Photo 3-2-1 Acrylic Disc Cutter in SLBC

2) Monitoring Equipment

Normally every public broadcast station is obligated to record its aired programmes on a recording machine and to keep them over one month.

However, in SLBC there is no such machine available, so that this is not being done.

Therefore, it is necessary to provide extended use recording machines for each domestic broadcasting channel in the new studio project.

As for the Ringmain (monitoring system in the studio building) purpose, it is also necessary to provide one both in the new studio and old studio buildings, but for the latter, only replacing the old audio distribution amplifiers.

(6) Providing Measuring Equipment

At present, SLBC has only one audio signal oscillator which was made in the 1960s, one distortion meter, one frequency modulation meter, two

oscilloscopes and one power meter, etc. Most of them are almost 20 years old and are not suitable for practical use.

Therefore, the minimum necessary measuring equipment units are to be provided for daily maintenance operations.

(7) Construction of a New Studio Building

Based upon the above considerations, the main scheme of the new studio building which is to accommodate the necessary broadcast equipment is described as follows:

1) Although the initially requested building was 4 stories high and the total floor space was 2,526m², the new studio building will be mostly one story high, but some parts will be 2 stories high and the total floor space will be 1908m². In addition, the condition that the existing Bo tree must remain and also site access in terms of daily operations should be taken into consideration.
2) The initial request for 3 production studios which have a floor size of 180m², 110m² and 70m², respectively, will be modified to one 230m² multipurpose studio.
3) 9 continuity studios will be changed to 12.
4) In the initial request, a tape storeroom, a news programme production room and offices for technical staff and administrative staff members were included.
However, these facilities can utilize the existing building's accommodations and are not included in the new studio building.
5) In the new studio building, with regard to the operating staff of the M.C.R., the continuity rooms and the radio room, the daily staff rooms, night duty rooms and the toilets are situated near to their respective rooms.
6) The new tower will be constructed just above the Radio room and the height is to be 75m from the ground level.

The planned floor space, basis to decide the space and function of main rooms are shown in Table 3-2-1.

Table 3-2-1 Planned Floor Space, Basis to Decide the Space and Function of Main Rooms

Main Room	Planned Floor Space (m^2)	Basis to Decide the Space	Function
Multipurpose Studio	234.375 (net floor space of 180.0m^2)	To accommodate orchestra and audience of about 150	Production of dramas, music, lectures, audience participation programmes, etc.
Control Room	57.875	Based on the equipment layout	To mix and record sounds
Sound Lock	14.25		
Observation Room	59.375	To accommodate audience of about 45	To observe programme production proceeding in the Multipurpose Studio
Store	21.9	Space for two rooms	To store acoustic partition, chairs, etc.
Continuity Studio	17.5 (×12) (net floor space of 14.0m^2)	Based on the NHK standards for a small announcer studio	To send out packaged programmes, disc jockey programmes, news, weather reports, informative announcements, etc.
Control Room	22.5 (×12)	Based on the equipment layout	To mix and record sounds
Master Control Room	72.25	Based on the equipment layout	To distribute signals inside the station or coming from outside the station to necessary destinations To monitor the final outputs of the station
Radio Room	59.375	Based on the equipment layout	To install FM transmitters and wireless links
Generator Room	25.0	Based on the equipment layout	
Electricity Room	40.0	Based on the layout of breakers, a voltage regulator, a non-interruption power supply, etc.	

Main Room	Planned Floor Space (m^2)	Basis to Decide the Space	Function
Air conditioner Room	218.25	To accommodate 9 systems of air conditioning machines	
Pump Room	27.5	To accommodate a water pump, fire pump and water tank	
Supervisor's and Engineer's Rooms	43.75	Space for 3 rooms for 8 working members ($5m^2$/person)	Working rooms
Relief Operator's Waiting Space	22.5		
Staff Rooms	28.75	Space for 2 rooms	
Maintenance Rooms	33.0	Space for 2 rooms	
Night Duty Rooms	45.23	Space for 3 rooms accommodating 10 beds in total	
Toilets	46.585	Space for 5 toilets	
Other Stores	37.1	Space for 3 stores	
Common Space such as Entrance, Corridor, Staircase, etc.	341.31		
Total	1,908.375		

Remarks: The above spaces are calculated with the dimensions of centre-to-centre of poles or walls.

3-2-5 Consideration of Necessity of Technical Cooperation

The current SLBC staff totals 1,971 (as of February 1990) and its constitution is shown in Table 2-2-1.

It is necessary to newly recruit about 40 more staff, in accordance with the increase of the broadcasting hours with the provision of more equipment and the new building operation, out of which about 15 staff are to be trained for the operation of the multipurpose studio and the new radio OB van system.

The training of those staff can be done during the installation of the equipment and also can be done by using an existing training studio in SLBC under the guidance of SLBC's engineers.

3-3 Outline of the Project

3-3-1 Implementing Organization and Management System

The implementing organization for this Project is the SLBC, Sri Lanka's only radio broadcasting organization under the supervision of the Ministry of Cultural Affairs and Information. The Project is to be pushed ahead by SLBC in close cooperation with the Ministry of Finance and Planning and the management of the Project after completion of the facilities will be undertaken as hitherto by SLBC.

With long experience of over 50 years in radio broadcasting and also with its high level of technical and managerial ability, SLBC is considered to be fully qualified as the implementing organization for this Project. And this has already been proved by the way SLBC conducted the shortwave broadcasting project.

3-3-2 Location and Condition of the Project Site

(1) Location

The site on which the radio studios are to be constructed under this Project is located at the northwestern section of the present premises of SLBC's Colombo studios which are located in the city of Colombo. The Colombo studios are located in Colombo 7 district, on Independence Square which is situated on a corner lot on the northeastern side of the crossing where Bauddhaloka Mawatha and Torrington Avenue meet. So, the new site is located facing the state-operated TV broadcasting organization, SLRC (Sri Lanka Rupavahini Corporation), across Torrington Avenue. At present, Torrington Avenue is closed in the section between the SLBC and SLRC buildings for security reasons and, as a result, that part of the Avenue is currently not available for general traffic use. Even though the projected site is 4-5km away from Fort or Pettah, both of which are Colombo's commercial centres, it still is located almost at the centre of the city district and its environment, too, is quite good. Quite close to it are such landmarks as Independence Memorial Hall and Bandaranaike Memorial International Conference Hall.

(2) Transportation

Bauddhaloka Mawatha and Torrington Avenue are the city's main roads and therefore trips by car to the scheduled site of construction are extremely convenient. The nearest railway station is Bambalapitiya (the third station from Fort on the railway leading to Galle) which is about 2km away.

The site is also located at a distance of only about 5.5km from the port of Colombo, so there is no problem about the transport of imported cargo, such as materials and equipment.

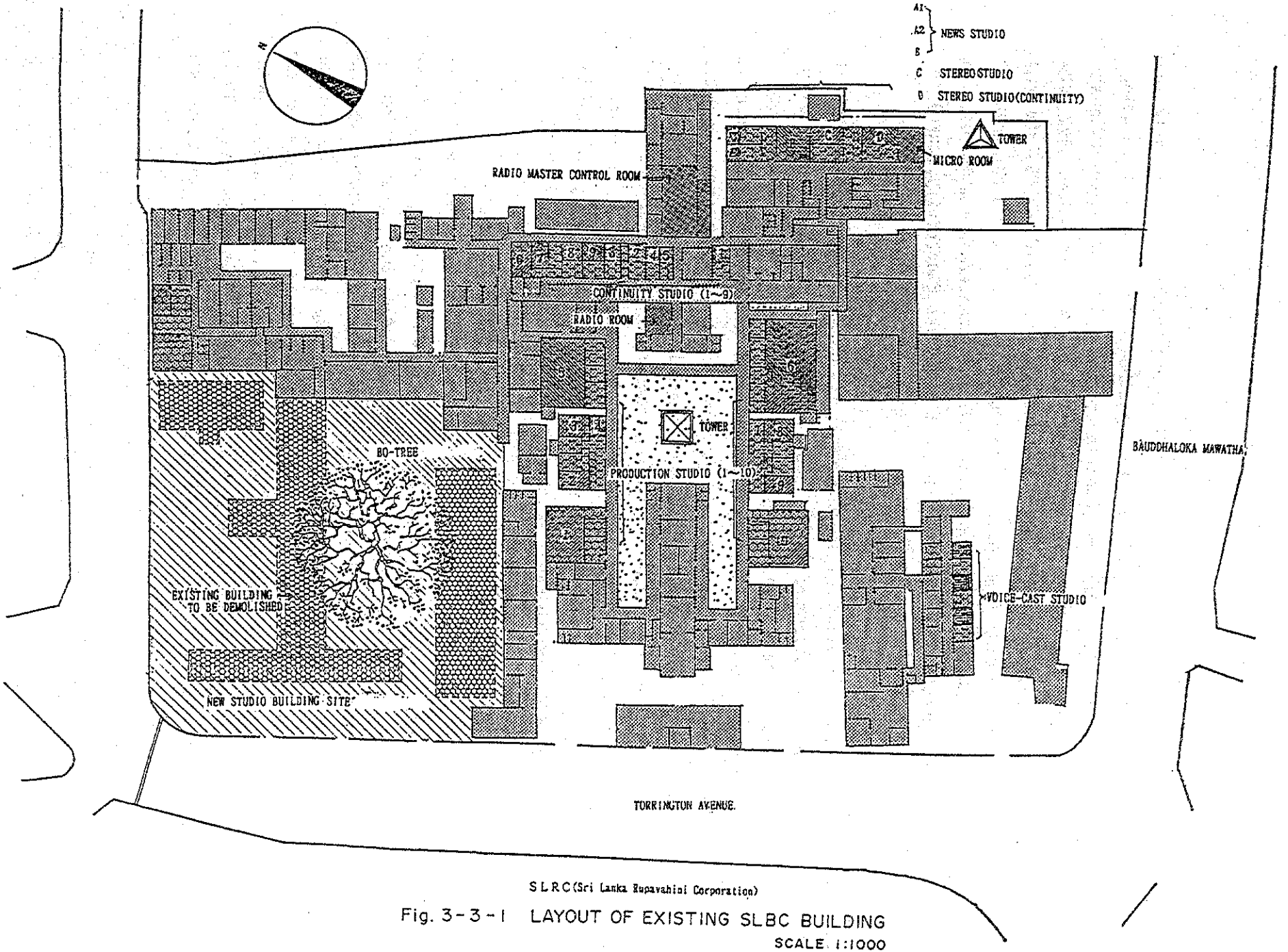
(3) Topography

The piece of land earmarked for the Project is a lot which is almost a perfect square in shape and may be described as being almost perfectly flat. Its total area is 5,000m² (about 68m in depth and about 74m in width).

(4) Obstructions, etc., on the Site

The Bo Tree, which grows at the centre of the site, is revered as the symbol of SLBC and therefore cannot be felled. On the site, there exist such structures as a building once used as an army barracks, a building now being used by the Finance Department and a warehouse. These are all scheduled to be removed along with the trees other than the above-mentioned Bo Tree.

Please refer to Fig. 3-3-1 which shows the present layout of SLBC's buildings.



SLRC(Sri Lanka Rupavahini Corporation)

Fig. 3-3-1 LAYOUT OF EXISTING SLBC BUILDING

SCALE 1:1000

(5) City Facilities

1) Electric Power

At present, the supply of electric power to the existing buildings of SLBC is done through the process of first reducing, with the transformer installed in the substation located in the southwestern corner of the premises, the 3-phase 3-wire 11kV 50Hz distributed power voltage down to 3-phase 4-wire 400/230V and then feeding the power through the wiring to each unit of equipment. The ownership and maintenance/management of the substation facilities belong to CEB (Ceylon Electricity Board).

2) Waterworks

Water is supplied to the existing buildings through inlets at five locations from the public waterworks passing underground along Torrington Avenue and Bauddhaloka Mawatha. The water is first led into the elevated tanks on the premises and then is supplied to each unit of equipment. All of these existing water tanks are of small capacity and therefore have little room for additional storage. Hence, there is the need to install additional water-receiving tanks and elevated tanks in order to ensure a supply of water to the buildings to be newly constructed under this Project.

3) Sewerage

The main sewerage pipes for public use pass underground along both Bauddahaloka Mawatha and Torrington Avenue for the drainage of wastewater. The responsibility for the construction of drainage facilities will be shared by both the Japanese and the Sri Lankan sides; the former to be responsible for the section from the inside of the new building to the final basin on the premises, and the latter for the section from the final basin on the premises to the main pipe of the public sewerage line. There is no need of a facility for purification-treatment on the premises.

3-3-3 Outline of Facilities and Equipment

(1) Outline of Building Facilities

Construction is planned of a single-story ferro-concrete building which is two stories in parts, with a total floor space of 1,908.375m² containing one multipurpose studio, 12 continuity studios, a master control room, a radio room and auxiliary rooms.

The steel tower will be 75m high above the ground and will be erected on the roof of the two-story portion of the building.

(2) Outline of Broadcasting Equipment

1) Outline of the Production Studio Installations

A multipurpose studio will be newly constructed with a total floor space of about 230m². This studio will be used for the production of enlightenment programmes such as lectures and discussions by intellectuals, large-scale educational dramas, contemporary music programmes and audience-participation programmes. The studio will also be equipped with a simple lighting system.

The studio will be equipped with units suited to the production of such programmes as mentioned above, the main units of equipment being a sound-mixer with 24 input channels, one multi-track tape recorder, four echo machines and one set of lighting equipment. The introduction of the multi-track tape recorder will enable production of stereo music programmes as well.

2) Outline of the Continuity Studio Installations

Twelve continuity studios will be provided. Taking into account operability and interchangability, all the continuity studios will be constructed under the same basic system. However, according to the purpose of their use, seven will be of a stereophonic transmission system and the remaining five, monaural.

Main items of equipment to be provided are one sound-mixer set with 12 input channels, two disc players, two tape recorders, two CD players and three cartridge tape players. These equipment

will be made to enable coping with any type of programme materials.

3) Outline of the Master Control Room Installations

The Master Control Room will be equipped with the following units:

a) A set of continuity studio input matrix (24 inputs × 32 outputs) for use in distributing, as the need arises, to the continuity studios, the in-house signals (from the production studios, news studios, etc.) and the signals from outside (stadiums, public halls, etc.).

b) The input equipment for use in receiving signals from outside the station and in monitoring or complementing the level or the sound quality of such signals.

c) The main unit of the intercommunication system linking different studios for communication on matters directly concerned with the programme transmission work.

d) A master-clock device that supplies the second pulses to drive the slave clocks installed in the continuity studios and the production studio.

4) Outline of the Radio Room Installations

a) FM Broadcast Installations

A centralized antenna system will be installed for the purpose of expanding the main service area comprising the Colombo metropolitan area and the surrounding area (Gampaha and Kalutara Districts) and of unifying the E.R.P. (Effective Radiation Power) of the seven service-media channels.

The transmission output power for the 7 service-channels will be unified to 300W. The transmission equipment to be installed will be of a single system, complete solid-state FM stereophonic unit. The transmission power for the seven FM channels will be put through a power combiner and fed to the

high-gain antenna through a main feeder line.

As for the high-gain antenna, a wide-bandwidth antenna capable of obtaining enough VSWR for all of the seven channels simultaneously becomes necessary, and so it was decided that two dipole antennas should be adopted for this system.

The transmission antenna to be newly erected will be 75m above the ground as high as the existing towers in order to maintain a necessary line of sight distance and a necessary field intensity required for off-air relay to downstream stations. It will also be of vertical polarization, the same as hitherto. As a result of the erection of this antenna, the actual estimated effective service area will be extended to a radius of about 40km in line-of-sight distance from the Colombo studios.

b) VHF Radio Communication Equipment

The radio-communication base station using VHF 163.5MHz and 164.0MHz for communication within Colombo and its neighbouring areas will be installed in the new radio room. As to the antenna for this equipment, a collinear antenna, which functions also as a lightning rod, will be adopted and will be installed on top of the new tower. Its output power will be 25W, the same in scale as that of the existing one. A control unit will be installed in the master control room so as to enable communication by remote control.

In the new radio room will be installed a transmission/reception device of a radio base station for communication use operating on VHF 169.5MHz between the Colombo Headquarters and all the regional stations through the Radella Repeater Station. The antenna to be installed on top of the new tower will be a 5-element vertical Yagi antenna, directed toward the Radella Station. A control unit will also be installed in the Master Control Room so as to enable communication between the Master Control Room and the regional stations by remote control.

c) Transfer of the STL (the Equipment for Reception of Programme Materials from Regional Stations)

The equipment to receive programme materials from the regional stations will be moved into the new radio room, and the receiving antenna and feeder will be newly installed on top of the new tower.

5) Measuring Instruments

Provision will be made of various measuring instruments that are considered necessary for routine maintenance and improvement work, such as sound-signal measuring instruments, oscilloscopes and field-intensity meters.

6) Radio OB Van

Since SLBC does not currently possess its own radio OB van, it has not been able to develop a quick news reporting capability and mobility in news coverage, both of which are the major merits of radio broadcasting. This radio OB van will have on board a radio unit capable of two-hop transmissions so as to enable the widest possible coverage in Sri Lanka. The van will also be capable of operating on a system enabling simultaneous transmission of programmes in three languages, viz., Sinhala, Tamil and English.

7) Editing and Monitoring Equipment

An editing device is the equipment for use in editing the tapes recorded both in and outside the station into complete programmes. For that purpose, 2 sets of tape recorders and one set of a compact mixer are provided in each of nine existing continuity studios, after the function of the existing continuity studios are transferred to the new continuity studios. (Some of the existing units will be used as a part of this new set of editing devices.)

On the other hand, the monitoring device consists of ringmain equipment and logging system. The ring main equipment enables the receiver output to be distributed to necessary rooms so that the staff in those rooms may be able to hear the broadcast and

the logging system receives the programmes with a receiver set and records them on long-duration tape recorders. These main units of equipment will be mounted in racks and installed in the Master Control Room.

3-3-4 Maintenance/Management Plans

(1) Maintenance/Management System

The maintenance and repairs of installations and equipment are to be undertaken mainly by the personnel of the radio room and the Master Control Room. The maintenance/Management system remains as it is but it is necessary to fully fill vacancy of posts (the numbers shown in parenthesis are now vacancy).

1) Operational System for the Radio Room

Senior Technical Manager	3 (1)
Engineer	1
Staff working on shift	8
(Day service: 08:00-18:00, Night duty : 16:00-24:00-08:00)	
Maintenance staff	6 (2)
Maintenance staff for antennas and the tower	2 (1)
	Total: 20 persons

2) Master Control Room Staff

The Master Control Room will be manned by the following staff members who will be working in two shifts under a 24-hour operation system:

Senior Technical Manager	1
Data-recording staff	1
Outside-broadcast staff	1
Liaison officer in charge of communication with other stations	1
Standby staff	1 (1)

Total Work Force: The above-mentioned 5 × 2 shifts (8:00-16:00, 16:00-8:00) × 1.6 = 16 persons

(2) Estimation of Maintenance Expenses

All the equipment to be newly installed under this Project are to be completely solid-state and therefore, unlike in the case of vacuum-tube type equipment, there is no factor that requires periodical supply or renewal. However, in the case of tape recorders/players, they require periodical replacement of recording/reproducing heads. In addition, even though the recent audio-equipment units have been enhanced in reliability, it still is necessary to change one unit or another occasionally as a result of unexpected failures. Needless to say, there is always the need to purchase such expendables as fuses and lamps from time to time. In terms of expense, there are several factors that need to be taken into account as unavoidable expenditures from the annual budget. These include repainting of the towers once every 3-4 years (3 million yen each time), repair of the facing of buildings and repair or repainting of the interior of the buildings (once every several years; 1 million yen each time), totaling about two million yen (about half a million Rs) to cover possible expenses required in relation to the repair of building installations, also including electrical installations and air conditioning equipment, as well as the other anticipated expenditures mentioned above.

