BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE IMPROVEMENT
OF
THE SHORTWAVE RADIO BROADCASTING
IN
THE DEMOCRATIC SOCIALIST REPUBLIC
OF
SRI LANKA

SEPTEMBER, 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

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Preface

In response to the request of the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan has decided to conduct a basic design study on the Improvement of the Shortwave Radio Broadcasting (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Sri Lanka a basic design study team headed by Mr. Hajime Okai, Director, Engineering Division, Broadcasting Bureau, Ministry of Posts and Telecommunications, from May 17 to June 6, 1988.

The team had discussions on the Project with the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka and conducted a field survey in the Project areas. After the team returned to Japan, further studies were made, a draft report was prepared and, for the explanation and discussion of it, a mission headed by Mr. Masahiko Metoki, Assistant Director, International Cooperation Division, Communications Policy Bureau, Ministry of Posts and Telecommunications was sent to Sri Lanka from August 4, to August 11, 1988. As a result, the present report has been prepared.

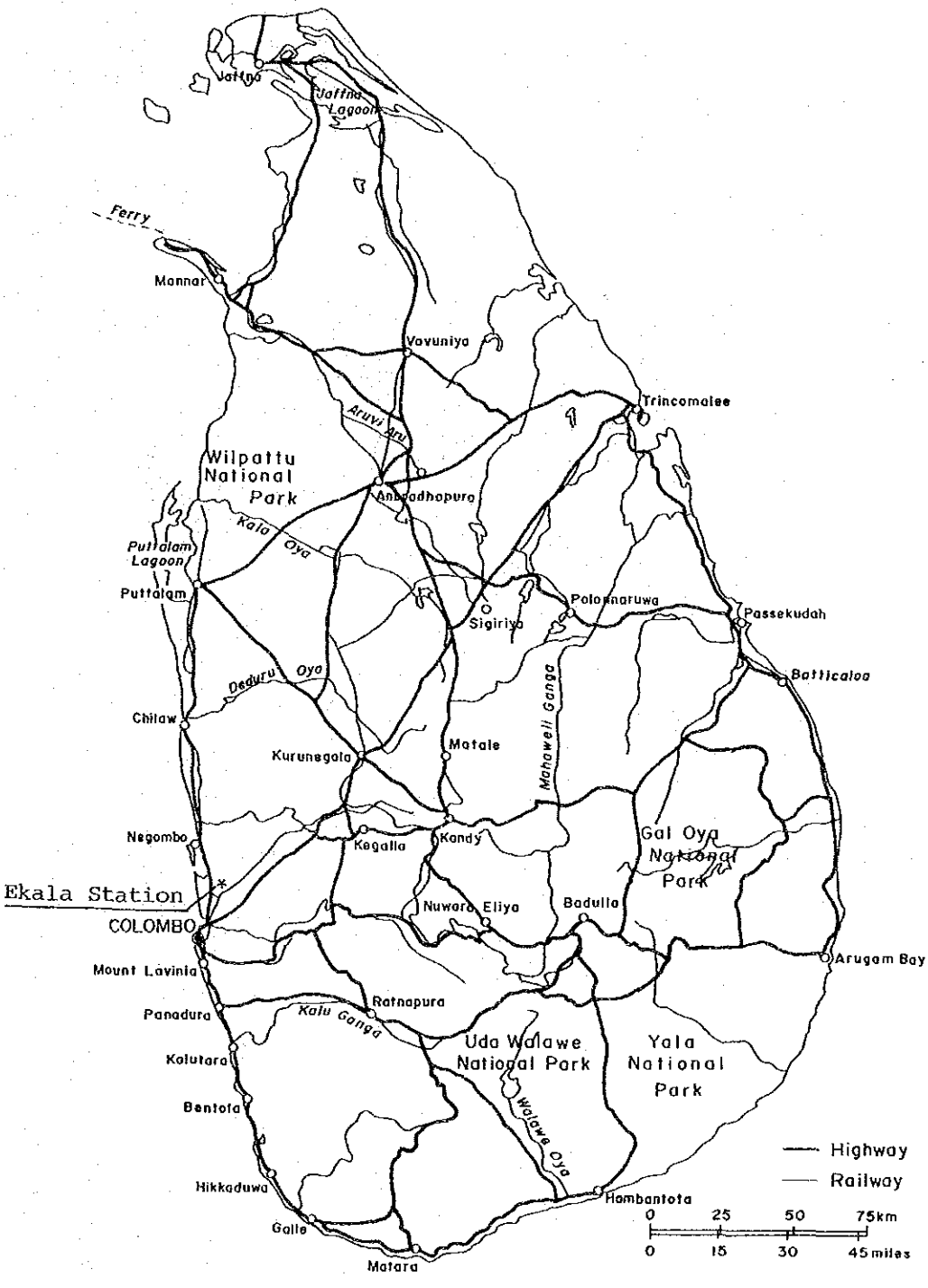
I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their close cooperation extended to the team.

September, 1988

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency



Sri Lanka

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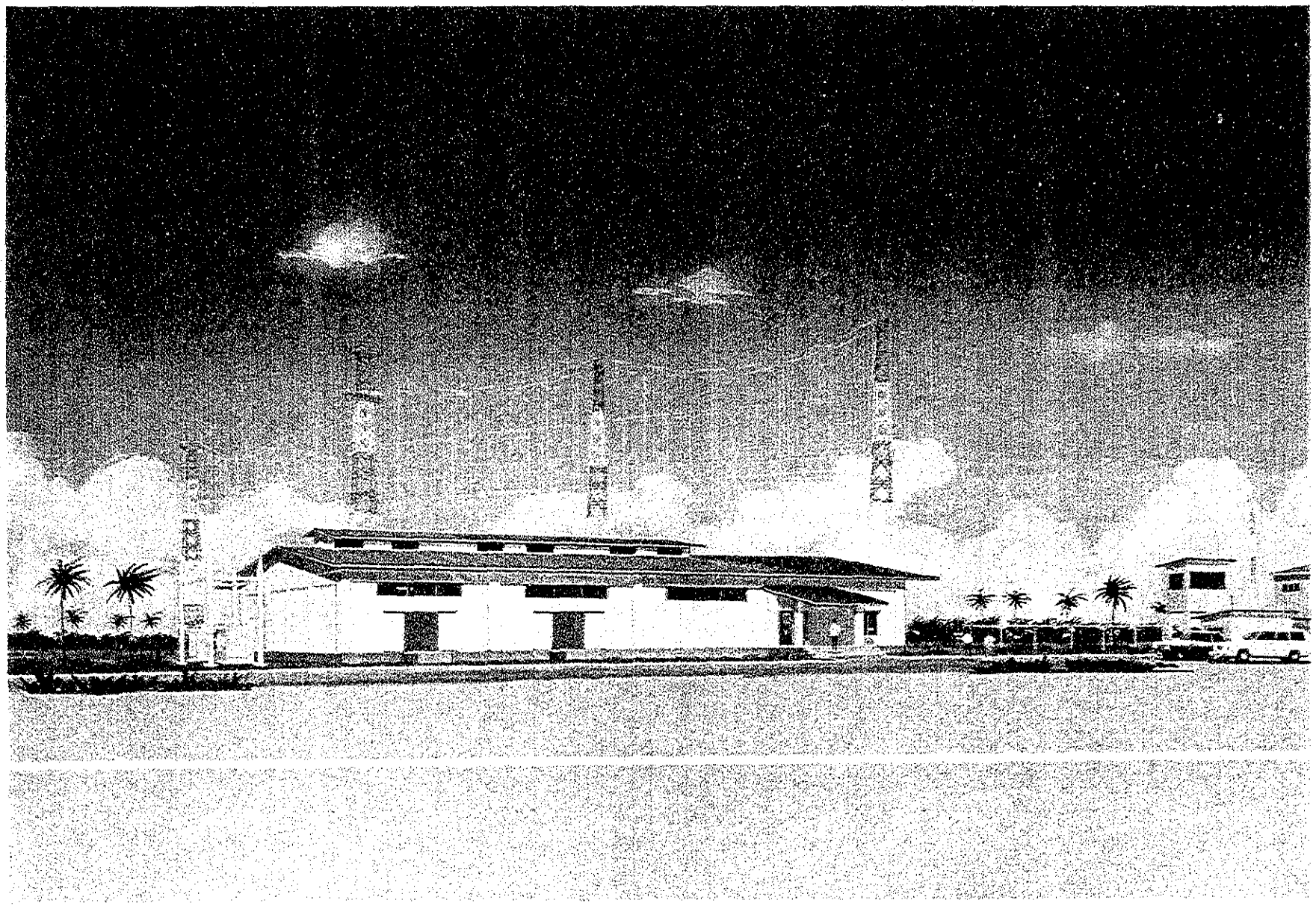

Perspective of New Transmitter Hall and Antennas

SUMMARY

SUMMARY

Radio broadcasting in the Democratic Socialist Republic of Sri Lanka was inaugurated in December 1925, as a state operated enterprise. Later, the Ceylon Broadcasting Corporation was established as an independent public broadcasting organization which ran the radio service until 1972, at which time, following the change in the name of the country, the Ceylon Broadcasting Corporation had its name changed to the Sri Lanka Broadcasting Corporation, or SLBC for short, as it is called today.

The SLBC is the sole radio broadcasting organization in Sri Lanka today and is an independent public organization that operates on a self-supporting financial basis.

At present, the SLBC conducts 700 hours a week of domestic radio broadcasting on medium wave, shortwave and FM, and 200 hours of external broadcast by shortwave transmission. However, the SLBC is obliged to operate with reduced transmission output and it has been unable to secure a sufficient range of service area. The reasons for this reduced service operation are that the equipment used for shortwave broadcasting, including the transmitters and antenna systems, have become obsolete in the 30 to 40 years since they were first installed and that maintenance parts are hard to obtain.

In order to improve this situation, the Government of Sri Lanka has drawn up a new improvement plan for shortwave broadcasting facilities. This covers the installation of two high-power shortwave transmitters (above 250kW) and the replacement of four 10kW short-wave transmitters with new ones. The Japanese government has been requested to provide financial cooperation in the form of grant aid with regard to the improvement project centering on SLBC's Ekala Transmitting Station facilities.

In response to this request, the Japan International Cooperation Agency (JICA) despatched a preliminary survey team to Sri Lanka from January 22nd to Feburary 8th, 1988, to confirm the necessity and the contents of the Project and subsequently conducted an on-site survey for a Basic Design Study from May 17th to June 6th, 1988.

