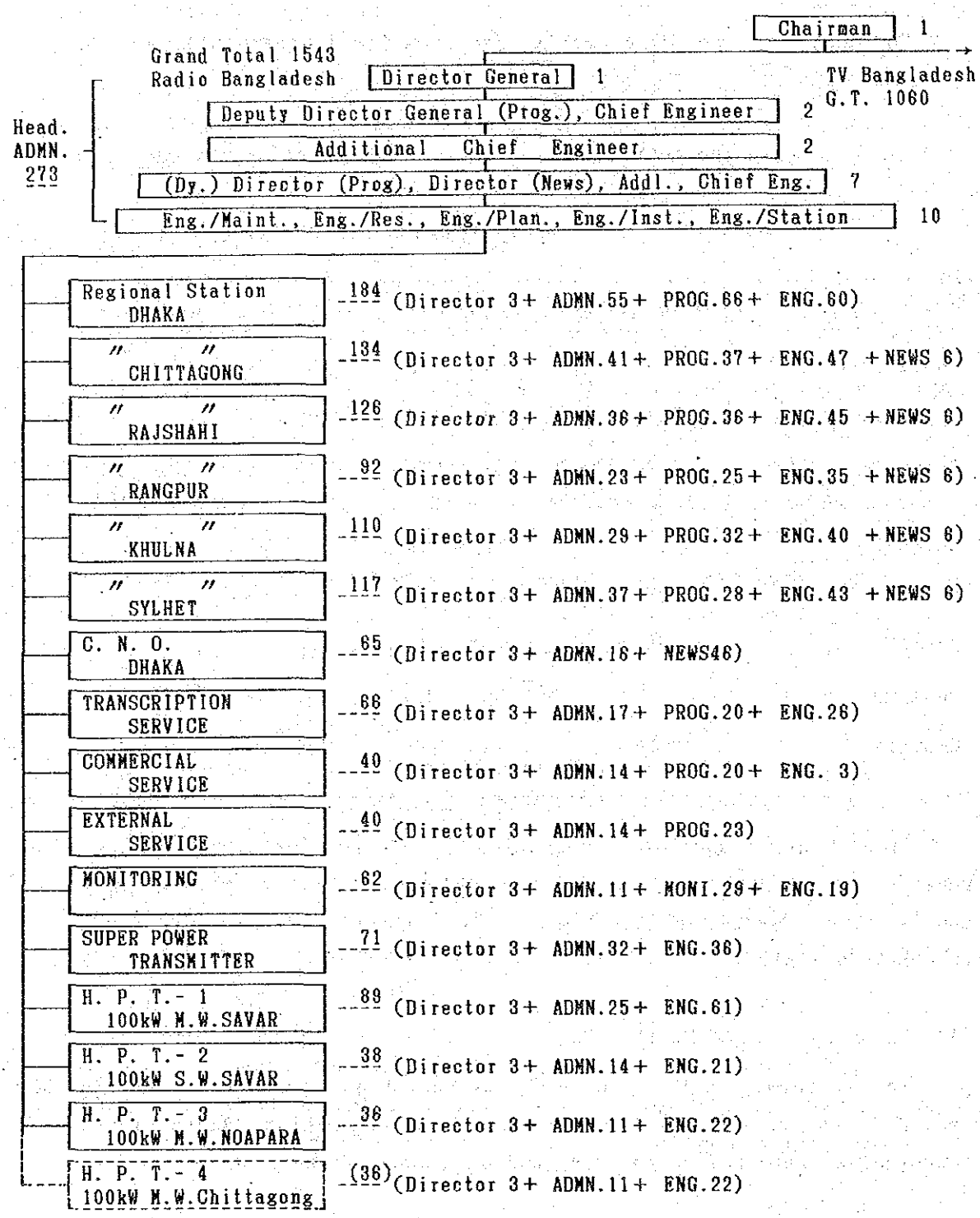
RB also has 3 short-wave transmitters (100 kW 2 sets, 7.5 kW 1 set, at Dhaka) for domestic services and 6 FM transmitters (2.0 to 0.25 kW, Dhaka and 5 cities except Comilla) for a concurrent use as each studio-to-transmitter link.

(1) Organization and Staff

In January, 1984, National Broadcasting Authority (hereinafter referred to as "NBA") was established comprising Radio Bangladesh (hereinafter referred to as "RB") and Bangladesh Television.

Table 2 shows the RB's organization chart including number of the staff.

Table 2 Organization Chart (RB)



(2) Radio Broadcast Facilities

1) Programme Production Facilities, Dhaka

National Broadcasting House at Dhaka, constructed with Japan's grant aid from 1981 to 1983, was normally composed of 10 radio studio, 1 auditorium and system of master control, power supply and air-conditioning. These new radio facilities are well operated except that an air-conditioner is now broken. The auditorium is not frequently used.

In the National Broadcasting House where plenty of programmes are produced for overseas services in addition to the two kinds of domestic services, Dhaka A (wide-ranged service by 1000 kW transmitter) Dhaka B (general service by 100 kW transmitter), the utilization rate of studios is extremely high and the quality of programmes is getting lowered due to insufficient rehearsal. RB eagerly desires to add more studios for coping with matters mentioned above. It also desires to integrate studio complexes of RB which are now dispersed at seven places in Dhaka into one annexed building on the site of the existing Broadcasting House, thus improving efficiency of the organization.

2) Medium-wave Transmitting Facilities, Dhaka

a) 1000 kW Transmitting Facilities

It is situated at Dhamrai, suburban Dhaka, being operated at a frequency 693 kHz. Though it has a parallel-running system of two 500 kW transmitters, the output power is actually 500 kW with only one transmitter in operation due to lack of working tubes for high power stages.

b) 100 kW Transmitting Facilities

It is situated at Savar, suburban Dhaka, being operated at a frequency 819 kHz.

3) Short-wave Broadcasting for Overseas Services

It is operated at 12 frequencies out of the band 7-17 MHz with 250 kW, 100 kW and 7.5 kW transmitters at Savar.

Table 3 shows their languages, hours and frequencies.

Table 3 Overseas Services

Languages	Broadcast	Transmitting Frequency (kHz)
Arabic	16:00 - 16:30	9945 , 13670
Bengali	06:30 - 08:00	15625 , 17670
	16:30 - 18:00	9945 , 13670
English	12:30 - 13:00	15525 , 17645
	18:15 - 19:00	9815 , 11553
	19:00 - 19:15	9815 , 11553
Hindi	15:15 - 15:45	9640 , 11745
Nepali	13:15 - 13:45	7105 , 9775
Urdu	14:00 - 15:00	9640 , 11745
Voice of Islam	08:30 - 08:30	15625 , 17670

(3) Radio Programme Transmission Lines

RB at present uses medium-wave or short-wave reception system for programme transmission network instead of microwave transmission system. Therefore, there are some problem concerning noise and quality, caused by fading and interference in propagation.

These problems might be solved using programme transmission lines by Telegraph & Telephone Board (hereinafter referred to as "T&T"). Fortunately, T&T operates the nationwide microwave network (1800 ch plus stand-by) which has passed through the places RB's regional stations are located at. The band-width 10 kHz, occupying 3 ch of any telephone, is

6) WORLD RADIO TV HANDBOOK, volume 40, 1986

necessary for radio programme transmission being sufficient to add a modulator and demodulator (wide-band 10 kHz, provided by T&T) and a link (provided by RB), tail connection between the relevant T&T terminal and RB's regional station.

In view of the importance of the matter, the Team directly offered Chairman of NBA a request to take necessary measures for ensuring reliable nationwide transmission for radio programmes.

2-2-2 Television Broadcasting

Television broadcasting commenced in 1964. PAL-B system, as colour television standard, was adopted in 1980.

Bangladesh Television (hereinafter referred to as "BTV") got under NBA as well as RB in 1984.

In 1970, in the period of East Pakistan, 4 TV stations were constructed by the Eighth Japanese Yen credit. After that, BTV accepted Japanese grant aid, for such projects as procurement of a mini OB van (1977), improvement of Dhaka station (1978) and construction of auditorium (1978), and has gradually executed the enhancement of facilities.

Table 4 shows TV transmitting stations.

Table 4 TV Transmitting Stations

Name	Channel	Power	Remarks
Dhaka	ch-9	10 kW	
Dhaka	ch-6	10 kW	not operated
Rangpur	ch-6	10 kW	
Natore	ch-8	10 kW	
Mymensingh	ch-12	10 kW	
Sylhet	ch-7	10 kW	
Khulna	ch-11	10 kW	
Noakhali	ch-12	10 kW	
Chittagong	ch-5	10 kW	
Satkhira	ch-7	1 kW	
Rangamati	ch-8	1 kW	
Cox's Bazar	ch-10	1 kW	

Broadcasting hours (weekly, regular) are

17:00 - 23:40 (6 h 40 min) from Saturday to Thursday

15:00 - 23:40 (8 h 40 min) Friday

the weekly total hours are 48 hours 40 minutes. (refer to Annex 6, No.3)

Number of diffused receivers, according to the estimation by Bangladesh Bureau of Statistics, is 159,864 sets (1981), but actually diffused sets might be estimated more than 230 thousand. The cost of TV receivers is 6,786 Taka for 20" black & white and 16,895 Taka for colour.

2-3 Present Situation of Chittagong Radio Station

2-3-1 Broadcast Programmes

RB promotes to produce and transmit the programmes as well as BTV based on the NBA's programming policy, in which the big 4 objectives for Radio and Television, powerful mass media are described. These are "Transmission of Informations", "Generalization of Education", "Cultivation for Development Activities" and "Proposition of Sound Entertainment". (refer to Annexe 6, No. 1)

Daily broadcasting hours are divided into three parts as follows:

1st programmes	6:00	-	9:30	(except Friday 6:00 - 10:06)
2nd programmes	12:30	-	15:30	
3rd programmes	16:30	-	23:30	(refer to Annex 6, No.2)

Self-produced programmes by Chittagong Station, a regional station of RB cover 82.1%, a fairly high rate, of the total broadcast programmes.

Weather forecasts (including cyclone information), one of the important programmes are daily broadcasted:

local Chittagong	6:40	-	5 min
	9:00	-	5 min
relay from Dhaka	6:20	-	5 min
	12:00	-	5 min
	18:55	-	5 min
	23:10	-	5 min

These are received from Chittagong Meteorological Department through telephone and compiled. In Dhaka it is received from Dhaka Meteorological Department by teleprinter and telephone.

The other main programmes are

Farm Broadcast	6:25	- 5 min (daily)
	18:00	- 30 min (daily)
Industrial	8:30	- 20 min (daily)
Commercial	13:05	- 105 min (daily)
Family Planning	15:05	- 25 min (daily)
	19:00	- 30 min (daily)
	20:10	- 20 min (daily, except Friday)
Social Welfare	16:30	- 30 min (weekly)
	16:30	- 30 min (monthly)
Children's	9:10	- 50 min (weekly)
Youth	16:30	- 30 min (weekly)
School	12:20	- 40 min (daily, except Friday)

Compilation rates of each programme are

News and related programmes	18.3 %
Religions programmes	1.09%
Educational & Cultural programmes	8.58%
Musical programmes	46.1 %
Commercial programmes	12.5 %
Talk/Discussion programmes	0.05%
Tribal programmes	2.97%
Drama/Play programmes	1.48%
Other National nationwide programmes	18.03%

Total broadcasting hours are 434.3 hours. (refer to Annexe 6, No.2)

2-3-2 Studio Facilities

Studio complex in Chittagong is conveniently located facing a main street, Sheikh Muzib Road in the Agrabad area.

There are six studios, but one sub-control is attached to two studios. One room available for studio and one room available for sub-control room are at present used as a tape library and a store for musical instruments

respectively. There are also one recording room and one master control room. (refer to Fig. 1)

Maintenance for each equipment is adequate although most of equipment is aged and spare parts including vacuum tubes are scarcely supplied.

The old audio control console, a vacuum type fabricated in 1962, is fairly well operated.

Most of tape recorders/reproducers are the ones, including the ones with reproduction only for a preliminary check use for programme material, which were fabricated in the early 1960s except 3 sets (1985) and 2 sets (1976), but it is considered that their workability is getting lowered in spite of actual operation.

Most of disk players, fabricated at the early stage of 1960s except 2 sets (1976), are also for the time being operated except 2 broken sets.

The equipment of the master control room, including 3 programme amplifiers (1 broken), and 3 monitoring amplifiers of a vacuum tube type, seems the oldest. The receiver (1980) for programme relay is comparatively new and well operated. An FM link for programme transmission to a transmitting station is not able to be repaired and used because of lack of spare parts.

The Team observed a recording of a programme during the survey of studio facilities. Its programme direction had a talk-to-talk form between one male announcer and one female one, who used one microphone (ribbon type, 20 years old) alternatively. Sound quality was not so bad in spite of lack of a high frequency range, as far as listening to with a speaker mounted onto the wall of a sub-control room.

Meanwhile, a 2 kW FM transmitter, installed in an annexe of the existing studio complex is broken and not operated due to no supply of spare parts.

RB, recognizing this situation, intends to improve these facilities at the next stage.

