Lamp, fuse	200 % of the number in use
Motor for ventilation fan	100 % of the number of motors in use
Main equipment module	One for each kind
Transistor, IC	Two for each kind
Air filter	200 % of the number of filters in use

4-2-2 Transmitting Facility

The transmitting equipment consists of transmitter, blower, output power combiner, dummy antenna, programme input equipment, and control surveillance console.

(1) Transmitter

The transmitter system is a parallel operation of two 50 kW transmitter sets, and the two output powers are combined by a combiner to obtain the rated 100 kW output power.
The circuit composition of each transmitter set is the same in order to ensure interchangeability of each set and the use of common spare parts.

In order to raise the reliability, stabilize the operation and reduce the consumption of power, the transmitter tubes (forced-air cooling) are used only in the final-stage modulated amplifier and modulator, and all other low-power stages use solid-state circuits.

The high-voltage power source equipment (transformers for high-voltage power source and rectifier circuit, modulation transformer and modulation choke-coil, etc.,) are installed in a safety fence separate from the transmitter in order to ensure security at the time of maintenance work. A safety device is also attached to the fence.
The output power of each transmitter is combined by an output power combiner, and the rated 100 kW output power obtained is supplied to the transmitting antenna through the main feeder line.

The programme input equipment and control/surveillance device, etc., for the transmitter are installed in the control room. The blowers for cooling transmitter tubes are accommodated in the blower room.
The layout of equipment in the transmitter room is shown in Fig.4-4-9.

Basically, the operation of transmitting station is attended, and operations such as starting/stopping, etc., are done by hand. The transmitter system could be controlled from two places: the transmitter main body and control console.

(2) Dummy Load

As for the dummy load to adjust and test the transmitter, a forced-air cooling dummy load for a 100 kW transmitter is installed in the transmitter room.

(3) Programme Input Equipment

The programme signal will be sent to Savar Transmitting Station (about 15 km away) from the Broadcasting House in Dhaka City through the existing STL (Studio-to-Transmitter Link, UHF-band radio-link, 6-channel multiplex).

The programme signals, after passing through the programme input equipment, become the input signal of the transmitters.

The input equipment has the function of limiting the signal amplitude and adjusting the signal level in order to prevent the transmitter from overmodulation. The input equipment consists of a limiting amplifier, input/output switchboard, jack panel and power source unit, and is accommodated in a standard rack that is installed in the control/surveillance room.
In order to facilitate the daily maintenance work, a monitor amplifier, monitor switchboard and oscilloscope for measurement of modulation degree, etc., are also accommodated in the same rack.

(4) Control Surveillance Console

A control surveillance console integrated with control/surveillance functions for daily operations, such as starting/stopping of the transmitters and adjustment of modulation degree, surveillance of operational conditions of transmitters, surveillance of modulation degree and sound quality, is installed in the control room.

To prevent the noise of ventilation and cooling, etc., from hindering the monitoring work, as much as possible. Partitions will be installed between the control room and the transmitter room.

(5) Ventilation Device

In order to forcibly draw out the heat radiated from each piece of equipment in the transmitter room by means of ventilation, intakes with an air filters attached are mounted on the wall, and ventilation fans are also installed. In the control room, an airconditioner is installed to adjust the room temperature as the control room will be separated by the partition from the transmitter room to prevent the noise.

(6) Station Telephone System

To carry out the daily routine work and maintenance work smoothly, and to ensure security, a loud-speaker type interphone is installed in the control room, transmitter room, electric power room, antenna tuning house, receiving power switch-board room, present transmitter hall and station master's room.

(7) Other equipment

Clock system to confirm the operation time of the transmitter, etc., and shelves for storing tools including spare parts, etc., which are necessary for operating the transmitting station are installed.

4-2-3 Transmitting Antenna

As the present 152 m high transmitting antenna operating on 819 kHz, 100kW, is to operate on 630 kHz, 100kW, it will be remodelled into a 122 m high transmitting antenna, as registered by IFRB. In addition, the superannuated stays will be exchanged and the deteriorated portion will be repaired applicable to the rated 630 kHz, 100 kW.

(1) Change in Transmitting Antenna Height

The top of the present tower mast will be cut off and remodelled into a 122m high tower. Due to this remodelling work, the base impedance against 630 kHz is estimated to be about $80\Omega+j70\Omega$.
In Fig. 13, the present and the remodelled antennas are shown.

(2) Antenna Base Insulator

No deterioration was observed in the base of steel tower. As the load on antenna base will reduce according to the cut off of top portion (30 m) of steel tower, and the voltage at antenna base is expected to become lower according to the change in frequency to 630 kHz, the antenna base will only be partly reinforced and used again.

The antenna base partitions will be partly remodelled such as follows. A rain-hat, corona-ring and ball-gap will be installed at the antenna base for prevention of discharge.

(3) Renewal of Stays

With the change in tower height, it would be necessary to change the position of the attached stays. In addition, as the voltage at the very top of transmitting antenna will rise by more than twice of the present state, according to the change in transmitting frequency it is necessary to compose the insulators so that they will ensure this voltage. It is very difficult to do this work at the station site, because it will extend the construction term. Therefore, all the stays including insulators will be renewed.

(4) Stay and Anchors

Some slight cracks were observed on the surface of stay anchors, but as there will be some reduction in tension according to the cut off of antenna top portion, the anchors will be re-used.
As for the radial earth, the existing earth (radius 180 m, 120 conductors) conductors will be used. However, as it is estimated that the earth current will increase by about 5 times according to the change in frequency, the earth connection points, etc., will be improved, so as to reduce the current loss.

(5) Aviation Obstruction Lighting System

The superannuated aviation obstruction lighting system will be renewed and the antenna mast will be painted according to the ICAO regulation in order to avoid aircraft accident in the daytime.

(6) Antenna Matching Device

With the change in antenna height and transmitting frequencies (152m to 122 m, 819 kHz to 630 kHz), the transmitting antenna impedance decreases greatly. Therefore, the antenna matching device is to be renewed in according to the change in antenna impedance.
The following table indicates the actually measured impedance of the present transmitting antenna, and the estimated impedance after the height is reduced to 122m.

Transmitting Antenna Impedance

Antenna Height	Transmitting antenna	Feeder line Impedance	Remarks
152 m (819 kHz) 122 m (630 kHz)	451Ω+j 273Ω 80Ω+j 170Ω	unknown 230 Ω	Present State Estimated Value after Remodelling

(7) Main Feeder Line

The main feeder line is to be renewed.

A 6-wire aerial feeder line which is easy to maintain is used, and it is installed between the new station building and the new antenna tuning house (distance, about 180 m).

The height of the aerial feeder line is about 4 m above ground level.

The impedance of the 6-wire aerial feeder line is 230Ω.

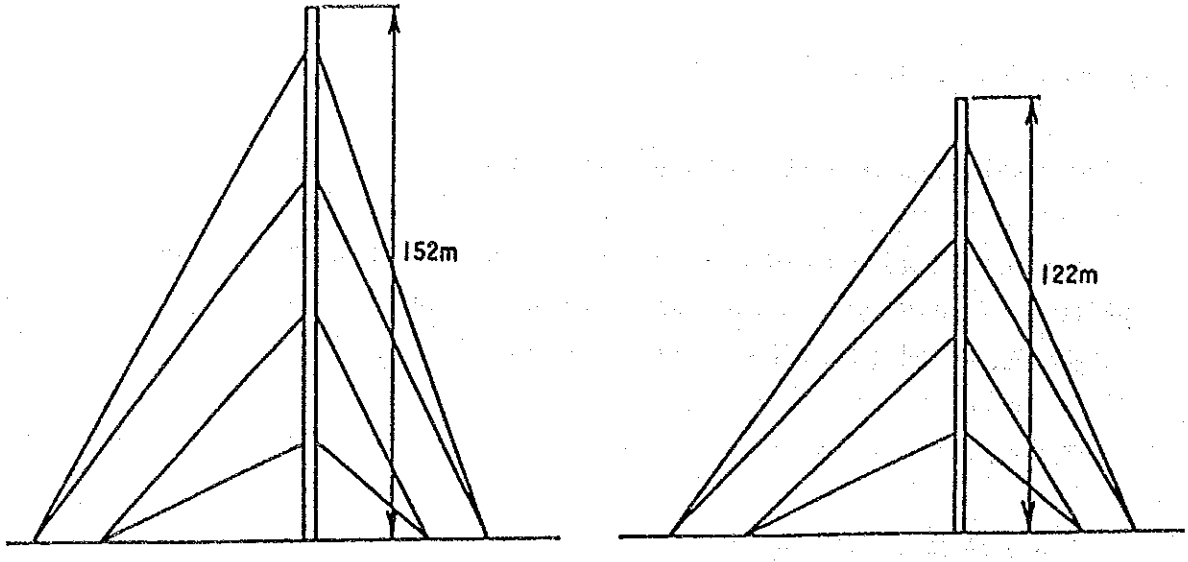


Fig. 13 Comparison Between Existing & Modified Antennas

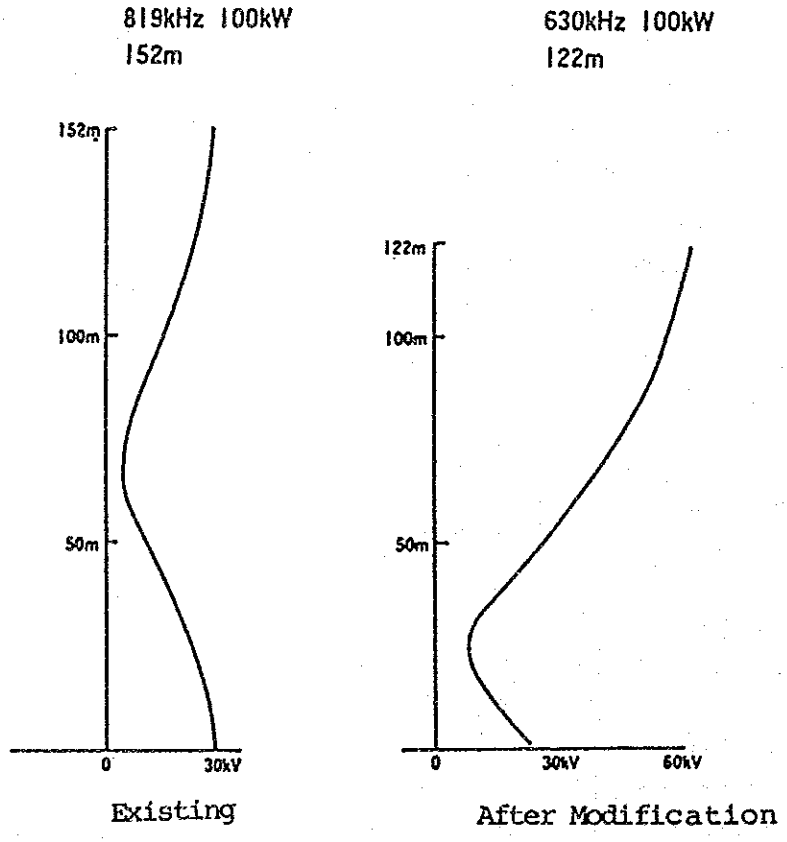


Fig. 14 Comparison of Distribution Voltage Between Existing & Modified Antenna

4-2-4 Power Source Facility

Either the Dhamrai Substation (11 kV) or Mirpur Substation power system (3.3 kV, boosted up to 11 kV at the transmitting station), is selected manually by a switch, and the output is distributed to each facility.

In order to stabilize the equipment operation, an automatic voltage regulator is installed in the receiving power system. It can automatically regulate a variation of ±15% in the receiving power voltage to a variation within ±2%.

In Fig. 4-4-10 the schematic diagram of the power receiving system is shown. The amount of power consumption in the main equipment is as follows:

Transmitter Equipment		
100 kW Transmitter	(at 0% modulation)	about 170kW
	(at 100% modulation)	about 240kW
	(at average modulation)	about 200kW
Dummy Load		3kW
Reflected Wave Equalizer		2kW
Input Rack		1kW
Control Console		1kW
Aviation Obstruction Lighting		2kW
Others		1kW
Sub total		250kW(at average modulation)
General Use Equipment		
General Lighting		5kW
Air Conditioner, ventilation		10kW
Others		10kW
Sub total		25kW
Grand Total		275kW(at average modulation)

An engine generator (350KVA) will be installed as a countermeasure against commercial power interruption.

4-2-5 Equipment, Materials

The transmitter and its related peripheral equipment, transmitting antenna and receiving power facilities are as follows:

(1) Transmitter device and its peripheral equipment

Medium Wave Radio Transmitter (630 kHz, 50 kW)		2 sets
Blower (Forced-air cooling for transmitting tube)		2 sets
Output Power Combiner (Input 50 kW × 2, Output 100 kW)		1 set
Dummy Load (100 kW forced-air cooling)		1 set
Programme Input/Surveillance Equipment		1 set
Limiting Amplifier	2 sets	
Modulation Meter	1 set	
Input Switch Board	1 set	
Monitor Switch Board	1 set	
Monitor Amplifier	1 unit	
Oscilloscope	1 set	
Audio Characteristic Measuring Apparatus	1 set	
Variable Attenuator (Audio frequency)	1 set	
Jack Panel	1 set	
Display Panel	1 set	
Cabinet Rack	1 set	
Interphone Device		1 set
Control/Surveillance Console		1 set
Measuring Apparatus		1 set
Impedance	1 set	
Frequency	1 set	
Test Oscillator	1 set	
Circuit Tester	3 units	

Insulation Resistance Tester	1 unit
Air Conditioner (Refrigerator 4-ton)	2 sets
Construction Material	1 set
Spare Parts (Transmitter tubes, etc.)	1 set

(2) Transmitting Antenna System

Antenna System Material	1 set
Main Feeder Line (including bowl type insulators, 100 kW, 6-wire aerial, 180m)	1 set
Antenna Tuning Unit	1 set
Stay (with metal mountings and insulators, 70m, 85m, 120m, 140m×3-direction)	1 set
Tubular Feeder (about 6m)	1 set
Austin Transformer (for aviation obstruction light, will be installed inside the antenna tuning house)	1 set
Aviation Obstruction Lighting System	1 set
Rain Hat	1 set
Corona Ring	1 set
Spare Parts	1 set

(3) Receiving Power Facilities

High Voltage Board	1 set
Lightning Arrester Board	1 set
Branch Board	1 set
Distribution Board	1 set
Transformer 500 kVA (11 kV/400 V/230 V)	1 set
Induction Voltage Regulator 350 kVA	2 sets
Spare Parts	1 set

