2.3.3 Equipment Design Plan

(1) Overall Plan

As mentioned earlier, the first phase of the Project for Improvement of National Broadcasting in Kingdom of Cambodia will principally comprise donating equipment commensurate to maintenance expenditures that TVK can afford, and establishing the urgently required Phnom Penh TV Broadcasting Station. Of the existing equipment, that still utilizable —— except that donated by France —— will be transferred to the new facility.

It was agreed with TVK that the building for the TV Broadcasting Station contain only those functions directly related to programme production and broadcasting, namely the studios, Master Control Room, and VTR Editing Rooms. Room for administrative functions will be housed in an administrative building to be built by TVK.

Initially TVK requested three studios, large, medium, and small, but as a result of discussions with TVK and considerations of in-house programme production volume and content, it was decided to build one 300 m^2 studio and a News/Continuity Studio. However, due to the reasons given in Section 2.2.2, it was decided to provide equipment commensurate to a 180 m^2 studio. It was also decided, in order to reduce maintenance expenditures borne by TVK, to transfer equipment currently in use at News Studio to the new News/Continuity Studio, and to donate only equipment not already owned, namely a character generator, caption scanner, and teleprompter.

In regard to the remaining rooms —— the Master Control Room, the Radio Control Room, and the VTR Editing Rooms —— TVK's requests were generally complied with as requested. However, instead of installing a new FPU in the Radio Control Room, the need will be filled by transferring the one currently owned. In regard to outside news-gathering equipment, TVK had requested two O.B. vans, but taking into consideration the types and numbers of programmes produced after the completion of the project and the amount of equipment available for programme production, it was decided to supply one O.B. van and instead increase the ENG equipment. In regard to the room housing the generator, it was decided to establish a separate building, in light of the noise and vibration produced.

A new 10 kW transmitter was purchased by TVK and installed at the Phnom Penh Transmitter Station in March 1995. TVK initially requested the donation of a spare transmitter, but because there is insufficient space to accommodate a spare transmitter in the transmitter room and because the new transmitter is constructed in unit format, it was explained that in the event of failure the unit can be replaced, and it was decided to donate some spare units. Hence a set of necessary units will be supplied.

The antenna and the feeder currently in use are those from when the 1 kW transmitter was in use, and hence the output of the transmitter is currently reduced. The antenna (superturn antenna) and feeder will be replaced with 10 kW models.

Initially requests were made to TVK for structural data on the transmitter tower. However, data had been lost due to the oivil war, and it was not even possible to find out when the tower was built, or by which contractor, let alone structural data on the tower. It thus became difficult to replace the antenna with a different model and increase the service area.

After returning to Japan, the consultants managed, as a result of extensive efforts, to discover the manufacturer and year of construction. Structural data were requested from the manufacturer, and calculations of the structural strength of the tower were carried out. As a result, the strength of the tower was found to be such that it was impossible to remove the current superturn-style antenna, strengthen the tower, and install a more effective dipole antenna. Furthermore, due to the installation of a commercial broadcaster's antenna to the tower, the strength of the tower is currently such that it cannot resist wind velocities of 30 m/s. (The original design provided for a wind velocity of 45 m/s.) Exchanging the antenna designed for 1 kW with an antenna designed for 10 kW would be equivalent to sanctioning a tower that cannot even withstand a wind velocity of 30 m/s.

For these reasons, the survey team requested TVK to remove the commercial broadcaster's antenna as soon as possible, and TVK agreed to have the commercial broadcaster's antenna removed before installing the new antenna supplied by Japan.

In regard to relay stations, it was decided to carry out improvements to the Sihanoukville Relay Station and its transmitter,

in order to improve the quality of TV broadcasts and to lengthen broadcasting time. The topography of Sihanoukville is such that in the vicinity there are hills higher than the elevation of the transmitter station; hence broadcasts are blocked by the hills and any improvements cannot be expected to have more than a limited effect. It was thus decided to increase the output of the transmitter to only 100W. However, this increase will enable broadcasts to reach some islands with sizable populations, leading to a slight increase in coverage.

(2) Determination of Design Conditions

The following design conditions have been drawn up to suit the purpose and operation of the facility.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
A.	300 m² Studio Equipment					
1.	Colour cameras	Equipment for shooting programme material in the studio	3CCD Portable type cameras with 20× zoom lens, pedestal dollies, cables (triaxial)	Picture quality of 3CCD portable type cameras is good and the cameras are easy to handle. O.B. van will have the same model. Camera performance significantly affects programme quality.	3 units	To switch between scenes with ease and produce dramas or traditional music programmes of good quality, experience dictates at least three units are necessary.
2.	Video equipment	Equipment for switching between video sources such as cameras or VTR. Used in the production studio to create programmes according to the director's designs.	Video switcher (Model 2M/K, 10 or more inputs) with video distributor, jack panel, VE monitor switcher.	The 2M/K model will be used to enable switching of scenes to produce informative programmes with abundant content. Input consists of 3 cameras, 3 VTRs, 1 caption scanner, 1 character generator. VE monitor switcher is used for technical checks.	1 set	
3.	Audio equipment	Mixing audio signals such as those from the microphones, and including these in programmes. Used to produce programmes according to the director's design.	Audio mixing amp with a frequency band range of 20 kHz or more (18 inputs or more), with distribution amp, cassette tape recorders, open reel tape recorders, CD players, microphones, mike stands, jack panel	At least 15 mixer inputs are required, namely 6 microphones, 3 VTRs, 2 open reel tape recorders, 2 cassette tape recorders, and 2 CD players. Cassette tape recorders are, like tape recorders and CD players, indispensable as audio equipment.	1 set	To variegate programme production, 4 microphones of each type will be provided.
4.	Monitoring equipment	Monitoring and appraising video and audio quality.	PAL colour system video monitors with VE monitor, line monitor, TV signal receiver, waveform monitor, vectorscope, audio monitor, monitor rack.	Video monitors are for sources such as cameras or VTRs and number 11 in total. VE monitor, waveform monitor, vectorscope are for technical checks, line monitor is for monitoring studio output.	1 set	A quantity equal to the input/output number of video sources will be provided.
5.	Intercoms	Equipment that allows the staff involved in programme production to communicate with each other.	Studio intercoms with mono headphones	Serves as a communication line between cameramen, producers on the studio floor and sub-control staff. Includes studio talk-back function (allowing the studio floor to be contacted from the sub-control room directly).	1 set	
6.	1/2-inch VTR	For playing back pre-recorded programme material, during programme recording or on location	For both recording and play back; with slow motion playback; with built-in TBC; includes monitoring function	Will include slow-motion playback function, to enhance information and raise effectiveness of programmes	3 units	2 units for recording and playback, 1 unit for slow motion playback, makes 3 required in total.
7.	S-VHS	For playing back existing tapes.	For both recording and playback; includes monitoring function		2 units	At least two units are required to play back pre-recorded material with ease.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
8.	Synchronizing pulse generator	Equipment which generates signals for controlling video equipment. Serves as a standard for synchronizing studio video signals.	PAL colour system; includes distributors.	Pulse for standardizing video equipment is generated and distributed to various equipment. Reference signal (BB) from master control room is received and synchronized with main synchronizing pulse in the station.	1 set	
9.	Character generator	Equipment for generating Khmer characters to be superimposed on the screen.	In Khmer; with disk memory; includes console; with monitor	In the Khmer language because it is superimposed on screen. Characters can be freely selected from keyboard. Shall include disk memory, for continuously outputting character patterns input in advance.	1 unit	
10.	Caption scanner	Device for generating text or graphics, for titles and other captions	With frame memory; includes console; with monitoring function	Shall include frame memory to enable continuous output.	1 unit	
11.	Lighting equipment	Equipment for illuminating the studio. Dimmer required for obtaining effect suited to design of programme.	Total output 90 kW	Lighting is to be effectively used for adding depth to flat screen and making the picture easier to view.	1 set	Set lighting at 500W per 1 m², bringing total for 180 m² to 90 kW.
12.	Console	For accommodating controls for switchers and mixers.			1 set	
13.	Equipment rack	For accommodating various equipment.			4 sets	
B.	News/Continuity Studio Equipment					
1.	Character generator	Equipment for generating Khmer characters to be superimposed on the screen.	In Khmer; with disk memory; includes console; with monitor	In the Khmer language because it is superimposed on screen. Characters can be freely selected from keyboard. Shall include disk memory, for continuously outputting character patterns input in advance.	1 unit	
2.	Caption scanner	Device for generating text or graphics, for titles and other captions.	With frame memory; includes console; with monitoring function	Shall include frame memory to enable continuous output.	1 unit	
3.	Teleprompter	The teleprompter is a system for making text appear in front of the camera lens, to prevent the announcer from facing downwards as the script is read.	Self-supporting; PAL system	To allow portable usage, not the type that is attached to the lens, but the self-supporting type will be supplied. The camera for use with the prompter will be suspended from the ceiling.	1 unit	Same as the number of cameras.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
C.	Master Control Room Equipment					
1.	Video equipment	Equipment for selecting and sending out programmes or commercials according to the broadcasting station's programming sequence. All broadcast television programmes are sent to the transmitter station via this equipment, making it vital for the broadcasting station.	Video switcher (12 or more inputs, simultaneous switching of video and audio), with distributor, equalizer, delay line, pre-selection switcher	The programme switching equipment will have at least 13 inputs, consisting of 2 from the studio, 6 from VTRs, 2 from outside the station (such as from satellite transmissions or the O.B. van), 1 from the electronic character generator (for putting names on the screen, or for adding explanations in Khmer to foreign programmes), 1 from the caption scanner (device for generating text or graphics), and 1 for test or reference signals.	1 set	
2.	Synchronizing pulse generator	The "heart" of a broadcasting station, this device generates reference pulses for unifying all video equipment. Will also be provided to other required locations in the station.	PAL colour system; automatically switches between active and spare; includes distributor	Shall be able to automatically switch to spare, to ensure stability	1 unit	
3.	Frame synchronizer	Device for synchronizing outside signals and in-house signals, thereby maintaining stability. Necessary when broadcasting different types of programmes.	Digital	Synchronizer that is stable and does not harm picture quality.	1 set	External broadcasts include satellite broadcasts and O.B. van broadcasts. 1 unit is required for the broadcasting of outside broadcasts through stable switchover.
4.	Character generator	Device for digital generation of text for subtitles, required for putting titles on screen, or for adding Khmer explanations to foreign programmes.	Khmer; with disk memory; with monitor; console included	In the Khmer language because it is superimposed on screen. Characters can be freely selected from keyboard. Shall include disk memory, for continuously outputting character patterns input in advance.	1 unit	
5.	Caption scanner	Device for generating text or graphics, for titles and other captions.	Includes console; with monitoring function	Shall include frame memory to enable continuous output	1 unit	
6.	Video timer	Device for inserting a time display on screen or in-between programmes.	Digital display; can be positioned anywhere on screen		1 unit	
7.	Station logo generator	Device for putting the station logo onto the screen			1 set	
8.	Audio equipment	For carrying out various final refinements on the audio signal	Frequency bandwidth 20 kHz or more, with distributor, limiter amp, jack panel, cassette tape recorder, CD player	One set of audio equipment for the Master Control Room. Cassette tape recorders and CD players are used to add music or recorded narrations to station logo sequences, promotional content, or messages.	1 set	

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
9.	1/2-inch VTR	Video cassette recorder with a tape width of 1/2-inch, for recording and playing back programmes.	For both recording and playback; with built-in TBC; with monitoring function	A TBC (Time Bases error Corrector) function shall be built-in, for correcting the deviation occurring between programmes during editing. VTR of professional grade.	2 units	At least two units are required to play back, switch between, and transmit recorded programmes with ease.
10.	3/4-inch VTR	This is a video cassette recorder with a tape width of 3/4-inch, for playing back existing programme tapes.	Playback function; with built-in TBC; with monitoring function	A TBC (Time Bases error Corrector) function shall be built-in, for correcting the deviation occurring between programmes during editing. VTR of professional grade.	2 units	At least two units are required to play back, switch between, and transmit recorded programmes with ease.
11.	S-VHS VTR	Video cassette recorder with a tape width of 1/2-inch, for playing back new programme tapes.	For both recording and playback; with monitoring function		2 units	At least two units are required to play back, switch between, and transmit recorded programmes with ease.
D.	Radio Control Room					
1.	TV STL equipment					
	Transmitter	Fixed microwave link between broadcasting station and transmitter. A transmitter unit and antenna equipment for transmission are positioned at broadcasting station; programmes are broadcast towards the transmitter. A receiver and reception antenna are located at the transmitter station; the programmes broadcast by the broadcasting station are received and passed on to the transmitter.	Frequency used; 7 GHz band; transmitter output: 1W; one system for current use plus backup function; fixed type	Transmission output of 1W is the standard output for microwave transmitters. Fixed devices are easy to protect and maintain. Dealing with failure is easy thanks to built-in backup function.	1 set	
	Receiver		Frequency used; 7 GHz band; one system for current use plus backup function; fixed type		1 set	
	Antenna equipment		Parabola antenna; waveguide; transmitter/receiver pair	A waveguide will be used for the supply of electricity to the parabola antenna, the antenna for the microwaves, to keep loss at minimum levels.	1 set	
2.	UHF communication equipment	Used for communication with broadcasting station during live broadcasts, for communications between staff away from O.B. van and staff in O.B. van, and for communications between news personnel and the broadcasting station.	1 set of equipment for the base station (25W); 6 portable units (walkie-talkies) (5W)	Base station equipment is for the broadcasting station, walkie-talkies are for contact with broadcasting station by personnel revolving around O.B. van and ENG (news-gathering) personnel.	1 set	6 walkie-talkies will be supplied, to match the number of cameras.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
E.	Audio Dubbing Studio Equipment					
1.	VTR equipment					
	1/2-inch VTR	For playing back the tape to be dubbed and recording the completed tape. (Playback is shown to the performers.)	For both recording and playback; with built-in TBC; with monitoring function		1 unit	
	3/4-inch VTR	For playing back tapes to be dubbed. (Playback is shown to the performers.)	For both recording and playback; with built-in TBC; with monitoring function		1 unit	
2.	Video equipment	For switching between VTR output and showing it to the performers.	Video selector with 6 track input, including console, jack panel, distributor	For switching between video for the monitors.	1 set	
3.	Audio equipment	For mixing microphone output. In some cases output from microphones may also be incorporated into the MTR (Multi-channel Tape Recorder).	Audio mixing amp (10 track input); MTR (8 channels); cassette tape recorders (with 3 heads and 3 motors)	Taking dubbing of dramas into account, mixing input will require at least 8 tracks, i.e. 4 tracks for mikes, 2 for cassette tape recorders, 2 for VTRs.	1 set	
4.	Monitoring equipment	Video and audio output from VTRs is monitored and appraised.	PAL colour system; video monitors, audio monitors	Video monitors consist of one 20-inch set for performers and one 14-inch set for observation purposes.	1 system	
F.	ENG (Electronic News-Gathering)					
1.	Colour camera with built-in 1/2-inch VTR	Mainly for recording programme material.	Portable 3CCD type camera; 15× zoom lens; with mobile tripod	Picture quality of portable 3CCD-type cameras is good, and the cameras are easy to handle. For recording programme material. Camera performance significantly affects programme quality.	3 units	3 will be supplied, to enable not only material for studio programmes to be collected, but also wide-ranging use, such as recording interviews for simple programmes such as information programmes or educational programmes.
2.	Colour camera with built-in S-VHS VTR	Mainly for recording news material.	3CCD camera; 15× zoom lens; mobile tripod	Compact and lightweight, these are suited for gathering material for news programmes. As currently a camera with built-in S-VHS is being used for news-gathering, compatibility was taken into account.	4 units	3 units will be used for everyday news-gathering, and 1 unit will be set aside for emergencies.
3.	Audio mixers	In case of simple information programmes or educational programmes, mixing can be carried out outside the studio.	4 track mixer; includes microphones		1 set	
4.	Battery lights	For illuminating camera work at night.	Batteries to be used as power source. Includes battery chargers and battery packs. 500W		7 sets	

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
G.	VTR Editing Equipment					
1.	VTR editing equipment (1/2-inch, 2:1)					
	1/2-inch VTR	Video cassette recorders for editing taped material.	2 units for playback, 1 for recording; with TBC function	A TBC function shall be built-in. VTR of professional grade.	3 units	Set of editing equipment consists of combination of two VTRs for playback and one VTR for recording.
	Editor unit	For editing VTR according to editing concept.	For A/B role editing		1 unit	One editing device.
	Colour monitors	For monitoring the VTRs.	14-inch model with loudspeakers		3 units	One monitor each for each of the playback and recording VTRs.
2.	VTR editing equipment (1/2-inch, 1:1)					
	1/2-inch VTR	Video cassette recorders for editing material gathered using the cameras.	1 unit for playback and recording each; with TBC function	A TBC function shall be built-in. VTR of professional grade.	2 units	Set of editing equipment consists of combination of one playback VTR and one recording VTR.
	Editor unit	For editing VTR according to editing concept.	For simple editing		1 unit	One editing device.
	Colour monitors	For monitoring the VTRs.	14-inch model with loudspeakers		2 units	One monitor each for the playback and recording VTRs.
3.	VTR editing equipment (3/4-inch, 1:1)					
	3/4-inch VTR	Video cassette recorders for editing taped.	1 unit for playback and recording each; with TBC function		2 units	Set of editing equipment consists of combination of one playback VTR and one recording VTR.
	Editor unit	For editing VTR according to editing concept.	For simple editing		1 unit	One editing device.
	Colour monitors	For monitoring the VTRs.	14-inch model with loudspeakers		2 units	One monitor each for the playback and recording VTRs.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
4.	VTR editing equipment (S-VHS, 1:1)					
	S-VHS VTR	Video cassette recorders for editing material gathered using the cameras.	1 unit for playback and recording each; with TBC function		2 units	Set of editing equipment consists of combination of one playback VTR and one recording VTR.
	Editor unit	For editing VTR according to editing concept.	For simple editing		1 unit	One editing device.
	Colour monitors		14-inch model with loudspeakers		2 units	One monitor each for the playback and recording VTRs.
H.	TV O.B. van					
1.	Colour cameras	Equipment for filming news, sports programmes, or programme materials outside	Portable 3CCD type camera; 20× zoom lens; with mobile tripod; with camera cables (triaxial cables).	3CCD cameras (which convert light signals into electrical signals and used to consist of vacuum tubes but now consist of semiconductors) shall be used as these are compact, can be handled easily, and have good picture quality. The magnification of the lens will be 20×. To film variable subject matter, mobile tripods are required.	2 units	Experience dictates that at least 2 cameras are required to produce programme material with ease. With two cameras it is possible to record material for insertion into studio programmes, such as outside material, discussions in small groups, events and happenings.
2.	Video switcher	Device for switching between multiple video signals, such as camera outputs.	Model 1M/K; 6 or more inputs; with jack panel	Switching and combining will be the most basic single-stage system (Model 1 M/K). At least 7 inputs for video signals will be required, namely 3 for camera output, 2 for VTR output, and 2 for test signals	1 set	
3.	Audio mixing amp	For mixing multiple audio signals in a balanced manner.	10 input tracks or more; with jack panel	At least 11 audio input tracks will be required, namely 6 for mikes, 1 for VTR, 1 for CD player, and 2 for cassette players.	1 set	
4.	Video monitoring equipment	Video for monitoring and appraising picture quality.	Waveform monitor; vector scope; video monitor; TV receiver (with antenna)	The video monitor is for evaluating the input to the video switcher, and includes a waveform monitor (a specialized oscilloscope for observing and measuring the waveform of video signals) and a vector scope (a device for observing and measuring the colour composition of video signals) for technical checks.	1 set	12 video monitors in total will be required, including 3 for camera output, 2 for test signals, 2 for VTRs and 10-inch monitors for broadcast output.
5.	Audio monitoring equipment	For monitoring and appraising sound quality.	Compact loudspeakers with amps	As the equipment is for mobile use, compact speakers will be used.	1 set	

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
6.	Synchronizing pulse generator	A device for emitting a reference signal required for the operation of all video equipment.	PAL colour system; with automatically activated backup system; includes distributor	Stable and guaranteed operation is required, so a backup function will be featured	1 unit	
7.	Microphones and mike stands	For collecting various sound sources.	With standard options		1 set	11 microphones will be provided in order to meet the minimum requirements for complying with a variety of outside programmes.
8.	Intercoms	Communication equipment for field work.	With mono headphones	Since the intercoms will be used outdoors, they must have high response levels, and must be resistant to wind pressure and background noise.	1 set	
9.	Cassette tape recorder	Device for simple audio recording or playback, for example for playing back background music at outside locations.	3 heads, 3 motors	Necessary as broadcasting equipment, for playing back background music of programmes, or for the independent recording of music or other audio.	1 unit	
10.	1/2-inch VTR	Video cassette tape recorder with a tape width of 1/2-inch, for recording or playing back programmes in the field.	For both recording and playback; with built-in TBC.	A TBC (Time Bases error Corrector) function shall be built-in, for correcting the deviation occurring between programmes during editing. VTR of professional grade.	1 unit	1 unit required for recording and playing back.
11.	Communication radios	For communicating with the broadcasting station during live broadcasts, as well as for communications between staff away from O.B. van and staff in O.B. van	3 walkie-talkies (5W)	Walkie-talkies are for programme staff to carry on their person when away from the O.B. van	1 set	
12.	Vehicle	For habitually carrying programme production equipment and for swiftly carrying all equipment for outside broadcasts. During programme production it also plays the role of sub-control room (the room serving as the hub of programme production).	Around 2.5m (width) * 6.0m (length) * 3.0m (height). Features power generator (with a capacity of 10 kVA); air-conditioned	Electricity for the equipment could be supplied from external sources, but a power generator will be carried in order to prepare against cases when electricity is difficult to obtain or when the power is out. The output capacity will be 10 kVA, consisting of 5 kVA for the equipment, 2 kVA for the limited amount of lighting equipment, and 3 kVA for the air-conditioner. The air-conditioner will be carried to ensure stable operation of the equipment.	1 unit	

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
I.	Transmitter Station (Phnom Penh Transmitter Station)					
1.	Spare unit	Spare unit for the existing 10 kW VHF transmitter, to provide against transmitter failure.	1 modulator unit and 1 PA unit each		1 set	
2.	Transmitter antenna	The current antenna was installed for a transmitter output of 1 kW, and will be replaced with one suited to an output of 10 kW.	Superturn-style antenna, 12 positions and 4 faces, 7 VHF channels, for 10 kW		1 unit	
3.	Transmitter feeder	The feeder will be replaced with a feeder of larger capacity suited to a transmitter with output of 10 kW.	Equivalent to 77D, 120m		1 unit	
J.	Programme Production Equipment for the Sihanoukville Broadcasting Station					
1.	Colour cameras with built-in S-VHS VTR	For recording news material outside the station	CCD cameras; 16× zoom lens; mobile tripod	Since the cameras are for gathering news material, the type with built-in S-VHS VTR was selected.	3 sets	One will be used as a studio camera, and two will be used as ENG cameras for recording news material.
2.	Video equipment	For switching between video sources such as cameras or VTRs, use in news or information programme production. Monitors picture quality.	Switcher (4 input tracks or more), including a distributor, delay line, TV signal generator, frame synchronizer, vector scope, and waveform monitor	At least 4 input tracks are required, including one for camera, one for VTR, and one for the test signal.	1 unit	
3.	Audio mixer	For mixing audio signals such as microphones, thus finishing a programme.	Audio mixing amp (4 input and 2 output tracks), faded unit with equalizer, console	Mixing input requires at least 4 tracks, including 1 for the microphone, 1 for the CD player, 1 for the cassette recorder, and 1 for the VTR.	1 set	
4.	Audio equipment	For playing back sound effects or background music in programme production.	CD player with control unit; cassette tape recorder (3 heads and 3 motors), includes distributor	CD player will feature a control unit to enable two units to be played continuously. Along with the cassette tape recorder, the CD players are indispensable audio equipment.	1 set	
5.	Monitor equipment	Monitoring and appraising picture and sound quality.	PAL colour system; video monitor; audio monitor	The audio speakers will be compact loudspeakers. One 20-inch monitor will be used to monitor the studio floor.	1 set	
6.	Lighting equipment	This is equipment for illuminating the studio floor.	Fixed electric batten type; capacity of 10 kVA	Since the programmes produced will be of simply format, the dimmer equipment will also be simple.	1 set	

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
7.	VTR editing equipment	Editing equipment recorded in the studio or gathered outside.	S-VHS VTR (recording and playback), includes editor, console, monitor		2 units	One unit will have the added function of recording programmes during studio takes. Two news-gathering cameras are provided, and since news programmes must be edited in a short time, 2 units will be provided.
K.	Transmitter Equipment (Sihanoukville Transmitter Station)					
1.	Transmitter	Equipment for emitting broadcast waves from the transmitter station in Sihanoukville.	100W and fully fixed VHF transmitter (PAL-B type, 7 channels); antenna (simple superturn-style antenna, 2 positions and 4 faces), feeder (equivalent to 20D, 50m)	Fully fixed type will be chosen to facilitate ease of maintenance and alleviate operating costs.	1 set	
2.	Programme transmission equipment	As there is no STL for transmitting signals between the studio and the transmitter station, completed tapes will be brought to the transmitter station, and be played back in a VTR there. Picture and sound quality will also be monitored and appraised.	S-VHS VTR; routine switcher (linked audio and video, 4 inputs), video monitor, waveform monitor, vector scope, monitor loudspeakers	At least 2 input tracks will be provided, to enable switching in between 2 sets of VTR (both video and audio).	1 set	2 sets of VTR are required to continuously transmit from the VTRs.
L.	Measuring Instruments					
1.	Oscilloscopes	For maintaining and servicing the video systems.	Measurement frequencies: 0-100 MHz; dual channel type; with cart	Specifications required for video system checks. The waveform at two locations in one system is compared. Considerations are made to enable easy movement between measuring locations.	2 units	1 unit each is required for the broadcasting station and the transmitter station.
2.	TV test signal generator	Device for producing the various different test signals required for diagnosing the condition of equipment and maintaining the quality of the TV signal.	PAL colour system; 10 or more types of test signal	To test the TV system from the studio to the transmitter output, a test signal will be generated at the broadcasting station, and the signal will be checked at each of the points using oscilloscopes or waveform monitors.	1 unit	1 unit is required for the broadcasting station.
3.	Low-frequency characteristics measuring instrument	Instrument necessary for diagnosing the condition of audio equipment and maintaining the quality of audio systems.	Frequencies measured: 20 Hz - 200 kHz	Such parameters as the output level, signal-to-noise ratio, and harmonics distortion within this range will be measured.	1 unit	To be shared between the studios and transmitter station.
4.	Circuit testers	For everyday maintenance.	Standard testing device for measuring voltage, current, and resistance	To be used for everyday maintenance.	5 units	1 each for the O.B. van and transmitter station, and 3 for the broadcasting station.