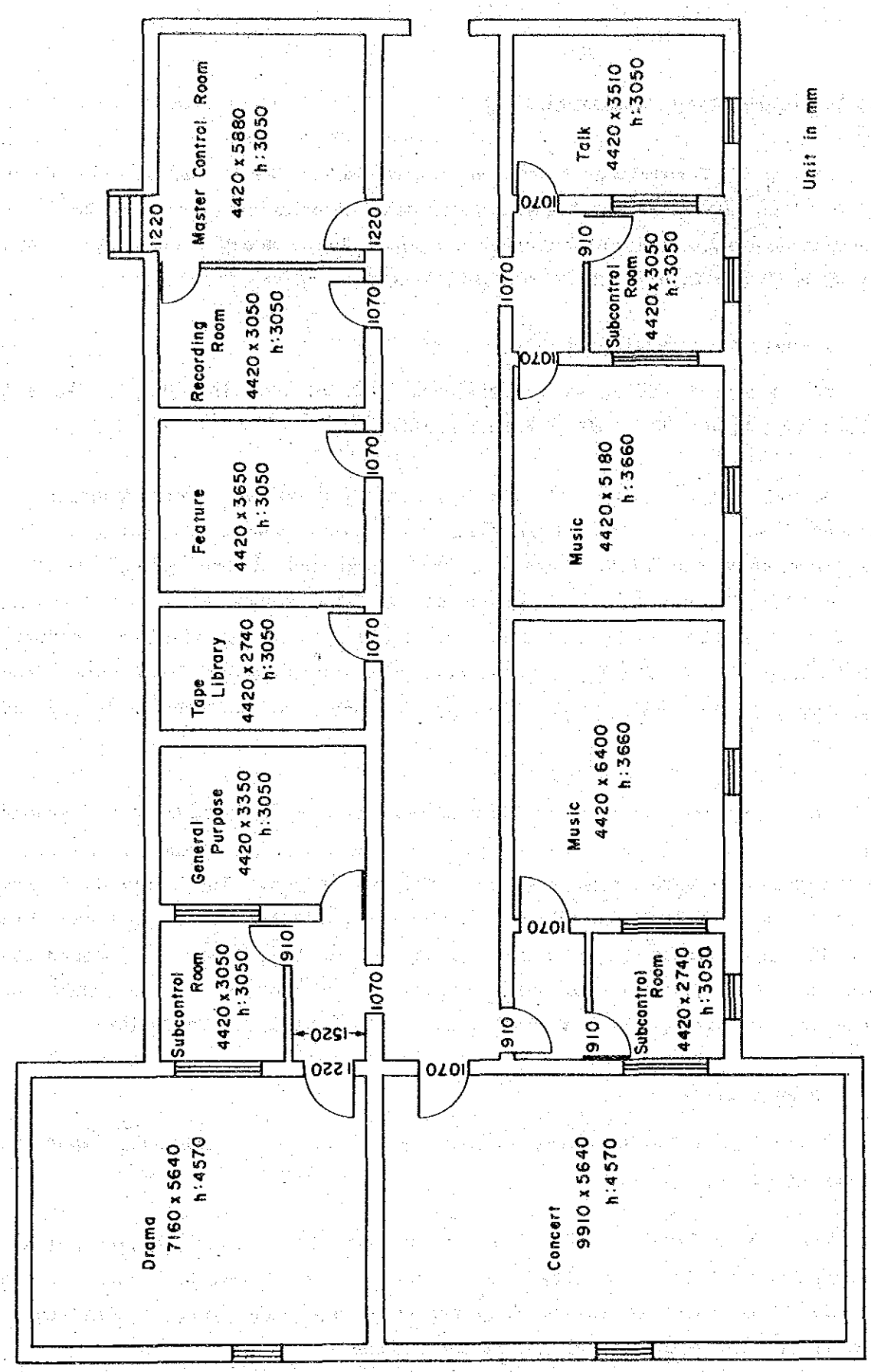


Fig. 1 Studio Layout in Chittagong Radio Station

2-3-3 Transmitting Facilities

Kalurghat Transmitting Station of Chittagong Radio Station is about 7 km to the northeast of Studio. Its site area is about 91,000 km^2. A transmitter house and antenna are separated and connected with air-opened six wire feeder line of about 200 m in length..

(1) Transmitting equipment

The existing medium-wave transmitter, fabricated in 1962, is an all vacuum tube type with final plate modulation.

Actual output power of the existing transmitter, corresponding to antenna input power, is 9.4 kW, near to nominal power, according to the measurement by the Team. However, the background of the request is that the supply of spare parts is impossible and the coverage by the existing 10 kW transmitter is insufficient for carrying out satisfactory services due to high field strength of co-frequencies and adjacent frequencies from neighbouring countries. Therefore, it is considered to need to renew and up power.

Ancillary equipment of the transmitter is a control console, programme input equipment, tape recorder/reproducer, power supply equipment, FM link, AM broadcast receiver for programme relay and so on. There are no engine generator and no air-conditioner. These equipment have been used far more than 20 years since their installation and it is useless to incorporate them into this project, as the contents of the request is to renew the whole transmitting facilities including a 100 kW powerful transmitter.

(2) Antenna System

A survey on the existing antenna system is one of the most important survey items.

The ground level of the site the antenna mast and radial earthing are located on is about 30 cm lower than that of the transmitting house. The site is flat, situated in the damp ground zone a rice family plantation is flourishing on, seems a weak ground at a glance.

It was impossible to approach the anchors for guys on foot because the water level on the site was getting up to a half of human stature during our survey at the end of rainy season. There is no possibility that the base of the antenna mast and the anchors for guys will get sunk under flood according to an experience of Regional Engineer, Chittagong: the maximum water level on the site since installation has been 15 cm above the access road.

The existing antenna mast was erected by JAMPRO Antenna Company, U.S.A. in 1973, following the former self-supported truss mast broken down by cyclone in 1970. The feeder line and radial earthing which were not broken at that time are still in use. (refer to Fig. 2, Photo 1)

It was constructed by a constructor at Dhaka under the supervision of Public Works Department, a Government organization. The foundations of the antenna base and anchors for guys were constructed, by reason of the weak ground thereof, based on a report on subsoil investigations by SOILTECH International Limited referring to JAMPRO's standard drawing.

Its rating and specifications by JAMPRO's instruction manuals and annexed specifications to RB are as follows:

Structure	:	insulated base, triangle truss mast with 3 directional, 4 leveled guys
Height	:	122 m
Frequency	:	870 kHz
Power	:	up to 100 kW (at 100% modulation)

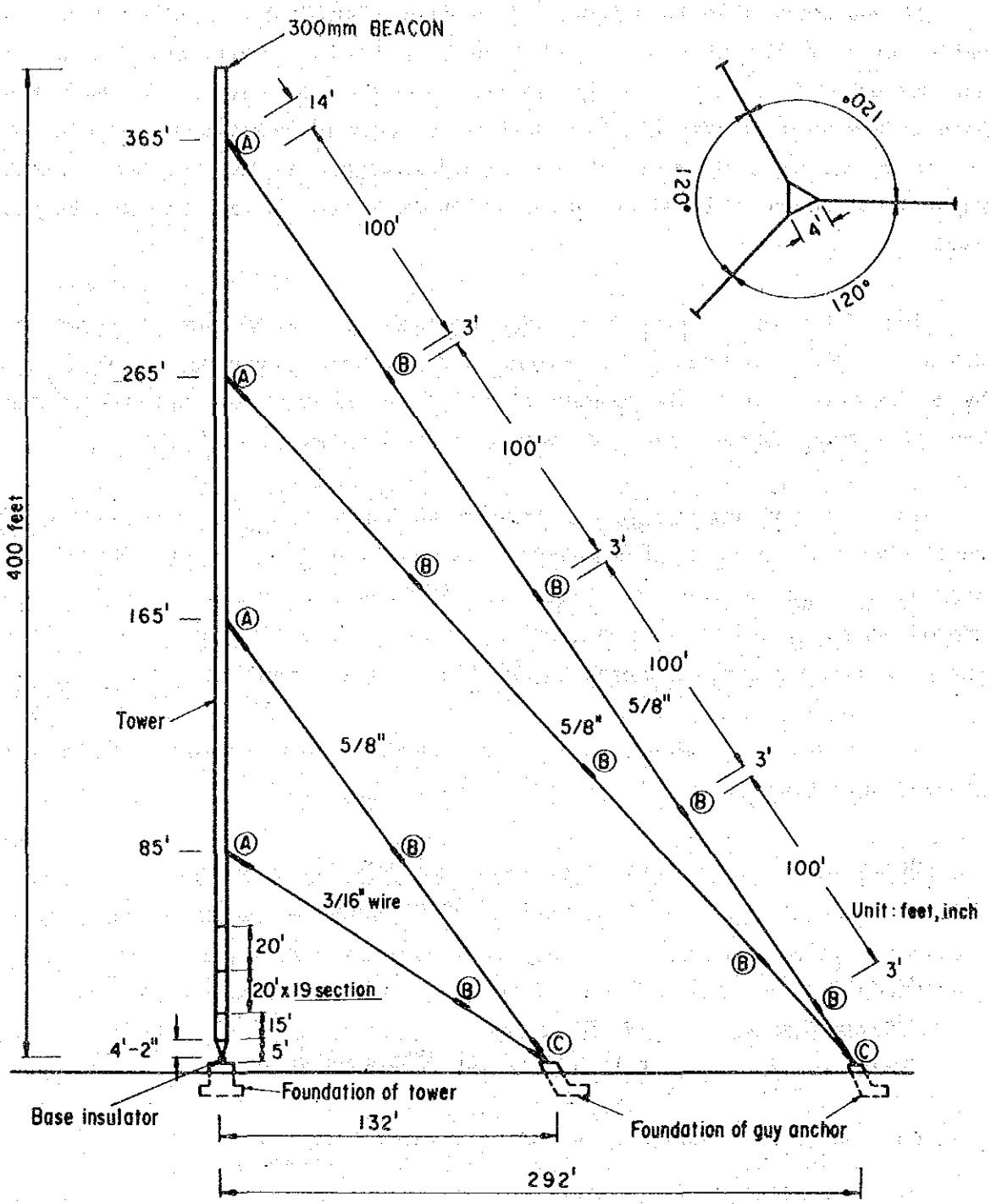
1) Outline of the results of structural investigations

a) Uprightness of the mast

Good conditioned. Maximum deviation is 33 mm as a result of measurement at 2 points with a transit.

b) Rust and corrosion of the mast

Good conditioned. Not perceptible in spite of advanced choking on the galvanized layer and the painting dissipates to the extent that the stripe painting regulated by ICAO is only slightly visible.