(4) Others

Engine Generator 350KVA (3ø 400V 50Hz)	1 set
Oil Storage Tank 2000ℓ	1 set

4-3 Basic Design Drawings

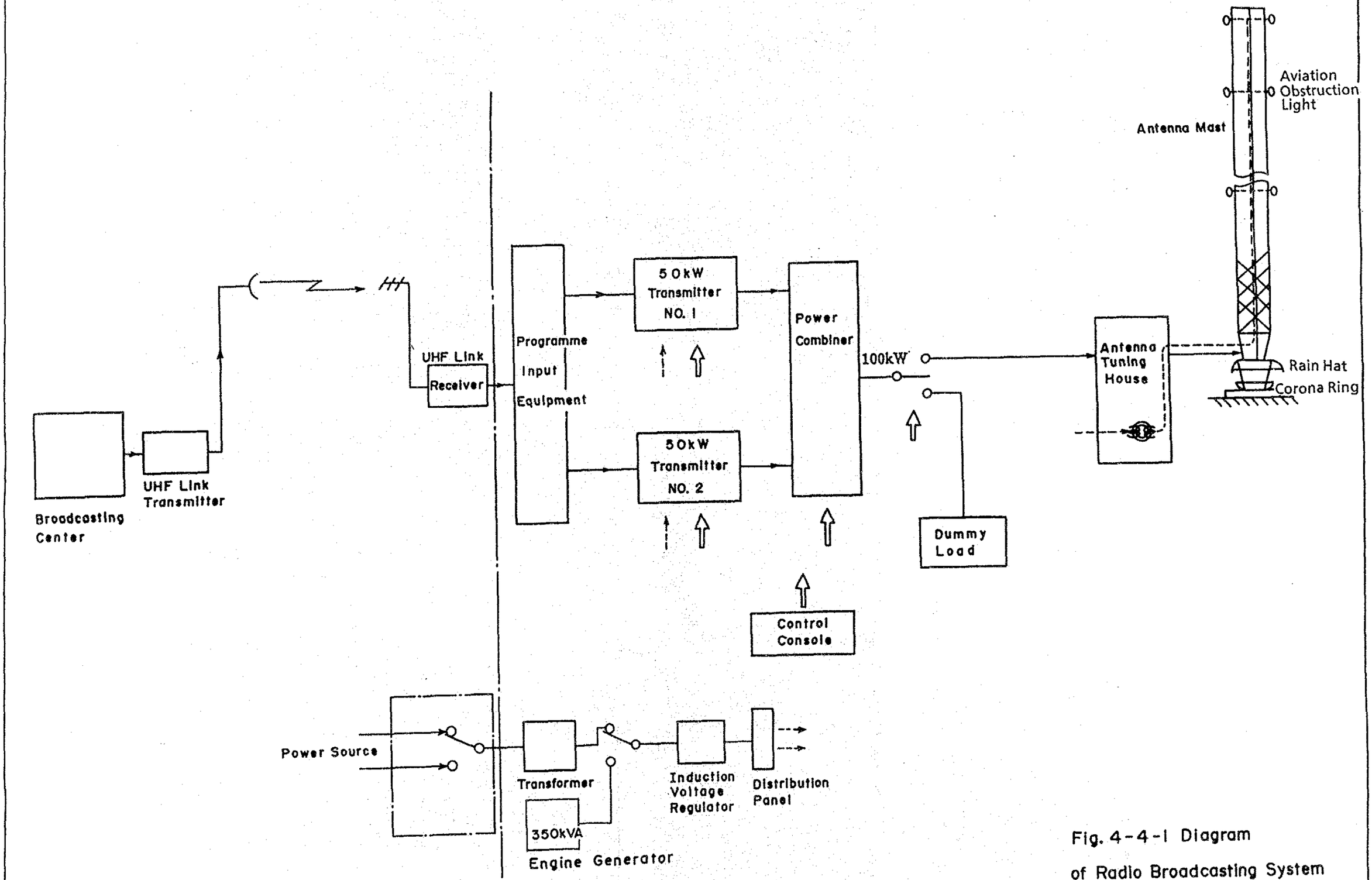


Fig. 4-4-1 Diagram of Radio Broadcasting System

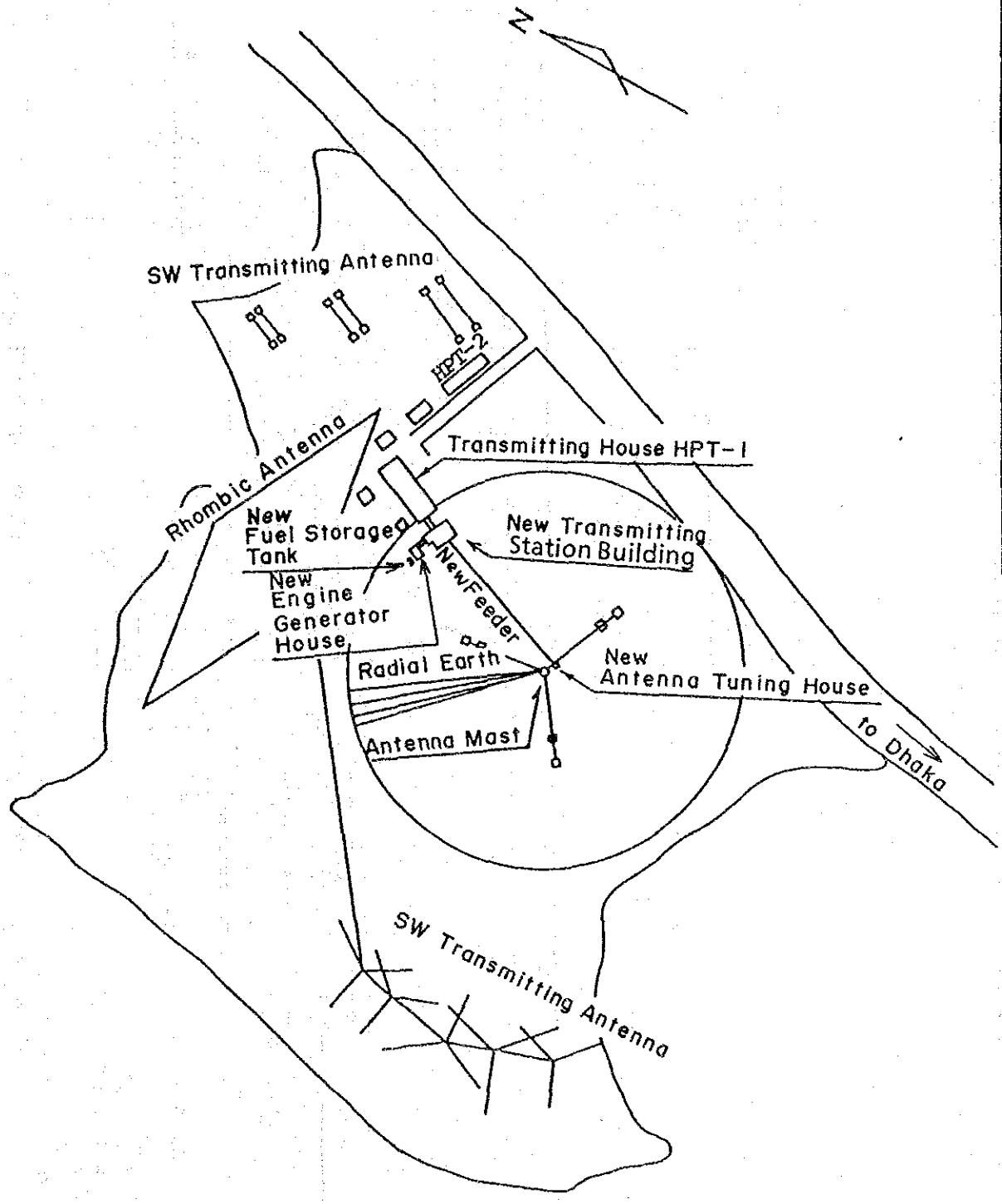


Fig.4-4-2 Site Plan of Savar Transmitting Station
(Outline of Existing and Proposed Facilities in
Savar Transmitting Station Site)

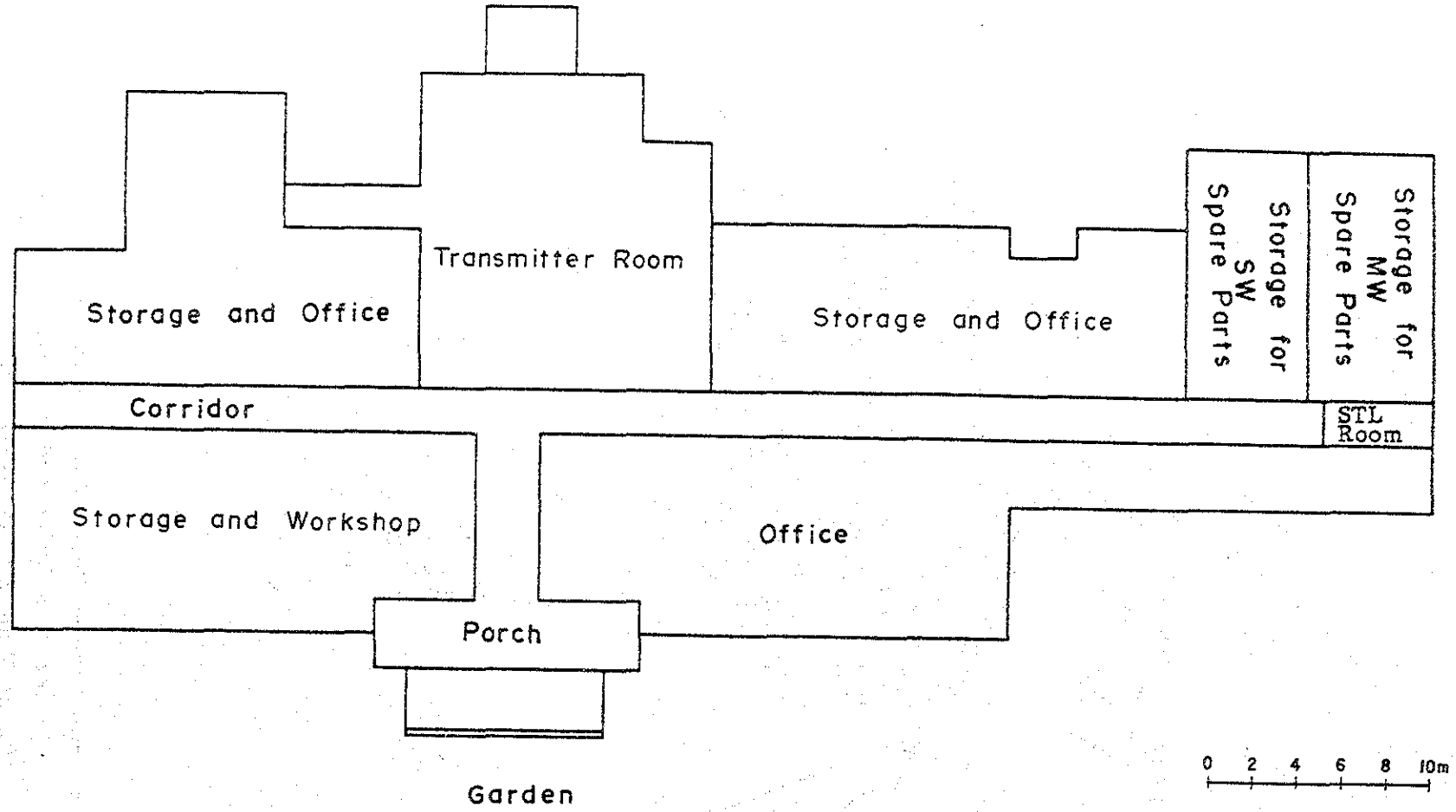


Fig. 4-4-3 Floor Layout of Savar Transmitting Station (Existing)

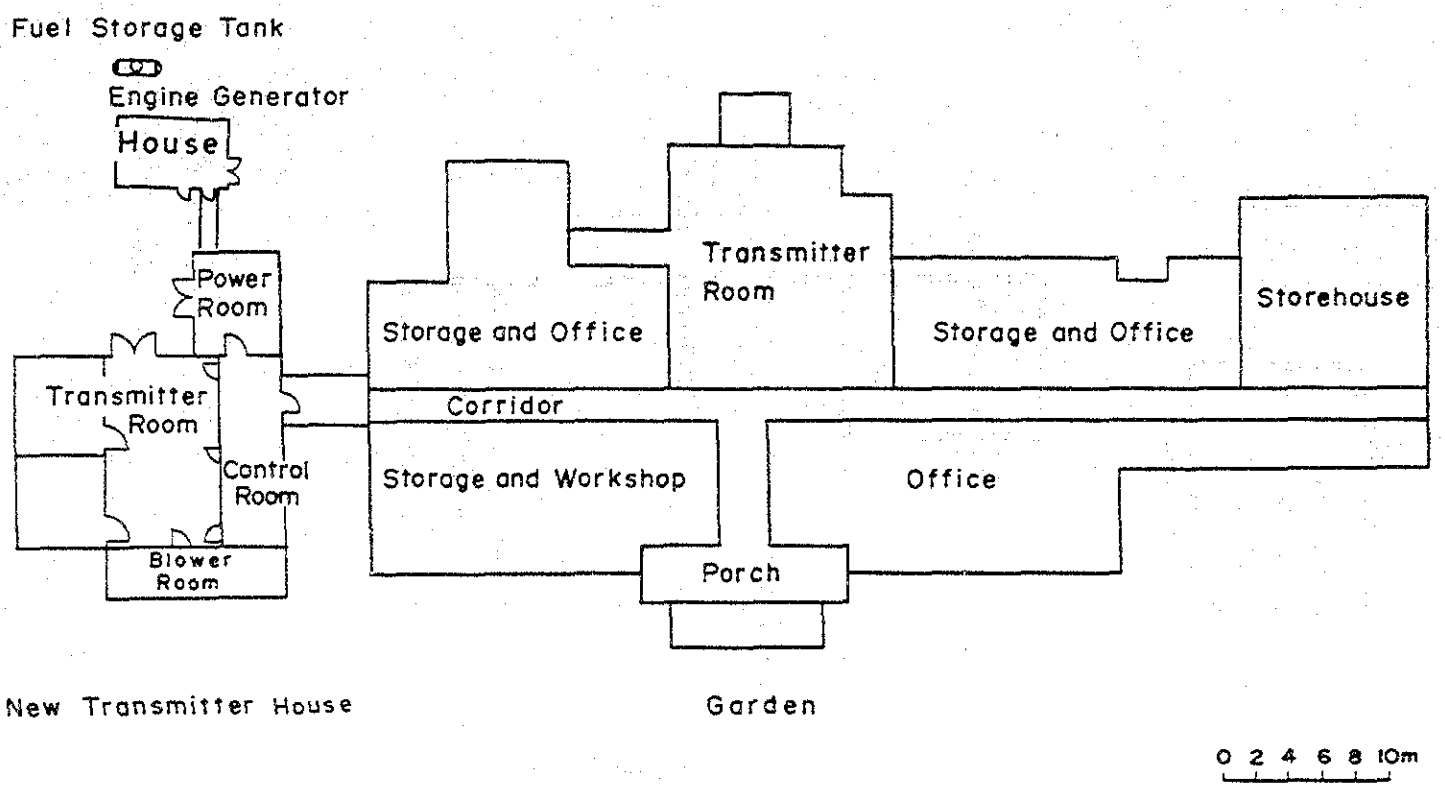
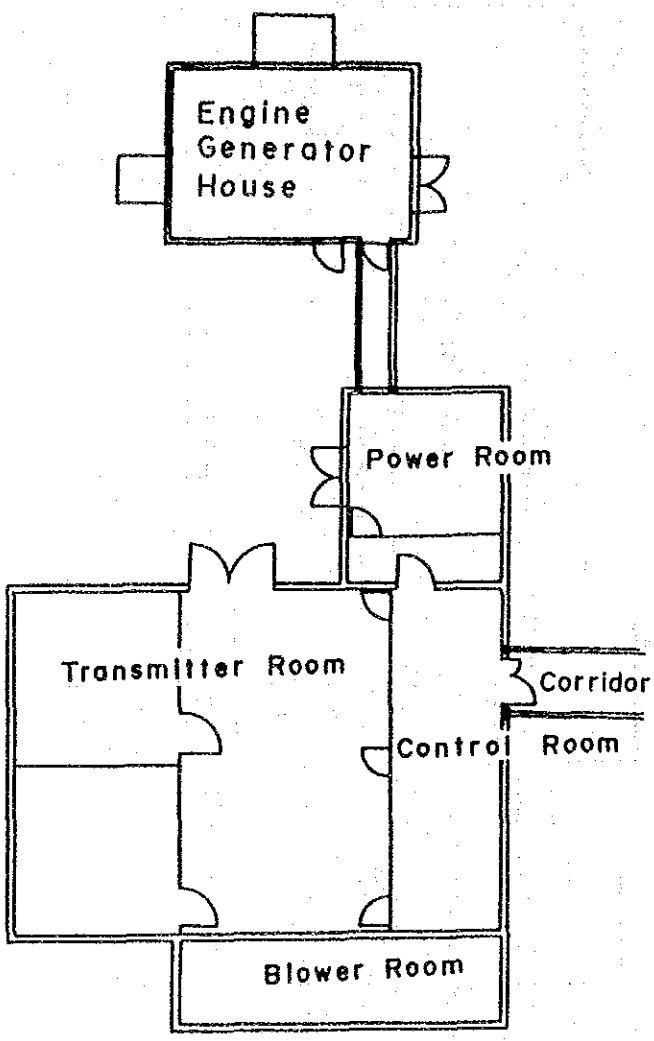
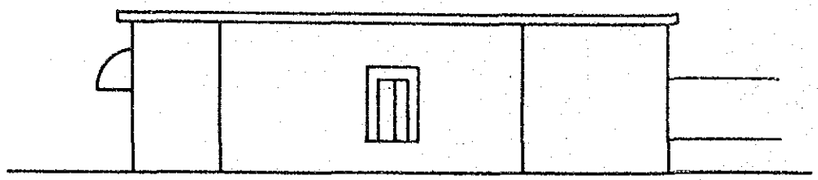


