(15) Operation of dubbing studio

Dubbing of sound for imported foreign programmes is executed within the dubbing studio. In order to synchronize the running speed of the VTR and Tape recorders , EBU time-code is utilized. As for the tape recorder, multi-track type is used to record foreign languages, sound effects, Nepali language, and time-code signal, etc.

2-3. Studio Equipment Plan

Installation schedule of studios and other equipment is shown in Table 3-2-5.

Table 3-2-5 Studio equipment construction plan

	Phase 1	Phase 2	Phase 3	Phase 4
Master control		○		
65 m^2 studio	○			
200 m^2 studio	○			
300 m^2 studio		○		
Dubbing studio	○			
Telecine		○		
Converter		○		
OB van			○	
Equipment for local news gathering		○	○	○

2-4. Utilization Plan of Existing Facilities

NTV uses some studio equipment which does not meet broadcasting specifications. Although they may be insufficient in quality, maneuverability, and reliability, the existing facilities shall be utilized for training as much as possible.

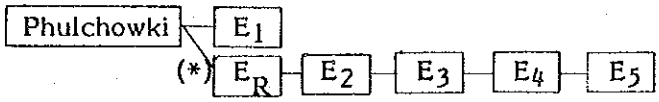
CHAPTER 3. BROADCASTING NETWORK PLAN

3-1. Broadcasting Network

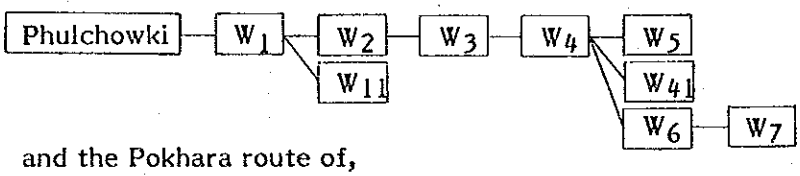
Since effective service of TV broadcasting to mountainous regions is very difficult, this development plan sets its goal at providing the network to cover approximately 60 percent of the population, over the area of Kathmandu and its neighboring districts, the Eastern and the Western terai regions. The following three plans have been studied.

(1) Plan-1 (See Fig. 3-3-1 and Fig. 3-3-2)

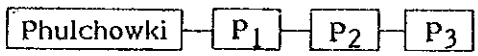
A manned transmitter station is built on the top of Mt. Phulchowki, from which TV network is extended by the tandem connection of transposer stations. The main routes are E_1 and Eastern terai route of



the western terai route of,



and the Pokhara route of,



(*) E_R is a repeater station for relaying TV programme from Phulchowki station to E_2 at UHF band and will not provide broadcasting service.

Phulchowki TV transmitter station has the objective of providing broadcasting service to some parts of the terai region including Birganj and Malangwa, as well as the Kathmandu valley. It will also serve as the main station for the network extension to the Eastern and Western terai regions. It will serve as the master station for downstream stations which are built in the mountainous areas near Mt. Phulchowki in the future.

The Eastern and Western terai routes will have unmanned transposer stations in hilly areas, on the border between mountainous and flat lands, to receive the signal radiated from Phulchowki station and provide broadcasting services to the Eastern and the Western terai regions.

The Pokhara route has transposer stations at Gorkha and Pokhara to relay and rebroadcast TV programmes from Phulchowki to these areas.

Population coverages of these stations are estimated as follows. (Where the coverages of two stations overlap, population in the overlapping portion is included in the upper station in the list below, i.e., that has a smaller subscript number in the list.)

Table 3-3-1 Population coverage by Plan-1

Route	Name of station (tentative)	Population coverage
Phulchowki	Phulchowki Transmitter Station	12.5%
Eastern terai route	E_1 transposer station	2.5%
	E_2 " "	9.%
	E_3 " "	4%
	E_4 " "	8%
	E_5 " "	3%
		Sub total 26.5%
Western terai route	W_1 transposer station	7%
	W_2 " "	3%
	W_3 " "	3.%
	W_4 " "	2.4%
	W_5 " "	3%
	W_{11} " "	2%
	W_{41} " "	0.6%
	$W_6 + W_7$ " "	1%
		Sub total 22.0%
Pokhara route	$P_1 + P_2 + P_3$, transposer station	2%
	Grand total	63%

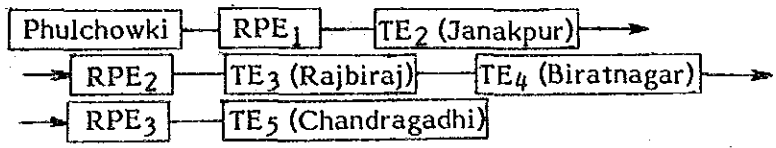
According to this Plan-1, programme transmission through transposer connected in tandem requires no special repeater equipment, and the installation of stations on hills assures a high transmission efficiency, so the equipment in the stations can be relatively simple.

On the other hand, the station which is located in places far from villages and towns requires the construction of long power lines and access road and the increase of construction cost is expected inevitably.

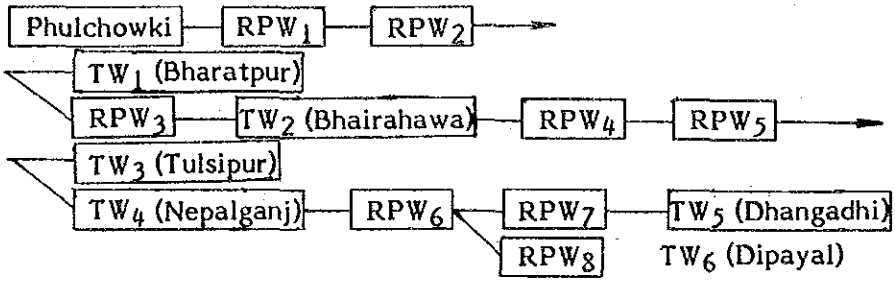
In addition, deterioration of picture quality through the tandem connection of transposers is unavoidable on the performances, such as S/N, synchronizing pulse waveform, phase, and amplitude performance, etc.

(2) Plan-2 (See Fig. 3-3-3 and Fig. 3-3-4)

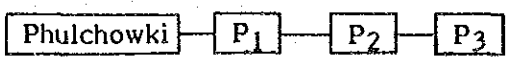
TV transmission networks are constructed to extend from the manned Phulchowki transmitter station by means of broadcaster-owned microwave links. Main transmitter stations are installed in the main cities. Eastern terai route is as follows;



The Western terai route is as follows;



and the Pokhara route;



(Note) The symbol T stands for a transmitter station, and the symbol RP for a microwave repeater station.

Population coverages of these stations are estimated as follows. Where the coverages of two stations overlap, the overlapping portion is included in the upper station in the list, i.e., in the station having a smaller subscript number in the list.

Table 3-3-2 Population coverage by Plan-2

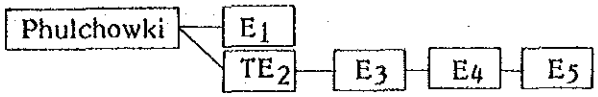
Route	Name of station (tentataive)	Population coverage
Phulchowki	Phulchowki transmitter station	12.5%
Eastern terai route	E_1 transmitter station	2.5%
	TE_2 " "	8%
	TE_3 " "	5%
	TE_4 " "	5.%
	TE_5 " "	4%
		Sub total 24.5%
Western terai route	TW_1 " "	2.5%
	TW_2 " "	4%
	TW_3 " "	1%
	TW_4 " "	2%
	TW_5 " "	2%
	TW_6 " "	1%
		Sub total 12.5%
Pokhara route	$P_1 + P_2 + P_3$, transposer station	2%
	Grand total	51.5%

Plan-2 envisages broadcasting stations installed in cities and microwave repeater stations installed in flat lands or in the places where existing microwave repeater stations of the Nepal Telephone Corporation (NTC) are located. This assures easy construction of the stations as a whole, and the deterioration in electric performances can be kept less by the relay of microwaves than the off-air relay of broadcast programme. However, each broadcasting station is required to have very large facilities including a high-power transmitter and tall antenna towers of 150 meters or so, though the coverage cannot be increased so much as proportionate to such large facilities.

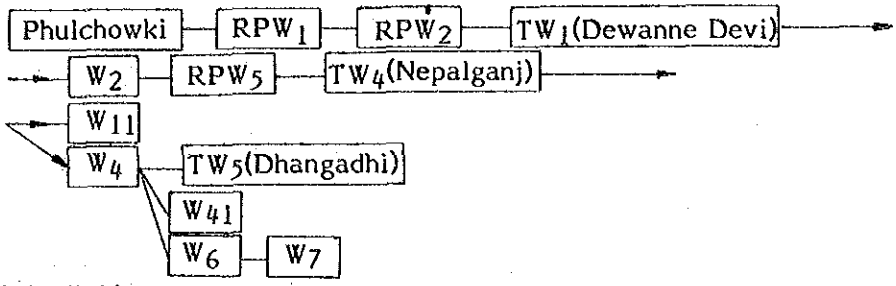
(3) Plan 3 (See Fig. 3-3-5 and Fig. 3-3-6)

The plan is a compromise between Plan-1 and Plan-2. It follows Plan-1 except for the location of transposer stations that will require the installation of electric power lines over a long distance as proposed in Plan-1. Plan-3 proposes construction of the transmitter stations in flat land areas instead of such transposer stations in Plan-1.

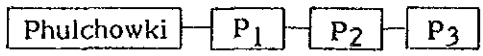
The Eastern terai route is as follows:



The Western terai route is as follows:



and the Pokhara route;



Population coverages of these stations are estimated as follows.

Table 3-3-3 Population coverage by Plan-3

Route	Name of station (tentative)	Population coverage
Phulchowki	Phulchowki transmitter station	12.5%
Eastern terai route	E_1 transposer station	2.5%
	TE_2 transmitter station	8% *1
	E_3 transposer station	5% *2
	E_4 " "	8%
	E_5 " "	3%
		sub total 26.5%
Western terai route	TW_1 transmitter station	7%
	W_{11} transposer station	2%
	W_2 " "	3%
	TW_4 transmitter station	2%
	W_4 transposer station	2.4%
	W_{41} " "	0.6%
	TW_5 transmitter station	2%
	$W_6 + W_7$ " "	1%
		sub total 20%
Pokhara route	$P_1 + P_2 + P_3$, transposer station	2%
	Grand total	61%

*1 Population coverage is wider than that of plan-1 because service nearer to E_2 is expanded more than in Plan-1, with the antenna pattern changed.

The plan can reduce the construction costs of electric power lines, but requires large-scale facilities. For the Western terai route, in particular, it does not offer remarkable advantages in respect of construction costs and electric properties.

(4) Comparison of three plans

There will be no gainsaying as to the construction of the main transmitter station on Mt. Phulchowki and the transposer stations on the Pokhara route, but the three plans involve marked differences as to the Eastern and the Western terai routes. For these two Terai routes, therefore, the three plans are compared in Table 3-3-4 and Table 3-3-5 by the items and on the evaluation criteria shown below.

Population coverage: ○ =high; △ =medium; X=low
Scale of facilities: ○ =small; △ =medium; X=large
Power supply construction cost: ○ =low; △ =medium; X=high
Number of stations: ○ =small; △ =medium; X=large
Total construction cost: Total of power supply construction cost and facilities construction cost is
○ =low; △ =medium; X=high.

Table 3-3-4 Eastern terai route

	Plan-1	Plan-2	Plan-3
Population coverage	○	X	○
Scale of facilities	○	X	△
Power supply construction cost	X	○	△
Number of stations	△	X	○
Total construction cost	△	X	○

Table 3-3-5 Western terai route

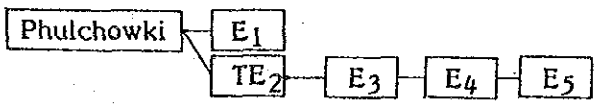
	Plan-1	Plan-2	Plan-3
Population coverage	○	×	△
Scale of facilities	○	×	△
Power supply construction cost	×	○	△
Number of stations	○	×	△
Total construction cost	○	×	△

(5) Conclusion

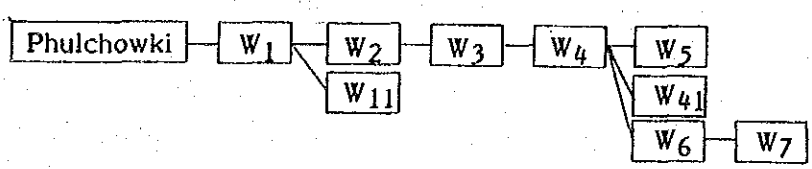
For the Eastern terai route, the above comparison of the three Plans shows that Plan-3 is most desirable. Although the scale of facilities under Plan-3 will be somewhat large because the construction of TE_2 station (Jaleswar) is involved, this transmitter station can be used also for news gathering and as a maintenance centre in the Eastern terai district. The efficient possible usefulness of the station will offset its somewhat high initial cost. Thus, Plan-3 is considered most desirable.

For the Western terai route, good effects cannot be expected from Plan-3, including the difficulty of constructing electric power lines. Plan-1, although involving this difficulty, is after all considered preferable. All things considered, the most desirable broadcasting network plan is shown in Fig. 3-3-7 and Fig. 3-3-8.

The Eastern terai route of proposed plan is as follows;



the Western terai route is



and the Pokhara route is

Population coverage by the plan is estimated as follows, and if the area of poor reception is included, total population coverage will become about 75%.

Table 3-3-6 Population coverage by proposed plan

Route	Name of station (tentative)	Population coverage
Phulchowki	Phulchowki transmitter station	12.5%
Eastern terai route	E_1 transposer station	2.5%
	TE_2 transmitter station	8%
	E_3 transposer station	5%
	E_4 " "	8%
	E_5 " "	3%
		Sub total 26.5%
Western terai route	W_1 transposer station	7%
	W_2 " "	3%
	W_3 " "	3.%
	W_4 " "	2.4%
	W_5 " "	3%
	W_{11} "	2%
	W_{41} " "	0.6%
	$W_6 + W_7$ " "	1%
		Sub total 22%
Pokhara route	$P_1 + P_2 + P_3$, transposer station	2%
	Grand total	63%

3-2. Frequency Allocation Plan

TV channels assigned in Nepal are shown in Table 3-3-7 and Table 3-3-8.

The three Plans propose the following frequency allocations, in consideration of the necessity of avoiding interferences among the existing stations in the neighboring countries, particularly India, and also to avoid mutual interferences within and among the stations in the network. Furthermore, it considers the channel assignments within Band III and partially in Band I. For reference, TV channel frequencies in VHF and UHF bands are shown in Appendix A-31.

In order to establish the nationwide frequency allocation plan, the following conditions are taken into account.

1) Two programme channels are considered for the future.
2) Use of band III at VHF is mainly taken into consideration.
3) Use of channel 4 in Band I is considered for the frequency assignment in some stations.
4) To avoid co-channel interference, existing latent field strength is referred to.
5) To ensure off-air relay programme transmission, frequencies are grouped into several combinations and neighbouring channel reception is avoided.
6) Beat interferences caused among the future frequency assingments not taken into consideration, because there is much flexibility in the choice of frequencies in the UHF band.

For reference, TV channel frequencies in VHF and UHF bands are listed in Appendix A-31.

Table 3-3-7 Frequency allocation (Plan-1)

Station	Channel	Station	Channel	Station	Channel
Phulchowki	5 (7)	W_1	12 (10)	W_6	U (U)
E_1	8 (U)	W_2	6 (8)	W_7	10 (6)
ER	U (U)	W_3	11 (U)		
E_2	11 (9)	W_4	9 (7)	P_1	9 (11)
E_3	4 (U)	W_{11}	4 (U)	P_2	5 (7)
E_4	12 (10)	W_{41}	5 (U)	P_3	12 (10)
E_5	5 (7)	W_5	12 (U)		

* Channels within parentheses are for the 2nd television channel in the future.

(2) Frequency allocation for Plan-2

Table 3-3-8 Frequency allocation (Plan-2)

Station	Channel	Station	Channel	Station	Channel
Phulchowki	5 (7) SHF	RPW_1	SHF	RPW_6	SHF
TE_1	8 (10) SHF	RPW_2	SHF	RPW_7	SHF
RPE_1	SHF	TW_1	4 (6)	TW_5	11 (9)
TE_2	11 (9)	RPW_3	SHF	RPW_8	SHF
RPE_2	SHF	TW_2	12 (10) SHF	TW_6	10 (6)
TE_3	4 (6)	RPW_4	SHF		
TE_4	12 (10) SHF	RPW_5	SHF	P_1	9 (11)
RPE_3	SHF	TW_3	6 (8)	P_2	5 (7)
TE_5	5 (7)	TW_4	5 (7) SHF	P_3	12 (10)

(3) Frequency allocation for Plan-3

Table 3-3-9 Frequency allocation (Plan-3)

Station	Channel	Station	Channel	Station	Channel
Phulchowki	5 (7)	RPW_1	SHF	W_4	5 (7)
E_1	8 (U)	RPW_2	SHF	W_{41}	12 (10)
TE_2	11 (9)	TW_1	12	TW_5	4 (U)
E_3	4 (U)	W_1	12 (10)	W_6	U (U)
E_4	12 (10)	W_{11}	4 (U)	W_7	6 (8)
E_5	5 (7)	W_2	6 (8)	P_1	9 (11)
		RPW_5	SHF	P_2	5 (7)
		TW_4	9 (11)	P_3	12 (10)

(4) Frequency allocation for proposed plan

Table 3-3-10 Frequency allocation (Proposed Plan)

Station	Channel	Station	Channel	Station	Channel
Phulchowki	5 (7)	W_1	12 (10)	W_{41}	5 (U)
E_1	8 (U)	W_2	6 (8)	W_6	4 (U)
TE_2	11 (9)	W_3	11 (U)	W_7	10 (U)
E_3	4 (U)	W_4	9 (7)	P_1	9 (11)
E_4	12 (10)	W_5	12 (U)	P_2	5 (7)
E_5	5 (7)	W_{11}	4 (U)	P_3	12 (10)

3-3. TV Standards and Technical Standards

(1) TV Standards

B-PAL system which is employed in many of the neighbouring countries is employed. The main specifications are as follows.

Number of scanning lines	:	625
Subcarrier frequency	:	4.43361875 MHz
Horizontal scanning frequency	:	15.625 KHz
Vertical scanning frequency	:	50.0 Hz
Radio frequency band width	:	7 MHz
Video band width	:	5 MHz
Difference between audio and video carrier frequencies	:	+5.5 MHz
Vestigial sideband width	:	0.75 MHz
Video modulation	:	Negative
Audio modulation	:	FM
Front porch width	:	1.5 ± 0.3 μs
Burst width	:	2.25 ± 0.23 μs
Horizontal synchronization pulse width	:	4.7 ± 0.2 μs
Horizontal blanking pulse width	:	12 ± 0.3 μs
Vertical blanking period	:	25 lines

(2) Technical Standards

In principle, technical recommendations of CCIR are applied, and all equipment shall be strongly-built, easy-to-use and easily maintainable equipment satisfying the specifications for the broadcasting stations will be employed.