(3) Personnel Plan

Even though SLBC's prescribed number of staff members is 2,420, the Corporation's total work force at present is 450 persons short of this figure. However, it is quite possible to fill the prescribed number of SLBC's total staff members in near future. The revival of the Tamil Commercial Service which is currently suspended can be realized when this Project is implemented.

With the implementation of this Project, the addition of a total of about 40 persons will be needed. They are the staff members to man the multipurpose production studio (4-5 producers and 7-8 technicians), building management staff (2 persons × 3 shifts) and guards (3 persons × 3 shifts) who will be required as a result of the construction of the new building.

(4) Budget Plan (the Additional Operational Expenses Required as a Result of the Construction of the New Studio Building)

1) Increase in the Consumption of Tapes for Recording Purposes

As a result of the installation of tape recorders, the current programme stocks on acrylic discs will be gradually replaced with those on tapes. At the same time, along with the increase in the volume of programmes to be produced from now on, the consumption of tapes is expected to increase substantially.

If the increase in tape consumption were assumed to be 4 reels of 6mm tapes (10 inches) per week, the total annual increase would be as follows, assuming that each tape costs 1,000Rs:

1,000Rs × 4 reels × 52 weeks = 208,000Rs/year.

Consequently 208,000Rs is anticipated to be the additional expenditure due to an increase in the consumption of tapes as a result of implementation of this Project.

2) Cost of Electric Power Consumed

The total consumption of power by the existing studio building is comparatively large at 300kW, owing to the fact that the load is applied by vacuum-tube type equipment. For the above-mentioned consumption of power, the charge currently being paid to the C.E.B. is as follows:

300kW × 0.8 (average ratio) × 16 hrs/day ×
1.9Rs/kWh × 30 days = 218,880Rs/month
125Rs × 300kW = 37,500Rs (basic charge)/month
Total 256,380Rs/month × 12 months = 3,076,560Rs/year

Almost all of the above-mentioned power consumption would be taken over by the units of equipment in the new studio building which are of higher power efficiency. Even so, since two power-receiving systems, the new and the old, will be in operation side by side, the total power consumption after implementation of the Project is, after all, expected to be very much the same as hitherto.

3) Increase of Personnel Expenses Resulting from the Increase in the Number of Staff Members

As mentioned in the above (3) Personnel Plan, an estimated additional employment of 40 persons would result in an increase in the annual personnel expenses as follows:

3,000Rs/month × 40 persons × 12 months = 1,440,000Rs/year

The increase of operational cost after the completion of this Project will be about 2.15 million Rs(*) per annum which is only less than 1.5 percent, compared with 140 to 190 million Rs of annual income of SLBC.

(*) Note:

Increase in maintenance expenses	0.50 million Rs
Increase in consumption of tapes	0.21 million Rs
Increase in personnel expenses	1.44 million Rs
Total	2.15 million Rs

CHAPTER 4 Basic Design

CHAPTER 4 Basic Design

4-1 Basic Design - I : Building Plan

4-1-1 Design Policy

In designing the buildings for this Project, the basic policy has been established as follows:

(1) The aim has been set on ensuring that the buildings to be constructed will best conform with the objective of the Project and that the maximum effects may be obtained within the range of the grant aid assistance offered.

(2) The buildings to be newly constructed should functionally link well with the existing facilities. When there are portions within the existing facilities that are still able to serve their required purposes adequately, none of such portions shall be included in the buildings to be newly constructed.

(3) The buildings to be newly constructed shall be in harmony with the existing ones in terms of design.

(4) While the selection of the materials and construction methods will be made in such a way as to best conform with the objectives of the use of the building and with the limits of the period of construction, efforts will be made to ensure that materials manufactured locally and methods employed locally will be used as much as possible.

4-1-2 Examination of Design Conditions

1) Weather Conditions

The city of Colombo is located in the coastal district of the moist lowland zone in the southwest of the island. As a result, its average temperature is almost unchanged throughout the year, at around 27°C. The lowest average temperature of about 23°C is recorded during the months of December and January and the highest average of about 32°C during the months from March to May. The annual rainfall totals about 2,400mm; heavy in April-May and October-November and light in January-February. The heaviest recorded 24-hour rainfall during the period from 1931 to 1970 is 290mm. The average relative humidity throughout the year

is 70-80% in the daytime; at nighttime, the figure goes up to as high as 85-93%. Heavey thunder occurs at the time when monsoons are most active. The winds are on the whole quite mild and the velocity is normally 2-3m/sec. In April-October, the winds are usually southwesterly, while in other months the winds usually blow from northerly directions.

According to the standards for architectural design in Sri Lanka, it is recommended that a wind velocity of 33.5m/s should be taken into account in the design of a general type of structure but that a velocity of 38m/s should be adopted as the standard when the structure being designed is a public building or some other important facility.

2) Earthquakes

Since Sri Lanka is located outside the earthquake zones of the world, and also in view of past records, there appears to be no need of taking the factor of earthquakes into consideration when architectural designing is done.

3) Geological Conditions

In 1989, a ground boring investigation was conducted by the SLBC at two points within the Project site. From the results of this investigation, it appears that the ground has the allowable bearing power of 12.5t/m^2 at the depth of 1.5m from the surface.

4) Construction Methods, Materials, etc.

As for the construction methods adopted in Sri Lanka, the general types of buildings are structured, in their main portions such as foundation, pillars, beams and floor slabs, with ferro-concrete and are of a roof-truss structure made of wood-frame (steel-frame in the case of large-scale buildings) with the walls built of bricks. The roofs are covered either with corrugated asbestos-cement sheets or clay tiles. In the case of a small-scale building, a construction method in which the foundation is built of stones so that the lower end of each pillar may be fixed firmly in the stone foundation is also adopted in this country. Private houses are generally built of bricks. Because of Sri Lanka being a country never hit by earthquakes, the structures of

the buildings generally look fragile. In the actual construction work, such as concrete-placing, the work is done mainly by hand in Sri Lanka. Generally speaking, in such aspects as construction methods, quality control and management of work progress, a number of problems can be seen. The speed of construction is generally slow owing to various circumstances, such as the shortage of machinery, lack of skilled labour and uncertainty in the supply of materials. Another factor contributing to this inefficiency in construction work is the general lack of awareness about the importance of progress management. Thus, in Sri Lanka, cases where construction projects are completed as originally scheduled are said to be quite rare.

While the basic materials can be procured locally, many of them, depending on the objectives of their use, have problems in such respects as quality standards and marketability. The fittings made of metal (in Sri Lanka, wooden fittings are generally used), high-class finishing materials and building equipment used in this country are almost all imported products. Reddish clay roof tiles, which are traditional materials used in Sri Lanka's architecture, are used in a number of different ways. The clay roof tiles are usually laid on horizontal battens on the roof boards, but sometimes are used as decorative covering on corrugated asbestos-cement sheet roofing, or on inclined concrete slabs or on metal roofing. When the reddish clay tiles are used in one or the other of the manners described above, they create a fascinating contrast between the red tiles and the green trees in the background. As for the timber used for construction of houses in this country, most of the trees are of species that are quite hard because of their being tropical, with the result that it is difficult to obtain a big cross-section or a long piece of material for construction use. The processability of such timber is not good either. Furthermore, owing to the instability of the supply of domestically-produced timber, a large amount of imported timber from Malaysia and other countries is used in Sri Lanka for construction purposes.

5) Laws, Standards, etc.

Among the various building laws which relate to this Project, there are the UDA Planning and Building Regulations-1983 which were established in 1983 in accordance with the Urban Development Authority Law No. 41 of 1978. These regulations provide, quite concretely and in considerable detail, methods and procedures for such matters as the submission of plans on the use of land for construction purposes and of plans for the construction of buildings, the obtaining of permits for such plans, the qualifications of planners, and restrictions imposed from the viewpoint of city planning, construction planning and building techniques. However, in the case of construction plans such as those for this Project which involves special kinds of architecture that is different from the ordinary type of architecture and the construction of buildings equipped with sophisticated types of installations, the said regulations lack concrete provisions and, for that reason, detailed consultations must be held with the authorities concerned. In view of the actual content of the regulations, there seems to be little likelihood of this Project being particularly influenced by them. As regards the criteria and standards which are applied to technical calculations, materials, etc., the said regulations provide that almost all of the materials that should be used are those stipulated by the authorities as being appropriate. On the whole, materials based on the British Standards (BS) are being used in Sri Lanka. In such documents as the specifications for public works, the CS (Ceylon Standards) are used in the selection of some of the materials. However, criteria or standards other than BS or CS are recognized and, especially with regard to materials supplied from a foreign country under an assistance programme, it appears that most guidelines are based on the criteria or standards of the country providing such assistance. Basically, the idea seems to be that planning and design work should be the responsibility of qualified architects or engineers, as the case may be.

4-1-3 Basic Plans

(1) Site Plan

The two areas in the southeastern part of the site are surrounded by the existing facilities, while the other two areas face roads (of which the road on the western side is currently closed). Taking into account the environment and shape of the site and its connection (through two paths; one to the entrance to the corridor of the Master Control Room to be newly built and one to the entrance to the sound lock of the multipurpose studio) with the existing facilities, the building, most of which will be 1-story and the rest 2-story, will be arranged in a U-shape, in such a way as to surround the Bo tree (about 15m high and with branches spreading about 40m from one end to the other) in the centre of the site. Regarding this Bo tree, it will become necessary to cut off a few branches that may brush against the wall of the 2nd-story portion of the building. Taking into account the falling leaves, none of the new buildings will have an eaves gutter. Pebbles will be laid on the ground around the building so that the rainwater from the eaves may be absorbed into the ground through the pebbles.

Of the three existing gates, two will be left as they are at the present locations and a drive will be constructed in such a way as to link the two gates.

Incidentally, it is considered appropriate to erect the steel tower on the roof immediately above the radio room, in view of its positional relations with the radio room and also in view of the fact that there is no appropriate ground space on which to erect the tower. As to the substation which is scheduled to be provided by SLBC to accommodate the power-receiving and substation installations, a space on which to construct this substation will be planned near the electrical installation room to be newly constructed under this Project.

(2) Building Plan

The building being planned may be roughly divided into three parts. The part that corresponds with the on-line system comprising such rooms as a group of continuity studios, a master control room and a radio room; the part comprising the programme-production studio that can be used for various purposes; and the part comprising the building-equipment rooms that support the functions of such rooms as mentioned above.

Regarding the layout plan, the main points that need to be noted are as follows:

1) In view of the connections maintained with the existing Master Control Room, the new Master Control Room and its auxiliary rooms will be positioned close to the existing facilities.
   -- For this reason, it is necessary to remodel the related portion of the existing facilities so as to make them approachable from the new Master Control Room.
2) Next to the new Master Control Room, a group of 12 continuity studios will be positioned, one next to the other.
3) A supervisor's room, for the person who handles the continuity studio work, and its auxiliary rooms will be positioned at the centre of the group of continuity studios.
4) On the floor above the Master Control Room, a radio room and its auxiliary rooms will be positioned. And by erecting the steel tower on the roof immediately above the radio room, the efficiency of the transmission system will be enhanced.
5) The rooms mentioned in items 1)-4) above constitute what may be called the nucleus of the broadcasting station. Therefore, every protective measure will be taken to cope with any unexpected emergency.
6) It is considered appropriate that the multipurpose studio should be so positioned as to enable approach from any location within the existing facilities. On the 1st floor adjoining this studio, an observation room will be provided so that visitors to the station may be able to watch from above the activities going on in the studio.
   -- For that purpose, it will become necessary for the existing rooms adjacent to the sound lock of the studio to be remodelled into a sort of waiting space for such people as those engaged in the production of programmes in this studio or those who are visiting the station to have a look at the activities in the studio.
7) The building containing the new building's equipment (generator, air conditioner, etc.) will be constructed separately from the main building so that vibrations and noise caused by the operation of the machines may be isolated.

Under the layout plan as outlined above, the floor spaces will be 1,686.5m² on the ground floor and 221.875m² on the 1st floor, totalling 1,908.375m².

The names of the rooms and their floor spaces are as shown in Table 4-1-1.

Table 4-1-1 Floor Space of Each Room

Dimensions by centre to centre of pole or wall
Unit : m^2

Room	Floor	Floor Space
MULTIPURPOSE STUDIO	1	234.375
CONTROL ROOM	1	57.875
SOUND LOCK	1	14.25
STORE	1	17.4
OBSERVATION ROOM	2	59.375
STORE	2	4.5
CONTINUITY STUDIO	1	17.5×12 210.0
CONTROL ROOM	1	22.5×12 270.0
SUPERVISOR'S ROOM	1	15.75
SUPERVISOR'S REST ROOM	1	15.25
RELIEF OPERATOR'S WAITING SPACE	1	22.5
STORE	1	13.5
TOILET (M, F)	1	20.0
MASTER CONTROL ROOM	1	72.25
ENGINEER'S ROOM	1	17.5
MAINTENANCE ROOM	1	22.5
NIGHT DUTY ROOM	1	21.2
STORE	1	14.6
TOILET	1	10.36
RADIO ROOM	2	59.375
ENGINEER'S ROOM	2	10.5
MAINTENANCE ROOM	2	10.5
NIGHT DUTY ROOM	2	11.78
STORE	2	9.0
TOILET	2	7.475
GENERATOR ROOM	1	25.0
ELECTRICITY ROOM	1	40.0
AIR CONDITIONER ROOM	1	218.25
PUMP ROOM	1	27.5
STAFF ROOM	1	28.75
TOILET	1	8.75
ENTRANCE	1	52.5
CORRIDOR	1	221.31
STAIRCASE	1~2	58.35
DUCT · SHAFT SPACE	2	9.15
Total		1908.375

(3) Section Plan

Height of the ground floor		G1 + 500mm
Height of each story	1st floor	G1 + 4500mm
	2nd floor	G1 + 9000mm

On both the 1st and the 2nd floors, a roof-truss with a 3-inch inclination made of steel-frame will be placed. The eave protrusion will be 1500mm in length.

Height of the ceiling:

Multipurpose studio	7000mm
Other rooms	3000mm, 2700mm or 2500mm

(4) Structure Plan

1) The standards for the structural design of the building and steel tower shall be based on the Building Laws of Japan and the various Structural Design Guidelines of the Architectural Institute of Japan. The structural design, however, shall be conducted by also taking into account the calculation standards and various data for calculation use which are actually used in Sri Lanka.

2) The structure of the building frame shall be of ferro-concrete corrugated structure which is considered most appropriate from the point of view of such factors as the scale of the building and its required functions. The walls shall be built by piling up concrete blocks, adopting the construction method normally used in Sri Lanka.

   The inclined roof, as mentioned above, shall be of a roof-truss structure made of steel.

3) The steel tower comprises a self-supporting quadrangular structure of 45m in height for the main body and a 3m square antenna gain mast of 20m length.

   The tower legs, with a stance of 12.5m, shall be fixed to structural pillars by anchor bolts on the top of the 2-story portion of the building.

   Two-dipole antennas on the gain mast, a navigation light and collinear antenna combined with lightning rod on the top shall be installed.

   On the middle and top of the main body, a Yagi antenna shall also

be installed.

Ladders for use in maintenance work and feeder racks shall be installed at the centre of the tower.

The tower shall be plated by the hot dip galvanized method and painted striped colors as regulated by navigation laws.

(5) Building Equipment Plan

1) Electrical Installations

a) Power supply

A substation shall be installed at an appropriate location on the new construction site and, in this substation, such devices and appliances as power transformer, main switch and kilowatt-hour meter shall be installed. The 3-phase, 3-wire system 11kV 50Hz power will be received on the primary side from the CEB (Ceylon Electricity Board), and the secondary (low voltage) side and onwards will be drawn in as far as the main switch in the electricity room by means of a 3-phase, 4-wire system 400/230V. These shall be within the scope of work to be carried out by the Sri Lankan side.

Beyond the main switch in the electricity room, branch switches shall be installed for different uses, such as the broadcasting equipment, lighting for rooms, socket-outlets, air conditioning and water supply and drainage equipment, so that power may be supplied to each type of equipment and fitting. In the electricity room will be installed an AVR (Automatic Voltage Regulator) and a UPS (Uninterrupted Power Supply) for the broadcasting equipment, as well as a branch main switch for each set of installations. All these items of equipment shall be of a cubicle type, taking into account their reliability, constructibility and maintainability.

b) Emergency Power Supply

In the generator room will be installed a diesel-engine-driven generator with an output rating of a 3-phase, 4-wire system 400/230V 50Hz 180kVA (approximately). The engine shall be provided with an electric automatic starter and automatic change-over switching device from city power. The power generated will be supplied to important equipment and facilities which must not experience any long duration power

failure, such as in the broadcasting installations, the continuity studios, control rooms, Master Control Room, radio room including lighting installations for the foregoing rooms, water supply pump, fire fighting pump and some of the air conditioning system.

c) Main-feeder and Power Line Wiring

The main-feeder system includes the lines for broadcasting equipment, lighting, socket-outlets, for powering of air conditioners and the water supply system, and lighting for the multipurpose studio. As for the wiring system for the main-feeders, the steel conduit wiring system and cable-rack wiring system shall be adopted from the point of view of durability, economy and constructibility. In order to avoid obstructions or interference being caused to broadcasting equipment owing to electric noise generated, the main power lines mentioned above shall be laid in such a way that their coming close to or crossing with the broadcasting equipment and their wiring is avoided as much as possible.

d) Lighting Installation

From the point of view of achieving maximum color-rendition and economy, the light source shall consist mainly of fluorescent lamps. As for the levels of illumination for each room, the JIS (Japanese Industrial Standard) shall be applied but also considering other factors such as the general conditions in Sri Lanka, the following standards shall be adopted:

Continuity studios, control rooms, master control room, radio room, etc.	400 lx
Multipurpose studio, electricity room, air conditioner room,	200 lx
Corridors, staircases, toilets, stores, etc.	100 lx

As to the types of fluorescent-lamp lighting fittings, those to be used in the multipurpose studio (general lighting) maintenance room, control rooms, etc., shall be of a flush-type, while those in such rooms as the electricity room, air conditioner room and stores shall be of batten type.