Fig. 4-4-4 Floor Layout of Savar Transmitting Station

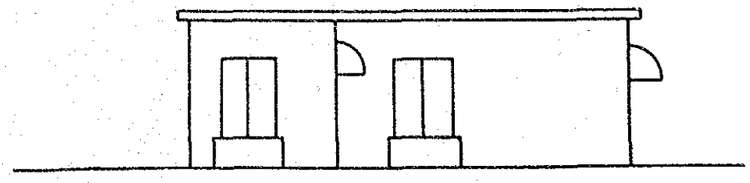


1 : 200

Fig. 4-4-5 Ground Floor Plan of New Transmitting Station Building

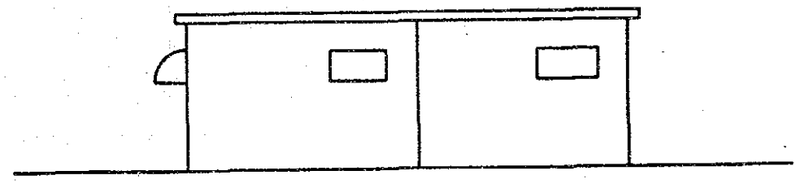


NORTH



WEST

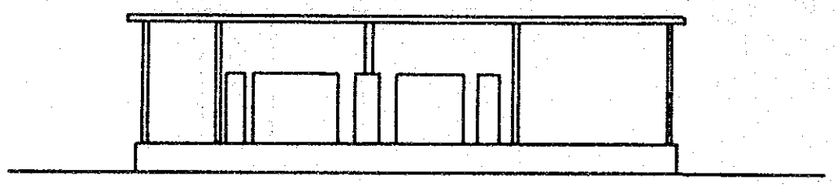
SOUTH



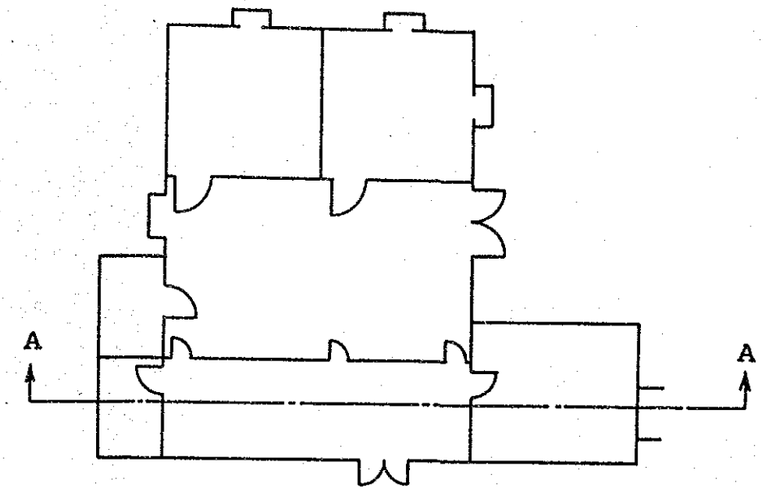
EAST

Fig. 4-4-6 Level Diagram of
New Transmitting Station Building

1 : 200



A ~ A



KEY PLAN

1 : 200

Fig. 4-4-7 Sections of
New Transmitting Station Building

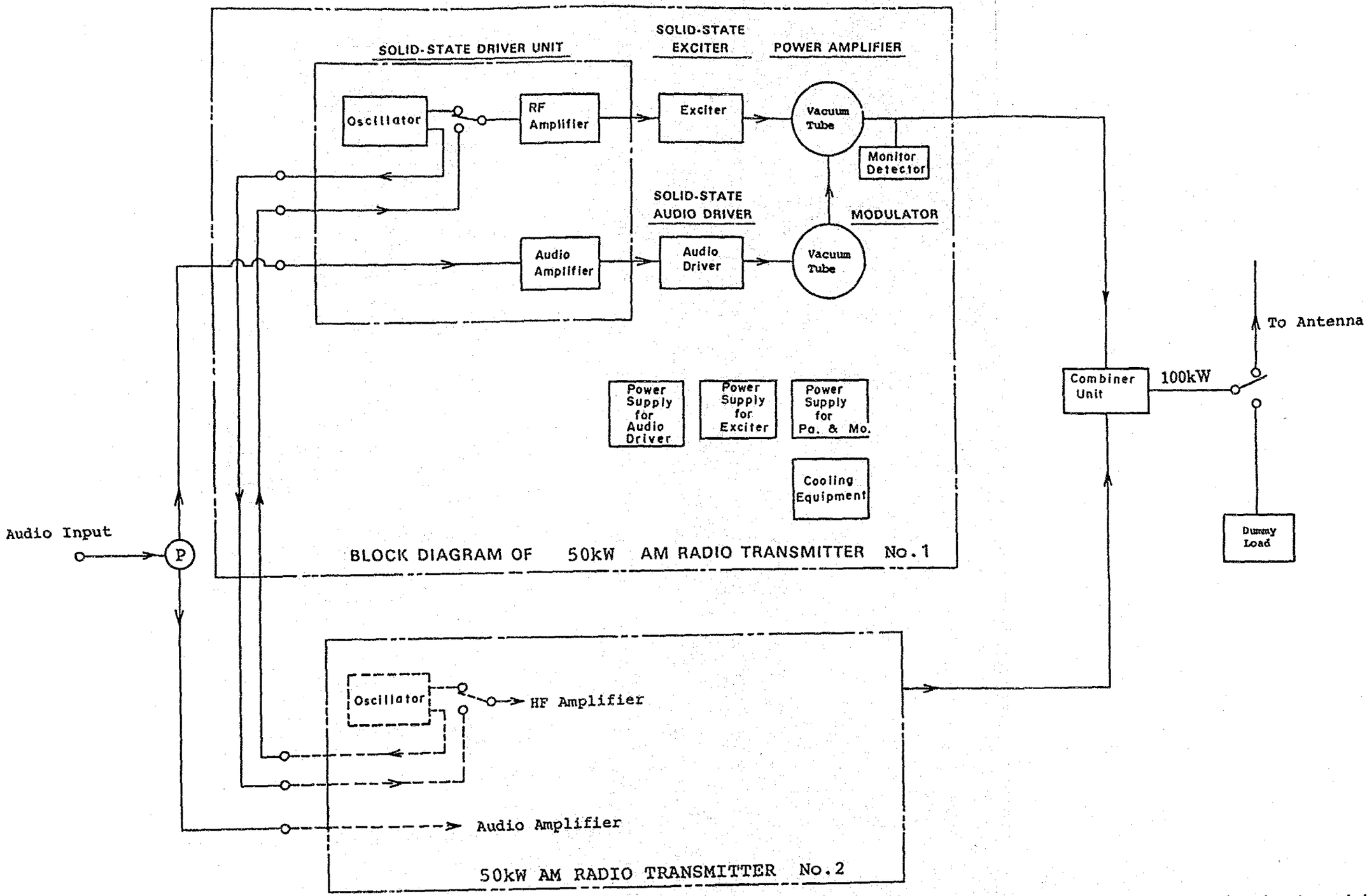


Fig. 4-4-8 Block Diagram of 100 kW Transmitting System

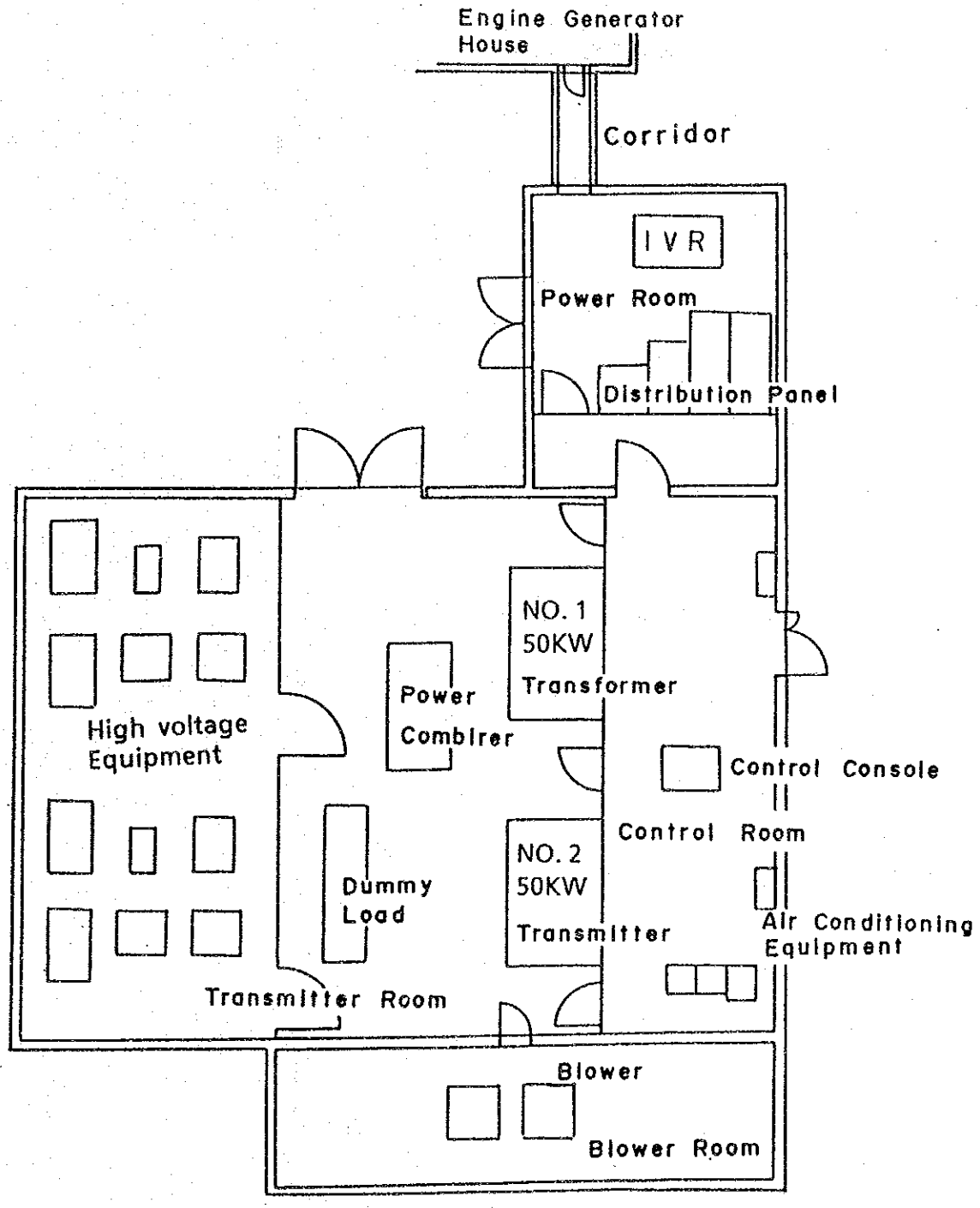


Fig. 4-4-9 Layout of Equipment in New Transmitting Station Building

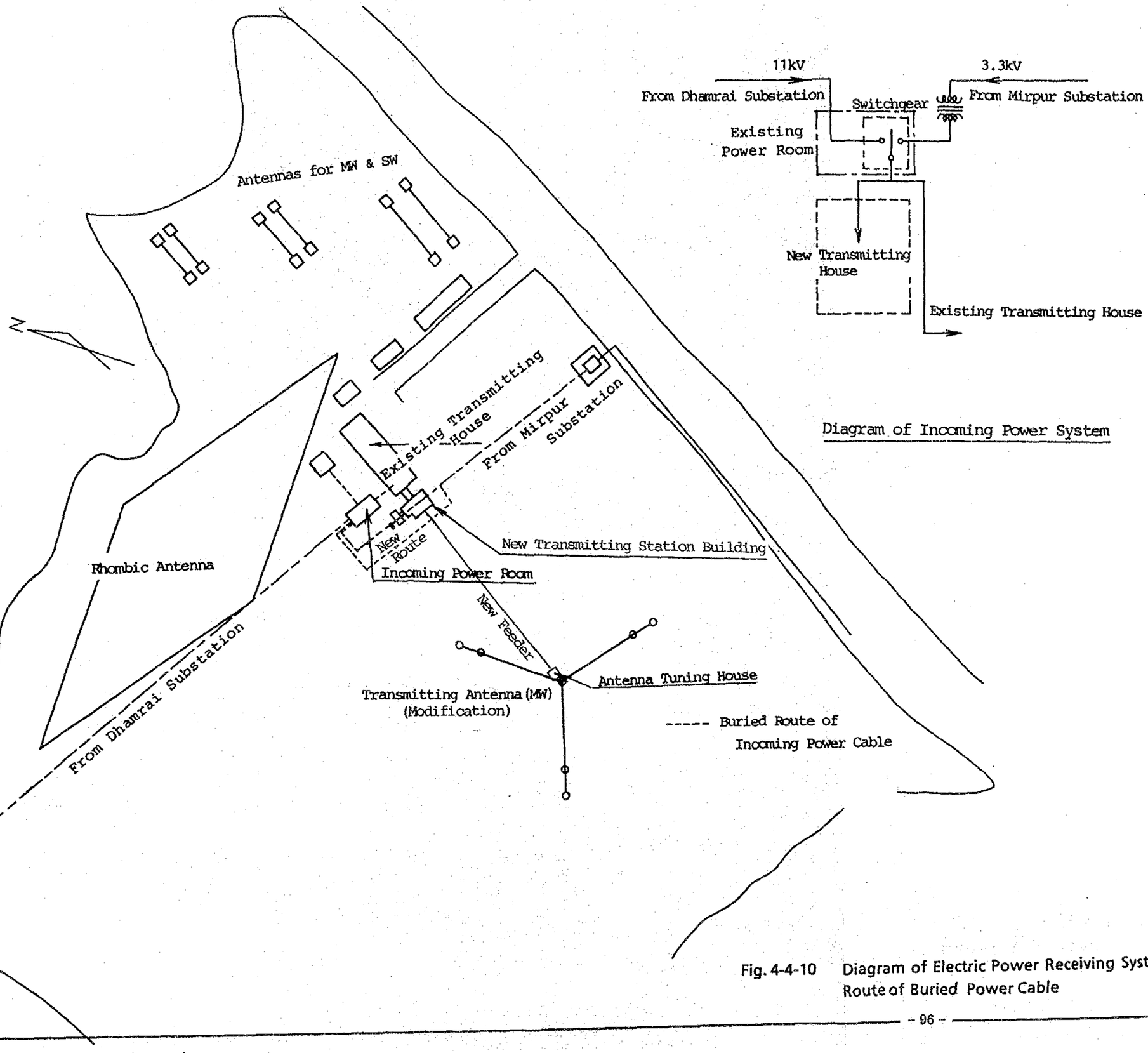


Diagram of Incoming Power System

Fig. 4-4-10 Diagram of Electric Power Receiving System and Route of Buried Power Cable

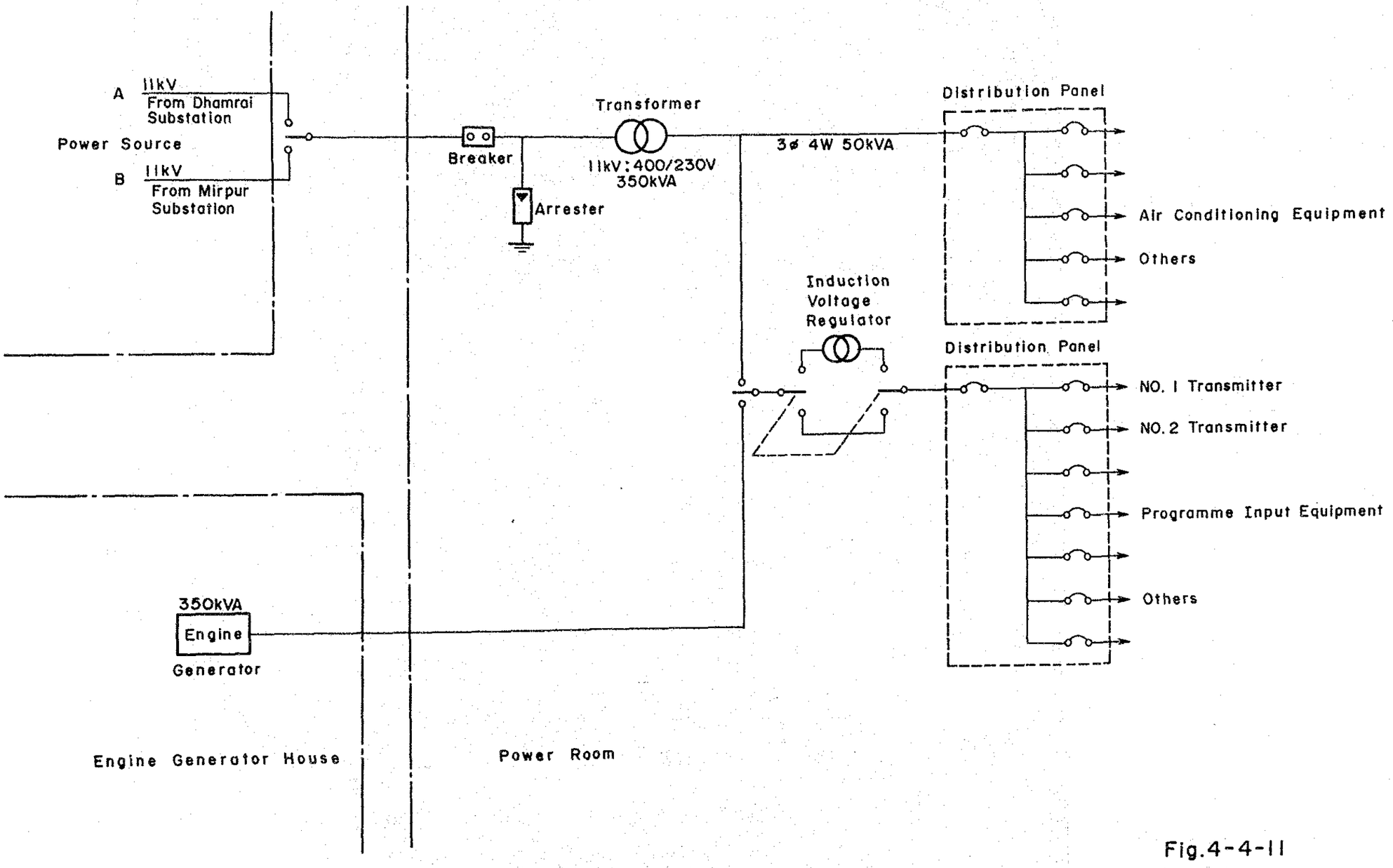
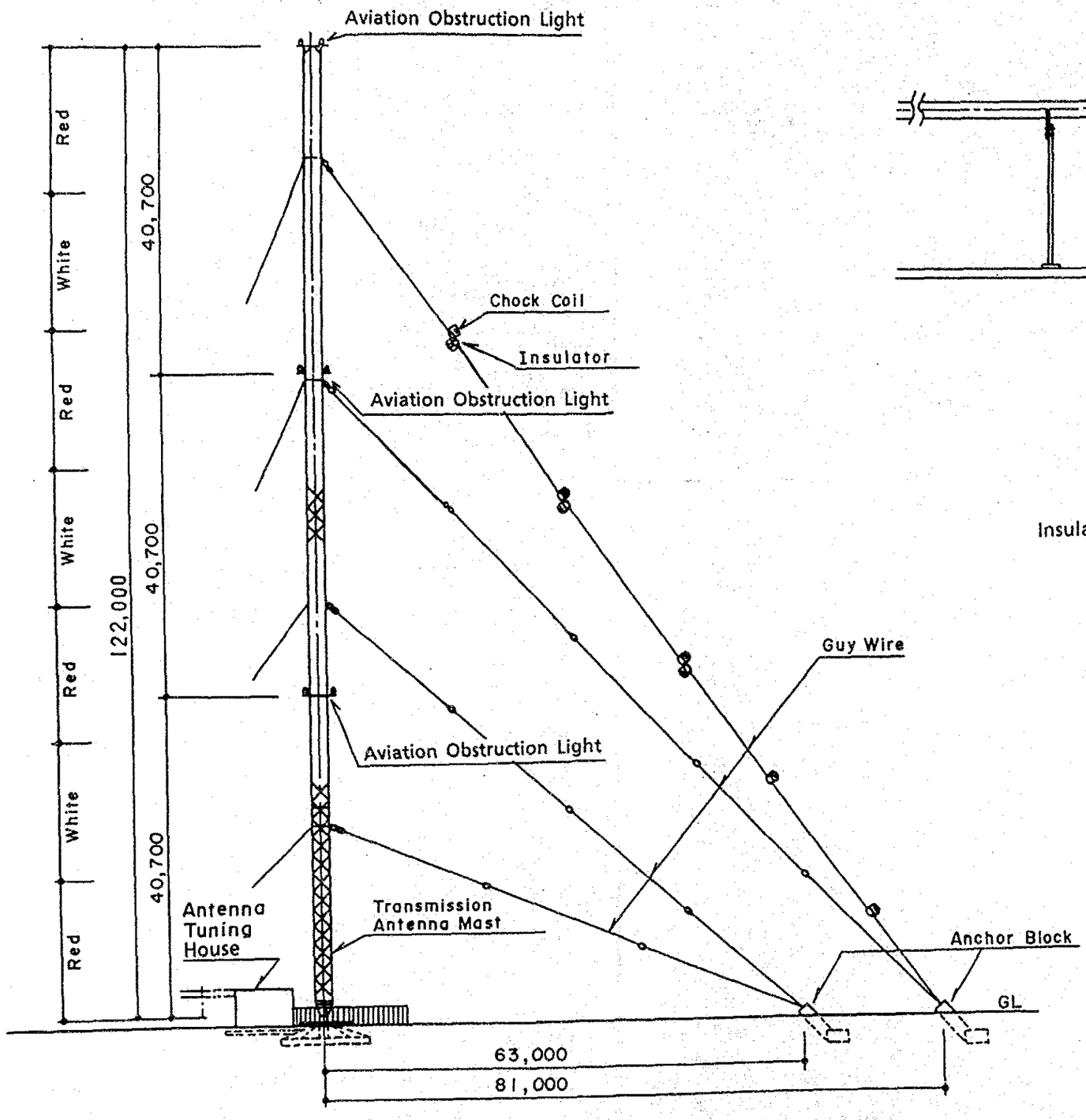
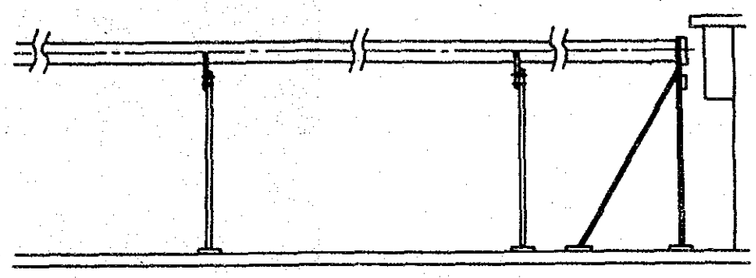