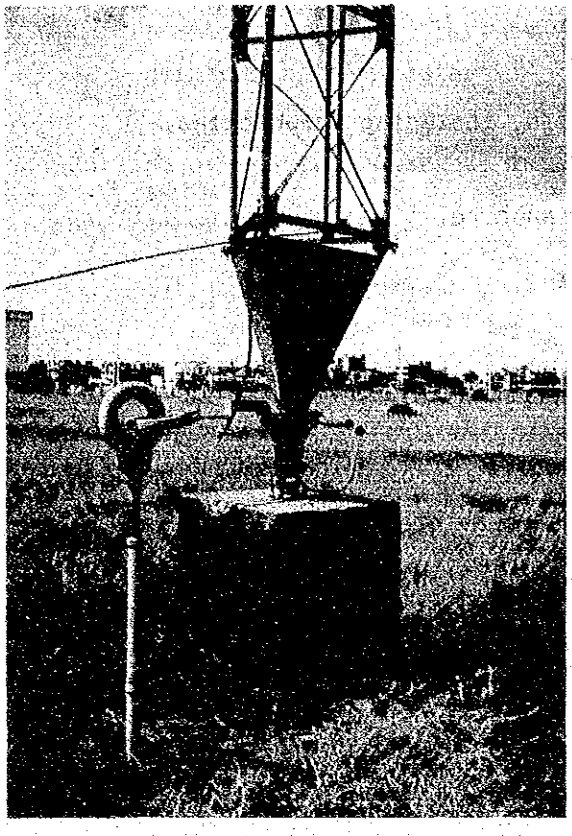


Ⓐ Fibreglass Rod Insulator 14 Feet

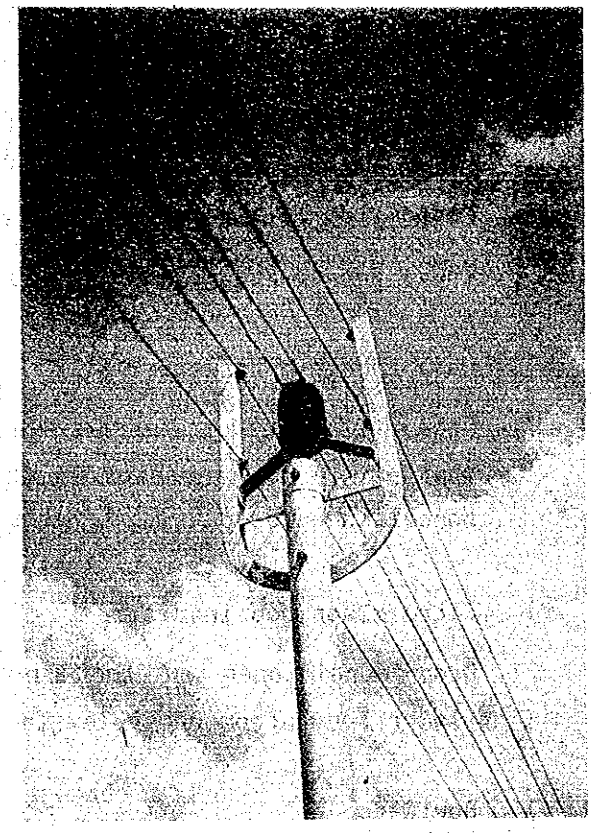
Ⓑ Fibreglass Rod Insulator 3 Feet

Ⓒ Fibreglass Rod Insulator 3 Feet & Turnbackle

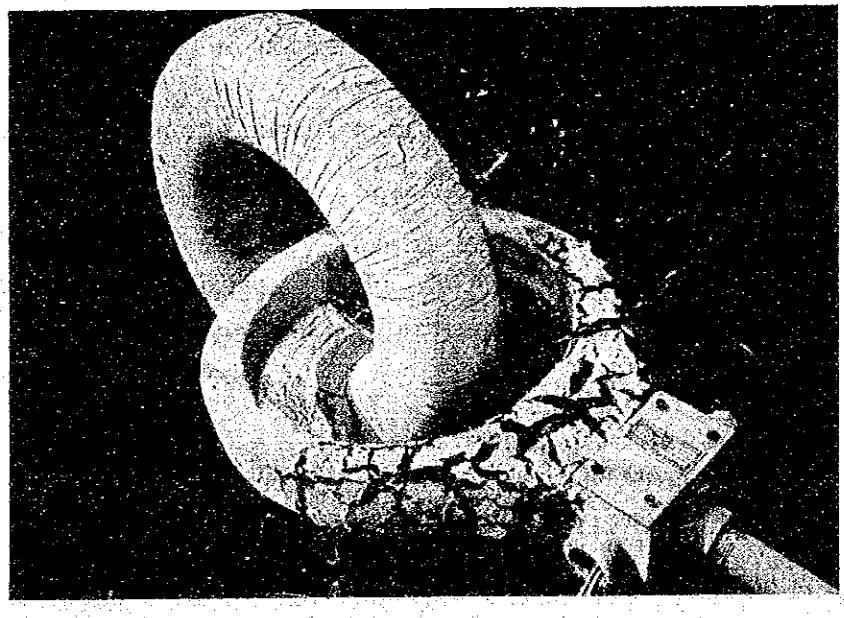
Fig. 2 OUTLINE OF EXISTING ANTENNA MAST



Base of Antenna



Six-wire Main Feeder



Austin Transformer

Photo 1 Existing Antenna System

However, it is necessary to paint it immediately in order to avoid a trouble caused by rust and corrosion.

c) Rust and corrosion of guys

Good conditioned. Not perceptible, including turnbuckles.

d) Foundation of the mast base and anchors.

There are no perceptible cracks.

e) Base insulator of the mast

Good conditioned. Not perceptible are cracks and something like that except small chafes on the surface of the insulator, normal porcelain baked putting brown glaze.

f) Fibre glass rod insulator

Good conditioned on the surface according to observation and finger touch from upper levels of the mast.

g) Bowl gap

Possible to use successively by itself, although there are small traces by lightning.

h) Austin transformer

Necessary to replace because of deep injury of armour.

i) Six wire feeder line

Necessary to replace because of no capability for 100 kW transmission with 3.2 mm diameter of inner and outer wires.

j) Tuning hut

Necessary to construct by reason of narrow space (2.5 x 3m) of the existing one without a door and parallel operation during installation.

k) Feeding pipe (line between antenna tuning unit and antenna base)

Necessary to replace by reason of no capability of 100 kW transmission with 16.1 mm diameter of non-supported copper pipe jointed in the middle.

2) Outline of electric characteristics of a result of investigations.

a) Impedance at the base

376 + j329 ohm measured at frequency 873 kHz

b) Current at the base

5.0 A measured with a finer class high frequency ammeter

c) Antenna input power

5.0^2 x 376 = 9.4 kW, near to nominal rating, derived from a) and b)

d) Insulation resistance at the base

420 M ohm between the base ground, measured with an insulation resistance meter (test voltage 1 kV)

e) Earthing resistance

0.2 ohm measured with an earthing resistance meter.

f) Field intensity

Table 5 shows a result of measurement of actual field intensity in the comparatively near zone from the station. Meanwhile, a result of measurement along coastal belt on the way to and at Cox's Bazar about 100 km away from Chittagong is shown in Table 6.

3) Capability of taking 100 kW power of the existing antenna mast

a) Structure

It is considered that the mast itself and its guys whose life and security factors have the difference between JAMPRO's way of thinking and Japanese one have no big problem according to a fact of recently successive 10 years operation.

It is also considered that there is no problem on the foundation of the mast designed for weak ground according to data of subsoil investigations and drawings for construction obtained during a survey.

The anchors whose volume is comparatively small from the point of view of Japanese side are still practicable by reason of no strain of the anchor rod, in spite of a stress for a long time.

Table 5 Field Intensity (in and around Chittagong)

NO.1	Distance	Direction	Field Intensity	Places
1	2.4	43	107.5	Rail Road Crossing
2	2.0	25	104.0	Kashimir Garments Ltd.
3	1.6	78	113.5	Chandgoan
4	1.8	129	110.0	Sabanghata
5	2.1	204	110.5	Kapashgola Road
6	1.8	237	111.5	Crossing of CDA Ave. & Hathazari
7	2.1	308	100.8	Kumarubara
8	0.23	-	132.0	In front of the entrance of TX house
9	4.4	228	106.5	Top of Battali Hill
10	4.1	223	103.5	Tiger Pass Road
11	1.0	210	113.0	Baharder Hat, Market
12	1.0	50	116.0	Cox's Bazar Road
13	6.0	210	99.0	In front of the entrance of Hotel AGRABAD

Table 6 Field Intensity (long distance)

NO.1	Distance	Direction	Field Intensity	Places
1	40	136	84.5	Keranirhat
2	50	155	79.0	Lohagara
3	90	170	63.5	Cox's' Bazar, Rest House

b) Electric characteristics

There are characteristics of limited voltage and power of the base insulator and fibre glass rod for guys with direct relation to taking 100 kW power.

A test of limited voltage and power of the same sized insulator as the fibre glass rod of the existing Chittagong Station was performed by NHK (Japan Broadcasting Corporation) in 1971. According to a result of this test, sparking voltage of the tested insulator is 46.5 kV (peak) under water pouring and 62.4 kV (peak) under dryness at 100% modulation.

Provided that there is about 2 times margin against 23.5 kV at the base of the existing antenna at 100 kW output and 100% modulation, that the tested insulator is comparatively small sized, and that sparking voltage of the base insulator is higher than that of the insulator for guys, it is desirable to add a high speed surge protector for a proposed transmitter and mount a rain hut and corona ring onto the existing base insulator.

Besides, concerning a capacity of the tested insulator, the temperature hereof increased about 25°C on condition of 4 hours continuous impression of high frequency voltage 28 kV (peak) at 1 MHz. (refer to Annexe 6, No. 6)

2-4 Proceeding and Contents of the Request

2-4-1 Proceeding of the Request

In Bangladesh, radio broadcasting is the most effective and popular mass communication medium, and playing a very important role with various educational and cultural programmes such as family planning, population control, farm broadcast, school education, adult education and other rural development programmes.

Besides, Chittagong Radio Station has another mission which is to broadcast warning signals against cyclone[7] attacks for the people living on coastal belt and offshore islands together with the fishermen and sailors in the Bay of Bengal.

However, the existing radio transmitter at Chittagong, the second largest city in the country following the capital city Dhaka has already elapsed more than 20 years. The transmission performance has been deteriorating due to ageing and non-availability of spare parts which the manufacturer has ceased to prepare.

This in turn made it difficult for Radio Bangladesh to maintain its uninterrupted good quality transmission from this station.

Moreover, due to co-channel and adjacent channel interference of high power transmitters of neighbouring countries, the reception condition beyond several ten kilometres from Chittagong has become poor during daytime and worse at night.

As per final acts of the Regional Administrative LF/MF Broadcasting Conference (ITU) held in Geneva in 1975, it was decided to allocate a frequency channel 873 kHz to a 100 kW MW Transmitter in Chittagong. This must be materialized by 1989, otherwise the assigned frequency channel will have to be surrendered for use by other countries.

RB expects to obtain enough field strength at two more scheduled re-broadcasting stations, one at Rangamati (under construction) and other at Cox's Bazar (under planning) which are to receive the Chittagong's signal, in consequence of replacing the existing 10 kW transmitter with the new high power 100 kW one.

In the Third Five Year Plan, the Government has formulated several projects for radio broadcasting among which the establishment of a 100 kW transmitter at Chittagong Radio Station ranks as a top priority project. Besides, The Daily Life, one of the famous news papers in Chittagong,

---

7) cyclone: tropical low pressure, corresponds to a typhoon in Japan. stronger March to October in rainy season, the strongest especially May to June. RB releases a record in 1985: Maximum velocity of wind 166 km/h (46 m/s), Storm surge 7.5 m, feet, Loss of Life 15,000.

reported that an Islamic Institution staged a demonstration and submitted a memorandum containing 4-point demand including immediate installation of a 100 kW transmitter at Chittagong Radio Station to the Regional Director, on 17th December, 1984.

The Executive Committee of the National Economic Council had already approved a total sum of Tk. 813.57 lakh including Tk. 426.36 lakh in foreign currency.

Based on the background mentioned above, RB offered the Project Proforma, a proposal with the main point of replacing the existing 10 kW transmitter with a new high power 100 kW one and the Bangladesh Government requested the grant aid assistance to the Japanese Government in 1985.

2-4-2 Contents of the Request

The following is items proposed in the Project Proforma, page 21.

	Items	Quantity
(1)	100 (2x50) kW. MW. Transmitter associated power supply equipment and accessories	1 set
(2)	Working Tubes for final PA & MA	2 sets
(3)	2x50 kW Combining Equipment	1 set
(4)	Dummy Antenna 2x50 kW	1 set
(5)	Transmitter Control Console	1 set
(6)	Programme Input Equipment comprising:	
	1) Automatic Voltage Controller	2 sets
	2) Automatic Peak Controller	2 sets
	3) AM Modulation Monitor	1 set
	4) Oscilloscope	1 set
	5) Monitor Amplifier	2 set

6)	Monitor Selector Panel	1 set
7)	Audio Frequency Oscillator	1 set
8)	Distortion Meter	1 set
9)	Audio Jack Panel	1 set
10)	Tuning Box	1 set
11)	RF. Switch Panel	1 set
12)	Cabinet Rack Assembly	1 set
(7)	150 W FM Transmitter, 88-108 MHz with aerial, cables & accessories	2 nos.
(8)	Hi-Fidelity FM Receiver	6 nos.
(9)	Hi-Fidelity AM Broadcast Receiver, 525 kHz -30 MHz	2 nos.
(10)	Audio Equipment comprising	2 sets
1)	Tape Recorder/Reproducer	
2)	Monitoring amplifier	
3)	Loud-speaker	
(11)	Six wire transmission Line, 230 ohms	200 m
(12)	Antenna Tuning Unit	1 set
(13)	Obstruction Light	1 set
(14)	Power Cable for Obstruction Light	100 m
(15)	Austin Transformer	1 set
(16)	Cable for Monitoring	200 m
(17)	VHF Talking Link, 172 MHz	2 nos.
(18)	Measuring Equipment comprising:	1 set
1)	Circuit Tester	
2)	Insulation Resistance Tester	
3)	Wide-band Oscillator	

4) Impedance Bridge
5) RG-3 Receiver/Generator
6) Spectrum Analyser 6 kHz - 2 GHz
7) Other items as required

(19) Air-conditioning Plant, 20 tons with spares — 2 nos.

(20) Substation Equipment
1) 11 kV HT Switch gear, 650 - 750 kVA — 1 set
2) HT Transformer 11 kV/0.4 kV, 650 kVA — 1 set
3) LT (400 V) Distribution Panel — 1 set
4) Automatic Voltage Regulator, 3-phase, 4-wire, 400 kVA — 1 set
Primary : 400 V ±10%
Secondary : 400 V ±2%
5) Diesel/Gas Generator, 400 kVA — 1 no.
6) Cable & other accessories — 1 set

(21) Installation Materials — 1 set

(22) Installation Tools for MW Transmitter & Power supply Equipment — 1 set

(23) Spares — 1 set
1) Spare Transmitting Valves
2) Essential spares of Transmission including Modulation-Transformer Choke and spares for Combiner, Dummy Antenna, ATU, AVR
3) Spares of Minor importance for 5-year operation of Transmitter including spare transistors, diodes, ICs, Spares Quartz Crystal Oscillator, Lamp & Fuse, RF Meter (10A, 20A, 30A), Spares for Control Console, PIE, etc.
4) Spares for Diesel Generator
5) Spares for Substation Equipment
6) Spares for A.C. Plant

N.B. : The existing 400' mast is capable of taking 100 kW Power. The same mast will be used.

CHAPTER 3 CONTENTS OF THE PROJECT

CHAPTER 3 CONTENTS OF THE PROJECT

3-1 Objective and Target

The proposed 100 kW MF Transmitter is intended to achieve the following objectives : -

- It will decrease the effect of co-channel and adjacent channel interference.

- It will ensure good quality transmission with increased signal strength.

- Existing coverage area will be increased thereby ensuring good quality reception on cheap radio receivers. It will have effective coverage area, Cox's Bazar area, offshore islands of the Bay of Bengal, Coastal vessels and ships. It will inspire the listeners to participate in all nation building activities.

- Well-advanced warning signals against cyclone and tidal bores will save valuable lives and properties in the covered zone.

- Radio Broadcasting being the most effective and popular mass communication medium, this will help educate people by presenting popular programmes such as Family Planning, Population Control, Farm Broadcast, Education and Adult Education and other rural Development and Cultural Programmes. All these factors have direct influence over the national economy.