As to the fluorescent-lamp lighting fittings used in the studios, they shall be of a type in which the ballast is installed separately from the fitting itself in order to prevent noise interference to the broadcasting equipment.

e) Socket-outlets

Socket-outlets of various types, some for general use and others for broadcasting-equipment use, will be installed appropriately in each room. The types and standards of such socket-outlets shall be those that are compatible the outlets generally used in Sri Lanka.

f) Fire-alarm System

Taking into consideration the importance of the broadcasting facilities, the minimum necessary automatic fire-alarm equipment will be installed at appropriate locations in the building. In addition, a heat or smoke detector will be installed in each room excepting toilets, and push-button fire alarms, alarm bells, etc., will be set up at crucial locations within the building, such as in corridors. An alarm receiving panel shall be installed at a location in the building where staff will be working 24 hours a day.

g) Telephone Conduit System

In order that telephone sets may be installed at necessary locations in each room, a terminal box for telephones will be installed and the conduits between the terminal boxes and from each terminal box to each telephone set will be laid.

h) Earthing

For the building's electrical installations and for the broadcasting equipment, the following earthing will be provided and their installation and wiring for the terminal boxes for connection use will be conducted.

(Earthing for)	(Earth Resistance Value)
Low-voltage (400/230V) equipment	Less than 10 ohms
Broadcasting equipment	Less than 10 ohms
Telephone conduit	Less than 100 ohms
Lightning protection system	Less than 10 ohms

2) Water-supply, Drainage and Sanitary Equipment

a) Water-supply

Water will be drawn from the city water mains running on the side of Torrington Square to as far as the meter installed on the premises (this portion of the construction work to be undertaken by the Sri Lankan side) and then, will be fed to each item of equipment via the water-receiving tank and the elevated tank.

The water-supply method shall be a gravity water-supply system using a pump and an elevated water tank.

The capacity of the water-receiving tank is estimated at about 5m^3 which is the total amount of water likely to be used each day.

b) Drainage

A separate system will be established within the building for drainage of soil and wastewater which will join the outdoor soil/waste pit and then be led to the final pit on the premises.

c) Sanitary Fixtures

Each toilet will be equipped with such sanitary fixtures as a lavatory basin, a shower and water closets, and also with such accessories as glass shelves and a mirror. The water closets shall be of both Western and local types, and a tap will be provided within a booth.

d) Fire-fighting Installations

In order to protect the new building from fire, indoor hydrants will be installed at appropriate locations in the corridors, etc., each equipped with hoses and nozzles. A water tank for fire-fighting purposes, with a capacity of about 6m^3, will also be set up at the bottom of the pump room.

3) Air Conditioning and Ventilation System

a) Air Conditioning

In maintaining an appropriate environment for programme-production and broadcasting equipment, the air conditioning installations play an extremely important role. A long duration stoppage of the air conditioning will seriously

obstruct continuation of broadcasting work. Hence, the adoption is being planned of an air-cooled package-type air conditioner which not only offers high reliability but also excels in economy and maintainability.

As the studios are used separately at different hours and it is also necessary to prevent noise and vibrations caused by operation of the air conditioning, the air conditioners will be set up separately for each series of rooms to be operated individually.

As for the radio room, double sets of direct-blow, air-cooled package type air conditioners (standing by each other) will be installed in the room to improve reliability of the air conditioning system. These air conditioners, which can be operated to remove moisture, will draw outside air into the room at the rate of about 0.5 time/hour and maintain room air at positive pressure to prevent dust infiltration.

The air conditioning equipment of a single-duct system will be equipped with air supply ducts and return ducts. As to the duct that passes through the attic, its design will be done with particular attention paid to shutting off noise and making it vibration-proof.

The operation and monitoring of the air conditioners in different rooms, excepting the radio room, will be done from the staff room.

b) Design Conditions of Air Conditioning

The design conditions for air conditioning have been determined as follows, based on the meteorological data possessed by the Department of Meteorology and the design standards of the ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) :

b-1) Outdoor Temperature and Humidity Conditions throughout the Year;

33.3°C D.B. 76% R.H.

b-2) Indoor Temperature

Throughout the year;

26±3°C D.B.

b-3) Rooms Applicable and Loads

The air conditioning, which will be for cooling only,

will be applicable to the continuity studios, control rooms, master control room, multipurpose studio, radio room and observation room. Heat loads by equipment, lighting and personnel will roughly be as follows in standard values:

(Floor)	(Name of Room)	(Equipment Load)	(No. of Personnel)
1st floor	· Continuity studios and Control rooms	1.5kW /room	4
	· Master control room	10kW	4
	· Multipurpose studio and Control room	Equipment 10kW Lighting 30kW	150
2nd floor	· Radio room	13kW	8
	· Observation room		45

c) Ventilation

The general-type rooms facing the open air will not be air-conditioned but, instead, by means of architectural design, will be so maintained as to ensure that maximum use is made of natural ventilation to save energy. In the case of offices, however, fixed ceiling-fans will be installed.

d) Mechanical Ventilation Fans

Mechanical ventilation equipment will be installed in the rooms where heat, dust, odors or moisture tend to be generated. The ventilation method will be of the Class 3 Mechanical Ventilation (exhaustion) System. The names of rooms to which mechanical ventilation will be applied and the frequency of air changes are as follows:

(Name of rooms)	(Air changes)
Generator room	8 times/hour
Electricity room	8 times/hour
Air conditioner room	5 times/hour
Pump room	5 times/hour
Store	5 times/hour
Toilet	30 $m^3/m^2 \cdot h$

e) Fixed Ceiling-fans

The fixed ceiling-fans will be installed in the following rooms:

Supervisor's room, Engineer's room, Maintenance room, Night duty room and Entrance.

(6) Architectural Acoustic Plan

1) Sound-insulation and Vibration-proof Measures

The western and the northern sides of the construction site each face a road. However, the road on the western side is currently closed and there is almost no traffic on the road that runs on the northern side of the site. So, the site does not suffer from traffic noise. (The result of the measurements made of traffic noise at two locations near the border of the site, including the portion where facilities already exist, is included in the Appendices at the end of this Report.) And there is no other outside noise that may become harmful to the facilities to be constructed. However, taking into account the possible increase in traffic volume in the future, all of the studio walls that directly face the outside will be provided with an interior sound-insulation layer (of dry construction).

Between two adjacent studios, double walls (of concrete blocks) will be built including the control room portions, in order to prevent cross talk. All the studios will be arranged on the ground floor. Since there is nothing in their surroundings to become a source of vibration, none of the studios will be of vibration-proof structure. (The main building equipment rooms will be built separate from the studio block.)

The acceptable noise level (air conditioning noise) for the studios and control rooms shall be NC-25, respectively, as a design target. For that reason, the necessary number of sound absorbing ducts (or sound absorbing chambers) will be attached to the supply and return ducts of each duct system, in the sound generating room (air conditioner room) and in the studios and control rooms, respectively. In the case where return passes are installed between a studio and a control room and between a control room and a corridor, two sound absorbing elbows (or sound absorbing chambers) will be installed in each room.

As a result of measurements conducted on the air conditioning noise in the existing four rooms, viz., two production studios and two continuity studios, the noise levels were found to be NC-

30 and NC-25, respectively, in medium sound level. This is considered to be because of the wind velocity at the air outlets being too great. For reference, the measured data are included in the Reference Data Column at the end of the Report.

2) Room Acoustics Plan

a) Shape and Dimensional Ratio of the Room

The shape of the multipurpose studio shall be rectangular, and, in order to avoid flutter echoes, etc., the surface of the ceiling and the wall on either side shall be of saw-tooth form. The surface of the front wall shall be convex (1/8 inclination). The dimensional ratio of the multipurpose studio shall be of a standard ratio of 1:1.6:2.5. The height of the ceiling shall be 7.0m. The continuity studio shall be of irregular shape with two side-walls inclining. As for the continuity studio, its dimensional ratio shall be the standard ratio for a small studio, viz., 1:1.25:1.6 and the height of the ceiling, 2.5m. The height of the ceiling of the control room shall be 2.7m.

b) Reverberation Time

The reverberation time in the multipurpose studio shall be planned at a value different than that which is normally recommended. (About 0.8 second)

Furthermore, curtains shall be installed on the walls (three sides), so as to enable variation in the reverberation time by opening or closing the curtains according to the type of programme being recorded. (0.8 - 0.5 second).

The reverberation time in the continuity studio shall be about 0.2 second.

3) Interior-finish Plan

For the construction of the front wall of the multipurpose studio, reflective material will be used and, for the wall of the control room side, sound-absorbing material will be used. And acoustically, the so-called dead-end/live-end system will be adopted. On the surfaces of the side walls and the ceiling, the material for absorbing medium and high sounds and material for absorbing low sound will be arranged in a zigzag form so as to

scatter the sound. Also, in order to respond effectively to the multi-microphone recording system, acoustic screens (2000W × 3000H) will be provided. As for the continuity studio, the material for absorbing medium and high sounds and that for absorbing low sound will be arranged in a zigzag form on both the walls and the ceiling. The ceiling shall be constructed with sound-absorbing rock wool board.

The sound lock of the multipurpose studio shall have its four interior walls constructed with material for absorbing medium and high sounds and its ceiling constructed with material for absorbing medium and high sounds (sound-absorbing rock wool board).

(7) Building Materials Plan

1) For general structures, the materials and construction methods that suit the local conditions best shall be adopted as much as possible.

2) As for the construction materials, those locally available shall be adopted as much as possible. However, in selecting such materials, careful examination shall be made on such points as the material's standards, quality, marketability, price, construction method, construction period and maintainability, with regard to each position at which the material is to be used. As to the materials to insulate or absorb sounds, for use in constructing a room that requires acoustic designing, such as a studio or a control room, those to be used shall be planned mostly with Japanese products, excepting those materials whose performance is clearly known.

As for the general finishing materials, the selection shall basically follow the examples of what are actually used in the existing facilities.

3) Materials and construction methods of the main structures shall be as follows:

a) Structure of the Main Body of the Building

The foundation, pillars, beams, and floor slabs shall be of ferro-concrete structure, the type in general use in Sri

Lanka. As for concrete, the supply of ready-mixed concrete is locally available. While there is no particular problem about the cement and aggregate, it will probably be necessary to examine the possibility of using reinforcements that are manufactured in Japan or a third country, considering quality and other factors.

b) Walls

As regards the walls, the construction method universally adopted in Sri Lanaka is the brick-construction method. The locally produced bricks, however, are on the whole not of sufficiently high quality; dimensional accuracy is poor and strength is low. In this Project, concrete blocks will be used in place of bricks.

c) Roof

In Sri Lanka, the roof-trusses are generally made of wood. In this Project, however, a steel-frame structure shall be adopted because of its high performance for construction work. The locally produced timber is so hard that processing is very difficult. Besides, there are such shortcomings as the difficulty in obtaining large blocks of timber for construction, and unstable availability of the material on the market. As for the materials to cover the roof, flat roof tiles will be used, the same as in the case of the existing facilities.

d) Interior-finish Work

The rooms for general use shall be of a general-type finish, using locally produced materials. As for the walls and the ceiling of the room containing the building's equipment, a finish using sound-absorbing materials will be considered. For the studios and control rooms, various types of sound-insulating or sound-absorbing materials will be used in accordance with acoustic designs. With regard to such materials, those which are locally available will be used as much as possible, if it is more advantageous to procure the materials locally. However, if the quality of such locally procurable materials is found to be uncertain, Japanese products whose quality is proven will be used.

e) Others

Excepting large size doors of the multipurpose studio, doors for the studios and other rooms, fittings and glass which are manufactured locally will be used. The fittings shall in principle be those made of wood. For locks, the master-key system will be adopted.

(See table showing exterior and interior finish work planned.)

Table 4-1-2 Exterior and Interior Finish Schedule

Exterior Finish

Roof:	Plane tiling on Pitched roof w/Steel truss	External Wall:	Cement plastering Acrylic paint finish -- harmonizing with the existing building
Bottom of Eaves:	Asbestos cement flexible sheeting Vinyl paint finish	Base:	Cement plastering

Interior Finish

Room Name	Floor	Skirting	Wall	Ceiling	Remarks
Multipurpose Studio	Vinyl asbestos tiling on mortar setting bed	Wood H = 200	Side wall: Sound insulating layer of Gypsumboards -- Perforated plywood on rock wool & plain plywood -- Varnish finish Reflecting wall: Wall tiling on block Sound absorbing wall: Perforated plywood, wooden rib (Varnish finish) & Cloth on rock wool	Perforated plywood on rock wool & Plain plywood -- Varnish finish CH = 7000 mm	Grid pipe Curtain Sound-insulating panel Steel soundproof door & observation window
Control Room	Vinyl asbestos tiling on mortar setting bed	Vinyl tile H = 75	Perforated plywood on rock wool & plain plywood -- Emulsion paint finish	Rock wool acoustical board on Gypsumboard CH = 2700 mm	Steel soundproof door Floor trench
Sound Lock	Vinyl asbestos tiling on mortar setting bed	Vinyl tile H = 75	Perforated plywood on rock wool -- Varnish finish	Rock wool acoustical board on Gypsumboard CH = 2700 mm	Steel soundproof door
Observation Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Wooden door
Continuity Studio	Vinyl asbestos tiling on mortar setting bed	Vinyl tile H = 75	Sound insulating layer of Gypsumboards (Outer wall only) Perforated plywood on rock wool & plain plywood -- Emulsion paint finish	Perforated plywood on rock wool & plain plywood -- Emulsion paint finish CH = 2500 mm	Wooden soundproof door & observation window
Control Room	Vinyl asbestos tiling on mortar setting bed	Vinyl tile H = 75	Perforated plywood on rock wool & plain plywood -- Emulsion paint finish	Rock wool acoustical board on Gypsumboard CH = 2700 mm	Wooden soundproof door Floor trench
Master Control Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Wooden door Floor trench
Radio Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Wooden door Floor trench
Supervisor's Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Jalousie window w/Lattice wooden door
Engineer's Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Jalousie window w/Lattice wooden door
Maintenance Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Jalousie window w/Lattice wooden door
Night Duty Room	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Jalousie window w/Lattice wooden door
Entrance	Terrazzo tiling on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 3000 mm	Glass screen w/ Wooden frame
Corridor	Floor painting on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 2700 mm	Jalousie window w/Lattice wooden door Floor trench
Relief Operator's Waiting Space	Floor painting on mortar setting bed	Vinyl painting on cement plastering	Emulsion painting on cement plastering	Rock wool acoustical board (T bar method) CH = 2700 mm	Wooden partition
Toilet	Porcelain tiling		Semi-vitreous tiling	Asbestos cement flexible sheeting -- Emulsion paint finish	Jalousie window w/Lattice wooden door Shower for men
Store	Cement plastering	Cement plastering	Block facing, Pillar: Exposed concrete	Exposed concrete	Jalousie window w/Lattice wooden door
Generator Room Electricity Room	Cement plastering	Cement plastering	Block facing, Pillar: Exposed concrete Emulsion paint finish	Exposed concrete	Jalousie window w/Lattice wooden door
Staff's Room Pump Room	Cement plastering	Cement plastering	Block facing, Pillar: Exposed concrete Emulsion paint finish	Exposed concrete	Jalousie window w/Lattice wooden door
Air Conditioner Room	Cement plastering	Cement plastering	Rock wool mat hanging	Rock wool mat hanging	Jalousie window w/Lattice wooden door
Shaft	Cement plastering	Cement plastering	Block facing	Exposed concrete	Steel ladder

Notes : Vinyl asbestos tile t = 2 mm, Plywood t = 5.5 mm, Gypsumboard t = 12 & 9 mm
Rock wool acoustical board t = 12 mm, Rock wool t = 50 mm 32 k,
Rock wool mat t = 25 & 50 mm, Asbestos cement flexible sheet t = 6 mm,
Perforation ϕ 9 mm - pitch 15 mm

(8) Basic Design Drawings

The following basic design drawings are attached herewith.