In the on-site survey, the Basic Design Study Team carried out a series of investigations and studies on the condition of the Ekala Station site, 22km north of Colombo City, together with the present condition of transmitting facilities, station buildings, electric power supply and SLBC's programming policy for its external service, etc., paying special attention to the following points:

① Programming policy and planning for the necessary facilities.

② Problems incurred in combining the 30~40 year old equipment and the equipment newly introduced under the Project into one harmonious operational system.

③ Drawing up a study of an effective construction work plan so as not to cause any disturbance to the daily operation of existing facilities.

④ Planning to give as much flexibility for future planning as possible to the whole system.

As a result of the Basic Design Study, it was confirmed that a power output of 300kW would be most suitable for the high-power transmitter and that the two existing obsolete antennas should be replaced with four sets of new wideband antennas for the use of the above shortwave transmitters, arranged effectively within the limited site area, together with the construction and installation of programme input equipment, a power supply and a transmitter building.

As for the improvement of domestic shortwave broadcasting, replacement of four of the 10 existing 10kW transmitters is planned.

With regard to electric power, an exclusive power line will be

prepared by Sri Lanka so that a more stable and reliable power supply may be expected.

An outline of the improvement of facilities by the Project and major improvements are as shown in the following table.

Outline of the Project and Improvement

	Present	After Completion	Improvement
B'cast hrs./day	Hrs./day(total)		
Domestic S.	66.5hrs	ditto	
Exernal S.	55.5hrs	ditto	
Commercial S.	25 hrs	increase approx. 10hrs.	Increase in commercial prog. hours.
Target area	No. of antennas	Exist. − Remove + Renew = Total	Increase in number of antennas for more service variety and improvement of reception by high gain antennas.
Middle East	1	1 − 1 + 2 = 2	
India	4	4 − 1 + 2 = 5	
Australia	1	1 − 1 + 2 = 5	
Facilities			* Power increase for external service with two 300kW TXs ** Improvement of domestic service by four new 10kW TXs instead of outdated ones. (Actual output 5kW)
300kW TX	—	2 new sets*	
100kW TX	2	ditto	
35kW TX	3	ditto	
10kW TX	10	10 (4 renewed**)	
STL	1 system	2 systems	
Power line	Common line (4.5km)	Exclusive line* (2.0km)	*Constructed by SLBC Completed by Nov. 1989.

The local construction expenses incurred by Sri Lanka are estimated at about 2.5 million rupees.
(2 mil. Rs for the exclusive power line)
(0.5 mil. Rs for the removal of existing facilities at the site, etc.)

As to the term of project implementation work, the following periods are required for different stages of the work:
After the Exchange of Notes, it will take about 4 and a half months for the consultant contract arrangement, the detailed design and tender procedures and after the determination of the contractor for

the construction,11~12 months for the construction of a station building, about 8 months for the manufacturing of power-source facilities, transmitters and antenna systems, 1.5 months for shipping and transport, and then 5~6 months for on-site assembly and adjustment.

With regard to administration and operation, the SLBC has many years of experience and achievement in broadcasting, and therefore there should be no problems in the implementation of the Project as well as in operation and maintenance after the completion of the Project.

External broadcasting by shortwave transmission is said to be "an information dissemination tool with no limitations of national borders" by its nature, and today, services run by more than 80 countries are in operation.

By execution of the Project, the SLBC also intends to inform listeners of Sri Lanka's current situation, its standpoint, viewpoints, and the culture and daily life of the Sri Lankan people, to extend its service for listeners abroad, and at the same time to improve its information service to Sri Lankans overseas, whose number has been increasing year by year.

The Project aims at effective cooperation for the Improvement of Shortwave Radio Broadcasting planned by Sri Lanka's government and the SLBC, thus grant aid assistance by the Japanese government is significant as the implementation of the Project is expected to further deepen the mutual friendship between the two countries.

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INTRODUCTION

INTRODUCTION

The Democratic Socialist Republic of Sri Lanka is an island country in the Indian Ocean, located to the southeast of India and lying between lat. 5.5° N and 9.5° N, and long. 79.4° E and 81.5° E. At the point closest to the subcontinent, Sri Lanka faces India only 29km away across the Palk Strait. About 600km to the southwest of Sri Lanka are scattered the many small islands of the Republic of Maldives.

The total area of the country is 65,607 square kilometers. Its north-south length is about 430km and its width is about 220km. The shape of the island somewhat resembles that of a pear.

The population of the country is about 16.117 million, according to the national census in 1986.

While Sri Lanka's real economic growth rate has continued to maintain a level of 5% per annum, the actual economic environment the country finds itself in today is by no means an easy one; with inflation growing at an annual rate of about 10%, the per capita GNP head has hovered at the level of US$ 345 (1986, Ministry of Finance and Planning) owing to a number of unfavourable developments in recent years, such as the continuing depression in the international market for farm products and a decrease in the number of foreign tourists owing to domestic unrest in the country.

Since the nation gained independence in 1948 from the United Kingdom, the Government of Sri Lanka has been progressively devoting greater efforts to the utilization of radio broadcasting to settle racial tensions, to promote education, to develop agriculture, and for the dissemination of knowledge on sanitation and hygiene.

Moreover, to secure the independence and safety of the country, it is considered indispensable to hold dialogues and exchanges of information with foreign countries, and to this end shortwave

External Service was inaugurated and expanded soon after independence.

The Sri Lanka Broadcasting Corporation (SLBC) is the sole radio broadcasting organization in Sri Lanka. It is an independent public organization that operates on a financially self-supporting basis, depending on the revenue from license fees and advertising.

At present, the SLBC conducts about 700 hours a week of radio broadcasting in its medium wave, shortwave and FM domestic services and about 200 hours in its external service. However, the SLBC is being obliged to operate with reduced transmission output, and so has been unable to secure a sufficient range for its service area. The reasons for this reduced level of operation are that the equipment used for shortwave broadcasting, including the transmitter and antenna systems, have become outdated in the 40 years since their first installation and that maintenance parts for them are hard to obtain.

Under the circumstance, the Government of Sri Lanka has established a plan for the improvement of shortwave transmitter facilities to further reinforce the dissemination of information to people both at home and abroad, in which Japan has been asked to cooperate with grant aid.

The main contents of the SLBC's request were,

1. Installation of two sets of high power shortwave transmitters for the external service,

2. Renewal of four 10kW shortwave transmitters for domestic service,

3. Renewal of the associated antennas, and installation of the necessary new electric power equipment and programme input

equipment, together with the construction of a new transmitter building to contain the necessary equipment.

In response to this request, JICA dispatched a Preliminary Study Team to Sri Lanka, from 26 January to 8 Feburary 1988, led by Kenichiro Torigoe, Director, International Cooperation Division, Communications Policy Bureau, the Ministry of Posts and Telecommunications (MPT), which conducted a study on the present status of broadcasting on the site, and confirmed the background and the contents of the request.

Following this, and basing its decision on the preliminary report, JICA sent a Basic Design Study Team, headed by Hajime Okai, Director, Engineering Division, Broadcasting Bureau, MPT, to Sri Lanka from 17 May to 6 June 1988. The team held a series of discussions and consultations on the Project with the Sri Lankan officials concerned, and studied the present status of the facilities, power supplies, programming plan, etc., at Ekala Transmitter Station and the Colombo studios.

The basic items discussed and agreed on for the Project between the Study Team and Sri Lanka were summarized in the form of minutes, which were then signed and exchanged.

After the team's return to Japan, analysis and study of the results of the survey were conducted. The appropriateness of the Project as a grant aid project was confirmed, and a Draft Final Report was drawn up consisting of the basic design, an estimate of construction costs, an implementation schedule, an evaluation of the Project, recommendations, etc.

An Explanation Team, led by Masahiko Metoki, Assistant Director, International Cooperation Division, Communications Policy Bureau, MPT, was then dispatched to Sri Lanka from 4 to 11 August 1988 to explain and discuss the contents of the Draft Final Report, and after

confirmation of the contents, the resulting basic items were set out in minutes, which were signed and exchanged.

This report is based on the above results.

Member lists of the study teams, the schedule of each study visit and the minutes are shown in the appendices.

CHAPTER 1

PRESENT STATUS OF BROADCASTING IN SRI LANKA

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1-1 History of Radio Broadcasting

The history of broadcasting in Sri Lanka can be traced back to the birth, in November 1922, of the Ceylon Wireless Club organized by amateur wireless operators. It was, however, not until December 16, 1925(*1), that regular radio broadcasting was officially started under the administrative control of the Department of Post and Telecommunication.

Following that, the broadcasting service in the country was run as a state-operated enterprise. In 1949, the Ministry of Broadcasting was established (*2)and the call sign of "Radio Ceylon" was created.

In January 1967, under Ceylon Broadcasting Corporation Act, No.37 of 1966, the Ceylon Broadcasting Corporation was organized as an independent and autonomous public broadcasting organization. In 1972, following the change in the name of the country, the CBC had its name changed to the Sri Lanka Broadcasting Corporation, or SLBC for short, as it is called today.

The SLBC is the sole radio broadcasting organization in Sri Lanka today.

Meanwhile, in September 1950, Sri Lanka saw the start of its first commercial service. Further, many more local stations began operating in many regions of the country. The opening in 1979 of the Anura Dha Pura-Rajarata Sevaya local station in the north of Sri Lanka was followed by the opening of more local stations, such as the Matara-Ruhunu Sevaya Station on the southern coast (1980) and the Kandy-Mahanuwara Sevaya Station in the central part of the country (1983). In 1981, an FM stereophonic service was inaugurated.

The SLBC is operated with the revenue from license fees (30 rupees a year, or about 123 yen if converted at the exchange rate of 1 rupee = 4.1 yen at the end of May 1988). According to SLBC statistics, the number of radio receivers in the country is as follows:

Table 1-1-1 Number of LICENSED RADIO SETS

Year	Number of sets
1977	539,413
1978	882,832
1979	1,178,186
1980	1,384,191
1981	1,525,143
1982	1,434,320
1983	1,256,785
1984	1,496,050
1985	1,268,321

The figures shown above for each year are from 1st October of that year to 30th September of the following year. This is because the General Post Office issues licenses for the ensuing year from October 1st. Due to domestic unrest and other reasons, procedures for issuing licenses are hindered in some regions of the country, so the actual number of radio sets should be considered to be much greater than the registered number, probably reaching as many as two million.