- Two more Low Power Transmitters are coming up shortly, one at Rangamati and the other at Cox's Bazar and these two stations will relay the programmes of Chittagong Station. The increased power of the existing Chittagong Station will ensure good quality reception for its re-broadcasting from the above relaying stations.[8)]

---

8) PROJECT PROFORMA for 100 (2x50) kW. MF. TRANSMITTER, CHITTAGONG, 1985

3-2 Examination of the Contents of the Request

(1) Objective and Role of Radio Broadcasting in the National Development Plan

The following is an objective and role based on the Third Five Year Plan (1985 - 1980):-

Radio Broadcasting plays a dominant part in educating people about the functions and policy of the Government. Radio Bangladesh is a Government organization; it is a very important link between the Government and the people. In Bangladesh 90% of the people live in rural areas where there is no electricity in most places. It is the radio which conveys the information as regards education, agriculture, family planning, news and commentaries, entertainment programmes, sports events, development programmes of the Government and other day-to-day works which the Government carries out for the benefit of the people. The radio also plays important part in weather forecasting and spreading an alarm for cyclone disaster etc. In the Third Five Year Plan, the Government has formulated several projects for improvement of Radio Broadcasting and the establishment of 100 kW transmitter in Chittagong is designated as a top priority project. Chittagong being situated in the Bay cyclonic belt, the Radio Station of Chittagong has a special importance in carrying weather forecast and cyclone warning to the people of the seacoast, offshore islands and the nearby ships and fishing boats.

(2) Expansion of the coverage

Chittagong Division is composed of 15 zillahs including Chittagong, Comilla and Sylhet and situated as splitting from north to south the eastern part of Bangladesh. Sylhet district in the north and Comilla district in the middle are covered by a 20 kW transmitter and 10 kW one respectively. In addition, the relevant parts of these two districts are also covered by Super High Power Transmitting Station (1000 kW) and High Power Transmitting Station (100 kW), Dhaka. Therefore, in case of replacing the existing 10 kW transmitter with the new High power 100 kW one, the coverage of Chittagong Station is to be estimated, on an average of the difference of propagation during day and night time through dry and rainy season, as follows (refer to fig. 3):

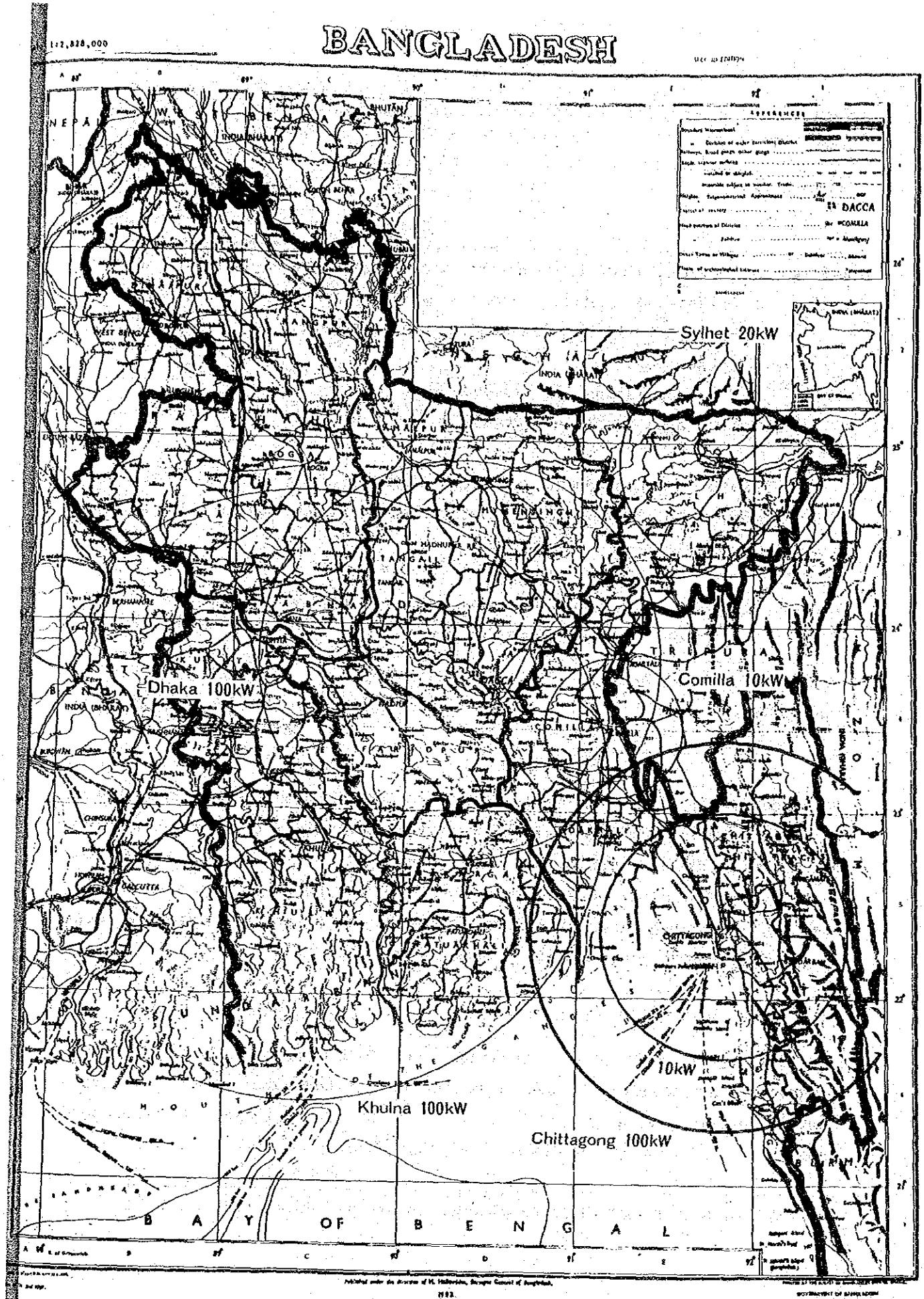


Fig. 3 Coverage of the Stations

Coverage	Existing 10 kW TX	New 100 kW TX
Population	24%	92%
land	35%	95%

Remarks Provided that denominators are the population and land area of Chittagong district comprising 8 zillahs; Chittagong, Cox's Bazar, Bandarban, Rangamati, Khagrachhari, Feni, Noakhali and Lakshmipur.

population	10.058
area	26,097 km^2 9)

A result of measurement of field strength from the existing 10 kW transmitter of Chittagong Station conducted at Cox's Bazar, 100 km away from Chittagong, is as follows:

Points	Time	Field strength	by
Cox's Bazar (Rest House)	11:00, 17th Dec.	63.5 dB	Team
Cox's Bazar	Aug.	63 dB	RB

Accordingly, at the completion of the project, the new 100 kW transmitter will cover approximately 100% of Chittagong district comprising 8 zillahs mentioned before all the year around, at day and night time through dry and rainy seasons, provided that the two relaying transmitting stations, Rangamati and Cox's Bazar commence re-broadcasting services with reception of Chittagong station's programmes.

(3) Social Benefit caused by the Execution of the Project

Chittagong Station will broadcast the following principal programmes (regular) corresponding to the expansion of the coverage, about 3.8 times. Monthly programmes will total about 434 hours including self-produced programmes, accounting for 82% of the total ones.

9) STATISTICAL BULLETIN of Bangladesh (monthly), June, '86, p. 3

Programmes	Duration	Abstract
Weather and cyclone forecasts	06:40 a.m. 5 min 09:00 p.m. 5 min 06:20 a.m. 5 min 12:00 Noon 5 min 06:55 p.m. 5 min 11:10 p.m. 5 min	 Relay from Dhaka - do - - do - - do -
Farm Broadcast:	06:25 a.m. KRISHI KATHA 5 min (Daily)	General Information on Agriculture. Prog. fed by Agricultural Information service.
	06:00 p.m. KRISHI KHAMAR 30 min (Daily)	Information, education & promotion prog. on Regional Basis.
Industrial	08:30 a.m. SHILPANGON 20 min (fortnightly)	On the spot recording on different industrial complex
Commercial	01.05 p.m. BIGGYAPAN TARANGA 105 min daily)	Commercial advertising, spots of local products
Family Planning	03:05 p.m. SUKHI JIBAN 25 min (daily)	Data received from different sources & compiled
	08:10 p.m. SUKHI SANSAR 20 min (daily) except Friday	Relay from Dhaka
	7:00 p.m. DESH AMAR MATI AMAR 30 min (daily)	- do -

Social Welfare Programme	4:30 p.m. ANONNYA 30 min (weekly)	Programme for women folk, entertainment, education & Information supplied.
	4.30 p.m. SCOUT ANGON 30 min (monthly)	Boy scout programme.
Children's programme	9:10 a.m. SHISHU KISHORE MELA 50 min (weekly)	Programme for children & adolescents.
Youth Programme	4.30 p.m. NABOK ETAN 30 min (weekly)	Activities of the youth, Information & Education.
School Broadcast	12:20 p.m. SHIKKHARTHIDER ASAR 40 min (daily except Friday)	Programme on School Syllabus & other Information Relay from Dhaka.

Weather and cyclone forecasts are received from Chittagong Meteorological Department through telephone and compiled. In Dhaka it is received from Dhaka Meteorological Department by teleprinter and telephone.

With relation to utilization of broadcast programmes, number of radio sets licenced by Bangladesh Post Office is 54,800 (1984). Meanwhile, Bangladesh Bureau of Statistics estimates 2,333,343 sets (1981). In this connection, Regional Director, Programme of National Broadcasting House explains that forty million people out of one hundred million population in Bangladesh are listening to the popular programme in the morning over the radio. It means there are 6.77 million radio sets in Bangladesh, derived from 40 million divided by average household size 5.9 persons. Accordingly, actually distributed radio sets might be estimated more over than 2.3 million aforesaid. An annual licence fee for each radio set is 15 Taka for domestic use and 50 Taka for commercial use. Each listener pays the respective Post Office a fee. This fee, similar to a reception fee in Japan, is fairly cheap, 75 - 250 yen. Most people, nevertheless, intend to listen to the radio without paying licence fees.

On the other hand, television sets estimated by Bangladesh Bureau of Statistics number 159,864 (1981, including 105,637 licenced sets).

An annual licence fee for each television set is 100 Taka for black & white for Dhaka, Metropolitan area and 75 Taka for the rest of the country and 250 Taka for colour for the whole country for domestic use only and 1,000 Taka for both black & white and colour for the whole country for commercial use.[10)]

Programme being received by people of coastal belts & offshore islands by individual radio receivers and sometimes mikes are being used by Mass Communication Department and Red Cross after receiving the information from Radio.

(4) Operational Organization System after the Execution of the Project

The responsible and executing agency for this project is Radio Bangladesh, National Broadcasting Authority under the Ministry of Information. RB offered the Project Proforma (PP), a proposal.

PP is composed of 7 Parts: Part A deals with Project Digest, Part B Project Description, Part C Investment Cost, Part D Financing of the Project, Part E Project Implementation, Part F Operation of the Project, Part G Benefit Cost Analysis. Regarding CDST (Custom Duties and Sales Taxes) which is characteristic to Bangladesh, for instance, a domestic currency portion Tk. 238.76 lakh is appropriated with regard to a foreign currency portion Tk. 426.36 lakh corresponding to the request for broadcast equipment. In addition, domestic currency Tk. 32.4 lakh including the cost for dismantling of the old 10 kW transmitter and for erection of feeder poles, 7.6% of a foreign currency portion mentioned above, as contingency, is also summed up.

The existing antenna mast will be used as described in sub-section 2-4-2. The Basic Design Study Team asked the staff of the authorities concerned about the preparation of CDST because a foreign currency portion might increase according to some necessary reinforcement which would have been caused by the further investigation after their coming back to Japan.

---

10) aforesaid 3), P. 484 - 485
aforesaid 8), P. 3

In response to this question all the responsible persons of the External Resources Division, the Ministry of Information and RB remarked that CDST would not cause any problem. CDST for this project are prepared by the Ministry of Information.

In this connection, the procedure of revision of PP is not necessary provided that an increase of CDST is within 10% considering a factor of price escalation. A payment system in installment has also been introduced. These two points have been made clear through the survey of the Study Team.

After the execution of this project, Kalurghat Transmitting Station of Chittagong Radio Station, as well as 100 kW High Power Transmitting Station, Noapara, Khulna Station, will be raised to a higher status as an "independent station" placed under the supervision of a Resident Engineer in RB's organization. Number of the staff is 36. The office block for all the staff will be constructed as a remodeling of the existing building together with a room for the new 100 kW transmitter.

Technical staff on duty of operation and maintenance is 19 persons out of the total 36, which includes experienced engineers and technicians organically transferred from Super High Power Transmitting Station, Dhamrai, Dhaka, and High Power Transmitting Station, Savar, Dhaka, and High Power Transmitting Station, Noapara, Khulna. The newly raised station will have more adequate man power if despatch of trainees to overseas countries is conducted on a regular basis.

RB appropriates Tk. 429.90 lakh for maintenance cost mainly purchasing spare parts in 1986 - 87. This amount corresponding to about 200 million yen, includes a foreign currency portion 50%.

As mentioned above, there is no big problem concerning maintenance for broadcast equipment. The Team recognizes that the present condition of maintenance by RB itself is very favourable, as a result of observation of the aforesaid 3 big high power stations: best cleaning-up of facilities environment, especially a maintenance schedule table for the existing 10 kW transmitter of Kalurghat Transmitting Station, Chittagong.