Fig. 4-1-1 SLBC New Studio Building, Site Plan

Fig. 4-1-2 SLBC New Studio Building, Gnd Floor Plan

Fig. 4-1-3 SLBC New Studio Building, 1st Floor Plan

Fig. 4-1-4 SLBC New Studio Building, Elevation

Fig. 4-1-5 SLBC New Studio Building, Section

Fig. 4-1-6 Schematic Diagram of Electrical Installation

Fig. 4-1-7 Schematic Diagram of Plumbing

Fig. 4-1-8 Schematic Diagram of Air Conditioning System

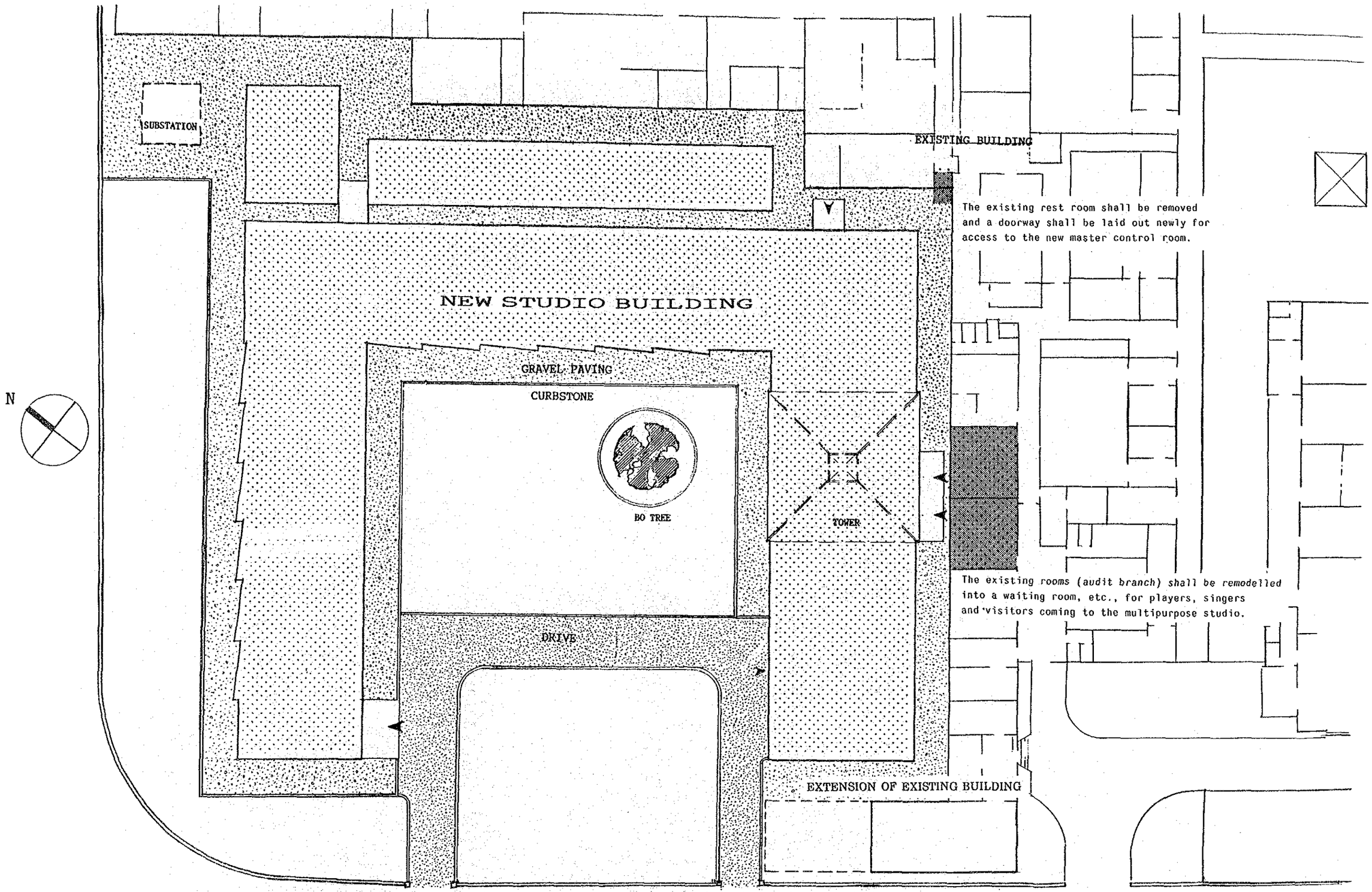
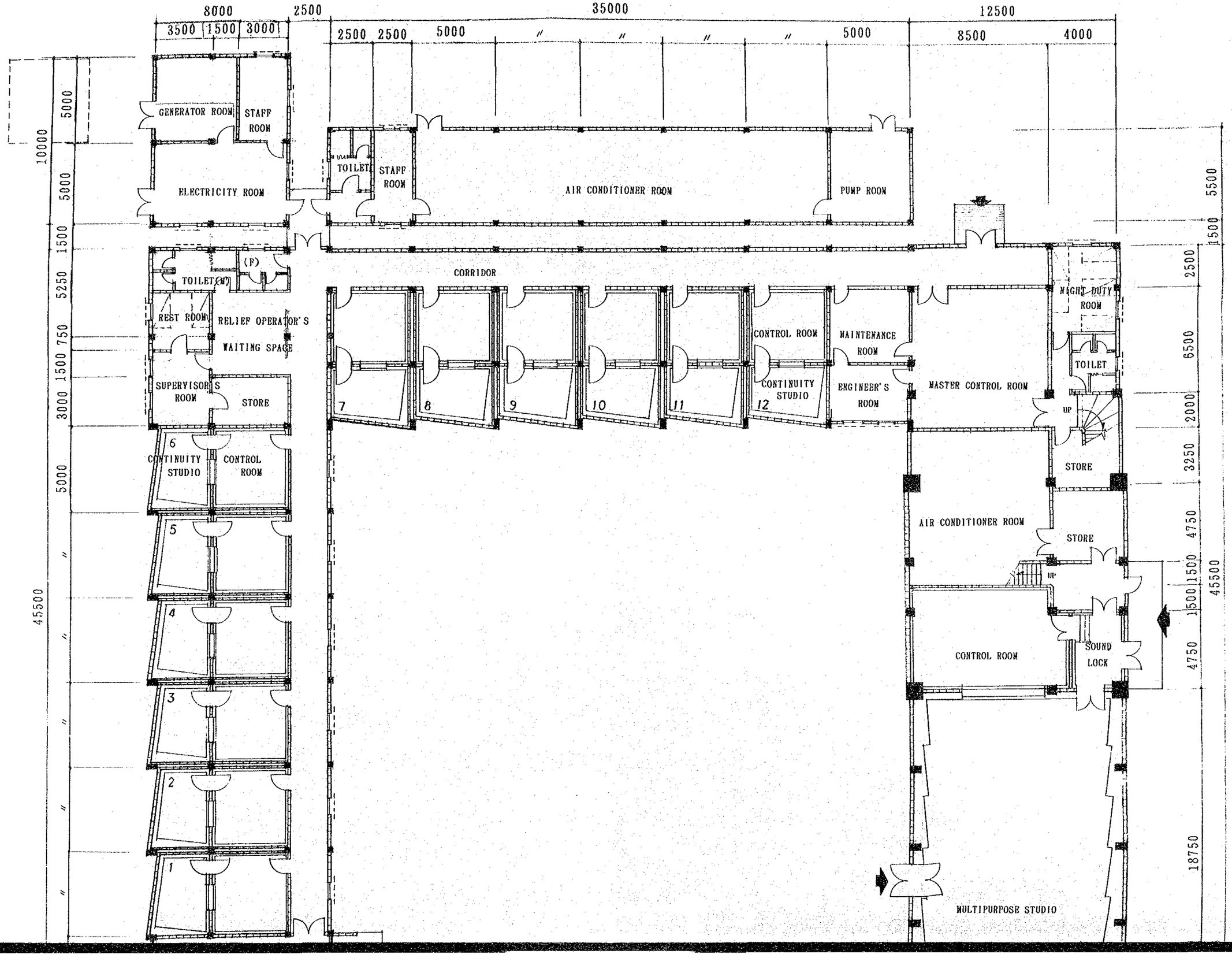


Fig. 4-1-1 SLBC NEW STUDIO BUILDING SITE PLAN SCALE 1:300


8000
2500
35000
12500
3500 1500 3000
2500 2500 5000 〃 〃 〃 〃 5000
8500 4000
GENERATOR ROOM
STAFF ROOM
ELECTRICITY ROOM
TOILET
STAFF ROOM
AIR CONDITIONER ROOM
PUMP ROOM
CORRIDOR
(F)
TOILET(M)
REST ROOM
RELIEF OPERATOR'S WAITING SPACE
SUPERVISOR'S ROOM
STORE
6
CONTINUITY STUDIO
CONTROL ROOM
5
4
3
2
1
7
8
9
10
11
12
CONTROL ROOM
MAINTENANCE ROOM
CONTINUITY STUDIO
ENGINEER'S ROOM
MASTER CONTROL ROOM
NIGHT DUTY ROOM
TOILET
UP
STORE
AIR CONDITIONER ROOM
STORE
UP
CONTROL ROOM
SOUND LOCK
MULTIPURPOSE STUDIO
10000
5000
5000
1500
5250
750
1500
3000
5000
〃
〃
〃
〃
45500
5500
1500
2500
6500
2000
3250
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45500
18750

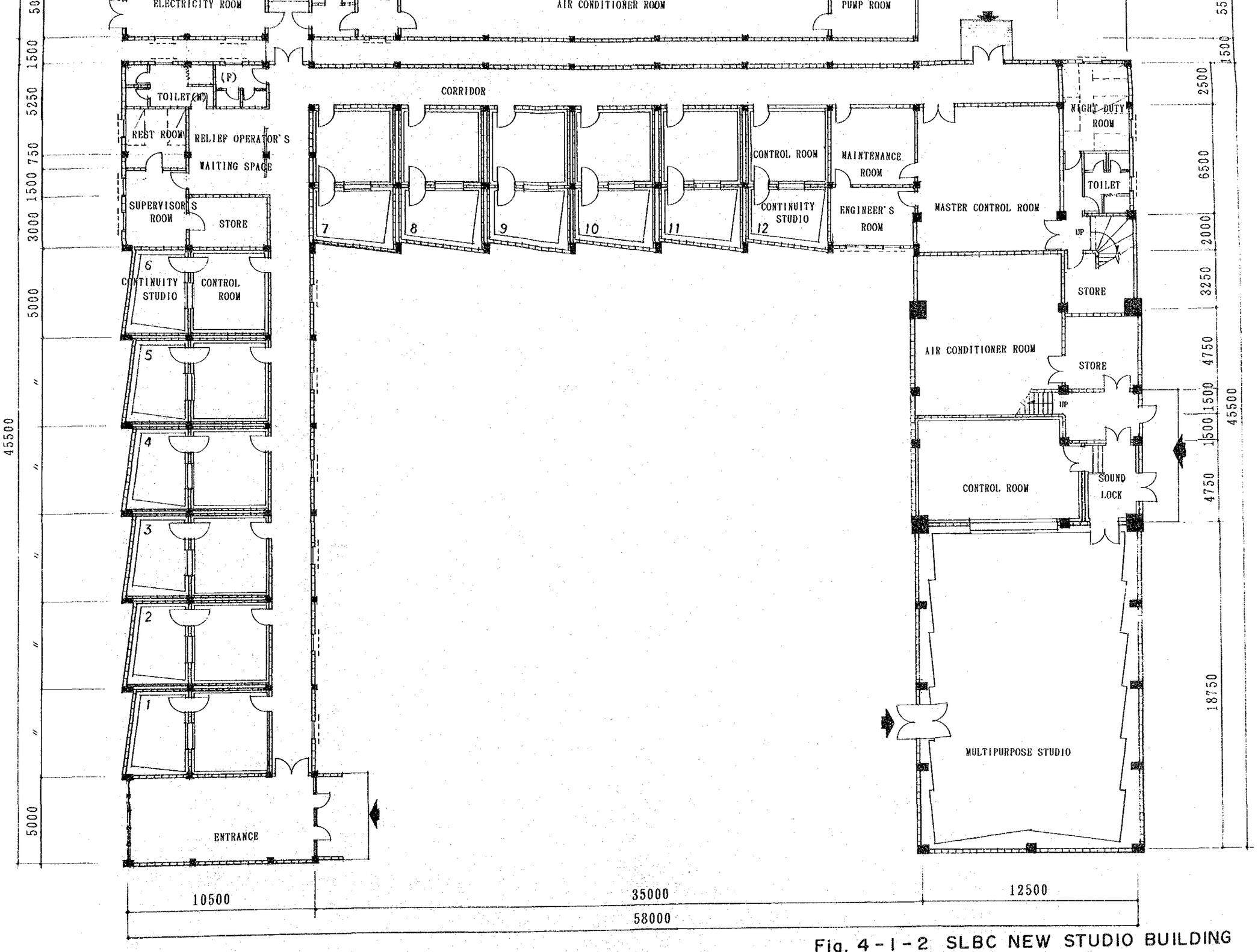
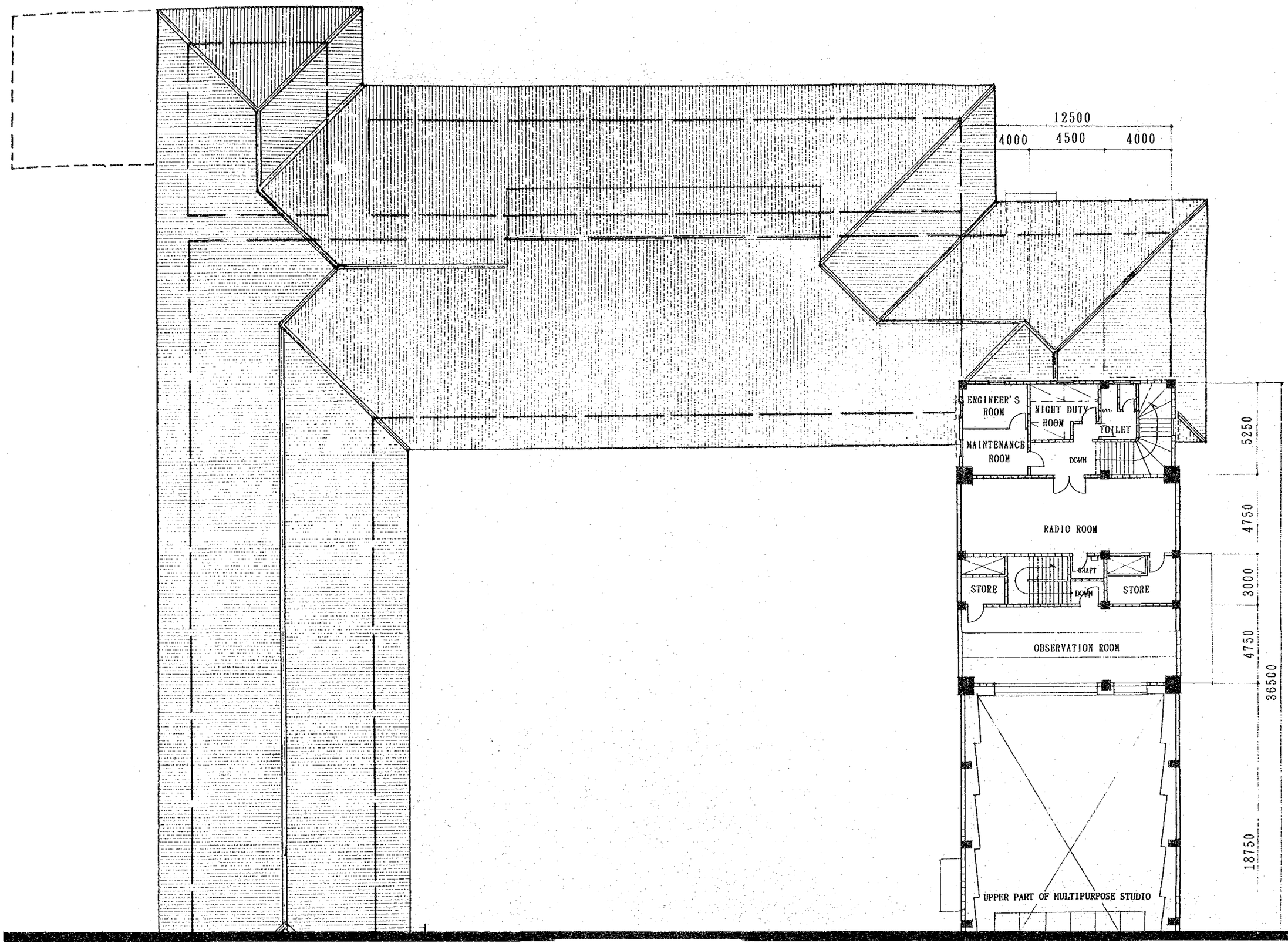


Fig. 4-1-2 SLBC NEW STUDIO BUILDING
Gnd FLOOR PLAN SCALE 1:200


12500
4000
4500
4000
ENGINEER'S ROOM
NIGHT DUTY ROOM
TOILET
MAINTENANCE ROOM
DOWN
RADIO ROOM
SHAFT
DOWN
STORE
STORE
OBSERVATION ROOM
UPPER PART OF MULTIPURPOSE STUDIO
5250
4750
3000
4750
36500
18750

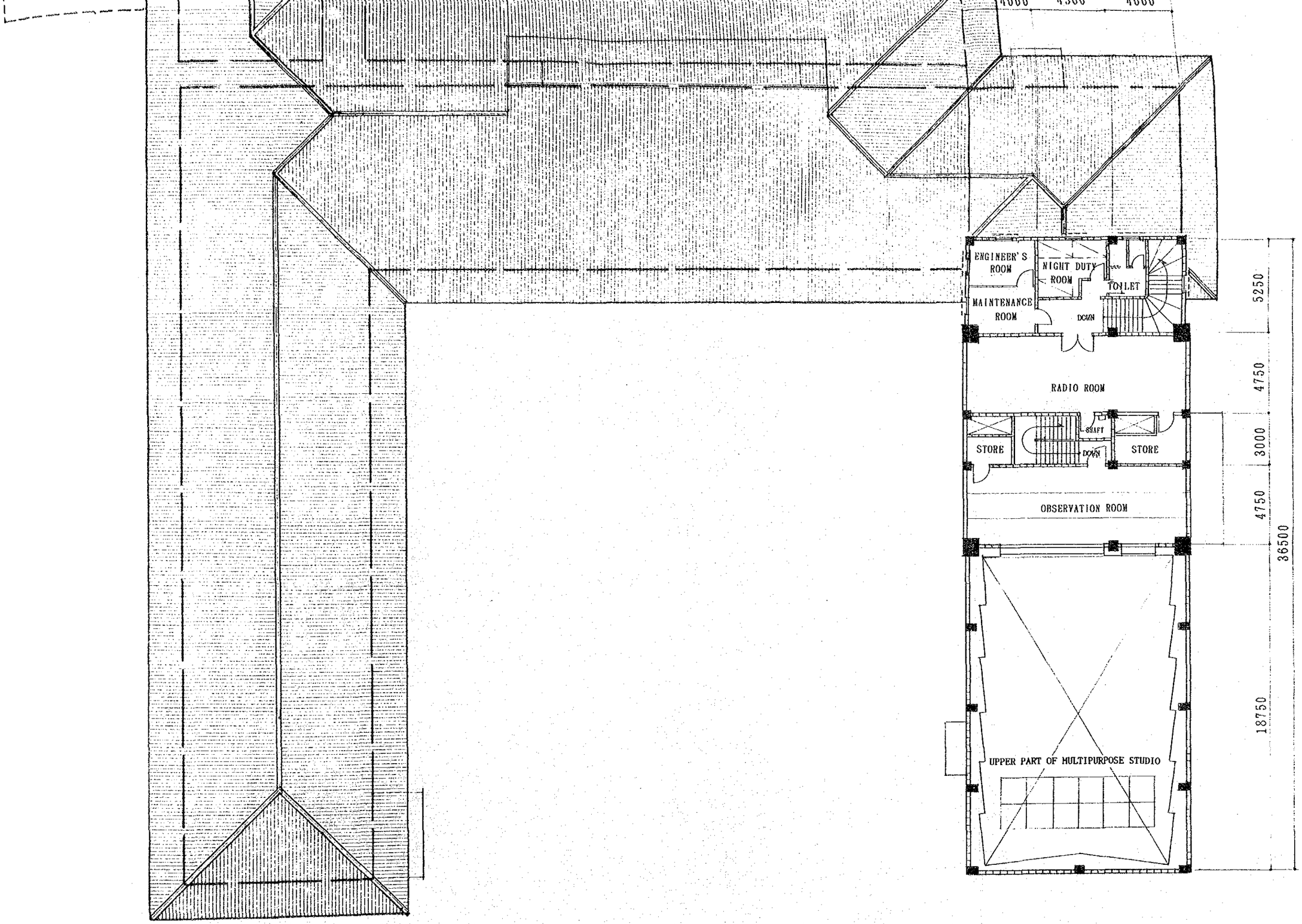
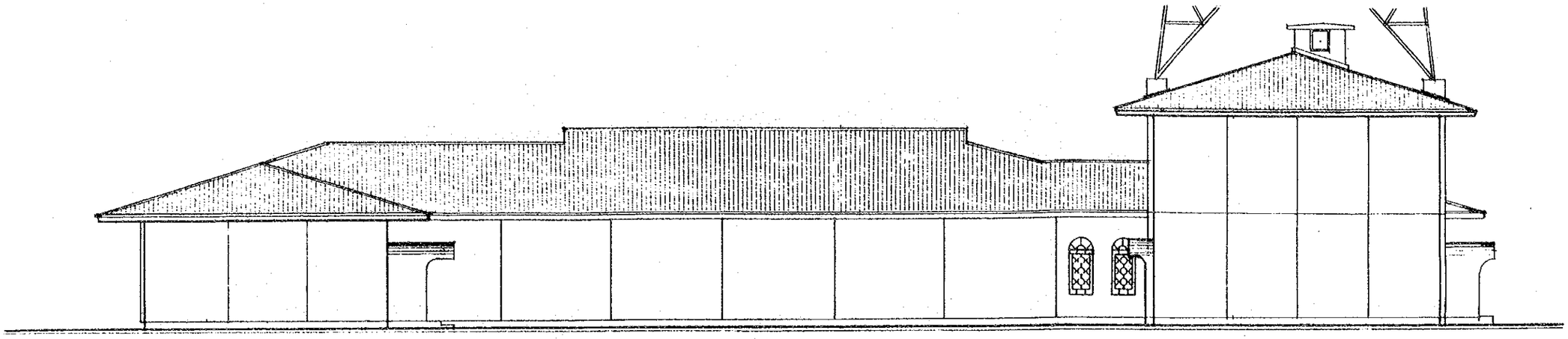
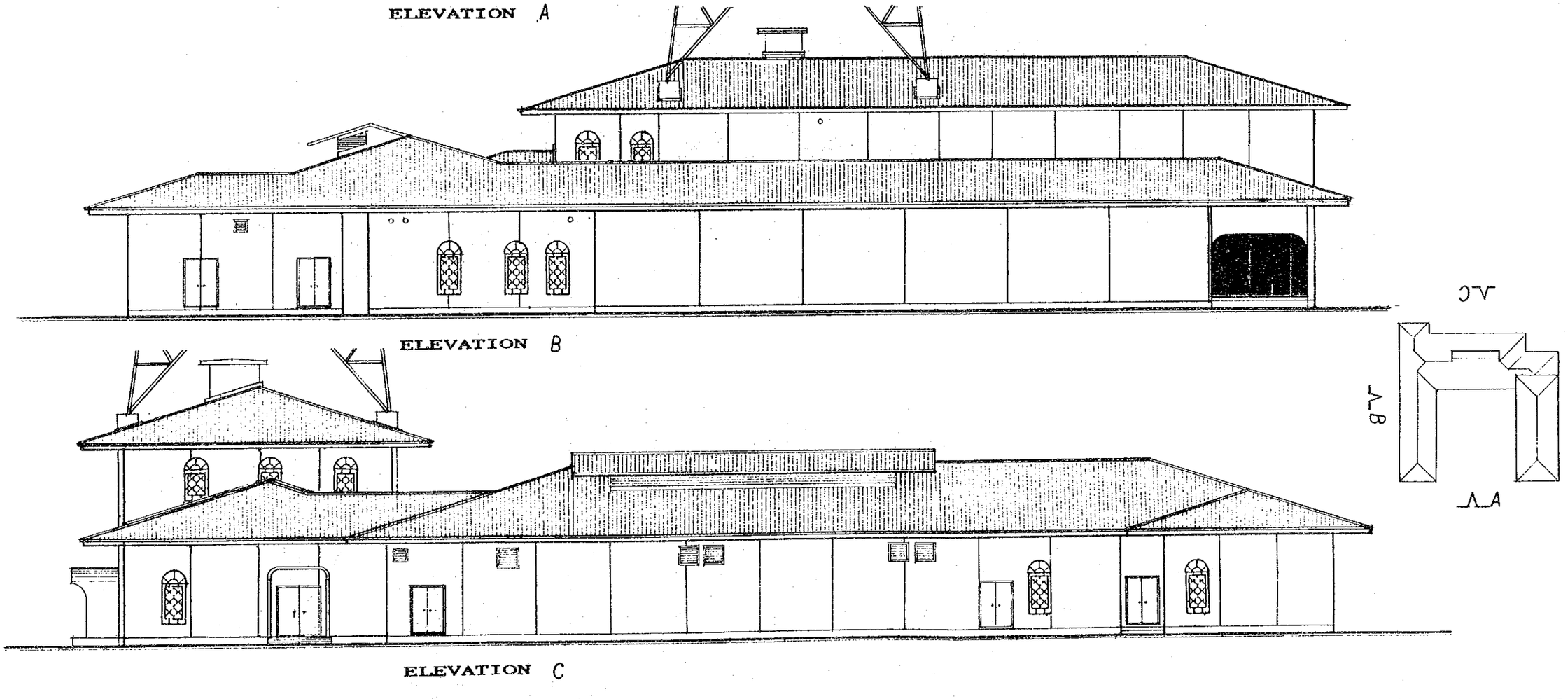