Fig.4-4-11

Diagram of Power Supply Facility System





6-Wire Aerial Feeder
& Supporting Mast

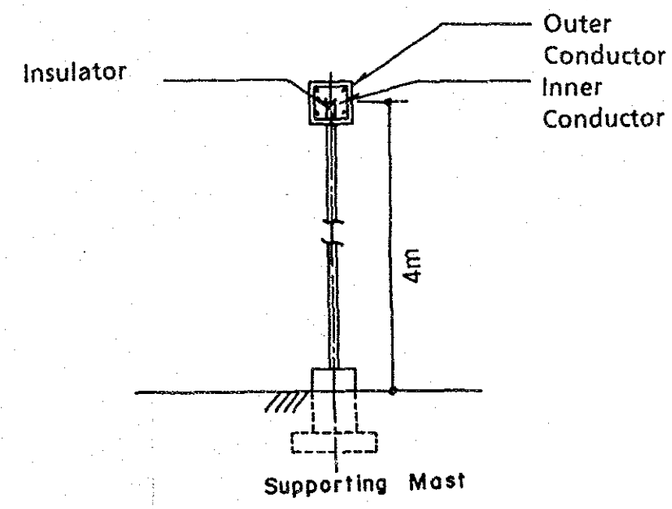


Fig 4-4-12
Outline of the Transmitting Antenna System

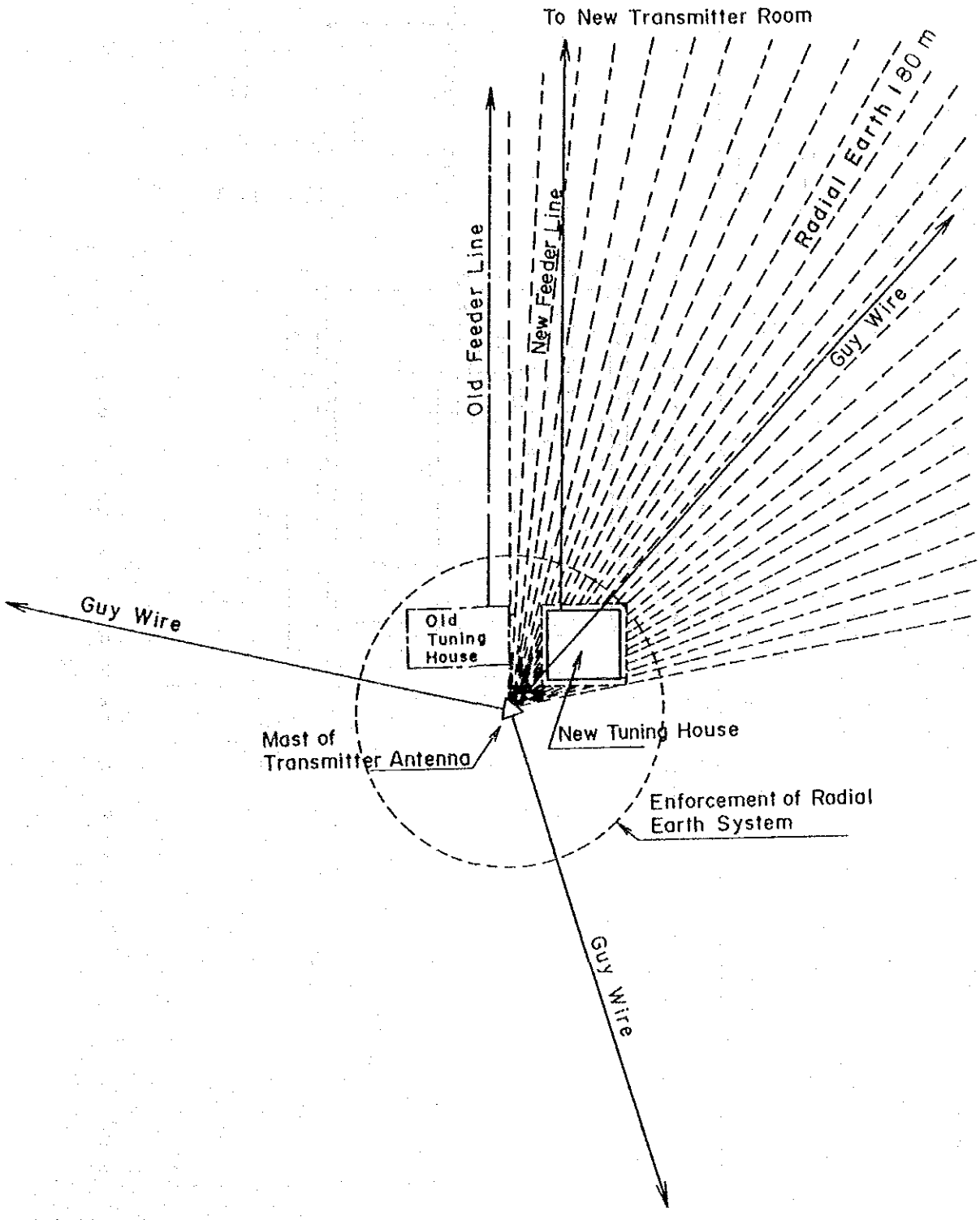


Fig. 4-4-13 Diagram of Radial Earth of Antenna System

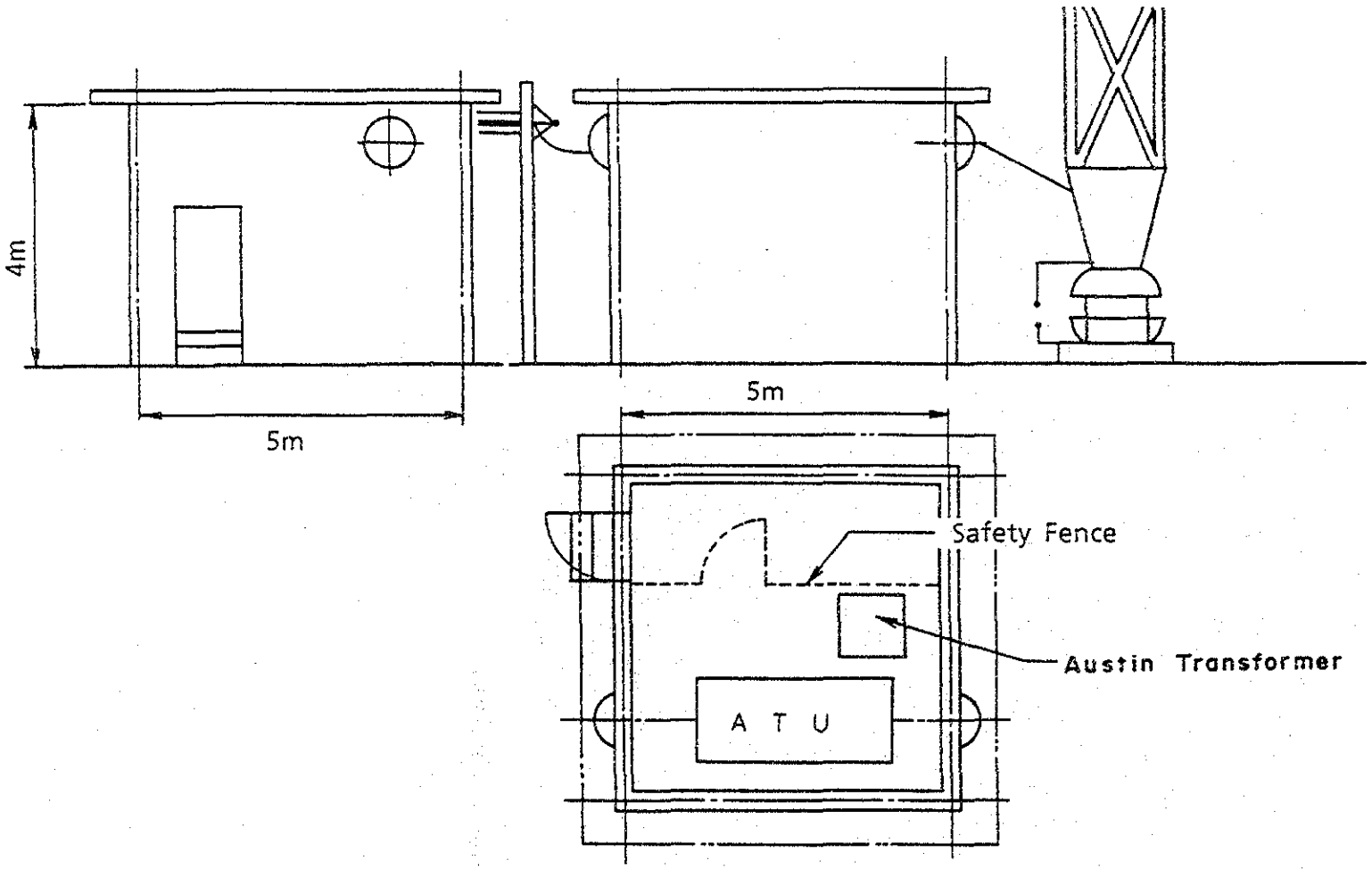


Fig.4-4-14 Outline of Antenna Tuning House

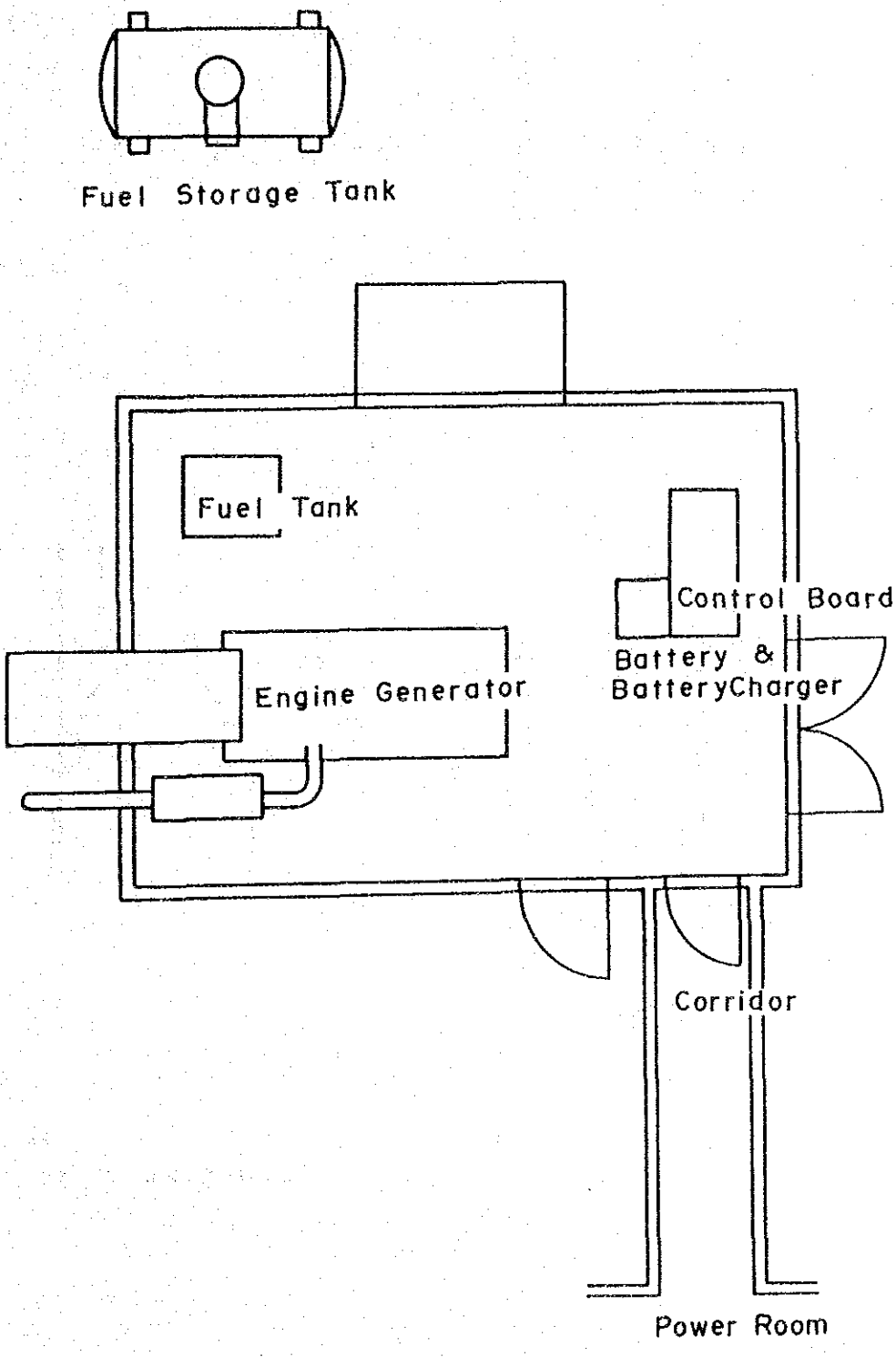


Fig. 4-4-15 Layout of Equipment in Engine Generator House

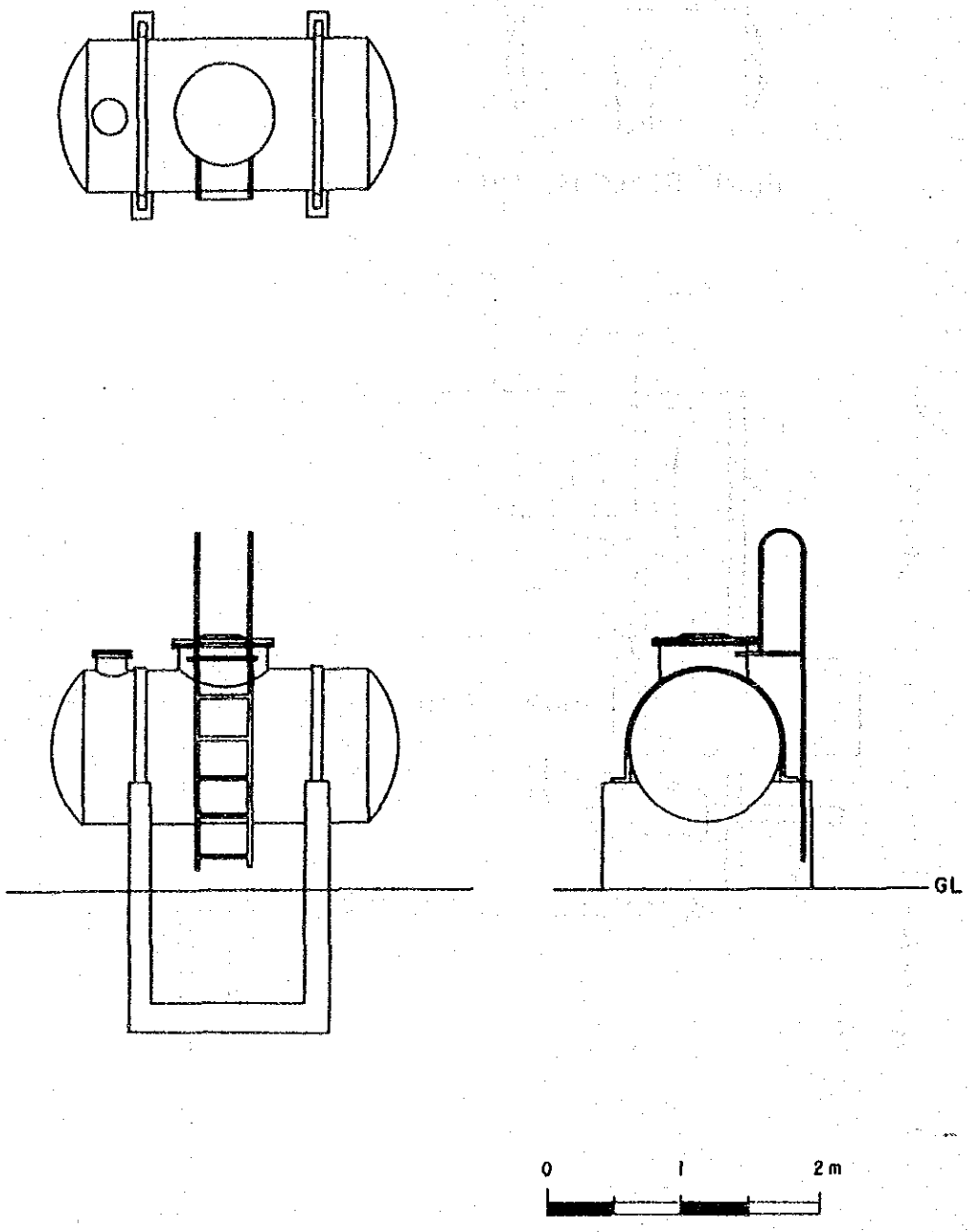


Fig. 4-4-16 Outline of Fuel Storage Tank

CHAPTER 5 IMPLEMENTATION PLAN

CHAPTER 5 IMPLEMENTATION PLAN

5-1 Implementation System

This Project is to be implemented in accordance with the framework of the grant aid system of the Japanese Government.

After this project is approved by both governments and the "Exchange of Notes" is concluded, it will be implemented formally.

A consultant contract will be concluded between the Japanese Consultant and RB, the main implementation organization of the Bangladesh side, and then the Consultant will begin the detailed design work of the related facilities and equipment.

After completion of the detailed design documents, the Project will be implemented by the Japanese company decided on through the tender.

After completion of the Project, RB will take charge of the maintenance, management and operation of the facilities included in the Project.

5-2 Division of Construction Work

The main construction work to be borne regarding the Project is, as follows:

(1) Construction work to be borne by the Japanese Government side

1) Grant of transmitter equipment and construction material and installation of them

2) Remodelling and repairing of transmitting antenna and grant of the necessary construction materials and installation of them (including aviation obstruction lighting system)

3) Power source equipment and the necessary construction materials including installation, wiring and adjustment

4) Grant of engine generator and its installation (including fuel storage tank)

(2) Construction work to be borne by the Bangladesh Government side

1) New station building, power room, engine generator house and antenna tuning house

2) Transfer of receiving power cable

3) Construction work for supplying water to the new station building

5-3 Execution Plan

5-3-1 Execution Supervision Plan

(1) Outline of Execution Supervision Plan

The construction work of this Project can be roughly divided into architectural work on the building to accommodate the transmitter, power source equipment, and engine generator, installation and adjustment work of the transmitters and power source equipment, and remodelling work on the change in height of transmitting antenna.

In respect to the division of construction work, the supply of local materials and labor, the actual results of the renewal project of Chittagong Medium Wave Broadcasting Station, etc., will be taken into consideration, as well as the architectural standards of Japan.

In order to carry out the construction work smoothly and shorten the time that broadcasting will be suspended, engineers will be dispatched from Japan and local workers for such tasks as electrical work, the disassembly and erection of the steel tower and painting will be employed as assistants to organize a construction work system. In addition, as the transportation of equipment controls the term of construction work, it is necessary to pay sufficient attention to the construction schedule. Especially in this Project, as a great number of precise equipment will be transported, special care is to be paid.

From the above view point, it is necessary to select well-experienced contractor, as well as consider the execution schedule thoroughly and establish a precise construction schedule.

During the construction term, the dispatched engineers will properly organize on-the-job training for the counterpart staff for the transfer of technics related to the operation and maintenance of the newly installed facilities and equipment.

The Bangladesh side is to be responsible for the architectural work related to the New Station house, power room and antenna tuning house, but

as such work is closely related to the installation of equipment, it will be necessary to continually exchange information such as working drawings to carry out the construction work smoothly.

(2) Outline of Work

As an agent for the client, the following business will be executed by consulting with the client.

a) Business related to the construction contract
b) Dispatch of supervisory engineers
c) Approval of design documents, factory acceptance tests and approval of completed product.
d) Business report to client, business related to matters needing approval of client
e) Arrangement of construction schedule report, and report of field construction meetings
f) Business related to acceptance test at construction site
g) Management of documents related to items pointed out at construction site, various meetings, and acceptance tests
h) Cooperation with approval of payment procedures

After completion of the construction work, the consultant is to confirm whether the terms of the contract have been met and be present at the handing over of the facilities. Then the consultant will terminate business after obtaining the approval of the client. In addition, the consultant is to report to the related Japanese organization on the progress of construction work, payment procedures, and necessary items related to handing over.

5-3-2 Equipment and Materials Supply Plan

The transmitter and its peripheral equipment and facilities, the power source, engine generator, antenna tuning unit and construction materials are to be supplied from Japan.

The transmitting equipment and all facilities will be fabricated in Japan. After the factory inspection is completed, if necessary, the equipment will be dismantled and then transported. Upon arrival in the construction site it will be installed, adjusted and restored to the original state.