(5) Examination on the composition of broadcasting equipment proposed in the Request

1) To list up Limiting Amplifier combining (6) 1) Automatic Voltage Controller with 2) Automatic Peak Controller.

2) To list up Audio Test Equipment integrated as measuring equipment for (6) 7) Audio Frequency Oscillator and 8) Distortion Meter.

3) Not to line up (6) 10) Tuning Box as it is usually mounted on a transmitter itself.

4) Not to line up (6) 11) RF Switch Panel as it is functionally included in 6) Monitor Selector Panel.

5) To list up FM Link integrating (7) FM Transmitter and (8) Hi-Fidelity FM Receiver. Its output power shall be 50W.

6) To line up two AM Broadcast Receiver for programme relay instead of (9) Hi-Fidelity AM Broadcast Receiver.

7) To line up Tape Recorder/ Reproducer with Monitor for reproduction of emergency programmes and identification signals in test broadcasting, concerning (10) Audio Equipment.

8) (14) Power Cable for Obstruction Light and (16) Cable for Monitoring shall be included in (24) Installation Materials.

9) To list up Impedance Meter combining (18) 4) Impedance Bridge with 5) RG-3 Receiver/Generator.

10) To delete (18) 6) Spectrum Analyser as it is out of minimum requirement for a radio transmitting station.

11) To list up Frequency Counter concerning (18) 7) Other items as required.

12) Two Air-conditioners shall be provided to cool a part of the transmitter room where (5) Transmitter Control Console, (6) Programme Input Equipment and (20) 3) LT Distribution Panel are installed.

13) Power capacity of (20) 2) HT Transformer shall be 500 kVA as follows:

Capacity of Automatic Voltage Regulator	350 kVA
Lights and receptacles	
Air-conditioner	50 kVA
Power supply for miscellaneous use	
Sub-total	400 kVA
Expansibility (+25%)	100 kVA
Total	500 kVA

14) Power capacity of (20) 4) Automatic Voltage Regulator shall be 350 kVA as follows:

2 Transmitters (at 100% modulation)		120 kW x 2
Power factor 80%, therefore	240 ÷ 0.8 =	300 kVA
Obstruction Lights, Security Lights		10 kVA
Ancillary Equipment		30 kVA
Power supply for miscellaneous use		10 kVA
Total		350 kVA

15) To line up Diesel Engine Generator in point of view of economization and local environment relating to (20) 5) Diesel/Gas Generator, and its capacity shall be 350 kVA as well as Automatic Voltage Regulator.

16) Item (21) includes paint for the existing antenna mast.

17) To list up Rain Hut and Corona Ring as reinforcement for electric characteristics of the base insulator of the antenna mast as a result of further investigation after coming back to Japan, with regard to Note of the Minutes of Discussions.

3-3 Outline of the Project

3-3-1 Responsible and Executing Agency

Responsible and Executing Agency is Radio Bangladesh, NBA under the Ministry of Information.
RB has a 47 year history including the period of British India and East Pakistan. And RB has rich experience of operating 3 big High Power Transmitting Stations: 1000 kW Super High Power Transmitting Station, Dhaka, 100 kW High Power Transmitting Station, Dhaka and 100 kW High Power Transmitting Station, Khulna.

After the execution of this Project, Kalurghat Transmitting Station of Chittagong Radio Station, as well as 100 kW High Power Transmitting Station, Noapara, Khulna Station, will be raised to a higher status as an "independent station" placed under supervision of a Resident Engineer in RB's organization. Number of the staff is 36. The office block for all the staff will be constructed together with a room for the new 100 kW transmitter, borne by RB.

RB has an investment plan in the PP. This is borne by Bangladesh side with regard to this Project.

Domestic currency portion Taka in lakh (1985)

	Items	1985 - 86	1986 - 87	1987 - 88	Sub Total
(1)	Pre-construction	2.00			2.00
(2)	Construction Works	26.21	26.79	9.23	62.23
(3)	Machinery & Equipment	4.10	256.44	1.10	261.64
(4)	Transport Vehicles	4.00			4.00
(5)	Man Power	0.76	4.34	2.46	7.56
(6)	Other Costs	6.20	10.65	0.45	17.30
(7)	Cost escalation		29.82	2.66	32.48
	Total	43.27	328.04	15.90	387.21

Item (3) Machinery & Equipment include Tk. 238.76 lakh for CDST, which corresponds to 56% of a foreign currency portion Tk. 426.36 lakh for requested transmitting equipment. And a domestic currency portion Tk. 32.4 (7.6%) lakh, as contingency, including a cost for dismantling of the old 10 kW transmitter and erection of feeder poles, is summed up for a foreign currency portion aforesaid.

3-3-2 Principal Plan

In full consideration of analysis and investigation of the Request and obtainable documents at a stage of preliminary preparation in Japan, confirmation of the items requested during the survey in Bangladesh, confirmation of responsibilities of Bangladesh side, discussions with responsible counterparts, and analysis and examination of data obtained during the survey in Bangladesh after coming back to Japan, the Basic Design has been prepared.

The following is the principal matters in relation to composition of radio broadcast equipment.

- Combining system of two 50 kW medium-wave transmitters
- 2 way acceptance of city electric power with high tension 11 kV
- A 350 kVA engine generator for an emergency use
- Air-conditioners for a transmitter room
- FM link for programme transmission from Studio and Transmitting Station
- AM all wave receivers for an emergency use
- Tape recorder/reproducer for an emergency use
- Reinforcement for the existing antenna
- Supplementation of measuring equipment
- Spare parts including vacuum tubes for high power stages

The undertakings of Bangladesh side is as follows:

- Extension works of a transmitter room, substation room, engine generator room, office rooms and other attached rooms.
- Construction works of a new antenna tuning hut
- Erection of feeder poles
- To lead in electric power from Power Development Board
- Dismantlement of the old 10 kW transmitter.

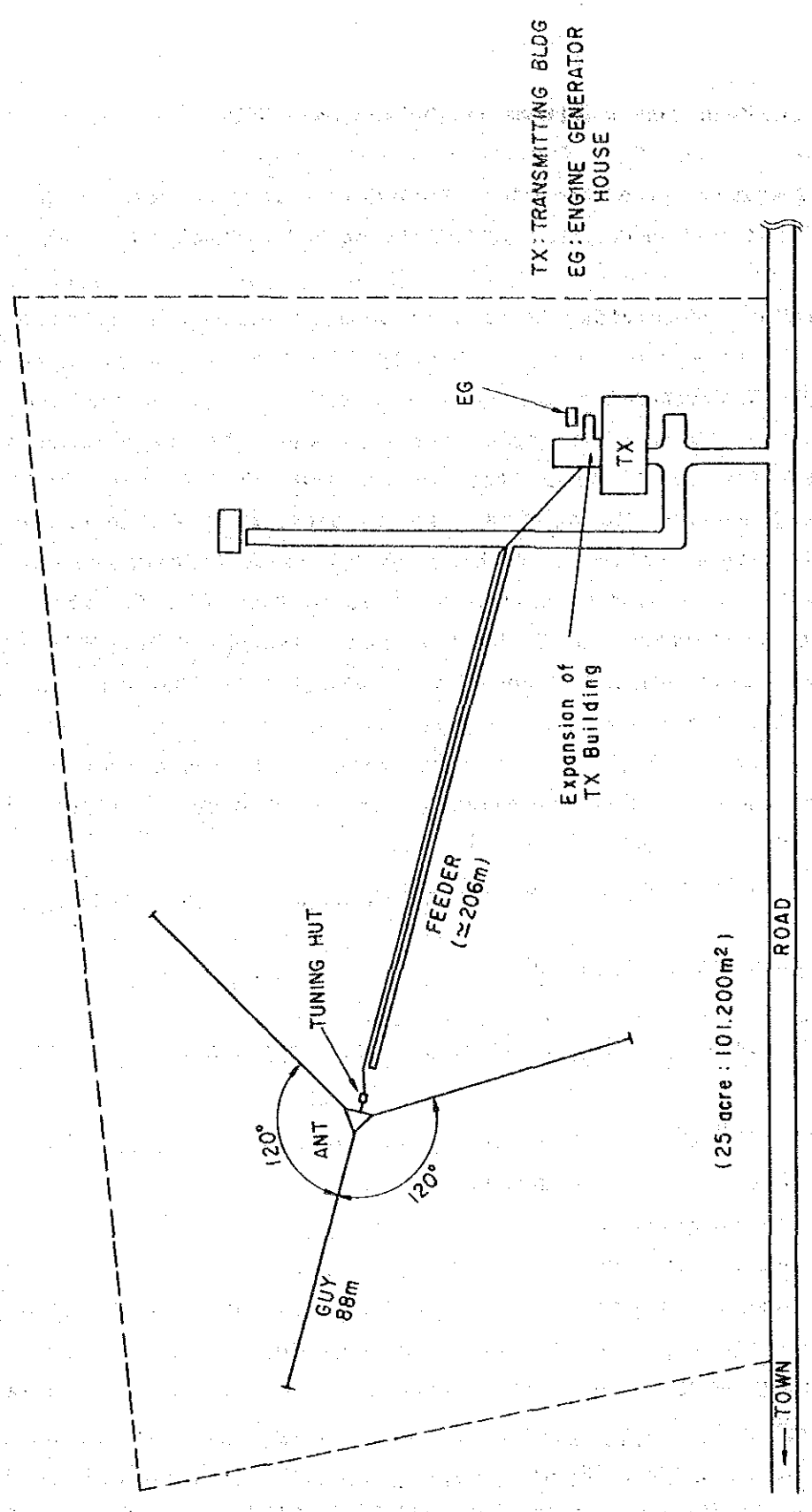


Fig. 4 Site Layout

3-3-3 Location and Condition of the Proposed Site

The proposed site for this Project is at the premise of present Kalurghat Transmitting Station of Chittagong Radio Station.

Kalurghat Transmitting Station is about 7 km to the northeast of the studio. Its site area is approximately 91,000 km^2. A transmitter house and antenna are separated and connected with air-opened six wire feeder line of about 200 m. The ground level of the site the antenna mast and radial earthing are located on, is lowered 30 cm from that of the transmitting house. The site is flat, situated in the damp ground zone a rice family plantation is flourishing on, apparently a week ground. It was impossible to approach the anchors for guys on foot because the water level on the site was getting up to half of human stature during our survey at the end of rainy season. There is no possibility that the base of the antenna mast and the anchors for guys will get sunk under flood according to an experience of Regional Engineer, Chittagong: the maximum water level recorded on the site since installation is 15 cm above the access road.

Fig. 4 shows an outline of the site.

3-3-4 Abstract of Equipment

The following is an abstract of proposed equipment.

(1) Transmitting equipment

a)	50 kW MW radio transmitter	2 sets
b)	Control console	1 set
c)	Output combiner	1 set
d)	Dummy antenna	1 set
e)	Programme input and monitoring equipment	1 set
f)	Equalizer	1 set
g)	FM link	1 set
h)	VHF communication equipment	2 sets
i)	AM broadcast receiver for programme relay	2 sets
j)	Tape recorder / reproducer	1 set

(2) Power supply equipment

a)	HT changeover switch	1 set
b)	HT circuit breaker	1 set
c)	HT / LT transformer	1 set
d)	Automatic voltage regulator	1 set
e)	LT distribution panel	1 set
f)	Engine generator	1 set

(3) Ancillary Equipment of the existing antenna

a)	Six wire feeder line	1 set
b)	Antenna tuning unit	1 set
c)	Feeding pipe	1 set
d)	Austin transformer	1 set
e)	Obstruction light assembly	1 set
f)	Rain hut	1 set
g)	Corona ring	1 set

(4) Measuring equipment 1 set

(5) Airconditioner for transmitter room 2 sets

(6) Installation tools and materials 1 set

(7) Spare parts 1 set

3-3-5 Management Plan and Staff Assignment

After the execution of this Project, Kalurghat Transmitting Station of Chittagong Radio Station will be raised to a higher status as an "independent station" placed under the supervision of a Resident Engineer in RB's organization. As a result hereof, number of the staff will be increased to 36 persons. The operation will be done based on a specimen duty roster as shown in Table 7. In this table, any member of the shift in the morning (1st shift) differs from any member of the shift in the night (3rd shift). This shows RB's own system: members of the shift in the night is returning to their residence by a station vehicle. On this condition, a residential building is to be proposed.

Table 7 Duty Roster of Technical Staff

SPECIMEN DUTY ROSTER OF TECHNICAL STAFF(RADIO ENGINEER TO EQUIPMENT ATTENDENT) OF 100 (2x50) KW MW TRANSMITTING STATION,CHITTAGONG

Days	1st shift	2nd shift	3rd shift	Maintenance/General shift	Weekly off	leave	Remarks
	Period from 0530 to 1200 hrs	from 1115 to 1745 hrs	from 1730 to 2400 hrs	from 0730 to 1400 hrs			
Saturday	A3,B1,D1,D6	A4,B2,D3	A5,B3,D4,D7	A1,B4,C,D5,E1,E2	A2,D2	On average about 4 persons may be on leave on each working day of the week	
Sunday	A2,B4,D1,D6	A3,B1,D2	A5,A4,D4,D7	A1,B2,C,D5,E1,E2	B3,D3		
Monday	A2,B2,D2,D7	A5,B1,D1	A4,B3,D5,D6	A1,A3,C,D3,E1	B4,D4,E2		
Tuesday	A2,B2,D3,D4	A5,B3,D1	A3,B4,D2,D6	A1,B1,C,D7,E1,E2	A4,D5		
Wednesday	A4,B3,D3	A2,B4,D2,D4	A3,B1,D1,D5	A1,B2,C,D7,E1,E2	A5,D6		
Thursday	A5,B4,D1	A4,B3,D4,D5	A2,B2,D3	A1,C,D2,D6,E1,E2	A3,B1,D7		
Friday	A3,B1,D6	A5,B3,D4	A4,B4,D2,D3	A2,D5,D7,E2	A1,B2,C,D1,E1		

	Symbol	Designation
1	A1 to A5	Radio Engineer No 1 to 5
2	B1 to B4	Asstt Radio Engineer No 1 to 4
3	C	Air condition Supervisor
4	D1 to D7	Radio Technician No 1 to 7
5	E1 & E 2	Equipment attendant No 1 & 2

N.B. : (i) Above duty roaster is of typical nature. When any member of technical staff takes leave, number of persons in shift will be decreased. It may be mentioned here that each member of the staff is entitled for 20 days Causal leave, 33 days earned leave and 30 days Medical leave yearly in addition to weekly holiday and yearly govt holidays (about 20 days). Occasionally due emergency, duty shift personnels may be interchanged in different shift.