Fig. 4-1-3 SLBC NEW STUDIO BUILDING
1st FLOOR PLAN SCALE 1:200



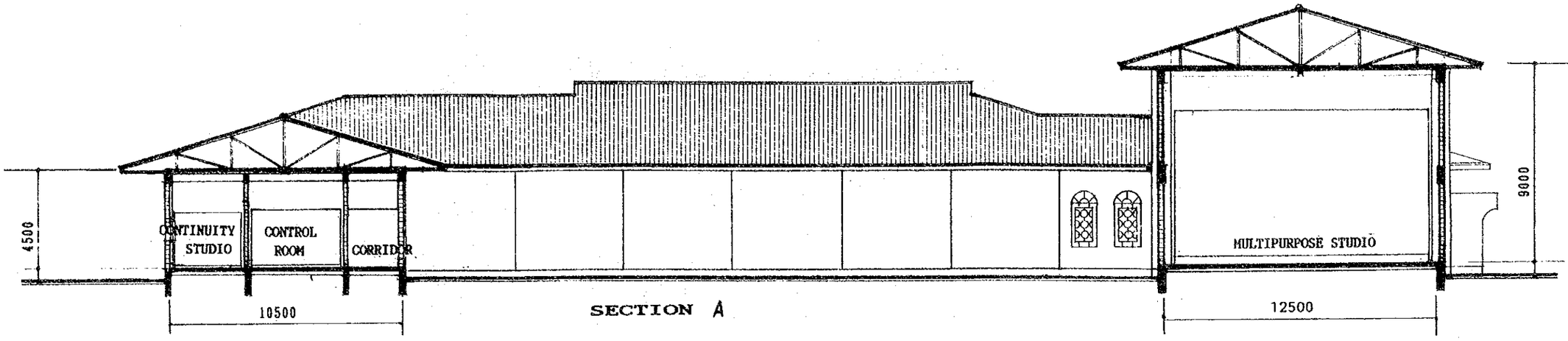
ELEVATION A



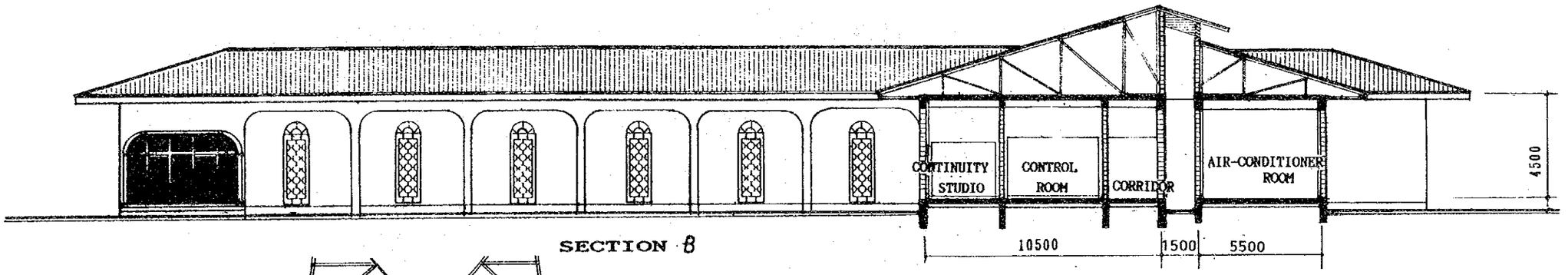
ELEVATION B

ELEVATION C

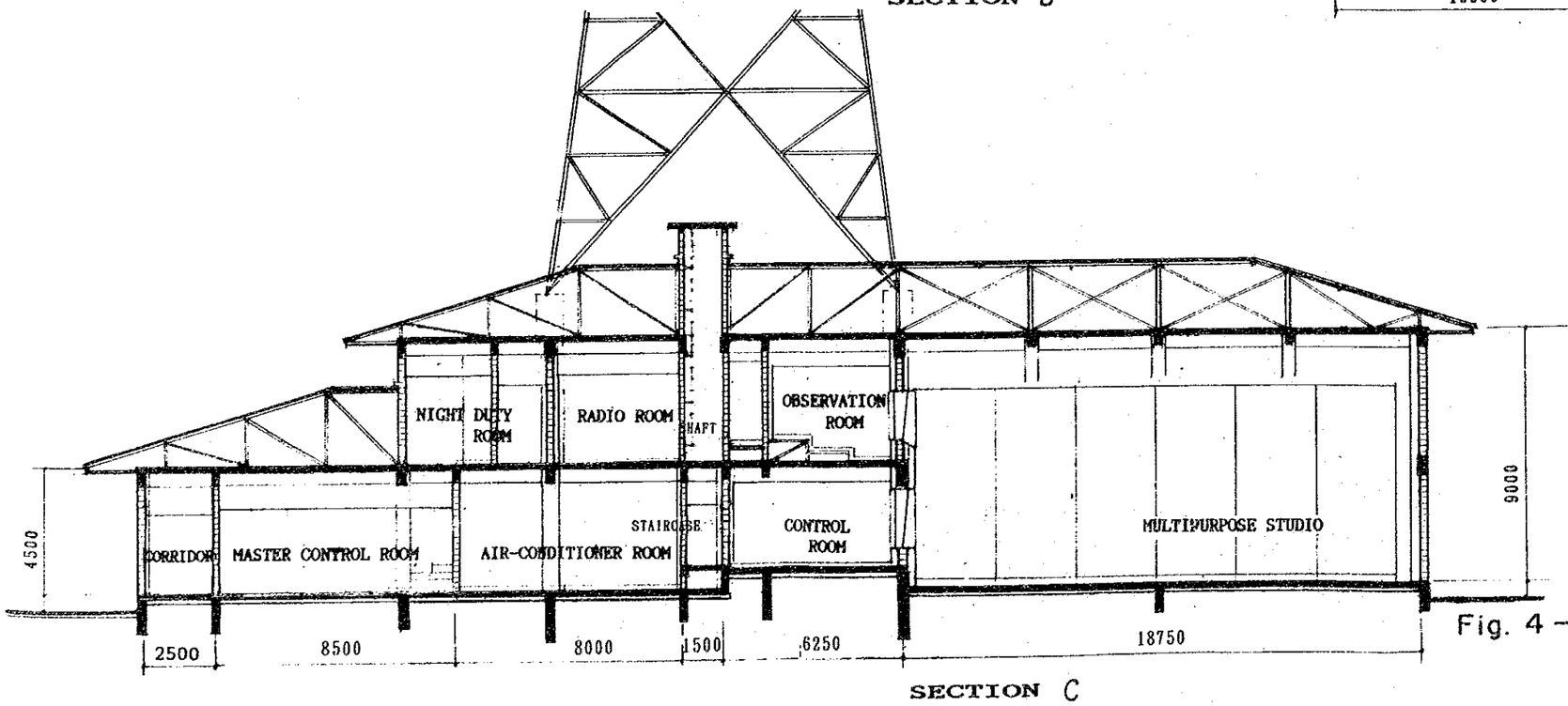
Fig. 4-1-4 SLBC NEW STUDIO BUILDING
ELEVATION SCALE 1:200



SECTION A



SECTION B



SECTION C

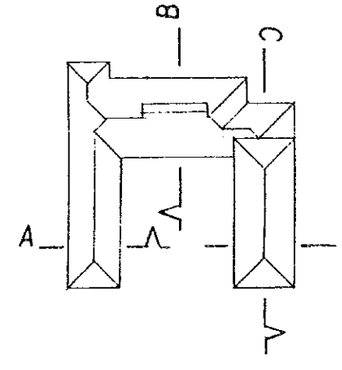
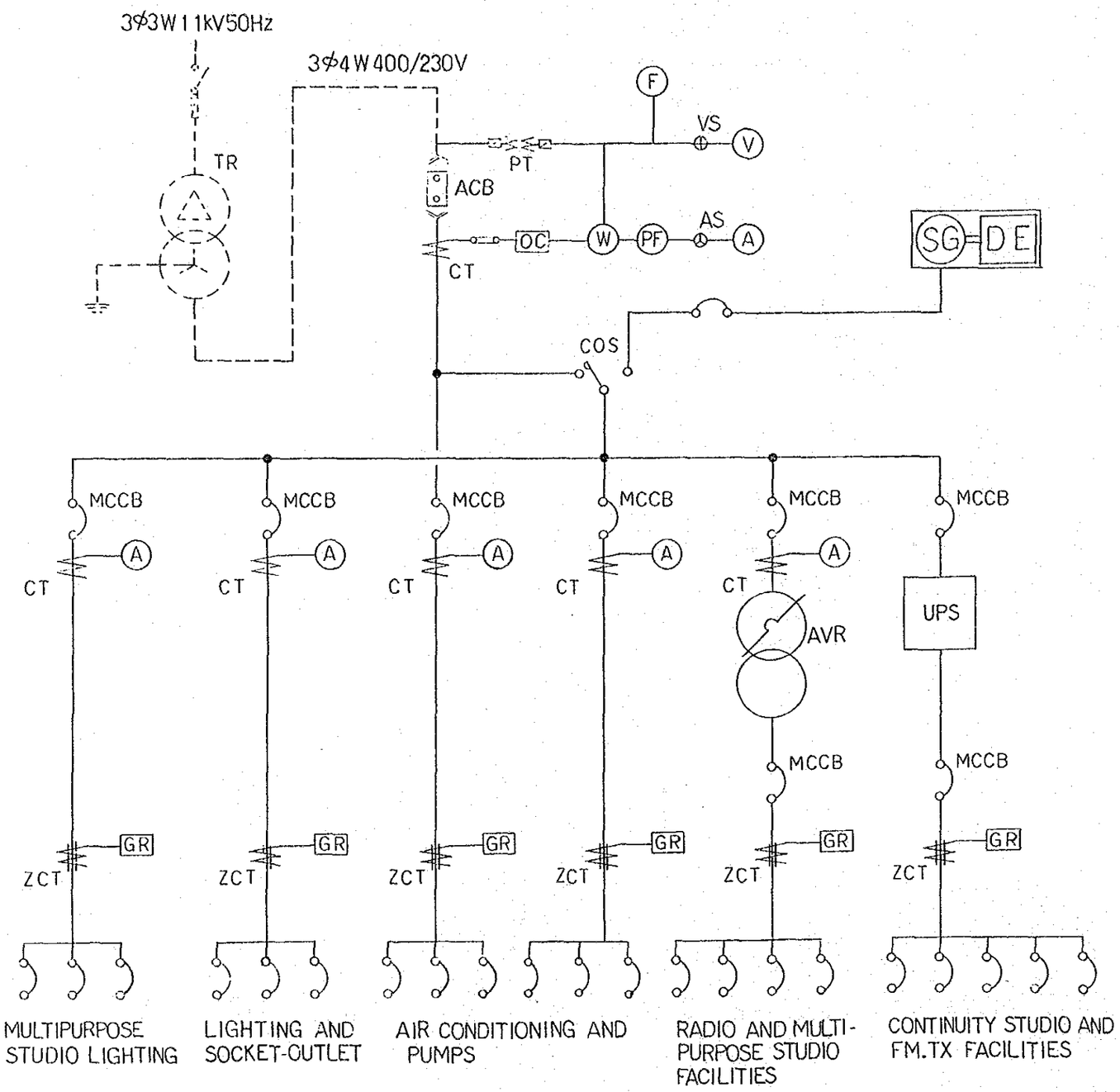


Fig. 4-1-5 SLBC NEW STUDIO BUILDING
SECTION SCALE 1:200



LEGEND

A	AMMETER
ACB	AIR CIRCUIT BREAKER
AS	PHASE CHANGEOVER SWITCH FOR AMMETER
AVR	AUTOMATIC VOLTAGE REGULATOR
COS	CHANGEOVER SWITCH
CT	CURRENT TRANSFORMER
DE	DIESEL ENGINE
F	FREQUENCY METER
GR	GROUND RELAY
MCCB	MOLDED CASE CIRCUIT BREAKER
OC	OVER CURRENT RELAY
PF	POWER FACTOR METER
PT	POTENTIAL TRANSFORMER
SG	SYNCHRONOUS GENERATOR
TR	TRANSFORMER
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTMETER
VS	PHASE CHANGEOVER SWITCH FOR VOLTMETER
W	WATTMETER
ZCT	ZERO PHASE-SEQUENCE CURRENT TRANSFORMER