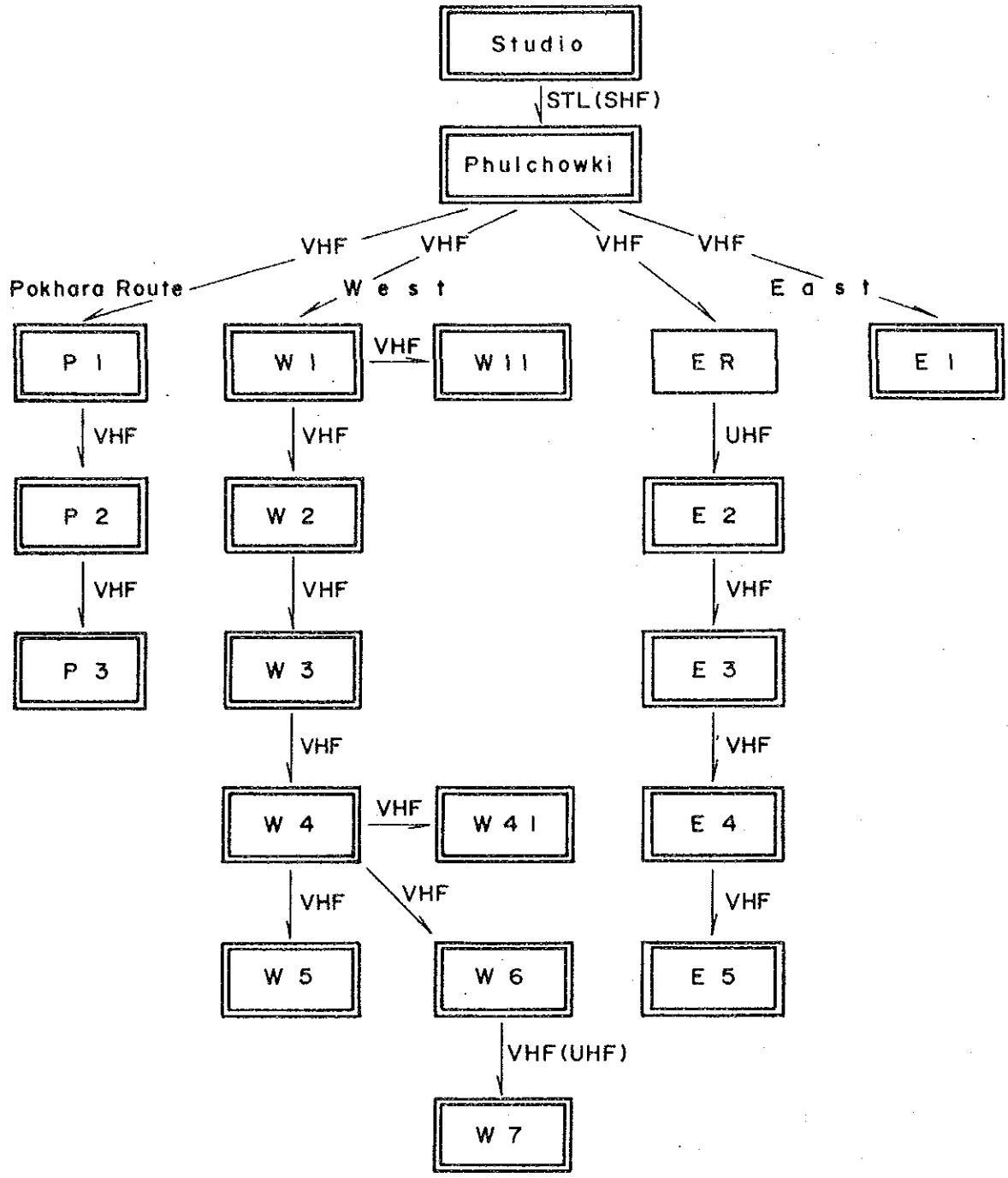
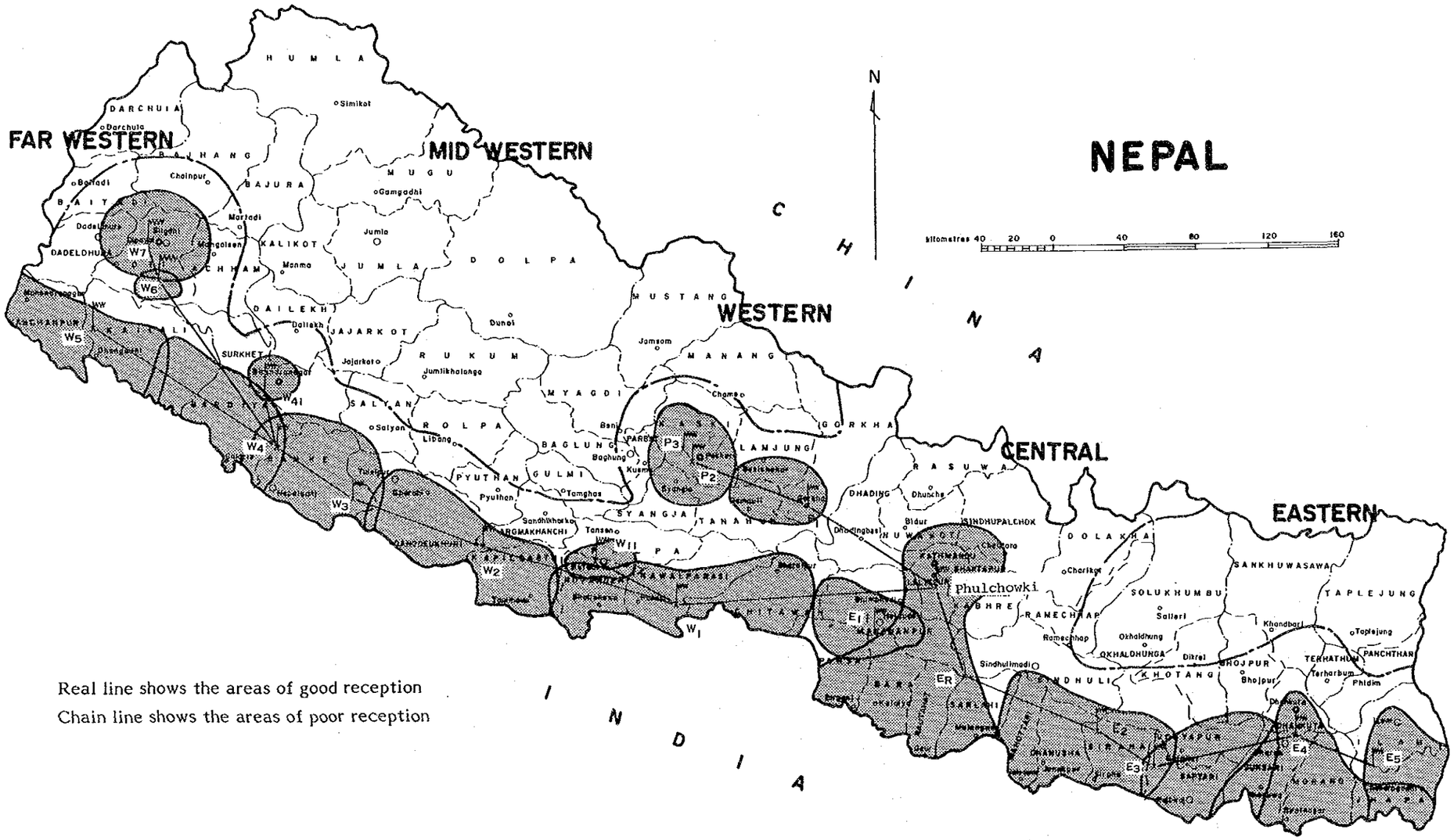


Fig. 3-3-1 Television network in Nepal (Plan-1)



Real line shows the areas of good reception
Chain line shows the areas of poor reception

Fig. 3-3-2 Expected Service Area (Plan-1)

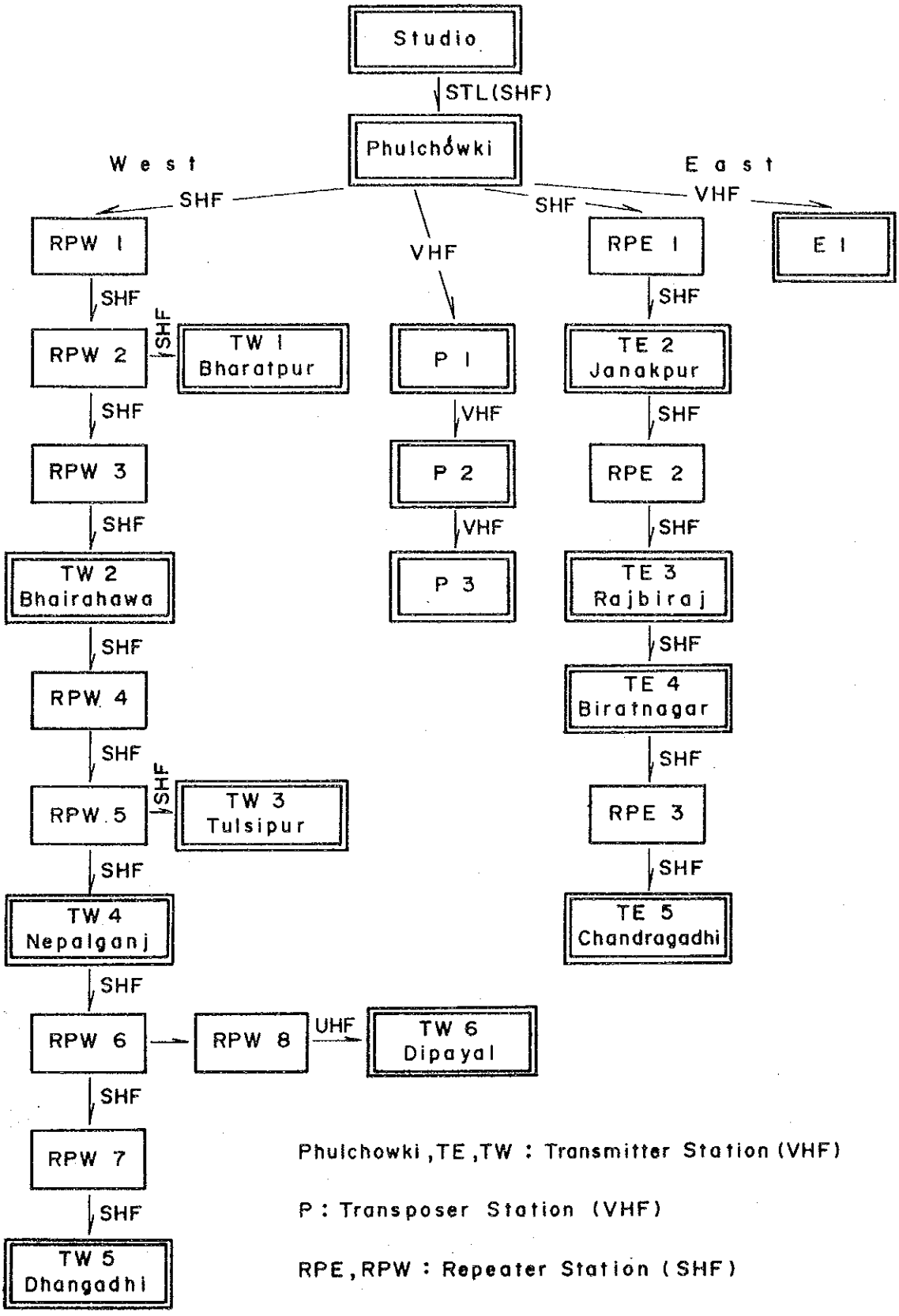
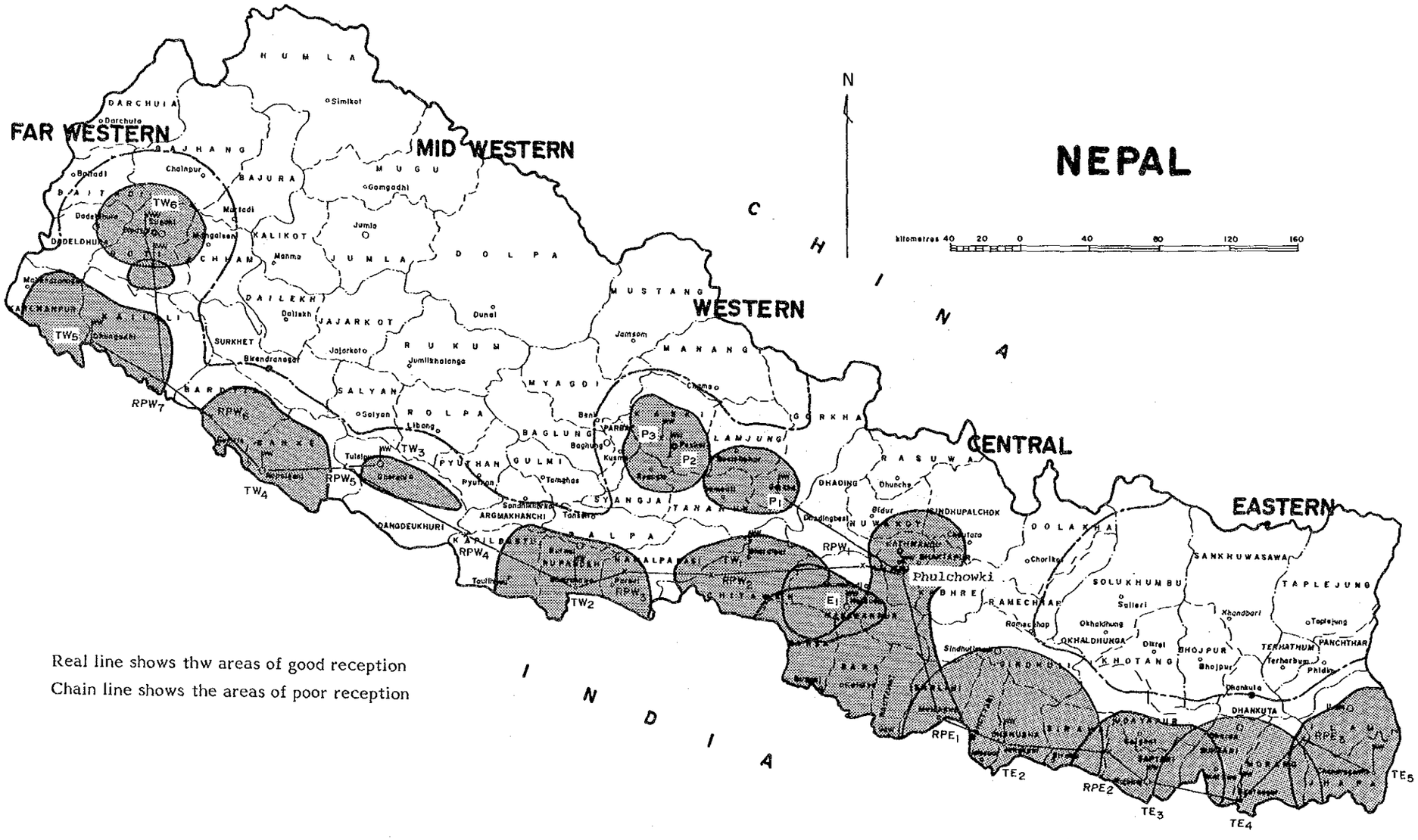


Fig. 3-3-3 Television network in Nepal (Plan-2)



Real line shows thw areas of good reception
Chain line shows the areas of poor reception

Fig. 3-3-4 Expected Service Area (Plan-2)

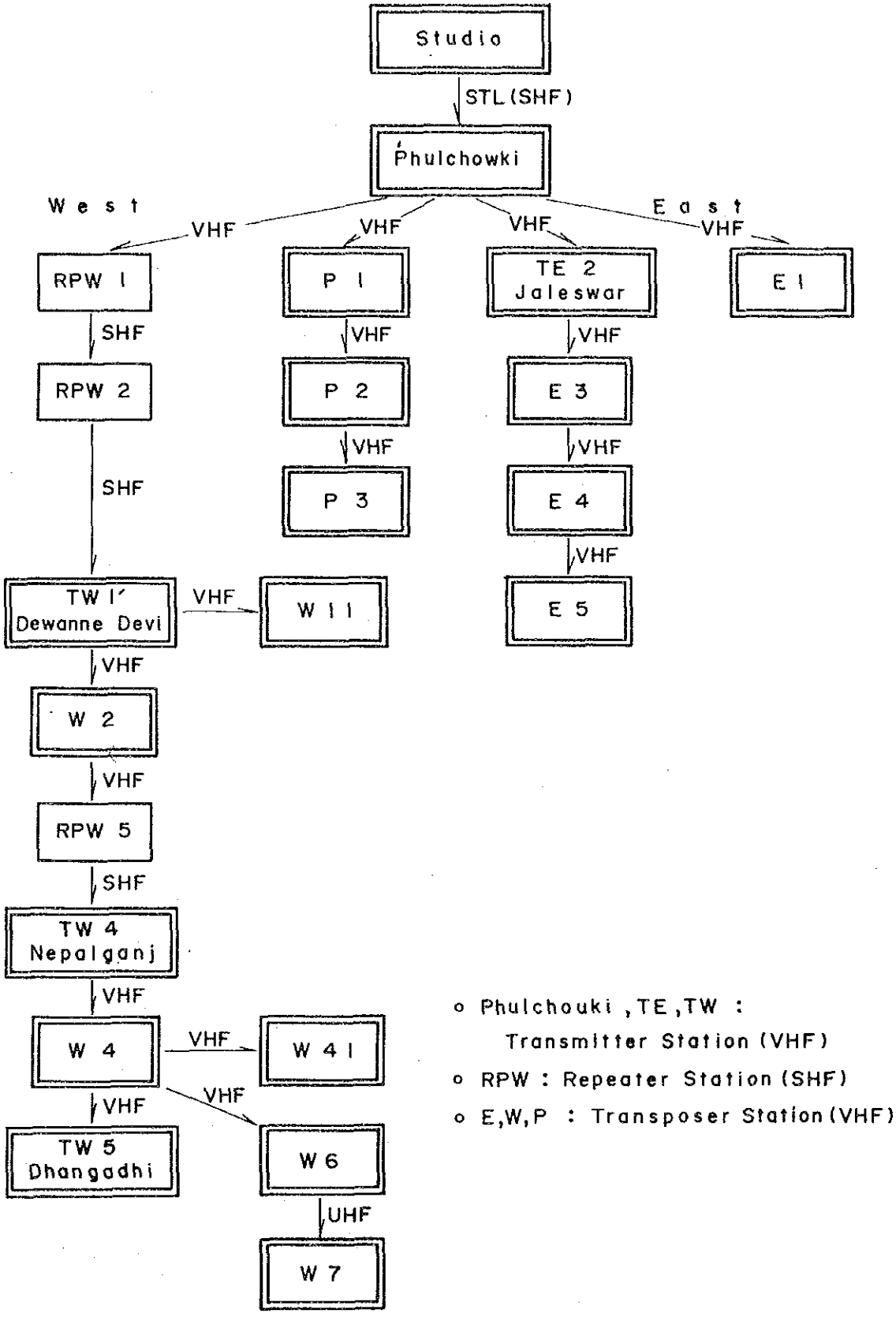
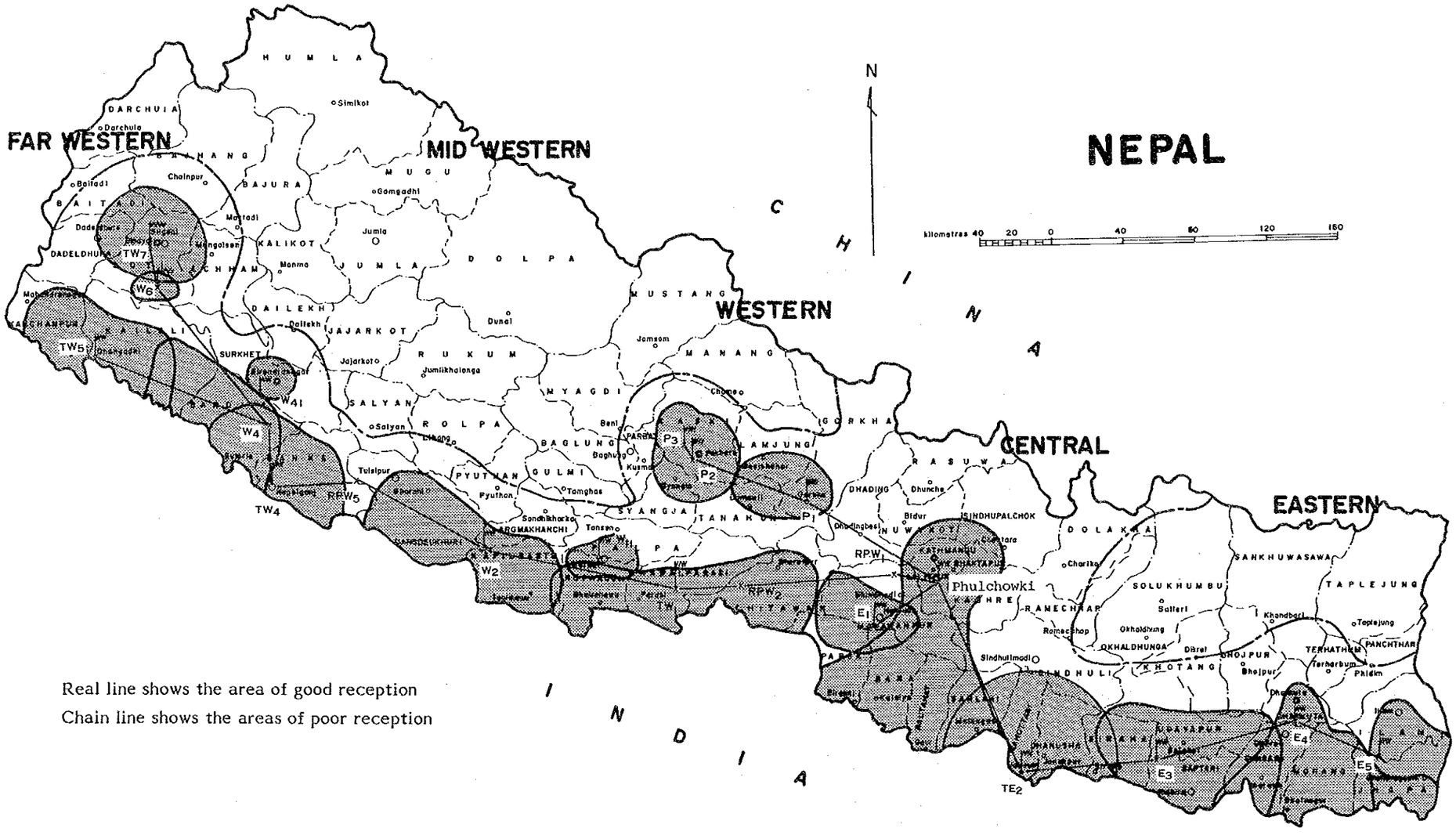
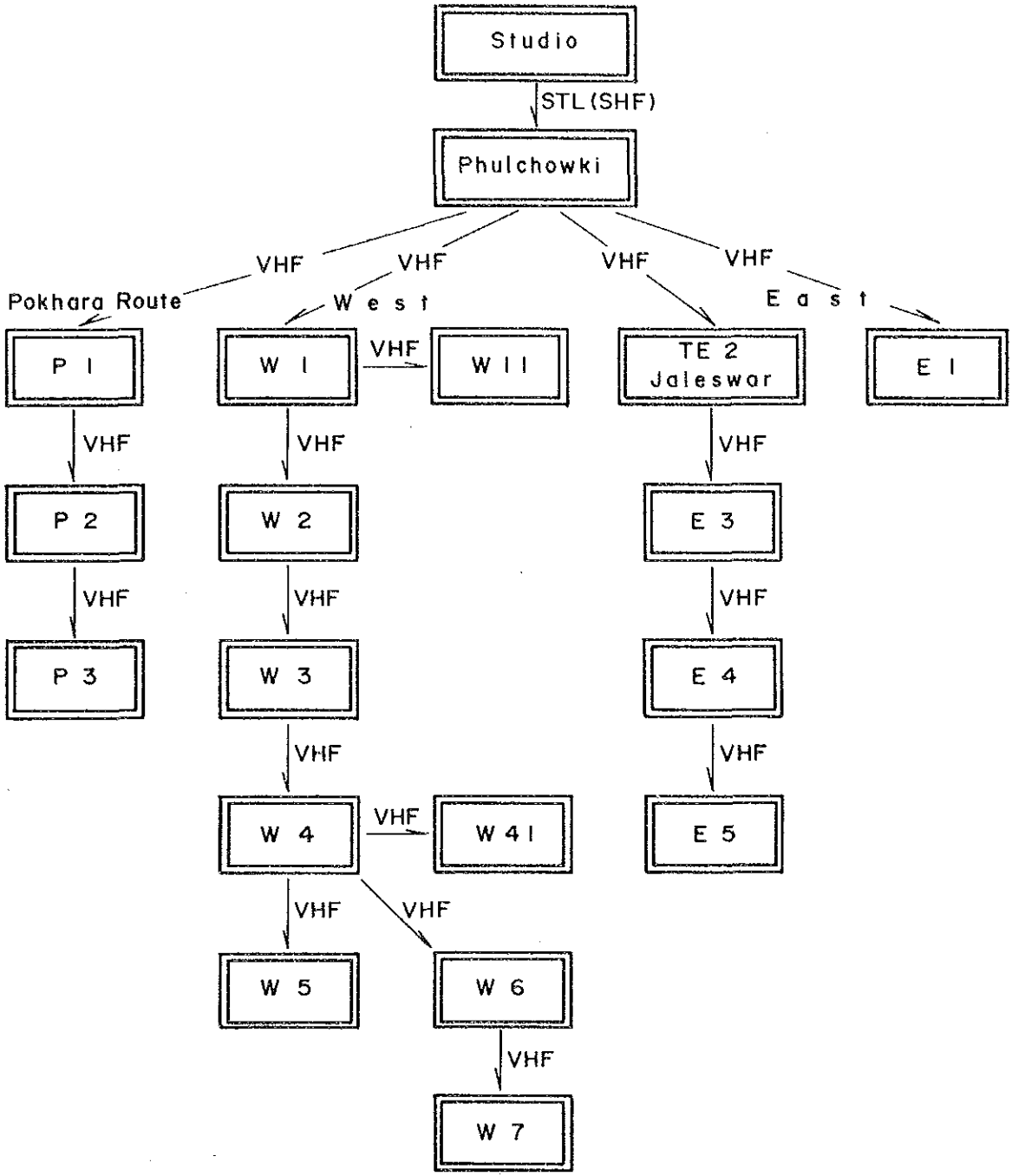