(ii) Resident Engineer & Station Engineer perform office duty from 0730 to 1400 hrs from Saturday to Thursday.

(iii) Maintenance shift personnels are responsible for repairing maintenance work of transmitter and associated gears,Diesel generator, Air condition plant, aerial & feeder line, periodic testing of valves, taking periodic performance test of transmitter and other equipment.

(iv) 1st,2nd & 3rd shift personnels are responsible for proper operation of transmitter and associated gears. Shift personnels of different shift are also assigned for preparing different kinds of technical reports in addition to normal shift duty.

Technical staff on duty of operation and maintenance is 19 persons out of the total 36, which includes experienced engineers and technicians organically transferred from Super High Power Transmitting Station, Dhamrai, Dhaka, and High Power Transmitting Station, Savar, Dhaka, and High Power Transmitting Station, Noapara, Khulna. Total man power will have gotten adequate to the new raised station in addition to despatching trainees to overseas countries conventionally.

The following shows designation of the total 36 persons:

		Nos.
-	Resident Engineer	1
-	Station Engineer	1
-	Radio Engineer	5
-	Asstt Radio Engineer	4
-	Air conditioner Supervisor	1
-	Radio Technician	7
-	Equipment attend	2
-	Head Assistant	1
-	Stenographer	1
-	Accountant-cum-cashier	1
-	Stenotypist	1
-	LDA-cum-typist	3
-	Store-keeper	1
-	MLSS (Peon)	4
-	Driver and Daftly	3
	Total	36

CHAPTER 4 BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Policy of the Design

In full consideration of

- Analysis and investigation of the Request and obtainable documents at a stage of preliminary preparation in Japan
- Confirmation of the items requested during the survey in Bangladesh
- Confirmation of undertakings of Bangladesh side
- Analysis and examination of data obtained during the survey in Bangladesh after coming back to Japan,

the Basic Design has been prepared.

4-2 Examination of Condition for the Design

(1) Natural Environment

1) General Meteorology

Chittagong is in the subtropical zones. Monthly normal temperature (maximum and minimum), relative humidity and rainfall are shown in Table 8[11].

The duration from May to October is rainy season with high temperature and high humidity. Accordingly, a transmitter room and attached rooms need pull-in grills and exhaust fans with air-filters for the purpose of good ventilation. In the part of the transmitter room where a control console and programme input and monitoring equipment centreing the operation are furnished, two air-conditioners shall be installed.

---

11) 1984-85 Statistical Yearbook of Bangladesh, p. 29-31

Table 8 Monthly normal temperature, relative humidity and rainfall

Month		1	2	3	4	5	6	7	8	9	10	11	12
Max. Temp.	°C	25.9	28.1	30.8	32.1	32.3	31.0	30.5	30.7	31.3	31.0	29.2	26.5
Min. Temp.	°C	14.0	15.9	20.4	23.7	25.0	25.2	25.1	25.0	25.0	24.0	19.9	15.6
Humid.	%	73	71	75	78	80	86	87	87	85	83	78	74
Rainfall	mm	05	12	59	86	240	589	687	538	285	246	55	08

2) Particular Meteorology - Cyclone

Cyclone is a storm corresponding to a typhoon in Japan. Bangladesh Bureau of Statistics provides statistics since 1941[12]. In November, 1970, the entire area from Khulna to Chittagong experienced hurricane winds of maximum velocity 61.7 m/s for about 9 hours and innumerable human lives estimated to be about two hundred thousand were lost. Recently in May, 1985, a maximum velocity of winds 42.8 m/s is recorded.

In view of such natural condition, the building, especially doors, needs ample strength and it is necessary to provide apertures of air supply and exhaust with hoods against rainy winds.

3) Submergence on the Site

According to an experience of Regional Engineer, Chittagong, the maximum water level recorded on the site since installation was 15 cm above the access road in the event of locally centralized heavy rainfall in 1968. The floor level of a proposed transmitter room inside the existing transmitter house whose ground level is almost equal to that of the access road should keep at least 50 cm higher above there, considering that a recent medium-wave transmitter needs an air duct under the floor for the purpose of cooling for working vacuum tubes.

12) aforesaid 11), p. 24

4) Present situation of Power Supply

The two lines for high tension transmission of electric city power is installed up to a road in front of the site of Chittagong Transmitting Station as a result of special considerations on importance of broadcasting. Number of times of power failure is counted 4 to 5 per month even during cyclone. Generally speaking, it seems comparatively good conditioned. However, in order to make secure the operation of a broadcast station having importance and urgency, an engine generator with back up function shall be installed and, leading in 2 lines of high tension power, the changeover hereof shall be made possible by the staff of the Station. And the proposed automatic voltage regulator shall have a normal rating: input $\pm$10%, output $\pm$2% against voltage stability $\pm$5% of respective city power.

4-3 Basic Plan

4-3-1 Scale of Facilities

The scale of facilities to be provided under this Project has been determined, based on the result of the survey and in full consideration of maximum effectiveness by minimum expenditure and possibilities of economical and efficient operation after the execution of this Project, as mentioned hereunder.

4-3-2 Site Plan

This Project is to replace and up power transmitting equipment, so the proposed site is at the premise of the present Station. The extension construction of a building necessary therefor will be done. The proposed new 100 kW transmitter room and power supply room will be added as extended backward behind the existing transmitter house. An engine generator house will separately be annexed hereto. And a tuning hut will newly be constructed. All these construction works related to architecture are to be borne by Bangladesh side provided that construction drawings are offered by Japanese side.

4-3-3 Broadcast Equipment Plan

(1) Transmitting Equipment

100 kW power will be obtained by combining the outputs of two 50 kW transmitters running in parallel. This combiner system has such merits that a 25 kW output is maintained even if one transmitter is broken down. The 50 kW output will be recovered with changeover inside of the combiner, thus enabling continuous services for the majority of listeners without causing a serious reduction of coverage. It also enables urgent repairing of the broken-down transmitter while maintaining programmes on-the-air.

The proposed transmitters shall have a plate modulation system which is the most orthodox as amplitude modulation, positively achieved, completed as designing method and very stable. In addition, it has been adopted for the existing transmitters of Transmitting Stations, Dhaka, Khulna and Chittagong and gotten popular in Bangladesh.

Vacuum tubes shall be used only for a final modulating amplifier and final modulated amplifier. The other stages of amplifiers shall be composed of all-solid-state circuits for the purpose of stability and low power consumption. In Bangladesh the transmitter of Khulna Station is lined up just like this. There is no problem on operation and maintenance.

At present, telephone lines have been utilized for programme transmission from Studio. An FM link shall be proposed for good and stable transmission instead of the telephone lines whose quality is comparatively bad and whose cross talk is frequent. In addition, an equalizer shall also be proposed to be able to utilize the telephone lines for stand by purpose.

The proposed 2 all wave radio receivers, in case of direct reception of programmes from Dhaka in emergency, shall make it possible to receive and select the most excellent wave out of the waves, medium-wave radiated from Dhaka (100 kW), short-wave from Dhaka (100 kW) and medium-wave from Khulna (100 kW).

An input selector therefor, limiting amplifier at the pre-stage of the transmitter against over modulation, and monitoring equipment including an AM modulation monitor, oscilloscope and monitor speaker, shall also be provided.

Transmitters and ancillary equipment are listed up as follows:

Items	Specifications	Q'ty	Remarks
MW radio transmitter	50 kW	2 sets	parallel running
Control console		1 set	
Output combiner	50 kW x 2	1 set	
Dummy antenna	100 kW	1 set	
Programme input and monitoring equipment		1 set	
Limiting amplifier		1 set	
AM modulation monitor		1 set	
Input selector		1 set	
Monitor selector		1 set	
Monitor amplifier		1 set	
Oscilloscope	Wide-band	1 no.	for high frequency monitoring
Audio test equipment		1 no.	full items for audio measuring
Jack panel		1 no.	
Cabinet rack assembly		1 set	
FM link	50 W Tx	1 set	
Equalizer		1 no.	
AM broadcast receiver for Programme relay	All-wave	2 sets	
Tape recorder / reproducer	Open reel type	1 set	
VHF communication equipment	Press-talk	2 sets	
Measuring equipment		1 set	
Impedance meter		1 no.	separate type
Frequency counter		1 no.	
Insulation resistance meter		1 no.	
Wide-band test oscillator		1 no.	
Circuit tester		5 nos.	
Air conditioner for transmitter	4 ton	2 sets	
Installation tools and materials		1 set	
Spare parts		1 lot	vacuum tubes etc.

A new transmitter room adjacent to the existing transmitter house will be constructed by RB.

A floor layout plan of the new transmitter room is shown in basic design drawings item 4-3-4. High tension equipment, composed of HT transformers and rectifiers for final modulating amplifiers and final modulated amplifiers, modulation transformers, modulation chokes and so on, shall be installed inside a safety fence separated from the transmitters.

Another fence between two transmitters shall be formed for maintenance and repairing with safety. A combiner and dummy antenna shall be located in space between transmitters and high tension equipment.

Airconditioners shall be installed in an independent room for ordinarily operational purposes, space partitioned from the front of the transmitters, that a control console and programme input equipment are to be located in.

Cabinet rack assembly shall be composed of a receiver of a FM link, equalizer, AM broadcast receiver etc. and audio test equipment which makes it efficient to check and measure performance characteristics by using patching cords for daily maintenance purposes.

In order to cool the working vacuum tubes for final modulating amplifiers and final modulated amplifiers, air supply fans, exhausted fans and air ducts independent per each transmitter shall be installed. An airtight chamber with an air inlet with filters shall also be installed against pulling-in dusts. Other air inlets and exhaust fan with filters shall be mounted into the wall of the transmitter room for the purpose of ventilation against heat caused by miscellaneous parts.

(2) Ancillary Equipment of the Existing Antenna

The mast of the existing antenna will be used as described in item 2-4-2 aforesaid and also as a result of post survey analysis in Japan.

The existing six wire feeder line with diameter 3.2 mm, antenna tuning unit designed for 10 kW power and feeding pipe with diameter 16.1 mm connecting the antenna tuning unit with the base of the mast shall be replaced being incapable of carrying 100 kW power.

The existing obstruction light assembly shall also totally be replaced by reason of heavy injury of armouring of the Austin transformer and power line from the transmitter house although it is under operation.

In addition, a rain hut and corona ring shall be mounted onto the base insulator against bad influence for insulation due to direct pouring of water during rainy season and against breaking down of the base insulator, due to creepage discharge hereof in case of extraordinary high voltage, respectively. These are reinforcement for electric characteristics of the antenna.

Accordingly, the following is equipment necessary for replacement and supplement on the antenna.

Items	Specifications	Q'ty	Remarks
Six wire feeder line	230 ohms	1 set	
Antenna tuning unit		1 set	
Feeding pipe		1 set	
Austin transformer		1 set	
Obstruction light assembly	ICAO	1 set	
Rain hut		1 set	
Corona ring		1 set	

(3) Power supply Equipment

1) Reliability of city electric power

Surveys on occurrence of blackouts and voltage regulation in Chittagong City show a better result than was anticipated during the preliminary survey in Japan.

Number of occurrence of a power failure of both Transmitting Station and Studio during the cyclone season is 4 or 5 times a month with the regulation factor approximately ±5%. This is because independent power lines have been installed in the Station by Power Development Board (PDB).

2) System of power acceptance

At present, 2 lines, A and B of 11 kV 6000 kVA are located up to the entrance of the site. It take 15 minutes for changeover from A to B or B to A because an attendant from PDB sub-station about 1 km apart from the Transmitting Station operates after getting the information from the Transmitting Station.

According to discussions with RB, leading the 2 lines mentioned above into a power supply room of the Station, the power source shall be fed to a transformer through a changeover switch provided by Japanese side. Thus, changeover time will be shortened as it is directly operated by RB side.

3) System of power supply

A principal systematic diagram is as shown in Basic design drawings, item 4-3-4.

The 3-phase 3-wire high tension power source by 2 lines of A and B will manually be selected by a dual geared changeover switch, fed to the transformer (star to delta, 500 kVA) through a circuit breaker (6000 kVA) and arrestors and converted into 3-phase 4-wire low tension 400/230 V. The trunk of low tension voltage will be separated into two systems. One system shall be distributed for a general use of lights and receptacles of offices and corridors, airconditioners for the transmitter room, and miscellaneous purposes. Another system is for broadcasting equipment. It will be fed to a distribution panel after stabilization by an automatic voltage regulator through a magnet switch for an engine generator output, and distributed for 2 transmitters, programme input equipment, ancillary equipment, obstruction light, emergency lights and so on.