No.	Equipment	Usage	Specifications	Specification Grounds	Quantity	Quantity Grounds
5.	Vector scope	For measuring the colour composition of video signals.	PAL colour system	Of the same type as Cambodia's broadcasting system.	1 unit	to be used where necessary for everyday maintenance.
6.	Video signal attenuator	Output level attenuating device used when measuring video signal.	Resolution: 0.1 dB; circuit impedance:75 ohm, imbalanced	In order to integrated all video equipment, the same current impedance is required.	1 unit	1 unit required for the transmitter station.
7.	Colour meter	Used for designing the illumination during studio programme production. Since it is colour TV, colour temperature will be managed on an everyday basis.	Automatic instrument for obtaining illumination data in short durations.	Studio lighting checks and colour temperature management has to be carried out on a daily basis.	1 unit	For use at the broadcasting station.
8.	Frequency counter	For measuring the frequency of various signals.	Frequencies measurable: 0.1 mHz - 1 GHz	Necessary for measuring the frequency of the synchronizing signal generator of the transmitter.	1 unit	To be shared between the broadcasting station and the transmitter station.
9.	Spectrum analyzer	Instrument required for analyzing the characteristics of the signal output of the transmitter. Quality of broadcasting waves shall be maintained at national and international standards.	Measurable frequency range: 9 kHz - 1,800 MHz	It is likely necessary to be able to measure frequencies in a wide range, for carrying out such measurements as checking that no broadcast waves are being emitted outside the allocated frequency range.	1 unit	To be used at the transmitter station.
10.	Field intensity meter	This is for measuring the intensity of the broadcasts emitted by the transmitter. Used to understand the electromagnetic wave conditions within the broadcasting area, and to manage the situation the transmitter station.	Frequencies used: VHF band; with measuring antenna and tripod	TVK's broadcasting frequency is channel 7 in VHF. To measure this, a specialized antenna (designed to be capable of measuring field intensity) and a tripod for attaching the antenna are required.	1 unit	Regularly receive and measure the broadcast waves within the broadcasting area.

(3) Equipment

The basic specifications and quantities of equipment are as follows.

Equipment	Basic Specifications	Quantity
1) Programme Production & Broadcasting Equipment for the Phnom Penh Broadcasting Station		
(a) Programme Production Studio (180 m²-class)		
a) Colour cameras	Portable 3CCD with CCU ×20 zoom lens, pedestal dollies, camera cables (triaxial)	3 sets
b) Video switcher	12 channels or more, 2MK, digital special effects, distributor, jack panel	1 set
c) Video production equipment		1 set
Caption scanner	With monitor and console	1 set
Character generator	In Khmer, with monitor, console, and disk memory	1 set
d) Audio mixing amp	18 track input, distributor, jack panel	1 set
e) Audio mixing equipment	CD player, tape recorder, etc.	1 set
f) 1/2" VTR	Pseudo-broadcasting quality (with recording & playback)	2 units
1/2" VTR	pseudo-broadcasting quality (playback only)	1 unit
g) Video monitor equipment	Waveform monitor, vector scope, video monitor	1 set

h) Audio monitor equipment		1 set
	Amplifier, speakers	
i) Intercom equipment	w/headphone for one ear	1 set
j) Lighting equipment	Electric batten type, capacity 150 kW, with lanterns (90 kW)	1 set

(b) News/Continuity Studio

a) Video production equipment		
Caption scanner	With monitor and console	1 set
Character generator	In Khmer, with monitor, console and disk memory	1 set
Teleprompter	Self standing type	1 set

(c) Master Control Room

a) Sending-out routing switcher (Audio follow video)		1 set
b) Video production equipment		
Video processor		1 set
Station logo generator		1 set
Character generator	In Khmer, monitor, console and disk memory	1 set
Caption scanner	monitor, console included	1 set
Frame synchronizer	digital	1 set
Television system converter	digital, PAL/NTSC/SECAM conversion	1 set
Video timer	with monitor	1 set
Video inserter		2 sets
c) Video tape recorder	1/2", pseudo-broadcasting quality, recording and playback	2 sets
	3/4"	2 sets
	S-VHS	2 sets
	Colour monitors (w/speakers)	6 sets
	Rack	1 set

d) Synchronizing pulse/test signal generator	automatic switching type, intended as spare	1 set
e) Audio production equipment	Limiter amp, CD players, etc.	1 set
f) Clock system	Master & secondary clocks, 1-second count, 30-second count	1 set
g) Video monitor equipment	Waveform monitor, vector scope, video monitor	1 set
h) Audio monitor equipment	Speakers w/amplifiers	1 set

(d) Radio Control Room

a) STL transmitter	Frequency: 7-GHz-band, transmitter power: 1W, backup system, fixed type	1 set
Receiver	Frequency: 7-GHz-band, backup system, fixed type	1 set
Antenna	1.2 meter diameter parabola antenna, waveguide, a pair for transmitter & receiver	1 set
b) UHF communications equipment		
	Set of equipment for base station (25W), antenna, feeder	1 set
	Portable units (5W)	6 units
c) Video & audio monitor		
	Waveform monitor, vector scope	1 set
	Video monitor, speakers	1 set

(e) Audio Dubbing Studio

a) VTR	1/2", recording and playback	1 set
b) VTR	3/4", recording and playback	1 set
c) Video switcher	6 in, 1 out	1 set
d) Audio mixer	8-track	1 set
e) Video monitor equipment	Includes a studio flow monitor	1 set
f) Audio monitor equipment	Speakers with amplifiers	1 set

(f) ENG Equipment

a) Camera with built-in VTR	1/2", tripod, dolly	3 sets
b) Camera with built-in VTR	S-VHS, tripod, dolly	4 sets
c) 4-channel audio mixing		1 set
d) Battery lights		7 sets

(g) VTR Editing Rooms 4 sets

a) 2:1 VTR editing equipment	1/2", editor, console	1 set
b) 1:1 VTR editing equipment	1/2", editor, console	1 set
c) 1:1 VTR editing equipment	3/4", editor, console	1 set

d) 1:1 VTR editing equipment		1 set
	S-VHS, editor, console	
(h) O.B. Van (with 2 cameras)		1 unit
a) Colour Cameras	Portable 3CCD, CCU	2 sets
	×20 zoom lens, camheads, a tripod dolly	
Camera cable (triaxial)		1 set
	100m × 3 , 75m × 3, 50m × 3, 25m × 3	
b) Video switcher	6 input channels, 1MK, distributor	1 set
c) Video production equipment		1 set
d) Audio mixing amplifier		1 set
	10 input tracks, distributors, jack panel	
e) Audio production equipment		1 set
f) Synchronizing pulse generator		1 set
g) VTR	1/2", pseudo-broadcasting quality, recording & playback	1 set
h) Video & audio monitor		1 set
i) UHF communications equipment		
Portable transmitters and receivers (5W)		3 units
j) Lighting equipment (portable)		1 set
k) Power generator (10 kVA)		1 set
l) Vehicle	6m-long, air-conditioning, left hand drive	1 vehicle
(i) Power Generator (included in building facility)		

(j) Transmitter Equipment

a) Spare unit for 10 kW VHF transmitter, as backup		1 set
b) Transmitting antenna (10 kW, and for VHF 7 channel)		1 set
c) Feeder (equivalent to 7/8D)		1 set
(k) Measuring Instruments & Tools		1 set
a) Studio measuring instruments		1 set
PAL TV test signal generator	(more than 10 types of test signal)	1 set
Audio distortion meter	Frequency measuring range: 20 Hz - 200 kHz	1 set
Oscilloscope	Frequency measuring range: 0 - 100 MHz (dual channel type)	1 set
b) Transmitter station measuring equipment		1 set
Frequency counter	Frequency measuring range: 0.1 mHz - 1 GHz	1 set
VHF sweeper		1 set
Spectrum analyzer	Frequency measuring range: 9 kHz - 1,800 MHz	1 set
Field strength meter	Frequency: VHF-band, measuring antenna, tripod	1 set
c) Tools		1 set
Special tools for VTRs	1 set each for 1/2", 3/4", and S-VHS	
(l) Test Tape		1 lot
(m) Spares		1 lot

2) Renovation of Regional Station in Sihanoukville

(a) Renovation of Studio Equipment

a) Colour camera	Portable 3CCD camera (w/CCU), ×16 zoom	1 set
Colour camera	S-VHS-VTR combined camera, ×16 zoom	2 sets
b) Video switcher	More than 4 inputs, 1MK	1 set
c) Video production equipment		
Television test signal generator	more than ten types of test signals	1 set
Frame synchronizer		1 set
d) Audio mixer	4 in, 2 out	1 set
e) Audio production equipment	cassette tape recorders, etc.	1 set
f) Video & audio monitor equipment		1 set
g) Lighting equipment	Fixed batten, 10 kVA, lanterns	1 set
h) VTR editing equipment		2 sets
	S-VHS, for recording and playback	4 sets

(b) Transmitter Renovation

a) 100W VHF transmitter	PAL 7 channel	1 set
Antenna	2-bays, simple super-turn antenna	1 set
Feeder	equivalent to 20D (50m)	1 set
b) S-VHS		2 sets

c) Routing switcher (Audio follow video) 1 set

d) Video & audio monitor equipment 1 set

Includes waveform monitor,
vector scope

(3) Drawings

The following drawings are given herewith:

Fig. 2-3-16 Phnom Penh TV Station, Site Layout Diagram

Fig. 2-3-17 Phnom Penh TV Station, Floor Plan (Ground Floor)

Fig. 2-3-18 Phnom Penh TV Station, Floor Plan (First Floor)

Fig. 2-3-19 Phnom Penh TV Station, 300 m²-Studio Equipment Layout

Fig. 2-3-20 Phnom Penh TV Station, Master Control Room Equipment Layout

Fig. 2-3-21 Phnom Penh TV Station, Radio Control Room Equipment Layout

Fig. 2-3-22 Phnom Penh TV Station, Audio Dubbing Room Equipment Layout

Fig. 2-3-23 Phnom Penh TV Station, VTR Editing Rooms Equipment Layout

Fig. 2-3-24 Equipment Layout of O.B. Van

Fig. 2-3-25 Phnom Penh TV Station, Schematic Diagram of Video System for 300 m²-Studio Sub Control Room

Fig. 2-3-26 Phnom Penh TV Station, Schematic Diagram of Audio System for 300 m²-Studio Sub Control Room

Fig. 2-3-27 Phnom Penh TV Station, Schematic Diagram of Video System for Master Control Room

Fig. 2-3-28 Phnom Penh TV Station, Schematic Diagram of Audio System for Master Control Room

Fig. 2-3-29 Phnom Penh TV Station, Schematic Diagram of Video System for News Continuity Studio

Fig. 2-3-30 Phnom Penh TV Station, Schematic Diagram of Audio System for News Continuity Studio

Fig. 2-3-31 Phnom Penh TV Station, Schematic Diagram for Audio Dubbing Room

Fig. 2-3-32 Phnom Penh TV Station, Schematic Diagram for Radio Control Room

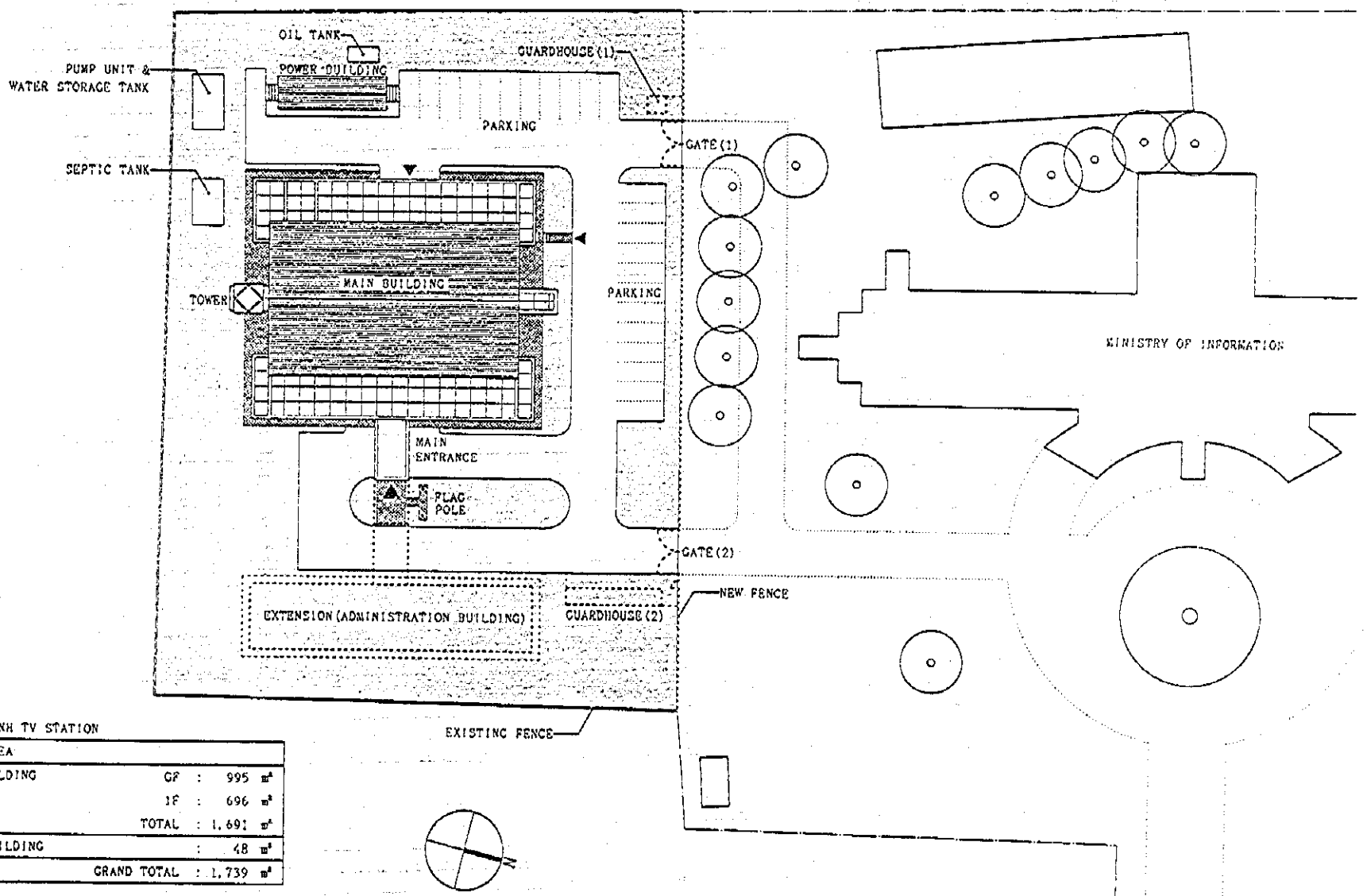
Fig. 2-3-33 Phnom Penh TV Station, Schematic Diagram for VTR Editing Room

Fig. 2-3-34 Phnom Penh TV Station, Schematic Diagram of Video System for O.B. Van

Fig. 2-3-35 Phnom Penh TV Station, Schematic Diagram of Audio System for O.B. Van

Abbreviations for Drawings

ADA	Audio Distribution Amplifier
ATR	Audio Tape Recorder
B/B	Black Burst
C/G	Character Generator
CAM	Camera Head
CB	Colour Bar Signal
CCU	Camera Control Unit
CD	Compact Disk (Player)
CST	Cassette Tape Recorder/Player
FS	Frame Synchronizer
L	Line
MK	Mix Keyer
MM	Master Monitor
PGM	Programme
PM	Picture Monitor
PV	Preview Monitor
Rx	Receiver
SC	Sub-carrier
SG	Synchronized Pulse Generator
STL	Studio to Transmitter Link
TSC	Television System Converter
Tx	Transmitter
VDA	Video Distribution Amplifier
VE	Video Engineer
VSC	Vectorscope
WFM	Wave Form Monitor



PHNOM PENH TV STATION

FLOOR AREA			
MAIN BUILDING	GF	:	995 m²
	1F	:	696 m²
	TOTAL	:	1,691 m²
POWER BUILDING		:	48 m²
	GRAND TOTAL	:	1,739 m²

REMARK: FACILITIES SHOWN IN DOTTED LINES SHALL NOT BE INCLUDED IN THE SCOPE OF WORKS BY THE JAPANESE SIDE.

FIG. 2-3-16 PHNOM PENH TV STATION, SITE LAYOUT DIAGRAM

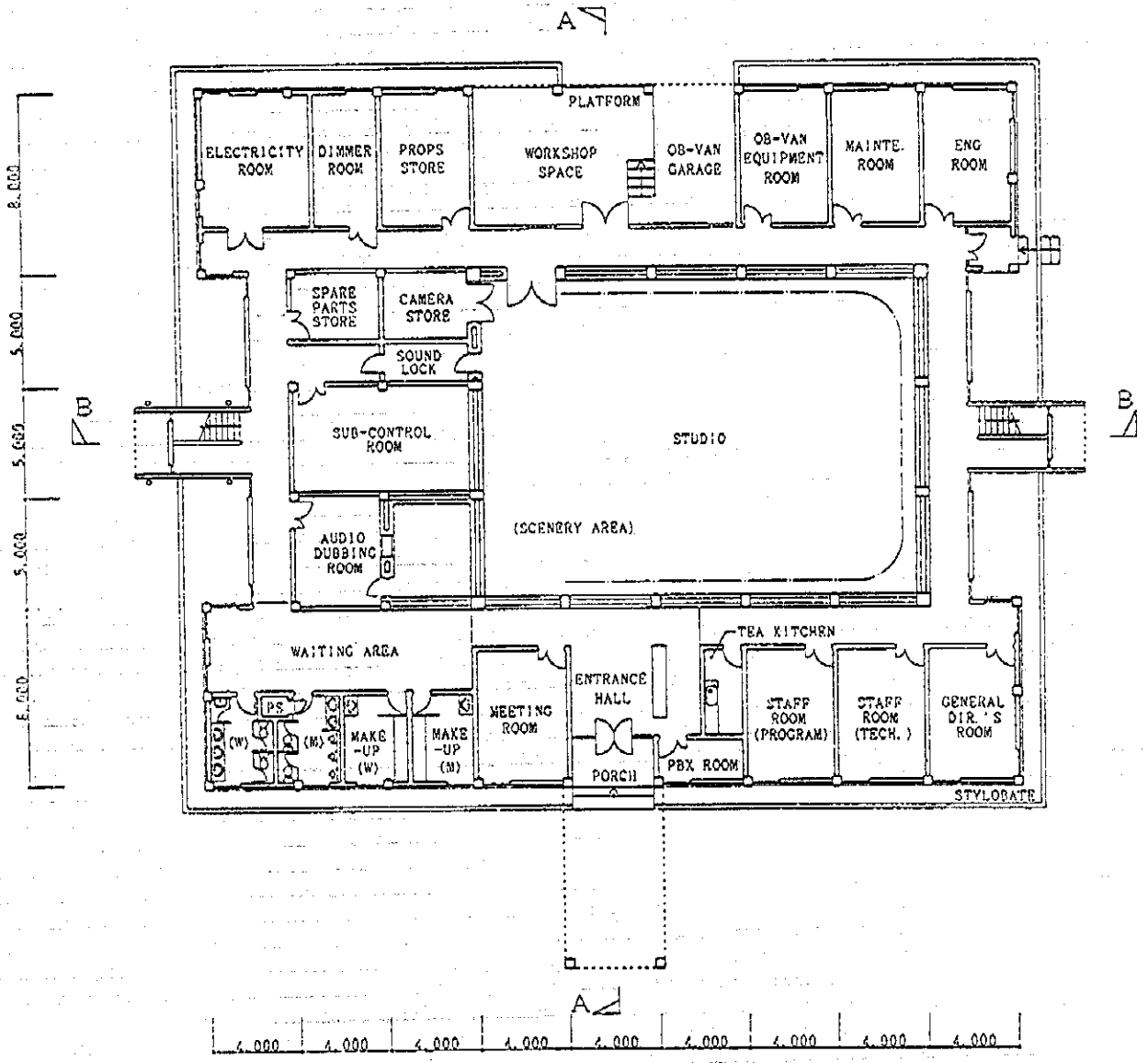


FIG. 2-3-17 PHNOM PENH TV STATION, FLOOR PLAN (GROUND FLOOR)

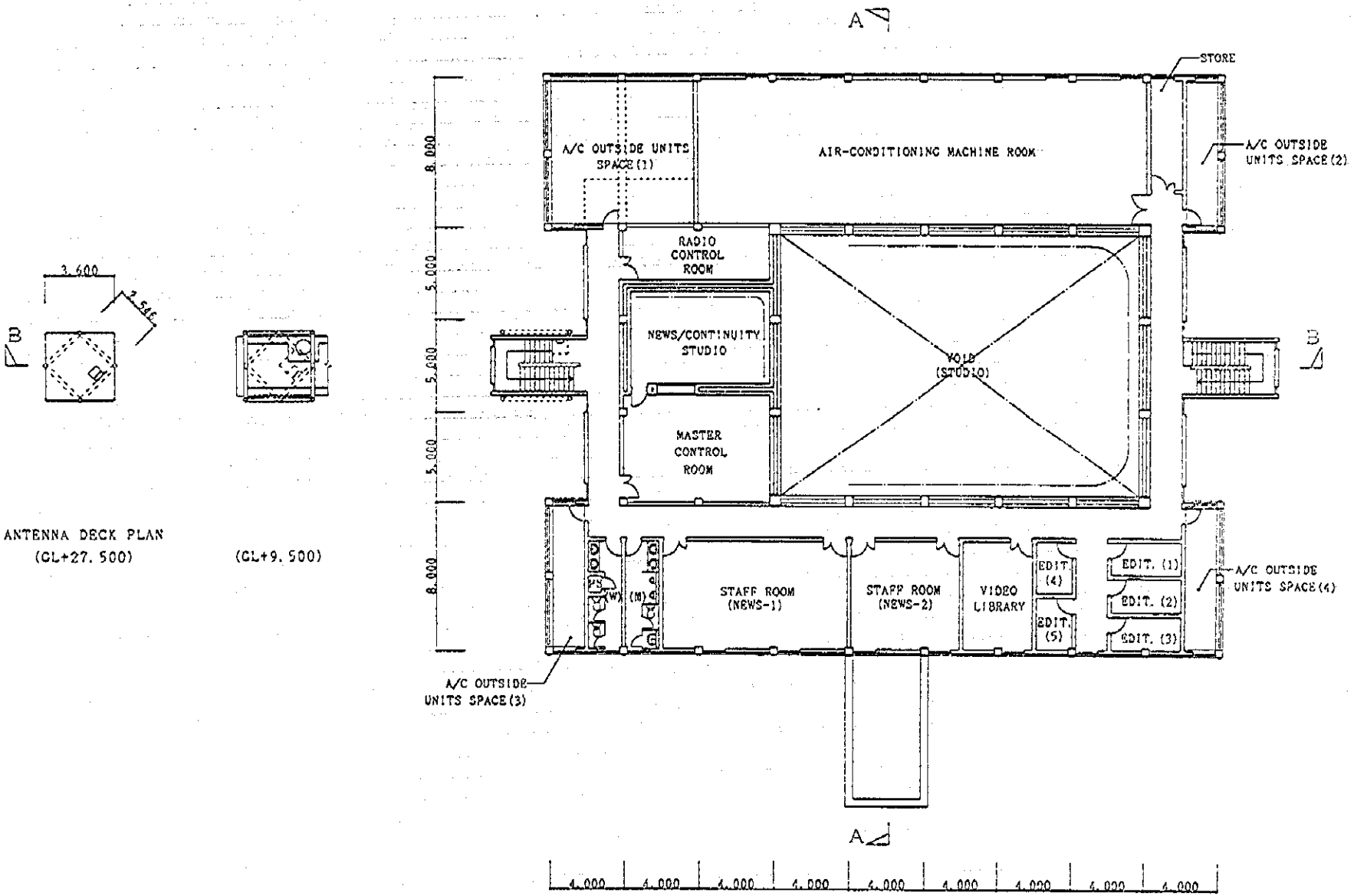


FIG. 2-3-18 PHNOM PENH TV STATION, FLOOR PLAN (FIRST FLOOR)