Fig. 3-3-5 Television network in Nepal (Plan-3)



Real line shows the area of good reception
Chain line shows the areas of poor reception

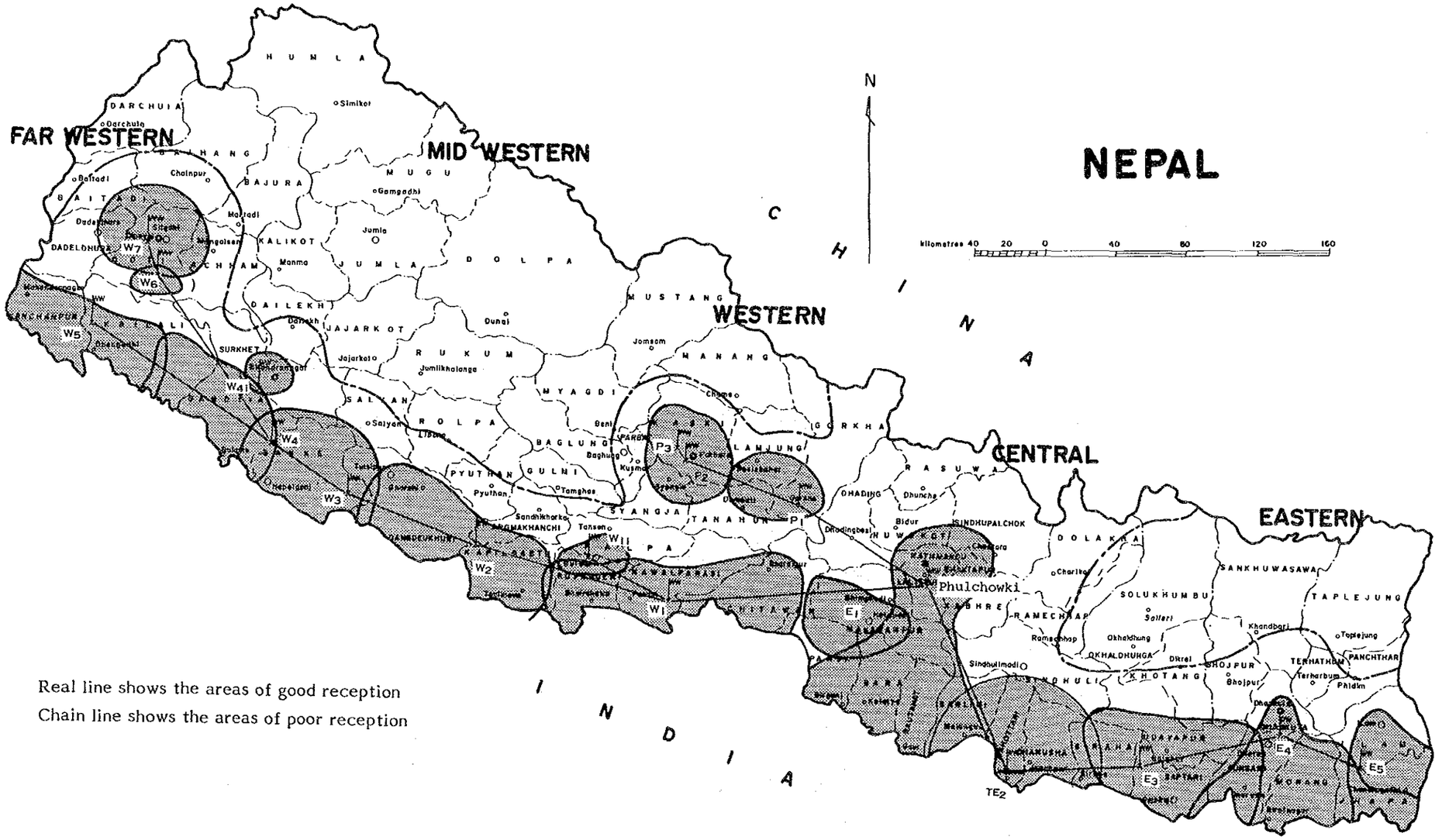
Fig. 3-3-6 Expected Service Area (Plan-3)



Phulchowki , TE : Transmitter Station (VHF)

E , P , W : Transnsposer Station (VHF)

Fig. 3-3-7 Television network in Nepal (Proposed Plan)



Real line shows the areas of good reception
Chain line shows the areas of poor reception

Fig. 3-3-8 Expected Service Area (Proposed Plan)

CHAPTER 4. CONSTRUCTION PLAN OF TV STATION

4-1. Location of Stations

As explained in the previous Section 3-2, frequencies are assigned to each TV station and locations of stations are chosen on maps with due consideration paid to site conditions as listed below (see Figs. 3-3-2, 3-3-4, 3-3-6 and 3-3-8).

1) Service area
2) Possibility of reception from upstream station
3) Status of power supply
4) Road condition

In practice, locations of stations are determined by the result of propagation tests from upstream stations.

4-2. Scale of Transmitter Stations

In Section 3-1 of the previous chapter "Broadcasting Network", three plans were examined. This section outlines the plans in terms of equipment.

Plan-1 A main station is constructed on the summit of Mt. Phulchowki and other transposer stations are constructed on tops of comparably lower hills which are placed in the northern parts of the terai region. These stations will be equipped with VHF and UHF transposers (10 w - 500 w) to connect in tandem for relaying and broadcasting. (See Table 3-4-1.)

Plan-2 A main station is constructed on the top of Mt. Phulchowki and other transmitter stations are constructed in the main cities of the terai region. Programme transmission between the main stations is conducted by means of microwave repeaters. (See Table 3-4-2.) Pokhara route and E1 stations are expected to operate by off-air relay, as in Plan-1.

Plan-3 This is a compromise plan between the above two. As to the eastern part of the terai region, a transmitter station (TE_2) is constructed in Jaleswar instead of ER and E_2 of Plan-1, where direct reception of signal radiated from Phulchowki transmitter station is possible, and the received signal is rebroadcast. For E_3 station and the rest, the plan is same as of Plan-1. As

to the western part of the terai region, programmes are sent through NTV operated microwave link for important stations and the others through off-air relay. As to the Pokhara route, it is same as of Plan-1. (see Table 3-4-3)

Proposed plan

As already mentioned in the conclusion of 3-1-(5), comparison of the above three plans (refer to 3-1-(4) in the preceding chapter) introduces the best plan, which is the combination of Plan-3 for the eastern terai route and Plan-1 for the western terai route, including the route to Pokhara.

A Summary of the main technical parameters of each station is listed in Table 3-4-4.

Table 3-4-1

Summary of main items for transmitter and transposer stations (Plan 1)

Site	Po(Tx)	A.S.L. (m)	ERP	Ant	Tower (m)	Electricity	*1 d(km)	Remarks
Phulchowki	V 2kW	2765	11.9kW	*2 2D-4-2 2D-2-2	50	Existing *3	16.2	from studio, STL
E_1	VV 100W	792	0.37kW	2D-2-1 2D-1-3	15	from the foot, 2km	46.6	Phulchowki reception
E R	VU 10W	762	1.2 kW	4mφ Parab	30	from Nijgadh, 37km	44.8	Phulchowki reception
E_2	UV 500W	304	1.2 kW	2D-2-3 2D-1-1	30	from Lahan, 33km	84.1	E R reception
E_3	VV 500W	320	1.7 kW	2D-2-1 2D-1-3	15	from Lahan, 14km	39.6	E_2 reception
E_4	VV 250W	1890	0.85kW	2D-2-1 2D-1-3	15	from Dharan, 11km	79.4	E_3 reception
E_5	VV 100W	640	0.3 kW	2D-2-2 2D-1-1	30	from Damak, 17km	48.7	E_4 reception
W_1	VV 500W	671	1.7 kW	2D-2-2 2D-1-1	20	from Dumkibas, 11km	156	Phulchowki reception
W_{11}	VV 50W	427	0.32kW	2D-2-1 2D-1-1	15	from Butwal, 4km	47.6	W_1 reception
W_2	VV 250W	914	0.9 kW	2D-2-2 2D-1-1	15	from Shivapur, 8.5km	104.3	W_1 reception
W_3	VV 250W	808	1.1 kW	2D-2-2	15	from Lamahi, 60km	74.9	W_2 reception
W_4	VV 250W	1006	1.1 kW	2D-2-1 2D-1-2	15	from Kohalpur, 20km	63.8	W_3 reception
W_{41}	VV 10W	1371	0.015 kW	2D-1-3	15	from Birendranagar, 17km *4	22.6	W_4 reception
W_5	VV 500W	762	1.7 kW	2D-2-1 2D-1-3	15	from Dhangadhi, 25km *4	120	W_4 reception
W_6	VU 3W	2891	0.1 kW 0.01kW	Parab. 2L-4-2	20	Solar battery	107.7	W_4 reception
W_7	UV 100W	1222	0.25kW	2D-2-4	20	from Dipayal, 3km *4	18.6	W_6 reception
P_1 (Gorkha)	VV 100W	1494	0.9 kW	2D-4-1 2D-1-3	20	from Gorkha, 5km *4	89.5	Phulchowki reception
P_2 (Pokhara)	VV 100W	1189	0.1 kW	2D-1-4	15	from Pokhara, 8.2km *4	69	P_1 reception
P_3 (Pokhara)	VV 10W	1585	0.02kW	2D-1-2	15	from Pokhara, 6.5km *4	8.9	P_2 reception

☞ ;

*1 Distance from upstream station

*2 2-dipole stack face
2D -4 -2

*3 Existing commercial power supply can be available, however some changes will be necessary if capacity is not enough.

*4 As the final branch point of commercial power supply is not clear, total length of power transmission line is measured from the nearest city.

Table 3-4-2

Summary of main items for transmitter and transposer stations (Plan 2)

Site	Po(Tx)	A.S.L. (m)	ERP	Ant	Tower (m)	*1	*2 d(km)	*3 Remarks
Phulchowki	V 1kW	2765	11.9kW	*4 2D-4-2 2D-2-2	50	*5	16.2	from studio, STL
E_1	VV 100W	792	0.37kW	2D-2-1 2D-1-3	15	from the foot 2km	46.6	Phulchowki reception
TE_2 (Janakpur)	V 5kW	73	12.7kW	2D-2-3	140	*6	39	RPE_1 reception
TE_3 (Rajbiraj)	V 5kW	76	12.7kW	2D-2-3	140		38	RPE_2 reception
TE_4 (Biratnagar)	V 5kW	71	12.7kW	2D-2-3	140		53.5	TE_3 reception
TE_5 (Chandragadhi)	V 5kW	104	12.7kW	2D-2-3	140		42	RPE_3 reception
RPE_1	μ 1W	82	—	4m φ	30	*7	69	Phulchowki reception
RPE_2	μ 1W	107	—	4m φ	30		52	TE_2 reception
RPE_3	μ 1W	122	—	4m φ	30		44	TE_4 reception
TW_1 (Bharatpur)	V 5kW	204	12.7kW	2D-2-3	140	*6	19	RPW_2 reception
TW_2 (Bhairahawa)	V 5kW	110	12.7kW	2D-2-3	140		38	RPW_3 reception
TW_3 (Tulsipur)	V 1kW	670	1.0kW	2D-1-4	140		17	RPW_5 reception
TW_4 (Nepalganj)	V 5kW	152	12.7kW	2D-2-3	140		55	RPW_5 reception
TW_5 (Dhangadhi)	V 5kW	152	12.7kW	2D-2-3	140		40	RPW_7 reception
RPW_1	μ 1W	2584	—	Parab 4m φ	30	*7	31.5	Phulchowki reception
RPW_2	μ 1W	168	—	Parab 4m φ	30		79.5	RPW_1 reception
RPW_3	μ 1W	676	—	Parab 4m φ	30		43.5	RPW_2 reception
RPW_4	μ 1W	930	—	Parab 4m φ	30		69.5	TW_2 reception
RPW_5	μ 1W	1157	—	Parab 4m φ	30		68.5	RPW_4 reception
RPW_6	μ 1W	168	—	Parab 4m φ	30		39	TW_4 reception
RPW_7	μ 1W	165	—	Parab 4m φ	30		48	RPW_6 reception
RPW_8	μ 1W	2891	—	Parab 3m φ	20	Solar battery	107.7	RPW_5 reception
W_7	V 100W	1222	0.25kW	2D-2-4	20	from Dipayal 3km *8	18.6	RPW_8 reception

Site	Po(Tx)	A.S.L. (m)	ERP	Ant	Tower (m)	*1	*2 d(km)	*3 Remarks
P_1 (Gorkha)	VV 100W	1494	0.9 kW	2D-4-1 2D-1-3	20	from Gorkha, 5km *8	89.5	Phulchowki reception
P_2 (Pokhara)	VV 100W	1189	0.1 kW	2D-1-4	15	from Pokhara, 8.2km *8	69	P_1 reception
P_3 (Pokhara)	VV 10W	1585	0.02kW	2D-1-2	15	from Pokhara, 6.5km *8	8.9	P_2 reception

☞ :

*1 Electricity

*2 Distance from upstream station.

*3 SHF radiated from upstream station is received except for E_1 and P route.

*4 2-dipole stack face
2D -4 -2

*5 Existing commercial power supply can be available, however some changes will be necessary if capacity is not enough.

*6 Length of power transmission line is estimated short, because site of the station is near to the main city.

*7 Principally, the power supply for the microwave repeater station is expected to use commercial power supply and emergency engine generator, however if it is difficult to use commercial power, use of solar battery etc., will be considered.

*8 As the final branch point of commercial power supply is not clear, total length of power transmission line is measured from the nearest city.

Table 3-4-3

Summary of main items for transmitter and transposer stations (Plan 3)

Site	Po(Tx)	A.S.L. (m)	ERP	Ant	Tower (m)	Electricity	*1 d(km)	Remarks
Phulchowki	V 2kW	2765	11.9kW	*2 2D-4-2 2D-2-2	50	*3	16.2	from studio, STL
E_1	VV 100W	792	0.37kW	2D-2-1 2D-1-3	15	from the foot, 2km	46.6	Phulchowki reception
TE_2 (Jaleswar)	V 5kW	61	12.7kW	2D-2-3	140	*4	108	Phulchowki reception
E_3	VV 500W	320	1.7 kW	2D-2-1 2D-1-3	15	from Lahan, 14km	78.8	TE_2 reception
E_4	VV 250W	1890	0.85kW	2D-2-1 2D-1-3	15	from Dharan, 11km	79.4	E_3 reception
E_5	VV 100W	640	0.3 kW	2D-2-2 2D-1-1	30	from Damak, 17km	48.7	E_4 reception
TW_1' (Dewanne Devi)	V 500W	671	1.7 kW	2D-2-2 2D-1-1	20	from Dumkibas, 11km	43.5	RPW_2 reception
W_{11}	VV 50W	427	0.32kW	2D-2-1 2D-1-1	15	from Butwal, 4km	47.6	TW_1' reception
W_2	VV 250W	914	0.9 kW	2D-2-2 2D-1-1	15	from Shivapur, 8.5km	104.3	TW_1' reception
TW_4 (Nepalganj)	V 5kW	152	12.7kW	2D-2-3	140	*4	55	RPW_5 reception
W_4	VV 250W	1006	1.1 kW	2D-2-1 2D-1-2	15	from Kohalpur, 20km	31	TW_4 reception
W_{41}	VV 10W	1371	0.015 kW	2D-1-3	15	from Birendranagar, 17km *5	22.8	W_4 reception
TW_5 (Dhangadhi)	V 5kW	152	12.7kW	2D-2-3	140	*4	105	W_4 reception
W_6	VU 3W	2891	0.1 kW 0.01kW	Parab 2L-4-2	20	Solar battery	107.7	W_4 reception
W_7	UV 100W	1222	0.25kW	2D-2-4	20	from Dipayal, 3km *5	18.6	W_6 reception
RPW_1	μ 1W	2584	—	Parab 4m ϕ	30	*6	31.5	Phulchowki reception
RPW_2	μ 1W	168	—	Parab 4m ϕ	30	*6	79.5	RPW_1 reception
RPW_5	μ 1W	1157	—	Parab 4m ϕ	30	*6	68.5	W_2 reception
P_1 (Gorkha)	VV 100W	1494	0.9 kW	2D-4-1 2D-1-3	20	from Gorkha, 5km *5	89.5	Phulchowki reception
P_2 (Pokhara)	VV 100W	1189	0.1 kW	2D-1-4	15	from Pokhara, 8.2km *5	69	P_1 reception
P_3 (Pokhara)	VV 10W	1585	0.02kW	2D-1-2	15	from Pokhara, 6.5km *5	8.9	P_2 reception

☞ ;

*1 Distance from upstream station.

*2 2-dipole stack face
2D -4 -2

*3 Existing commercial power supply can be available, however some changes will be necessary if capacity is not enough.

*4 Length of power transmission line is estimated short, because site of the station is near to the main city.

*5 As the final branch point of commercial power supply is not clear, total length of power transmission line is measured from the nearest city.

*6 Principally, the power supply for the microwave repeater station is expected to use commercial power supply and emergency engine generator, however if it is difficult to use commercial power, use of solar battery etc., will be considered.

Table 3-4-4

Summary of main items for transmitter and transposer stations (Proposed Plan)

Site	Po(Tx)	A.S.L. (m)	ERP	Ant	Tower (m)	Electri-city	*1 d(km)	Remarks
Phulchowki	V 2kW	2765	11.9kW	*2 2D-4-2 2D-2-2	50	*3	16.2	from studio, STL
E_1	VV 100W	792	0.37kW	2D-2-1 2D-1-3	15	from the foot, 2km	46.6	Phulchowki reception
TE_2 (Jaleswar)	V 5kW	61	12.7kW	2D-2-3	140	*4	108	Phulchowki reception
E_3	VV 500W	320	1.7 kW	2D-2-1 2D-1-3	15	from Lahan, 14km	78.8	TE_2 reception
E_4	VV 250W	1890	0.85kW	2D-2-1 2D-1-3	15	from Dharan, 11km	79.4	E_3 reception
E_5	VV 100W	640	0.3 kW	2D-2-2 2D-1-1	30	from Damak, 17km	48.7	E_4 reception
W_1	VV 500W	671	1.7 kW	2D-2-2 2D-1-1	20	from Dumkibas, 11km	156	Phulchowki reception
W_{11}	VV 50W	427	0.32kW	2D-2-1 2D-1-1	15	from Butwal, 4km	47.6	W_1 reception
W_2	VV 250W	914	0.9 kW	2D-2-2 2D-1-1	15	from Shivapur, 8.5km	104.3	W_1 reception
W_3	VV 250W	808	1.1 kW	2D-2-2	15	from Lamahi, 60km	74.9	W_2 reception
W_4	VV 250W	1006	1.1 kW	2D-2-1 2D-1-2	15	from Kohalpur, 20km	63.8	W_3 reception
W_{41}	VV 10W	1371	kW 0.015	2D-1-3	15	from Birendranagar 17km *5	22.6	W_4 reception
W_5	VV 500W	762	1.7 kW	2D-2-1 2D-1-3	15	from Dhangadhi, 25km *5	120	W_4 reception
W_6	VU 3W	2891	0.1 kW 0.01kW	Parab. 2L-4-2	20	Solar battery	107.7	W_4 reception
W_7	UV 100W	1222	0.25kW	2D-2-4	20	from Dipayal, 3km *5	18.6	W_6 reception
P_1 (Gorkha)	VV 100W	1494	0.9 kW	2D-4-1 2D-1-3	20	from Gorkha, 5km *5	89.5	Phulchowki reception
P_2 (Pokhara)	VV 100W	1189	0.1 kW	2D-1-4	15	from Pokhara, 8.2km *5	69	P_1 reception
P_3 (Pokhara)	VV 10W	1585	0.02kW	2D-1-2	15	from Pokhara, 6.5km *5	8.9	P_2 reception

☞ ;

*1 Distance from upstream station.

*2 2-dipole stack face
2D -4 -2

*3 Existing commercial power supply can be available, however some change will be necessary if capacity is not enough.

*4 Length of power transmission line is estimated short, because site of the station is near to the main city.

*5 As the final branch point of commercial power supply is not clear, total length of power transmission line is measured from the nearest city.