(*1) Regular radio broadcasting in Japan began on March 22, 1925.

(*2) The Ministry of Broadcasting was subsequently abolished and the SLBC was placed under the administrative control of the Ministry of State. Today, the SLBC is under the administration of the Ministry of Information which was newly created separately from the Ministry of State in January 1988.

1-2 Radio Broadcasting

The following is an outline of the current status of Sri Lanka's Domestic Service on medium wave, shortwave and FM, and of the External Service on shortwave, both conducted by the SLBC.

(1) *Broadcasting Hours (weekly)*

Domestic Service (medium wave, shortwave and FM)
.....691 hours and 30 minutes (about 99 hours a day)

External Service (shortwave)
.... 195 hours and 40 minutes (about 27 hours a day)

(2) Languages Used

Domestic Service ..... Sinhala, Tamil and English

External Service ..... Sinhala, Hindi, English, Japanese and six other languages (Refer to Paragraph 1-4, External Broadcasting)

The SLBC's domestic radio service may be classified as follows:
(Refer to Table 1-1-2, Programme Schedule for Radio Broadcasting)

① Sinhala Service, ② Tamil Service, ③ English Service, ④ Educational Service and ⑤ Regional Service.

The Sinhala, Tamil and English services are each divided into the National Service and the Commercial Service. In the case of the Sinhala Service, its National Service is run under the name of Sinhala Channel I and Commercial Service, Sinhala Channel II. Similarly, the Tamil Service is also divided into Channels I and II. In the case of the English Service, the National and Commercial services are run together on a single channel.

The most importance of the SLBC's Domestic Services is the Sinhala Service, which is broadcast daily for about 11 hours on Channel I and about 17 hours on Channel II. The Tamil Service is broadcast daily for about nine hours on each of its two channels, while the English Service is broadcast for about 18 hours a day, including some stereophonic broadcasts on FM. The Educational Service is broadcast for about four hours every morning from Monday through Friday.

The Regional Service is run by three regional stations, viz., Rajarata, Ruhunu and Mahanuwara, each broadcasting for about 5-8 hours a day.

The programmes broadcast on each of the above-mentioned five services can be classified into three categories: music programmes, religious programmes and news. In the case of the Sinhala National Service, the music programmes account for the largest portion (35%), followed by religious programmes (15%) and by news (10%). In the case of the Sinhala Commercial Service, the percentage of the music programmes is overwhelmingly high at 69%, followed by light entertainment programmes (7%) and then by religious programmes and programmes for women and children, each accounting for 4%.

Commercial Service

One of the major features of broadcasting services in Sri Lanka (on both Domestic and External services) is that commercial services are supported by advertisement charges. In the case of the SLBC, the amount of income it gained during 1987 from advertisements was 97,610,000 rupees which accounted for 58.5% of its entire revenue during that year. Incidentally, the SLBC's revenue during fiscal 1987 from license fees was 47,900,000 rupees which accounted for 28.7% of the SLBC's total revenue during that year.

Regarding the Commercial Service, detailed provisions are made by the "Rules Governing the Conduct of Business on the Commercial Service." The rules say that, when an advertiser wishes to advertise its wares by using the SLBC's radio service, he may transact the advertising business either directly with the SLBC or through a designated advertising agency or its overseas agent. The rules also provide in minute detail for such matters as how to use an advertising agent, the contents of the contract to be signed, and the differences between insertion of a commercial message during a sponsored programme and a spot commercial between programmes. Regarding advertisement charges, the rules say that payments should be made according to the different mediums and broadcast times (for instance, the difference between daytime, evening, and midnight), following a tariff card and the Table of Production Charges and that, in the case of an accident such as the suspension of broadcasting, a refund should be made for any suspension of broadcasting or technical breakdown lasting more than one minute.

The rules also touch on general regulations concerning commercial services. The rules, for example, request submission, prior to broadcast, of such items as the script, continuity and the recorded tape of the programme. The rules request strict adherence to broadcast standards which strictly ban (1) obscene jokes or songs, or expressions of blasphemy (2) making undue use of God's name, (3) expressing religious opinions or using expressions attacking racial characteristics and (4) criticising the democratic system or the administrative system. The rules, in addition, prohibit the use in the broadcasts of such sound effects as sirens, gunshots, bomb explosions, offensive laughter, or the sound of speeding fire-engines or ambulances.

1-3 Television Broadcasting

Television broadcasting in Sri Lanka was inaugurated in April 1979 by a private broadcasting station (ITN: Independent Television Network). Apart from this station, following the promulgation in January 1982 of Sri Lanka Rupavahini Act No.6 of 1982, the Sri Lanka Rupavahini Corporation (SLRC) was set up and began regular television broadcasting in February of that year.

At present, the SLRC's regular TV broadcasts for general viewers comprise the following: from Monday through Friday, about six hours a day (from 5:00 p.m. to around 11:00 p.m.; the sign-off time varies according to the day of the week); on Saturdays, about three hours in the morning; on Sundays, a total of about nine hours of programmes are broadcast, some in the morning with additional programmes starting at 1:30 p.m.

Besides the above, the SLRC televises about three hours of programmes on its Education Service directed to schools every morning from Monday through Friday.

The SLRC's TV broadcasts are in colour, on the B/PAL system, and are transmitted in three languages, viz., Sinhala, Tamil and English.

TV broadcasting, as with radio broadcasting, runs commercials. In 1986, the SLRC's income from commercials amounted to 76,670,000 rupees (about 314,350,000 yen, if converted at the exchange rate of 1 rupee = 4.1 yen effective at the end of May, 1988) which accounted for about 60% of the total annual revenue of the SLRC. Its revenue from license fees (annual rates being 250 rupees or about 1,025 yen for a colour set and 150 rupees or about 615 yen for a monochrome set) was 47,160,000 rupees (about 193,360,000 yen) in 1986.

The total number of TV receivers in Sri Lanka in fiscal 1986 was about 300,000.

On the other hand the ITN, the private TV station, conducts 4-5 hours of broadcasts a day in colour, on B/PAL, with the metropolitan area as its main service area.

1-4 External Broadcasting

Shortwave broadcasting in Sri Lanka began in 1944, but it was not until early in the 1950s that the External Service started.

At present, external shortwave broadcasting in Sri Lanka is conducted by the SLBC in five directions, viz., India, the Middle East, Southeast Asia, the Far East and Australia, for a weekly total of 195 hours and 40 minutes (about 27 hours a day). Roughly, the External Service may be classified into the following three types: (1) All Asia Service, (2) Middle East Service and (3) Southeast Asia Service.

(1) The All Asia Service may be divided into broadcasts in three languages: English, Tamil and Hindi.

1) The English Service is broadcast for a total of nine hours a day (63 hours a week); four hours in the morning and five hours in the evening. The broadcasts are aired to the Indian subcontinent on three channels, using 100kW, 35kW and 10kW transmitters. In the past, the English Service had sponsors in each different region in India. But as a result of the worsening of foreign currency conditions in India, the number of Indian sponsors decreased and, nowadays, it is said that the programmes previously supported by Indian sponsors have increasingly come to be replaced by programmes sponsored by American religious organizations.
None of the staff members of the SLBC works exclusively on external broadcasting. All the work relating to the External Service, including announcing, programme production and news-editing, are handled by the English-speaking staff from the Domestic Service of the SLBC.

2) The Tamil Service is broadcast every day for six hours from 1:00 p.m. to 7:00 p.m. (42 hours a week) and is aired to the Indian subcontinent on two channels, using 100kW and 10kW transmitters. In addition to the programmes in Tamil (one hour and 30 minutes a day), programmes in Kannada, Telegu and

Malayalam are also broadcast. These are the languages used in the states of Karnataka, Andhra Pradesh and Kerala, respectively, all of which are states located in the south of India.

The Tamil Service was originally started as a commercial service to be sponsored mainly by advertisers in South India. However, following the deterioration in the foreign-exchange situation in India and the resultant restriction imposed on payments in foreign currencies, this service at present consists mainly of religious broadcasts. In the case of broadcasts in Tamil and in Telegu, about a half of the programmes aired are religious programmes.

3) The Hindi Service offers a total of 66 hours and 10 minutes of weekly programming, which is by far the longest among the channels of the External Service. In fact, it constitutes the nucleus of the SLBC's External Service. The programmes are aired to the Indian subcontinent on two channels by 100kW and 10kW transmitters.

The Hindi Service, like the Tamil Service, has as its basis the commercial service addressed to listeners in the Indian subcontinent. Hence, the SLBC devotes effort to the acquiring of orders from Indian advertisers. The Hindi Service is extremely popular in India. Some 20,000 letters are received weekly from listeners. It is said that, even in Dhaka, Bangladesh, there is a Radio Ceylon Listeners' Club. The Hindi Service also offers programmes in Nepali, which are broadcast for one hour and 15 minutes every week. In addition, it occasionally broadcasts programmes in Marati, Gujarati, Punjabi, Bengali and Urdu, all of which are languages spoken in northern India.

(2) The Middle East Service was inaugurated in 1979, which was relatively late among the various services of the SLBC's External Service. At present, it broadcasts 14 hours and 30 minutes a week, in

English, Tamil and Sinhala, to the Middle East using a 100kW transmitter.

In the Middle Eastern area, particularly in Saudi Arabia, a large number of Sri Lankans are living as overseas workers. It is with the main purpose of offering an information service and entertainment to such Sri Lankan workers overseas that this Middle East Service is being broadcast. Hence, half the air time is occupied by programmes in Sinhala, followed by programmes in Tamil and in English. No commercial broadcasting is included in this Middle East Service.

(3) The South East Asia Service is broadcast daily for one hour from 4:00 p.m. to 5:00 p.m. (seven hours a week) in English (partly in Japanese) to three areas: Southeast Asia including Indonesia, Malaysia and Singapore, the Far East, including Hongkong and Japan; and Oceania including Australia. The broadcasts are made with three 35kW transmitters.

The seven-hour weekly broadcasts are all in English, with the exception of 30 minutes of transmissions in Japanese. The Japanese-language programmes are a 15-minute news broadcast on Mondays and a 15-minute programme about Sri Lanka on Fridays.
The Japanese-language programmes are broadcast from 4:30 p.m. to 4:45 p.m. (8:00 to 8:15 p.m. Japan time). The staff consists of only one person, a Japanese woman, who handles all the work from production to announcing.