Regarding the antenna steel mast, the existing 152 m tower will be remodelled to 122m height. The mast of the existing steel mast will be used. The stays and aviation obstruction lighting system, etc., are to be supplied from Japan. The range of things that will be supplied from the client country will be cement, sand and gravel for foundations.

5-3-3 Term of Construction Work which is to be the Responsibility of the Government of Bangladesh

In implementing this Project, there is a division of work that each country is to take charge of (Refer to 5-2).

Of the construction work, the transfer of receiving power route and construction of an additional station building (a transmitting station house, a antenna tuning house and a engine generator house including construction work related to water supply for the new station building), are the items that should be completed at an early stage. All the construction work mentioned above is to be the responsibility of the Bangladesh side.

After completion of the facilities above, it will be possible for the first time to convey equipment and material into the building.

Whether the whole Project will be completed according to the schedule or not depends on whether the construction work mentioned above is completed according to the schedule.

The construction work which the Bangladesh side takes charge of should be completed 9.5 months after concluding the Exchange of Notes.

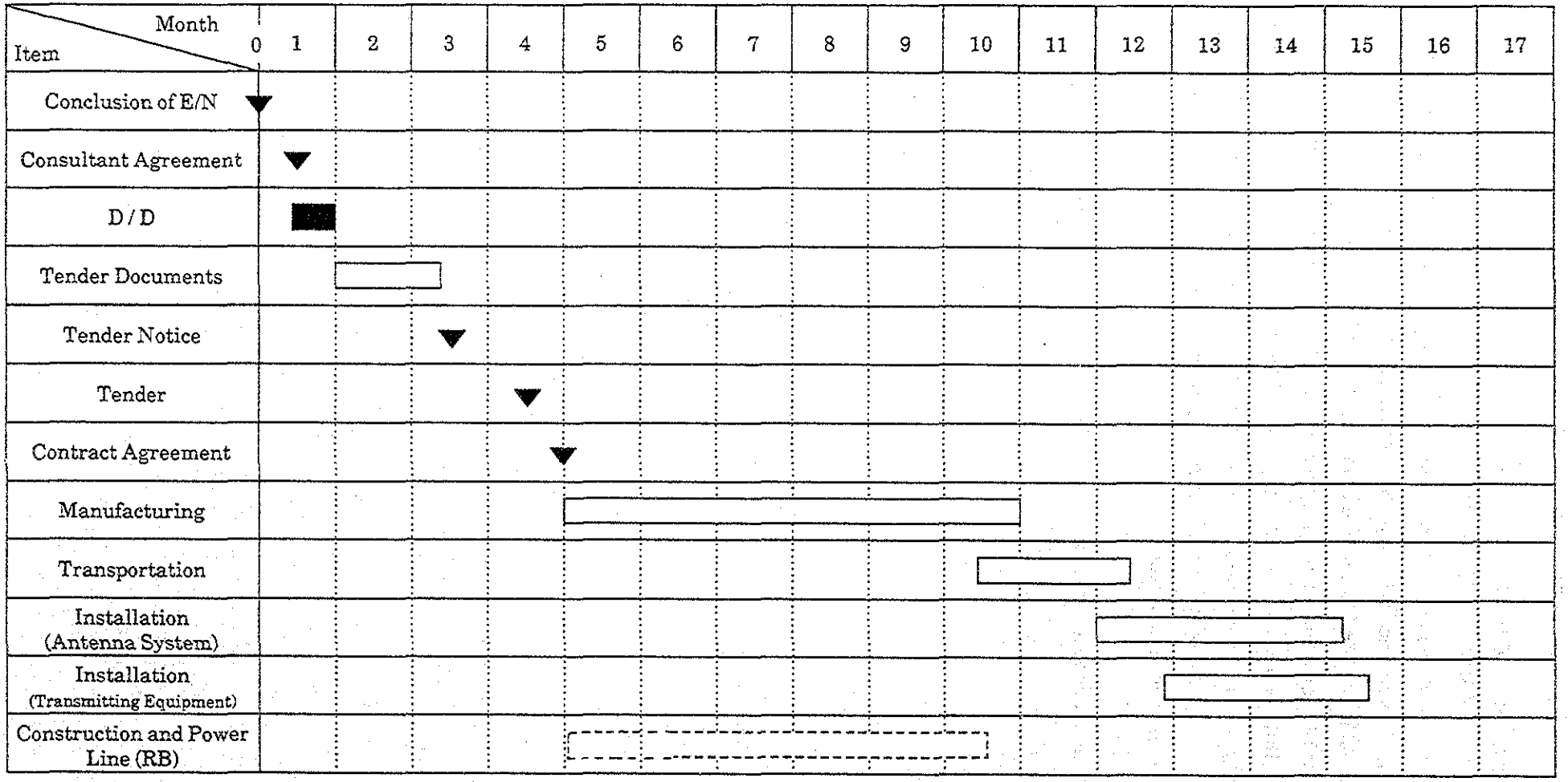
5-4 Execution Schedule

The term of construction work for this Project is to be 14.5 months, after concluding the Exchange of Notes (E/N).

The terms for construction work on the site is to be planned deliberately, so that the suspension of broadcasting services due to the construction work of this Project will be as short as possible. Especially, as Programme-C and domestic shortwave broadcasts are in operation, sufficient preventive measures are to be provided for the operation of these services.

The construction schedule for this Project is shown in Table 9.

Table 9 Implementation Schedule



5-5 Maintenance and Management Costs

The operating cost of Savar Transmitting Station in fiscal 1988 was about 93 lakh TK. However, in respect to the rough estimation of the annual operating cost for Savar Transmitting Station after completion of this Project, the total amount will become as follows;

Regarding the maintenance cost, etc., it will be adjusted properly, considering the free-guarantee term of the newly installed equipment, and the amount of spare parts provided, etc.

Personnel cost (Regular employee)	about	23.0	lakh TK
Personnel cost (Irregular employee)	〃	7.5	lakh TK
Electric power cost	〃	50.0	lakh TK
Telephone charge	〃	0.5	lakh TK
Others (Maintenance, vehicle cost, etc.)	〃	9.0	lakh TK
Total	about	90.0	lakh TK

In respect to the increment of the operating cost, proper steps will be taken in the arrangement of the total operating cost of Radio Bangladesh.

5-6 Rough Estimate of Project Cost

(1) Project cost to be borne by the Bangladesh side:
Estimated at 25.9 lakh TK.

The breakdown is as follows:

A total amount of about 25.9 lakh TK is estimated. The breakdown is as follows.

Construction of the new transmitter building	17.0	lakh TK
Construction of the antenna tuning house	1.6	
Construction of the engine generator house	2.2	
Change in power-receiving cable (Including the cost of changing the route)	5.1	
Sub total	25.9	lakh TK
CDST (Custom Duties and Sales Taxes which are to be imposed on the foreign-exchange portion of the equipment being brought into Bangladesh under this Project)	525.0	lakh TK
Total	550.9	lakh TK

For the above-mentioned estimated costs, necessary budgetary steps are due to be taken.

CHAPTER 6 EVALUATION OF PROJECT

CHAPTER 6 EVALUATION OF PROJECT

In Bangladesh, the Government has established the Third 5-year Plan and has been tackling the national development. In order to promote the national development plan with maximum efficiency, there is the need for the mass media that convey information nationwide and educate the people. Unfortunately, however, at the Savar Transmitting Station, which is the key station for nationwide broadcasting, the currently-used transmitter (100 kW, 819 kHz) is already superannuated after having been used over 25 years since its first installation. The spare parts and parts for repair use are hard to obtain as their manufacture has already been suspended, with the result that there is great fear that suspension of broadcasting services may be suspended in the near future occurring owing to a breakdown of the transmitter. From the present condition of stock of spare parts such as transmitting tubes, the residual life of the transmitter is estimated only for several years. Furthermore, as a result of co-channel or neighbouring-frequency interferences from the neighbouring countries, the nighttime coverage today has been narrowed to within the radius of about 52 km from the Savar Transmitting Station.

In terminating such an acute state of affairs as described above, this Project will be of great significance, because when it is implemented, the superannuated transmitter will be replaced with the equipment of high reliability and, at the same time, the transmission frequency will be changed into 630 kHz which is less susceptible to interferences and more advantageous in propagation. And, as a result, the coverage is due to be expanded by about twice as large in area.

The implementation of this Project, therefore, is expected to produce the following effects:

① As a result of the renewal of the superannuated transmitter, procurement of spare parts and parts for repair will become possible, which enables maintenance of functions of the equipment for a long period.

② As a result of the adoption of the parallel-operation system (50 kW × 2 sets), it will become possible to maintain the broadcast service even if one of the two transmitters may have broken down. This, coupled with the effect of ① mentioned above, a system

will be established to ensure continuation of the broadcasting service without a break.

- As a result of solid-state circuits being adopted for the entire structure of the transmitter except for its final stage, the reliability of the transmitter is high and this is expected to lead to a reduction in the maintenance and management costs of the equipment.

In the aspect of the broadcasting service, the following effects are considered to be brought forth as a result of implementation of this Project.

With the expansion of coverage area, it will be possible to receive the radio broadcasting signal with a relatively simple receiving set , even in the area near the country border. Therefore, the effect will be extremely large.

RB is broadcasting programmes of weather information, education, agricultural technique and population control setting up propaganda every day through broadcasting, and after completion of this Project, the adult population that are able to receive broadcasting signal will increase from 30% to 50%, and the programmes closely related with the Government Plan will contribute greatly to enlighten the regional residence.

The organization to implement and operate this Project is RB, and the upper organization NBA had already prepared a Project Proforma for this Project, and is studying the details.

In respect to the maintenance and operating system, after completion of this Project, as RB will take over the present state as previously described, there will be no problem as system for attended operation.

In addition, regarding the maintenance and operating costs, it is regarded appropriate as estimated in the calculation in Item 5-5. It is expected that the incomings and outgoings will be balanced.

With the implementation of this Project such as explained above, by conveying various programmes through broadcast waves of high-reliability,

the visible and invisible merits of it that will contribute to the development of the country are immeasurable.

Considering the great expectation of Bangladesh side against this Project, it is judged that the implementation of this Project based on Japan's Grand Aid is appropriate.

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

7-1 Conclusions

The country of Bangladesh is placing great importance on radio broadcasting as a measure for conveying information.

The superannuation of transmitting facilities of Savar Transmitting Station, executing nationwide broadcasting is remarkable, and furthermore, because of the interference from signals of high-power transmitters of neighboring countries, the coverage area is becoming narrow. The requirement of the country of Bangladesh to improve this condition was renewal of the transmitting facilities of Savar Transmitting Station, and increase the transmitting power. After analysing the necessity of this requirement, the problems that might occur, the effects that could be expected after completion, etc., it was concluded appropriate to renew the transmitter equipment to 100 kW, 630 kHz.

With the implementation of this Project, the transmitter equipment of Savar Transmitting Station will be replaced with an up-to-date one of high reliability. Then, the new facilities could convey information on education and cyclones, etc., and various programmes related to family planning and entertainment, etc., to the nation as well as establish an excellent reception environment and relieve the audience living near the country border that are suffering from interference. Thus, it would be possible to respond to the requirement of the Bangladesh Government and contribute greatly to improve the living of the nation and raise the cultural level.

Considering the aforementioned matters, implementation of this Project based on the Grant Aid of Japan was judged appropriate, and it is desired that it will start at an early stage.

7-2 Recommendations

(1) Operational System after Implementation of the Project

There is not a great change in this operational system in comparison with the former one. However, as the transmitting facilities will be replaced by the most up-to-date high power equipment, of course the reliability will rise remarkably. Accordingly, with the reduction in maintenance time, it is desired to use the resulting surplus of time in training staff in countermeasures against equipment failures and in acquiring new techniques, etc.

In addition, with the rise in reliability, consideration is to be given to the time for purchasing spare parts and for arranging the budget, etc.

(2) Training for Staff and Arrangement of Staff

Savar Transmitting Station (HPT-1) is an important station implementing nationwide broadcasting which is second in scale only to Dhamrai Transmitting Station (SPT). In the station, a shortwave transmitter for domestic broadcasting, a 10 kW medium wave transmitter for local broadcasting and an 819 kHz, 100 kW transmitter, which will not be used after implementation of this project, are installed. It is therefore proposed here to use the facilities including the newly added station building and the new transmitting facilities as a place for training the regional station staff of RB.

In addition, it is necessary to execute staff training constantly, by dispatching the staff to foreign countries.

In addition, regarding the staff arrangement, it is necessary to transfer the staff to regional stations periodically for improvement of techniques and for mutual exchange of central and regional staff.

(3) Use of T & T Programme Transmission Link

At present in Bangladesh, T&T is operating a nationwide transmission network for telegraph and telephone communications. But in order to ensure programme quality and conduct high-quality broadcasting, the

microwave transmission link should be used for composing a nationwide network.

For programme transmission of medium wave broadcasting, a band width of 10 kHz is required, but this could be done by using only three channels of telephone lines. The facilities to prepare are a modulator/demodulator and transmission lines to connect the T&T terminal station and NBH.

APPENDICES

APPENDICES

MINUTES OF DISCUSSIONS
ON
THE PROJECT FOR REPLACEMENT OF MEDIUM WAVE TRANSMITTER OF HIGH POWER TRANSMITTING STATION
IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a basic design study on the Project for Replacement of Medium Wave Transmitter of High Power Transmitting Station (hereinafter referred to as "the Project"),and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Bangladesh the study team headed by Mr. Kenji KAMEI, Deputy Director, Frequency Planning Division, Telecommunications Bureau, Ministry of Posts and Telecommunications from November 16 to December 3, 1988.

The team had a series of discussions on the Project with the officials concerned of the Government of the People's Republic of Bangladesh headed by Mr. Saiful BARI, Chairman, National Broadcasting Authority, Bangladesh and conducted a field survey in Savar High Power Transmitting Station.

As a result of the study and discussions, both parties agreed to recommend to their respective Government that the major points of understanding reached between them, attached herewith, should be examined toward the realization of the Project.

Dhaka, November 23, 1988

K. Kamei

Mr. Kenji KAMEI
Team Leader
Basic Design
Study Team,
JICA

Mr.Saiful BARI
Chairman
National Broadcasting
Authority,
Bangladesh

1. TITLE OF THE PROJECT

The title of the Project is "The Project for Replacement of Medium Wave Transmitter, Savar in the People's Republic of Bangladesh".

2. OBJECTIVES OF THE PROJECT

The objectives of the Project are to provide necessary equipment and facilities for the Medium Wave Transmitter of Savar High Power Transmitting Station in order:

1) To improve the radio broadcasting service
2) To provide a strong and reliable radio signal all over the country
3) To keep up coverage at optimum level to enable the Regional Station to relay national programme

3. IMPLEMENTING AGENCY

The Implementing Agency for the Project is Radio Bangladesh under National Broadcasting Authority.

4. PROJECT SITE

The site of the project is located at Savar, No.1 High Power Transmitting Station shown in ANNEX 1.

5. REQUEST BY THE GOVERNMENT OF BANGLADESH

The Japanese Study Team will convey to the Government of Japan the intention of the Government of the People's Republic of Bangladesh that the former takes necessary measures to cooperate in implementing the Project and provide the facilities and equipment listed in ANNEX 2 for High Power Transmitting Station in Savar under Japanese Grant Aid Programme.

6. JAPAN'S GRANT AID PROGRAMME

1) The Bangladesh side has understood the system of Japan's Grant Aid Programme explained by the Team which includes a principle for use of a Japanese consultant firm and Japanese contractors for the implementation of the Project.

2) The Bangladesh side will undertake to ensure the necessary budget and personnel for the proper and effective operation and maintenance of equipment and facilities provided under Grant Aid Programme.

7. NECESSARY MEASURES TAKEN BY BANGLADESH

1) To make utmost effort to get agreement of all the administrations having an assignment in the same channel or an adjacent channel, which is considered to be affected, through the IFRB, to increase of transmitting power to 500kW(2x250kW, frequency 630kHz), which is requested in the Project by the end of December 1988

In case of delay in getting the agreement, to inform the Government of Japan and to understand Japan's Grant Aid on this Project may not be possible to execute in 1989 fiscal year.

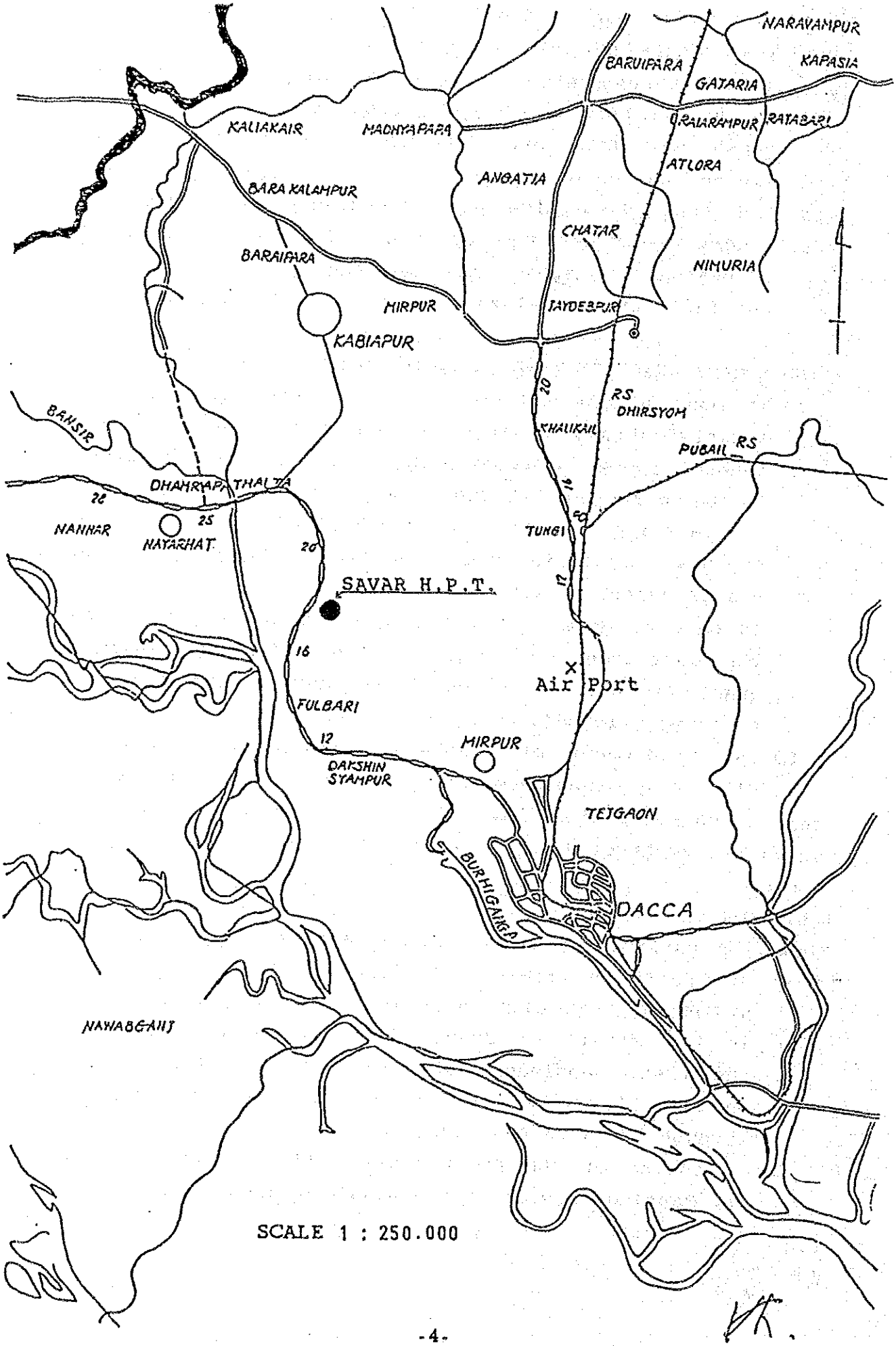
2) The Government of People's Republic of Bangladesh will take the necessary measures listed in ANNEX 3 on condition that Grant Aid Programme by the Government of Japan is extended to the Project.