4-3. Programme Transmission Network

(1) Multi-hop relay network

As the transposer amplifies vision and sound carriers simultaneously, non-linearity of the equipment deteriorates the picture quality considerably.

Concerning the picture quality of television signal radiated from each station, it is necessary to serve with picture quality of better than grade 3 in the five grade evaluation, even in the final station of multi-hop relay network.

In practice, degradation of the picture quality through tandem connection of transposers is added in each station and if law of addition on the degradation of picture quality is considered, allowable distortion/degradation per station for 5 hop-relay is limited to some extent. Furthermore, in the design of the transmission route, causes of picture degradation such as sync crushing, beat interference, and fading (especially selective fading) have to be taken into account.

1) Notabilia for the construction of multi-hop relay network

The following items must be considered in the design of a multi-hop relay network of transposer stations.

(a) Field intensity of upstream station at each receiving point must be as high as possible.

(b) Countermeasures have to be taken so as to cope with fading, especially selective fading.

(c) Received picture and sound quality shall be good enough.

(d) Stable power supply should be secured.

(e) Ease of maintenance should be ensured.

(f) Broad coverage

(g) Adjacent channel reception should be avoided as much as possible. If it is unavoidable, separation of transmitter and receiver should be considered.

(h) Offset carrier should be adopted, if necessary, to reduce interference between co-channel stations.

(i) It must be free from natural calamities, such as damage from thunder, snow, flood or wind, as much as possible.

(j) On-air monitoring system must be established and a person entrusted for monitoring must be appointed.

In addition to the items listed above, it is necessary to take into consideration future increases in facilities and the introduction of new services such as teletext, bilingual broadcasts, etc. Establishment of a liaison system is also necessary.

Whether commercial power lines are extended from a commercial power source or an independent power plant is installed shall be determined with due consideration of construction and operation costs.

Increase of one more TV channel is expected in the future frequency allocation plan.

2) Parameters for evaluating picture quality

Generally, six independent parameters are said to suffice in determining picture quality. They are S/N, D.P, DG, C/L delay, C/L gain and 2T. In practice, specifications are determined in accordance with the relationships shown in below.

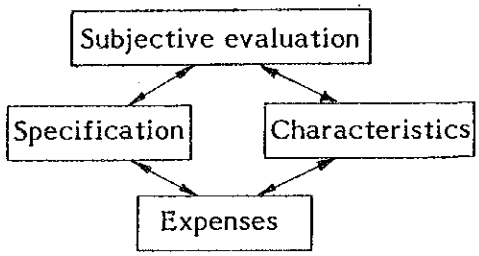


Fig. 3-4-1

Accordingly, specifications must be determined in connection with the subjective evaluation of many people and required expenses.

(2) Programme transmission lines

In order to send local news and programmes from regional stations to other stations, which will be built after the 4th phase, it is necessary to provide TV microwave up links from these local stations to Kathmandu. However, at present it is estimated to be difficult for either NTC or NTV to build such transmission lines due to financial reasons. Furthermore, NTC's microwave link has been designed to be of the "equipment standby system" which is different from the "route standby system", so it is impossible to use NTC's standby equipment for TV programme transmission. For these reasons, countermeasures should be taken into consideration tentatively. Programme transmission lines are shown in Fig. 3-4-2.

(3) International programme transmission

As shown in Fig. 3-4-3, television programmes are exchanged among foreign broadcasters via Intelsat V.

The frequency band used in Intelsat V for TV transmission is shown in Table 3-4-5.

Table 3-4-5. Frequency band of Intelsat V

Down link	10.95 to 11.2 GHz 11.45 to 11.7 GHz 3.7 to 4.2 GHz
Up link	14.0 to 14.5 GHz 5.925 to 6.425 GHz

Transmission bandwidth is 36 MHz per transponder. The frequency allocation for the operation of half-transponders is shown in Fig. 3-4-4.

Audio transmission is carried out in FM at 6.6 MHz or 5.58 MHz.

Conversion of TV standards is conducted in the receiving earth station in compliance with international agreements. An earth station, therefore, is required to be equipped with a standards converter in order to convert TV programme from other standards, NTSC or SECAM, to B-PAL.

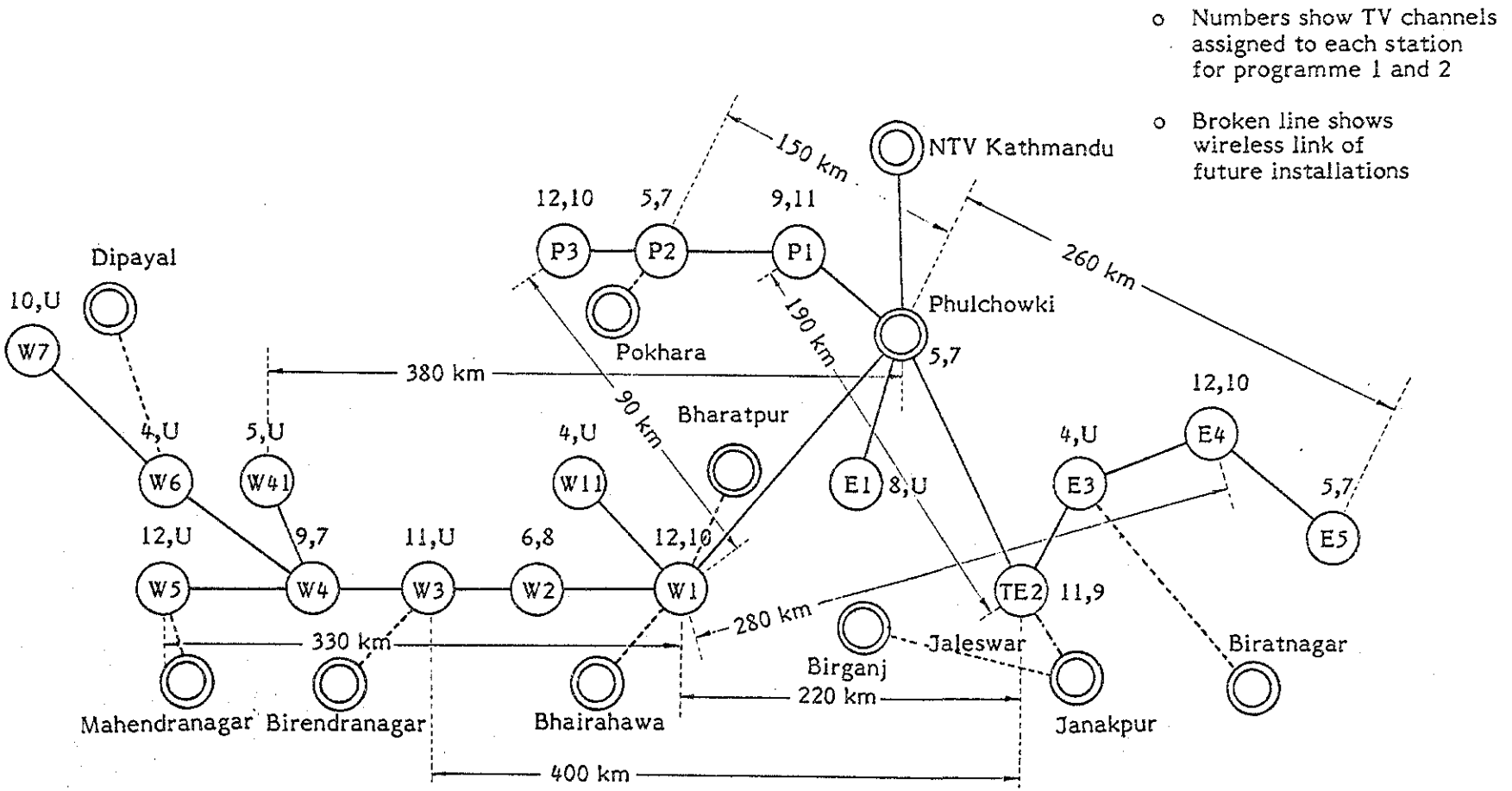


Fig. 3-4-2 Programme Transmission Lines

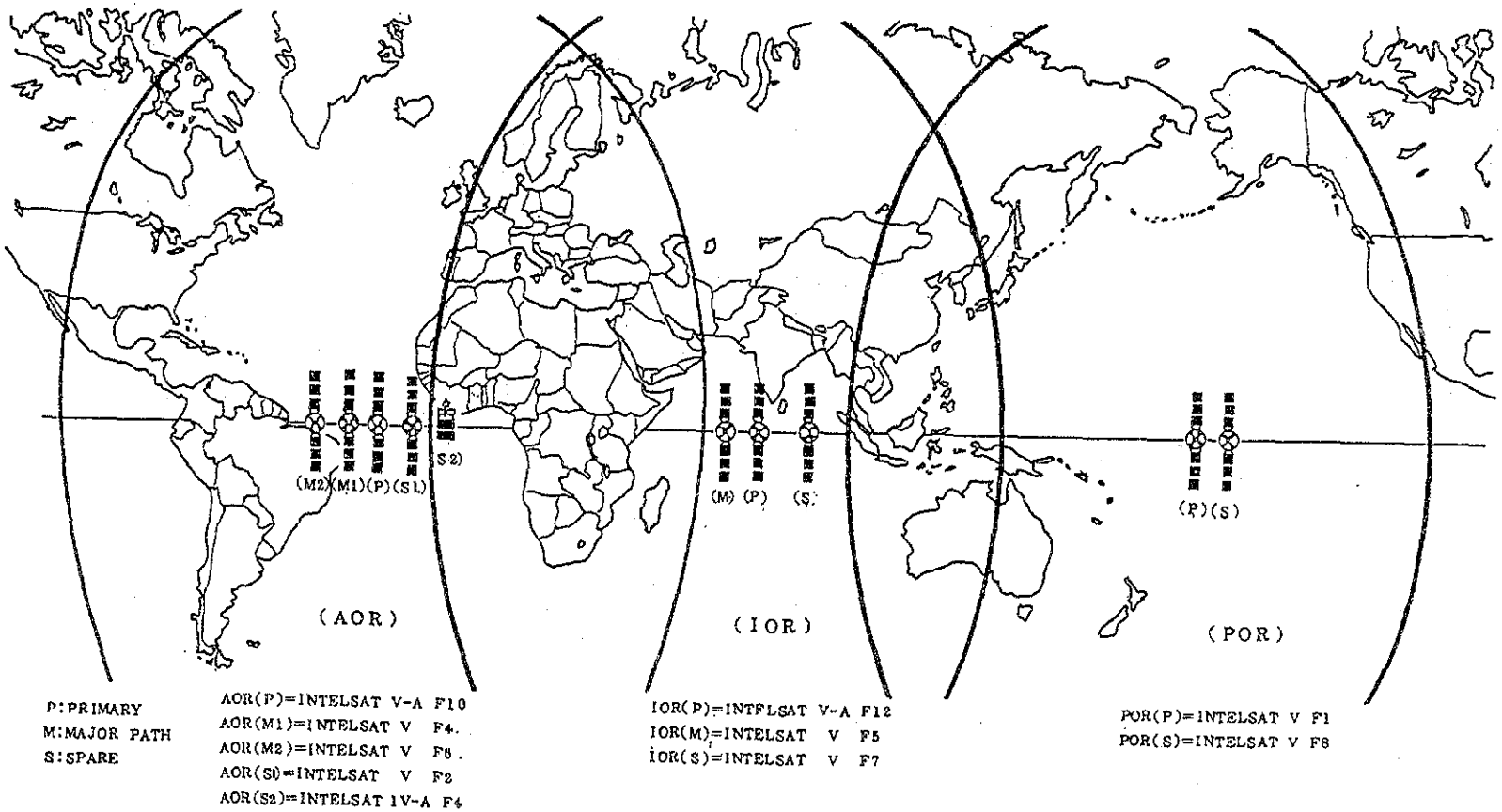


Fig. 3-4-3 Arrangement of Intelsat

It is necessary to establish an up link circuit as shown in Fig. 3-4-5, for the purpose of television programmes originating in Nepal. It is also necessary to follow the prescribed procedure for utilization of the satellite. Preparation of a standard glossary and establishment of a telex circuit are necessary as preliminary arrangements.

The values indicated in the figure show the frequency for transmission to the satellite

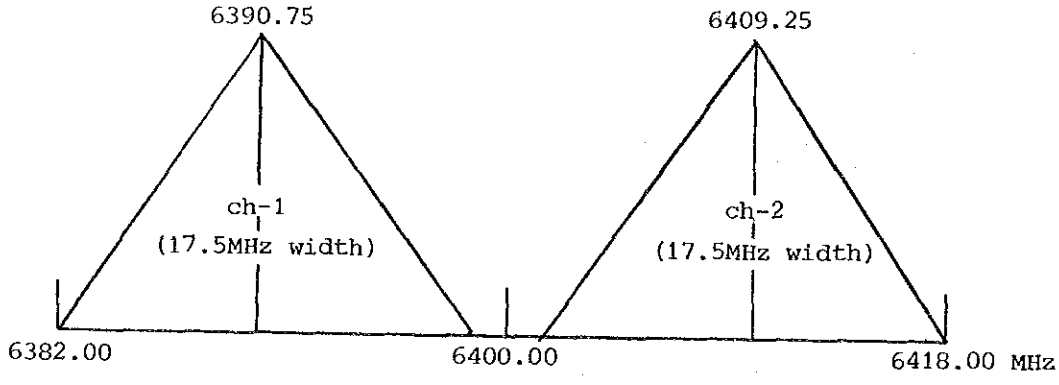


Fig. 3-4-4 Example of frequency band share of Intelsat V for half-transponder use

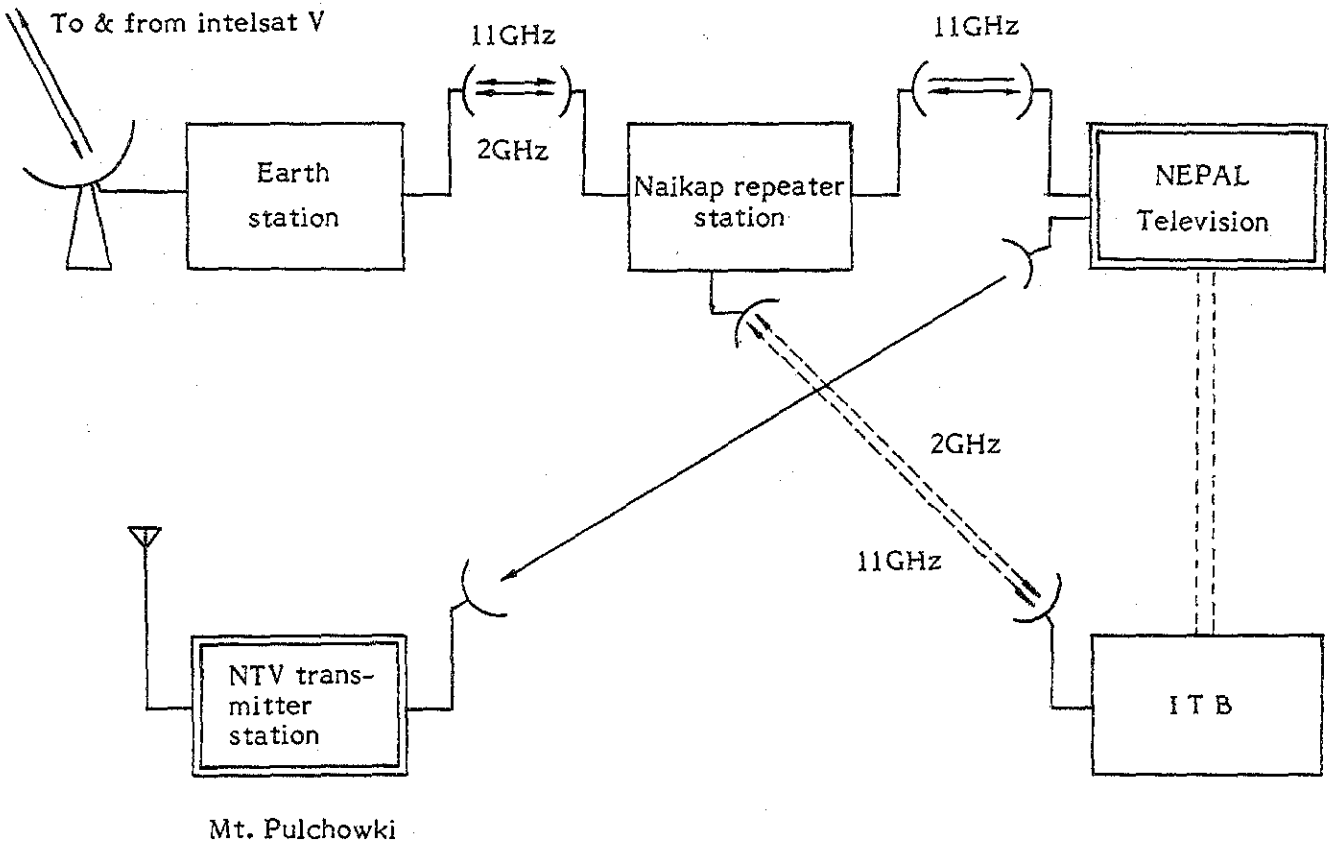


Fig. 3-4-5 TV programme transmission lines

4-4. VHF Intercommunication Network

In order to execute intercommunication which is infalible in respect of routine maintenance and operation, VHF intercommunication network is constructed after the fourth phase. A commercially sold, universal type VHF transceiver is used to lower the construction cost. The intercommunication network is shown in Fig. 3-4-6 and Fig. 3-4-7.

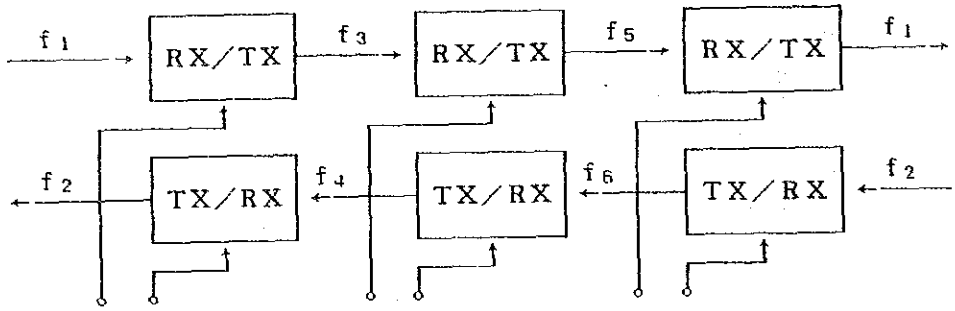


Fig.3-4-6 VHF intercommunication

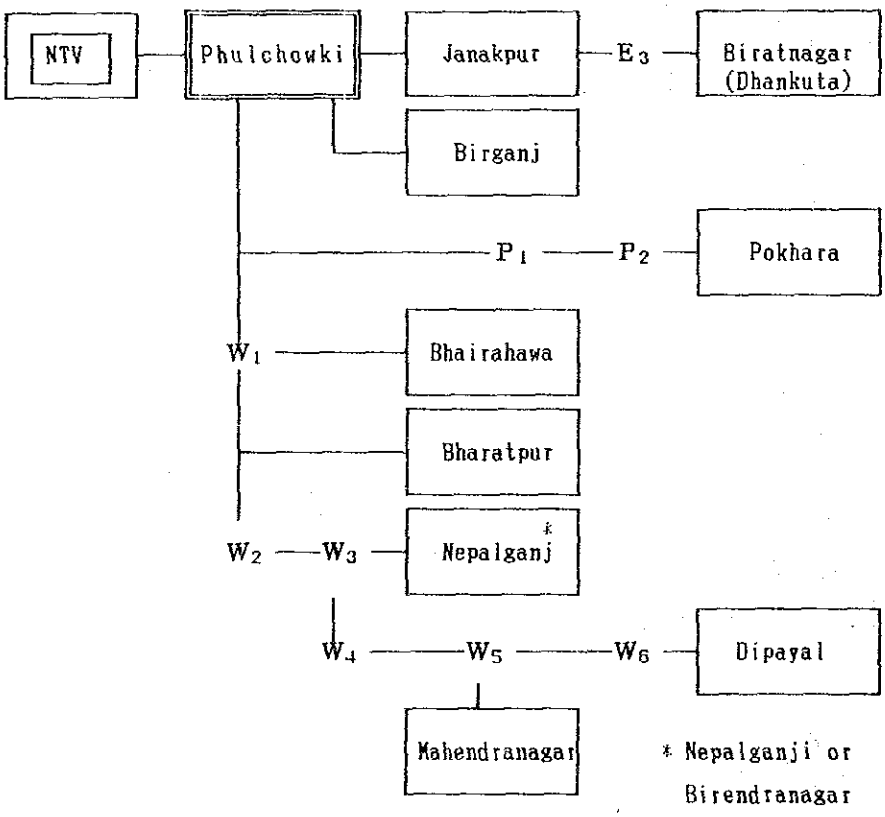


Fig. 3-4-7 VHF intercommunication network

4-5. Transmitting Facilities

Outline of transmitting facilities for each station of the proposed plan is as follows:

(1) Transmitter

At present, two type of transmitters are mainly used; one is all solid-state type and the other vacuum-tube type (only final stage). Considering the future trends in electronics, use of all solid-state transmitters is expected for low power transmitters. Standby functions are also considered.

(2) Transposer

Simultaneous amplification of Vision (V) and Sound (A) carriers is possible owing to the large V/A power ratio. All solid-state transposers with standby functions are expected to be principally introduced. Standardized double-conversion system is adopted and, to secure the sufficient selectivity, saw filters are applied.

In case sufficient D/U (Desired signal/Undesired signal) is not obtained, receiving antenna are installed separately from the transposer site to increase D/U. Adjacent channel filters are principally used to suppress interfering signals. Conceptional design of each station is tabulated in Table 3-4-4.

(3) Antenna

Principally, 2-Dipole antennas are used and appropriate antenna directivity is considered. Yagi antenna is mainly used for reception of upstream station. In case interference signal is observed, diversity reception is considered.