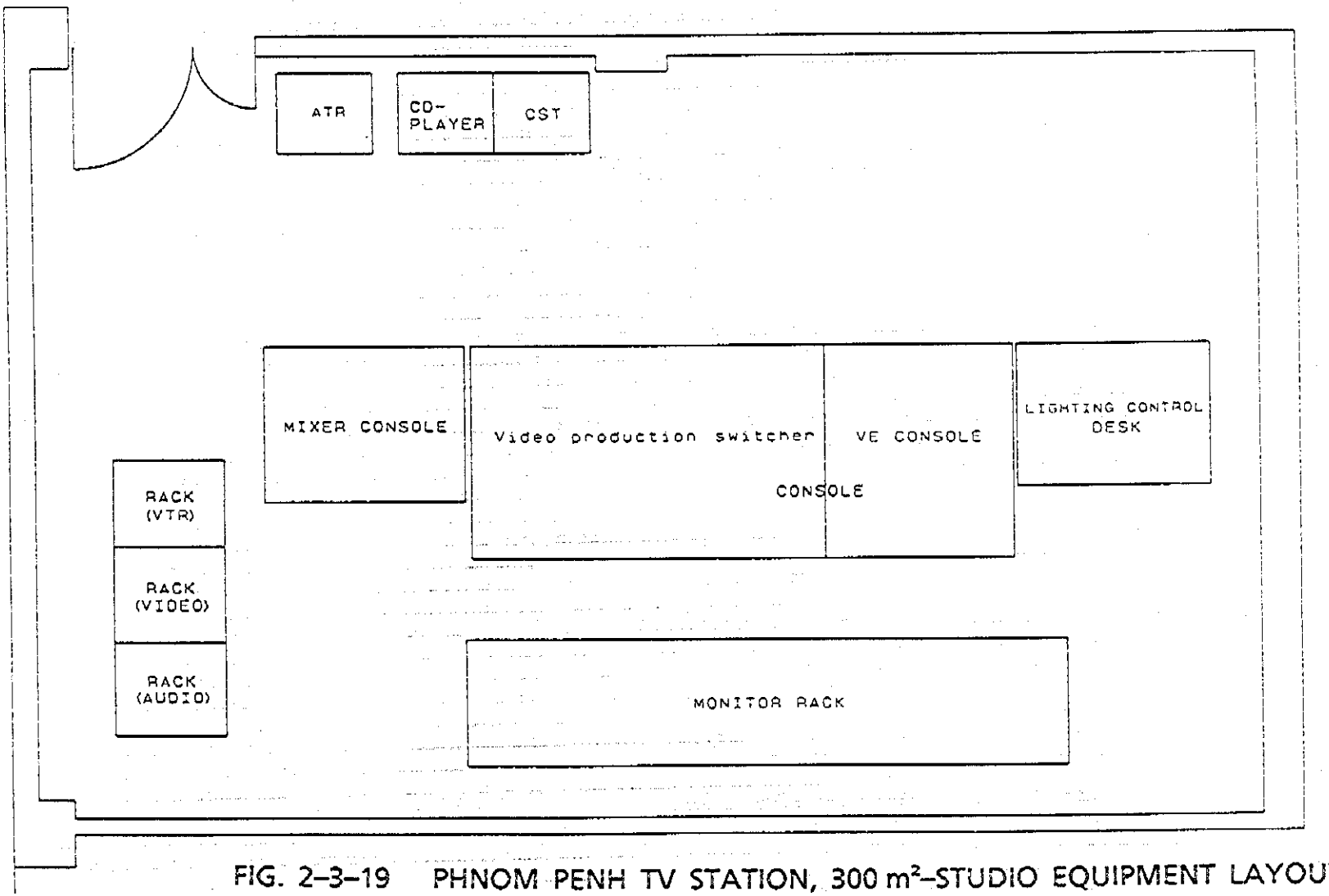


FIG. 2–3–19 PHNOM PENH TV STATION, 300 m²–STUDIO EQUIPMENT LAYOUT

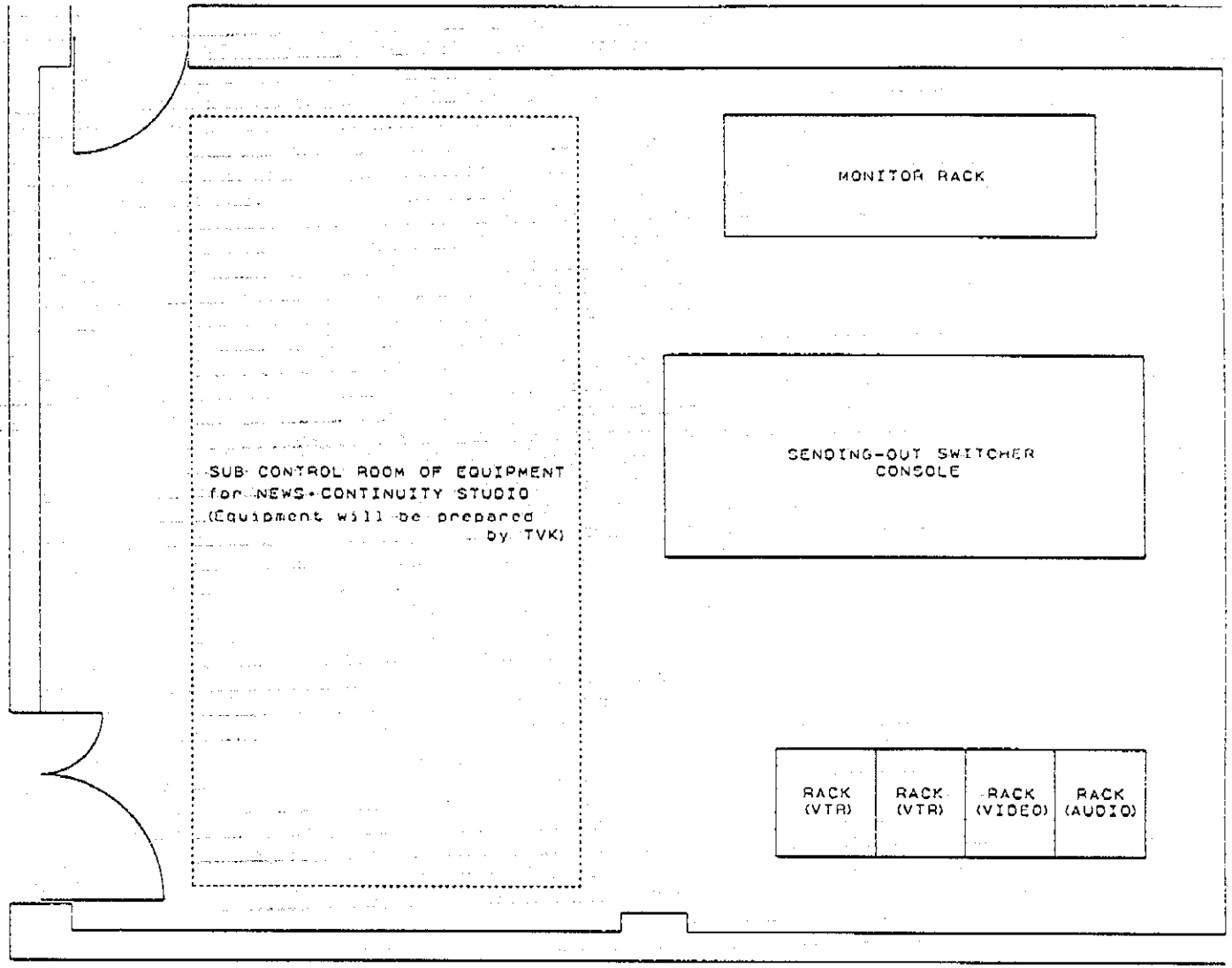


FIG. 2-3-20 PHNOM PENH TV STATION, MASTER CONTROL ROOM EQUIPMENT LAYOUT

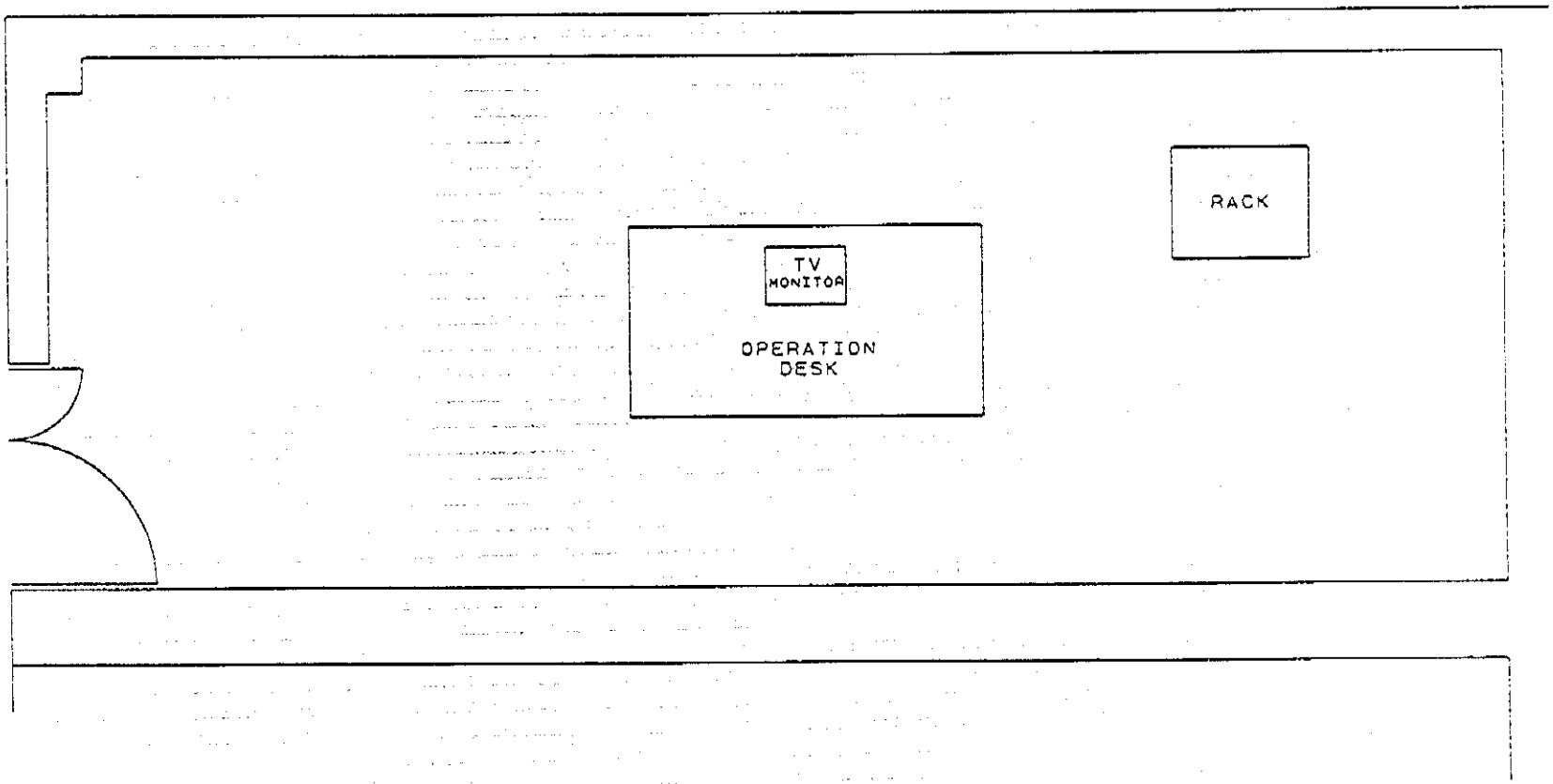


FIG. 2-3-21 PHNOM PENH TV STATION, RADIO CONTROL ROOM EQUIPMENT LAYOUT

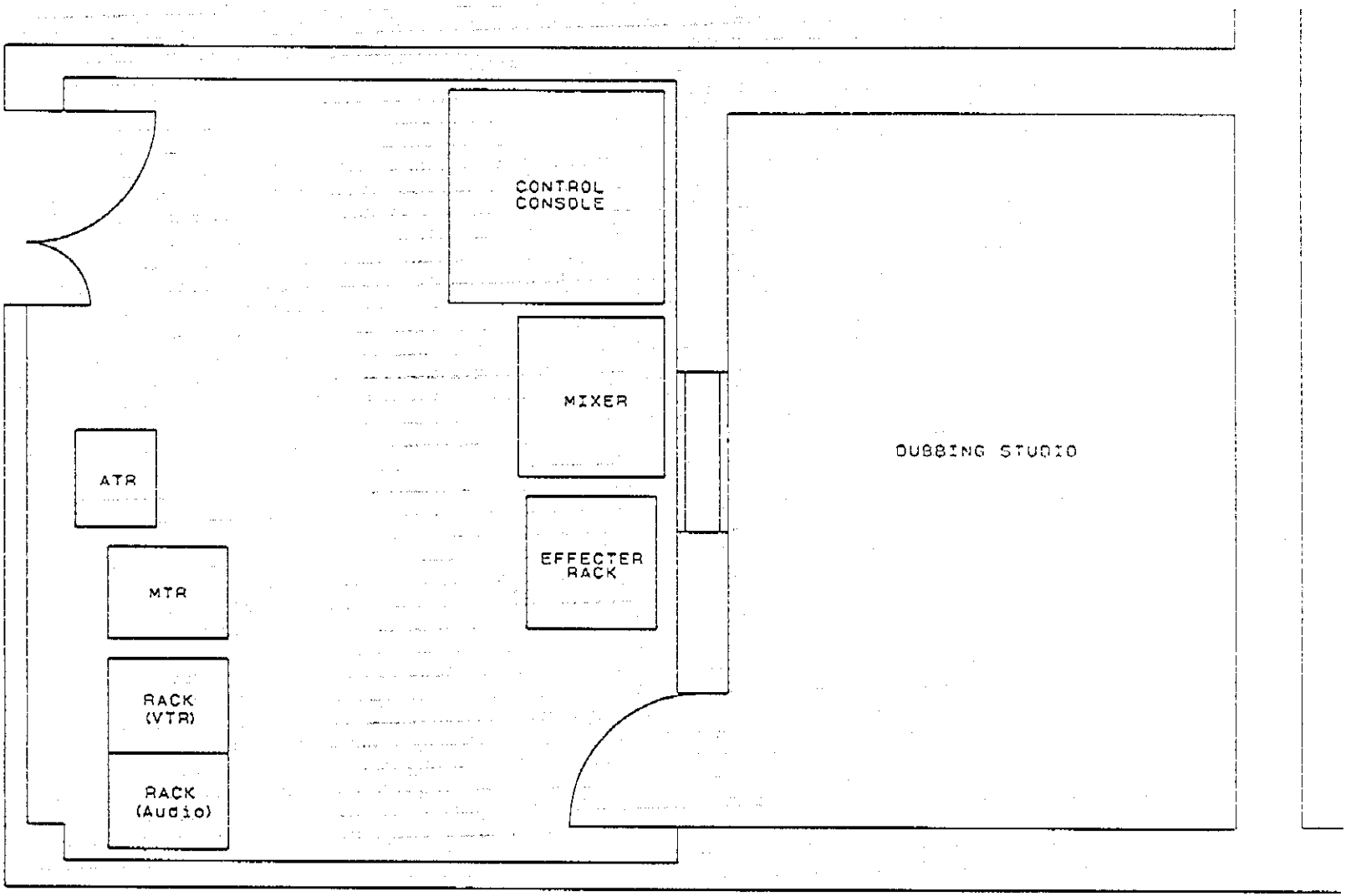


FIG. 2–3–22 PHNOM PENH TV STATION, AUDIO DUBBING ROOM EQUIPMENT LAYOUT

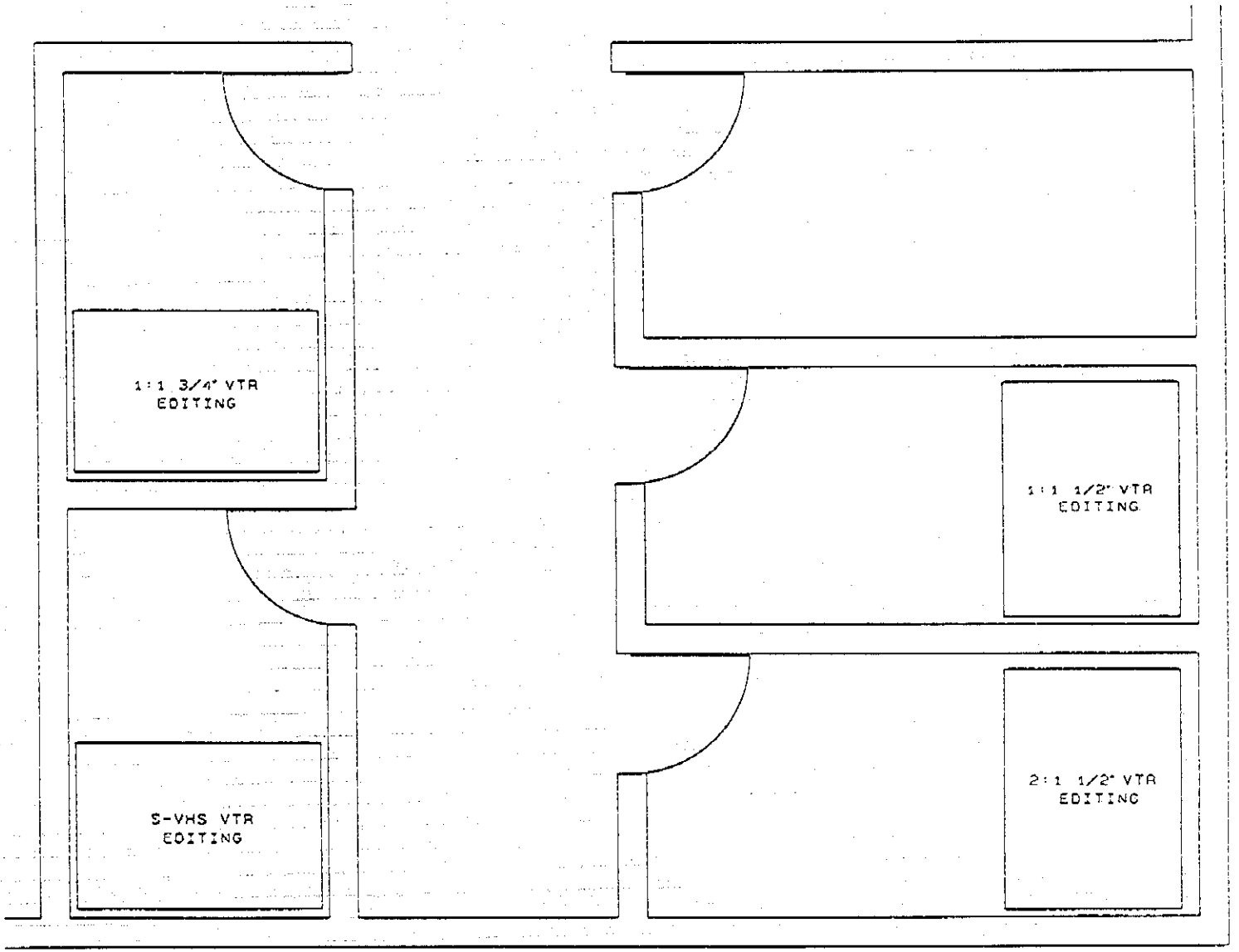


FIG. 2-3-23 PHNOM PENH TV STATION, VTR EDITING ROOMS EQUIPMENT LAYOUT

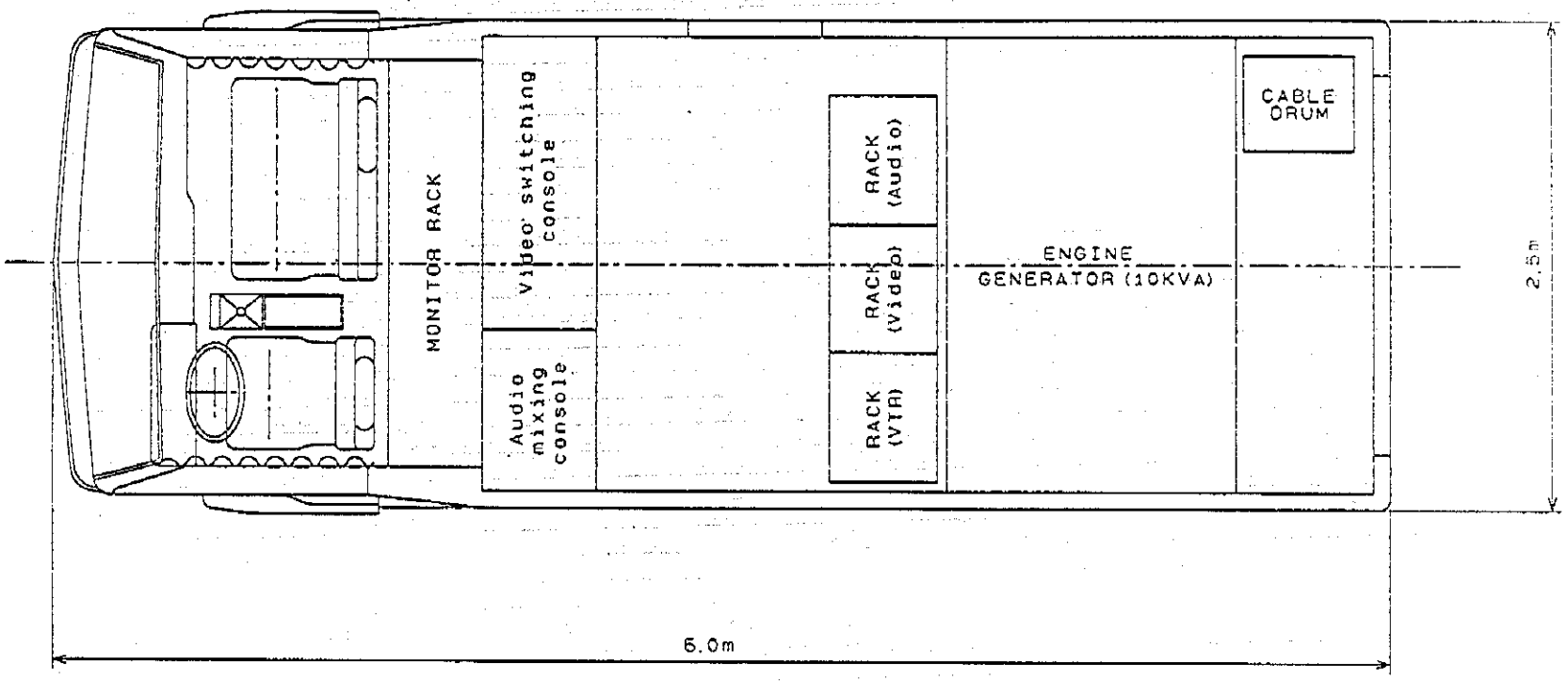


FIG. 2-3-24 EQUIPMENT LAYOUT OF O.B. VAN

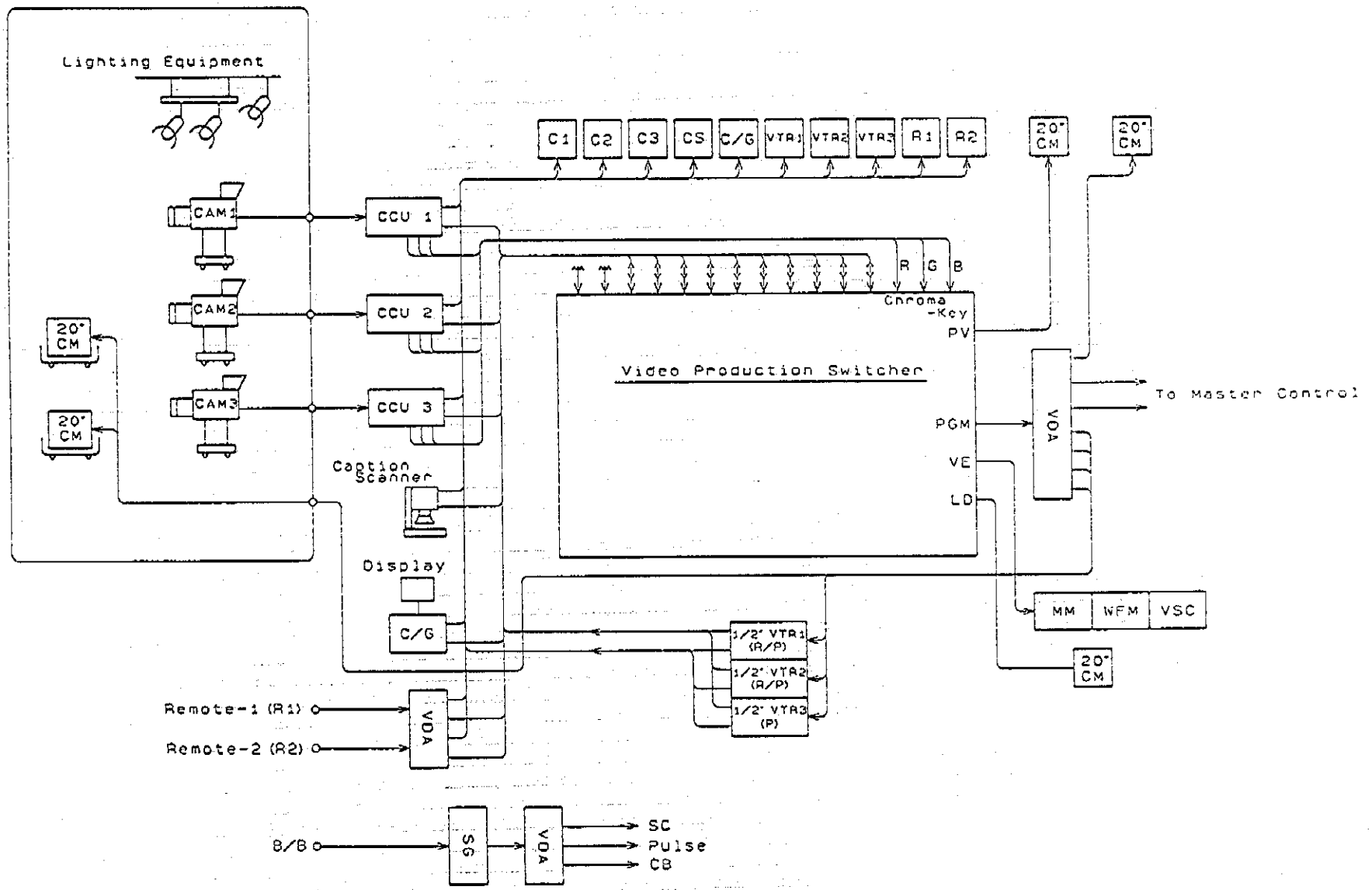


FIG. 2-3-25 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF VIDEO SYSTEM FOR 300 m²-STUDIO SUB CONTROL ROOM