Fig. 4-1-6 SCHEMATIC DIAGRAM OF ELECTRICAL INSTALLATION

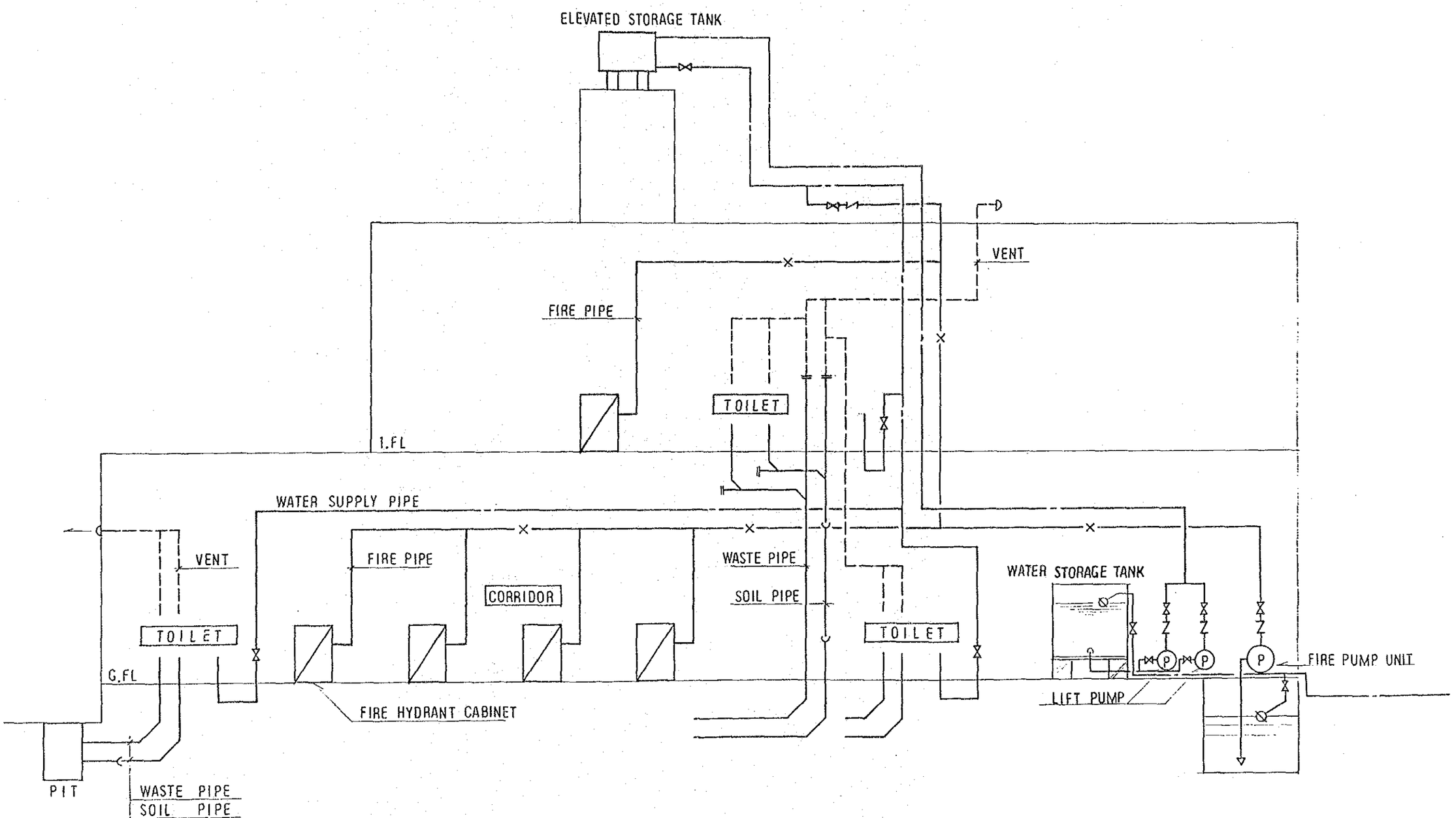
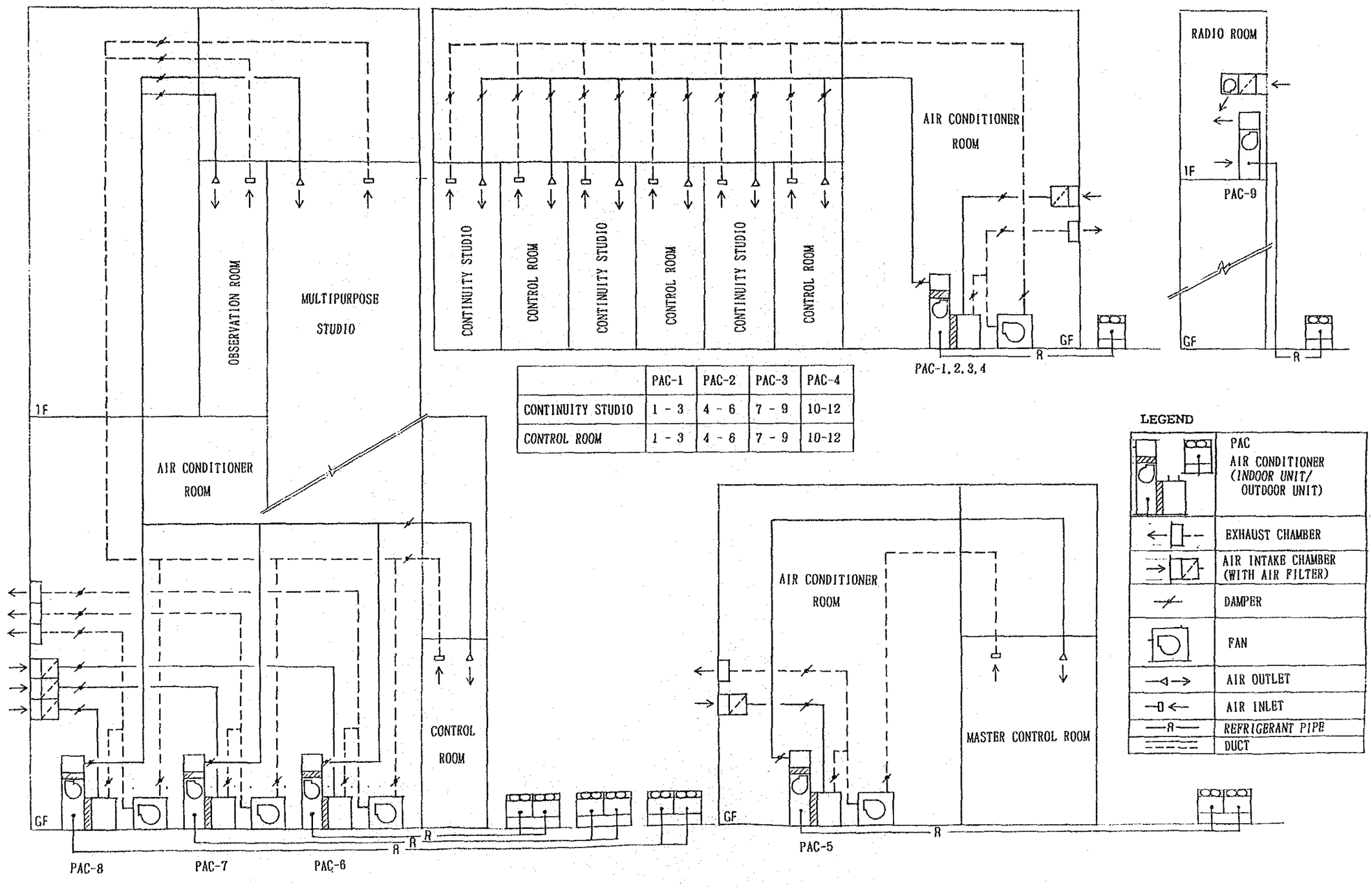


Fig. 4-1-7 SCHEMATIC DIAGRAM OF PLUMBING



	PAC-1	PAC-2	PAC-3	PAC-4
CONTINUITY STUDIO	1 - 3	4 - 6	7 - 9	10-12
CONTROL ROOM	1 - 3	4 - 6	7 - 9	10-12

Fig. 4-1-8 SCHEMATIC DIAGRAM OF AIR CONDITIONING SYSTEM

4-2 Basic Design - II : Broadcast Equipment Plan

4-2-1 Design Policy

In designing the broadcast equipment for the Project, the basic policy has been established as follows:

(1) The facilities most suitable for the Project should be provided to gain the most effective results within the framework of the assistance aid.

(2) Equipment and construction methods most suitable for the purpose of the facilities and the limited completion period should be employed.

(3) The project cost should be minimized by the maximum use of the local work force and by a systematic combination of material supply and local production.

(4) The system design should be made in consideration of future expansion.

(5) Equipment specifications should basically accord with the technical standards of the International Radio Consultative Committee (CCIR), and equipment must be designed to be safe and solid both mechanically and electrically.
In addition, due consideration should be given to such factors as maneuverability, maintainability, reliability, economy, supply of spare parts, etc.
Spare parts should be supplied, in principle, in the form of spare modules for easy replacement.

4-2-2 Examination of Design Conditions

Design conditions are examined on the following items.

(1) To expand the service area in quantity as well as in quality in and around the Colombo area.

(2) To design a total system in consideration of interfacing with the existing system such as existing off-air relay stations.

(3) To unify quality of FM reception in the service area by employing a common antenna with high gain for all 7 FM transmitters.

(4) To provide better environmental conditions in the radio room so that the transmitters can operate stably for a long period of time.

(5) To pay sufficient attention in advance to the whole process of construction work so as to avoid any interruption to the continuation of broadcasting services.

(6) To design a reliable system taking into account the tropical climate in Sri Lanka with its characteristic high temperatures and humidity.

4-2-3 Basic Plan

(1) Multipurpose Production Studio Equipment

1) Equipment Plan

The system of the multipurpose production studio is applicable for producing not only dramas, traditional music and modern music in stereophonic sound, but also audience-participation programmes such as speeches and discussions by distinguished persons from various fields, etc.

The mixing console has 24 input channels each of which is equipped with built-in tone control circuits. The circuits permit the elimination of unnecessary frequency bands, compensation for frequency characteristics and boosting of well-modulated sounds. Furthermore, the tone control circuits create special sound effects particularly required in a drama production.

Nowadays, music is recorded with a multi-microphone arrangement where microphones are placed near each musical section or instrument, by which clearer sounds and better separation between each musical section can be obtained. The microphone outputs of each musical instrument are separately recorded on 8-channel

multi-track tape through the audio mixing console. Afterwards, when the recorded sounds are tracked down to stereo or monaural, they are mixed in such a way that the best balancing in volume among musical sections is obtained.

This multi-track recording system also effectively performs useful services in producing dramas and in dubbing sounds, because actor's lines, music, sound effects, etc., are recorded on separate channels and are dubbed in with best balance later.

One multi-track recorder set, 4 sets of stereo recorder/players, and two sets of cartridge players are provided as tape machines. One of the cartridge players has a recording amplifier which provides the player with a recording function.

Today, the use of vinyl disc players is gradually decreasing but SLBC has lots of discs in stock. Two sets of disc players, therefore, are provided for those discs, and two sets of CD players are provided for playing compact discs, the latest counterpart of conventional vinyl discs.

Four sets of electronic reverberation machines are provided to add echo as required during music recording, special sound effects (like fantasy scenes) of drama recording, etc.

Two loudspeakers in the control room enable an audio mixing man to monitor sounds in stereo when he mixes sounds. Four loudspeakers are provided for the purpose of public address in the studio floor.

The necessary amount of microphones and their supporters are to be supplied. Various types of microphones such as ribbon microphones, condenser microphones, etc., and various types of supporters from desk stands to boom stands are provided, considering wide varieties of recording programmes.

The system diagram and floor layout of the multipurpose studio are attached as Fig. 4-2-1 and Fig. 4-2-2 respectively.

2) Equipment List

The principal equipment making up the system of this studio is shown in Table 4-2-1.

Table 4-2-1 Equipment List of Multipurpose Production Studio

			Remarks
a)	Audio Mixer (24-input channel)	1 set	The input modules to have an equalizer
b)	Disc Player	2 sets	Three speeds: 33 1/3, 45, 78 rpm
c)	Tape Recorder/Player	4 sets	Tape speeds: 19 cm/s, 38 cm/s
d)	Compact Disc Player	2 sets	
e)	Cartridge Tape Player	2 sets	NAB cartridge tapes applicable
f)	Recording Amplifier for above equipment	1 set	
g)	Multi-channel Tape Recorder/Reproducer	1 set	Tape speeds: 19 cm/s, 38 cm/s 8-channel
h)	Test Tape (Multi-Channel, Cartridge, Cassette, CD, etc.)	1 set	
i)	Reverberation Machine	4 sets	Variable reverberation time
j)	Monitoring Speaker		
	i-1) Speaker in Control Room	2	
	i-2) Speaker in Studio Floor	4	
	i-3) Speaker in Observation Room	2	
k)	Microphone and Accessories	1 set	
l)	Studio Lighting Equipment	1 set	Lighting fixtures to have pantographs
m)	Connector Board	5 sets	
n)	On-air Display	4 sets	

(2) Continuity Studio Equipment

1) Equipment Plan

Seven continuity studios in stereo and five continuity studios in mono, 12 in total, are provided. The audio mixer has 12-input channels consisting of:

Microphone	1
Distribution matrix outputs	5 max.
(Remote sources, production studio outputs, etc.)	
Disc player outputs	2
Tape player outputs	2
Compact disc player outputs	2
Cartridge tape player outputs	3
News studio outputs	3 max.

The total outputs become a maximum of 18 but a twelve input mixer is used by providing an input switch to the input module.

In the control room, as described above, disc players, CD players, open-reel tape players and cartridge tape players are provided so that all sound materials available in SLBC can be reproduced and sent out for transmission. These players are stereo versions though they are installed in the mono studios because almost all materials are assumed to be stereophonic. In the case of the mono continuity studios, stereo sound from players are converted into mono by use of a matching box and sent to the mixer.

A microphone is provided in the studio floor and used to produce live disc-jockey programmes, announcements, discussion programmes with a few panelists, etc. The microphone has a cough box which an announcer can operate to cut the microphone output on any occasion, for example, when he feels like coughing. An announcer table in the studio is covered with a sort of velvet so as not to generate noise when he turns scripts.

Two loudspeakers for the stereo control rooms and one speaker for the mono control rooms are provided to monitor sounds. Similarly, two loudspeakers are provided in the stereo studio floor and one speaker in the mono studio floor.

The system diagram is shown in Fig. 4-2-3 and the floor layout in Fig. 4-2-4.

2) Equipment List

2-1) Stereo Continuity Studios

Each of the seven stereo continuity studios has the equipment shown in Table 4-2-2.

Table 4-2-2 Equipment List of Stereo Continuity Studio

			Remarks
a)	Stereo Audio Mixer (12-input channel)	1 set	On-air signals to be monitored
b)	Stereo Disc Player	2 sets	Three speeds: 33 1/3, 45,78 rpm
c)	Stereo Tape Recorder/Player	2 sets	Tape speeds: 9.5 cm/s, 19 cm/s
d)	Stereo Compact Disc Player	2 sets	
e)	Stereo Cartridge Tape Player	3 sets	NAB cartridge tapes applicable
f)	Monitoring Speaker		
	f-1) Speaker in Control Room	2	
	f-2) Speaker in Studio Floor	2	
g)	Microphone and Accessories	1 set	
h)	Announcer's Table and Cough Box	1 set	With on-air tally light
i)	On-air Display	3 sets	

2-2) Mono Continuity Studios

Each of the five mono continuity studios has the equipment shown in Table 4-2-3.

Table 4-2-3 Equipment List of Mono Continuity Studio

			Remarks
a)	Mono Audio Mixer (12-input channel)	1 set	On-air signals to be monitored
b)	Stereo Disc Player	2 sets	Three speeds: 33 1/3, 45, 78 rpm

c)	Stereo Tape Recorder/Player	2 sets	Tape speeds: 9.5 cm/s, 19 cm/s
d)	Stereo Compact Disc Player	2 sets	
e)	Stereo Cartridge Tape Player	3 sets	NAB cartridge tapes applicable
f)	Stereo-to-Mono Conversion Box	9 sets	
g)	Monitoring Speaker		
	g-1) Speaker in Control Room	2	
	g-2) Speaker in Studio Floor	1	
h)	Microphone and Accessories	1 set	
i)	Announcer's Table and Cough Box	1 set	With on-air tally light
j)	On-air Display	3 sets	

(3) Master Control Room Equipment

1) Equipment Plan

One of the major items of equipment installed in the master control room (MCR) is a 24-input by 32-output distribution matrix.

The 24 inputs of the matrix consist of:

Remote sources	8
Multipurpose production studio output	1
News studio outputs	3
Production studio No.2 output	1
Production studio No.3 output	1
Production studio No.5 output	1
Production studio No.6 output	1
Production studio No.8 output	1
Production studio No.9 output	1
Utilities	6
Total	24

The 32 outputs consist of:

Multipurpose production studio input	1
Continuity studio inputs for English National	5
Continuity studio inputs for Tamil National	5
Continuity studio inputs for Sinhala National	5
Continuity studio inputs for Sports, Education	2
Continuity studio inputs for Middle East	2
Continuity studio inputs for Hindi Asia	2
Continuity studio input for Sinhala Commercial	1
Continuity studio input for English Asia 1	
Continuity studio input for Tamil Commercial	1
Continuity studio input for English Stereo	1
Continuity studio inputs for TWR	2
Continuity studio inputs for External	2
Utility	1
Monitor bus	1
Total	32

The matrix distributes any signals out of 24 incoming signals to any continuity studios when the signals are required. Sound level and quality of all 24 input signals can be monitored with a monitoring bus and a loudspeaker on the bus.

A remote source input rack including equalizing amplifiers, a VU meter and a loudspeaker is provided in the MCR to compensate for audio signals coming from the outside such as social gatherings, sporting fields, some spots where special events are taking place, overseas broadcasting stations, etc.

The signals come into SLBC via telephone lines or wireless links. Their level and quality are monitored at the rack position and they are equalized, if necessary, before the signals are sent to continuity studios or production studios.

The Master Control Room plays a main role in daily operations as the centre of the broadcasting station. Close communications between the M.C.R. and on-line rooms like continuity studios, news studios, etc., are essential for daily activities. Push-button interphones are placed in the necessary locations for room-to-room communications.

An accurate master clock installed in the MCR drives slave clocks in the on-line rooms in the new studio building. Based on the time the clock indicates, programmes are switched to go on the air. The existing clock system of the present building will be used as it is but three news studios (A_1, A_2, B) will have new slave clocks driven by the new master clock, because the news studios are connected to new continuity studios and used to send out live news programmes on a daily basis. It is essential that the slave clocks in the continuity studios and news studios indicate exactly the same hour.

In the M.C.R., tape recorders are provided to record remote signals and to replay them for transmission later.

In addition, equipment racks are installed in the M.C.R. to house audio distribution amplifiers which distribute audio signals to various places throughout the station, jack panels for trunk lines, the logging machines (long-duration tape recorders) described in item (7), etc.

The system diagram of the Master Control Room is shown in Fig. 4-2-5 and the floor layout in Fig. 4-2-6.

2) Equipment List

The equipment list of the Master Control Room is shown in Table 4-2-4 below.

Table 4-2-4 Equipment List of Master Control Room

		Remarks
a) Audio Distribution Matrix		
a-1) Matrix (24-input by 32-output)	1 set	Electronic crosspoints
a-2) Control Panel	1 set	To be placed on the console
a-3) Monitor Panel	1 set	To be placed on the console
a-4) Equipment Rack	1 set	
a-5) Console	1 set	

b)	Remote Source Input Rack		
	b-1) Equalizing Amplifier	8 sets	To equalize audio signals
	b-2) Monitoring Equipment	1 set	
	b-3) Equipment Rack	1 set	
c)	Audio Distribution Amplifier	18 sets	
d)	Tape Recorder/Player	3 sets	Tape speed: 9.5 cm/s, 19 cm/s
e)	Monitoring Equipment for Continuity Studio Output	1 set	With VU meters
f)	Interphone Equipment		
	f-1) Main Equipment	1 set	
	f-2) Interphone	40sets	
g)	Clock Equipment		
	g-1) Master Clock Equipment	1 set	
	g-2) Slave Clock	40sets	
h)	STL Input Equipment (to be installed in Microwave Room)		
	h-1) Audio Distribution Amplifier	12 sets	Six outputs
	h-2) Patch Panel	1 set	
	h-3) Equipment Rack	1 set	
i)	Signal Distribution Amplifier with Cable Equalization	6 sets	
j)	Rack Assembly including Patch Panel	1 set	
k)	Typewriter and copying machine for programme compilation and distribution	1 set	
l)	Monitor Equipment	2 sets	

(4) Radio Room Equipment

1) FM Transmitters

Definition of transmission scale and Effective Radiation Power (E.R.P)

The transmission scale must be designed with sufficient cost performance and to extend the service area as far as possible to include areas which have high population density such as the Colombo city district and it's outlying 2 districts while maintaining the high transmission quality of each of the 7 services in the service area.

a) Definition of Antenna Height

It is defined generally as the service area within the line of sight distance from the transmitting station by the characteristics of VHF FM wave propagation.

Colombo district and it's outskirts extend along a low-lying coastal plain with a height of about 10 metres above sea level and stretching for hundreds of kilometers.

Consequently it is geographically impossible to get the height gain of an antenna due to the flat land shape in these coastal regions.

It is necessary to consider certain factors to define the height of an antenna. There are two factors which are required; firstly, to maintain the good condition of the off-air transmission to relay stations while maintaining sufficient receiving levels and, secondly, to ensure the enlargement of the service area by stretching the line of sight distance as far as possible for an economical design. To ensure the possibility of a line of sight, this relationship was calculated taking into consideration the effective radius of the Earth between antenna height and a line of sight distance as the antenna height changes from 70m to 100m and the results are given on Table 4-2-5.

Table 4-2-5 Relationship between Line of Sight Distance and ANT Height

Height of Transmitting Antenna (m)	Line of Sight Distance (km)
60	40.2
70	43.0
80	47.3
100	49.4

As a result of this, there is a limit to getting a reasonable line of sight distance.

It will remain in the 40km range even though increasing the height of an antenna. On the other hand, the construction cost may increase uselessly.