The External Service of Sri Lanka is apparently not run according to a particular national policy, as in the case of other countries. As can be seen from the SLBC's organizational chart (See Fig.1-6-1, SLBC Organization Chart, on page 18), there is no particular unit specializing in the External Service; the work is handled by personnel who take charge of both the Domestic and External Services. As for the programmes, also, cases are often seen where the programmes produced

primarily for theDomestic Service are also used in the External Service, except for news and a few other types of programme.

Likewise in the case of the Domestic Service, commercial broadcasts are also conducted on the External Service. The Hindi and Tamil Services, in particular, carry commercial broadcasts as the mainstream.

1-5 Foreign Broadcasting Organizations in Sri Lanka

(1) TWR (Trans World Radio) ... USA.

The Trans World Radio (TWR) is a radio service run by an American broadcasting company headquartered in Chatham, New Jersey, with the propagation of Christianity as its objective. It began broadcasting in 1976, using technical facilities rented from the SLBC, mainly on medium wave to the southern regions of India.

At present, TWR conducts external broadcasting in 14 languages including Hindi, Bengali, Urdu, Kannada, Oriya, Telegu and Malayalam, for seven hours a day on medium wave and two hours and 45 minutes on shortwave. Many of the languages used in the external service are those spoken in the southern districts of India. The other target areas are the Middle East and Far East Asia, to which a total of four hours a day are transmitted.

The medium-wave broadcasts are made from the Puttalam Medium-wave Transmitting Station, about 150km to the north of Colombo, using a 400kW transmitter. The shortwave broadcasts are sent from the Ekala Shortwave Transmitting Station using a 35kW transmitter. With the exception of Hindi programmes, all the programmes are produced in studios in India and the recorded tapes are sent to SLBC.

For the broadcast hours purchased, TWR pays an annual amount of 12,090,000 rupees to the SLBC (1986).

(2) Voice of America (VOA) ... USA.

Renting the facilities of the SLBC's Ekala Shortwave Transmitting Station, the VOA at present broadcasts seven hours of programmes a day (6:30-9:30 in the morning and 7:30-11:30 in the evening) with three transmitters - two 35kW and one 10kW - on three frequencies to the Indian subcontinent and the Middle East.

The VOA receives the broadcast signals mainly from its Philippine Transmitting Station (250kW) at the SLBC's Seeduwa Receiving Station near Colombo Airport, records the broadcasts received on tapes, plays back the tapes according to VOA's transmission schedule of broadcasts to the Indian subcontinent and transmits the replayed programmes out of the Ekala Transmitting Station.

The VOA pays the SLBC an annual amount of about 6,000,000 rupees (1987) in rent and redemption. The necessary vacuum tubes are supplied to the SLBC by VOA.
The VOA expects to complete the improvement of the Puttalam Transmitting Station with seven new 500 kW transmitters installed by 1993 and to provide the SLBC with one of them.

(3) Deutsche Welle (DW) ... Federal Republic of Germany

DW has one 600kW medium-wave transmitter (operating at 400 kW) and three 250kW shortwave transmitters installed at Trincomalee. There is no intake of power, the station being operated entirely with self-generated electric power. Since the SLBC personnel who had been working there left this station in 1986 in order to escape the danger of being involved in the domestic unrest, the station is currently being operated by Germans. It is said that, at present, only a part of the facilities at the station is in operation.

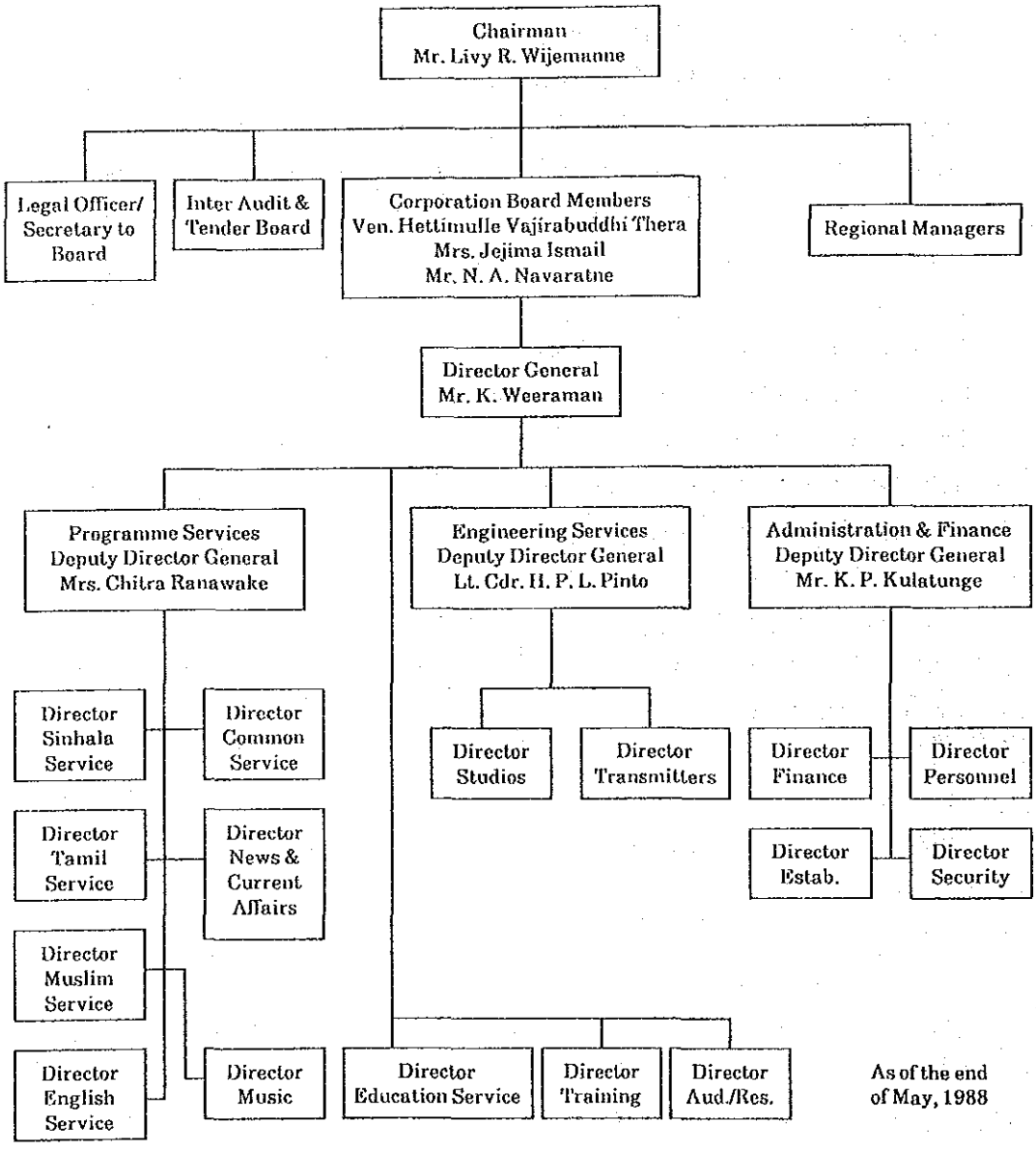
DW's redemption to the SLBC, which amounted to 1,440,000Rs in 1986, fell to zero in 1987.

1-6 Organization and Personnel

1-6-1 Organization Chart of SLBC

The organizational structure of the SLBC is as shown in Fig. 1-6-1. The SLBC has a total of 2,100 staff members, consisting of 800 engineering personnel, 500 programme-production personnel and 800 administration personnel.

Fig.1-6-1 SLBC Organization Chart



1-6-2 Staff of EKALA Station

The number of staff members working at the Ekala Transmitting Station is about 130 (working on shifts), of which a breakdown is shown in Table 1-6-1.

Table 1-6-1 Staff numbers at Ekala Transmitter Station (as of May 1988)

	Actual	Cadre	Remarks
Engineer	3	4	Engineers & Technicians
T. A. I	10	9	
T. A. II, III	22	31	
T. A. Tr	14	–	
Store Keeper I.	1	1	
〃 II	1	1	
Sec. Assistant (clerk)	3	2	
Peon	1	1	
Foreman	–	1	
Selection Grade	–	4	
Skilled Grade I	10	15	
〃 II	3	10	
〃 III	20	20	
Driver	4	3	
Labour Supervisor	–	1	
Sanitary Labourer	1	2	
Chief Security Officer	1	–	
Security Officer	1	–	
Security Guard	17	19	
Labourer Gr. IV, V	20	35	
Total	132	159	

1-7 Finances of the SLBC

1-7-1 Yearly Shift of Total Income and Expenditure

The income and expenditure of the SLBC during the last three years are shown in Table 1-7-1.

Table 1-7-1 Finances of the SLBC

(Unit : Million Rs)

Fiscal Year	Revenue ①	Expenditure ②	Balance ① − ②
1986 (Actual)	150.5	136.4	14.1
1987 (Actual)	167.0	138.5	28.5
1988 (Estimate)	167.0	154.3	12.7

1-7-2 Revenue and Expenditure

(1) Revenue

As shown in Table 1-7-2 on the next page, 28.7% of the total revenue was accounted for by income from radio license fees in the fiscal year 1987. The greater part of the income of the SLBC, therefore, depends on outside sources, such as income from sponsors (domestic and foreign) and from other organizations including foreign broadcasting organizations, which accounted for 62.1% of total revenue in 1987.

As for income from radio license fees, it appears that it will continue to follow the present trend, since such factors as internal unrest would make it difficult for the SLBC to expect any substantial increase in the income from radio license fees.

Table 1-7-2 Three Year (1986-1988) Shift of the SLBC's Revenue

(Unit : Million Rs)

Item	1986 (Actual)		1987 (Actual)		1988 (Total Estimated)	
	Rs	%	Rs	%	Rs	%
Sales of Air Time	86.47	57.4	97.61	58.5	107.50	64.4
(Asia Service)	(74.38)		(97.61)		(23.00)	
(Local Service)					(70.00)	
(TWR)	(12.09)				(1,450)	
Foreign Organizations	5.09	3.4	6.06	3.6	7.15	4.3
(Voice of America)	(3.65)		(6.06)		(5.90)	
(Deutsche Welle)	(1.44)		(0)		(1.25)	
Radio Licence Fees	45.99	30.6	47.90	28.7	39.00	23.4
Miscellaneous Revenue	12.94	8.6	15.44	9.2	13.30	7.9
(Production Charge)	(5.17)		(5.80)		(5.08)	
(Obituary Notices)	(4.73)		(6.59)		(5.00)	
(Others)	(3.04)		(3.05)		(3.22)	
Total	150.49	100.0	167.01	100.0	166.95	100.0

(2) Expenditure

As can be seen in Table 1-7-3, expenditure as a whole shows a gradually increasing trend.