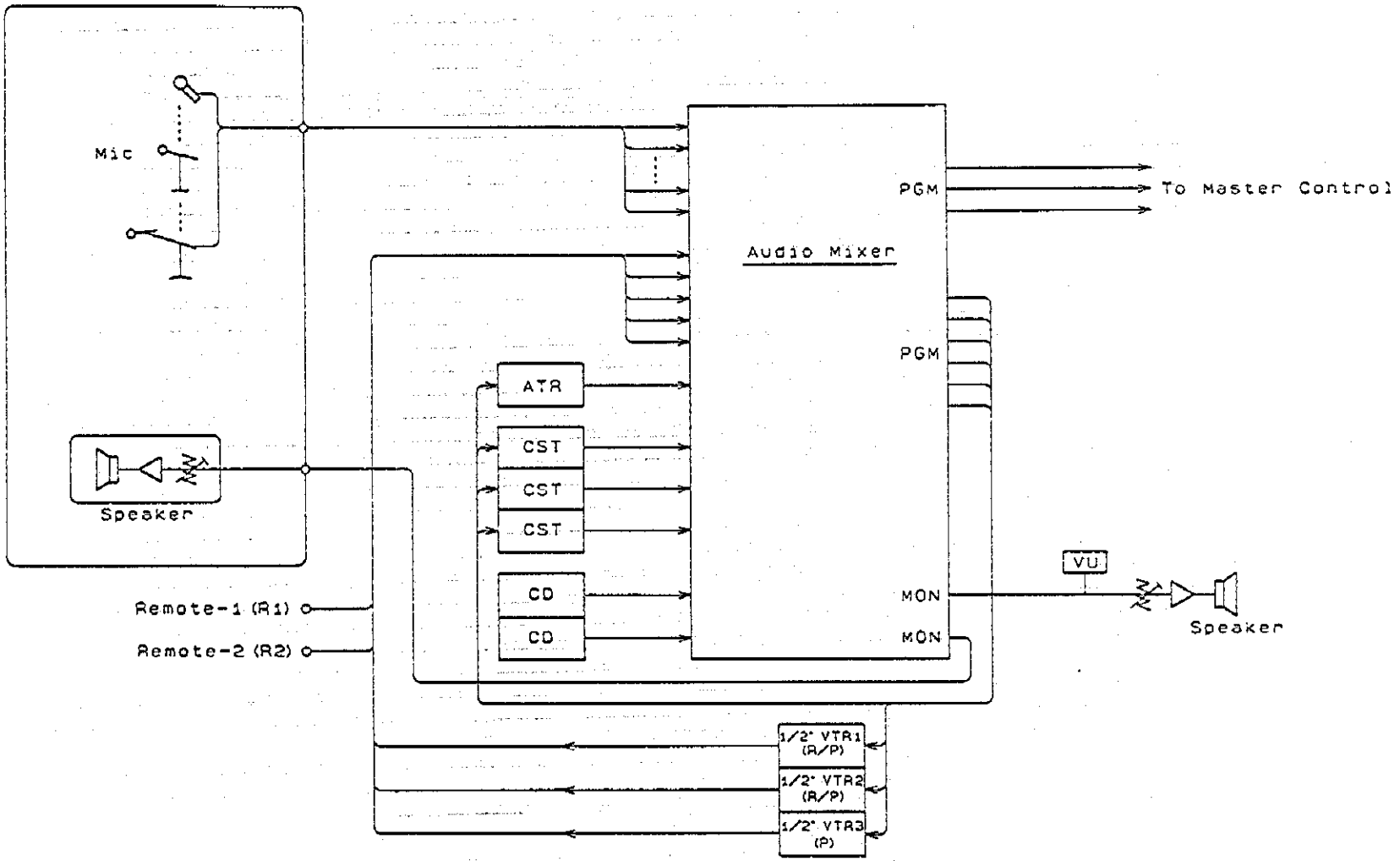


FIG. 2-3-26 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF AUDIO SYSTEM FOR 300 m²-STUDIO SUB CONTROL ROOM

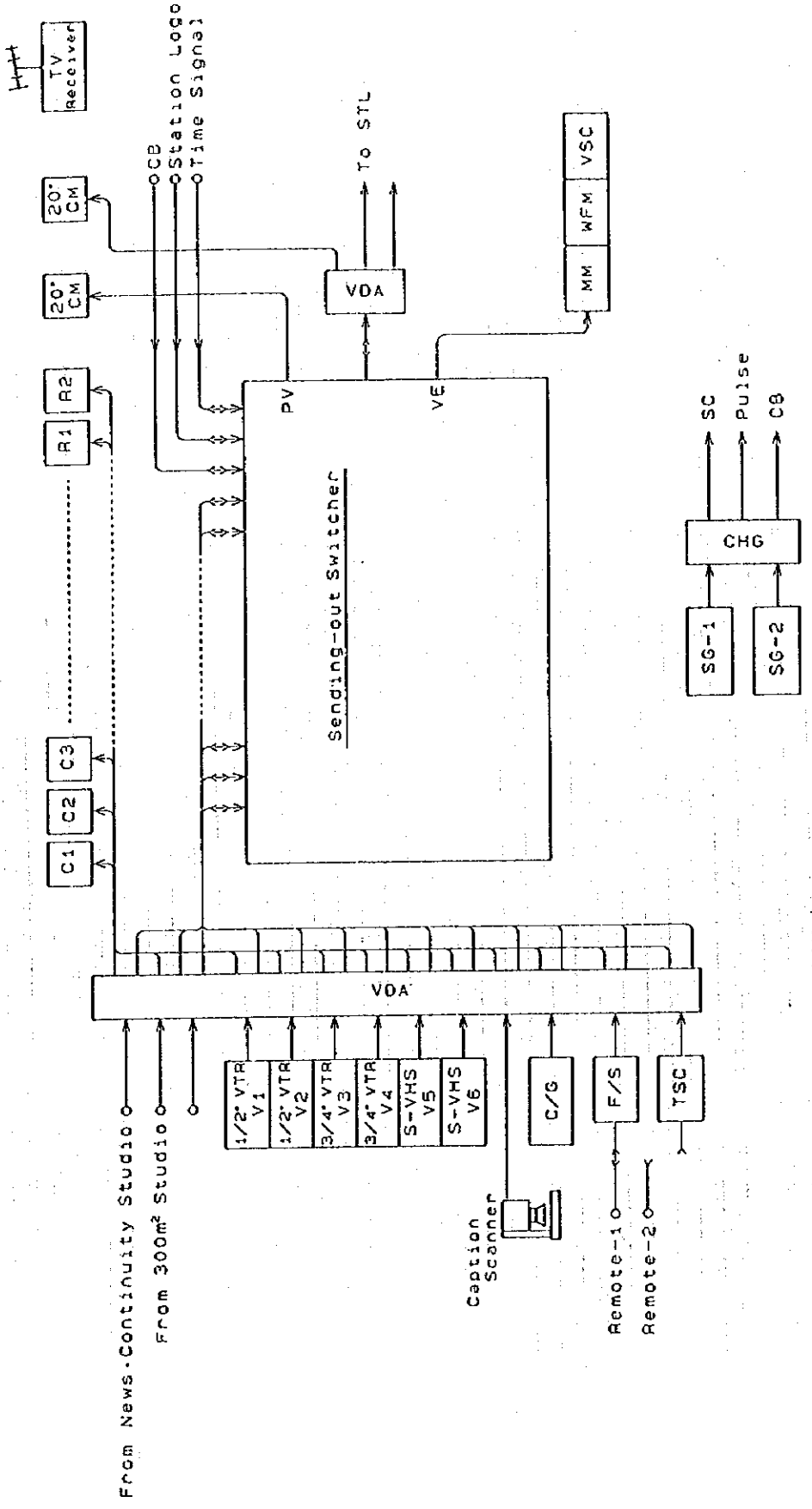


FIG. 2-3-27 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF VIDEO SYSTEM FOR MASTER CONTROL ROOM

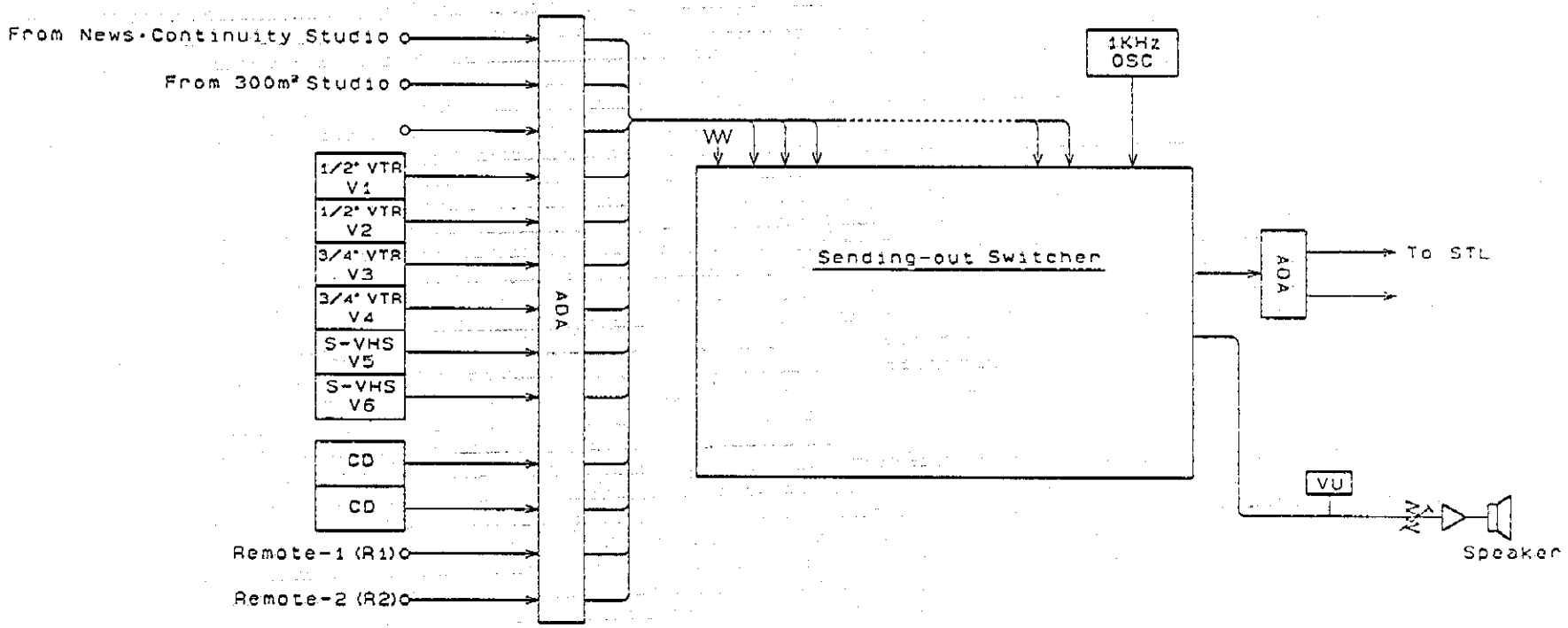


FIG. 2-3-28 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF AUDIO SYSTEM FOR MASTER CONTROL ROOM

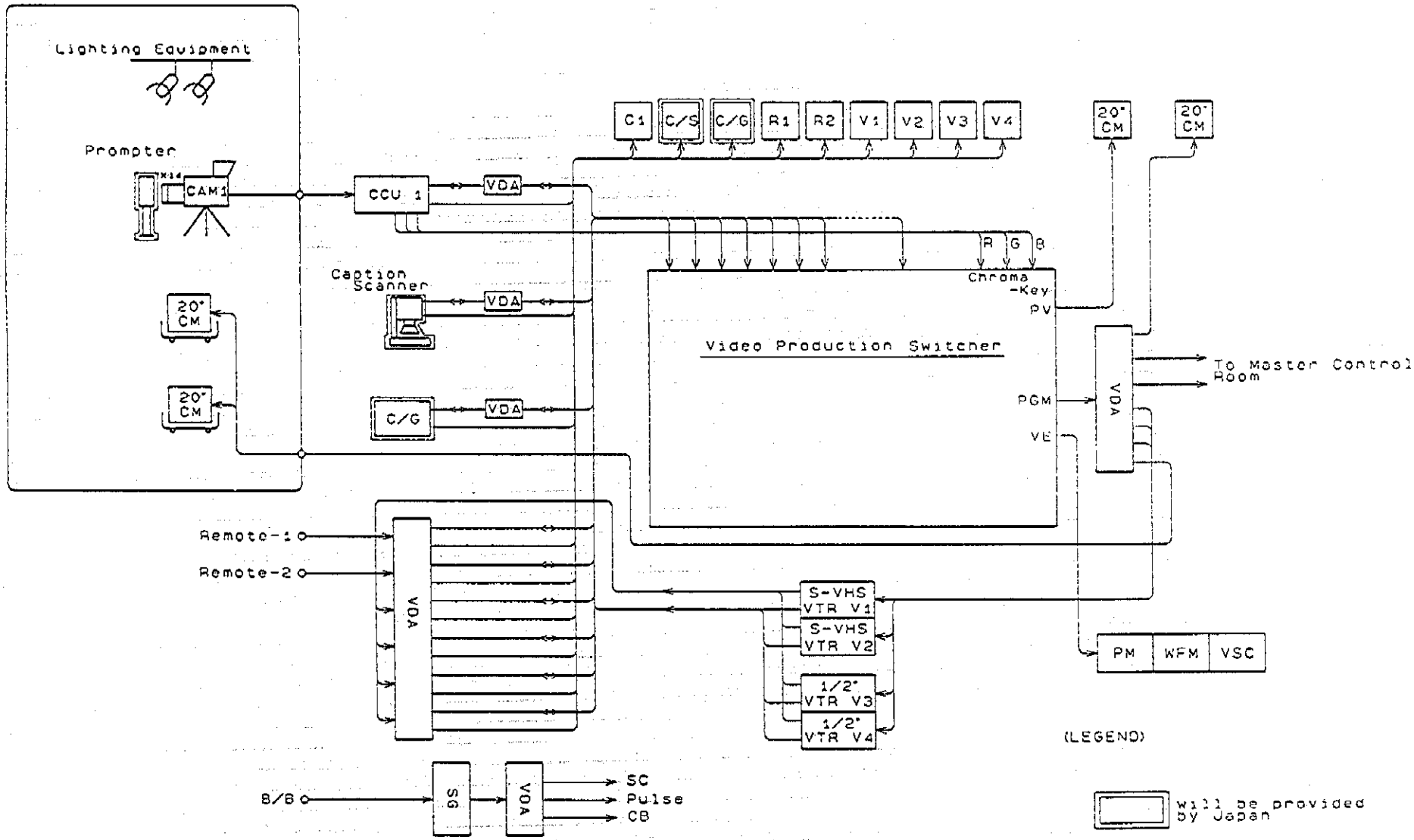


FIG. 2-3-29 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF VIDEO SYSTEM FOR NEWS CONTINUITY STUDIO

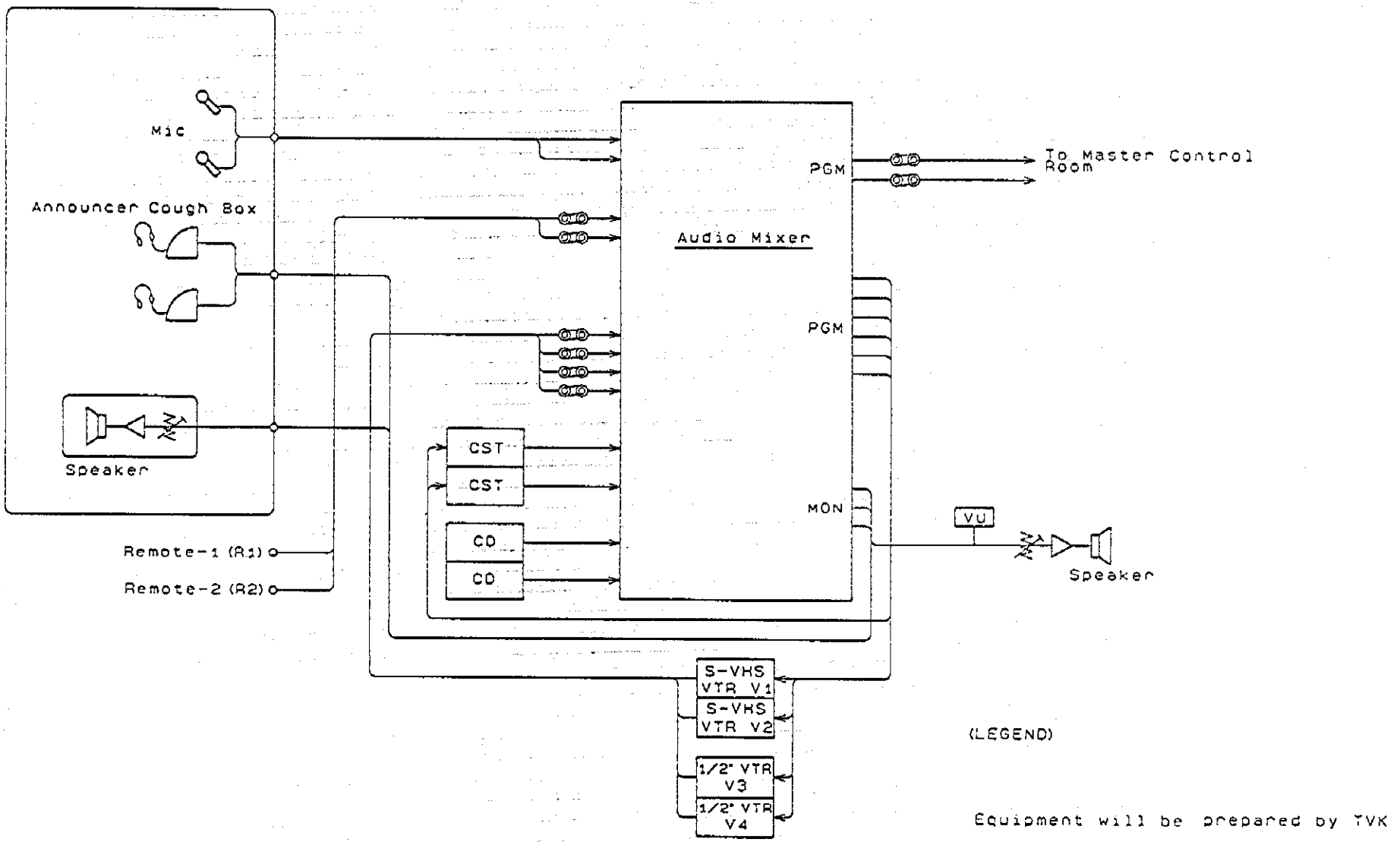


FIG. 2-3-30 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF AUDIO SYSTEM FOR NEWS CONTINUITY STUDIO

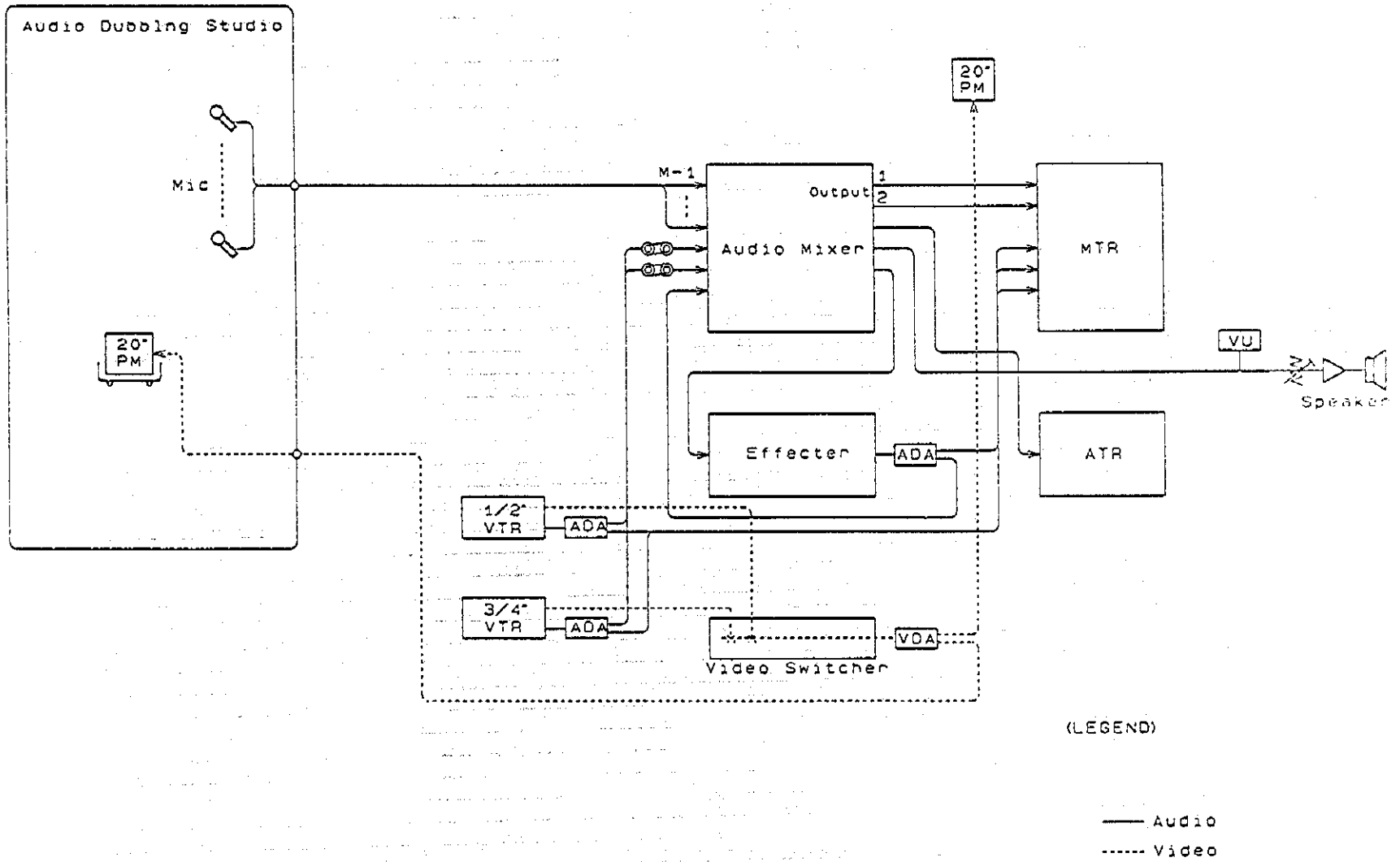


FIG. 2-3-31 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM FOR AUDIO DUBBING ROOM