8. REPORT

1) The equipment and facilities requested by Bangladesh side will be examined by the Team in Japan and the equipment list will be sent to the Bangladesh side in the middle of January,1989 for confirmation of the list. Bangladesh side will forward the comment on the list, if any, by the end of January,1989 through the JICA Bangladesh office.

2) 10 copies of the final report will be submitted to the Bangladesh side at the middle of March,1989.

ANNEX 1 PROJECT SITE



ANNEX 2 EQUIPMENT AND FACILITIES REQUESTED BY BANGLADESH

1) 2 sets of 250kW MW Transmitter with combining unit for 500kW Transmitter with necessary combining unit dummy load and all associated accessories

2) 1 set of Audio Equipment

3) 1 set of Measuring Equipment

4) 1 set of Antenna system with matching unit and Aviation Lighting System

5) 1 set of Feeder line

6) 1 lot of Spare parts

7) 1 set of Installation materials

8) 1 set of Power Supply Equipment

ANNEX 3 NECESSARY MEASURES TAKEN BY BANGLADESH

1. To provide data and informations necessary for detailed design
2. To carry out necessary works of buildings for installation of the equipment provided under Grant Aid
3. To provide power source necessary for installation work operation of the equipment of the Project
4. To ensure prompt unloading, customs clearance of the equipment under Grant Aid Programme, if any, at ports of disembarkation in Bangladesh
   The custom duties and sales taxes of the equipment will be the responsibilities of the Government of the People's Republic of Bangladesh.
5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal lesised which may be imposed in Bangladesh respect to the supply of the products and services under the verified contractors
6. To accord Japanese nationals whose services may required in connection with the supply of the products and the services under the verified contract much facilities as may be necessary for their entry to Bangladesh and stay there in for the performance of their work
7. To maintain and use properly and effective the equipment purchased under Grant Aid
8. To provide facilities for distribution of electricity, drainage, communications and security
9. To provide necessary permissions, licences and other authorizations for carrying out the Project
10. To admit the intermittence of the broadcasting service in Savar Station on the installation work, if necessary

MINUTES OF DISCUSSIONS OF THE BASIC DESIGN STUDY ON THE PROJECT FOR REPLACEMENT OF MEDIUM WAVE TRANSMITTER OF HIGH POWER TRANSMITTING STATION IN THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to the request of the Government of the People's Republic of Bangladesh of the Project for Replacement of Medium Wave Transmitter of High Power Transmitting Station (hereinafter referred to as " the Project") the Government of Japan decided to conduct a basic design study on the Project and entrusted the study to the Japan International Cooperation Agency(JICA).

JICA prepared a draft final report according to the result of the study conducted by JICA in 1988, and dispatched a draft final report explanation team headed by Mr. Takao YAMAGUCHI, Assistant Director, Engineering Division, Broadcasting Bureau, Ministry of Posts and Telecommunications, from March 25 to April 1, 1990.

Both parties had a series of discussions on the report and have agreed to recommend to their respective Governments that the major points of understandings re ched between them, attached herewith, should be examined towards the realization of the Project.

Dhaka, March 29, 1990

J. Yamaguchi

Mr. Takao YAMAGUCHI
Leader,
Basic Design Study Team
JICA.

Mr. Saiful BARI
Chairmen
National Broadcasting
Authority, Bangladesh.

ATTACHMENT

1. The Bangladesh side has principally agreed to the basic design proposed in the Draft Final Report.
Major component of requested equipment confirmed, including the revised transmitter, are shown in Annex-II.

2. The Bangladesh side has understood Japan's grant aid system and agreed that the necessary measures shall be undertaken by the Bangladesh side, as shown in Annex-I, which is in line with the Annex-3, "NECESSARY MEASURES TAKEN BY BANGLADESH", of THE MINUTES OF DISCUSSIONS on the Project signed on November 23, 1988, on condition that the grant aid by the Government of Japan would be extended to the Project.

3. The Bangladesh side stated that the Project paper, including necessary budget, had been already approved by the Planning Commission to construct the new buildings for installation of the equipment provided under the grant aid.

4. The Bangladesh side stated that the previous proposal such as the transmitting power (500 kW) had already been canceled and recognized by the IFRB, see the attached the copy of telex from IFRB as Annex -III.

5. Ten copies of the Final Report in English will be submitted to the Bangladesh side though JICA by the end of May, 1990.

ANNEX - I NECESSARY MEASURES TAKEN BY BANGLADESH

1. To provide data and informations necessary for detailed design

2. To carry out necessary works of buildings for installation of the equipment provided under Grant Aid.

3. To provide power source necessary for installation work operation of the equipment of the Project.

4. To ensure prompt unloading, customs clearance of the equipment under Grant Aid Programme, if any, at ports of disemberkation in Bangladesh.
   The custom duties and sales taxes of the equipment will be the responsibilities of the Government of the People's Republic of Bangladesh.

5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal lesised which may be imposed in Bangladesh respect to the supply of the products and services under the verified contractors.

6. To accord Japanese nationals whose services may required in connection with the supply of the products and the services under the verified contract much facilities as may be necessar for their entry to Bangladesh and stay there in for the performance of their work.

7. To maintain and use properly and effective the equipment purchased under Grant Aid.

8. To provide facilities for distribution of electricity, drainag communications and security.

9. To provide necessary permissions, licences and other authorisations for carrying out the project.

10. To admit the intermittence of the broadcasting service in Sava Station on the installation work, if necessary.

11. To bear all the expenses other than those to be borne by the Grant aid.

ANNEX - II MAJOR COMPONENT OF REQUESTED EQUIPMENT AND FACILITIES CONFIRMED BY BOTH PARTY.

1) 100 kW medium wave transmitter (50 kW two sets) with all associated accessories

2) 1 set of Audio Equipment

3) 1 set of Measuring Equipment

4) 1 set of Antenna system with matching unit and Aviation Lighting System

5) 1 set of Feeder line

6) 1 lot of Spare parts

7) 1 set of Installation materials

8) 1 set of Power Supply Equipment

9) 1 set of Engine Generator (350 kVA)

MAR 19 17:16

642228 NBA BJ

421000W UIT CH
90.03.19 11.11

ZCZC 051207
TX0780642228
+++
FROM IFRBCOM GENEVA.

TO TELEBOARD DHAKA

IFRB 30C(BCD)/0.0517/90 CONCERNS MODIFICATIONS TO THE REGIONAL LF/MF BROADCASTING PLAN, GENEVA, 1975.
2. REFERENCES:
A) YOUR LETTER E/RES/C-1/89-55 OF 24 JULY 1989
B) IFRB TELEX 30C(BCD)/0.4186/89 OF 31 JULY 1989
C) PART A OF SPECIAL SECTION GE75/74 OF 5 SEPTEMBER 1989
D) YOUR TELEX OF 6 MARCH 1990
3. YOUR TELEX OF 6 MARCH 1990 IS ACKNOWLEDGED. WE HAVE NO TRACE OF YOUR LETTER Z/RES/C-1/89-258 OF 15 NOVEMBER 1989. FROM YOUR TELEX, IT IS UNDERSTOOD THAT YOUR ADMINISTRATION HAS ABANDONED THE PROJECT OF MODIFICATION OF THE CHARACTERISTICS OF STATION DACCA 630 KHZ, WHICH WILL NOW REMAIN AS CONTAINED IN THE PLAN. CONSEQUENTLY, THE MODIFICATION PUBLISHED IN PART A OF SPECIAL SECTION GE75/74 WILL BE CONSIDERED AS CANCELLED.
REGARDS IFRB. IFRBCOM.

COL OK
NNNN

642228 NBA BJ

421000W UIT CH.

NO. 2 - 1 Staffing of the Basic Design Study Team (1988.11.16 ~ 12.3)

Name	Assignment	Present Post
Mr. Kenji KAMEI	Team Leader	Deputy Director, Frequency Planning Division, Telecommunications Bureau, Ministry of Posts and Telecommunications.
Mr. Hiroshi SHIONO	Project Coordinator	Second Basic Design Study Division, Grant Aid Planning and Survey Department, Japan International Cooperation Agency.
Mr. Manabu YANAGISAWA	Broadcasting Planner	Chief Engineer, International Department, All Japan Radio & Television Engineering Services Co., Ltd. (AJTS)
Mr. Takashi MIYAGI	Transmitting & Radio Equipment Engineer	Chief Engineer, International Department, All Japan Radio & Television Engineering Services Co., Ltd. (AJTS)
Mr. Yutaka HARA	Antenna Equipment Engineer	Chief Engineer, International Department, All Japan Radio & Television Engineering Services Co., Ltd. (AJTS)
Mr. Akira NAGASE	Building Facilities Engineer & Cost Estimate	Engineer, International Department, All Japan Radio & Television Engineering Services Co., Ltd. (AJTS)

NO. 2-2 Staffing of the Basic Design Study Team (1990.3.25 ~ 4.1)

Name	Assignment	Present Post
Mr. Takao YAMAGUCHI	Team Leader	Assistant Director, Engineering Division, Broadcasting Bureau, Ministry of Posts and Telecommunications
Mr. Takashi MIYAGI	Broadcasting Planner	Chief Engineer, International Department, All Japan Radio & Television Engineering Services Co., Ltd. (AJTS)

NO. 3 - 1 Study Schedule (1988.11.16 ~ 12.3)

NO	Date	Contents
1.	Nov 16 (Wed)	Tokyo (Japan) → Bangkok (Thailand)
2.	17 (Thur)	Bangkok → Dhaka (Bangladesh) Meeting on Study Schedule (JICA Office).
3.	18 (Fri)	Observation of related facilities for Study at NBA. Meeting (Study Team).
4.	19 (Sat)	Courtesy call to Ministry of Planning, Ministry of Information and NBA. Presentation &Explanation of Report & Questionnaire to NBA.
5.	20 (Sun)	Visit Savar Radio Transmitting Station to observe the facilities. · Discuss Study Schedule & Others. · Study of Layout for Building. · Study of Existing Antenna.
6.	21 (Mon)	Study of Power Supplying Facilities at Savar Station.
7.	22 (Tue)	Preparation of Minutes (Draft) and discussion of them between NBA and Study team. Measurement of Field Strength at Dhaka City. Measurement of Antenna Impedance of Savar Transmitting Station(after Broadcasting Service).
8.	23 (Wed)	Signing of the Minutes. Courtesy call on Ambassador. Report to the Embassy of Japan & JICA Office (Mr. Kamei & Mr. Shiono).
9.	24 (Thur)	Mr. Kamei & Mr. Shiono leave Dhaka for Tokyo. Collecting the materials for Study.

NO	Date	Contents
10.	Nov 25 (Fri)	Study of the facilities at Savar Transmitting Station. ・ Preparation of Soil Test ・ Measurement of Ground Conductivity
11.	26 (Sat)	Execute Boring for Soil Test at Savar Transmitting Station. Visit Dhamrai Transmitting Station.
12.	27 (Sun)	Measurement of Field Strength at Local Cities. (Separate into 2 Groups)
13.	28 (Mon)	① A Group. Members: Mr. Harunur Rasid (RB) Mr. Yanagisawa, Mr. Nagase Location: Sylhet City and vicinities ② B Group. Members: Mr. Bhuiyan (RB) Mr. Miyagi, Mr. Hara Location: Rajshahi City and vicinities
14.	29 (Tue)	Overall discussion together with RB Staff. Visit Meteorological Bureau, T&T and PDB to collect the materials.
15.	30 (Wed)	Last Meeting with RB. Confirmation of the Questionnare, collecting materials, etc.
16.	Dec 1 (Thur)	Report to the Embassy of Japan & JICA Office.
17.	2 (Fri)	Dhaka → Bangkok
18.	3 (Sat)	Bangkok → Tokyo

NO. 3 - 2 Study Schedule (1990.3.25 ~ 4.1)

NO	Date	Contents
1.	Mar 25 (Sun)	BG-087. Tokyo (Japan) → Bangkok (Thailand) → Dhaka (Bangladesh)
2.	26 (Mon)	Visit Savar Radio Transmitting Station to study the facilitieis.
3.	27 (Tue)	Meeting on Study Schedule (JICA Office). Coutesy call to Ministry of Information. Explantion of the Draft Report to NBA. Discuss the Project with NBA.
4.	28 (Wed)	Discuss the Project at Savar Station. Preparation of the Minutes of Discussions.
5.	29 (Thur)	Signing of the Minutes of Discussions. Report to the Embassy of Japan and JICA Office.
6.	30 (Fri)	Collecting materials of the Project.
7.	31 (Sat)	Collecting materials at PDB and Others. TG-324. Leave Dhaka → Bangkok
8.	Apr 1 (Sun)	TG-640. Leave Bangkok → Tokyo

NO. 4 - 1 List of Interviewees (1988.11.16 ~ 12.3)

- Mr. A.N.M. Yusuf
  Secretary,
  Ministry of Information

- Mr. MD. Nasim
  Deputy Secretary, External Resources Division,
  Ministry of Planning

- Mr. Saiful Bari
  Chairman,
  National Broadcasting Authority, Dhaka

- Radio Bangladesh, Dhaka

  Mr. Sumsuzzaman Chowdhury
  Additional Chief Engineer

  Mr. Golam Mostafa
  Resident Engineer (High Power TX Station, Savar)

  Mr. Harunur Rashid
  Project Director

  Mr. Rafiqul Islam Bhuiyan
  Regional Engineer

  Mr. Abdul Rashid
  Senior Engineer

  Mr. Abdul Haque Bhuiyan
  Regional Engineer

  Mr. Nazrul Islam
  Radio Engineer (High Power TX Station, Savar)

  Mr. Nazim Choudhury
  Regional Engineer (National Broadcasting House)

  Mr. MD Barkatullah
  Radio Engineer (National Broadcasting House)

- Radio Bangladesh, SYLHET

  Mr. Hasan Iman
  Regional Director

  Mr. Nowab Ali
  Regional Engineer

- Radio Bangladesh RAJSHAHI

  Mr. Belal Uddin
  Regional Engineer

- Telegraph & Telephone Board

  Mr. Mahfuz Uddin Ahmad
  Divisional Engineer MW Maintenance - II

- Embassy of Japan

  Mr. Takeo Iguchi
  Ambassador Extraordinary and Plenipotentiary

  Mr. Minoru Nakano
  1st Secretary

- JICA Bangladesh Office

  Mr. Norio Matsuzawa
  Resident Representative

  Mr. Hiroshi Umezaki
  Deputy Resident Representative

  Mr. Yukiya Satio
  Assistant Resident Representative

NO. 4-2 List of Interviewees (1990.3.25 ~ 4.1)

- Mr. Sysd Ahmad
  Secretary,
  Ministry of Information,
  Government of Bangladesh Dhaka

- Mr. Saiful Bari
  Chairman,
  National Broadcasting Authority (NAB),
  Government of Bangladesh Dhaka

- Mr. Harunur Rashid
  Project Director,
  National Broadcasting Authority

- Mr. Shamsuzzaman Choudhury
  Additional Chief Engineer,
  National Broadcasting Authority

- Mr. Golam Mostafa
  Resident Engineer,
  High Power Transmitting Station

- Mr. Ali Hazrat
  Assistant Chief Architect,
  Department Architecture
  Public Works Department

- Embassy of Japan

  Mr. Tetsuro Ito
  Minister

  Mr. Takeshi Ota
  2nd Secretary

- JICA Bangladesh Office

  Mr. Norio Matsuzawa
  Resident Representative

  Mr. Takeshi Naruse
  Assistant Resident Representative

NO. 5 - 1 Dhaka - A Programme (Dhamrai, 693kHz, 1000kW)

6:00(6:30) ~ 10:30, 17:00 ~ 23:30
( )=Wintertime

06 : 29	Opening Announcement
06 : 30	Recitation from Holy Koran in Arabic Recitation from Holy Koran in Bengali Religious Songs Discussion on Religion
06 : 50	Weather Forecast Today's Programme Summary
06 : 55	Agricultural Programme
07 : 00	Bengali News
07 : 10	English News
07 : 20	Religious Programme Including Explanation for Other Religions (Hindu, Buddhist, Christian)
07 : 30	Morning Magazine Programme
08 : 00	Nazrul Songs
08 : 15	Religious Folk Songs
08 : 30	Rabindra Songs
08 : 45	Modern Songs
09 : 00	Bengali News
09 : 05	Summary of Bengali News
09 : 15	Folk Songs
09 : 30	Nazrul Songs
09 : 45	Classical Music
10 : 00	Rabindra Songs
10 : 30	Close
17 : 00	Bengali News
17 : 05	Rabindra Songs and Modern Songs
17 : 15	Rural Listeners' Programme
17 : 35	Rural Songs
17 : 40	Talks (on many topics)

17 : 45	Nazrul Songs
18 : 00	Agricultural Programme
18 : 35	Modern Songs
18 : 50	Weather Forecast Stock Exchange Report Advertizements (Vacancies & Sales)
19 : 00	Rural Agricultural Programme
19 : 30	Local Bengali News
19 : 35	Programme for Army Personnel
20 : 10	Happy Family (Family Planning)
20 : 30	Bengali News
20 : 40	Review of Bengali Programme
20 : 45	National Hook - up / Music
21 : 00	Radio Magazine
21 : 30	News in English
21 : 40	Review of English News
22 : 00	Area-wise Rural Programme
22 : 10	Religious Programme
22 : 30	Classical Music (Sitar Recital)
23 : 00	Bengali News
23 : 05	English News
23 : 10	Weather Forecast Tomorrow's programming in Brief
23 : 15	Religious Songs
23 : 25	Recitation from Holy Koran Closing Announcement National Anthem
23 : 30	Close

NO. 5 - 2 Dhaka - B Programme (Savar, 819kHz, 100kW)

6:00 (6:30) ~ 7:30, 10:30 ~ 23:30
( )=Wintertime

06 : 29	Opening Announcement
06 : 30	Recitation from Holy Koran in Arabic Recitation from Holy Koran in Bengali Religious Songs Discussion on Religion
06 : 50	Weather Forecast Today's Programme Summary
06 : 55	Agricultural Programme
07 : 00	Bengali News
07 : 10	English News
07 : 20	Religious Programme Including Explanation for Other Religions (Hindu, Buddhist, Christian)
07 : 30	Close
10 : 30	Guitar
10 : 40	Nazrul Songs
10 : 50	Folk Songs
11 : 00	Bengali News
11 : 05	Rabindra Songs
11 : 20	Modern Songs
11 : 30	Family Planning Programme
12 : 00	Weather Forecast, Announcement of Lost and Found
12 : 05	Folk Songs
12 : 20	School Broadcast
13 : 00	News in English
13 : 05	Commercial Programme (Advertizement & Songs) Mixed Songs
14 : 00	Mixed Songs
14 : 30	Film Songs