Table 1-7-3 Three Year (1986-1988) Shift of the SLBC's Expenditure

(Unit : Million Rs)

Item	1986 (Actual)		1987 (Actual)		1988 (Total Estimated)	
	Rs	%	Rs	%	Rs	%
Salaries (Wages , etc.)	47.05	34.6	49.55	35.8	57.15	37.0
Travel Expenses	2.63	1.9	2.39	1.7	2.28	1.5
Electricity and Power	20.11	14.8	20.92	15.1	25.44	16.5
Repairs and Maintenance	15.40	11.2	8.55	6.2	19.02	12.3
Motor Vehicle Running Exp.	4.84	3.5	4.72	3.4	4.64	3.0
Commission - Sale of Air time	12.13	8.9	13.39	9.7	14.34	9.3
Collection Charge (License Fees)	7.88	5.8	8.14	5.9		
Business Turnover Tax	6.33	4.6	7.40	5.3	9.56	6.2
Programme Expenditure	4.26	3.1	4.26	3.1	3.87	2.5
Contribution to Provident Fund	7.51	5.5	6.66	4.8	9.21	6.0
Postage, Telephone, etc.	2.75	2.0	2.91	2.1	2.45	1.6
Others	5.51	4.0	9.58	6.9	6.35	4.1
Total	136.40	100.0	138.47	100.0	154.31	100.0

CHAPTER 2

BACKGROUND OF THE PROJECT AND

MANAGEMENT OF THE SLBC

CHAPTER 2 BACKGROUND OF THE PROJECT AND MANAGEMENT OF THE SLBC

2-1 Background of the Project

While Sri Lanka's real economic growth rate has continued to maintain the level of 5% per annum, the actual economic environment this country finds itself in today is by no means an easy one. Inflation has progressed at the annual rate of about 10%, the per capita GNP has hovered at the level of US $345 (1986, according to the Ministry of Finance and Planning) owing to a number of unfavourable developments in recent years, such as the continuing depression in the international market for farm products and a decrease in the number of foreign tourists owing to domestic unrest within the country.

The SLBC is Sri Lanka's sole radio broadcasting organization. It is an independent public organization that operates on a financially self-supporting basis, depending on revenue from license fees and advertising.

Its history is a very long one. It started broadcasting as early as December 1925 (NHK,i.e., Japan Broadcasting Corporation started its radio broadcasting in March of the same year). At first, the SLBC's operation was placed under the administrative control of the Ministry of State, but this past January (1988), it was placed under the jurisdiction of the Ministry of Information, a Ministry newly established and separate from the Ministry of the State.

At present, the SLBC conducts about 900 hours a week of radio broadcasting including about 200 hours of external broadcasts. However, the SLBC is obliged to operate with reduced transmission output, and so it has been unable to secure a sufficient range for its service area. The reasons for this reduced level of operation are that the equipment used for shortwave broadcasting, including the transmitter and antenna

systems, have already become obsolete after the elapse of 40 years since their first installation and that maintenance parts for them are hard to obtain.

Under the circumstance, the Government of Sri Lanka established a plan for improvement of shortwave transmitter facilities to further reinforce the provision of information to people both at home and abroad, and requested the Japanese government, to cooperate with grant aid assistance.

Thus, based on the results of the preliminary survey conducted from January to Feburary 1988, the Basic Design Study has been carried out from May 17 to June 6 for the present plan to improve the technical facilities for shortwave broadcasting in Sri Lanka.

2-2 Contents of the Request

2-2-1 Outline of the Project

The main objectives of this plan are to install new high-power shortwave transmitters at the Ekala Transmitting Station, to make it possible for the SLBC to achieve effective and wide-ranging external broadcasting by renewing the antennas; and, at the same time, to replace the existing transmitter facilities for domestic broadcasting so as to enhance broadcasting stability.

2-2-2 Requested Facilities and Equipment

(1) Transmitting facilities and equipment

a) Shortwave broadcasting transmitters
(incl. dummy load equipment, etc.)
above 250kW (*) 2 units

b) Shortwave broadcasting transmitters
(incl. dummy load equipment, etc.) 10kW 4 units

c) Programme distribution/input equipment 1 set

d) Monitoring/control equipment
for the transmitters mentioned in a) above 1 set

e) Power-receiving equipment
for the transmitters mentioned in a) above 1 set

(2) Antennas

a) Antennas for transmission (Wide-band antennas) 4 sets
(For India: 2 sets. For Middle East/Australia: 2 sets)

b) Self-supporting towers for antennas 4 units

(3) Building

A building to house the new transmitters mentioned in a) of (1) above	about 800m^2

(4) Other

a) STL	1	set
b) Measuring equipment	1	set
c) Microbus	1	

(*) Although 'above 250kW' had been proposed at the stage of the initial request, this was changed to '300kW' as a result of this Basic Study. The reason for this determination will be described later in this report. (Refer to Paragraph 4-2-1)

2-3 Mission of the SLBC and Managerial Problems

(1) Mission and theme of the SLBC

The SLBC has a responsibility to respond to the expectations of the nation and to the requests of the government as the sole independent radio broadcasting organization in Sri Lanka.
To comply with the nation's request to serve the whole country with good multi-language programmes in each region, it is insufficient to broadcast on existing medium wave networks and to cope with interference coming from abroad during the night-time. A plan to establish an FM broadcasting network is being considered, but it requires the investment of a huge amount of capital.
TV broadcasting is also conducted in Sri Lanka, but radio broadcasting still takes the lead as an information source for the public.

Accordingly, in programming, service for the delivery of public information from the government is necessary, while reflection of the opinions of the nation is also necessary in order to bolster the confidence of public in SLBC as an independent broadcasting organization. To that end, an increase in programmes on events of national concern and also entertainment programmes of better quality are required.

(2) Financial problems

Yearly shifts in the finances of the SLBC for the last three years, as in Table 1-7-1, show the surplus in the balance sheet, but this does not mean at all that the SLBC has abundant revenue. Conversely, the reality is that the SLBC is taking a policy of retrenchment by limiting expenditure to the necessary minimum in order to provide for future needs as a self-supporting organization.
As mentioned in the introduction of this report, the economic environment in Sri Lanka is by no means an easy one due to such

causes as the deficit in the balance of international payments, the depression in the international market for farm products and a decrease in the number of foreign tourists owing to domestic unrest. Meanwhile, inflation has progressed at an annual rate of about 10%, resulting in difficulty for the economy. The finances of the SLBC are no exception in that they are also facing difficulties.

Practical problems which the SLBC is now facing are as follows:

1) Electricity charges increased with a rate of about 30% in last year make a heavy impact on the finances of the SLBC, since the electricity expenses account for the main part of SLBC's operational expenditure for the services of medium wave and shortwave broadcasting.

2) Almost all of the spare parts and vacuum tubes used for the superannuated shortwave transmitters and studio equipment have to be procured from abroad, while the inflation is steadily increasing in Sri Lanka.

3) Improvement of salaries for employees and performance fees for actors is necessary in order to cope with the progress of inflation.

4) There are some problems in gathering license fees due to domestic unrest.

Thus, financial problems are the major challenge facing the SLBC.

2-4 Need to Improve Shortwave Broadcasting

2-4-1 Domestic Broadacsting

(1) In Sri Lanka, it is necessary to conduct broadcasts in more than one language. At present, this need has been pointed out for the following five services: (i) Sinhala National Service, (ii) Sinhala Commercial Service, (iii) Tamil Service (in combined programming with the National and Commercial Services), (iv) English Service and (v) Educational Service. However, owing to the inadequate domestic coverage by the medium-wave and FM networks, the medium wave broadcasts in the regions are conducted on average with two channels. Hence, the actual condition today is that broadcasts are conducted on one or the other of the channels selected from among the above-mentioned five and with some local programmes added. The FM service at present covers only a limited number of cities.

Under these circumstances, the above-mentioned five nation-wide services by shortwave are essential to supplement the inadequate medium wave and FM networks.

(2) Transmission on shortwave is important also as an emergency back-up medium for regional transmitting stations.

2-4-2 External Broadacsting

(1) It is necessary to provide news, entertainment programmes and so on, to the Sri Lankans living in the Middle East, Southeast Asia and Australia, whose numbers are increasing year by year.

(2) It is also necessary to increase the output power of shortwave transmitters to improve reception and to cope with the tendency towards increased interference in the shortwave broadcasting bands.

CHAPTER 3

PRESENT STATUS OF FACILITIES AND OPERATIONS

AT EKALA STATION

CHAPTER 3 PRESENT STATUS OF FACILITIES AND OPERATIONS AT EKALA STATION

3-1 Use of Frequencies for Shortwave Broadcasting

(1) The shortwave frequencies currently used by the SLBC at the Ekala Station are: (in kHz)

For Domestic Service: 4,870; 4,902; 4,940; 4,968; 5,020; 6,075; 6,130; 6,150 and 6,185 (total 9).

For External Service: 7,190; 9,720; 11,800; 11,835; 15,120; 15,425 and 17,850 (total 7)

For Foreign Organizations

The frequencies used by VOA - 7,115; 7,125; 9,645; 11,710; 15,250 and 15,395 (total 6)

by TWR - 11,895 and 11,920 (total 2).

(2) Use of antennas, transmitters and frequencies for External Service, at the Ekala Transmitting Station for each programme are shown later in this report (See Paragraph 3-2 and Table 3-2-1). As is clear from the table, the SLBC's frequency operations plan compiled by hours and by target regions is rather restricted. This, as explained later in this report (Paragraph 3-6), is because the main transmitters for External Service can be operated only on specific fixed frequencies.

Nevertheless, a substantial number of letters have so far been received regarding reception conditions from overseas listeners in India and the Middle East, and the number of letters sometimes reaches up to 20,000 per week, which shows that the SLBC's External Services are considerably well utilized abroad.

3-2 Operation and Maintenance

3-2-1 Operation of the Transmitters

At present, the Ekala Transmitting Station is operated under manned-supervision and the programme transmission services are basically conducted under the single-unit system without a stand-by transmitter. As a shortwave transmitting station, the Ekala Transmitting Station is quite large in scale. It transmits such programmes as shown in Table 3-2-1.
Most of the equipment used here is of an extremely old type, for which even spare parts are hard to obtain. In fact, it can be said that the station is barely running.