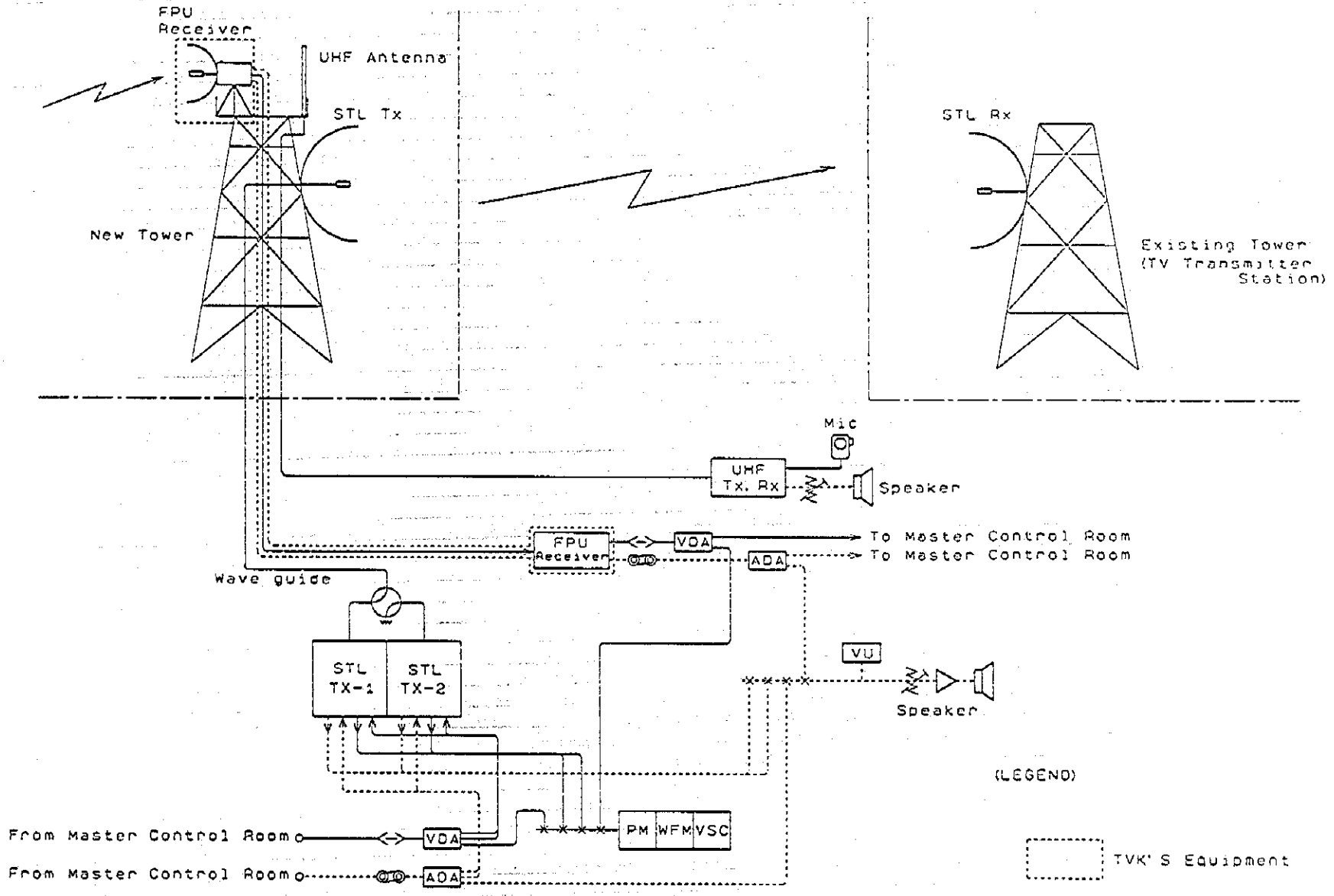


FIG. 2-3-32 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM FOR RADIO CONTROL ROOM

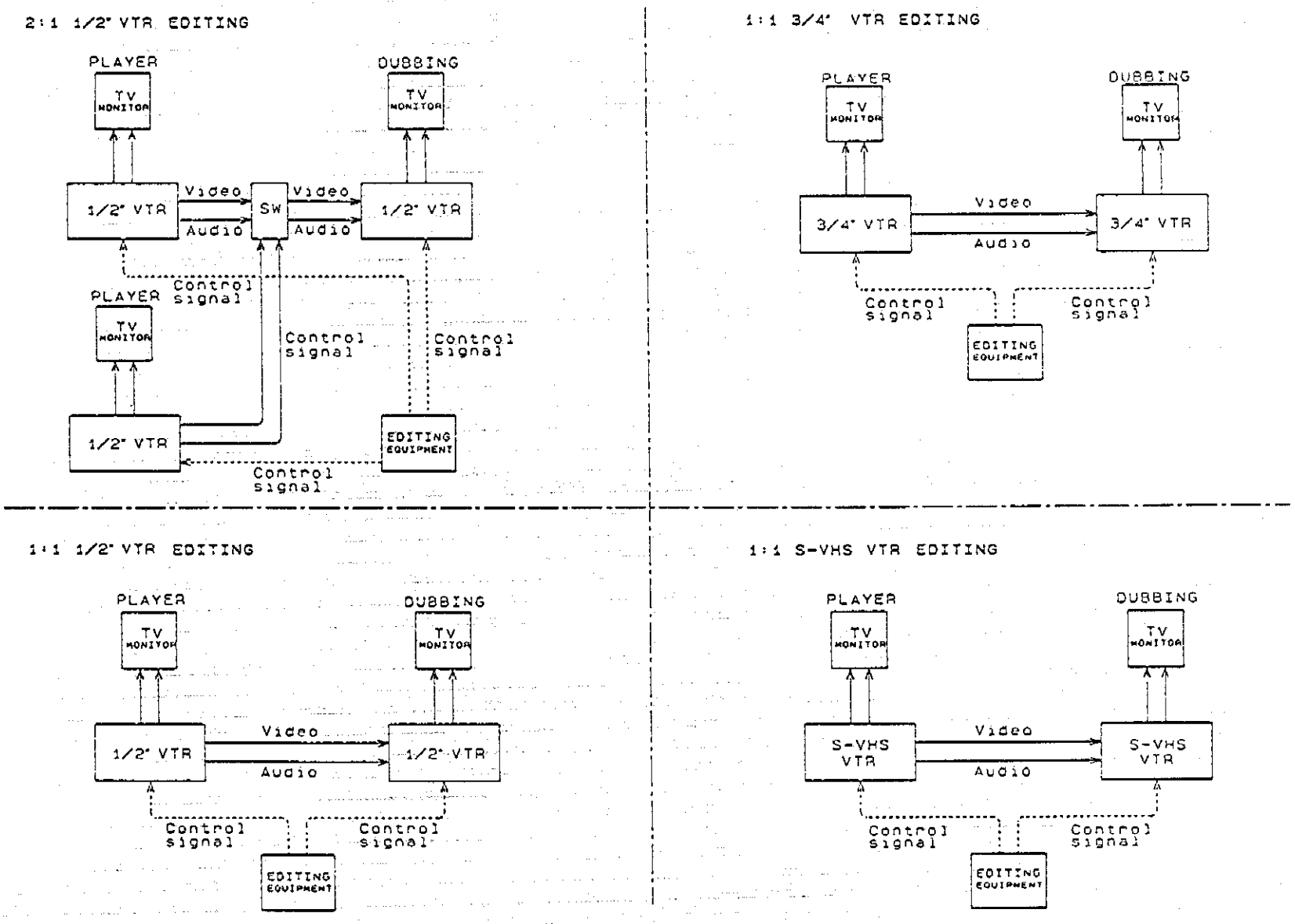


FIG. 2-3-33 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM FOR VTR EDITING ROOM

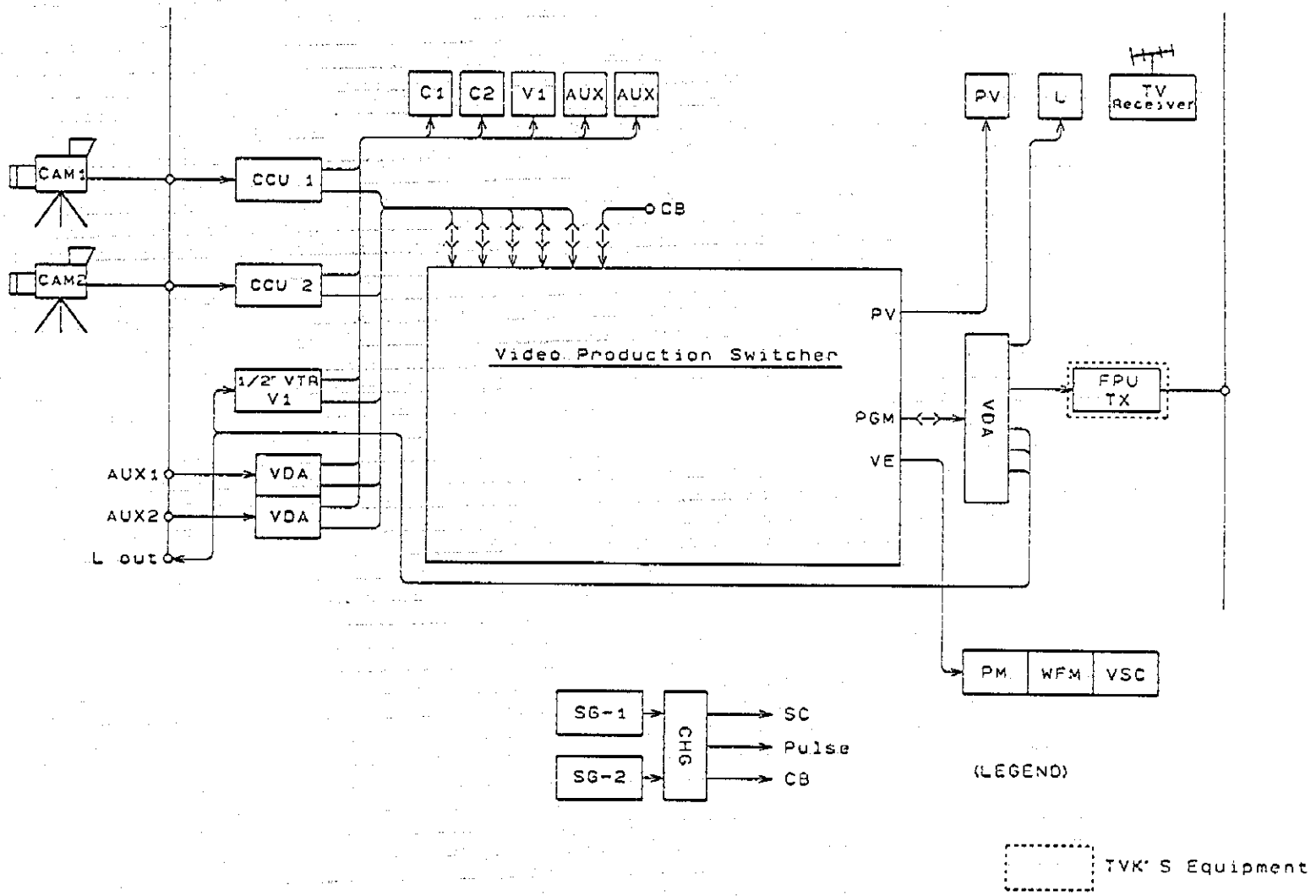


FIG. 2-3-34 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF VIDEO SYSTEM FOR O.B. VAN

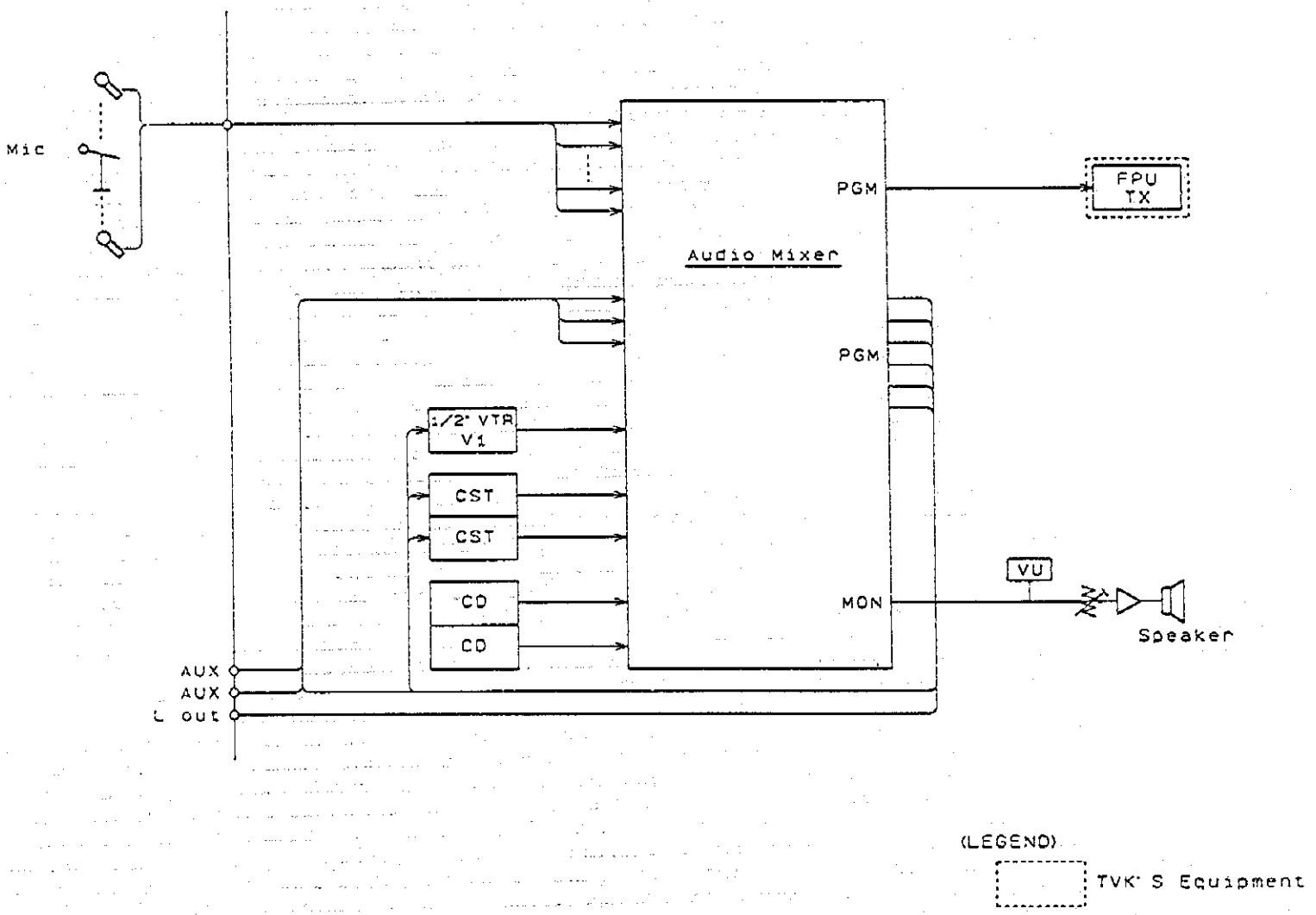


FIG. 2-3-35 PHNOM PENH TV STATION, SCHEMATIC DIAGRAM OF AUDIO SYSTEM FOR O.B. VAN

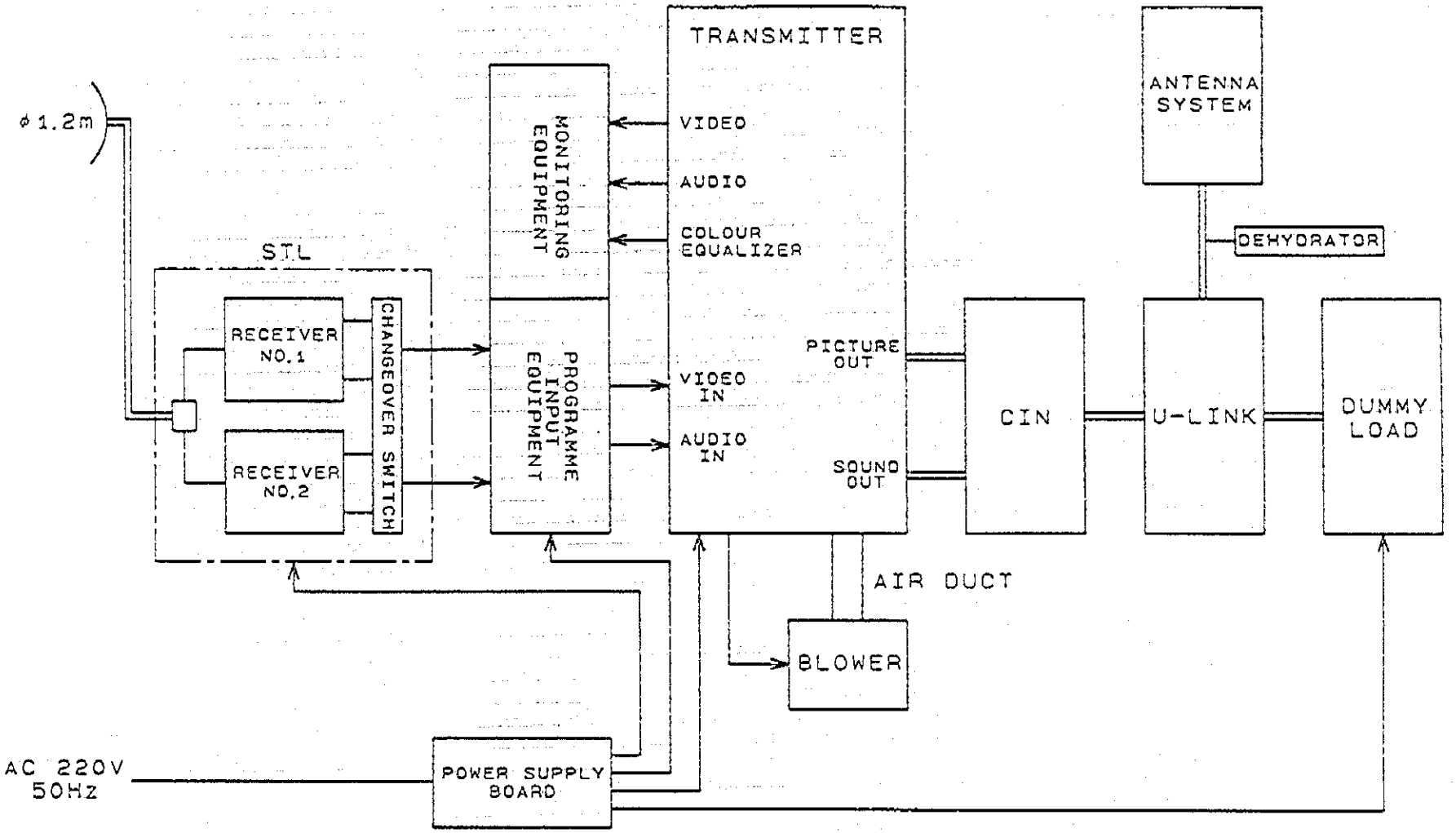


FIG. 2-3-36 PHNOM PENH TV TRANSMITTER STATION, SCHEMATIC DIAGRAM

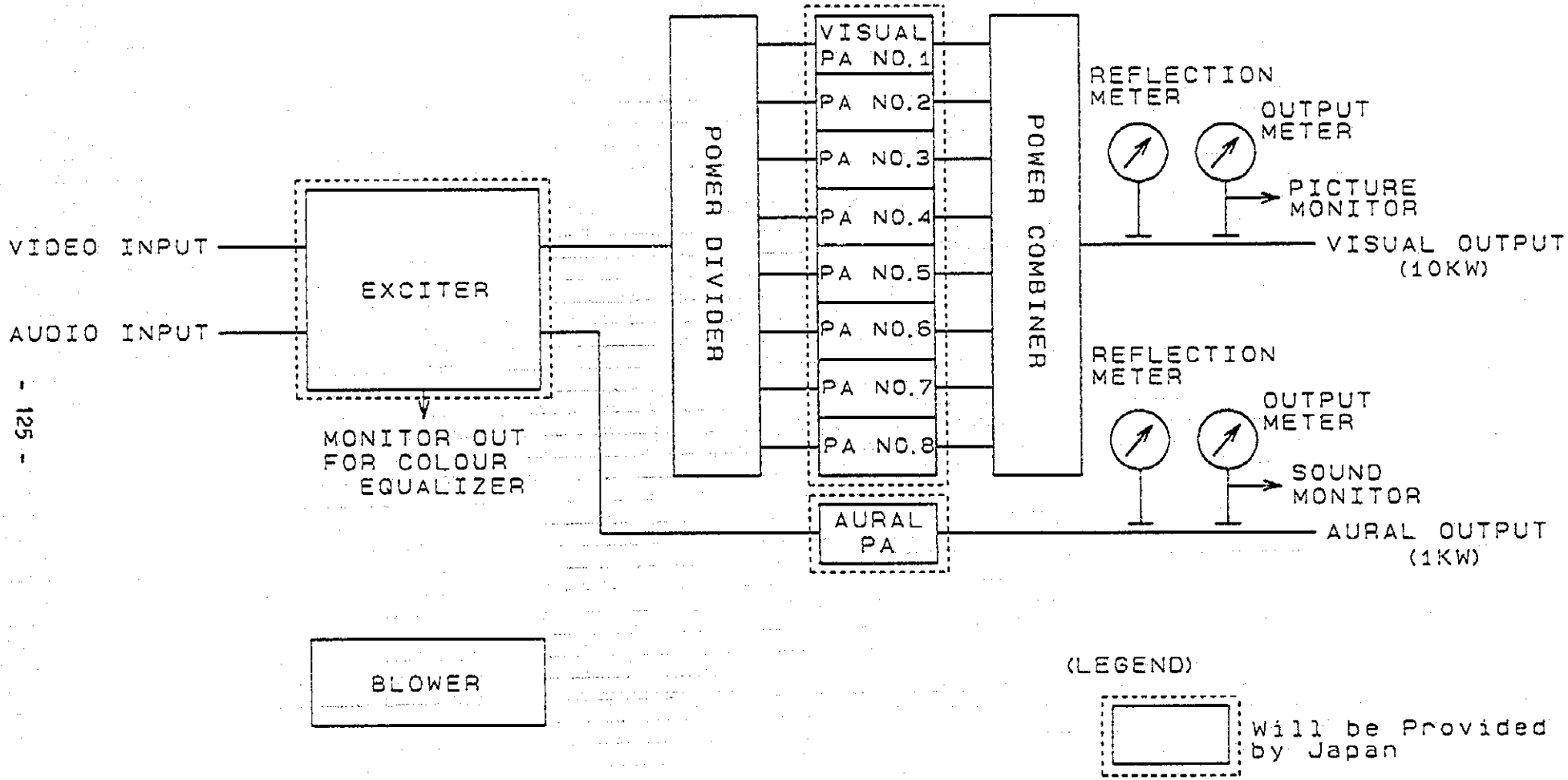


FIG. 2-3-37 PHNOM PENH TV TRANSMITTER STATION, SCHEMATIC DIAGRAM FOR TRANSMITTER

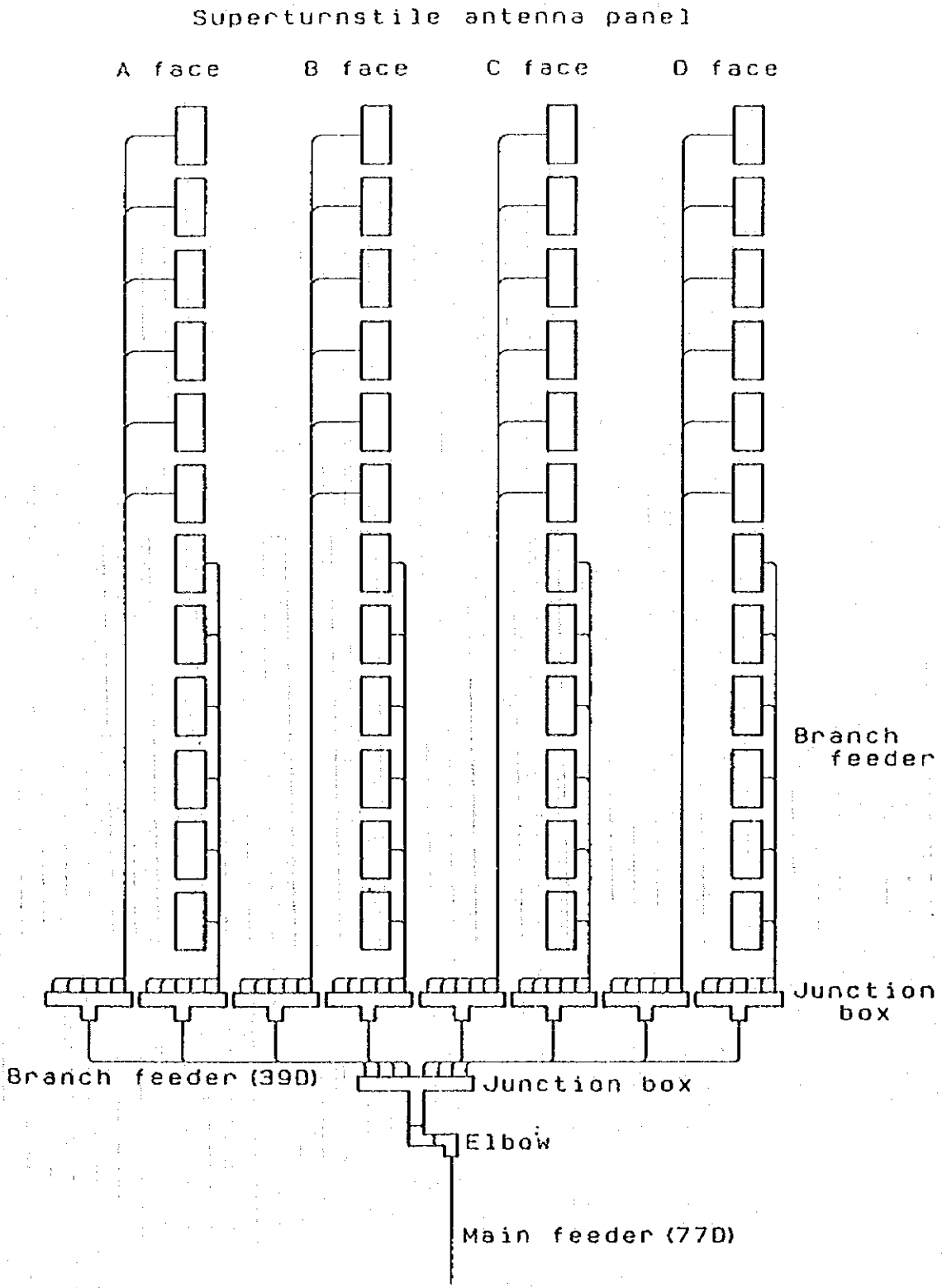
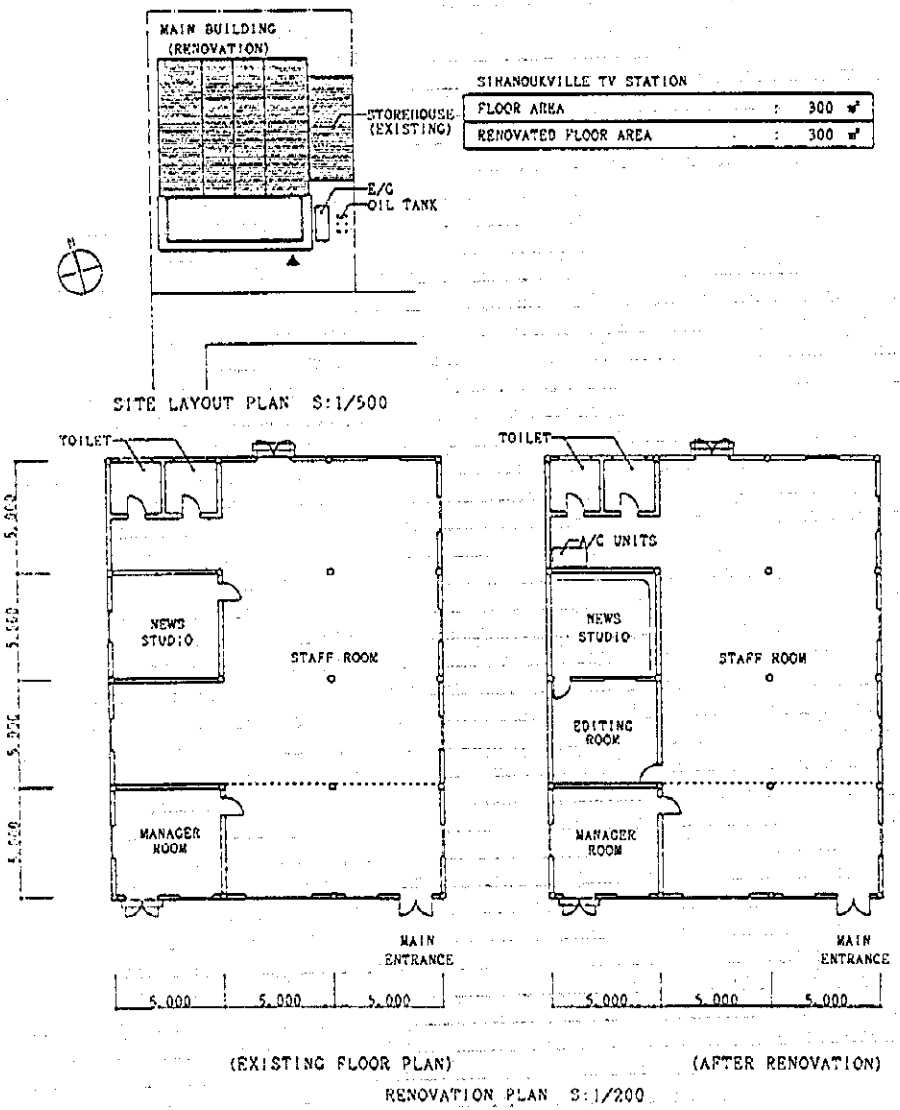