15 : 00	Bengali News
15 : 05	Population Planning Programme
15 : 30	Programme for University and College Students
16 : 00	Announcement for Prayer and Religious Discussion
16 : 05	Religious Songs
16 : 10	Nazrul Songs
16 : 20	Modern Songs
16 : 30	Mass Education Programme
17 : 00	Bengali News
17 : 05	Commercial Programme Mixed Songs
18 : 00	Film Songs
18 : 30	Mixed Songs
21 : 00	Mixed Songs
21 : 30	Mother's land
22 : 00	Rural Programme
22 : 10	Religious Programme
22 : 30	Classical Music
23 : 00	Bengali News
23 : 05	English News
23 : 10	Weather Forecast
23 : 15	Religious Songs
23 : 25	Recitation from Holy Koran Closing Announcement National Anthem
23 : 30	Close

NO. 5-3 Dhaka - C Programme (Savar, 1170kHz, 10kW)

7:30 ~ 22:00

07 : 30	Morning Magazine Programme
08 : 00	Nazrul Songs
08 : 15	Religious Folk Songs
08 : 30	Rabindra Songs
08 : 45	Modern Songs
09 : 00	Bengali News
09 : 05	Summary of Bengali News
09 : 15	Folk Songs
09 : 30	Nazrul Songs
09 : 45	Classical Music
10 : 00	Rabindra Songs
10 : 15	Modern Songs
10 : 30	Guitar
10 : 40	Nazrul Songs
10 : 50	Folk Songs
11 : 00	Bengali News
11 : 05	Rabindra Songs
11 : 20	Modern Songs
11 : 30	Family Planning Programme
12 : 00	Weather Forecast, Announcement of Lost and Found
12 : 05	Folk Songs
12 : 20	School Broadcast
13 : 00	News in English
13 : 05	Commercial Programme (Advertizement & Songs) Mixed Songs
14 : 00	Mixed Songs
14 : 30	Film Songs

15 : 00	Bengali News
15 : 05	World Music
16 : 00	Announcement for Prayer and Rligious Discussion
16 : 05	Religious Songs
16 : 10	Nazrul Songs
16 : 20	Modern Song
16 : 30	Mass Education Programme
17 : 00	Bengali News
17 : 05	Rabindra Songs
17 : 15	Rural Listeners' Programme
17 : 35	Rural Songs
17 : 40	Talks (onmany topics)
17 : 45	Nazrul Songs
18 : 00	Agricultural Programme
18 : 30	Bengali News
18 : 35	Modern Songs
18 : 50	Weather Forecast Stock Exchange Report Advertizements (Vacancies & Sales) Lost and Found Announcement Programme Summary
19 : 00	Rural Agricultural Programme
19 : 30	Local Bengali News
19 : 35	Programme for Army Personnel
20 : 10	Happy Family (Family Planning)
20 : 30	Bengali News
20 : 40	Review of Bengali Programme
20 : 45	National Hook-up

21 : 00	Radio Magazine
21 : 30	News in English
21 : 40	Review of English News
22 : 00	Close

NO. 6 Equipment Failure and Maintenance

I . Countermeasures against Equipment Failure

The following three types of failures are recognized considered (Refer to Bathtub Curve).

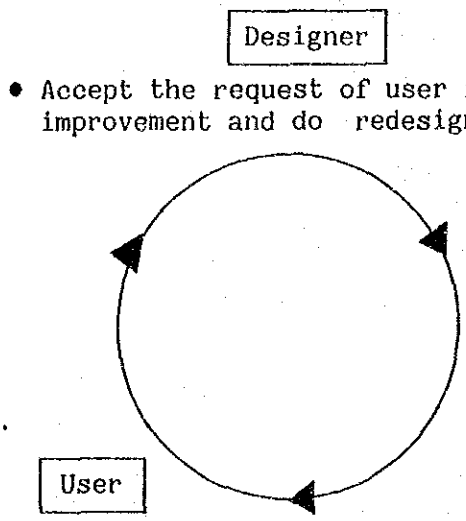
(1) Initial Failure

After operating newly installed equipment for a while (a relatively short time) a great number of small failures are apt to occur due to defective design, bad operational environment, etc. This period is called the "Initial Failure Period," or the "Debugging Period," and such failures are to be repaired immediately so that they will not cross the feed-back circle as in the following figure.

To avoid this,

a) Collect and analyse the reliable data.

b) Especially pay attentionto the environment of the equipment(vibration, temperature, humidity, water seepage, gas and lightning damage, etc.).



(2) Random Failure

After the initial failure in cleared up, the period that the equipment operates stably is called the "Random Failure Period." The occurrence of failure in this period is really accidental, and the failure rate will be low.

It is to be noted that the average failure interval of the random failure period is called MTBF (Mean Time Between Failures) and is an index of equipment reliability.

This kind of failure can be avoided in advance by performing appropriate preventive maintenance.

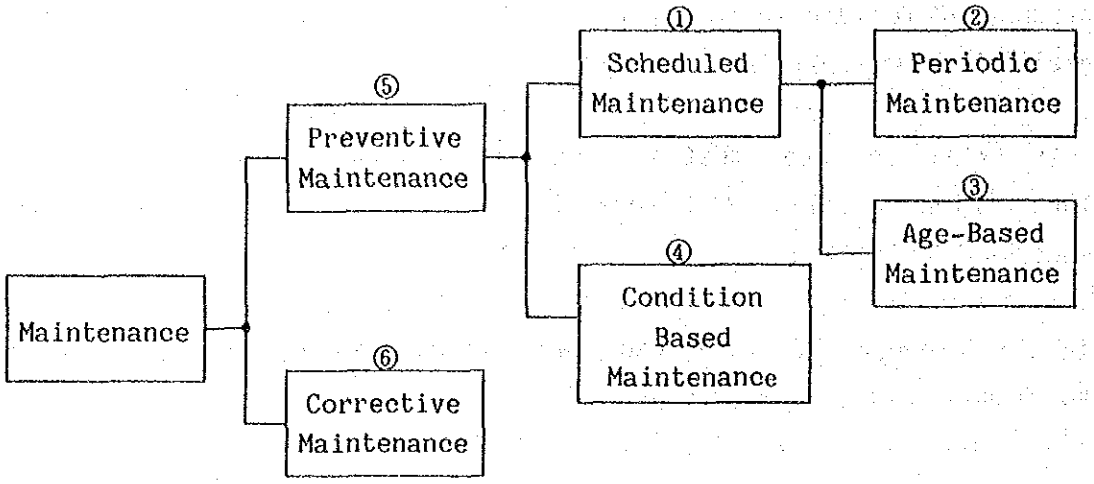
(3) Wear-out Failure

When the random failure period of equipment has ended and the use of the equipment is still continued, the equipment will enter the "Wear-out Period" during which failure increases rapidly.

By applying appropriate preventive maintenance, equipment in the wear-out failure period can be returned to the random failure period to some extent, but with a great increase in the number of failures the maintenance cost will also increase rapidly, so the replacement of superannuated equipment is often the most economical strategy.

II Equipment Maintenance

(1) Classification of Maintenance



(2) Explanation of Maintenance

1) Scheduled Maintenance (Shown in classification ①)

- Preventive maintenance that is performed according to a time schedule.
- It could be called "point" maintenance.

(Example)

Maintenance Item	Period (one year)												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Air Filter	×	×	×	×	×	○	×	×	×	×	×	○	Inspected monthly (×) Exchanged every six months (○).
Cooling water	○	×	△	×	△	×	△	×	△	×	△	×	Inspected every other month (×). Water supplied every other month (△). Water changed once a year (○).

2) Periodic Maintenance (Shown in classification ②)

- This maintenance is appropriate for equipment that is used regularly.

  For example, periodic inspections of automobiles and ships.

3) Age-Based Maintenance (Shown in classification ③)

- This is appropriate for equipment that is used irregularly or intermittently.
- Appropriate for equipment for which the time of use is indicated by an integrating wattmeter or time-recorder.

4) Condition-Based Maintenance (Shown in classification ④)

- Maintenance that is conducted by supervising a monitor.

  Maintenance that is conducted by "line" against the "Scheduled Maintenance" ①.

  For example, to find equipment abnormalities by observing various meters in the cockpit of an airplane, or using an automatic monitoring system for the surveillance of radio/television transmitters.

5) Preventive Maintenance (Shown in classification ⑤)

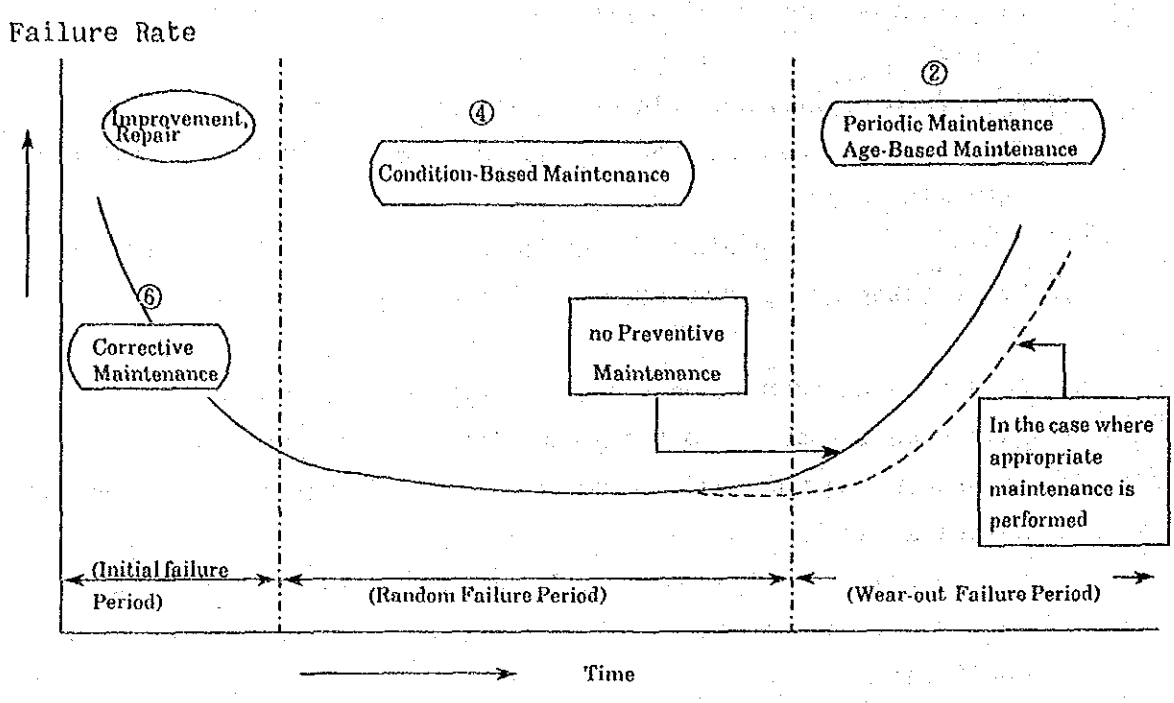
- Maintenance that is performed in advance of the occurrence of the failure of equipment or parts, etc.

  The above items ①- ④belong to this category.

6) Corrective Maintenance (Shown in classification ⑥)

- Maintenance that is performed after the occurrence of a failure.

(3) In the figure effective maintenance carried out according to the Bathtub Curve is shown.



Effective Maintenance that is Performed in Accordance with the Bathtub Curve.

NO. 7 Redundancy System and Reliability of Transmitters

With the rise in reliability of transmitters since 1960, the operation of transmitting stations in advanced countries has been converted into unattended operation to reduce the operational costs.

In addition, with the development of semi-conductors and related equipment, digital techniques have been introduced in the control of transmitters so that automatic control and remote control of transmitters can be performed easily.

In order to shorten the failure period of transmitters as much as possible, the method of operating two transmitter units in parallel, and switching between the two transmitters is widely used.

These days it is common sense to prepare a spare transmitter against transmitter failures.

In the accompanying pages various redundancy systems for transmitters and typical spare transmitter systems are shown.

Fig. 1 Comparison of a Typical Standby Transmitter System for Radio Transmitters

Table 1 Comparison of Two Standby Transmitter Systems for Radio Transmitters.

For reference, Fig. 2 shows the reduction in combined power output when a failure occurs in amplifier units which are operated in parallel. It can be seen that the influence upon power output is relatively small. This is the merit of operating amplifier units in parallel.

In most of the recent power amplifiers, several amplifier units are frequently operated in parallel to obtain a high power output. In this case, as the power source of each unit is separated, if one of the units happens to fail, broadcasting can be continued with no suspension of broadcast signal but with only a small reduction in power.

The [A] in Fig. 2 is when the amplitude of one of the parallel units becomes half (-6dB), and the reduction in the combined amplifier is as follows:

When there are four units $A[dB]=20\log\frac{3+0.5}{4}=1.158dB$;

When there are two units $A[dB]=20\log\frac{1+0.5}{2}=2.5dB$.

[B] is when the phase of one of the parallel units has shifted by 60°, and the reduction of the combined amplitude is as follows:

When there are four units

$$B[dB]=20\log\frac{\sqrt{(4-1)^2+1+2(4-1)\ \mathrm{Cos}\ 60°}}{4}=0.90dB$$

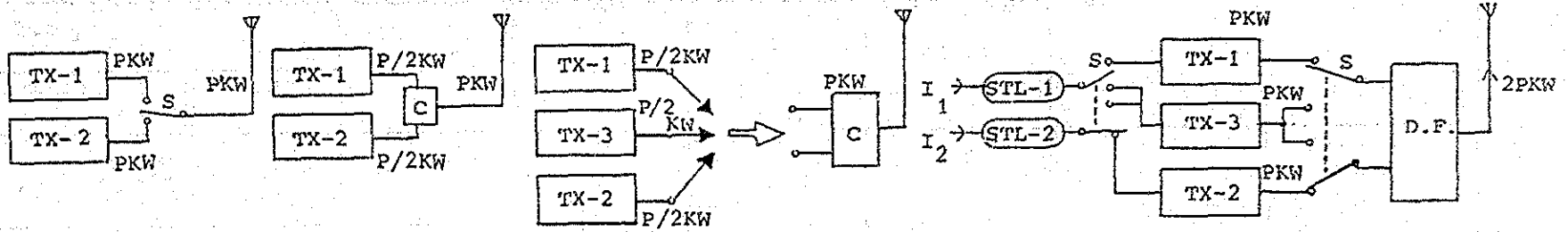
[P] is when one or more parallel units have failed, and the reduction in power output is as folows:

When there are four units $P=PO\left(\frac{4-1}{4}\right)^2=0.56$

Usually, in the case where the output is 10 kW, it reduces to 5.6 kW

Fig. 1

Comparison of Radio Transmitter Existing/Standby System



System	2-TX Switching System	2 Parallel Standby System	2 Parallel 1 Standby System	Common Standby for 2CH System
Application	· 1 KW - 10 KW 10 KW - 100KW	· 50 KW or more big power transmitter	· Important big key station	· For Key Station Economical System
Reliability (MTBF*)	2.2	1.55	3.3	2.2
	S: Switch * MTBF of single TX taken as 1. · Very popular system, particularly for small power transmitter stations.	C: Combiner · Suitable for considerably powerful station.	I· In case of trouble, failed transmitter is replaced by standby by automatic switching action. · Combination of the transmitters by switching are TX-1 — TX-2, TX-2 — TX-3 and TX-3 — TX-1.	CH-1:Input Signal-1 Ch-2:Input Signal-2 D·F:Duplex Feeding Equipment TX-3:Common for CH-1& CH-2 ·very economical system

Table. 1

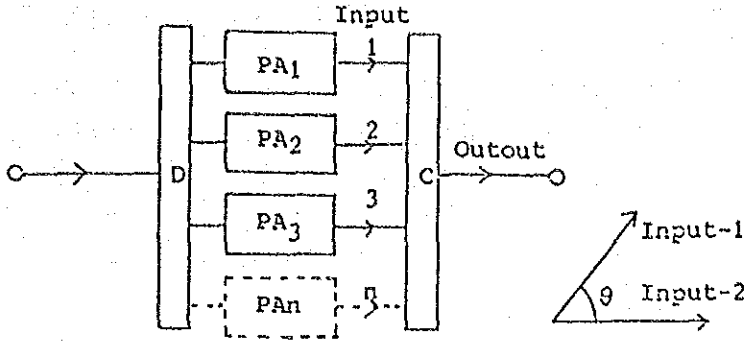
Comparison between 2 systems (Radio)

output	System	Initial Cost	Reliability	Maintenance	Running Cost	Space	Remarks / Evaluation
1KW	① 2-TX Switching	Low	2.2	Easy	Low		2-TX Switching system is better than parallel
	② 2 parallel	High	1.55	not so easy	High	Larger than	
10KW	① 2-TX Switching	High	Ditto	Ditto	Low	Ditto	① is a little better than or the same as 2
	② 2 parallel	Lower than ①			High		
50KW	① 2-TX Switching	High (about 10%)	Ditto	Ditto	Low	Large *1	② is a little better than ①
	② 2 parallel	Lower than ①			Higher than ①	not so large *1	
100KW	① 2-TX Switching	High (about 20%)	Ditto		Ditto	Ditto	② is more economical
	② 2 parallel	Lower than ①					
300KW	① 2-TX Switching	High (about 30%)	Ditto		Ditto	Ditto	Ditto
	② 2 parallel						

*1 Powerful transmitter (such as 50kW or more), parts (such as modulation transformer, HT transformer, etc.) are installed outside of the main transmitter rack, therefore additional space is needed.