(4) Antenna mast

Principally, in the flat land where acquisition of sufficient land area is possible, guyed antenna mast is used and in cases where the site area is narrow, a self-supporting tower is constructed.

(5) Station building

Unmanned operation of transposer stations is expected except for the Phulchowki and TE_2 (Jaleswar) main transmitter stations. So buildings with no

windows and using prefabricated structures are mainly used. Protective fence is provided for antitheft.

(6) Electricity

Commercial power supply is used principally. For the main transmitter and transposer stations, which are located in the TV trunk transmission route, an emergency engine-generator is installed for avoiding interruptions of power supply. At stations where access is difficult, an emergency engine-generator is installed at the foot of the hill or mountain so that fuel oil can be easily supplied.

(7) Monitoring

Supervision of radiated signal is carried out by NTV and related staff, however for stations located in isolated areas, monitoring should be entrusted to some person, such as a responsible person in the CVC etc.

CHAPTER 5. BUILDING CONSTRUCTION PLAN

5-1. Basic Concept

The experimental TV broadcasting in the Kingdom of Nepal, which was commenced on December 29th, 1985, is conducted with temporary facilities prepared on the top floor of the 4-storied joint government office located on the front side in Singha Durbar, the governmental office area at the centre of Kathmandu. An office room is remodelled to TV studio and TV broadcasting equipment are located there. TV transmitters and antenna are installed temporarily within the premises of NTC's microwave repeater station.

Therefore, construction of TV broadcasting buildings and facilities for NTV's exclusive use are required before starting the full-scale TV broadcasting services based on the development plan of television network now under consideration.

It is especially required to build a TV broadcasting centre which will form the core of the broadcasting complex. The broadcasting centre is a central facility for producing programmes and a nucleus for the operation and management of the business. It will act as the key station of the nationwide television network. The broadcasting centre is indispensable for the development of television network and includes the most important facilities and spaces for the purpose.

In addition to the broadcasting centre, it is necessary to construct facilities to send television signals such as transmitter stations and repeater stations, based on the station construction plan described in Chapter 4 .

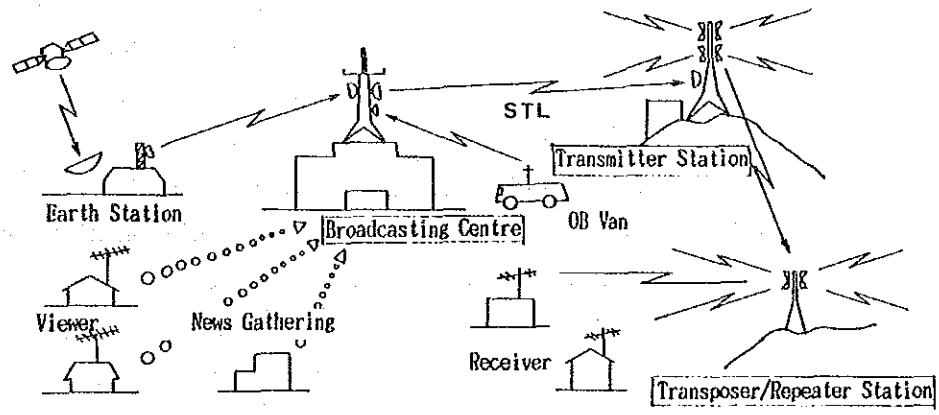


Fig. 3-5-1 Broadcasting centre and facilities

Since transmitter and repeater stations are located at points which can efficently send television signals and are free from obstacles to service areas, they are often preferably built on mountain and hill tops. This project intends to construct a transmitter station on the summit of Mt. Phulchowki, located to the south-east of Kathmandu, and to arrange repeater station on mountains, hills, and ridges which are effective for covering the respective service areas concerned.

As described previously, this development plan of television network requires three types of facilities, namely, a TV broadcasting centre, transmitter and repeater stations. However, the broadcasting centre and transmitter and repeater facilities are intrinsically different from each other and cannot be treated in the same manner. The broadcasting centre, which is composed of spaces possessing a large variety of functions, is a composite building containing TV studios, which are very particular spaces from an architectural viewpoint, and it will be constructed in an urban area. On the other hand, transmitter and repeater stations are buildings possessing relatively simple functions of sending or relaying electric waves, and are equipped with receiving and transmitting antennas and other equipment. They are generally built on the top of hills or mountains outside the towns.

When viewed from the standpoint of architectural design, there are essential differences between them. The broadcasting centre is composed of many specific rooms and space where lots of people engage in a great variety of activities. It will be sometimes necessary to receive outsiders, including performers and visitors. When making a construction plan, emphasis should be laid on living comforts and superiority in design, in addition to functional merits. For the broadcasting centre will be constructed at the centre of the important area in the City and be a symbol of the broadcasting business for the future. In constructing it, surrounding environment and urban environment must be taken into consideration, and devices and design must be those which make the building always familiar to people over a long period. But the transmitter and repeater stations, where a limited number of persons institute special inspections and maintenance, should be built so as to fulfill their required functions. That is, the basic concept for these stations will be founded on functional merits, workability, and economic merits.

Nepal commenced TV broadcasting about 30 years later than the advanced countries did. Broadcasting technology has made striking progress during this period and continues rapid development day by day. It will be very important, though very difficult under these circumstances, for NTV to give clear and accurate functions to the broadcasting centre and other buildings which will form the core of TV broadcasting in Nepal and to deal with changes in hardware and software. The construction plan, therefore, needs to have the maximum "flexibility" in its floor plan, structural plan, and facility plan. The term "flexibility" means a floor plan which facilitates future improvements, remodelling and changes in partitioning as far as possible for the inside of the buildings, and a layout and a structural plan which facilitate the construction of possible additions and partial revision of the buildings in the future for the outside of them.

For a composite building like the broadcasting centre, floor area tends to be excessively large, with more space for diversified functions to be contained therein and possible expansion in the future. To pursue the ideal for the TV broadcasting centre maybe one thing, but the construction plan should be of an appropriate scale, neither too small nor too large, in view of the present state of the Kingdom of Nepal.

Buildings for TV broadcasting should be superior to ordinary buildings in respect of their properties of earthquake and wind proofing, and fire resistance. The broadcasting centre contains vast spaces, like studios and scenery stores. One of the essential points of the construction plan will be how to handle such spaces. Studios require high sound insulation and consequently thick walls to surround them, often causing increased rigidity. Methods to enhance the rigidity of surrounding portions will be required to keep in equilibrium with it. Composite buildings which contain diversified functions should be simple in shape and construction, which will offer higher flexibility for the future.

Construction of transmitter and transposer stations must be stronger than ordinary buildings. Since they are often constructed on slopes or on hill tops, sufficient retaining walls and sheeting work are necessary to prevent the occurrence of landslides which may otherwise be caused by the filling and cutting of earth when levelling the construction sites.

5-2. Sites and Surrounding Conditions

(1) Broadcasting centre

There are three proposed sites for the construction of the broadcasting centre. The below-mentioned points should be taken into account when evaluating which is most appropriate.

(a) The site should be placed near the centre of the city and be easy to access.

(b) At least two sides of the site should face roads with sufficient width to facilitate access of vehicles, people, and materials.

(c) The site should have sufficient area for the expansion of buildings which may be required in the future.

(d) In the vicinity of the site there should be no sources of loud noises or strong vibrations.

(e) The site should be equipped with urban facilities such as power supply, telephone, water supply, and sewerage system.

(f) The site should be flat and well-drained and on solid ground.

(g) The site should allow construction of communications tower for use of FPU and STL.

(h) The site should be well guarded.

1) Proposed Site I

Site-I is located in the central government office area called Singha Durbar in the centre of Kathmandu and at the eastern end along the axial line from the front gate. In front of the gate, along the above-mentioned axial line, is situated the joint government office in which the present experimental broadcasting facilities are located. At its rear side are construction sites for offices of the Ministries of Defense and of Water Resources, followed by those of the Ministries of Panchayat and Local Development and Home.

This construction site under plan is located on the east side adjacent thereto.

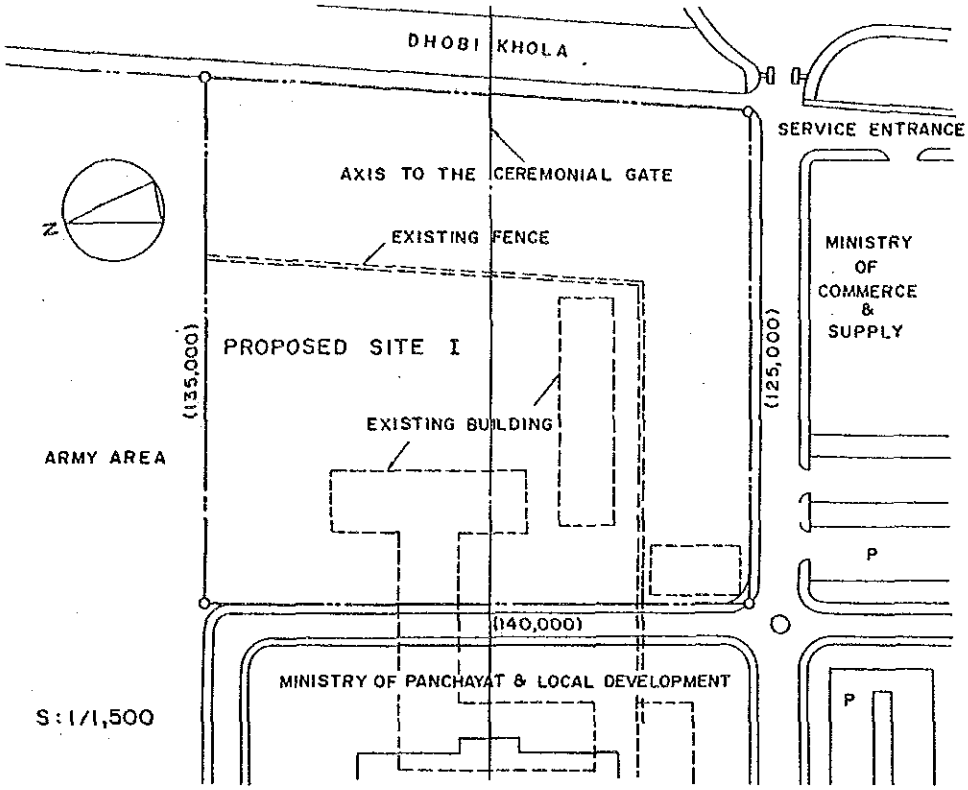


Fig. 3-5-2 Plan of Site-I

The site is about 130m from east to west and 140m from south to north and has a sufficiently vast area of 18,000 m^2 (1.8 ha).

Singha Durbar is surrounded with solid fencing, and gates are provided at necessary points where the authorities check passers-by. This is one of the safest areas in Kathmandu.

Military lodgings, the Master Plan Office of Singha Durbar, and a building belonging to the Telecommunication are located within this site. Selecting this site calls for removal of these buildings. The portion of the site about 30m wide from its eastern boundary is used for paddy fields, so it is necessary to fill them up to the height of the surrounding ground before construction of any buildings. There is a stream outside the east boundary of the site. This fact should be taken into consideration when determining the height of the floor of buildings to be constructed.

2) Proposed Site-II

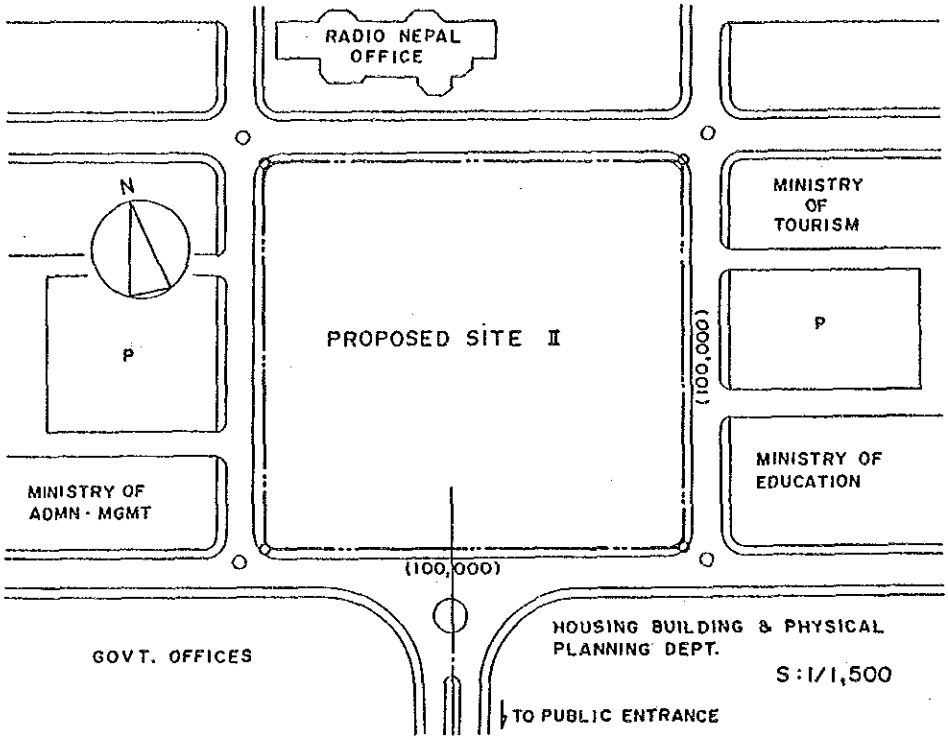


Fig. 3-5-3 Plan of Site-II

This site is also located within the Singha Durbar area and is a square-shaped land of 100m x 100m (with an area of 10,000 m^2) on the south of the Radio Nepal office. A south gate for Singha Durbar is planned to be built on the front side facing to the south.

Military barracks are built in this site, and the land has not been prepared as a housing lot.

Although this site is suitable for a building of 4,000 to 5,000 m^2, which this project intends to build for the time being, there is no room for the future addition of buildings, no freedom to arrange the layout of the buildings, and in sufficient space for parking, thus lessening its suitability.

A master plan of Singha Durbar including the proposed sites I and II for the TV broadcasting centre is shown in Fig. 3-5-4.

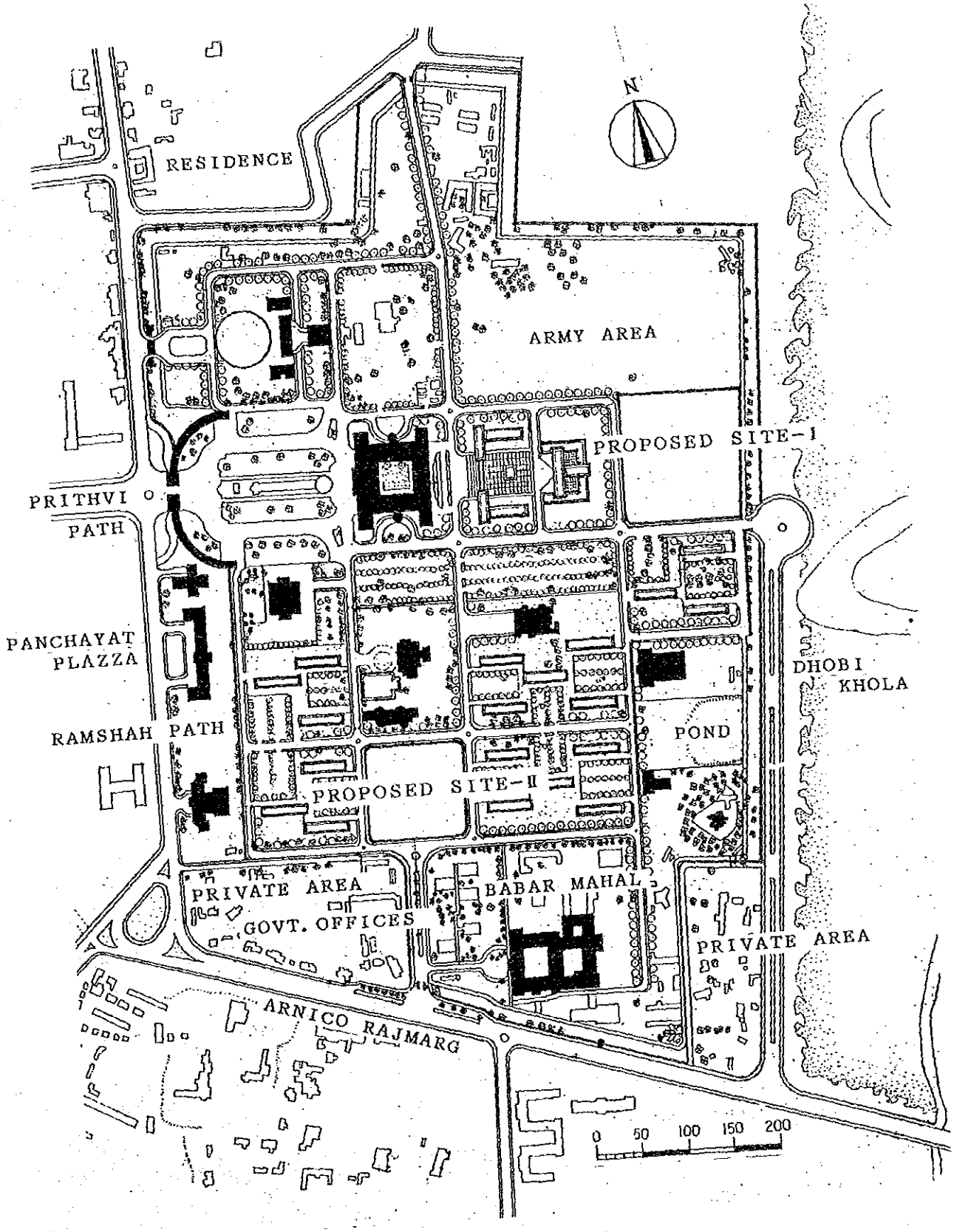


Fig. 3-5-4 Singha Durbar Site

3) Proposed site-III

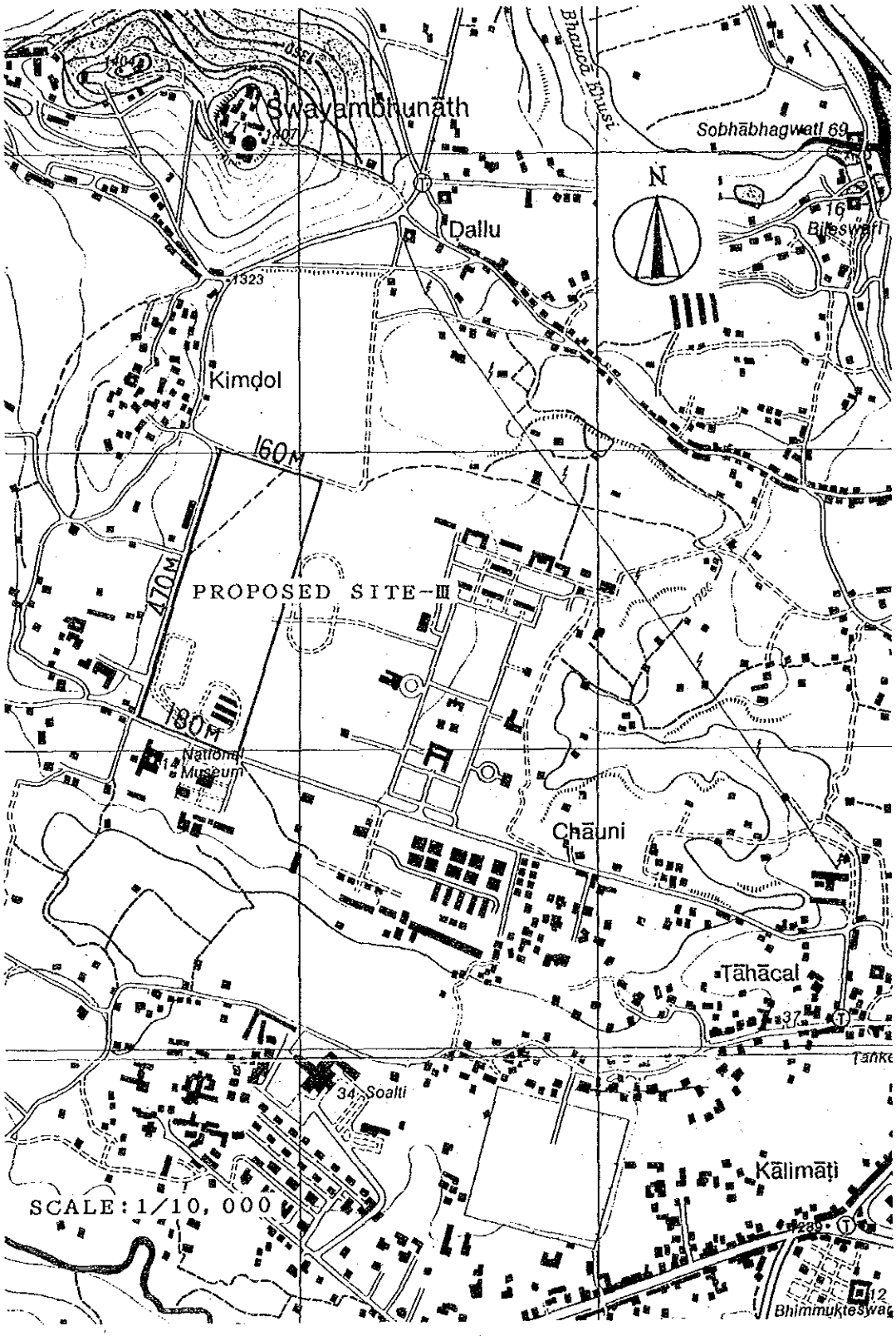


Fig. 3-5-5 Plan of Site-III

This is located 2 to 3 km west from the centre of Kathmandu and faces the National Museum. At about 1 km to the north is seen a gently sloped hill, where Swayambhunath temple is located.

This is a vast site of about 450m from south to north and about 170m from east to west, with a total area of about 80,000 m^2 (8 ha). In the eastern vicinity of the site are military facilities, and a part of this site is used for a stockyard for the facilities.