FIG. 2-3-38 PHNOM PENH TV TRANSMITTER STATION, SCHEMATIC DIAGRAM OF ANTENNA SYSTEM



SIHANOUKVILLE TV STATION		
FLOOR AREA	:	300 m²
RENOVATED FLOOR AREA	:	300 m²

SIHANOUKVILLE TRANSMITTING STATION		
FLOOR AREA	:	70 m²
RENOVATED FLOOR AREA	:	70 m²

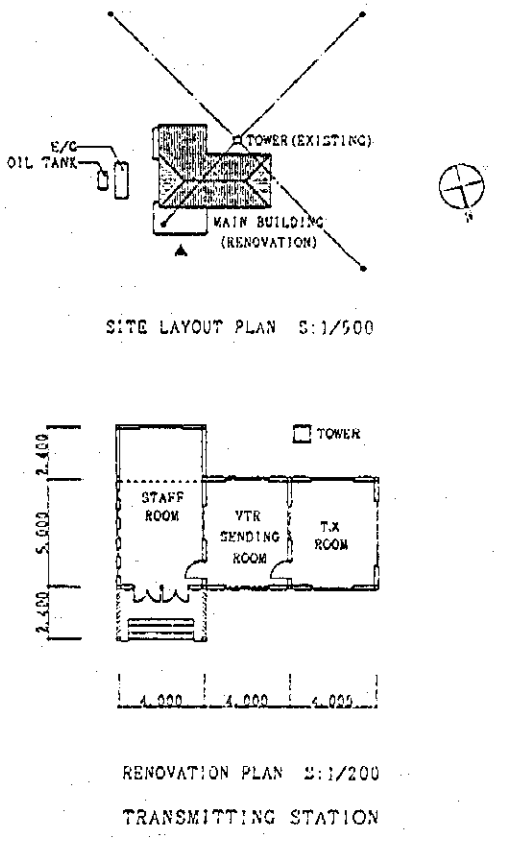


FIG. 2-3-39 SIHANOUKVILLE EXISTING BUILDINGS RENOVATION DRAWING

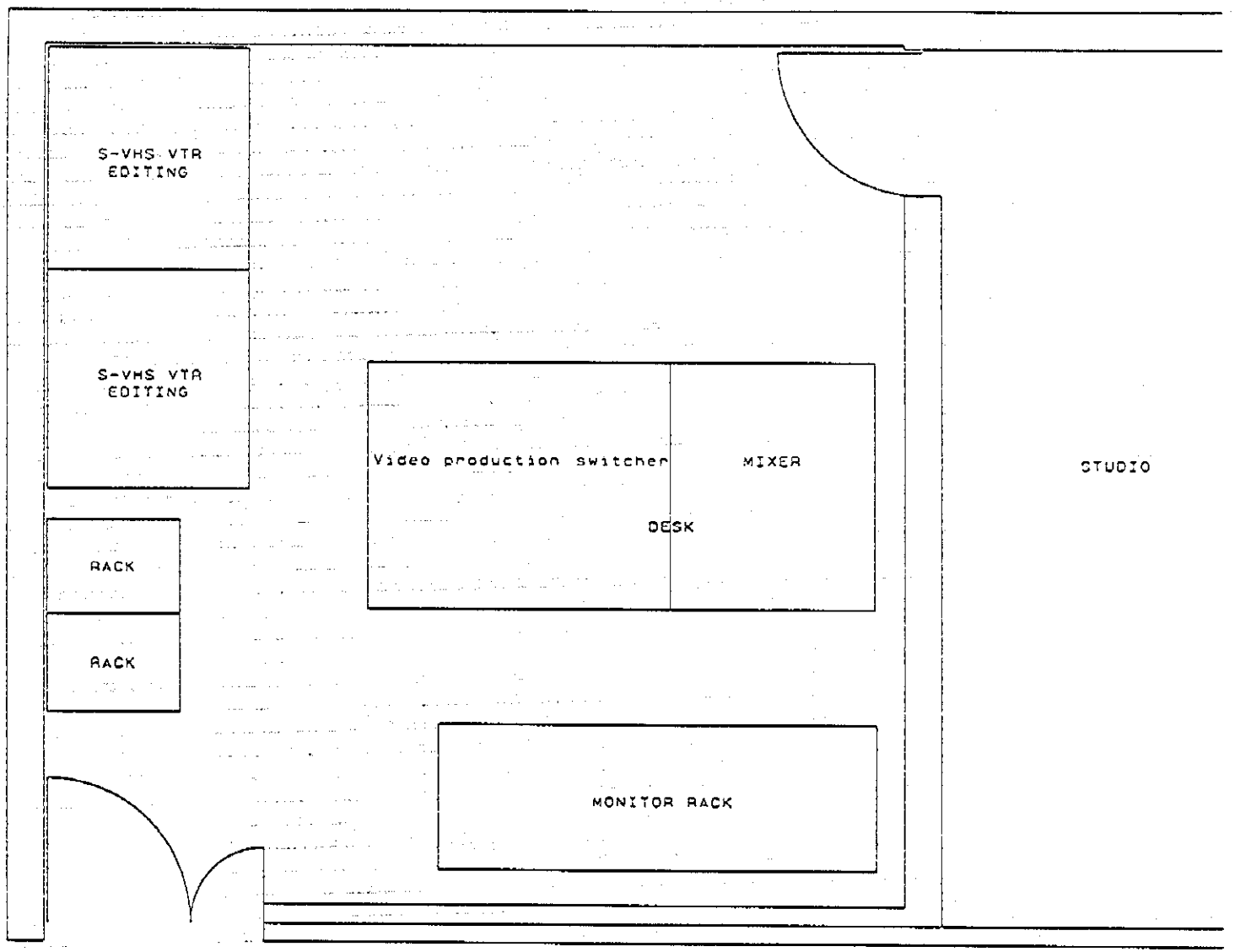


FIG. 2-3-40 SIHANOUKVILLE TV STATION, EQUIPMENT LAYOUT

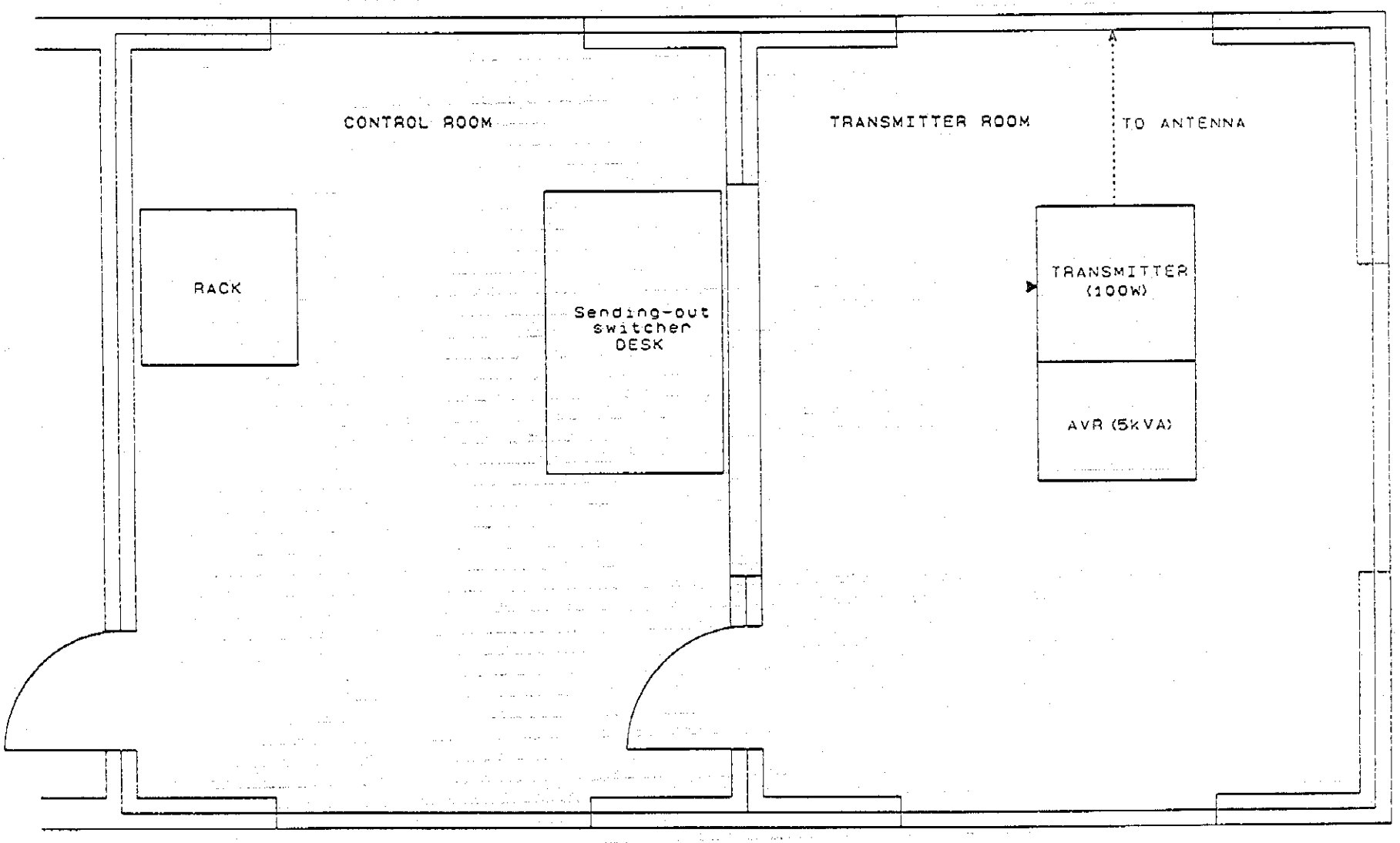


FIG. 2-3-41 SIHANOUKVILLE TV TRANSMITTING STATION, EQUIPMENT LAYOUT

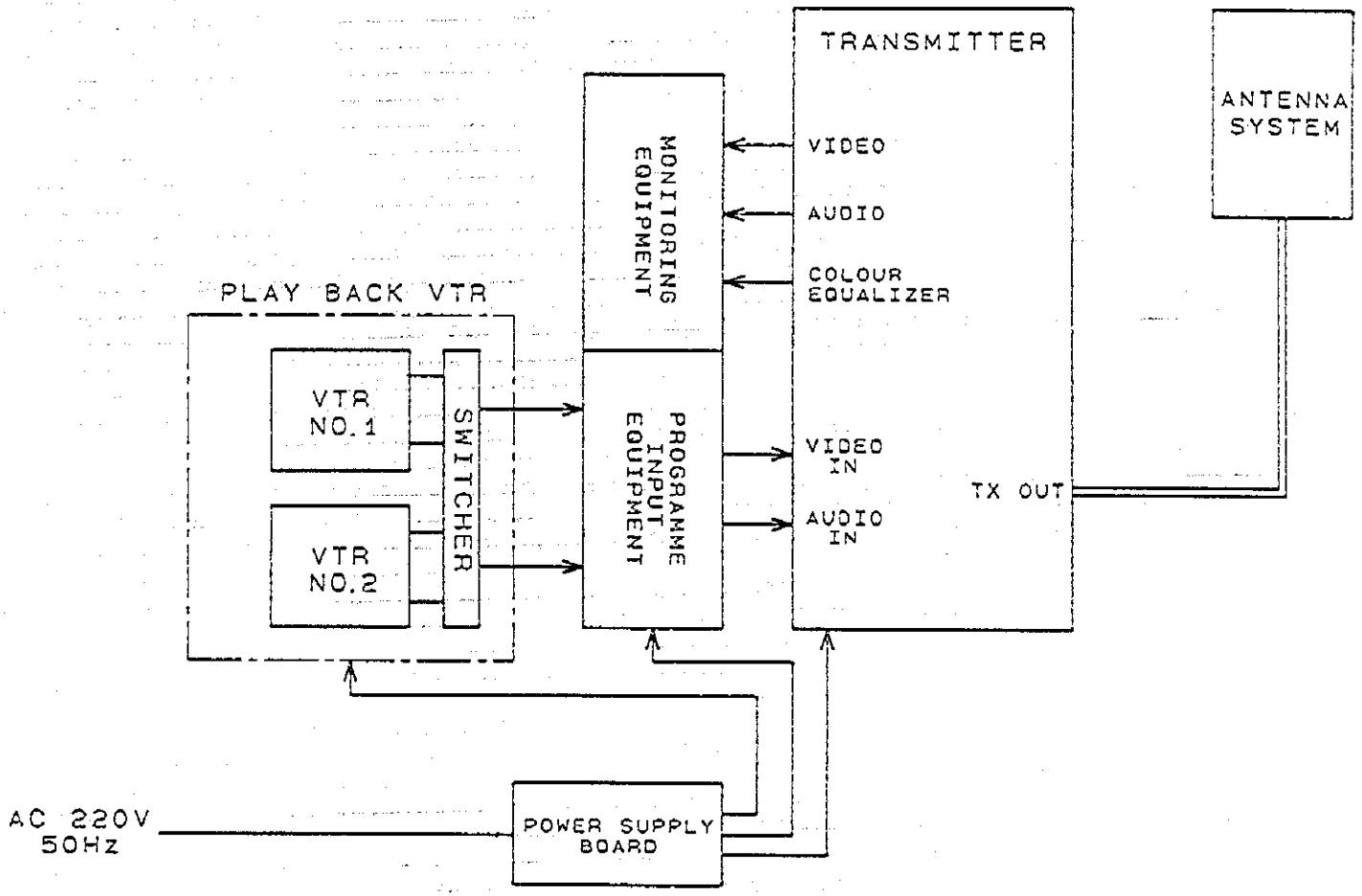


FIG. 2-3-42 SIHANOUKVILLE TV TRANSMITTING STATION, SCHEMATIC DIAGRAM

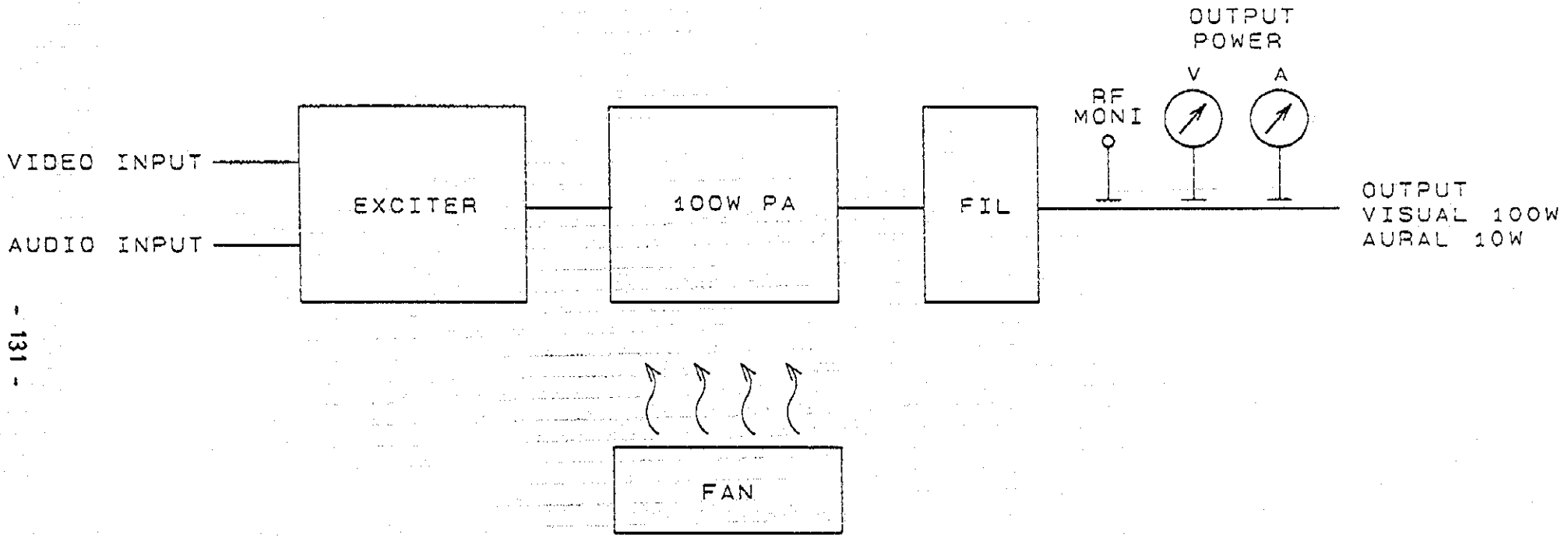


FIG. 2–3–43 SIHANOUKVILLE TV TRANSMITTING STATION,
SCHEMATIC DIAGRAM FOR TRANSMITTER

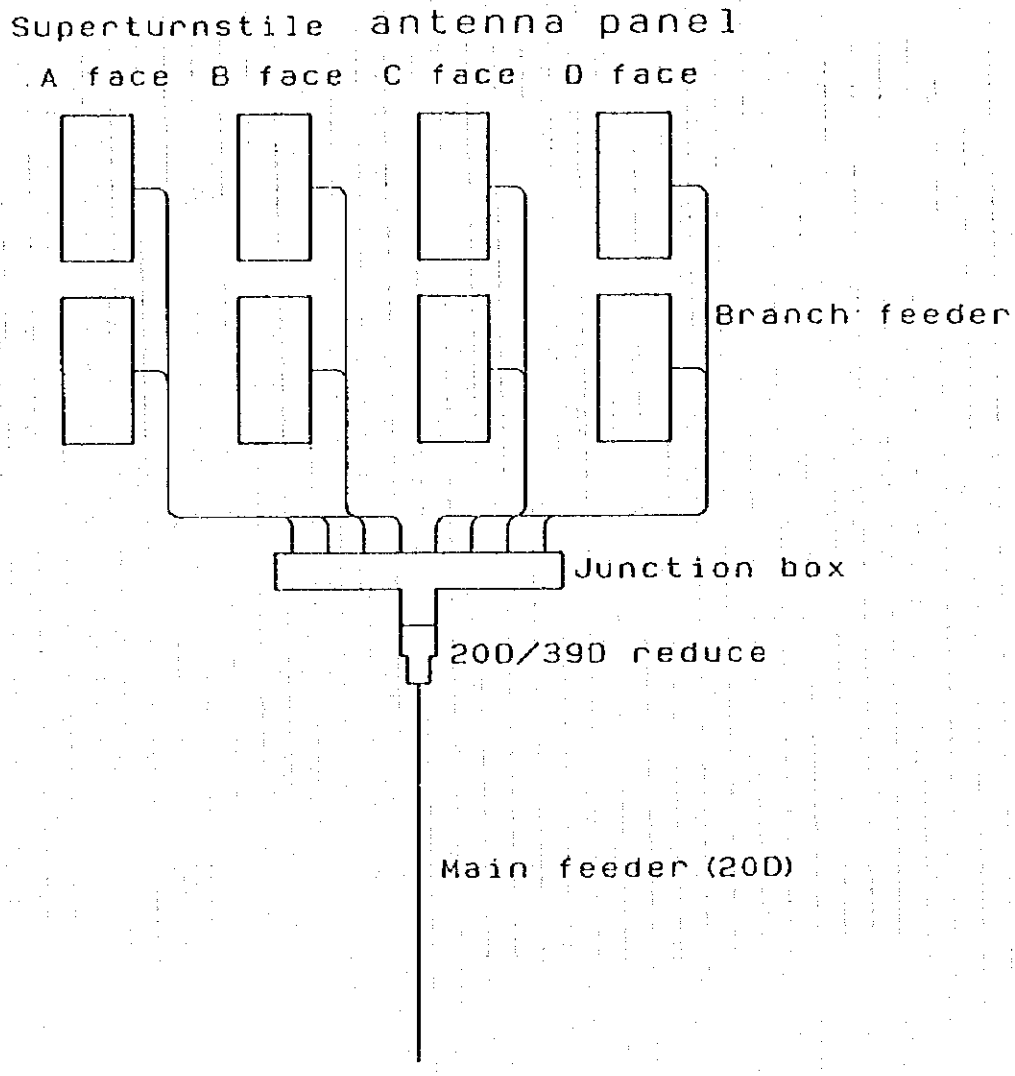


FIG. 2-3-44 SIHANOUKVILLE TV TRANSMITTING STATION, SCHEMATIC DIAGRAM OF ANTENNA SYSTEM

Chapter 3 Implementation Plan

Chapter 3 Implementation Plan

3.1 Implementation Plan

3.1.1 Implementation Concept

The body carrying out this project is TVK, National Television of Cambodia. In order that the project is carried out smoothly and without delays, it is vital that there are no differences between various departments regarding the implementation schedule and the scope of authority of each department. Hence TVK should select the counterparts (i.e. contacts) to liaise with the consultant's project manager regarding work supervision before the commencement of work. The consultants and their counterparts will inspect and revise particular work processes, work schedules, and technical specifications. They will also maintain close links with governmental officials in charge of the project in each country. Additionally they shall offer suggestions and advice swiftly and appropriately to the contractors carrying out the work, in order to ensure the smooth progression of the project.

The Phnom Penh TV Broadcasting Station to be built under this project is the most important domestic facility in terms of national broadcasting, and will form the core of Cambodia's broadcasting facilities. The completed facility must, in addition to providing a work environment for the facility staff, adequately satisfy unique requirements as a television studio. Hence the following particulars must be kept in mind when constructing the building and installing equipment:

(1) Consideration for Design Adjustments

A large number of the design conditions imposed on a television studio —— a unique type of building —— are determined according to the broadcasting facilities and equipment it will house. The heat production, power requirements, dimensions, and wiring requirements of various equipment tend to differ according to the specifications of the manufacturer of the equipment. Therefore, substantial adjustments

or reviews of a large number of items relating to the details of the building, such as the shapes of equipment foundations, layout of trenches, sizes, shapes and positions of openings in floors and walls, etc. are essential even after the commencement of work.

(2) Ensuring Studio Quality

Defects in the construction of the walls, floor and doors of a studio, which requires excellent sound-isolation, can prove to be fatal for programme production. Hence it is necessary to pay detailed attention to airtightness when constructing the studio and related rooms, in order to attain the required acoustical performance.