The Ekala Transmitting Station's operational work may roughly be classified as follows:

(1) Operation of transmitters
(2) Switching of antenna matrices
(3) Trouble-shooting measures
(4) Liaison work
(5) Regular checking of equipment and keeping it in good condition (maintenance work)
(6) Checking of equipment data
(7) Miscellaneous

In the case of shortwave transmitters, continuous operation is rare; generally, the operations are of what are called the 'piecemeal-service' type. As a result, for this station, it is fairly troublesome to operate the equipment exactly in accordance with the time schedule. For example, the work of switching antenna feeders is dangerous, especially during the nighttime, as the staff are obliged to walk across a wide expanse of ground where cobras often appear.

Three different transmission services are handled by this station; the Domestic Service, External Service and the services

Table 3-2-1 Present Schedule of Programme Transmission

HOURS OF RADIATION — MAY 1988

TRANSMITTER	DAYS	LT / UTC	HOURS OF RADIATION	FREQ KHz	ANT NO.	TARGET AREA
PH-8 10 KW	WDs	49	EDUCATIONAL (03 LT – 16 LT)	6075	SB4	DOMESTIC SERVICE
		61	SINHALA-N (00 UTC – 03 UTC); SINHALA-N SERVICE (11 UTC – 20 UTC)	4902	SB7	
	WEs HOLIDAYS	49	SINHALA-N SERVICE (03 LT – 13 LT)			
		61	SINHALA-N (00 UTC – 03 UTC); SINHALA-N SERVICE (11 UTC – 20 UTC)			
	POYADAY	49	SINHALA-N SERVICE (03 LT – 16 LT)			
		61	SINHALA-N SERVICE (21 UTC – 03 UTC); SINHALA-N SERVICE (11 UTC – 20 UTC)			
PH-5 10 KW PH-7 10 KW	DAILY	49	SINHALA-C SERVICE (04 LT – 16 LT)	6185	SB3	
		61	SINHALA-C (01 UTC – 04 UTC); SINHALA-C SERVICE (12 UTC – 17 UTC)	4870	SB2	
PH-3 10 KW	DAILY	49	TAMIL SERVICE (04 LT – 16 LT)	6150	FD7	
		61	TAMIL (00 UTC – 04 UTC); TAMIL SERVICE (11 UTC – 20 UTC)	5020	FD4	
PH-4 10 KW	WDs	49	ENGLISH (04 UTC – 05 UTC); ENGLISH (08 UTC – 09 UTC)	6130	SB5	
		61	ENGLISH (02 UTC – 04 UTC); ENGLISH SERVICE (11 UTC – 20 UTC)	4940	SB1	
	WEs HOLIDAYS	49	ENGLISH SERVICE (04 LT – 16 LT)			
		61	ENGLISH (02 UTC – 04 UTC); ENGLISH SERVICE (11 UTC – 20 UTC)			
PH-6 10 KW	DAILY	49	6005 ALL ASIA ENGLISH (02 UTC – 04 UTC); 6075 ALL ASIA ENGLISH (10 UTC – 20 UTC)	60··	SB6	IND
PH-9 10 KW	DAILY	31	ALL ASIA ENGLISH (02 UTC – 04 UTC); ALL ASIA ENGLISH (10 UTC – 20 UTC)	9720	STBY	
C-1 35 KW	DAILY	16	SEA (11 UTC – 13 UTC)	17850	15	SEA
		19	15250 VOA (02 UTC – 04 UTC); 15395 VOA (10 UTC – 20 UTC)	15···	17	IND
C-2 35 KW	DAILY	25	VOA (02 UTC – 04 UTC)	11710	18	IND
		25	AU (11 UTC – 13 UTC)	11835	4SE	AU
		31	VOA (10 UTC – 20 UTC)	9645	11	FE
C-3 35 KW	DAILY	19	ALL ASIA ENGLISH (02 UTC – 04 UTC); FE (11 UTC – 13 UTC)	15425	7	IND
				15120	10	FE
		25	TWR 11895 (13 UTC – 14 UTC); 11920 TWR (11 UTC – 13 UTC); TWR 11895 (14 UTC – 16 UTC); TWR 11895 (16 UTC – 17 UTC)		9	FE
				11···	18	IND
					4NW	ME
PH-10 10 KW	WDs SUNDAY	41	ALL ASIA HINDI (02 UTC – 04 UTC); ALL ASIA HINDI SERVICE (04 UTC – 20 UTC)	7190	6	IND
PH-11 10 KW	DAILY	41	7115 VOA (02 UTC – 04 UTC); 7125 VOA (10 UTC – 20 UTC)	71··	16	IND
MARCONI 100 KW	DAILY	31	ALL ASIA ENGLISH (02 UTC – 04 UTC); ALL ASIA ENGLISH (10 UTC – 12 UTC); ALL ASIA HINDI (12 UTC – 20 UTC)	9720	5	IND
SIEMENS 100 KW	WDs SUNDAY	25	ALL ASIA HINDI (02 UTC – 04 UTC); ALL ASIA HINDI SERVICE (04 UTC – 16 UTC); ME (16 UTC – 20 UTC)	11800	8	IND
					4NW	ME

INTERNATIONAL SERVICE

METER BAND

WDs : WEEKDAYS, WEs : WEEKENDS, IND : INDIA, FE : FAR EAST, AU : AUSTRALIA, SEA : SOUTH-EAST ASIA, ME : MIDDLE EAST

commissioned by foreign broadcasting organizations. In the case of the transmission service commissioned by TWR, in particular, the station is required to switch the outdoor feeder matrix six times during the daily period of about six hours from the evening to night. Moreover, for the VOA, the station is required to do the switching six times daily as well. So, the staff member assigned to the VOA Hall are actually engaged in quite a heavy type of operational work.

Regarding trouble-shooting, the staff in charge at the station have been racking their brains to handle the work efficiently. In fact, many of the items of equipment often have problems owing to the antiquated condition of the transmitters, especially in such matters as the cooling of vacuum tubes. As an example of the pathetic efforts made by the station staff, there was a case where a transmitter tube, which had become unusable as a result of the grid and cathode touching, was repaired by being burned off with high voltage. There also was an instance where a transmitter, of such an extremely old type as to use a mercury-arc rectifier, was repaired by replacing the failed portion with a semiconductor device. In another instance, AC heating was tried instead of DC heating. Many more examples were seen of ingenious and painstaking devices being made to upgrade the performance of the aged equipment. There still, however, seems to be the need for further improving of the maintenance activities to properly eliminate shortcomings by, for example, recording and keeping in files the actual cases of trouble-shooting done. Even so, the marvellous efforts made by the SLBC staff in their maintenance work, despite the shortage of an operational budget, are worthy of high praise and respect. In fact, the survey team took note of many examples of such efforts made by the SLBC staff to keep the facilities running with maximum efficiency. Here are several such instances which the survey team actually observed or was informed of.

(1) Repair of the mechanical structure of a transmitter.
(2) Improvements made everywhere in the cooling devices for transmitter tubes, etc.
(3) Lengthening of the lives of transmitter tubes by lowering the heater voltages.
(4) Adding ventilation equipment to lower the room temperature.

On the whole, it may be said that, compared with the condition of maintenance at transmitting stations in other countries, the staff at the Ekala Transmitting Station are doing a good job in maintaining the aged equipment in the best possible condition.

As for inter-station liaison, there are apparently cases where connections cannot be established promptly owing to the fact that telephone circuits have not yet been put into complete order. Although this station at present has a communication circuit with the SLBC headquarters, using 150MHz wireless communication devices, there still exist some problems with respect to S/N (Signal to Noise ratio) due to city noise. On the other hand, the communication system linking the VOA Hall and the Seeduwa Receiving Station, which is a wireless circuit, has been maintained in good condition.

Liaison within the compound of the station, too, is done on foot, which is the only available means. Establishing an appropriate liaison method within the premises of the station is necessary, also from the point of view of safety.

The maintenance work and maintenance/checking of equipment are carried on in the workshop and other parts of the station. Tools and implements, as well as measuring instruments, are taken good care of. However, some shortage has been observed with regard to certain types of tools and measuring equipment which need to be supplied in the course of the present project.

Although the system of the transmitting station, as considered from the viewpoint of operation and maintenance, has been well

devised since the planning stage, some aspects remain to be put in order in terms of the necessary instruments, and they need to be improved as much as possible through this project.

For example, the improvement work that needs to be undertaken includes: provision of an advance notice board for switching antenna feeder matrices, provision of a mini-power wireless device for intra-station liaison, and maintenance in good working order of measuring equipment.

There also is the need to make organic and effective use of the workshop by the SLBC as a whole. Of imminent importance is the provision of vehicles in order to enhance the manoeuverability of personnel in their day-to-day activities.

For the sake of enhancing the reliability of different types of equipment used at the station, it is most essential to collect and maintain statistical records and maintenance data concerning the equipment, such as records of troubles which have occurred in the past. Also of importance is maintaining materials for ready reference in order to enhance the level of manoeuverability and activity of the workshop. As for reference books and documents, for example, it is necessary to keep in good order the printed materials that should be readily available for use by the engineers on the work site, such as materials concerning semiconductors (Siemens equipment, for example, uses semiconductors).

Such printed material as notes describing various reference books are available to some extent in the SLBC's library but there is the need to further expand the collection of such books and other reference materials.

The study team has been able to see for itself the technical level of the personnel at their work sites, where they were seen disassembling and repairing various types of equipment, such as a transmitter and an engine-generator. From the way they used

the tools, their manner of doing the work and the way they handled the weak points of each item of equipment, the study team could assess their technical level as being quite high. Even so, in order for them to properly handle the latest types of equipment to be introduced to the SLBC from now on, it seems evident that there is every need of training being given to a considerable number of staff members.

3-2-2 Transportation

The Ekala Transmitting Station is located in the suburbs of Colombo, about 20km to the north of the capital. From the point of view of the staff commuting to this station, it is inconveniently located (the municipal bus being the major means of transportation).

The staff of this station works 24 hours a day on three shifts. There is no staff dormitory on the premises, and the station staff live in their own houses scattered over a wide area. As a result, there is the pressing need of securing a microbus as a means of transportation

(1) of restoration and support staff in casee of an emergency;

(2) to enable shared use of vacuum tubes and other spare equipment and parts, especially scarce items such as measuring equipment, between the studios and transmitting stations;

(3) of staff members of the station working on shifts; and

(4) of maintenance staff between the VOA receiving station and the transmitting station.