Although two sides of the site face roads, the site is lower than them. Drainage dampens it especially in the rainy season. It will be necessary, therefore, to reclaim a large part of the land prior to construction of the intended buildings.

This site is inferior in convenience and maintenance of security to the other two sites within the Singhar Durbar area

4) Comparison of proposed sites

Comparison on the fitness of the three proposed sites for the broadcasting centre was made with respect to various items such as convenience, safety, area of site, etc., and concluded that Site-1 is most appropriate. Boring test is necessary for soil analysis (Geological analysis) prior to building construction.

(Notes) For all the sites described above, it is necessary to conduct boring tests of the ground to survey their geological features prior to starting the execution of the Project of the broadcasting centre.

(2) Transmitter stations

Two transmitter stations will be built in Phulchowki and Jaleswar. The former is located on the summit of Mt. Phulchowki which is in the southeast of the mountains surrounding the Kathmandu Valley and has the highest altitude of 2,762m. The summit is very narrow and oblong from east to west, and the western half is taken up with communications facilities. The highest point in the centre of the summit is occupied with a small shrine, stupa, altar, and other religious facilities and is not available for the site of the transmitter station. The station will be constructed along the slope from southeast to

east. This proposed site is sparsely covered with high trees and mantled with bushes. The ground is a rock base.

There is an unpaved road about 4m wide to the summit of Mt. Phulchowki since the communications facilities have been constructed. But the road is paved up to the foot of mountain where the Botanical Garden exists and it takes approximately an hour by vehicle from Singha Durbar to the summit.

However, much care must be exercised in the rainy season, since the road is in a poor condition as a result of landslides and water flows.

As to the site of Jaleswar, it is expected in the west side of the city, and as the land is flat no problem should arize except in land acquisition.

(3) Transposer stations

The Development Project plans to construct sixteen (16) transposer stations, all of which are to be constructed on gently sloped hills near the plain area, at the foot of mountains or on their summits. Their accurate locations have to be determined, at the time of the B/D or D/D team visits. Since the repeater stations will inevitably be located on mountains or hills far from town, neither access roads nor power facilities are available at present. It will be necessary, therefore, to extend a new road from any existing one in the vicinity when constructing a repeater station. Specifications for such an access road may be those which are the minimum required for transporting construction materials and for conducting maintenance and inspections.

There may be difficulty in having power supplied to the construction sites, but power supply is one of the basic requirements for constructing transposer stations and must be secured as a top priority.

5-3. Construction Plan

(1) TV Broadcasting centre

What is required of the broadcasting centre so that it can offer the broadcasting services intended by NTV? It is vital to determine this matter first of all, since it is the starting point of the construction plan. The scale

and facilities necessary for the broadcasting centre will differ substantially depending upon broadcasting hours, contents of television programmes, and ratio of programmes to be produced there.

The area of each room will differ in accordance with its shape and locational relation with other rooms. Common space including corridors will differ slightly depending on types of floor plans. However, the scale of the broadcasting centre may be roughly estimated.

Based on the recognition that the broadcasting centre is a composite building which possesses different functions, a method has been adopted to compose the whole plan by classifying all the rooms into several groups by functions, objectives, and scales, and by grasping each group as a block.

It is possible to separate an office block and a studio block from each other. The office block includes the office rooms of the production departments, an office room for the management and administration department, and a data room. The studio block includes studios, studio control rooms, performers' rooms, and a scenery and properties store. In addition to these blocks, it is possible to group rooms related to broadcasting engineering equipment, with the main control room as a core in the block, and rooms related to construction equipment into another block. The locational relationship between rooms of the NTV Broadcasting Centre is illustrated as follows.

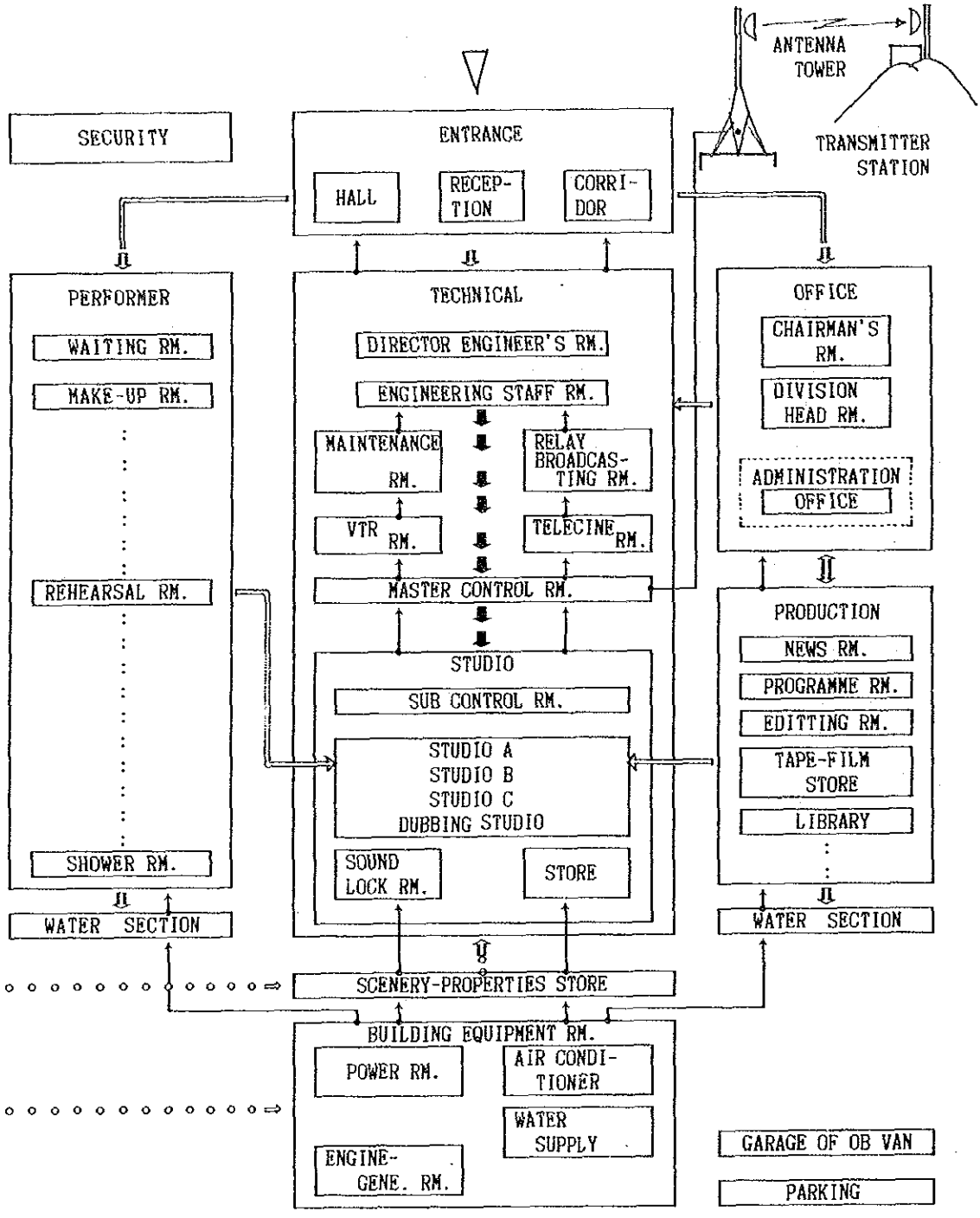


Fig. 3-5-6 Block diagram of the NTV Broadcasting Centre

For the whole plan, several patterns can be considered based on this concept of blocks. The patterns of broadcasting centre of the similar scale in the world are roughly classified as follows:

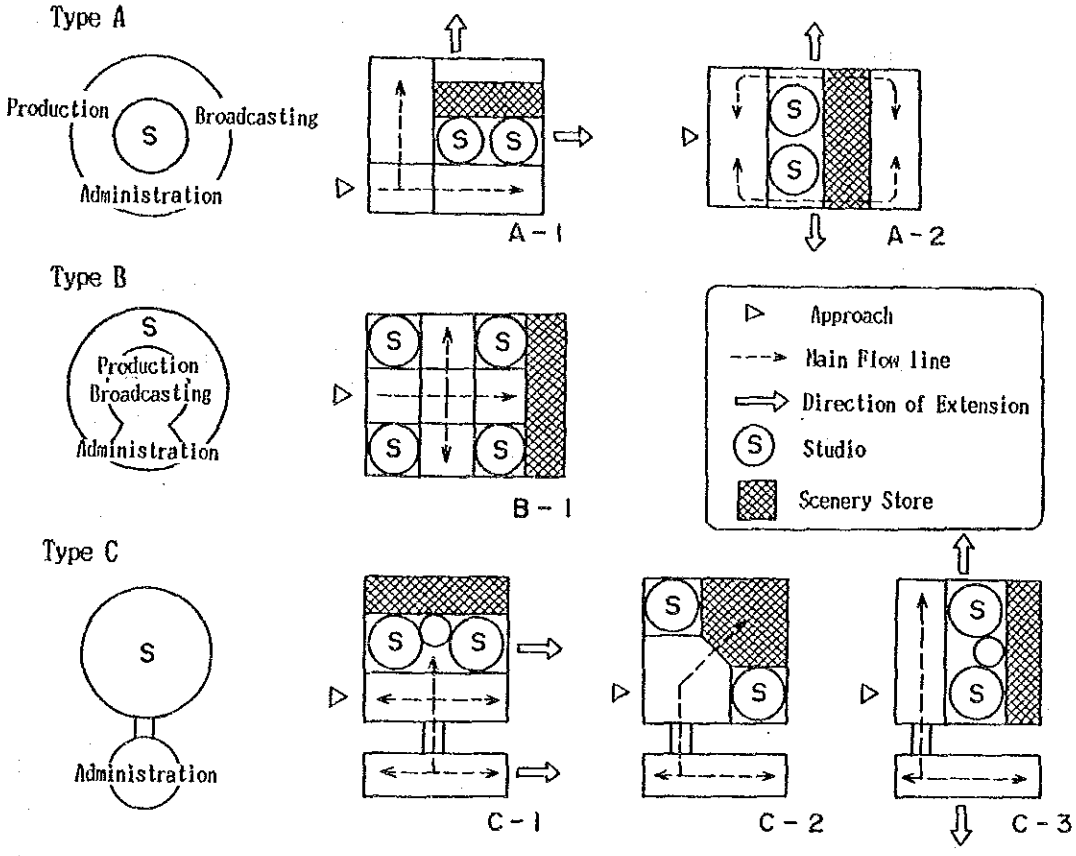


Fig. 3-5-7 Block patterns of broadcasting centres

When studying which pattern of block plans should be adopted, the following items should be taken into consideration:

1) The block plan is most suitable for the shape of an intended construction site, after taking into account sufficient area for a parking lot and room for future extension and modifications.

2) The block plan will meet possible requirements for extensions and modifications of facilities in the future.

3) It should be a plan easily divided into several construction periods so that construction may be effected step-by-step.

4) It arranges each block in a simple and functional manner and possesses a smooth line of flow for easy understanding.

Judging from the above-mentioned items, the pattern C-3 in Type C in Fig 3-5-7 is presumed to be best for the Project. Assuming the block diagram in Fig. 3-5-6 is applied to the pattern C-3, a typical example of the NTV block plan will be as shown in Fig. 3-5-8.

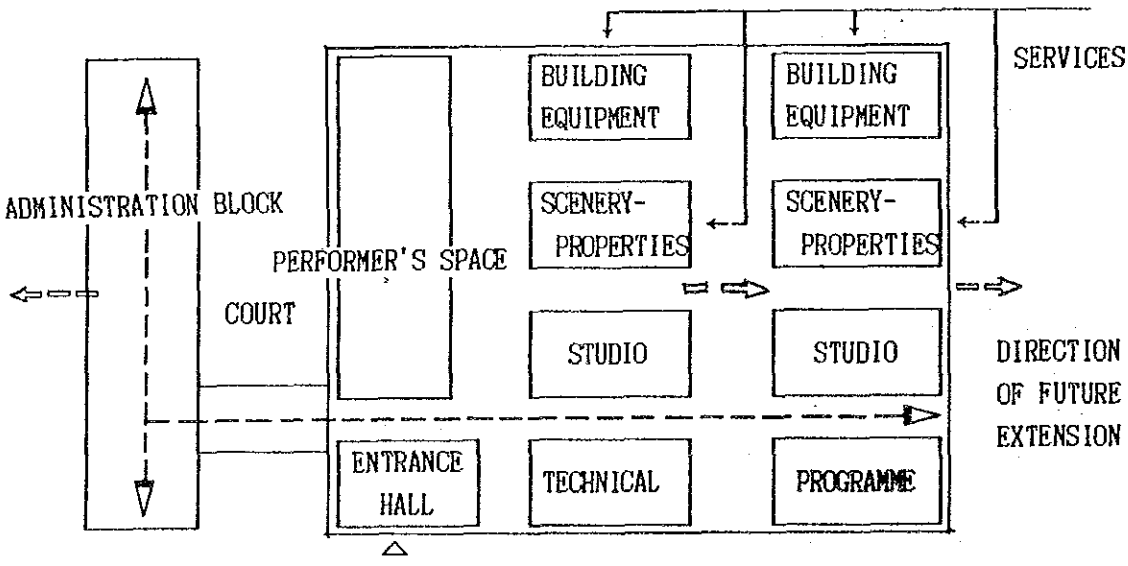


Fig. 3-5-8 Block pattern of NTV

The above-mentioned division into blocks and block plans forms a rough sketch of the whole Project. Now, the points to which importance must be attached, in considering functional, line-of-flow, and structural correlationship among blocks, and floor plan of rooms in each block, are listed below:

1) The space should have a structure that contributes to the production of higher-quality programmes.
2) The space and the environment should be comfortable for people working there.
3) Each room should be wide and the whole should be appropriate in scale.
4) Flows of persons, materials, and vehicles should be smooth and easy to understand.
5) The plan should be convenient for daily maintenance and suitable for economical maintenance and management.
6) Care must be exercised as to the arrangement of partitioning walls and structures so that remodelling and modifications of interiors may be effected as a result of technical progress in the future.
7) Care must be exercised as to the locational relation between air-conditioning and utilities rooms, which may generate noises and vibrations, and those rooms which are sensitive to noises, such as studios.

The structural features of the TV broadcasting centre are as follows:

- The building should be one- or two-storied.
- The centre contains those portions which require thick, sound-proof walls and those which do not require walls to ensure flexibility for the future.
- It contains large hollow spaces such as studio etc.
- It should have a durable structure which may hardly be deformed by an earthquake.

Therefore, it will be suitable for the TV broadcasting centre to have a rigid-frame structure with reinforced concrete.

The structural style of the building should be dynamically simple. Since a rectangular rigid-frame structure assures accurate grasping of the structural characteristics which may be clearly estimated in secondary design, it may be said to be an appropriate structural style.

The structure should be as rigid as possible and well-balanced, as a whole, by exercising due care in arranging earthquake-resisting walls in an appropriate manner.

The internal rooms should be designed to give priority to the functional merits and living comforts and should be neat and well controlled rather than competing in splendor. The external view of the building is the face of NTV and the symbol of the TV broadcasting business in the future. So, an attempt to add the beauty of formative arts to it will be necessary.

However, meeting the functional demands of broadcasting is the most important task for the broadcasting centre. So, more attention should be paid to this point rather than to the formative beauty.

The NTV broadcasting centre will be constructed in the climate of Nepal and should be a broadcasting complex which must become familiar to the Nepalese forever together with NTV. Therefore, many of the design motifs, construction materials, and construction methods, brought up to date, in the climate, culture, and traditions of Nepal should be employed, applied, and utilized so that the centre may be most appropriate to the Nepalese nationality and environmental features.

The broadcasting centre requires a tower which will be used for mounting STL antennas for transmission of programmes to the transmitter station and other communication antennas. The tower should be installed on the roof of the broadcasting centre building, judging from the viewpoints of effective use of the land, assurance of required height above the ground level, and construction costs. Special attention should be paid to harmonizing its design with the environment, since it will be outstanding in the scenes of the city.

Three plans are presented here which are all based on the aforementioned general concepts but are three different ideas.

1) Plan A

This is a plan to arrange an office building, a building with 65 m^2 and a 200 m^2 studios as cores, and a building with a 300 m^2 studio as a core at certain intervals along an axial line. Since the buildings are separated from

each other at a certain distance, it is easy to construct respective buildings one after another.

Independent roofing will make it possible to employ a pyramidal roof or other inclined roofs. Since this plan includes a considerable space between adjacent buildings, however, this plan is not suitable to site II.

Since the buildings are arranged in a scattered style, the line of flow becomes longer and the area of external walls is larger, resulting in a higher construction cost. The office building and the studio buildings are partially two-storied. The total floor area will be approximately 6,000 m^2.

2) Plan B

The basic idea of Plan B is generally the same as that of Plan A, but the distance between blocks is reduced to an extent that the whole centre may look as if it were a single building. If step-by-step construction is required, it is possible to construct each building independently, with the external walls adjacent to each other. As in Plan A, the office and the studio buildings are partially two-storied, the total floor area being 4,700 m^2 which is considered appropriate in scale.

3) Plan C

This is a plan to make the whole area as compact as possible by making use of space in a three-dimensional manner. If step-by-step construction is required, necessary parts should be structurally separated, but they should be adjacent to each other on walls. All the buildings should be two-storied, except studios and other rooms which require high ceilings, thereby making full use of the available space. As in Plan B, it is difficult to adopt an inclined roof. The total floor area is about 4,300 m^2.

4) Evaluation of the plans of building

Study of the arrangement of the building complex within the proposed site-1 produced the conclusion that plan-B is most appropriate for providing good environmental conditions, such as sufficient space in the periphery to ensure enough parking space and an appropriate distance from the road. Furthermore, the site is placed just on the centre axis from the front gate,

extending to the east direction, and a symmetrical allocation of buildings relative to the site is possible. From the viewpoint of total floor area, plan-B would be the best and most reasonable in terms of scale i.e., neither too large nor too small.

(2) Transmitter station

Since the intended construction site on Mt. Pulchowki is accessible to vehicles for transporting construction materials and workers, a construction plan is made by referring to the popular construction methods prevailing in Nepal, using bricks on the external walls of a reinforced concrete building. The plan view which is very simple includes only a transmitter room and a power source room.

Since the transmitter station will be a manned station, a lodging house for staff members is required. In the case of Mt. Phulchowki, since both the transmitter station and the lodging house are to be constructed along the slope near the summit, the foundation of the buildings should be solidified by using tough retaining walls so that no calamities will ever occur.

(3) Transposer and relay stations

The transposer and relay stations are almost the same as the transmitter stations in terms of the plan view. However, most of the stations are to be constructed in mountains and will be unmanned. As the intended construction sites are not provided with power supplies and access roads, it is recommended that a prefabricated building, whose construction parts are easy to transport and which requires minimum work at sites should be introduced. However, concrete work will be necessary at the sites for the foundation.

5-4. Facilities Plan

(1) TV broadcasting centre

The required electric installations in the broadcasting centre include power sources in general such as those for the transmitter, electric lamps, special illumination, outlets, and other power supplies. Pipings for broadcasting equipment and communications and liaison facilities are also required. A no-

break power unit and non-interruption power supply are required in addition to receiving and distributing equipment. The electric power system of the broadcasting centre will be diversified and complicated.

Water supply and sewerage facilities are hardly different from those in ordinary buildings, except with respect to sound and vibration resisting measures for studios and other rooms. It is preferable that water supply and sewerage facilities should be provided for some studios for the purpose of enhancing stage effects in educational, cooking, and other programmes.

The ventilation system requires careful consideration for the whole centre. Independent ventilation facilities are sometimes required in the engine-generator room, studios, scenery and properties store, maintenance room, workshops, and toilets in addition to water closets, hot water supply rooms, and shower rooms. Air-conditioning facilities are inevitable in studios, studio control rooms, the master control room, and other broadcasting equipment rooms.

It must be studied whether or not air-conditioning facilities are required in the store rooms for tapes, VTR's, and films, some part of the office rooms, performers' rooms, waiting rooms, and lobbies. Due care should be exercised in determining the composition of systems since rooms in the broadcasting centre have different loads and different utilization times, according to use.

Since the broadcsting centre is one of the most vital facilities in the nation, the buildings should be fully resistant against any type of possible accidents. As measures against fire are to some extent technically practical it is necessary to study the provision of facilities such as sprinklers, hydrants, and fire alarms in addition to architectural measures.

(2) Transmitter station

Ventilating facilities are indispensable for a transmitter station since it is necessary to keep the station interior within the allowable temperature range so that the transmitting equipment may function in the correct manner. Some transmitter stations whose service area is vast should be provided with a diesel engine generator as an emergency power source to ensure their important role.

(3) Transposer and relay stations

The transposer and relay stations are in principle an unmanned operation system. No construction facilities should be provided for the stations except illumination and power outlet facilities which are required for maintenance and inspection services. A construction plan should be made to allow natural ventilation for the transposer and relay equipment room rather than relying upon mechanical ventilation systems.

5-5. Laws and Regulations for Building

With reference to applied laws and regulations, standards, and rules the Kingdom of Nepal does not have established laws and regulations which correspond to the Building Standards Act and the Town Planning and Zoning Act of Japan. Laws for the construction industry and construction work include the Industrial Enterprise Act, 1987 and the Company Act, 1964, but they do not stipulate regulations or standards on construction. To industrial standards of construction materials, ISI (Indian Standards) and BS (British Standards) are applied.

As there are no specific rules and regulations established for constructing buildings, designing must be carefully done after due consideration of the surrounding environment and conditions of the location. A certain level must be maintained in engineering, including the structure, applying BS or, if necessary, the Building Standards Act of JIS (Japanese Industrial Standards) of Japan.