Therefore if we could design a new antenna tower maintaining around the same height of the existing antenna, it will have a line of sight in the 40 km range which could cover the high population density area of the entire Colombo district, a third of Kalutara district and three-quarters of Gampaha district as described before.

The new E.R.P must exceed the value given on Table 4-2-6 and give sufficient field strength or more to receive FM waves by comparison with a standard level in the circular area measured by its radius with a line of sight of about 40 kilometers.

It should also satisfy the necessary and sufficient conditions matching the existing system's requirements (i.e, to maintain the present receiving levels at relay stations). Therefore the optimum scale of the system design could be an antenna height of 75m from the ground level.

Table 4-2-6 Present Effective Radiation Power (E.R.P)

Media	TX Power Output	Antenna Gain	E.R.P.
(1) English Commercial	1 kW	0 dB	1 kW
(2) Ratnapura STL (Sinhala Com.) while servicing Colombo area	300 W	5 dB (Maximum Radiation)	948 W
(3) Five Other Channels	100 W	0 dB	100 W

(Polarization: Vertical wave)

b) E.R.P. and Antenna System Design

b-1) Definition of Transmitter Power Output

Application of a high gain antenna generally causes service deterioration in the vicinity of the transmitting point.

Therefore service quality (receiving input levels) in Colombo and it's environs must be maintained by increasing transmitter power output to avoid direct influences and it should be unified at 300W for all media taking into consideration the comparatively low power output on the basis of the important Ratnapura STL, including system coordination as shown in (2) on Table 4-2-6.

b-2) Design of 7-channel FM Power Combiner

Each of the 7 power outputs goes to a diplexer to combine with one power which is fed to a 2 dipole antenna. It is necessary to be designed to equally cover the inland service area by omnidirectional antenna and to cover the service area in the coastal region by feeding lower power to the antenna facing the coastal area.

Stable performance is required in spite of ambient temperature rises to maintain resonance frequency of a diplexer at high power stage and also requires a large power capacity for the antenna system.

Therefore it will increase costs to pay for this system and will be disadvantageous. It will be possible to design a high reliability 7-channel power combiner with a

comparatively low power output of 300W for each transmitter. It is also very important to have high reliability since 7 systems are united into one from the systematic view point. The power combiner comprises a filter diplexer and constant impedance notch diplexer (CIN). As a total system it will usually increase insertion losses applying CIN type power combiners. Therefore it must be designed to make up for these losses and to get enough E.R.P. utilizing a high gain antenna.

b-3) Definition of Antenna Style and E.R.P.

As prescribed above, there shall be adopted a 2-dipole vertical antenna which has the satisfying characteristics of a V.S.W.R. (Voltage Standing Wave Ratio) covering wide band ranges for the transmission of 7 channels of FM waves.

This antenna comprises 3 faces with 6 stacks directed toward the inland area and 1 face with 2 stacks directed to the coastal area. It will be possible to get an antenna gain of about 8.2 dB and 1.98kW of E.R.P. to the inland area, after subtracting losses (including combiner and feeder losses).

Even for fringe areas at distances 40km from Colombo it will be possible to get a sufficient field strength of 45dB (3dB less than the 48dB receiving standard level in rural areas) with less noise distribution than urban areas and it will be possible to receive sufficient quality from the present FM receivers with their good noise figures. Finally it is fed to an antenna by the 39D or equivalent main feeder. As mentioned above, the summarized functions are shown on Table 4-2-7.

Table 4-2-7 Major Functions of Transmission Scale

Height of Steel Tower	: 45 m	75 meters above the ground
Height of Antenna Gain Mast	: 20 m	
Height of Building	: 10 m	
Transmitter Power Output	: 300 W	
7-Channel Power Combiner	: 3 kW	
E.R.P	: 1.98 kW	
Antenna Style	: 2-Dipole Vertical Antenna 6 stacks with 3 faces for inland area and 2 stacks with 1 face for seacoast	
Estimated Service Area	: Area within radius of about 40km from Colombo Studio More than 4 times the radius of ex-service	

2) Fixed-Base Station for VHF Communications

Existing fixed-base station systems are shown on Fig. 2-2-5 in the second chapter. This existing old base station with unstable functions will be replaced with a new system since it has been operating for VHF communications for more than 20 years. There are 2 kinds of functions for VHF communications as shown below.

No.1 Fixed-Base Station: Able to communicate on a 169.5MHz VHF band with all the other regional stations via the Radella Repeater Station (Radella FM Relay Station installed on the top of Mt. Radella 2108 meters above sea level) and on 164.0MHz with only close-by stations.

No.2 Fixed-Base Station: Able to communicate on both 163.5MHz and 164.0MHz VHF bands with only close-by stations.

It is not necessary to install the 164.0MHz channel with the No.1 Fixed-Base Station because the Radella Repeater Station has no repeater functions on 164.0MHz so that in the new system this channel shall be omitted for the No.1 Fixed-Base Station.

For that reason the No.2 Fixed-Base Station to be installed in the new radio room has a 2-channel function to communicate with close-by stations (able to change to both 163.5 and 164.0MHz).
On top of the new tower shall be installed a collinear antenna serving both as a lightning rod and an omnidirectional antenna for the use of No.2 Fixed-Base Station. On the middle of the new tower shall be installed a 5-element Yagi antenna directed toward Radella for the use of No.1 Fixed-Base Station. It has a sufficient 25W power output for both base stations. It is almost able to cover all of Sri Lanka so that it shall be good enough to install the same function of No.2 Fixed-Base Station on the Outside Broadcasting Van.

3) Transmitter Cooling System (Refer to the details of the air conditioning of the radio room in the chapter on building plans)
The environmental conditions of the new radio room must be controlled, considering the tropical high temperatures and high humidity in Sri Lanka, to maintain high reliability of the all solid-state transmitters during long duration operations. An economical design satisfying these conditions can be realized by adopting the method shown below.

a) Utilizing a Forced-Air Cooling System with a blower to dissipate high transmitter temperatures in the radio room

b) Utilizing circulation inside the room by dual air conditioning equipment which can also supply dry cooling air. This dry, cool air fills the main feeder from the dehydrater to withstand the heat generated by power transmission.

c) Room temperature usually maintains a proper and constant level and must not exceed more than 40°C, even if the dual air conditioning equipment breaks down.
In the case of a failure of both pieces of equipment, another blower can take the outside air automatically from the inlet dumper and through the air filter.

4) Equipment List

Major equipment list is outlined on Table 4-2-8.

Table 4-2-8 Equipment List of Radio Room

			Remarks
a)	FM Transmitter		
	a-1) FM Transmitter 300W	7 sets	All solid state, Mos FET PA applied
	a-2) Programme Input & Distribution Board	1 set	
	a-3) U Link Board	1 set	Antenna to dummy load selector
	a-4) Measuring and Monitor Board	1 set	
b)	FM Antenna System		
	b-1) FM Antenna	1 set	
	Antenna Element (2 dipole; 6 stacks with 3 faces for inland area and 2 stacks with 1 face for seacoast)		
	Main Feeder and Dehydrater (39D or equivalent, 100m)		
	Branch Feeder (10D or equivalent, 20 pieces)		
	Feeding parts, supporting metal parts and power splitters (T type power splitter, Junction Box)		Filterplexer, CIN
	b-2) FM 7-channel Power Combiner		
c)	Fixed-Base Station for VHF Communications		
	c-1) Collinear Ant/Main Feeder	1 set	20D or equivalent

c-2) 5-Element Yagi Ant/Main Feeder — 1 set — 20D or equivalent

c-3) VHF Transceiver — 1 set — 163.5 MHz/164.0 MHz, 25W

VHF Transceiver — 1 set — 169.5 MHz, 25W

d) STL Receiver

d-1) Installation of Ant — 3 sets

5-Element Yagi Ant/Main Feeder — 20D or equivalent

414.3MHz

(Seeduwa SW Receiving Stn)

416.0/417.7MHz

(Radella FM Stn)

170.0MHz

(Karagahattena FM Stn)

d-2) Replacement of STL RX from existing radio room — 1 set

e) FM Linear Detector for Monitoring — 7 sets

(5) Measuring Equipment

1) Equipment Plan

Appropriate maintenance service is necessary to maintain the equipment in good condition. Measuring devices capable of checking the equipment conditions precisely are required for such maintenance service. Solid and reliable instruments that are easy to use are provided in accordance with necessary maintenance items.

Furthermore, tool sets including screw drivers, cutting pliers, nippers, soldering irons, etc., are provided for maintenance work by maintenance technicians.

2) Equipment List

The equipment list of measuring instruments is shown in Table 4-2-9.

Table 4-2-9 List of Measuring Equipment

			Remarks
a)	Audio Test Set	3 sets	An audio frequency generator, measurement for distortion factors, levels
b)	Oscilloscope with Cart	3 sets	
c)	Field Strength Meter for MF Band	1 set	
d)	Field Strength Meter for VHF Band	1 set	
e)	Electronic Voltmeter	4 sets	Up to high frequency band
f)	Attenuator	2 sets	One dB steps minimum
g)	Circuit Tester	5 sets	
h)	Frequency Counter	1 set	Up to 500 MHz
i)	Spectrum Analyzer	1 set	Up to 500 MHz
j)	FM Linear Detector	1 set	VHF
k)	Stereophonic Signal Generator	1 set	Up to 500 MHz
l)	Stereophonic Signal Demodulator	1 set	
m)	VHF/UHF FM Signal Generator	1 set	Up to 500 MHz
n)	Tool Set	5 sets	
o)	Test Tapes and Discs	1 set	
p)	Acoustic Measuring Instrument		
	o-1) Noise Meter	1 set	
	o-2) Level Recorder (with Printer)	1 set	
	o-3) Octave Filter	1 set	

(6) Radio OB Van

1) Equipment Plan

Frequencies to be used for wireless links of the OB Van are allotted among the frequencies SLBC is now using.

For programme transmission (wide band) . 8 frequencies
(4 frequencies by 2 hops)

For communications (narrow band) . . . . 2 frequencies

(SLBC shall obtain permission to use the frequencies for the OB Van from the authority concerned.)

Coverage areas by the wireless links of the van are estimated at about a 50km radius from Colombo city, if there are no obstacles between the SLBC Colombo Station and a transmission point.

To increase coverage areas, two-hop links are provided, which makes it possible to cover about 60% of the Sri Lankan territory with the aid of the existing STL network.

Three programmes in three different languages are simultaneously sent out.

The base station in SLBC Colombo has antennas with a rotary mechanism which is mounted on the new tower and remotely controlled from the radio room.

2) Equipment List

The equipment list of the Radio OB Van System is shown in Table 4-2-10.

Table 4-2-10 Equipment List of Radio OB Van System

			Remarks
a)	Radio OB Van		
	a-1) Vehicle	1 set	With air conditioning
	a-2) Audio Mixer	1 set	8-input
	a-3) Audio Mixer	3 sets	4-input
	a-4) Microphone and stand	3 sets	
	a-5) Open-Reel Tape Recorder/Player	3 sets	to be placed in the vehicle
	a-6) Cassette Tape Recorder	12 sets	Portable
	a-7) Monitor Speaker	1 set	
	a-8) Air Monitor	1 set	

a-9)	Wireless Programme Link (TX)	4 sets	25W, VHF band
a-10)	Transmitting Antenna for above	1 set	
a-11)	Wireless Communications	1 set	VHF band
a-12)	Antenna for above	1 set	
a-13)	Transceiver	3 sets	Portable
a-14)	Generator/AC-DC Converter	1 set	

b) Relay Station

b-1)	Wireless Programme Link (TX)	4 sets	25W, VHF band, portable
b-2)	Transmitting Antenna for above	1 set	Portable, collapsible
b-3)	Wireless Programme Link (RX)	4 sets	VHF band, portable
b-4)	Receiving Antenna for above	1 set	Portable, collapsible
b-5)	Wireless Communications	1 set	VHF band, portable
b-6)	Antenna for above	1 set	Portable, collapsible
b-7)	Monitor Speaker	1 set	
b-8)	Portable Generator	1 set	1 kVA, 230V, 50Hz

c) Base Station (SLBC Colombo)

c-1)	Wireless Programme Link (RX)	4 set	VHF band
c-2)	Antenna for above	1 set	With remote control mounting device
c-3)	Splitter	1 set	
c-4)	Wireless Communications	1 set	VHF band
c-5)	Antenna for above	1 set	
c-6)	Monitor Speaker	1 set	

(7) Editing and Monitoring Equipment

1) Equipment Plan

Two sets of tape recorders and one compact mixer set are newly provided in each of the 9 existing continuity studios and are used for editing purposes together with the existing disc players.

Monitoring equipment consists of radio receivers (MW, SW, FM), logging machines (long duration tape recorders) and an audio ring main.

The radio sets receive medium-wave, shortwave and VHF FM programmes of SLBC. The outputs of the receivers are supplied to the logging machines for recording and to the audio ring main for monitoring.

The receivers and logging machines are mounted in equipment racks and installed in the MCR for recording on-the-air programmes.

Recorded tapes are stocked and may be reproduced when the occasion arises, for example, as records of transmissions (clients sometimes request on-air records of their commercials), as records of interruptions should such happen, etc.

For monitoring purposes, the outputs of the receivers are sent to the loudspeakers provided in the supervisor's room, relief operator's room, night duty room, etc., in the new studio building and monitored by staff members as required.

The receiver outputs with 0dBm in 75ohms are also sent to the existing audio ring main.

2) Equipment List

The equipment list of the editing and monitoring system is shown in Table 4-2-11.

Table 4-2-11 Equipment List of Editing and Monitoring System

			Remarks
a)	Editing Equipment		
	a-1) Tape Recorder/Player	2 sets × 9	Tape speed: 9.5cm/s, 19 cm/s
	a-2) Simple Mixer	1 set × 9	4- input channel
b)	Monitoring Equipment		
	b-1) AM/FM Receiver	7 sets	AM medium-wave: 535~1605 kHz FM VHF: 76~92 MHz
	b-2) Medium wave/Shortwave Receiver	6 sets	Medium-wave: 535~1605 kHz Shortwave: 6~28 MHz
	b-3) Amplifier Rack	1 set	20-hour recording
	b-4) Logging Machine	8 sets	7 media + one spare
	b-5) Wall type Speaker with Switch Panel	12 sets	

(8) Other Items

In addition to the major equipment described above, the following items are required for the completion of the Project.

1) Installation Materials 1 set

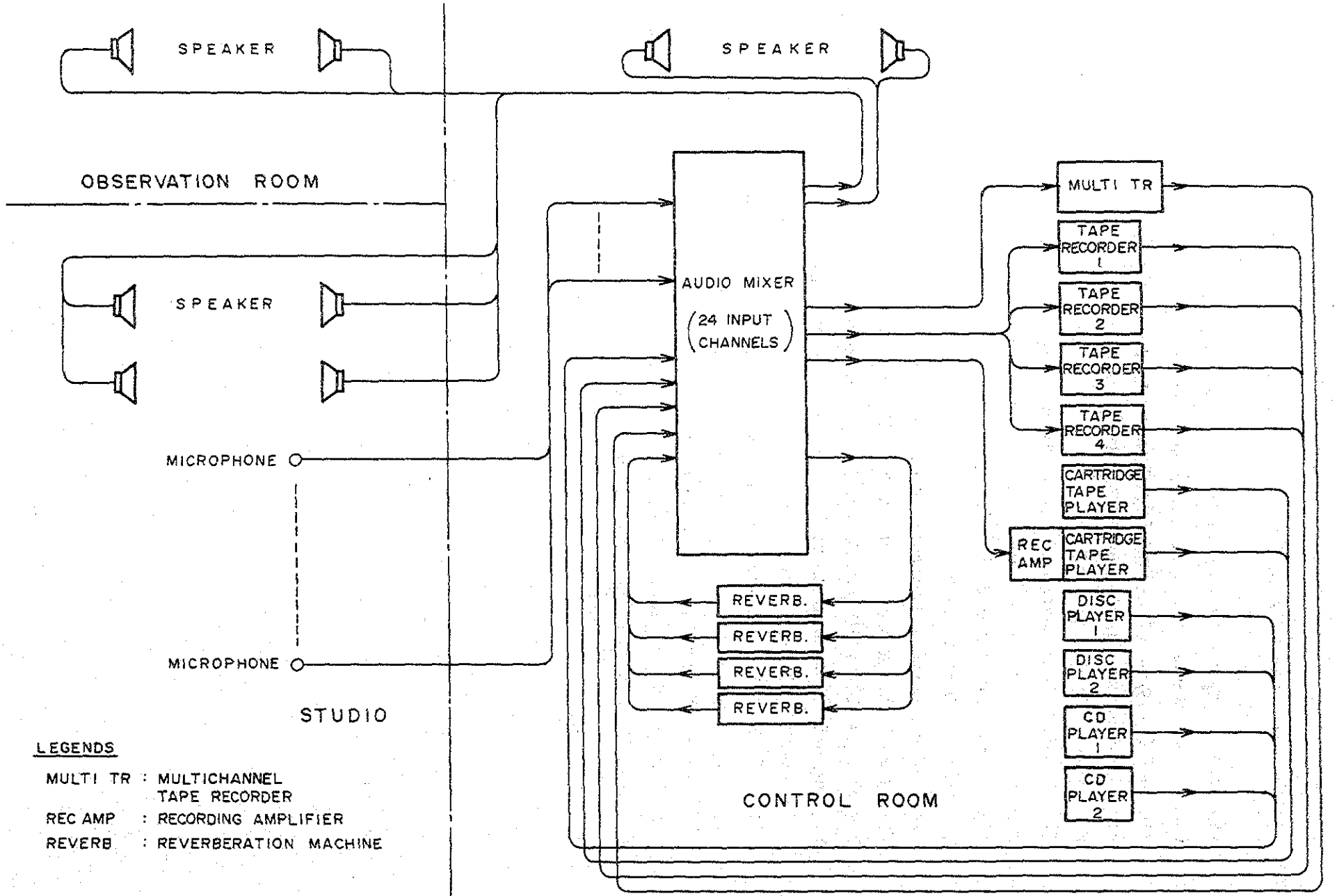
Necessary amount of audio cables, control cables, multi-conductor cables, power cables, etc., are required for the connection of equipment.

2) Spare Parts 1 set

Details are to be defined at the time of the detailed design, but the following basic parts will be supplied as a minimum so that operation can be continued for about two years without replenishing parts after installation. During this period, SLBC can record consumption of spare parts and take some budgetary actions.