(3) Observing and Adjusting the Work Schedule

This project is subject to various limitations, due to the fact that its schedule is determined by Japan's aid granting mechanism. Hence the installation of some equipment during construction work is inevitable. As any delays in construction work will have a serious effect on equipment installation, it is extremely important that work schedules be adhered to. Hence the building construction contractors should, in accordance with instructions from the consultant, carry out sufficient discussions and coordination work with the equipment installation contractors. Also, equipment installation firms must continuously maintain close links with the building construction contractors during the construction, and always provide detailed information on the timing of the delivery, installation, and trial operation of equipment.

(4) Use of Local Contractors

According to information obtained from the Cambodian Ministry of Commerce, currently 53 construction and civil engineering firms have been registered with the Ministry. However, the scale and experience of each firm is unclear, and almost all are materials suppliers established with investments from neighboring Thailand, China, or Vietnam, and are equivalent to small-scale workshops. Building materials that can be obtained domestically are limited to cement, gravel, sand, and bricks. This means that there are unfortunately almost no local firms that can independently undertake the construction of a medium-sized or larger building, including interior

finishing work and facilities installations. It can also not be denied that local work supervision techniques are not sufficiently developed. Hence the de facto status quo is that construction work by aid agencies from Japan and other countries usually rely on local contractors mainly for labour, while materials and technicians are brought in from the country providing the aid or from neighbouring countries. Technology is transferred as appropriate to local technicians throughout. The work for this project will be carried out in this way.

(5) Management Personnel Plan

1) Building Construction Work

The work will have to be carried out under extremely tight conditions, as the ground is weak and pile work will have to be carried out first, and as it will be carried out under the restrictions imposed by the concurrent installation work of equipment. Hence it is necessary, in order to ensure work quality and to make sure that proper procedures are adhered to, to position sufficient supervisory personnel. The Japanese supervision personnel will consist of four persons: a site director, a construction engineer, a facility installation engineer, and an office administrator. These personnel will probably be based on-site throughout the construction period.

Additionally, as the studios that will form the core of the new facility will require much skilled work, such as special sound-absorbent interior finishing, grid piping, catwalks, and installation of soundproof doors, a technician with expertise in studio finishing and all types of metal work will have to be dispatched to the site for a limited period during the construction.

The above supervisory personnel will also be dispatched to the site as appropriate for the renovating the existing facility in Sihanoukville.

2) Equipment Installation Work

Equipment installation work can be roughly divided into installations by the respective manufacturers of lighting equipment, studio equipment, radio-related equipment, and transmitter-related equipment. Each manufacturer will dispatch their own installation personnel.

All manufacturers will dispatch a team to assemble the equipment and take care of the wiring, and a team to carry out adjustments and inspections. The former team takes charge from the unpacking of the shipment, through the wiring between equipment, up to the wiring checks afterwards. From then on the latter takes over and checks the wiring, thus completing the double-check system. If there are no perceived errors, the system is powered up, the equipment adjusted, then the OJT carried out, final data taken, and the final inspection carried out. Teams will be comprised of two Japanese engineers and four or five local assistants. Each team will have one team leader, who will coordinate the work.

3.1.2 Implementation Conditions

(1) Natural Conditions

Phnom Penh, the site of the work, has geologic properties which cause the groundwater level to rise to around 1m from the surface during the wet season. The soil near the surface consists of fine silt, i.e. sand or fine particles, and is extremely weak. Excavation of water-bearing ground involves difficulty, and greatly affects the work process. It is therefore necessary to plan the work so that pile work and earth work is carried out during the dry season, from November to April. From time to time the entire city of Phnom Penh may be submerged, and it is thus necessary to make appropriate provisions for preventing the intrusion of water into the site during the site preparation.

(2) Preparations for Procuring Materials

As basic materials that can be obtained in Kingdom of Cambodia are limited, most of the finishing materials will have to be obtained from nearby countries, and all materials for facility installations

will have to be obtained from nearby countries or Japan. Hence the building contractor must gather information on importation procedures and shipment times as early as possible, so that importation does not upset the construction schedule. In Thailand, exportation of some construction materials has been banned in the past due to domestic circumstances, so conditions in the various countries must be sufficiently researched in advance. Currently most of the necessary construction machinery can be obtained locally, but it is possible that changes in local conditions can lead to difficulties in obtaining construction machinery in future, so care is also required in this respect.

(3) Construction Permits and Related Laws

At present, laws on the licensing of building design or construction work have not been drawn up. According to municipal authorities at the time the basic design survey was conducted, zoning legislation is currently being debated but will take time until promulgation. Hence it is thought that there will be no problems if the building design and construction work is carried out according to standards accepted in Japan and internationally, but it is necessary to verify whether or not zoning or other legislation affecting construction work have been promulgated at the time of implementation.

(4) Considerations Regarding Equipment

Although it would be preferable for equipment installation work to be carried out only after the construction work for the TV Broadcasting Station has been completed, due to time constraints installation work will probably have to be successively carried out as soon as the basic building construction work has been completed. As moving equipment in and unpacking requires quite a large amount of space, it is essential that the work proceeds under close coordination with the building construction contractors.

Extra care will have to be taken when attaching the antenna and feeder at the transmitter station, as the work will be off the ground and as another antenna has already been installed on the same tower at a lower level.

3.1.3 Scope of Works

(1) Division of Work Between Kingdom of Cambodia and Japan

Owing to the fact that this project will be carried out as cooperation in the form of straight aid, the division of responsibilities between Japan and the Cambodian government should be as follows:

1) Scope of Work Undertaken by Japan

(a) Construction of the Phnom Penh TV Broadcasting Station and one ancillary building

(b) Supply and installation of electricity generation equipment for the Phnom Penh TV Broadcasting Station

(c) Driveway and parking lots within the grounds of Phnom Penh TV Broadcasting Station

(d) Supply and installation of broadcasting equipment for the Phnom Penh TV Broadcasting Station

(e) Supply of spare units for the transmitter at the Phnom Penh Transmitter Station; replacement of the antenna and feeder

(f) Partial renovation of the existing broadcasting station in Sihanoukville; supply and installation of electricity generator

(g) Supply and installation of programme production equipment for the Sihanoukville broadcasting station

(h) Partial renovation of the existing transmitter station in Sihanoukville; supply and installation of electricity generator

(i) Supply and installation of a 100W transmitter for the Sihanoukville transmitter station; supply and installation of programme transmission equipment

2) Scope of Work Undertaken by Kingdom of Cambodia

(a) Providing and preparing the site for the construction of the Phnom Penh TV Broadcasting Station

(b) Gratis provision of work space for construction and renovation work

(c) Removal of all on-site obstacles to the work

(d) Drawing of water and drainage mains to within the site for the Phnom Penh TV Broadcasting Station

(e) Bringing of commercial electricity to the Phnom Penh TV Broadcasting Station

(f) Provision of, as appropriate, telephones, furniture, office equipment, potted plants, etc.

(g) Removal of IBC's dipole antenna when the superturnstile antenna is attached

3.1.4 Consultant Supervision

(1) Basic Policy Regarding Supervision

The consultant must understand the concept of the basic design, put together a project team for the comprehensive management of the implementation of design and construction work, coordinate the opinions of all parties concerned, and aim for the completion of the project. The basic policy regarding supervision is as follows:

1) Utmost efforts must be made so that delays are avoided and no discord arises between those involved in the construction work and those handling equipment installation work; close links must be maintained throughout.

2) Close links must be maintained and reports delivered to government officials of both countries, and construction contractors must be given appropriate and swift advice and suggestions, so that work proceeds smoothly.

3) An attitude conducive to the transfer of technology must be maintained regarding construction methods and techniques, so that maximum effect is derived from the implementation of the aid programme.

(2) Supervisor Duties

The supervisory duties to be carried out by the consultant are as follows:

1) Duties Related to Job Contracts

Preparing design and bidding documents, preliminary investigations of the qualifications of contractors, bidding, bid evaluation and contractor selection, drafting of contract documents, overseeing the contract documents.

2) Verification of Documents Submitted by Contractors

Verification and approval of work plans, product plans, products, and samples submitted by construction work contractors and equipment manufacturers.

3) Direction of Work

Determining work plans and drawing up a work schedule, instructing the construction contractor, as well as regular reports to the client on the progress of the work.

4) Cooperation on Payment Certification

Cooperation on verification of contractors' invoices and payment procedure, vis-a-vis the contract fee paid after completion of the construction work.

5) Witnessing Inspections

Witnessing and approving various tests and inspections carried out from start to finish, reports to Japanese government officials on necessary particulars regarding work progress, payment procedure, completion, and delivery, as well as confirmation of the completion of the work and witnessing the delivery to the client.

(3) Supervisory Personnel

1) Building Construction Work

As stated earlier, in this project work processes overlap, and high-intensity work supervision is required. The consultant in charge of work supervision must always be aware of the status of all work, and should place priority on continuous instruction and advice to the construction contractor and local government officials, so that the quality of the building is assured and the work schedule adhered to. Hence it is essential that supervisory personnel are dispatched to be permanently based on-site. It may also be necessary to incorporate the ad hoc dispatch of supervisors, so that the tight schedule can be met. Supervisory personnel will include one supervisor each for construction work and for facilities installation work. The former will carry out supervision based on-site, and the latter will probably have to travel to neighboring countries as necessary, while undertaking duties such as product inspection and approval for building materials obtained there, as well as inspecting completed work. The work supervisors chosen for the job must have extensive experience and decision-making capability, as well as a wide perspective and the ability to handle problems as they arise.

2) Equipment Installation Work

Equipment installation work will proceed during a short period (approx. 3 months), and will involve simultaneous installation and adjustment work on the Phnom Penh TV Broadcasting Station, the Phnom Penh Transmitter Station, the Sihanoukville Broadcasting Station, and the Sihanoukville Transmitter Station. In particular, work at the Phnom Penh TV Broadcasting Station will involve a large amount of equipment as well as a large number of contractors, and it is necessary to coordinate with the contractors regarding the work schedule, and to continuously instruct and advise each of the contractors as well as the local government officials in charge. One work supervisor shall be based in Phnom Penh during the construction work, and the other will be in charge of the remaining three locations. The work supervisors chosen for the job must have extensive experience and decision-making capability, as well as a wide perspective and the ability to handle problems as they arise.

3.1.5 Procurement Plan

(1) Construction Materials Procurement Plan

Construction materials produced in Kingdom of Cambodia are limited to basic products, such as concrete aggregate, concrete forms and bricks. Materials such as structural steel frames and various types of interior finishing materials are mostly imported from abroad. Sophisticated mechanical and electrical equipment such as airconditioning and ventilation equipment and fire alarms, are unavailable on the domestic market. Simpler items, such as electric wires and cables, conduit pipes, socket outlets, piping materials and sanitary fixtures, are available from neighbouring countries, but are unstable and unreliable in terms of their quality, specifications and supply. While the basic rule under the present project will be to procure construction materials in the host country, materials that cannot be procured locally or are unreliable in terms of quality and supply, will be procured in Japan or in a third country. The principal construction materials are listed according to their procurement sites on the following page.

(2) Equipment Procurement Plan

Equipment to be procured shall be Japanese-made, because it is recognized worldwide that it performs well and is reliable. Moreover, this is also in accordance with TVK's wishes.

When determining the models and specifications of equipment, emphasis shall be placed on simplicity of construction, durability, and ease of obtaining spares or supplies. Equipment specifications shall conform to the CCIR technical standards, and shall be electrically and mechanically safe, and of sturdy construction.

Cameras shall be 3CCD, which require only simple maintenance and which last long. Taking into consideration compatibility, all shall be of the same type. Note that not the large-scale studio cameras but cameras of the portable type will be used for the studio. Also the camera of the O.B. van will be of the same type, for the sake of compatibility with the cameras to be used in the studio; however, as operational conditions will be different, the magnification power of the lens will be higher.

Currently, two types of video tape recorders are used by TVK, and a third will be added under this project. The format that will be introduced is the 1/2" type, of pseudo-broadcasting quality, and will help not only improve the picture quality of programmes produced by TVK, but also the exchange of programmes with other broadcasting organizations.

Taking into consideration compatibility with equipment and video tapes currently owned by TVK, equipment of the same type as that used at present will be installed in the editing rooms.

Table 3.1.1 Procurement Locations of Principal Materials

Material	Procurement Location			Reason; Remarks
	Cambodia	Other Country	Japan	
[Construction Work]				
· aggregate	○			· No problem with hardness, grading, or supply volume
· cement	○			· Satisfactory Thai products can be obtained
· reinforcing bars		○		· No local products
· structural steel		○		· No local products
· brick	○			
· waterproofing		○		· No local products
· slates		○		· Local products exist, but quality lags
· aluminum doors/windows		○		· No local products
· steel doors/windows		○	○	· No local products (only soundproof doors/windows from Japan)
· wooden doors		○		· Local products exist, but quality lags
· terrazzo	○			
· plaster	○			
· ceramic tiles		○		· No local products
· paint	○			
· sound-absorbent finish		○		· No local products
· metal ceiling base		○		· No local products
· vinyl tiles		○		· No local products
· ceiling panels		○		· No local products
[Installation Work]				
· distribution panel		○		· No local products
· electrical cables		○		· No local products
· lighting fixtures		○		· No local products
· switches		○		· No local products
· socket outlets		○		· No local products
· fire alarm equipment			○	· Ensure quality and performance
· engine generator		○		· No local products
· UPS			○	· Ensure quality and performance
· air conditioning units		○		· No local products
· ventilation fans		○		· No local products
· outlets/intakes		○		· No local products
· ducting material		○		· No local products
· polyvinyl chloride piping		○		· Local products exist, but quality lags, supply is irregular
· steel piping		○		· No local products
· lavatory fixtures		○		· No local products
· FRP purification tanks		○		· No local products
· pumps			○	· Ensure quality and performance

(3) Material Transportation Plan

1) Transport of Construction Materials

(a) Material Procured in Japan

There are two possible routes for transporting material from Japan to Cambodia; either by unloading the shipment at Sihanoukville, in the south of Cambodia, and transporting it from there to Phnom Penh by land, or by shipping it up the Mekong via Vung Tau, Vietnam, directly to Phnom Penh. As there are safety problems for transporting material to Phnom Penh from Sihanoukville by land, materials for Phnom Penh will be shipped by the latter route.

Normal vessels will be used for the marine transport of construction materials, but ships sailing out of Japan displace 8,000 - 10,000 tons, and cannot enter the Mekong, which has a depth of only 3 - 4m. Hence shipments coming via this route generally are transferred to local boats of around 1,000 - 1,500 tons, called feeder boats, at Singapore. This method will also be used for this project.

Construction materials to be used for renovation work in Sihanoukville will also have to go through Singapore and be reloaded to local boats, as there is no scheduled service to there from Japan, and owing to tonnage problems.

The minimum number of days required between departure from Japan and unloading are as follows:

[Transportation to Phnom Penh]

Japan - Singapore (marine transport)	:	10 days
Singapore (transit customs)	:	2 - 3 days
Singapore (reloading)	:	approx. 7 days
Singapore - Vung Tao, Vietnam (marine transport)	:	5 days
Vung Tao (transit customs)	:	1 day
Vung Tao - Cambodian border (riverine transport)	:	2 days
Cambodian border - Phnom Penh (customs, river transport)	:	3 days
Total number of days required	:	approx. 30 - 35 days

[Transportation to Sihanoukville]

Japan - Singapore (marine transport)	:	10 days
Singapore (transit customs)	:	2 - 3 days
Singapore (reloading)	:	approx. 7 days
Singapore - Sihanoukville (marine transport)	:	3 days
Total number of days required	:	approx. 20 - 25 days

(b) Materials Procured from Other Countries

Thailand could be a source of materials, but since the overland route across the northern Cambodian border is extremely dangerous, the method used will be marine transport from Bangkok with a small ship. As for materials coming from Japan, shipments destined for Phnom Penh will travel up the Mekong via Vung Tao.

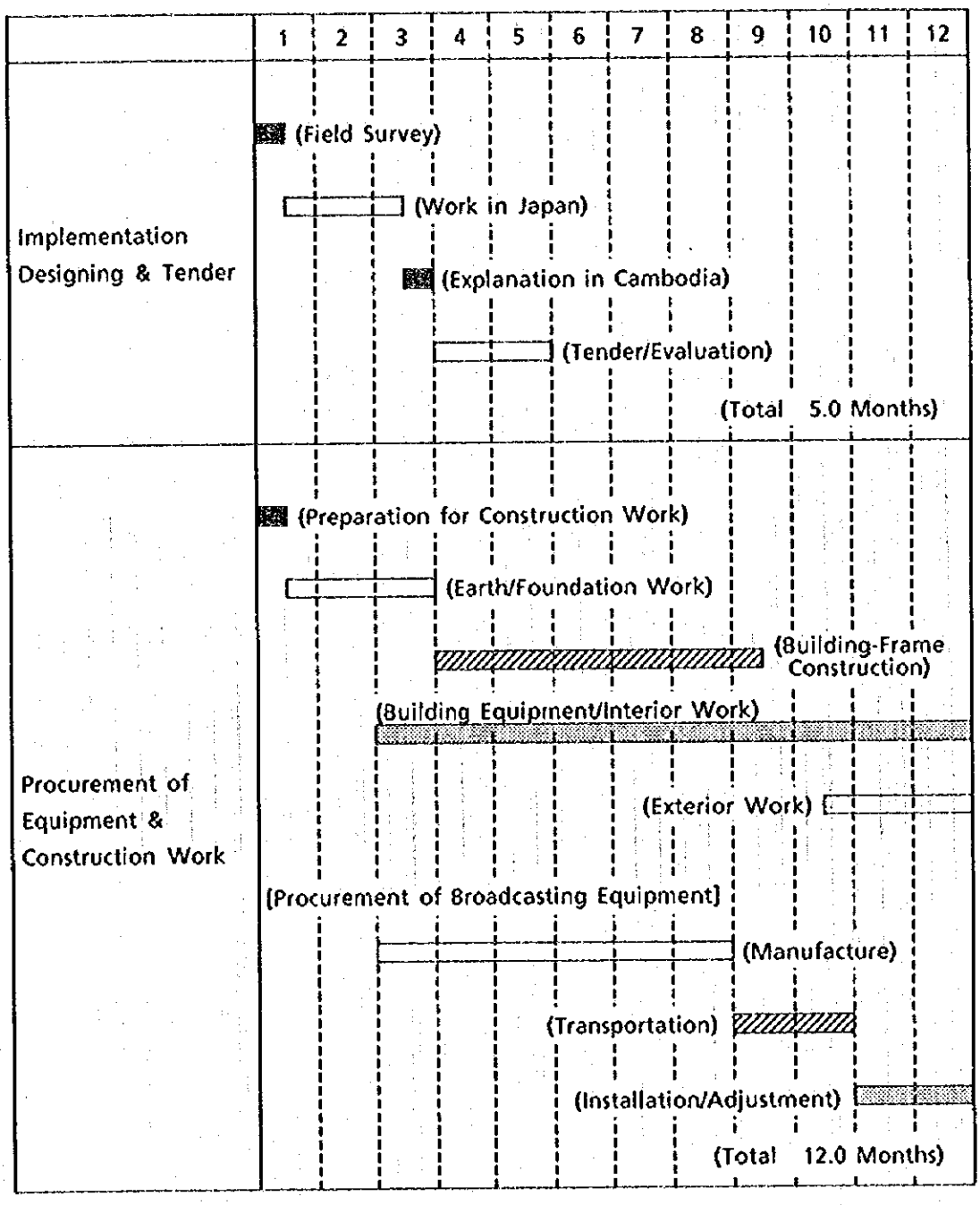
The number of days from Bangkok to unloading is 1 - 2 days to Sihanoukville, and approximately 10 days in total to Phnom Penh, as the shipping time from Bangkok to Vung Tao is around 4 days.

2) Transportation of Equipment

Broadcasting equipment will transported in the same manner as construction materials. However, as broadcasting equipment is vulnerable to moisture, particularly saline humidity, the material will travel in containers to Singapore, be transferred there to feeder boats, and transported on to Phnom Penh. Also shipments for Sihanoukville will be transported in containers to Singapore, and be reloaded there for the final leg of the journey.

3.1.6 Implementation Schedule

The implementation schedule is shown below.



3.1.7 Obligations of Recipient Country

(1) Obtaining all legal approvals concerning construction and renovations

(2) Providing tax-free importation of all construction materials required for work funded by Japan, and of all equipment to be donated by Japan

(3) Preparing payment authorizations and paying bank charges required for amending these documents

(4) All other duties to be incurred by the aid recipient country, as specified in the agreements exchanged

(5) All necessary procedures regarding registration of the donated O.B. van

3.2 Operation and Maintenance Plan

Costs for operation and administration of the project will be required as of 1998 (Cambodia's fiscal year commences in January). It is therefore necessary to obtain the understanding of the financial authorities in the government when the budget appropriation decision is made in September, 1997.

The principal components of operational and maintenance costs are personnel costs, programme production costs, expenses related to news gathering, and costs for maintaining, improving, and repairing equipment.

(1) Personnel Costs

Currently TVK employs 230 persons, in addition to which around 10 positions are unfilled. It is thought that, since the station has one channel only, day-to-day operations can be continued if the ten vacant positions are filled and the number of personnel is brought to 240, even if broadcasting time and the number of programmes produced in-house increases due to implementation of the project.

Staff salaries are paid by the national government, separately from the operational budget of TVK; the latest figure for total monthly expenditures is 9,678,237 Riels, or US$ 3,871.29. Although the same is true for Cambodian civil servants in general, the status quo is that morale has been lowered because of the low salaries. The monthly salary of most employees is US$ 10 - 20, and it is difficult to ensure that employees spend all of their occupational hours working for TVK. When carrying out the project, this point should be taken into account, and we recommend a system in which the principal daily broadcasting work is shared by two teams.

(2) Programme Production Costs and Expenses related to News Gathering

The Project aims to raise the proportion of programmes produced in-house from 40% to 60%, and to lengthen broadcasting hours from 9.5 hours to 12 - 13 per day. In order to achieve this, it is necessary to —— as outlined in the "Basic Concept of the Project" —— secure production equipment and expenses for a total of 34 programmes per week, i.e. 14 news programmes and 20 other programmes.

Although it is quite difficult to calculate in detail the programme production costs for 34 programmes, it is probably reasonable to prepare a budget derived by multiplying current levels of expenditure with the increase in in-house production and the increase in broadcasting time, and also adding a slight increase in expense related to the enhancement of programme quality.

Analyzing the budget table of TVK, the costs allocated to news gathering and programme production are currently estimated at US$ 1,400 per month.

Hence the calculation is as follows:

$$\text{US\$ } 1{,}400 \times \frac{60\%}{40\%} \times \frac{12.5 \text{ hrs}}{9.5 \text{ hrs}} \fallingdotseq \text{US\$ } 2{,}760$$

Factoring an increase in costs due to the improvement and enhancement of programme quality, this leads to the conclusion that a monthly budget of about US$ 3,500 is required.

(3) Servicing, Maintaining and Repairing Equipment.

Japanese broadcasting corporations habitually calculate 1% of the equipment cost as the annual amount required for servicing, maintenance, and repair, as well as for the purchase of parts and spares. Applying this rule of thumb to this project means that an annual budget close to US$ 50,000 is required, i.e. 1% of the total equipment value of 500,000,000 yen (excluding things that can be used without replacement).

However, at the start of the project the equipment is still new, and repair costs are expected to be less; also parts good for two years will be supplied with the equipment initially, and it seems this problem can be put on ice temporarily.

As the new broadcasting station will commence operations in 1998, budgeting for maintenance and repair of equipment will become necessary after the year 2000.

(4) TVK's Income

Operational expenses incurred by TVK other than personnel costs are paid from an allotment of 7 million Riels per month (slightly less than US$ 3,000), which has been authorized by the government to be drawn from advertising income. This figure can be envisaged to rise to US$ 7,000 or up to 10,000 if so requested.

A promise to guarantee this budget of US$ 10,000 has been made by the financial authority of the Ministry of Information to the draft explanation team.

(5) Project Costs (Excluding Personnel Costs)

[Monthly expenditures]

Programme production and news gathering	US$ 3,500
Operational expenses, administrative costs (based on current figures)	2,000
New Year and Holiday bonuses (based on current figures)	360
Equipment maintenance, improvement, and repair (starting in 2000)	4,000
Total	US$ 9,860

[Maximum possible income]

Derived from publicity, the maximum possible income is US$ 10,000

Hence, if special funds of US$ 7,000 can be obtained for the first phase, from the start of operations by the National Broadcasting Station in April, 1998, up to March, 2000, TVK's accounts can be balanced.

From April, 2000 onwards, also, if TVK can fully obtain its full allotment of advertising income, it can satisfy almost all of its necessity to manage the National Broadcaster.

To ensure that this will happen, the following efforts should be made to make TVK more attractive to the citizens.

1) Autonomously produce numerous programmes with high-quality video and audio, using the latest equipment.

2) Improvise to draw viewers using the full capabilities of the new studios, such as DVE (Digital Video Effects) and special effects using chroma key tracking and wiping or colour lighting on the background, in order to enhance programmes without major spending on building sets.

3) In order to emphasize the difference from commercial broadcasters, efforts should be made to autonomously produce programmes which present the nation's culture and traditional folklore, which is currently hardly taken up at all by commercial broadcasters. Instead of pursuing the hiring of celebrities, persons humbly devoted to cultural activities should be found.

4) Currently, the times at which advertisements are broadcast is variable, and this is an obstacle to obtaining more sponsorship. When broadcasting time is lengthened, regular slots for publicity should be secured, in order to cultivate the sponsors' trust.

5) TVK should develop its own market, by emphasizing those aspects not undertaken by commercial stations, such as publicity for missing persons or announcements of cultural activities.