And a by-pass switch for the automatic voltage regulator shall also be installed in consideration of rare case of a failure hereof.

The engine generator for a emergency use shall be a generator having a co-axis with a Diesel engine and its power output rating shall be 3-phase 4-wire 400/230 V, 350 kVA.

In case of a failure in city electric power services, the engine generator shall automatically work, and, after the magnet switch automatically changes on condition of stabilization of the engine generator, supply the power for broadcast equipment. However, there is not always a merit for operational purposes concerning automatic sensoring for stability of city electric power in case of its recovery. Accordingly, the staff of the Station shall manually operate the magnet switch after confirmation of complete recovery of city electric power.

4) Power supply room and Engine generator room

RB intends to build a new engine generator house annexed to the existing transmitter house because the old house is superanuated and far therefrom.

The power supply room shall be located near to the transmitter room for convenience of daily operation, while the engine generator room will desirably be separated from the transmitter house against vibration and noise caused by rotation of the engine. On this condition, the engine generator house shall be located within easy access of the existing transmitter house through a breezeway.

An engine generator, control panel, battery charger, daily use tank and pump for fuel shall be installed in the engine generator house. A large-sized fuel tank (2000 litres) shall be located outside the engine generator house.

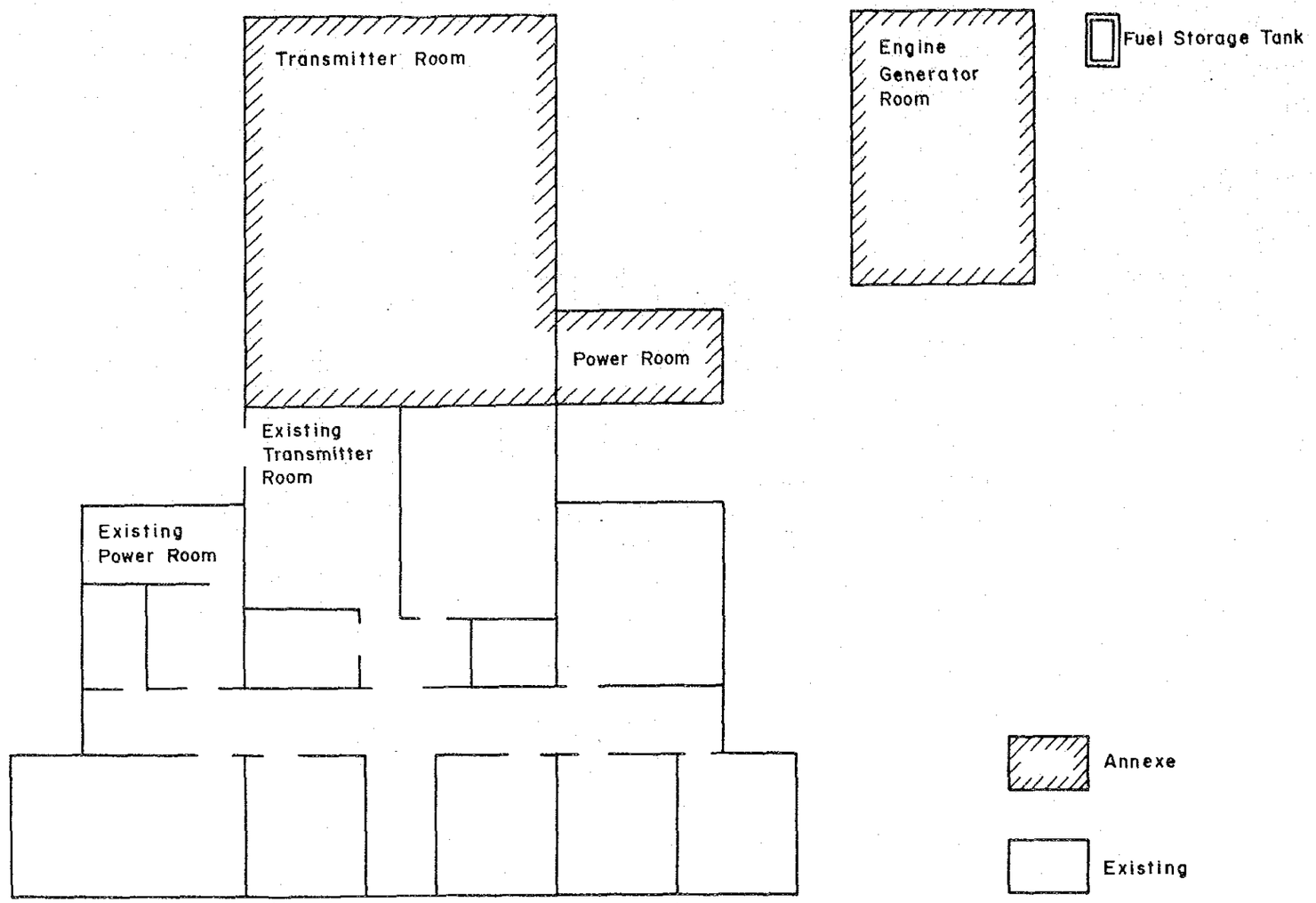
The power supply room shall be located adjacently to the transmitter room in order that the staff has access to it through one door. A floor layout plan of this room is shown in basic design drawings item 4-3-4. A changeover switch, high tension racks, low tension distribution rack, magnet switch for changeover of city electric power source and engine generator output will be installed. In addition, for the purpose of ventilation inside the room, a louvre will be mounted into the wall between the room hereof and the transmitter room and an exhaust fan shall also be mounted near the wall behind the transformer.

All the power supply equipment is as follows:

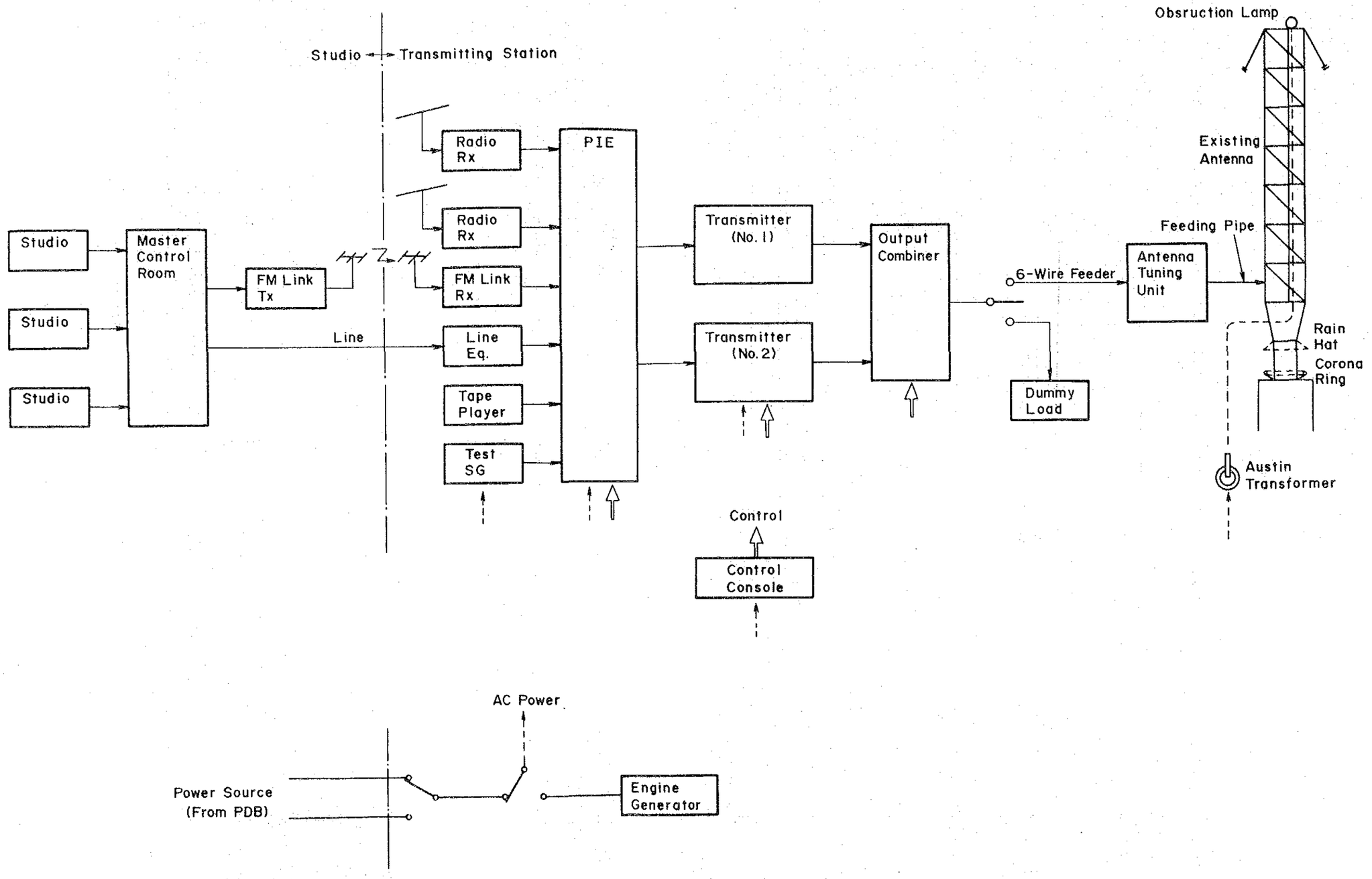
Items	Specifications	Q'ty	Remarks
HT changeover switch	6000 kVA	1 set	manual
HT circuit breaker	6000 kVA	1 set	
HT/LT transformer	500 kVA	1 set	
Automatic voltage regulator	350 kVA	1 set	
LT distribution panel		1 set	
Engine generator	350 kVA	1 set	Diesel engine

4-3-4 Basic Design Drawings

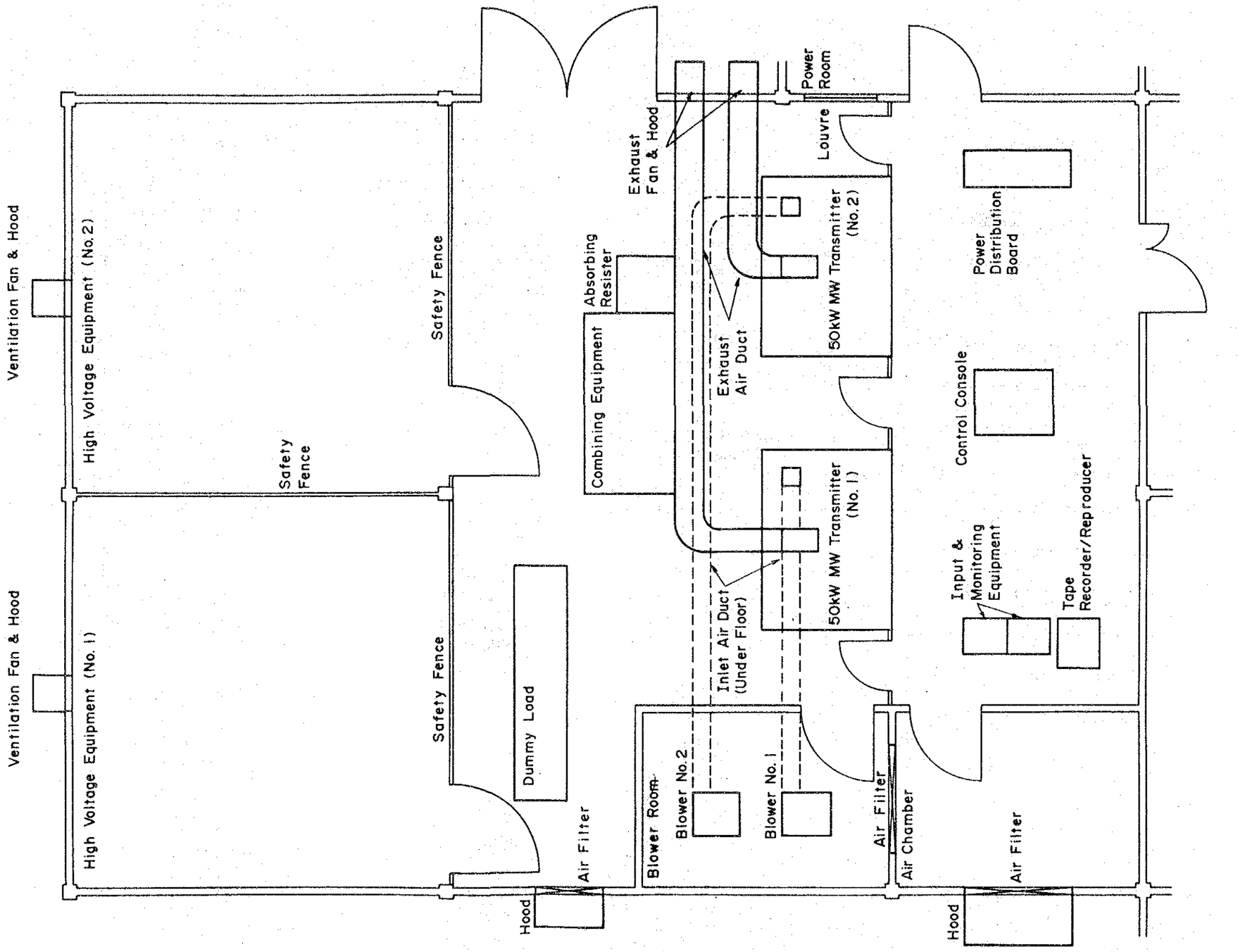
1. Layout of Buildings
2. System Block Diagram of Medium-wave Radio Transmitting Station
3. Equipment Layout in Transmitter Room
4. Block Diagram of Power Source
5. Equipment Layout in Engine Generator Room
6. Equipment Layout in Power Room