CHAPTER 6. MANAGEMENT AND OPERATION PLAN

6-1. Organizational Structure of Broadcasting

As explained previously in Part II, the present organization of NTV and its functions can be roughly classified as in the following:

1)	Programme division	Programme proposals, mainly programme producing in studio and outside.
2)	News division	News and overseas programmes.
3)	Engineering division	Programme production in studio, related to engineering, transmission, and maintenance of studio facilities.
4)	Administration division	Long-term development plan, personnel, general affairs and others.
5)	Finance division	Finance, budget, purchasing etc.
6)	Business section	Market research, advertisements
7)	Research section	Survey on the opinion of viewers
8)	Advisors	Studio consultant
9)	Visual archives	Cassette library

Present organizational structure of NTV has been reasonably established already and functioning very well, however in view of the future expansion and development in terms of scale, expansion of the organization will be necessary. Accordingly, it is necessary to analyze the present state of broadcasting in order to expand functionally without any difficulty.

Meanwhile, a general view of the expansion plan of television broadcasting by each phase is given in Table 3-6-1.

Table 3-6-1 Expansion of broadcasting

Phase	Studio	Network	Regional
First, Second	Kathmandu Studio	Mainly Eastern terai	Correspondent Office
Third, Fourth	Office Building	Mainly Western terai, Pokhara	〃
After Fourth	2nd Programme		Regional Broadcasting Station

NTV has to establish the basic concept for the whole development plan in an early stage, in order to cope with the future increase in facilities and equipment without any trouble. These include an extension of the organizational structure, especially the deployment of a correspondence office to deal with local news, etc., which will contribute to the promotion of the development of regional society, and furthermore the up-grading of services, such as the construction of small power transposer stations throughout the country, and the commencement of a second programme service which is expected to be introduced after the 4th Phase.

As depicted in Fig.3-6-1, the whole organizational structure of NTV in the future (after the fourth phase) will be associated with branch broadcasting stations in Biratnagar, (or Dhankuta) Janakpur, Bhairahawa, Pokhara, Nepalganj (or Surket) and Dipayal.

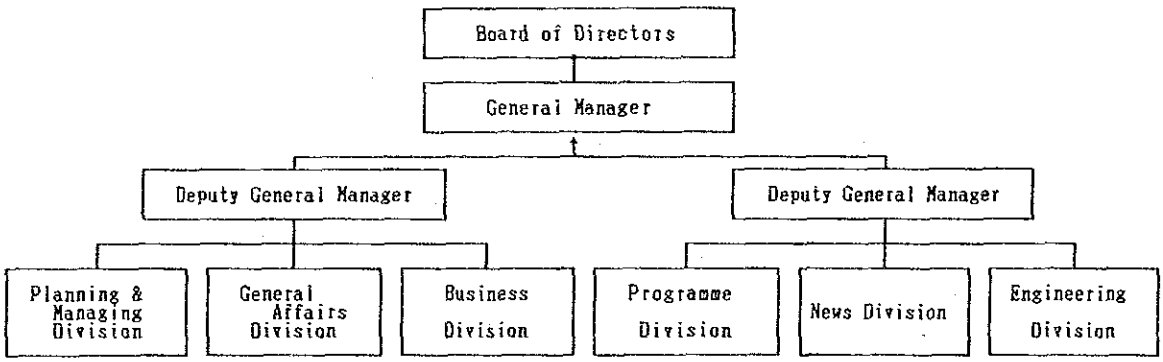


Fig. 3-6-1 NTV's organizational structure in the future

These stations will start at first as correspondent offices, and depending on the completion of the programme transmission line, the function of these stations will be strengthened and correspondent offices will be constructed in Baratpur and Mahendranagar, in the third phase. (In Birganji and Biratnagar, correspondent offices have been already opened.)

Accordingly, referring to the contents of the long-term plan, the methods of extensively improving the organizational structure should be taken into consideration.

Generally, in organizing the structure, consideration should be paid at first to the composition of management /administration.

The activities category of the present administration division in broadcasting is wide enough, covering the long-term programming plan, broadcast facilities,

finance, employees, secretaries and so on. Furthermore, at the time of the completion of the new broadcasting centre, it is required to take charge of the management of increasing activities such as building administration, air-conditioners, telephones, security, and many other matters that do not belong to any other division.

Accordingly, it is concluded that the most effective way will be to divide thoroughly the present administration into the following two sections: one is the general affairs division and the other is the administration division.

Concerning the tasks of the new administration division, it is expected to support the activity of broadcasting as a whole; the broadcasting section will be in charge of long-term programme planning, audience research, and other items concerned, and the engineering section will deal with the facilities plan, construction, maintenance of regional translator stations, and so on. In this sense, it is expected that the organizational structure will be reconstructed as shown in Fig 3-6-2.

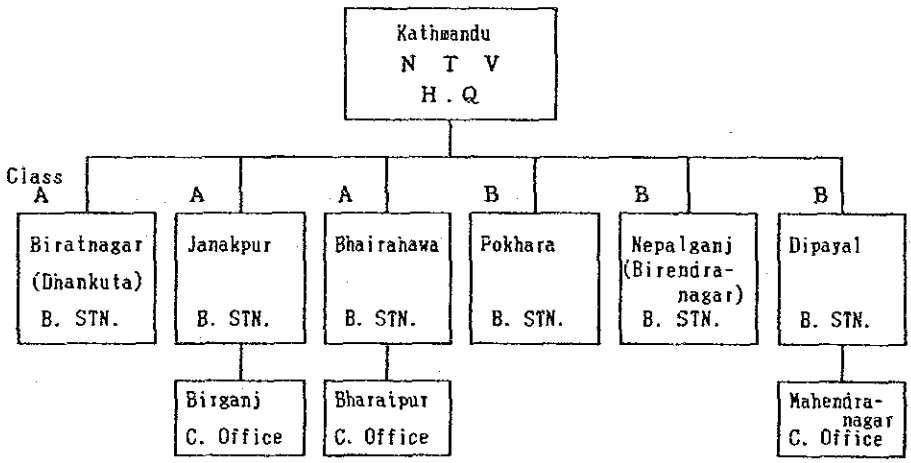


Fig. 3-6-1 An example of the organizational structure

Concerning the finance section, it is included within the general affairs division, and after the 2nd phase its position should preferably be reconsidered.

In the following, an outline of the role of each division is explained to clarify the organizational structure and activities.

6-2. Organizational Structure and Activity

The activity of broadcasting can be roughly classified as shown in Table 3-6-2. At the initial stage of the development of broadcasting, it is necessary to replenish the administration division in order to promote the improvement of programming and its composition in addition to the construction and facilities plans.

Table 3-6-2. Activity categories of broadcasting

	Management	Programme	Engineering	General affairs & Finance	Business
Administration	Management (Incl. Future plan)	Programming plan	Engineering plan Construction	Finance Budget Planning	Commercial plan
Practical Business	Management	Production Transmission	Production Transmission Broadcasting	Staff Mgt. Training	CM. production Sales
Auxiliary Task	Viewer Service	Prog. library Audience service	Maintenance C V C	Welfare Salary	Client Service

And, needless to say, the broadcasting divisions which take charge of routine programme production and transmission, have to extend their roles to meet with the future increase in broadcasting programmes and facilities. Furthermore, other services such as custody of taped programmes, audience services, maintenance of translator stations, correspondent offices, CVCs etc., will become necessary.

In the following, the role of each division is generally considered.

(1) Administration Division.

The activity category of the administration division can be roughly classified as shown in Table 3-6-2. The management section takes charge in the fields of the general management plan, programme screening, auditing, copyright, law and viewer services, the programme section, long-term programme plan, and programme composition: the engineering section deals with long-term construction and facilities plans, maintenance, and CVC services.

Table 3-6-3. Activity of Planning and Management Division

Section	Layout of Business
Management	Business, budget, prog. screening, management plan, law, copyright, audience services, international relations
Programme	Prog. long-term plan etc.
Planning	Long-term plan, facility plan
Facility	Construction, improvement, CVC etc.

(2) General Affairs Division

Activity of General Affairs Division is shown in Table 3-6-4.

Table 3-6-4 Activity of General Affairs Division

Section	Layout of Activities
Secretary	Secretarial services
Staff	Staff management, training, organization, welfare, salaries, etc.
Labour	Duty control, labour union, etc.
Building	Air conditionning, electricity, vehicles, buildings, telephones, etc.
General affairs	Other matters, general affairs
Finance	Finance
Fund	Fund control, gov. subsidy and investment, payment, advertisements
Purchase	Purchases, orders
Audit	Audit (internal, external)

(3) Programme Division.

Activity categories of the programme division is shown in Table 3-4-6.
In order to make effective use of studios and facilities, which are limited in number and in useable time, a centralized assignment of them should be considered.
Programming section should take charge of the assignment and determination of the programme schedule.
Programme production section engages in daily programme production, post-production, and monitoring of broadcasting.
Studio service section is responsible for programme design such as art work, effects, costumes, scenery, etc.
Library section engages in the arrangement of information materials, visual and sound materials, and so on.

Table 3-6-5 Activity of Programme Division.

Section	Layout of Business	Staff
Programme	Programme plan & proposition, programme schedule, studio control, tape control, equipment assignment	Broadcasting Control
Production	Programme production (incl. outdoor, relay)	Producer Cameraman Announcer
Studio service	Programme design, effect, art, scenery	Producer Artist Carpenter
Library	Information material, visual, audio material*	Librarian

* Incl. Visual archives etc.

(4) News Division.

News section gathers the news, weather information, political,economic and social news related to almost all of the events in the society and broadcasts the news programme.

Overseas section is in charge of gathering foreign news, its commentary service, transmission of news and other programmes from Nepal to foreign destinations, and vice versa.

Table 3-6-6. Activity of News Division.

Section	Layout of Business	Staff
News	News gathering, editing, commentary, weather, infomation gathering	Cameraman Newswriter Reporter Editor
Overseas	Programme exchange via satellite, broadcasting, news gathering, commentary	Interpreter Editor Reporter

(5) Engineering Division

Programme production section is responsible for routine programme production in the studio, and transmission section, programme continuity, transmission and programme relay, etc., which are included in the subsidiary section of master control.

Transmitting section is responsible for the operation of transmitter facilities. Maintenance section is in charge of the maintenance of studio facilities except for insignificant failures.

Table 3-6-7. Activity of Engineering Division

Section	Layout of Business	Staff
Programme production	Studio programme production, editing, O.B.Van service	VE, TD, Light man, Cameraman, SE
Tranmission	Master control, continuity, transmission, relay	Operator
Broadcasting	Operation & maintenance of TX. station	
Equipment maintenance	Maintenance of studio facilities	

(6) Business Division

Activity of Business Division is shown in Table 3-6-8.

Table 3-6-8 Activity of Business Division

Section	Layout of Business
Market	Commercial arrangement, production
Sales	Market research, order acceptances
Client	Client services

6-3. Basic Policy on Programming and Operation.

(1) Basic policy on programming

Referring to the fundamental concept underlying the establishment of NTV, programming and the contents are basically determined based on the agreement of the Board of Directors. Accordingly, NTV's programme are made reasonably so as to reflect the opinions of the Government, public organizations, social communities, and viewers under the democratic procedure.

Programme committee consisting of the Director of NTV and the persons in charge of programming, shall formulate the whole programme plan to submit to the Board of Directors, and after the conclusion is reached on the policy of programming, it will be reflected in the programming and its composition, through the meeting within NTV. Then, after the screening of the programme contents, programmes are produced and broadcast.

Concerning the social response to broadcast programmes, the opinions of viewers and regional programme committees are reflected in each programme section, and the process makes democratic operation of broadcasting possible. General procedure of programming is shown in Fig. 3-6-3.

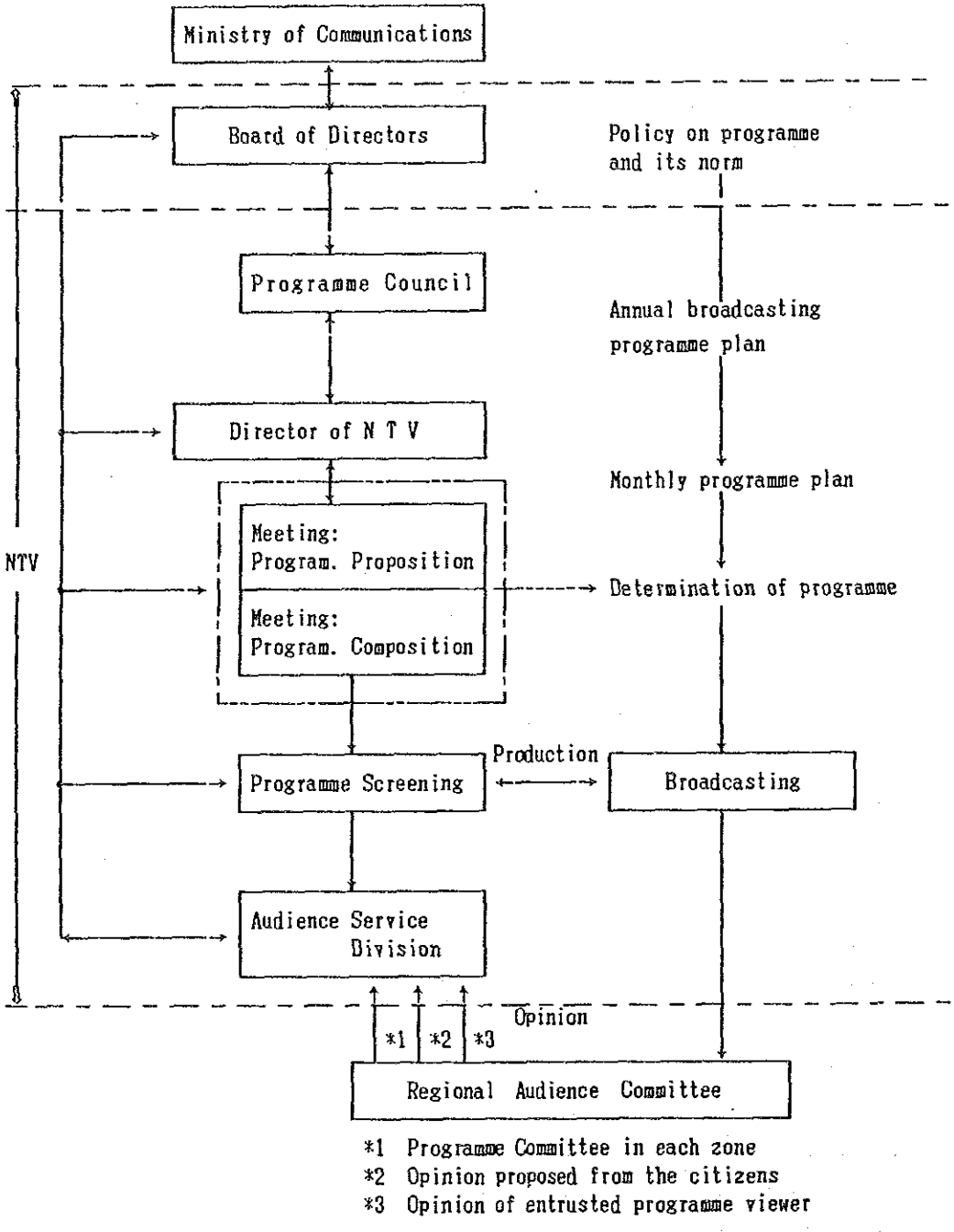


Fig. 3-6-3 Flow Chart of programme determination

(2) Programme production.

Programme production in the studio is conducted with two shifts, except for outside programme production. Programme producing processes are quite different depending on the types of programmes and their composition. Programme production is smoothly processed with the collaborative work of the staff engaged, and mutual cooperation is indispensably required. Classification of programmes is roughly given in the following:

1) News programme	:	News and commentary etc.
2) Outside broadcast	:	Programme shooting at the site of event.
3) Talk programme	:	Education, discussion, etc.
4) Drama	:	Complicated to produce, and requires many provisions.

A typical job flow of programme production for a taped material insertion programme is shown in Fig.3-6-3.

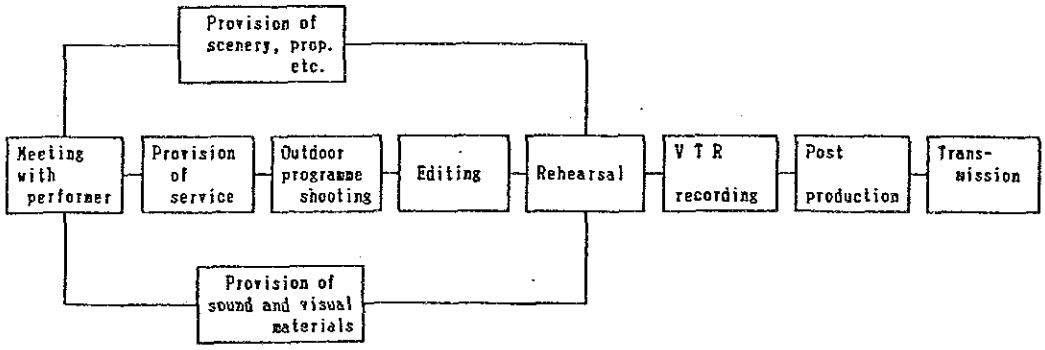
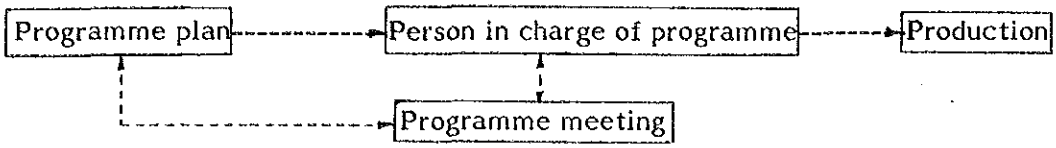


Fig. 3-6-4. An example of programme production

(3) Programme production system

Programme production is conducted with different conceptions and procedures according to each programme. For example, in a small scale programme, the following procedure is taken.



However, in the case of a school programme which is required to consider its effectiveness on education and to reflect the wishes of teachers, the opinions of many persons, must be taken into account and other investigations should be further made.

Furthermore, in the case of a drama programme, detailed discussion and provisions are necessary as a whole. In addition, special effects and arrangements, for insertion of an outdoor shot scene, will result in a complicated production system. In Fig. 3-6-4, the concept of the supporting system for programme production is depicted.

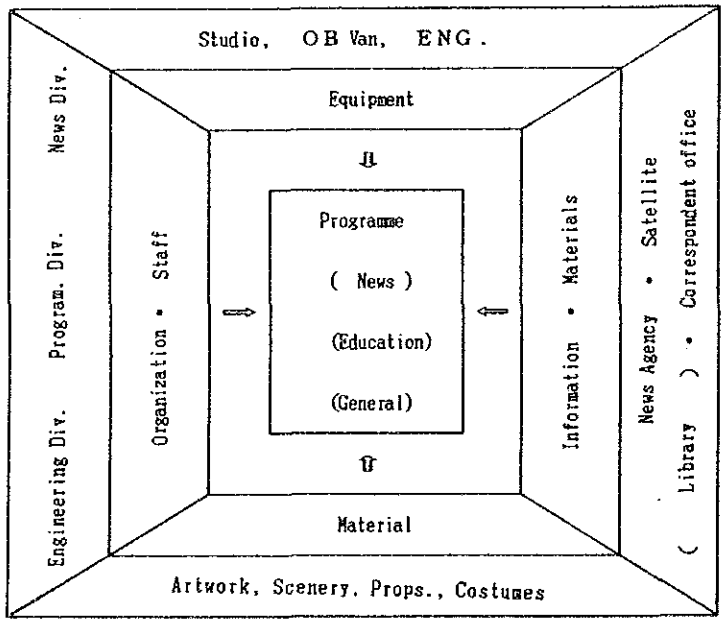


Fig. 3-6-5 Support scheme for programme production

(4) Operational management of programme production, (mainly for studios).

For routine programme production, operational management, assignment of VTRs, studios, and other equipment is made under the control of exclusively appointed persons. The reason is that all the facilities and equipment, including studios, are to be left under the unified control and assignment system in order to use them effectively. In the end the following administration is required.

1)	Studio	Facility assignment, operations, disaster prevention, arrangements of good conditions.
2)	Material	Take in and out materials, custody
3)	Equipment	Preparation, confirmation of functions, etc.
4)	Personnel	Performer, inspector, employee
5)	Others	Acceptance of raw material and so on

(5) News-gathering and transmission/transportation

1) News-gathering

In order to establish the system for news-gathering domestically and abroad and also for the exchange of news, provisions for news-gathering have to be introduced such as

a) News-gathering from public organizations
b) Deployment of correspondent offices
c) Establishment of an Overseas bureau
d) Cooperation and agreement for programme exchange among foreign broadcasters
e) Programme and news exchange among Asiavision affilitates via satellite
f) Information exchange by telex or facsimile

The project has been mainly planned based on items a), b), e) and f), due to financial limitations.

Item a) is mainly conducted with ENG and OB Van,

Item b) intends to distribute ENG equipment to some correspondent offices and taped programmes are sent by mail, and

Item c) is conducted by the construction of microwave link between the broadcasting centre and an earth station

(6) Custody of recorded tapes

Custody of recorded tapes and taped programmes broadcast is a very important task for the broadcaster, and the procedure for making a responsible system should be standardized with due consideration.

Some of the recorded and important programmes are stored fully or partially as reference materials. Some are repeatedly used and special care should be taken for keeping them in storage.

Operation of the library includes the custody of other materials such as record disks, photographs, information on personnel and society, newspapers and magazines, which are very important for the quality of programmes. A retrieval system has to be established from the beginning so as not to cause any confusion in the future.

6-4. Technical Operation

(1) Operation

Daily operation of NTV's programme transmission is made with two shifts. There are no special features in the routine business of technical operation, however without the establishment of a well arranged operation system, there is a possibility of introducing large mistakes. The main activity of the operation section is as follows.

1) Programme transmission, switching of resources such as studios, VTRs etc.

2) Supporting jobs for keeping continuity of transmission (Outdoor picture shooting and others)

3) Assisting programme production

4) Administration work for broadcasting

5) Recording, playback, dubbing, and standards conversion

6) Equipment assignment

7) Communication/liaison within and between stations and others, such as NTC or earth station, etc.