Chapter 4 Project Evaluation and Recommendation

Chapter 4 Project Evaluation and Recommendation

4.1 Project Effect

There are six items enumerated by TVK as problems that are difficult to solve independently, as well as four items discovered during the project survey. These items have been organized into Table 4.1.1, which gives the current status and nature of the issues, measures taken in this project to counter the problems, as well as the predicted effects of solutions and the degree to which the situations can be expected to improve.

Table 4.1.1 Current Status and Nature of Issues, Measures taken in this Project and Predicted Effects of Solutions

Current Status and Nature of Issue	Measures taken in this Project	Predicted Effects of Measures, Degree of Improvement
1. The current broadcasting station is cramped and installing professional studios is impossible. There are constraints also on soundproofing and lighting. Quality programmes cannot be produced.	1. Construction of a 1,690 m² broadcasting station, including a 300 m² studio, and installation of equipment for 180 m².	1. Production of programmes with a variety of video effects will become possible. Small-scale dramas and music programmes with small casts can also be produced.
2. Most of the equipment is of semi-professional quality (actually equivalent to consumer quality) and has exceeded its design life span. Maintaining video quality is difficult.	2. Upgrading most equipment in the Production Studio except the News-Continuity Studio to professional and semi-professional quality. Upgrading news-gathering cameras to semi-professional quality.	2. Most programmes produced by TVK will be guaranteed to have good video quality.
3. The aging of the O.B. van and the lack of an FPU (Field Pick-up Unit) restrain live broadcasts and programme production outside the station.	3. Provision of small-sized O.B. van. A set of FPU equipment has been already provided by TVK.	3. Outside programme production, both outdoor and indoor, will become possible. Live broadcasting will be also possible from areas where broadcasting signals reach directly to the broadcasting station.
4. Lack of a spare transmitter means there is no backup in the event of failure.	4. Provision of a spare transmitter unit.	4. Replacement of unit in the event of a fault prevents prolonged broadcast interruption.

Table 4.1.1 Current Status and Nature of Issues, Measures taken in this Project and Predicted Effects of Solutions

Current Status and Nature of Issue	Measures taken in this Project	Predicted Effects of Measures, Degree of Improvement
5. There is no power generator matching the standards of the broadcasting station and the transmitter station. The effect of disruptions in the commercial power supply are felt on an everyday basis.	5. The broadcasting station will be fitted with a power generator of suitable capacity. The master control room and other important rooms will also be fitted with uninterruptible power supplies.	5. Recording work in the broadcasting station is guaranteed at all times. Also momentary lapses in broadcasting are prevented. The transmitter station will continue to rely on the existing power generator, and though momentary lapses cannot be avoided, continued broadcasting is guaranteed.
6. Shortage of tools hampers equipment maintenance.	6. Several sets each of the necessary tools and instruments will be provided.	6. All maintenance the technical staff are capable of will become possible.
7. Antenna and feeder are not designed for the 10 kW output by the current transmitter, entailing risk of antenna burnout.	7. Replacement of antenna and feeder to suit 10kW transmitter.	7. Stability of broadcast transmissions is improved considerably.
8. The programmes most popular with the public are dubbed foreign films; TV is not contributing to the promotion of Cambodian culture.	8. Provision of a medium-sized 300 m² studio and installation of equipment for 180 m².	8. The proportion of in-house production is raised from 40% to 60%, and the number of programmes that contribute to the promotion of Cambodian culture will increase.
9. Lack of an audio dubbing studio hampers dubbing of imported programmes.	9. Installation of an audio dubbing studio.	9. Even the dubbing of programmes with large casts will become possible, encouraging also the utilization of programmes donated through cultural aid from Japan.
10. The five regional broadcasting stations nationwide have extremely poor equipment.	10. Improvement of regional broadcasting station in Sihanoukville, augmenting transmission power of the transmitter station, replacing antenna and feeder.	10. Improving one regional broadcasting station as a pilot plan allows basic data to be obtained for the improvement of the other stations. Also a slight increase in the service area can be expected.

Although there are no exact figures, it is estimated that TV receivers in Kingdom of Cambodia number around 300,000 sets (other private broadcasters say the figure is between 600,000 and 900,000 sets). Visual observations in the city of Phnom Penh showed that here and there residences with TV antennas can be observed —— it was noted that one set is watched not only by the family of the house, but also by neighbours who gather around. This situation reminds one of Japan in the '50s and '60s, when people would mingle around TV sets installed at public places.

This supports the notion that in Kingdom of Cambodia television is a powerful means of providing wholesome entertainment and useful information.

Currently, the most popular TV programmes in Kingdom of Cambodia are foreign films dubbed into Khmer and broadcast by private broadcasters. While these programmes are a source of popular entertainment, there are almost no programmes that contribute to the promotion of inherent Cambodian culture or to the education of children or students, or that impart useful information. Increasing such programmes at private broadcasting stations, whose priority is increasing revenue, is difficult, and hence this is a role that should be undertaken by the national broadcasting station.

Carrying out this project of expanding the national broadcasting station will contribute significantly to the enhancement of the Cambodian public's cultural awareness and education, by allowing attractively assembled programmes produced using the latest electronics equipment to be broadcast with good audio and video quality.

There will be a slight improvement also in the size of the area covered by the broadcast transmissions; additionally, the stability of broadcasts will be improved dramatically and picture clarity will be enhanced.

Furthermore, the renovation and improvement of the regional broadcasting station in Sihanoukville will act as a pilot plan for the improvement of other regional broadcasting stations in different areas, by allowing basic data to be obtained for the future establishment of a nationwide broadcasting network.

This project is intended to benefit not only the television-viewing audience directly, but also, by contributing to improvements in life-style and culture, the Cambodian nation in its entirety. This project is thus deemed appropriate as being carried out by Grant Aid from the Japanese Government.

4.2 Recommendation

4.2.1 Recommendations for Execution of this Project

As stated in the previous section, the implementation of this project is expected to bring extensive benefits to the Cambodian nation as a whole. In order to turn this hope into reality, it is necessary for the Cambodian Government to meet the following conditions, so that the project may be operated smoothly.

(1) Securing a Project Operation Budget

1) Programme Production and News Gathering Costs

Currently TVK produces almost no large-scale programmes, which means that programme production and news-gathering costs are low. Unless major changes are made to the programme production system, the increase in expense would be minor, even if the ratio of in-house production were increased and the total hours broadcast were increased, involving a rise from the current US$ 1,400 per month to about US$ 3,500 per month. Implementing the production of major programmes, such a drama series, or broadcasting spectacles via the O.B. van as TVK intends to do, would require a considerable production budget to be provided.

Considering that production expenses for one large-scale programme would be US$ 800, an increase of US$ 16,000 per month would be required in order to produce five major programmes per week, or twenty per month.

2) Maintenance, Improvement, and Repair of Equipment

Generally, around 1% of the purchase price of equipment owned is estimated as the annual cost for maintaining, improving, and repairing. This would mean that a monthly figure of around US$ 4,000 would have to be prepared in future, although this would not be the case while the equipment is new.

(2) Higher Allocation of Publicity Income to TVK

Currently, just less than US$ 3,000 is allocated to TVK from publicity income. This should be increased, and, separately, the appropriation ceiling of US$ 10,000 per month should be raised. A higher ceiling is important also in terms of spending US$ 16,000 on the production of major programmes. The revision of the publicity income allocation amount is also doubtless important form the standpoint of consolidating TVK's financial foundation.

(3) Securing Personnel and Improving Compensation

1) Between 60 and 62 persons are required as news-gathering and programme production staff, 110-114 as technical staff, and, in order to produce programmes such as dramas, about 10 as artistic staff. Overall, this means that the current number of staff will have to be increased slightly.

2) Although the same can be said for Cambodian civil servants in general, salaries are lower than in the private sector, which has led to a lowering of morale. If such levels of compensation are continued, there is a danger that, once the technical capability of TVK staff is improved, able workers will be lost to private broadcasters. It is thought that the compensation levels for core staff —— programme production staff and technical staff —— should be revised.

(4) Establishing a Staff Training System

Currently one of the problems is that, although there are several staff at TVK that have the ability to instruct others, their technical expertise is not being transferred owing to a lack of a suitable training system.

In the near future, experts may be dispatched from Japan or trainees may come to Japan for training, but the number of staff that can be taught by one instructor are limited, and there would be no significant effect on the technical capacity of TVK if the knowledge and skills obtained by the trainees does not travel further than themselves.

In order to make full use of experts and trainees, an urgent objective is to establish a training system for relaying knowledge.

(5) Further efforts should be made to raise the proportion of in-house production, and to economize on expenses when purchasing programmes from the outside.

(6) Efforts should be made to draw viewers by full utilizing the new capabilities of the new studios: using special effects such as DVE (Digital Video Effects), chroma key tracking, and wiping, projecting coloured lighting onto backdrops, to create a sense of colour and vibrance without spending large amounts of money on background sets.

(7) In order to emphasize the difference between TVK and commercial broadcasters, efforts should be made to autonomously produce programmes presenting Cambodian culture and traditional folklore, subjects which are currently hardly tackled at all by commercial broadcasters. Instead of pursuing the hiring of famous performers or programme directors, artists quietly dedicated to their art should be searched for.

(8) Currently, one of the hindrances in finding sponsors is that the times at which advertisements are broadcast are irregular. As broadcasting time is extended, regular slots suitable for publicity should be given priority, in order to gain the trust of sponsors.

(9) Emphasis should be placed on publicizing missing persons and cultural events, which are not covered by commercial broadcasters, thus developing TVK's own market.

4.2.2 Recommendations for Planning the Future of TVK

Owing to the limitations of the monthly operating budget and to technical restrictions faced by TVK, this project will be defined as implementing urgent improvements to facilities and equipment, and saving TVK from the crisis it is nearing. Hence the designs will be in accordance with the middle ellipse in Figure 4.2.1, "Requirements in Relation to Studio Size." This would satisfy the requisites for a monthly operating budget of US$ 10,000, a core technical staff of nine and one core programme production director. A promise to supply this budget of US$ 10,000 was obtained from the Royal Government of Cambodia during the meeting for the draft explanation of this project. Taking into consideration the technical aspect, this level of improvement is probably feasible.

However, in pursuing this project, it should be borne in mind that, in future, once the operational capability of TVK is raised and improved, the second phase of this project will be carried out, corresponding to the outer ellipse in Figure 4.2.1.

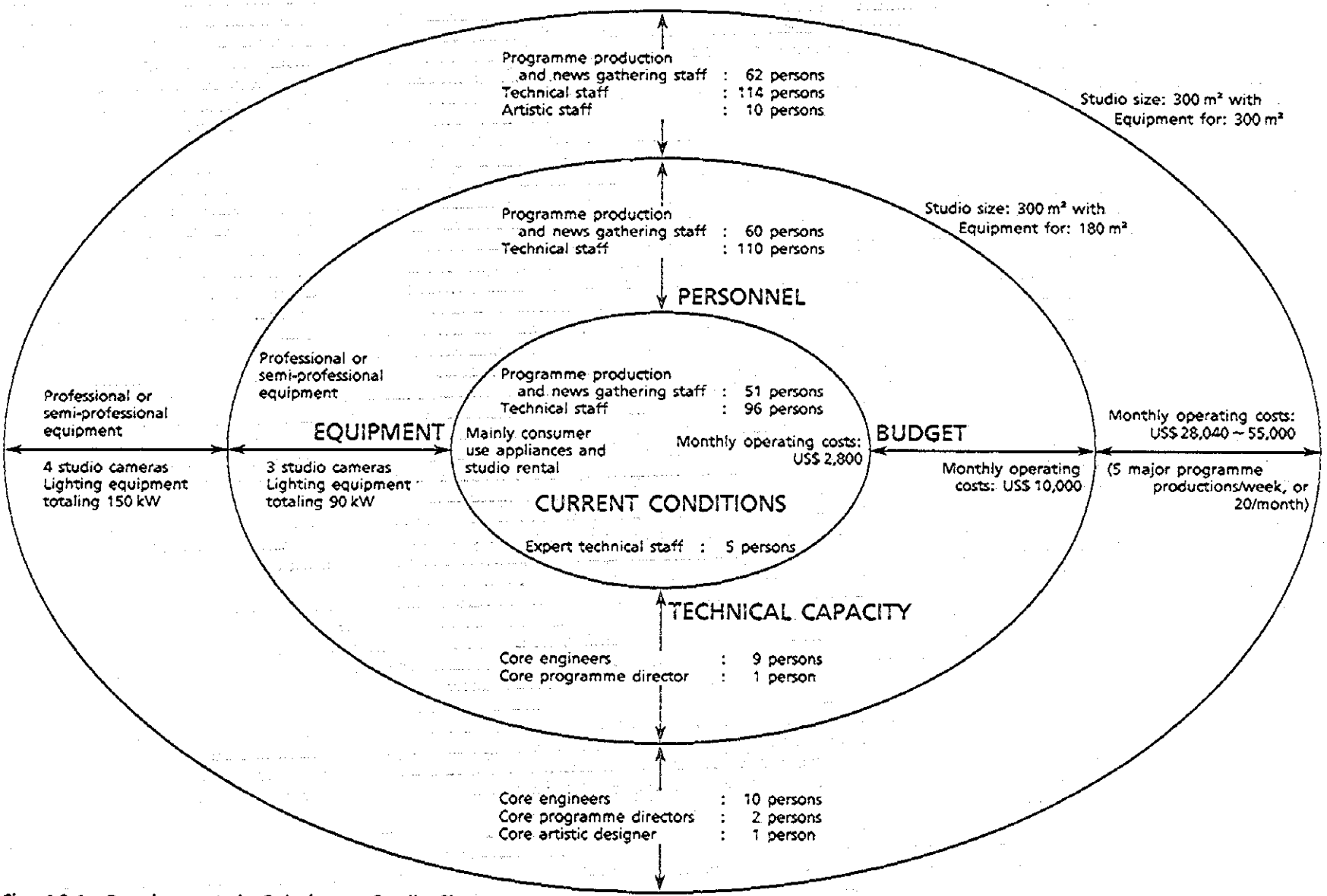


Fig. 4.2.1 Requirements in Relation to Studio Size

The second phase is envisaged to involve the following.

(1) Expansion of Studio Size to 300 m² from 180 m²

In the current project, the studio will be built to allow future expansion. It will have 300 m² of floor space, of which 180 m² will be fitted with equipment. Expansion to 300 m² will therefore require only limited renovation.

In terms of equipment, it is expected that the addition of one studio camera and some lighting equipment will bring the studio equipment to that required for a 300 m² studio.

Note that in this project, 120 m² of the unused portion of the 300 m² space will be used for scenery storage. Hence it will be necessary to prepare a scenery storeroom, either inside or outside the broadcasting station building, when all 300 m² are used as studio space.

In case the scenery storeroom is to be prepared within the building, one possibility would be to convert workshop space for this purpose.

(2) Renewal of the News/Continuity Studio Equipment

News broadcasting is an operation that can be called the mainstay of national broadcasting, and, given this importance, this aspect should be at the top of the list of the upcoming renovation plans.

Because in this project most equipment used in the news/continuity studio will be equipment currently owned by TVK and transferred to the new facility, it follows that this equipment will age and corrode earlier than the other new equipment.

When implementing Phase 2, top priority should be given to replacement of this equipment in the news/continuity studio.

(3) Upgrading O.B. Van Size

The O.B. van to be supplied as part of this project is a compact model with two cameras. It will make basic outside broadcasting possible, but it would be impractical to transmit live major spectacles or soccer matches.

Phase 2 should involve the provision of an O.B. van with three or four cameras, as well as a slow-motion VTR, so that all manner of outside broadcasts can be undertaken.

(4) Improvement of Regional Stations

Although in this project improvement of regional stations was limited to the one station in Sihanoukville, analyses of the data and results from this project should be utilized in the improvement of other regional stations and the development of a nationwide television broadcasting network.

Stations the Cambodian Government wishes to see improved are the stations in Battambang and Stung Treng.

Appendices

1. Member List of Survey Team

1. Member List of Survey Team

(1) The Basic Design Study Team

Name	Assignment	Present Post
Mr. Takumi UESHIMA	Team Leader	Deputy Director First Project Management Division, Grant Aid Project Management Department, JICA
Mr. Kinichi UMEYA	Technical Adviser	Broadcasting Bureau Ministry of Posts and Telecommunications
Mr. Yoshihiro IMAMURA	Coordinator	Overseas Offices General Management Division, General Affairs Department, JICA
Mr. Kei MIYAZAKI	Chief of Consultants	Chief Director International Dept., NHK ITEC
Mr. Osamu KARASAKI	Transmitting Facility	Chief Engineer International Dept., NHK ITEC
Mr. Seiichi UEDA	Programme Production Equipment	International Dept., NHK ITEC
Mr. Keisuke WATANABE	Building Design	Chief Designer NISSOKEN
Mr. Yoshishige NAGANO	Building Facilities/ Estimation	Manager NISSOKEN

(2) The Draft Report Explanation Team

Name	Assignment	Present Post
Mr. Takahiro SASAKI	Team Leader	Deputy Director Second Basic Design Study Division, Grant Aid Study & Design Department, JICA
Mr. Kazusa MATSUZAWA	Technical Adviser	Chief, Asia-Pacific Section, International Cooperation Division, International Affairs Department, Ministry of Posts and Telecommunications
Mr. Kei MIYAZAKI	Chief of Consultants	Chief Director International Dept., NHK ITEC
Mr. Osamu KARASAKI	Transmitting Facility and Production Equipment	Chief Engineer International Dept., NHK ITEC
Mr. Keisuke WATANABE	Building Design and Facilities	Chief Designer NISSOKEN

2. Survey Schedule

2. Survey Schedule

(1) Basic Design Stage

No.	Date (1995)	Contents
1	Nov. 12 (Sun)	Depart from Tokyo (NH915), arrive in Bangkok.
2	Nov. 13 (Mon)	Depart from Bangkok (TG698), arrive in Phnom Penh.
3	Nov. 14 (Tue)	Previous meeting at JICA Office. Courtesy call on Embassy of Japan, TVK. Site Inspection. Courtesy call on the Ministry of Foreign Affairs.
4	Nov. 15 (Wed)	Courtesy call on the Ministry of Information, and discussion. Courtesy call on Embassy of France and CRDB.
5	Nov. 16 (Thu)	Meeting at M.o.I. Courtesy call on CMAC. Discussion with relevant directors of M.o.I., M.o.P. and CRDB.
6	Nov. 17 (Fri)	Discussion with TVK. Consultants (Architects) arrive in Phnom Penh.
7	Nov. 18 (Sat)	Site survey at Sihanoukville. Site survey in Phnom Penh. (Mr. Miyazaki and Mr. Nagano)
8	Nov. 19 (Sun)	Same as above.
9	Nov. 20 (Mon)	Discussion with M.o.I. Mr. Miyazaki inspects Studio No. 5 at Radio Cambodia.
10	Nov. 21 (Tue)	Discussion about M/D, signing of M/D.
11	Nov. 22 (Wed)	Report to E.o.J. and JICA. Official Members depart from Phnom Penh. Consultants talk with directors of TVK.
12	Nov. 23 (Thu)	Discussion with directors of TVK. Collection of data.
13	Nov. 24 (Fri)	Transmitter station site survey. Visit to Channel 5.
14	Nov. 25 (Sat)	Discussion with directors of TVK. Collection of data.
15	Nov. 26 (Sun)	Measuring of Field Strength at Componcham.
16	Nov. 27 (Mon)	Discussion with directors of TVK. Collection of data. Visit to Channel 9.
17	Nov. 28 (Tue)	Same as above. Visit to CDC.
18	Nov. 29 (Wed)	Report and meeting with JICA.
19	Nov. 30 (Thu)	Discussion with TVK.
20	Dec. 1 (Fri)	Same as above.
21	Dec. 2 (Sat)	Site survey at Sihanoukville.
22	Dec. 3 (Sun)	Same as above.
23	Dec. 4 (Mon)	Discussion with TVK. Measuring of Field Strength at Kampong Trabek and Svay Rieng.
24	Dec. 5 (Tue)	Discussion with TVK. Collection of data.
25	Dec. 6 (Wed)	Final meeting with TVK.
26	Dec. 7 (Thu)	Report to E.o.J. and JICA.
27	Dec. 8 (Fri)	Arrangement of data. Discussion of the Draft B/D.
28	Dec. 9 (Sat)	Consultants depart from Phnom Penh.
29	Dec. 10 (Sun)	Arrive in Tokyo.

(2) Draft Basic Design Report Discussion Stage

No.	Date (1996)	Contents
1	Mar. 2 (Sat)	Depart from Tokyo , arrive in Bangkok.
2	Mar. 3 (Sun)	Arrive in Phnom Penh. Meeting with relevants of JICA.
3	Mar. 4 (Mon)	Previous meeting at JICA Office. Courtesy call on E.o.J., the Ministry of Foreign Affairs and the Ministry of Information. Courtesy call on TVK, and discussion with TVK.
4	Mar. 5 (Tue)	Joint meeting at M.o.I.
5	Mar. 6 (Wed)	Discussion of Draft Basic Design Report at M.o.I.
6	Mar. 7 (Thu)	Discussion with directors of TVK. Signing of M/D. Report to E.o.J. and JICA.
7	Mar. 8 (Fri)	Official Members depart from Phnom Penh. Explanation about Building Plan to TVK.
8	Mar. 9 (Sat)	Discussion with TVK. Collection of data.
9	Mar. 10 (Sun)	Mr. Miyazaki departs from Phnom Penh.
10	Mar. 11 (Mon)	Discussion with Attache of E.o.F. and Survey Team of France at E.o.F. Discussion with TVK. Collection of data.
11	Mar. 12 (Tue)	Depart from Phnom Penh.
12	Mar. 13 (Wed)	Arrive in Tokyo.

3. List of Party Concerned in Kingdom of Cambodia

3. List of Party Concerned in Kingdom of Cambodia

Ministry of Information

Mr. Ieng Mouly	Minister
Mr. Khieu Kanharith	Secretary of State
Mr. Prom Nhean Vicheth	Former Under Secretary of State in charge of National TV
Mr. Ung Tea Seam	Under Secretary of State in charge of National Radio
Mr. Lapresse Sieng	Under Secretary of State in charge of National TV Director of Cabinet
Mr. Sou Ny	Director of International Cooperation and Protocol Department
Mr. Leng Sochea	Deputy Director General
Mr. Chhum Socheath	Deputy Director of External Relations Department
Mr. Phoj Sovann	Deputy Director of External Relations Department
Mr. Sen Sam Nang	Assistant of Minister
Mr. Sann Sambory	Deputy General Director of Finance and Administration
Mr. Seng Malys	Under General Director in charge of Finance
Mr. Men Antreaouth	Deputy Director of Information Department
Mr. Chan Savuth	Director General of Finance and Planning

Ministry of Foreign Affairs

Ms. You Ay	Director of International Cooperation Department
Mr. Kan Phum	Deputy Director

Ministry of Planning

Mr. Reth Raksa	Deputy Bureau Chief of Ministry of Planning
Mr. Hem Hour Naryth	Debt and Aid Management Officer
Mr. Hing Chanmontha	Deputy Director in charge of Cooperation

Ministry of Economy and Finance

Mr. Thuck Panhchak Sokhavith	Representative

Ministry of Posts and Telecommunications

Mr. Ly Sam An	Deputy Director of International Telecommunications Department
Mr. Motonori Ando	Advisor of Telecommunications

CMAC (Cambodia Mine Action Center)

Mr. Mao Vanna	Chief of Information

CRDB (Cambodian Rehabilitation and Development Board)

Mr. Chhieng Yanara	Secretary General

CDC (Counsil for Development of Cambodia)

Ms. Heng Sokun	Representative

Department of Urbanization and Construction of Phnom Penh City

Mr. Leav Ky Heng	Chief of Office of Construction and Reparation

EDC (Electricité du Cambodge)

Mr. Iv Visal	Deputy Head of Network Office

Water Supply Authority in Phnom Penh

Mr. Moeung Sophan	Vice Chief

Kien Huot Enterprise Co., Ltd.

Mr. Chang Jin Ping	Chairman

M & M Investment Co., Ltd.

Mr. Ngo Eng Ngoun	Executive Director

Seng Enterprise Co., Ltd.

Mr. Seng Chhay Our	President
Mr. Jean De Spiegeller	Technical Director

National Television Kampuchea (TVK)

Mr. Mao Ayuth	Director General
Mr. Him Suong	Department Director of TVK
Mr. Uy Thuon	Technical Director
Mr. Nuth Bophann	Deputy Technical Director
Mr. Ouy Bounmy	Deputy Chief of Newsroom
Mr. Van No	Documentary & Program Producer and Reporter
Mr. Kang Sarann	Sihanouk Ville Regional Station
Mr. Or Saroelin	Sihanouk Ville Regional Station

Voice of Cambodia

Mr. Van Sengly	Director General
Mr. Nauv Sovathero	Deputy Director General
Mr. Tan Yan	Deputy Director General
Mr. Tey Maly	Chief of Radio Station

Sihanoukville City Government

Mr. Khim Bo	1st Deputy of Governor
Mr. Sun Heng	3rd Deputy of Governor

L'Ambassade de France

Mr. Alain Freynet	Counseiller Culturel
Mr. Michel Igout	Attaché Culturel
Mr. Pascal Cardeilhac	Attaché Audiovisual
Mr. Jérôme Kanapa	Expert
Mr. Joël Dechezleprêtre	Attaché Artistic