Parallel Operation of Power Amplifiers

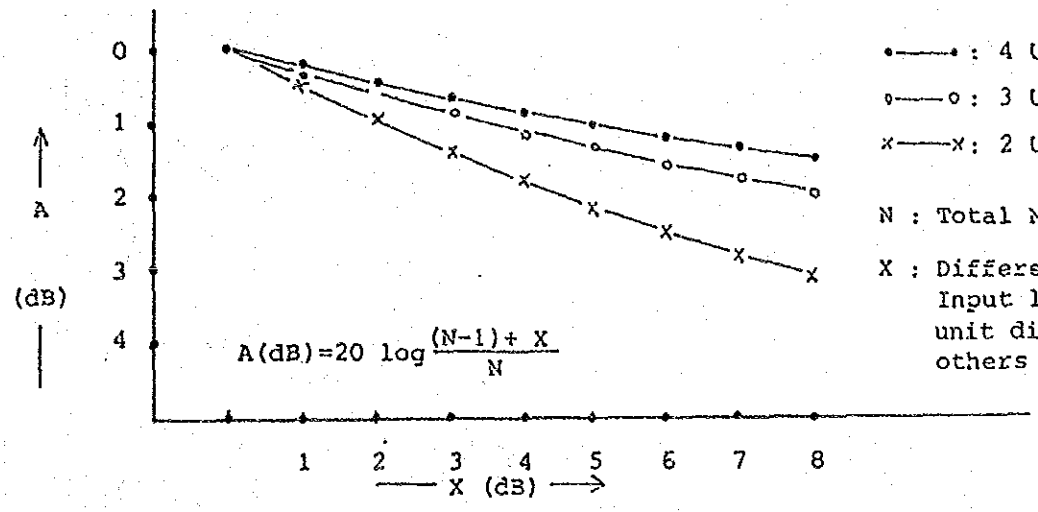
Fig. 2



D : Divider

C : Combiner

PA1~PAn : Power Amplifier



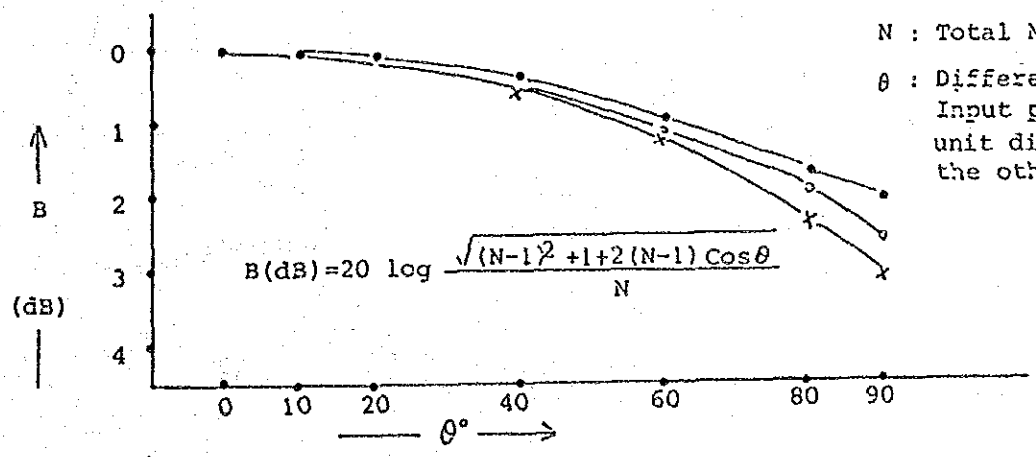
•——• : 4 Units Parallel

o——o : 3 Units Parallel

×——×: 2 Units Parallel

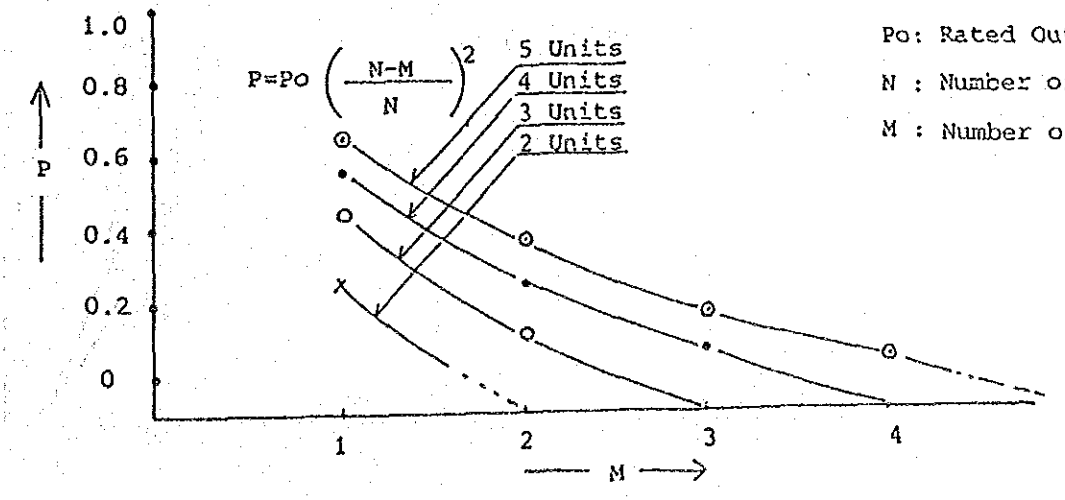
N : Total Number of Units

X : Difference of Level Input level of one unit differs from the others



N : Total Number of Units

θ : Difference of Phase Input phase of one unit differs from the others

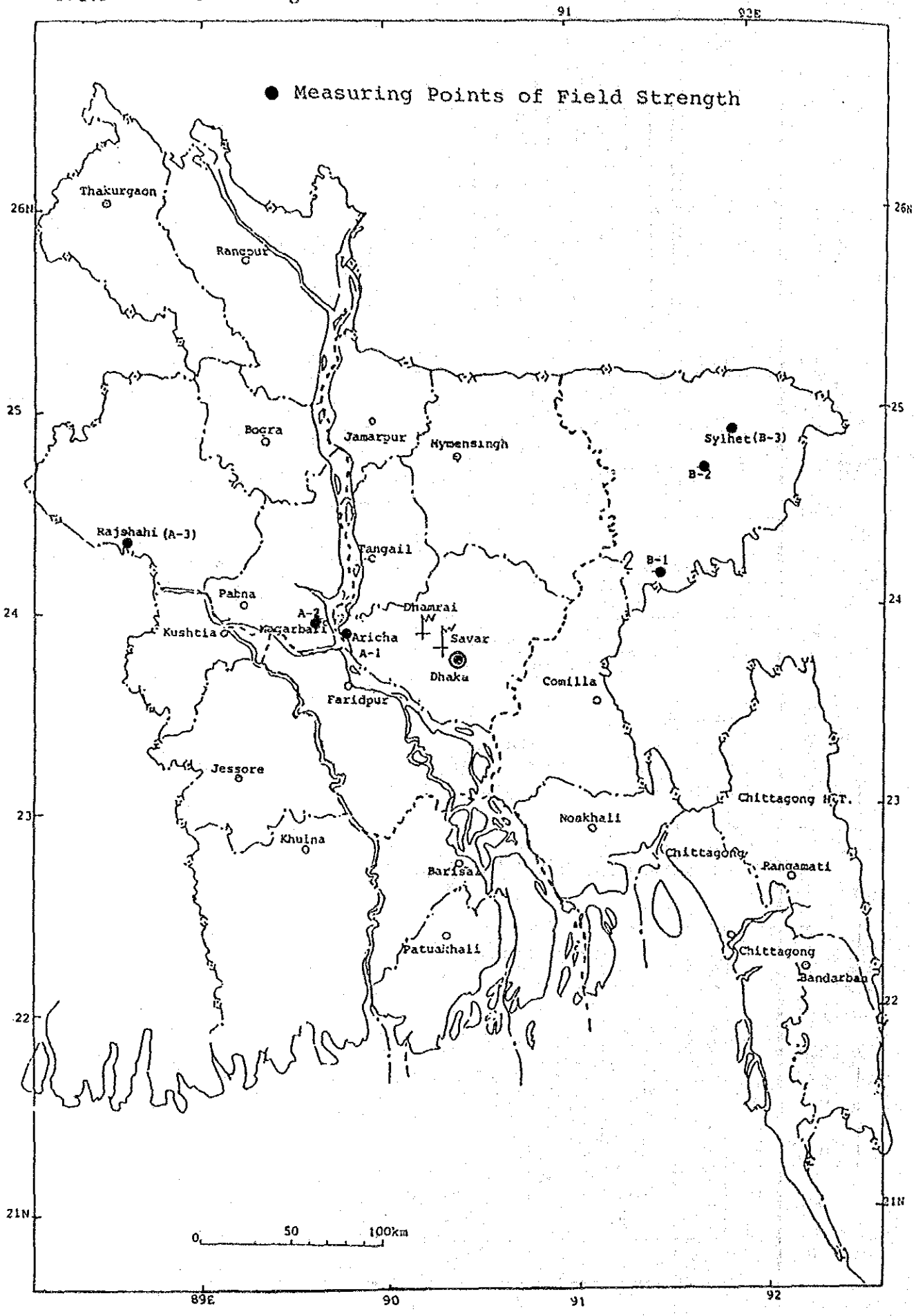


Po: Rated Output

N : Number of PA units

M : Number of failed units

NO.8 Field Strength Data



Reception Evaluation

In order to compare and judge the reception conditions easily, the following "SINPO Code" is used internationally.

SINPO Code

Item / Ranking	S	I	N	P	O
	Strength of Reception Signal	Phenomena that Degrade the Quality of Reception Signal			Overall Read-ability
		Interference	Noise	Propagation	
5	Excellent	nil	nil	nil	Excellent
4	Good	Slight	Slight	Slight	Good
3	Fair	Moderate	Moderate	Moderate	Fair
2	Poor	Severe	Severe	Severe	Poor
1	Barely Audible	Extreme	Extreme	Extreme	Unusu-able

In case the evaluation doesn't exactly correspond to each ranking, put a "+" or "−" on the evaluated figure.

FIELD STRENGTH DATA SHEET

* Site Name : Dhaka (on the roof of the Sonargaon Hotel)
* Date and Time : Nov. 21, 1988 21:00~21:30
* Weather : Fine
* List of Field Strength

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	630	53					2	fading
2	693	92					5	Dhamrai Station (Dhaka) (500kW)
3	819	115					5	Savar Station (Dhaka) (100kW)
4	621	62		2			2	interference
5	639	58		2+			2+	interference
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Dhaka (on the roof of the Sonargaon Hotel)
* Date and Time : Nov. 22, 1988 8:00~8:30
* Weather : Fine
* List of Field Strength

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	594	88					4~5	
2	639	35					1~2	distortion
3	657	70			3+		3+	
4	693	110					5	Dhamrai Station (Dhaka)
5	711	46			2		2	
6	819	Nil						rest time Savar Station (Dhaka)
7	828	39		1~2			1~2	
8	873	53			3		3	Chittagong Station
9	963	—			3-		3-	
10	1170	81					5	Savar Station (Dhaka) (10kW)
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Dhaka (on the roof of the Sonargaon Hotel)
* Date and Time : Nov. 22, 1988 16:30~17:00
* Weather : Fine
* List of Field Strength

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	558	86					5	Khulna Station
2	594	88					4~5	Calcutta Station (India)
3	639	52			3		3-	distortion
4	693	103					5	Dhamrai Station (Dhaka)
5	819	115					5	Savar Station (Dhaka)
6	873	63			3+		3+	Chittagong Station
7	1170	—					5	Savar Station (Dhaka)
8	1476	—			3		3	
9	1566	—			2		2	
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Aricha (at the car ferry terminal)
* Date and Time : Nov. 27, 1988 9:10~9:30 (evaluation only)
* Weather : Fine
* List of Field Strength

A group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	549	—					2	
2	558	—					4	Khulna Station
3	594	—					5	Calcutta Station (India)
4	639	—					1	
5	657	—					3-~3	Calcutta Station (India)
6	693	—					5	Dhamrai Station (Dhaka)
7	819	—					-	rest time Savar Station (Dhaka)
8	1008	—					1	
9	1170	—					3	
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Nagarbari (at a farm of 2km west from Nagarbari)
* Date and Time : Nov. 27, 1988 12:20~12:45
* Weather : Fine
* List of Field Strength

A group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	558	85					5	khulna Station
2	657	73					5	Calcutta Station (India)
3	693	—					–	rest time Dhamrai Station (Dhaka)
4	819	83.5					5	Savar Station (Dhaka)
5	873	53					4	Chittagong Station
6	1008	54					3	
7	1080	45					3-	Rajshahi Station
8	1170	59					3	Savar Station (Dhaka)
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET (1/2)

* Site Name : Rajshahi (at the front yard of the Parjatan Hotel)
* Date and Time : Nov. 27, 1988 20:00~20:40
* Weather : Fine
* List of Field Strength

A group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	540	—					2	
2	549	—					3	
3	558	—		B4			4	Khulna Station
4	576	—		2			2	
5	603	—		2			2	
6	621	67		3	3-		3-	
7	630	40		2	3-		2	
8	639	51					2	
9	657	—					3+	
10	666	—		4			3+	
11	675	—					2	
12	684	—					2	
13	693	81.5					4	Dhamrai Station (Dhaka)
14	711	—		2			2	
15	720	—					3-	

FIELD STRENGTH DATA SHEET (2/2)

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
16	792	—					4	
17	801	56		B3			3	fading
18	819	65					3	interference and fading Savar Station (Dhaka)
19	828	50						fading
20	879	—					2	
21	837	58						
22	927	—					3+	
23	954	—		3			3	
24	972	—					3	
25	981	—					3+ ~4	
26	1035	—					3-	
27	1080	—					5	Rajshahi Station
28	1134	—					4	
29	1170	42~48					3	Savar Station (Dhaka)
30	1233	—					3+	
31	1305	—					3+	
32	1467	—					3+	
33	1566	—					4	
34	1575	—					3	

FIELD STRENGTH DATA SHEET

* Site Name : Rajshahi (at the front yard of the Parjatan Hotel)
* Date and Time : Nov. 28, 1988 10:25~10:45
* Weather : Rain
* List of Field Strength

A group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	585	—					2	
2	594	86					4	Calcutta Station (India)
3	639	48	3				2	distortion
4	693	80~85					5	Dhamrai Station (Dhaka)
5	819	65					4	Savar Station (Dhaka)
6	846	84					4	Bogra Station
7	1008	46.5					2~3	
8	1080	86.5					5	Rajshahi Station
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : On the road near Chunarughat
* Date and Time : Nov. 27, 1988 11:00~11:15
* Weather : Fine
* List of Field Strength

B group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	621	Nil						
2	630	Nil						
3	639	Nil						
4	657	32						
5	693	Nil						rest time Dhamrai (Dhaka)
6	819	66						Savar (Dhaka)
7	1170	42						Savar (Dhaka)
8								
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : On the road near Burunga
* Date and Time : Nov. 27, 1988 13:05~13:20
* Weather : Fine
* List of Field Strength

B group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	630	Nil						
2	621	Nil						
3	639	Nil						
4	657	52						
5	693	72.5						Dhamrai Station (Dhaka)
6	819	62						Savar Station (Dhaka)
7	963	Nil						rest time Sylhet Station
8								
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Sylhet (front yard of the Radio Station)
* Date and Time : Nov. 27, 1988 14:40~14:50
* Weather : Fine
* List of Field Strength

B group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	594	63						Calcutta Station (India)
2	630	25						
3	693	Nil						rest time Dhamrai Station (Dhaka)
4	819	62						Savar Station (Dhaka)
5	810	Nil						
6	828	Nil						
7								
8								
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Sylhet (at the yard of the Circuit House)
* Date and Time : Nov. 27, 1988 17:05~17:15
* Weather : Fine
* List of Field Strength

B group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	621	43						
2	630	Nil						
3	639	47						
4	693	73.5					4	Dhamrai Station (Dhaka)
5	819	59					3-	Savar Station (Dhaka)
6	963	94					5	Sylhet Station
7								
8								
9								
10								
11								
12								
13								
14								
15								

FIELD STRENGTH DATA SHEET

* Site Name : Sylhet (at the front yard of the Circuit House)
* Date and Time : Nov. 27, 1988 21:10~21:25
* Weather : Fine
* List of Field Strength

B group

NO	Frequency (kHz)	Field Strength (dBμ/m)	SINPO code					Remarks
			S	I	N	P	O	
1	621	56						
2	630	40						
3	693	72					4	Dhamrai Station (Dhaka)
4	810	53		2			2	interference
5	819	60		2+			2+	interference Savar Station (Dhaka)
6	963	105					5	Sylhet Station
7								
8								
9								
10								
11								
12								
13								
14								
15								

NO. 9 Frequency Assignment (MW) and other Characteristics of Bangladesh

1	2	3	4	5	6	7	8	9	10
558	KHULNA	89E37 22N48	A 20	100	20.4	A	122	3	0000 – 1800
630	DACCA	90E26 23N43	A 20	100	20.4	A	122	3	0000 – 1800
693	DACCA	90E26 23N43	A 20	1000	32.1	A	203	3	0000 – 1800
819	DACCA	90E26 23N43	A 20	100	22.1	A	152	3	0000 – 1800
846	RAJSHAHI	88E50 24N20	A 20	100	20.6	A	122	3	0000 – 1800
873	CHITTAGONG	91E50 22N21	C 9	100	20.6	A	122	3	0000 – 1800
963	SYLHET	92E00 25N00	A 20	20	13.6	A	122	3	0000 – 1800
999	THAKURGAON	88E26 26N02	A 20	2	3.6	A	122	3	0000 – 1800
1053	RANGPUR	89E00 26N00	A 20	10	12.1	A	122	3	0000 – 1800
1080	RAJSHAHI	88E50 24N20	A 20	10	12.1	A	122	3	0000 – 1800
1098	TANGAIL	89E26 24N14	A 20	10	12.1	A	122	3	0000 – 1800
1143	SYLHET	92E00 25N00	A 20	10	10.4	A	67	3	0000 – 1800
1161	RANGAMATI	92E12 22N38	A 20	10	12.1	A	122	3	0000 – 1800
1170	DACCA	90E26 23N43	A 20	20	13.6	A	92	3	0000 – 1800
1215	MYMENSINGH	90E24 24N44	A 20	10	12.1	A	122	3	0000 – 1800
1260	DACCA	90E26 23N43	C 9	10	12.1	A	122	3	0000 – 1800
1287	BARISAL	90E23 22N43	A 20	10	12.1	A	122	3	0000 – 1800
1314	COXS BAZAR	92E00 21N27	A 20	10	12.1	A	122	3	0000 – 1800
1341	KHULNA	89E37 22N48	A 20	10	10.6	A	70	3	0000 – 1800
1386	PABNA	89E18 24N02	A 20	10	13.4	A	122	3	0000 – 1800
1413	COMILLA	91E13 23N23	A 20	10	13.4	A	122	3	0000 – 1800
1431	CHITTAGONG	91E50 22N21	A 20	10	13.4	A	122	3	0000 – 1800
1494	BOGRA	89E21 24N52	A 20	2	6.4	A	122	3	0000 – 1800

Note 1 : Assigned Frequency (kHz)
2 : Name of Transmitting Station
3 : Geographical Coordinates of Transmitting Station
4 : Necessary Bandwidth (kHz)
5 : Carrier Power (kW)
6 : Maximum Radiation (dB)
7 : Type
8 : Antenna Height (m)
9 : Ground Conductivity
10 : Hours of Operation (UTC)

1	2	3	4	5	6	8	8	9
1485	FARIDPUR	89E50 23N38	A 20	1	1.00	50	3	0000 – 1800
1584	KUSHTIA	88E55 23N56	A 20	1	1.00	50	3	0000 – 1800
1602	NOAKHALI	91E04 22N50	A 20	1	1.00	50	3	0000 – 1800

Note 1 : Assigned Frequency (kHz)
2 : Name of Transmitting Station
3 : Geographical Coordinates of Transmitting Station
4 : Necessary Bandwidth (kHz)
5 : Carrier Power (kW)
6 : Effective Monopole radiated Power (kW)
7 : Antenna Height (m)
8 : Ground Conductivity (mS/m)
9 : Hours of Operation (UTC)