Thus, the securing of a microbus is essential in ensuring smooth operation of the SLBC's shortwave transmitting station.

3-3 Environmental and Meteorological Conditions

Meteorologically, Sri Lanka belongs to the tropical monsoon zone. Its climatic trends are controlled by the monsoons and the topographical features of the island. The rainfalls are heavy during the southwesterly monsoon period (May - September) and light during the northeasterly monsoon period (November - March). On the whole, the rainfalls are heavier in the inland mountainous regions than in the coastal regions. In and around Colombo, the rainfalls are the heaviest during April/May; there was a record rainfall of 259.8mm/day on May 24, 1963. The humidity in this country is always high. In fact, it seldom falls below 75%. The temperature is high throughout the year, the average temperature being 26-29°C. It sometimes reaches 37°C during the daytime. The winds are always moderate, normally with a velocity of 2 to 3m/s. As for the direction of the winds, they are always southwesterly during April - October and northerly during other months.

In the design of structures, a wind velocity of 33.5m/s is usually adopted. But in the case of important facilities, it is recommended to adopt a velocity of 38m/s according to Sri Lankan architectural regulations. In the design of station buildings and towers, it would be better to adopt the latter figure.

In Sri Lanka, an earthquake occurs about once in ten years, but such earthquakes are usually small in scale. The records show that the most recent earthquake occurred in 1937, but there were no casualties. Therefore, when designing structures, there is little need to consider the possibility of an earthquake.

The Ekala Transmitting Station is located about 20km to the north of Colombo and about 7km to the east (inland) of the coastline. So, its meteorological conditions may be considered as being almost the same as those of Colombo. The station can be reached from Colombo by driving on the main highway that runs northward to the international airport. The road from Colombo

to the Ekala Transmitting Station is completely paved. From the main highway to the site of the station runs a paved road with a width of 6 meters. So, a big vehicle, such as a large trailer, can pass along this road leading to the station. However, the road is crossed at some points by power or communication lines stretching low overhead and, therefore, one needs to be very careful when moving a tall machine or transporting bulky equipment to the site along this road.

3-4 Site Conditions

The site of the Ekala Transmitting Station has a total area of 38ha. and is on the whole a flat and wet sandy piece of land. The area at the centre of the site, surrounded by a group of transmitting station buildings, SLBC and VOA Halls, and office building and gates, has a large number of coconut trees growing densely all over. However, in the surrounding grounds where groups of antennas are erected, there is nothing but grassland. The greater part of this grassland consists of marshes with a low water level. Possibly because the time of the team's survey coincided with the rainy season, there were puddles here and there and one or two brooks were seen flowing.

A boring test was conducted at four locations - three for antenna towers and one as the possible site for the station building (the site proposed by the preliminary survey team). At each site, an in-situ test (standard penetration test) and a physical test using samples were conducted. The results of these tests showed that the sites were on the whole made up of sandy ground and that there was a rock bed at a depth of about 20m. The composition of the intermediate sand beds differed by boring point. Sandwiched in between those layers was a layer containing organic matter, with a thickness of about 1-2m. But on the somewhat consolidated sandy bed about 1-2m below the ground surface , it is expected that a long-term bearing capacity of around 10 tons per square-meter is feasible.

In order to confirm whether it is possible to use the underground water as primary water for the cooling of vacuum tubes after processing through a water purifier, a laboratory test was conducted. The results of the analysis show that:

pH (at 25°C) ----------	6.43
Organic matter ----------	Not detected
Total solids at 180°C ----------	70 mg/l

Calcium hardness (as $CaCO_3$) ------- 22 mg/l

Total alkalinity (as $CaCO_3$) ------- 39 mg/l

Langlier Index at 30°C ---------- 2.37

From those data it was clarified that the water of the site well is satisfactory for the cooling of the output high power vacuum tubes.

3-5 Transmitter Buildings

Both the SLBC and VOA Halls are open type buildings, being well designed to fit the tropical climate. The high floor level configuration avoids the effects of moisture and sand dust. The inside of the buildings is considerably bright with sunlight coming in.

The locations of the buildings are arranged so as to be convenient for connecting the feeders stretching toward east and west, two directions in the case of the SLBC Hall, and for the VOA Hall also two directions north and east, which supply transmitter output to the related antennas for domestic and overseas broadcasting purposes.

Since the exhaust air of the 10kW Philips transmitters is released inside the SLBC Hall, the temperature is relatively high. The exhaust fans are also noisy.

3-6 Transmitter Facilities

The transmitting facilities are installed in the SLBC Hall and the VOA Hall. In the SLBC Hall are one Marconi 100kW transmitter and eight Philips 10kW transmitters. There is also a high voltage power receiving/distributing board.

In the VOA Hall are one Siemens 100kW transmitter, three Collins 35kW transmitters and two Philips 10kW transmitters.

3-6-1 Facilities in the SLBC Hall

In Fig 3-6-1, the layout plan of the SLBC Hall is shown.

(1) Marconi 100kW transmitter

The Marconi 100kW transmitter is of 1940 manufacture and so is extremely old. Although the changing of frequencies is supposed to be done by exchanging the coil units, the equipment is actually operated only on 9,720 MHz. The equipment is of such an old type that the filament power supply comes from a DC generator and for high voltage supply, two mercury-arc rectifiers were normally used, but owing to breakdown, they have since been replaced with silicon rectifiers. For both high and low voltage suppliers, the equipment has standby circuits and is operated by switching alternately every two weeks. The greatest weakness of this type of transmitter lies in the fact that little consideration is given to the cooling of the vacuum tubes, so that the temperature of the filament terminals becomes relatively high.

The input equipment, crystal oscillator, monitoring console, etc., are also real antiques; it is no exaggeration to say that they are barely kept in operation.

Note
* Indicated with asterisk
is the equipment outside
the Marconi transmitter cubicle.

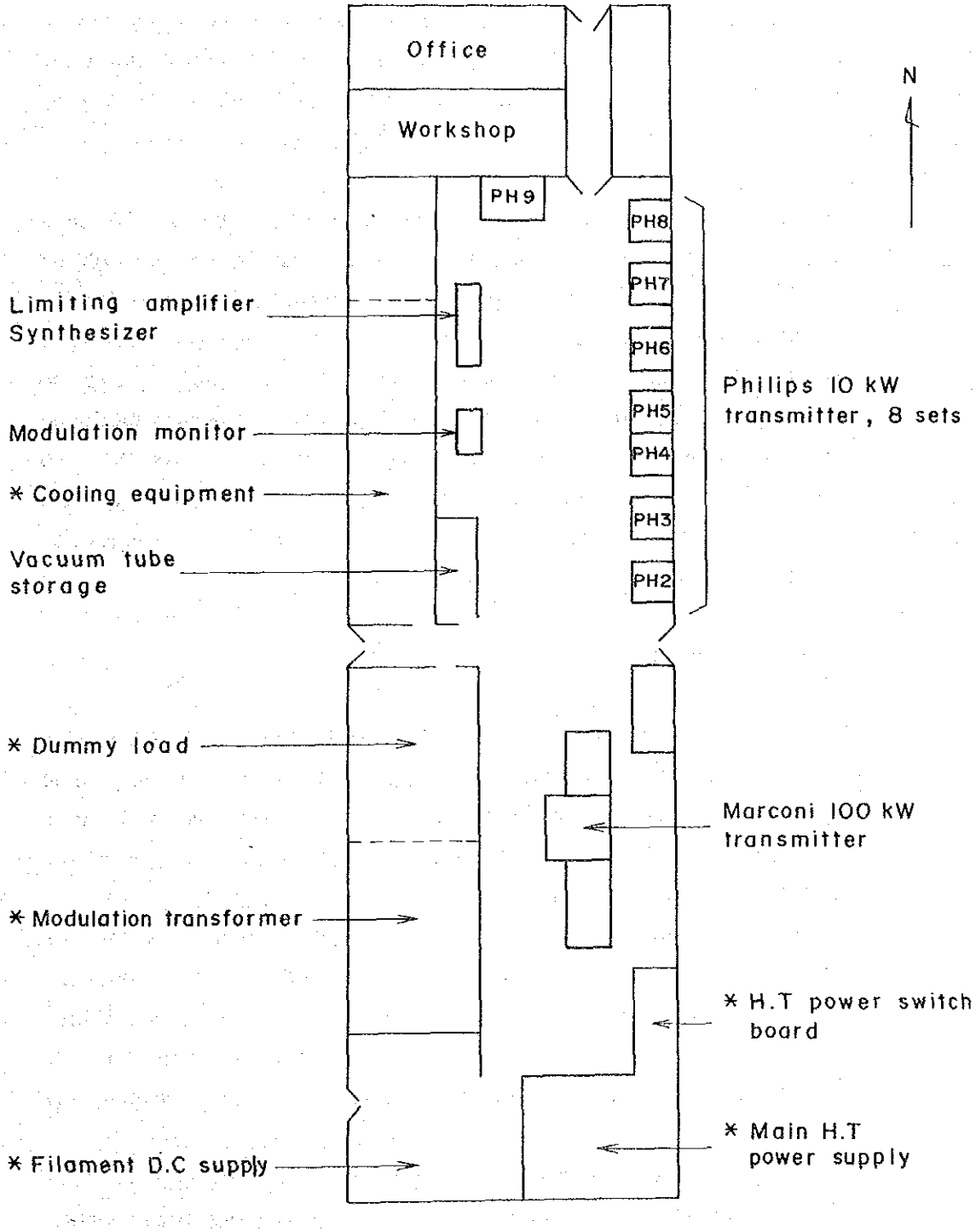


Fig. 3-6-1 Layout Plan of theSLBC Hall

The output feeder lines are so structured that they may be made to exit from either side of the station building with a manual switch. But for switching, one has to climb up a ladder. The water-cooling method is used for the cooling of dummy load and vacuum tubes, and the equipment is installed separately in different rooms.

Almost all of the problems occurring in the transmitter are caused by failure of the vacuum tubes and loose contact of the coils. Since the other parts have been appropriately fixed and adjusted, they are at present functioning relatively stably. By adjusting the flow of cooling air to lower the temperature of the sealed portion of the tubes and rationalizing the filament voltage, it will be possible to extend the lives of the vacuum tubes to operate the equipment for several years more. Of course, a supply of spare tubes would be necessary.