Module or printed board of main equipment	1 set
Relay and switch	1 set
Lamp and fuse	1 set
Replaceable semi-conductor	1 set
Typewriter and copying machine for Master Control Room	1 set

(9) Basic Design Drawings



LEGENDS

MULTI TR : MULTICHANNEL TAPE RECORDER
REC AMP : RECORDING AMPLIFIER
REVERB : REVERBERATION MACHINE

FIG. 4-2-1 SYSTEM DIAGRAM OF MULTIPURPOSE STUDIO

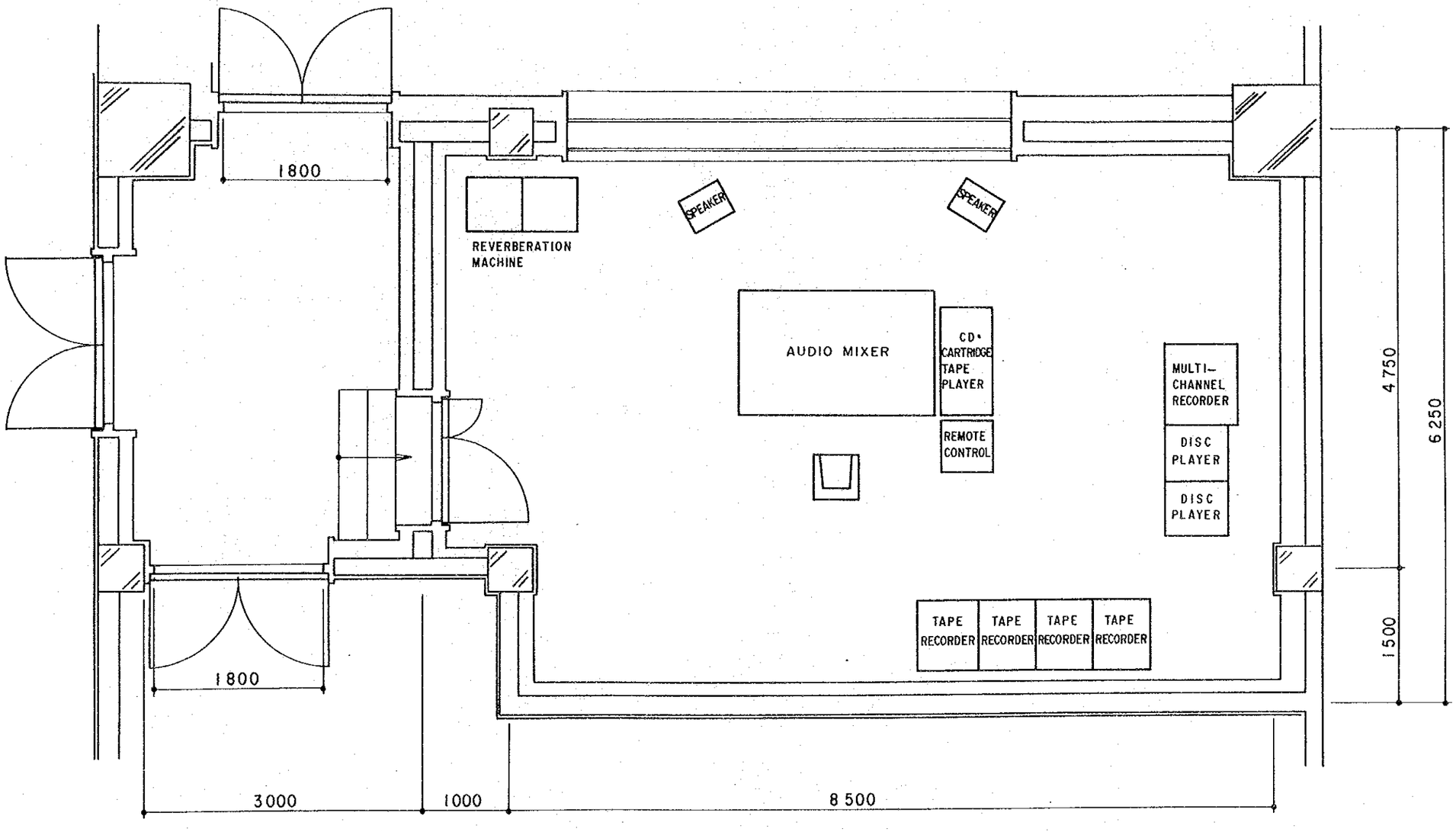


FIG. 4-2-2
FLOOR LAYOUT OF MULTIPURPOSE STUDIO 1/50

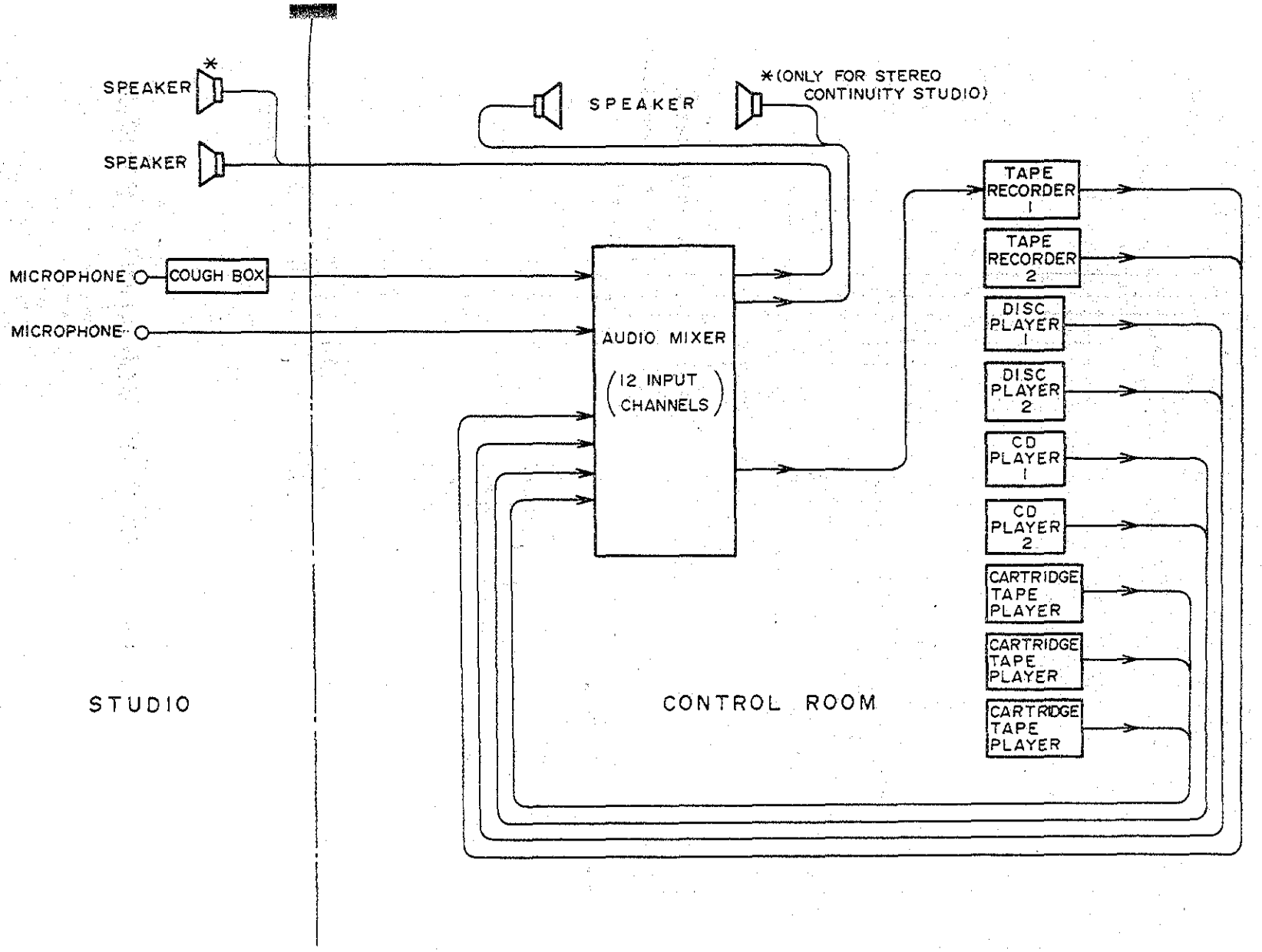


FIG. 4-2-3 SYSTEM DIAGRAM OF CONTINUITY STUDIO

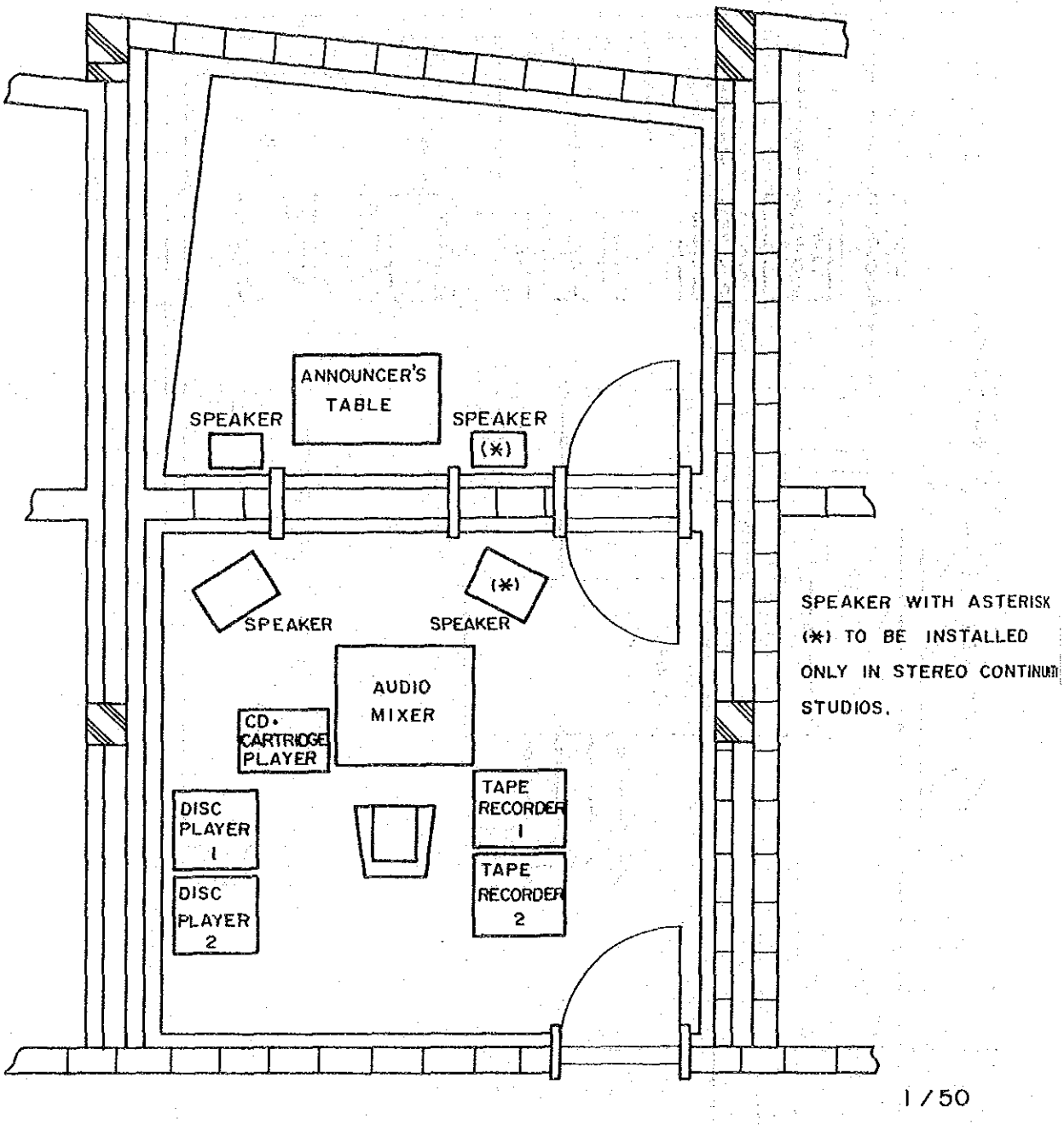


FIG. 4-2-4 FLOOR LAYOUT OF CONTINUITY STUDIO

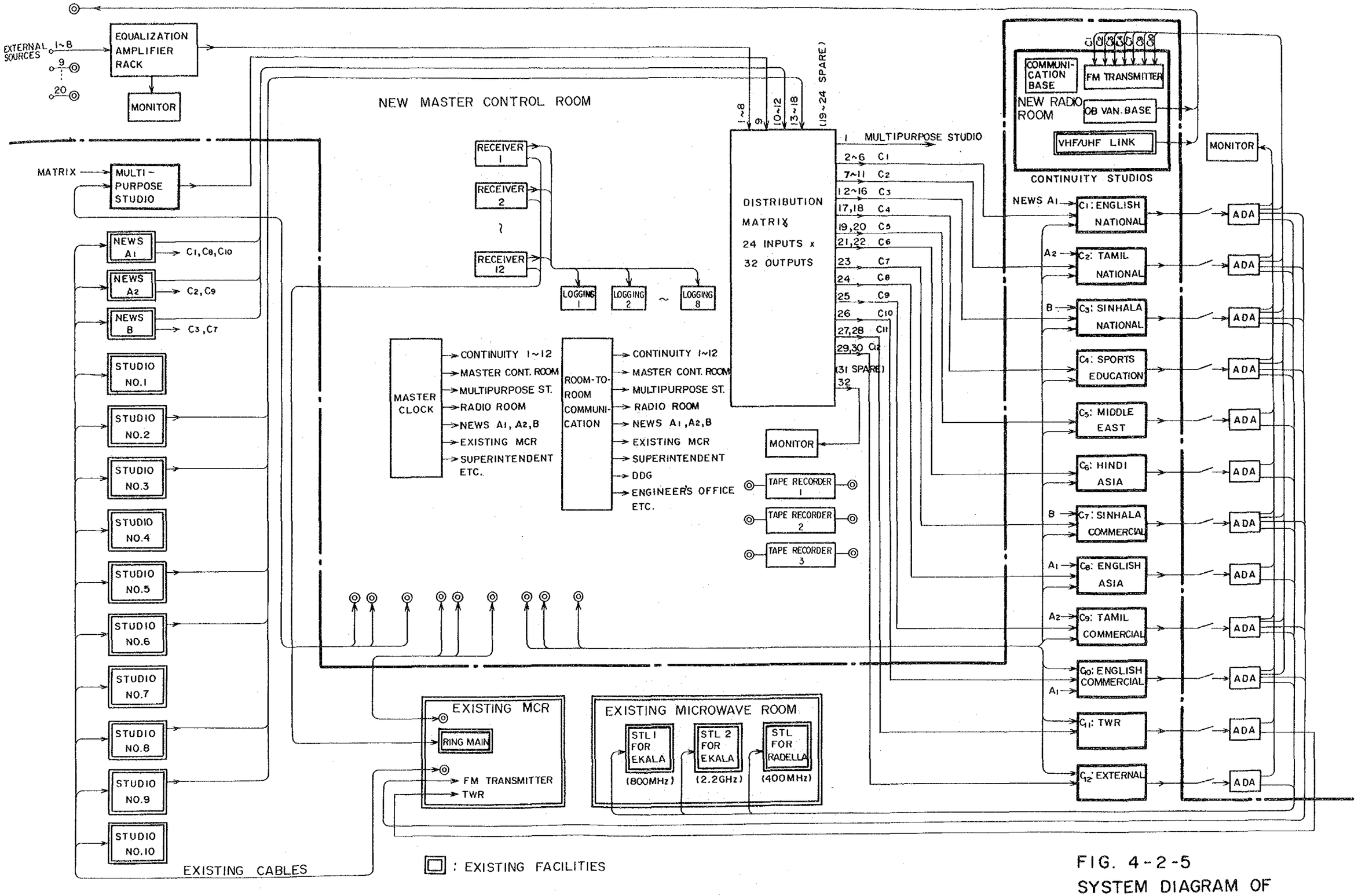


FIG. 4-2-5
SYSTEM DIAGRAM OF
MASTER CONTROL ROOM

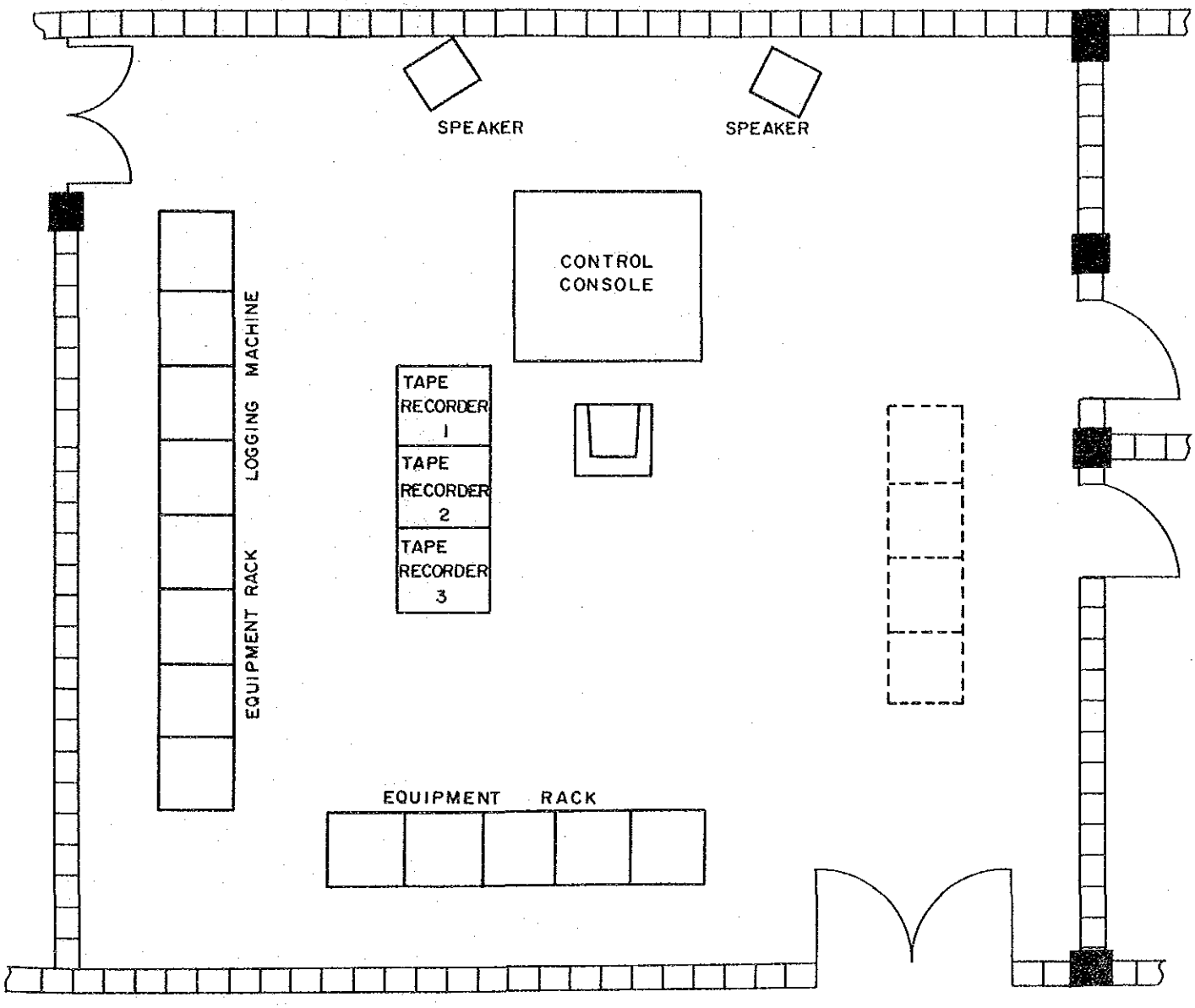


FIG. 4-2-6 FLOOR LAYOUT OF MASTER CONTROL ROOM