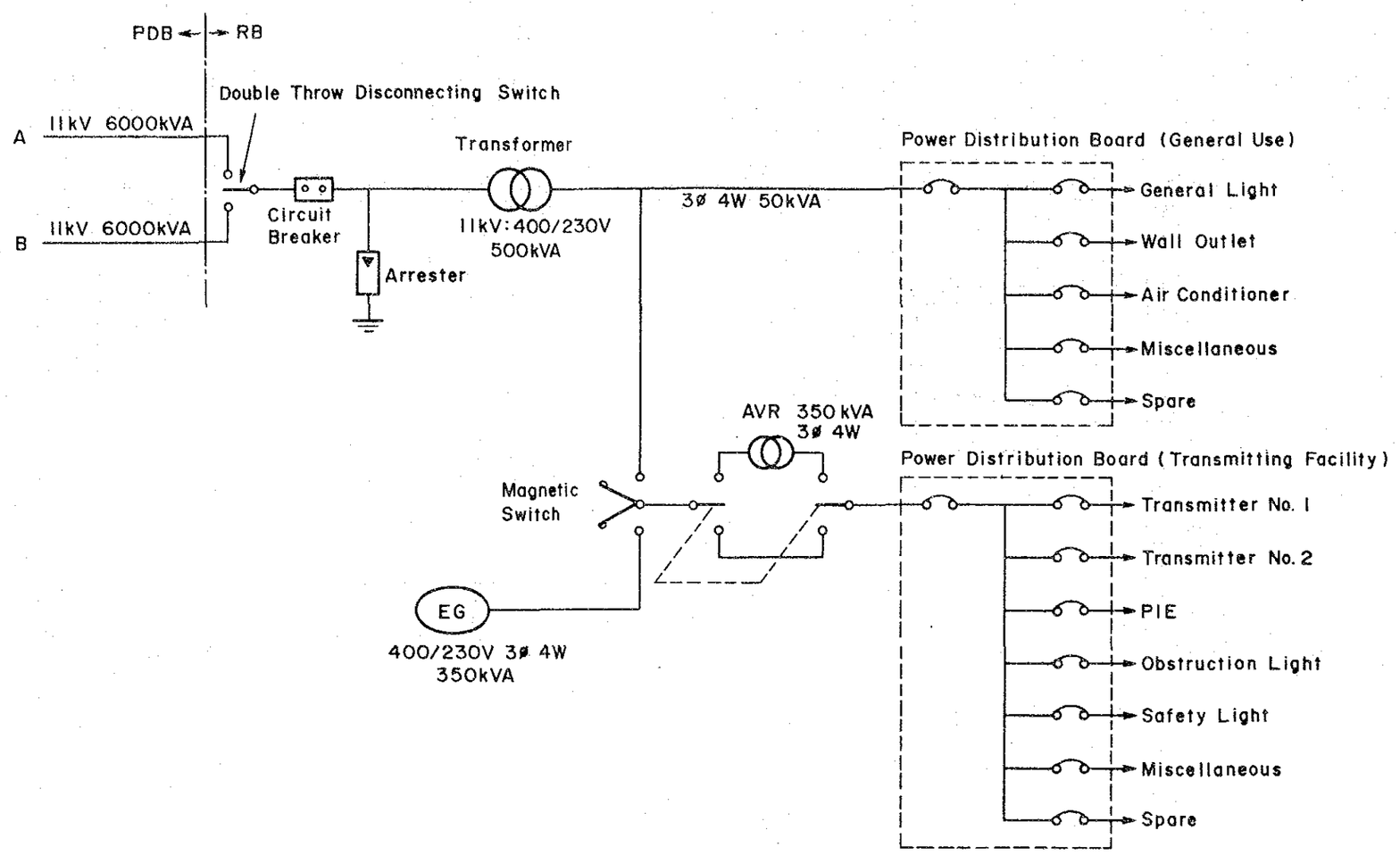
1. LAYOUT OF BUILDING



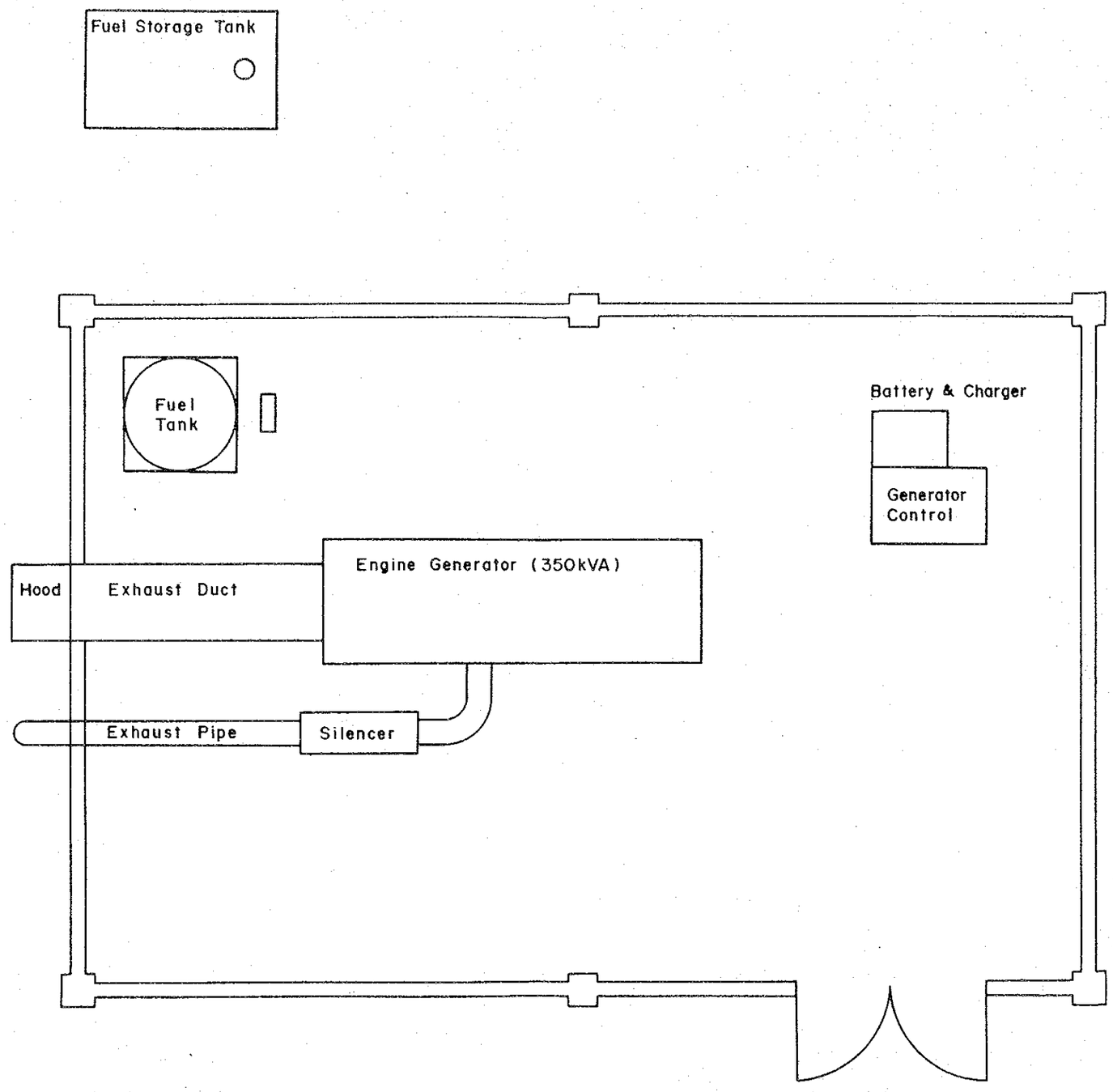
2. SYSTEM BLOCK DIAGRAM OF MEDIUM-WAVE RADIO TRANSMITTING STATION



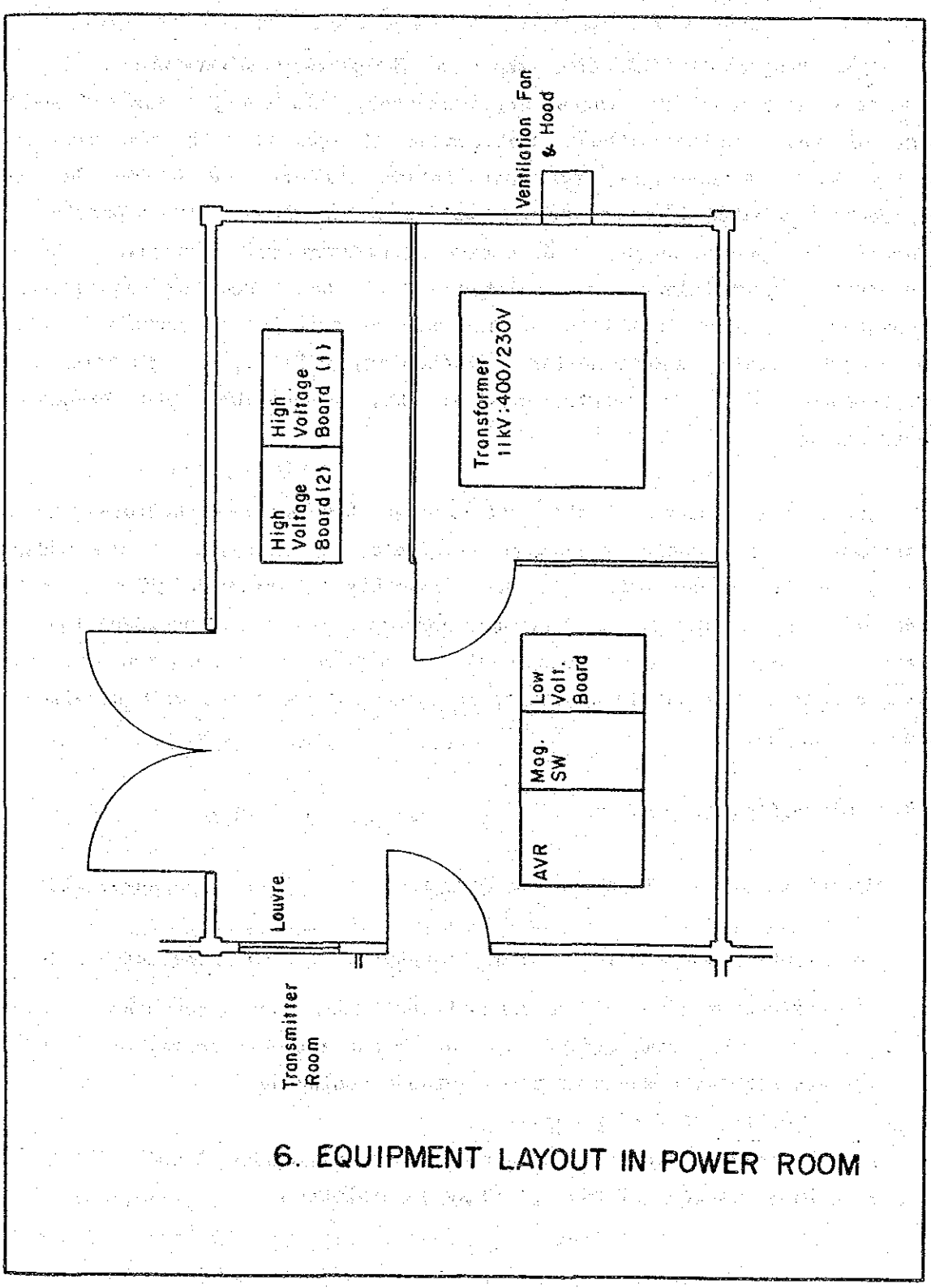
3. EQUIPMENT LAYOUT IN TRANSMITTING ROOM



4. BLOCK DIAGRAM OF POWER SOURCE



5. EQUIPMENT LAYOUT IN ENGINE GENERATOR ROOM



6. EQUIPMENT LAYOUT IN POWER ROOM

4-4 Installation Plan

4-4-1 Guideline of Installation

This Project is to renew the old medium-wave transmitter. It is necessary to conduct the installation smoothly, utilizing a limited break time of transmission without disturbance of operation by the existing transmitter. Accordingly, the installation will be carried out by the engineers despatched from Japan, who are in charge of supervision, transmitter, power supply and engine generator and antenna. Local labourers, electricians and painters will be hired as assistants. Despatched engineers from time to time during installation works will give on-the-job-training and transfer a technology relating to operation and maintenance to their counterparts in RB, responsible and executing organization.

Construction works of the extension of the existing building for a transmitter room, engine generator room etc. is included in the undertakings of Bangladesh side. It shall smoothly be executed, with Japanese side offering construction drawings prepared in full consideration of interface between broadcast equipment and air ducts, foundation etc. and exchanging the relevant informations in close collaboration with Bangladesh side.

4-4-2 Classification of Works

(1) Medium-wave Radio Transmitting Equipment 1 set Japanese side

(2) Construction works related to architecture 1 set Bangladesh side

- Extension works of a transmitter room, substation room, engine generator room, office rooms and other attached rooms.
- Construction works of a new antenna tuning hut
- Erection of feeder poles
- To lead in electric power from Power Development Board
- Dismantlement of the old 10 kW transmitter