(2) 10 kW transmitter

The eight Philips 10kW transmitters are of 1955 manufacture, with convenient features such as two or three power amplifier units with pull out functions and each adjusted to different frequencies to enable immediate switching from one to another, etc.
Design of the equipment is fairly good. However, with the passage of more than 30 years, many problems are occurring due to loose contacts, deterioration of insulation, rust, weakened insulation materials, cracks, absorption of humidity, denaturing, wear and bad fitting of mechanical parts, etc.
One of the eight transmitters became irreparable, and some of the parts have beenused for maintaining the other transmitters. Almost all the transmitters barely operate at a power of about five kW or so, due to the difficulty in the supply of new vacuum tubes so that they are forced to

use weakened tubes which compounds the problems of the superannuation of the transmitters.

(3) Architectural structure of the SLBC Hall

Its ceiling is of an open type, and the triangle net truss of the roof structure is exposed inside. As a result, the hanging down of feeders etc.for newly-installed equipment can be done very easily. The floor structure is made of cinder concrete with a thickness of about 150mm and is of an elevated type.

There are also blowers and ducts installed to let in the outside air. Even so, the overall air-circulation is not so good due to insufficient number of blowers. Accordingly, when new equipment is to be installed, there would also be the need to add an exhaust fan for the entire building.

3-6-2 Facilities in the VOA Hall

The VOA Hall's installations consist of one Siemens 100kW transmitter (manufactured in 1970), three Collins 35kW transmitters (manufactured in 1952) and two Philips 10kW transmitters (manufactured in 1956). There are also sets of input and monitoring equipment.
The layout plan of the VOA Hall is shown in Fig. 3-6-2.

(1) Siemens 100 kW transmitter

The Siemens 100kW transmitter is the equipment that breaks down most frequently, and therefore has been giving the hardest time to the SLBC staff in its operation and maintenance.

First, there is inadequate cooling of the vacuum tubes. Then, there are the occasional failures in the control

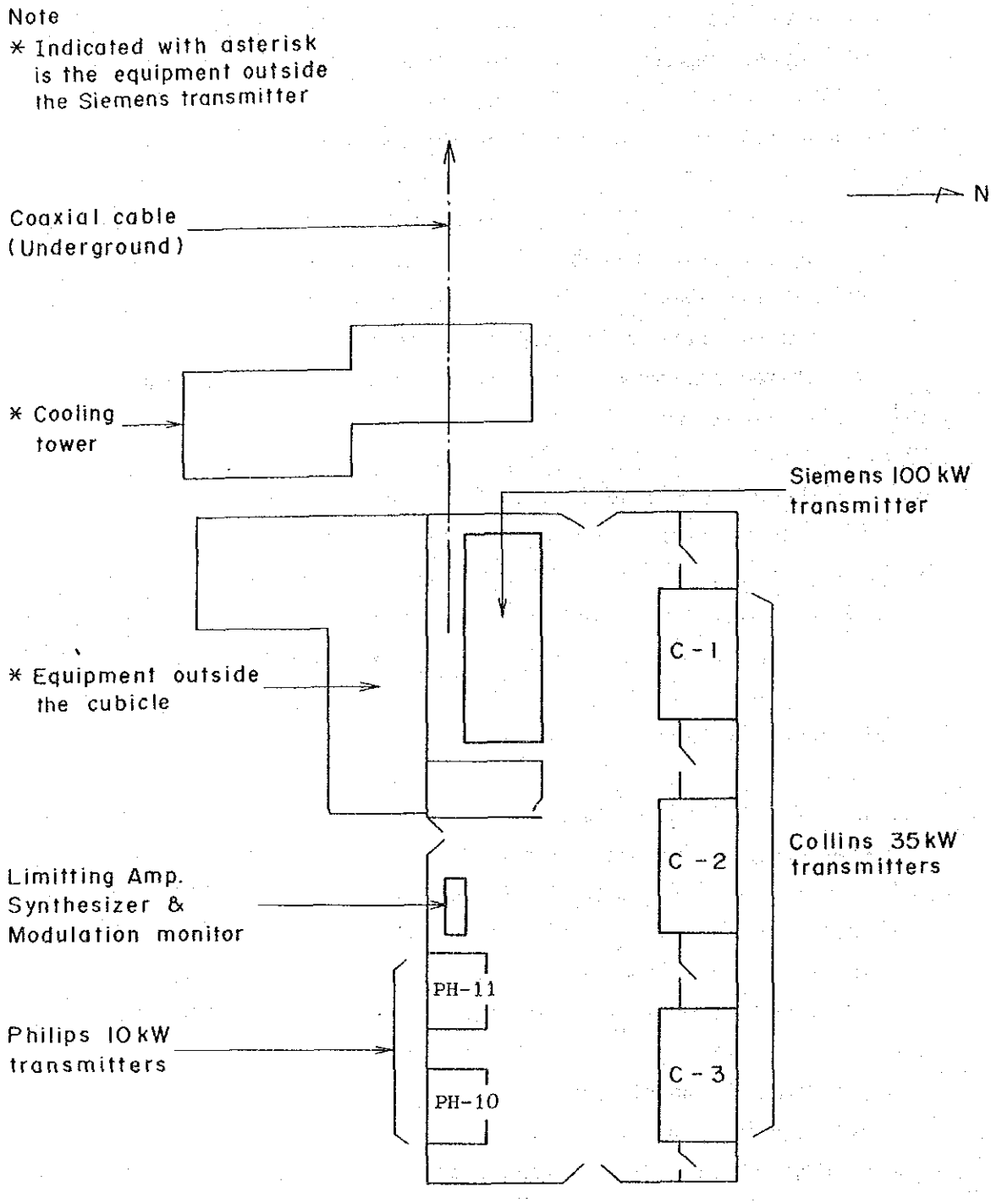


Fig. 3-6-2 Layout Plan of the VOA Hall

circuits and malfunctions of the tuning mechanism. It is at present operated with an output of about 70kW.

The outdoor impedance transformer is connected with a coaxial cable passing underground. A large number of traces of sparks are seen on the transformer itself, but the cause of the sparks was not clarified..

The cover of a part of the transmitter's body has been removed and the control units have been taken out of the body using an extension cable, so that the semiconductors may cool. Furthermore, a device to lower the voltage of the filament has been installed so as to prolong the lives of the vacuum tubes. Since the transmitter tube (PA) being used is of a vapour cooling, a cooling tower has been erected outside the VOA Hall.

This equipment, including a power-source transformer, was additionally installed later, so it was installed on a site with limited space. Switching of the dummy load is done manually, and is of a water-cooled type.

The changing of the frequency of the driver stage is comparatively simple, but because of the problems with the mechanism mentioned earlier, the 10-frequency automatic switching system is currently being used with a fixed frequency.

It has been agreed between the SLBC and TWR that, when the Siemens 100kW transmitter is out of order, the Collins No.3 transmitter can be used as a substitute.

(2) 35kW Collins transmitters

These are installed primarily for the VOA's broadcasting service. No. 1 and No. 2 transmitters are used for VOA, and No.3 for the SLBC and TWR. The rated output power of the transmitter is 35kW and output impedance, 300 ohms. There are two feeder systems for each transmitter which can be switched from one to the other. The switching is done remotely from the rack-side and frequency changes are done manually.

The cooling of the transmitter tubes in the last stage is especially bad, so the operators make it a practice to keep open the front cover of the body, except when the transmitter is in operation.

The transmitter tubes for the VOA service are supplied by the VOA.

The monitoring console is equipped only with selection keys for switching the monitoring signals received from the VOA receiving station and modulation-degree meters for monitoring.

As for the programme input equipment, there is a set of equipment including a limiting amplifier, modulation monitor and measuring equipment. There is also a tape recorder for emergency use. The racks are composed of seven units.

The modulation transformer, power-source transformer and other units associated with the transmitters are installed against the wall, while the main-power-source transformer is installed outside the building, taking into account the space factor. The front side of each transmitter is separated from the rear by a hanging wall so as to prevent noise from such such units as the transformers and magnet

switches. However, the noise issuing from other transmitters is fairly laud.

Although several practical measures are taken here and there, such as the forced air cooling given to the silicon rectifier, the life of the RF (Radio Frequency) output power tubes is rather short (about 5,000 hours on average) compared with the average life of more than 7,000 or 8,000 hours ordinarily. It seems they are too tightly assembled in a narrow space on the whole.

(3) 10kW Philips transmitters

Both transmitters are equipped with three RF units, to cover triple frequency bands, mounted in the RF portion.

The output impedance is 300 ohms only and a magnet switch is provided on the top of each transmitter. The structure of the feeder penetrating the wall surface with insulators is quite rational.

3-6-3 Programme Input Equipment

"Time-worn" would be just the word to describe the condition of the programme input equipment now in use at the Ekala Transmitting Station. Almost all devices are of 1950s make and vacuum tube types.

(1) Programme input equipment at the SLBC Hall

1) The 10kW transmitter equipment can be divided into such parts as the monitoring console, monitoring board and operating board. The monitoring console monitors only the audio output of each transmitter and the modulation degree.

Each transmitter is equipped with a monitoring board that includes a modulation monitor (manufactured by American President Lines, Ltd.) which has the function of calibration for measuring modulation degrees. Within five racks are installed such different equipment as the audio distortion analyzer, output selection switchboard, jack board, synthesizer, clock and frequency counter, almost all of which are for use in measuring the characteristics of each transmitter.

In addition, as an operating board, such equipment as a limiter amplifier, jack panel, etc. are installed.

2) 100kW Marconi transmitter

This transmitter consists of such units as a monitoring console, a monitoring board, and a frequency switching board, the entire composition being substantially the same as that of the 10kW transmitter. However, the frequency switching board, despite its effectiveness, is actually of little use because the transmitter is operated on a fixed frequency.

(2) The VOA Hall

1) The programme input equipment for the 100kW Siemens transmitter includes the following:

Distortion Analyzer	(H.P.),
Audio Frequency Oscillator	(A.W.A.),
Synthesizer	(Advert Elect.),
Multiple Oscillator (10 frequencies)	(Telefunken),
Digital Frequency Meter	(Mi),
Modulation Amplitude Monitor	(General Radio)

2) Programme input equipment for the Collins 35kW transmitters

This consists of seven racks. The equipment is basically the same as that for the Siemens transmitter, but the modulation monitor is capable of measuring the levels of positive and negative modulation. The installation also includes a control board for switching the transmitter output to either of the two feeder systems, together with three units of VOA programme receiving devices (three bands of 60-63 MHz) and a synthesizer for the driving of each transmitter.