8) Countermeasures against failures

9) Provisional arrangements and maintenance of equipment

10) Delegation of tasks among staff

(2) Transmitting

TV transmitter station in Pulchowki is operated with 2 shifts of two technicians and the station is required to train the staff on the job in order to educate them as experts.

All transposer stations are in principle operated unattended and periodical maintenance is conducted in collaboration with the staff of the Planning and Managing Division and the staff of Pulchowki transmitter station. As for the reporting of failures at unmanned stations, supervisory jobs shall be entrusted to persons living within the service area.

(3) Maintenance

As indicated in Fig. 3-6-6, all the equipment used for (1) programme production, (2) post-production, (3) transmission, (4) broadcasting, and temporarily (5) CVCs is under the responsibility of the maintenance section. Insignificant failures belonging to (1)-(4) have to be repaired in each engineering section. However for comparatively serious failures, they should be repaired with the assistance of the maintenance section (Workshop).

Accordingly, in order to effectively cope with the failures of scattered stations and to maintain them, including CVCs, technical staff are deployed in some correspondent offices located in the important cities. Skillful engineers who have plenty of experience in every field of engineering shall be appointed in the maintenance section in Kathmandu, because they have to maintain all types of broadcasting equipment.

A summary of the above and the conclusions are as follows:

1) For the maintenance of broadcasting equipment, a workshop is organized and the maintenance and repaires of all equipment are made under the responsibility of this section. Necessary staff are three at the initial stage and finally five. Measuring equipment and other necessary tools, etc. are provided and supplied successively. These staff engaged in the workshop will act as a task force in the case of special eventualities.

2) As to the monitoring and maintenance of transposer stations and the administration of CVCs in each development zone, a division of these takes to each branch broadcasting station will be required in order to rationalize operations in the future.

Table 3-6-9 Share of maintenance by each administrative station

STN in charge of maintenance	Transmitter & transposer	Mini-power * transposer
Kathmandu	Phulchowki	7
Biratnagar	E_3, E_4, E_5	18
Janakpur (Jaleswar)	E_1, TE_2	3
Bhairahawa	W_1, W_{11}, W_2	22
Nepalganj ** (Birendranagar)	W_3, W_4, W_{41}	19
Dipayal (Dangadhi)	W_5, W_6, W_7	10

* Estimated number of stations of future installation

** Tentative, in future, should be changed to Birendranagar

3) Activities of the maintenance section.

In order to promote the effective maintenance of the scattered equipment in the country, a comprehension of the information and data, relating to facilities is required. Also an improvement in the liaison (reporting system) and engineering skills of staff are required for fast recovery from failures.

Following items are the main tasks for establishing the maintenance system. The work will be carried out by the workshop for a while and then will be entrusted to the diversified branch broadcasting stations in the future.

a) Repair of failed equipment.
b) Provision of a station guide book.
c) Establishment of technical standards for the maintenance of facilities.
d) Establishment of a reporting system.
e) Establishment of procedures for trouble shooting and repairs.
f) Formulation of maintenance plan and its implementation.
g) Comprehension of data and history of broadcast equipment.
h) Recording of technical log sheet and statistical processing.
i) Storage of spare parts and materials, and its unified management for effective storage.
j) Arrangement of information about facilities and standardization of reports.
k) Establishment of a routine maintenance procedure.
l) Training of maintenance staff.
m) Maintenance and administration of CVCs.
n) Explanation of CVCs and provision of reference materials, etc.

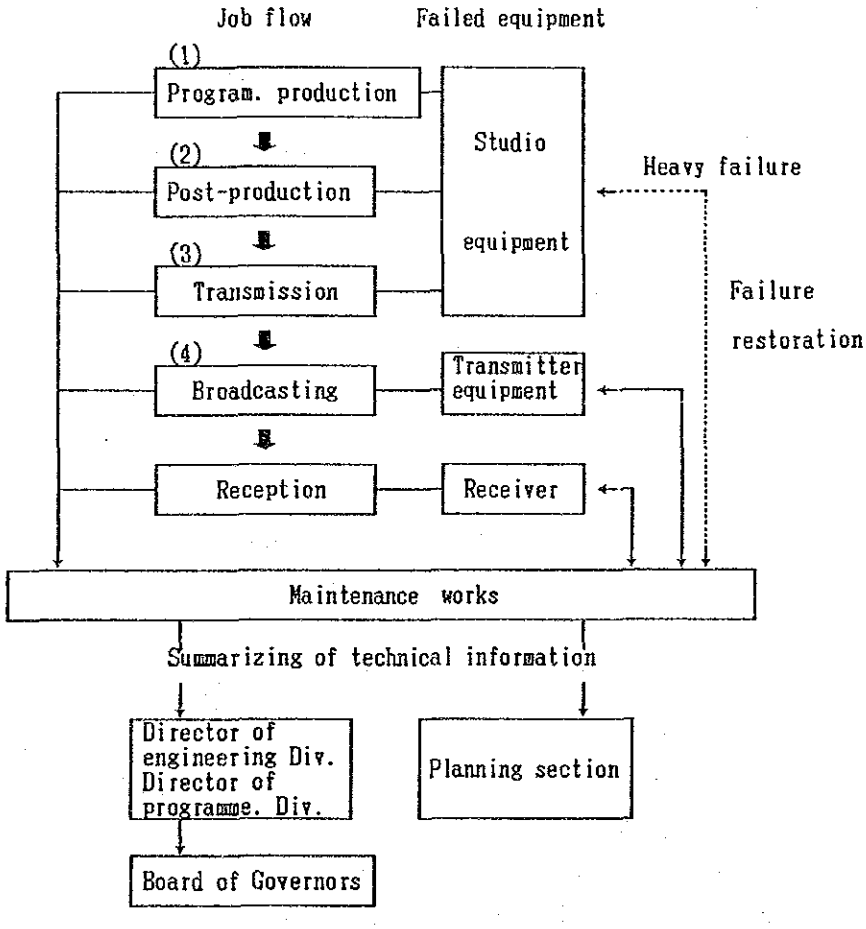


Fig. 3-6-6 Failure reporting and maintenance

6-5. Staff Plan

The necessary number of staff derived from the development plan is shown in Table 3-6-9.

Table 3-6-9. Staff

	present	Phase 1	Phase 2	Phase 3	Phase 4
General, Deputy Manager	2	3	3	3	3
Administration Div.	43	18	20	22	24
General affairs Div.	—	59	59	59	59
Finance Div.	7	—	—	—	—
Programme Div.	43	87	102	122	122
News Div.	19	42	58	72	87
Engineering Div.	38	93	127	133	133
Business Div.	4	9	11	11	11
Correspondence Office	4	8	14	18	18
Others	4	—	—	—	—
Total	164	319	394	440	457

6-6. Staff Training

(1) General

Training within the enterprise is conducted following approximately this course.

1) Basic training
2) Professional training
3) General (Overall) training
4) Adminstration staff training
5) Actual training at each site
6) On-the-job training

Activities in broadcasting are rather wide, and sufficient training should be conducted for ensuring a smooth operation of tasks.

Item 1) Basic training is given to each professional, and

for programme staff;

programming and production, news, news-gathering, etc.

for engineering staff;

Programme production, transmission,

transmitting and receiving

for the staff of finance and General Affairs Divs;

General affairs, finance,
whole activity of broadcasting

2) Professional training

for programme staff;

Programming, Composition, Drama, Sports, News-gathering, program shooting

for engineering staff;

Semi-conductor, digital technique,
program production, power supply,
lighting, (film) VTR, control,
air-conditioners, microwaves,
transmitter and receiver,
engineering administration.

3) General staff training

Engineering and broadcast administration,
foreign language,
methods for solving problems

4) Administration staff training

Management, administrative staff,
broadcasting and society

5) Actual training at each site

An expert conducts the training at each site of the specific field.

6) On-the-job training is mainly conducted within the activity of routine work to educate broadcasting staff in each division.

The ability and experience of each staff member is significantly different and it is necessary to provide the opportunity of training on a satisfactory time schedule. Through such an aggressive promotion of training, it becomes possible to entrust the operation of activities to each staff member with no anxiety.

In this sense, there is no better time than the present for requiring staff training and the full use of facilities. Unfortunately, at this moment, due to the lack of training facilities and opportunities, it is impossible to educate and develop the ability of staff.

Furthermore, as no provision is made in the equipment of NTV, actual training is planned as much as possible to be conducted at each site of a broadcasting station and workshop in order to make the most use of them.

(2) Number of trainees

The number of trainees and the subject of training courses for up-grading the knowledge on broadcasting, will be conducted following the Table 3-6-10.

Table 3-6-10. Training

	Basic Training	Expert Training	Overall Training	Manager Training	On the Job Training
Administration	1 month	2 months	2 weeks	2 weeks	At any time
Programme	〃	〃	〃	〃	〃
Engineering	〃	〃	〃	〃	〃
News	1 month	2 months	〃	〃	〃
Finance	2 weeks	2 weeks	〃	〃	〃
General Affairs	〃	〃	〃	〃	〃
Business	〃	〃	〃	〃	〃

As for the training of the personnel in finance and general affairs divs., no facilities are provided and training will be conducted mainly in the form of on-the-job training. Staff engaged in other divisions will be trained by utilizing the actual facilities, under the guidance of NTV experts and expert dispatched from overseas.

Concerning the dispatch of staff for training to AIBD or developed countries, such as Japan etc., it is intended to provide the opportunity at any time and, in the case of the special field of engineering, to ensure that the function of workshop is fully utilized.

As for broadcasting programmes, daily guidance will be given during the process of programme production.

(3) Training plan

As previously mentioned, there is no way for promoting a systematic training course except for training within the enterprise. Otherwise it depends on the AIBD or other Institutes in developed countries such as Japan etc.

So it is necessary to consider the practical implementation of training which aims at the improvement in the level of staff following the curriculum shown in (1).

(4) Education of experts

Concerning the training of professionals, it should be conducted with the technical cooperation of advanced countries or through inviting experts from abroad and expert staff who have plenty of experience in TV broadcasting.

At the same time, it is recommended that necessary texts and magazines should be provided in the library for the use of staff.

(5) Provision of broadcast materials

Urgent collection of broadcast materials is necessary in the fields of programming and engineering. These are used not only for training purposes but also for actual broadcasting, and include:

1) Magazines and books related to programming and engineering

2) Record disks, films, photographs, newspapers, recorded tapes, and other informative materials

3) Catalogues, specifications, engineering standards

4) Governmental information, information related to foreign Governments, society, people, etc.

A retrieval system for these materials has to be introduced at the beginning together with the provision of copy machines, space for storage, and measures for lending out materials. A budget for the purchasing of materials has to be furnished which is sufficient for the acquisition of materials.

CHAPTER 7. TV RECEIVER DIFFUSION PLAN

7-1. Predictions of TV Set Diffusion

(1) Prediction of TV set diffusion by Gross National Product (Case 1)

The relationship between the number of persons per TV set and GNP in the neighbouring countries to Nepal is as shown in Fig. 3-7-1. At present, the TV set diffusion rate in Nepal is 680 persons per set, while the diffusion rate is higher in Bangladesh whose GNP is lower than Nepal's.

In Nepal, TV broadcasting is in its experimental stage and its service area is small. Currently, therefore, TV sets are mainly used for video tapes and for receiving broadcasts from India. As Nepalese TV broadcasts are regularly started and maintained, TV sets will be rapidly diffused in view of the situation shown in Fig. 3-7-1.

The annual average nominal GNP growth rate of Nepal in the past 5 years is 12.78%, and the future growth rate is estimated to be 12% per annum. The GNPs up to the year 2000, based on this expected GNP growth rate and on the expected population growth listed in Table 3-7-3, and the TV set diffusion rates up to the same year 2000, are estimated as follows.

Table 3-7-1 Prediction of TV set diffusion by GNP (Case 1)

Year	GNP Market Price (in mil. NRs.)	Population (in th.)	Per-Capita GNP (US Dollars)	Diffusion Prediction	
				pers./TV set	Total sets
1987	56,867	17,633	149	* 680	* 25,000
1990	79,894	18,928	195	200	94,600
1995	140,800	21,120	307	80	264,000
2000	248,138	23,089	495	40	577,000

*Diffusion at present

The diffusion rates of growth in the number of TV sets in the neighbouring countries are shown in Fig.3-7-2.

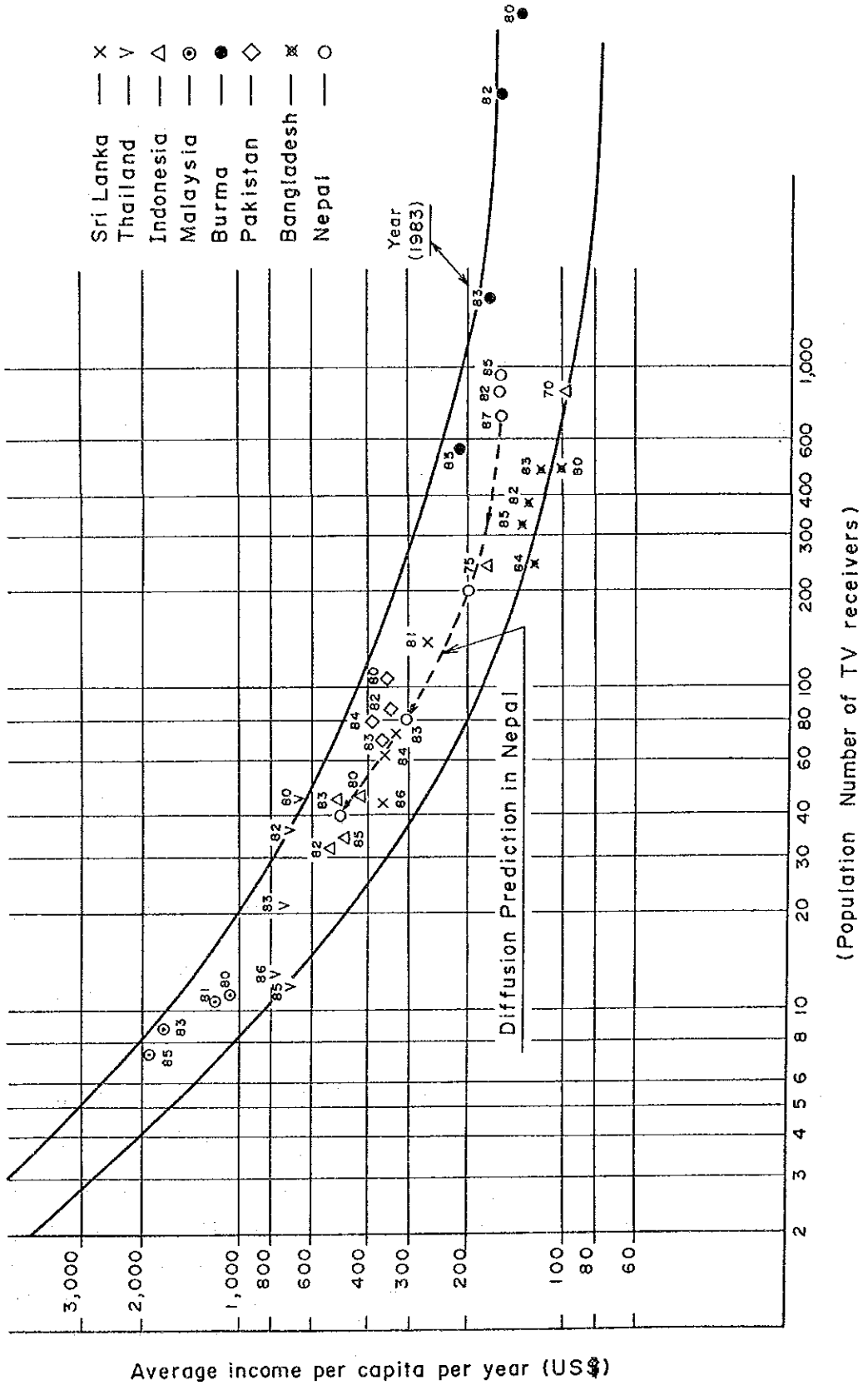


Fig. 3-7-1 Diffusion Prediction of TV Set by GNP (Case 1)

Table 3-7-2 Nominal growth of GNP

	GNP (Rs. in Million)	Nominal Growth Rate
1981/1982	31,603	13.3
1982/1983	34,458	9.0
1983/1984	38,809	12.6
1984/1985	42,384	9.2
1985/1986	50,774	19.8
Annual Av. of nominal GNP growth rate in the past 5 years		12.78 %

Source: "Economic Survey 1986/1987"
Ministry of Finance

Table 3-7-3 Growth of population

Fertility Rate - 4 (2000)

Development Region	1985 Population	1990 Population	1995 Population	2000 Population
Eastern	4,180,895	4,778,513	5,353,732	5,915,704
Central	5,404,523	6,056,275	6,713,147	7,260,255
Western	3,452,505	3,885,181	4,310,175	4,710,479
Middle Western	2,175,371	2,462,951	2,747,718	2,948,437
Far Western	1,499,530	1,745,421	1,995,766	2,254,314
TOTAL	16,712,824	18,928,341	21,120,538	23,089,189

Source: "District Population Survey Report"
National Population Commission

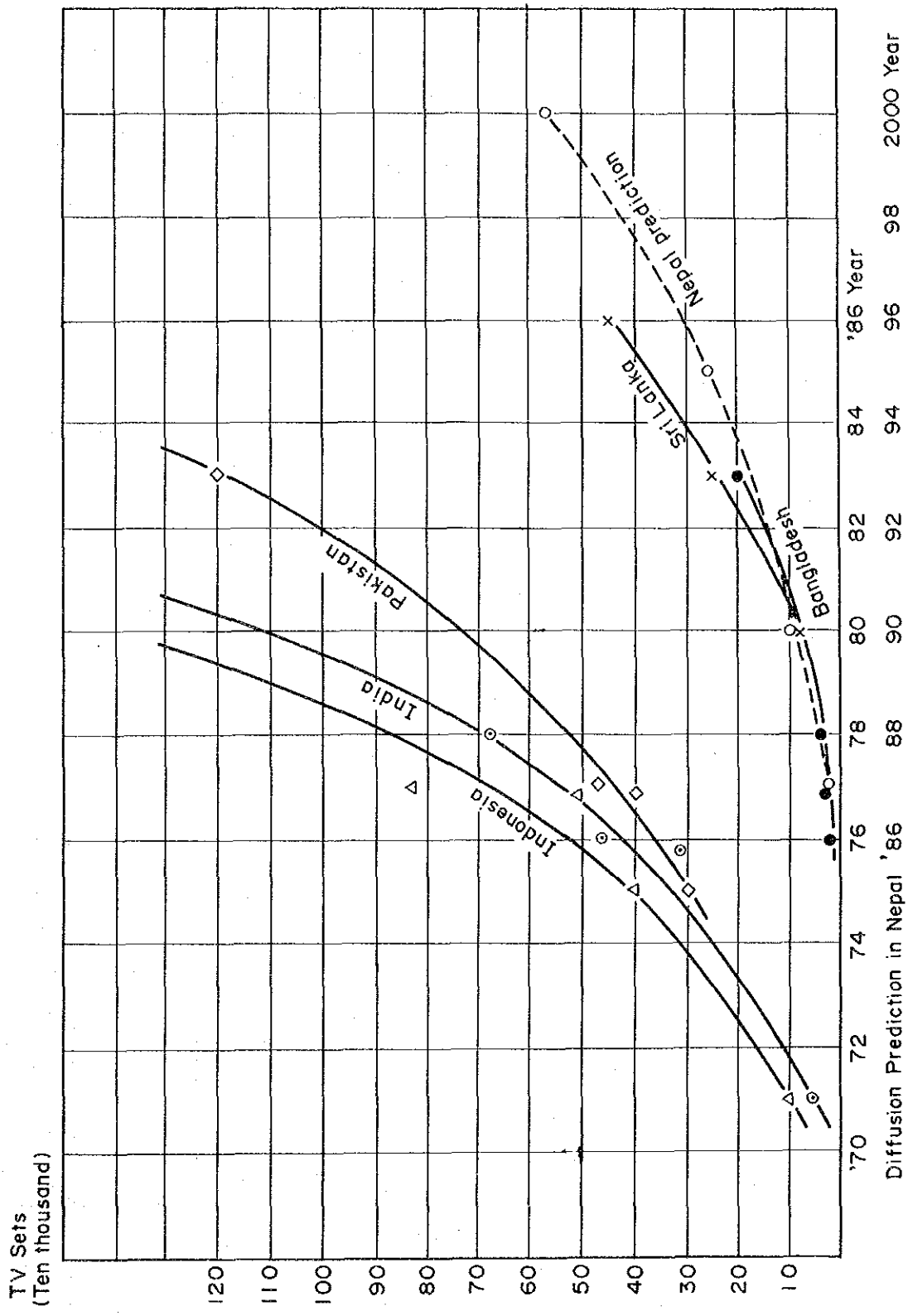


Fig. 3-7-2 The growth in the number of TV Sets in the neighbouring countries and diffusion prediction in Nepal

(2) Prediction of TV set diffusion by Gross National Product (Case 2)

Table 3-7-5 shows the per-capita GNPs and TV set diffusion rates in terms of the number of TV sets per population in the 15 developing countries in Asia and Africa in 1983. From these figures in the table, the following regression equation to show the relation between the two can be obtained by the method of least squares:

$$y = 151.92x + 221.75 \ldots\ldots (A)$$

x: TV set diffusion rate relative to population

y: GNP per capita (US dollars)

The regression lines are as shown in Fig. 3-7-3

Taking into account the present state of GNP and diffusion of TV receivers in Nepal, a slight correction of the above equation introduces the following equation.

$$y = 151.92x + 148.79 \ldots\ldots (B)$$

Substituting the estimated GNP value for each of the years in Nepal into the above equation (B) gives the estimated number of TV sets listed in the table below.

Table 3-7-4 Prediction of TV set diffusion by GNP (Case 2)

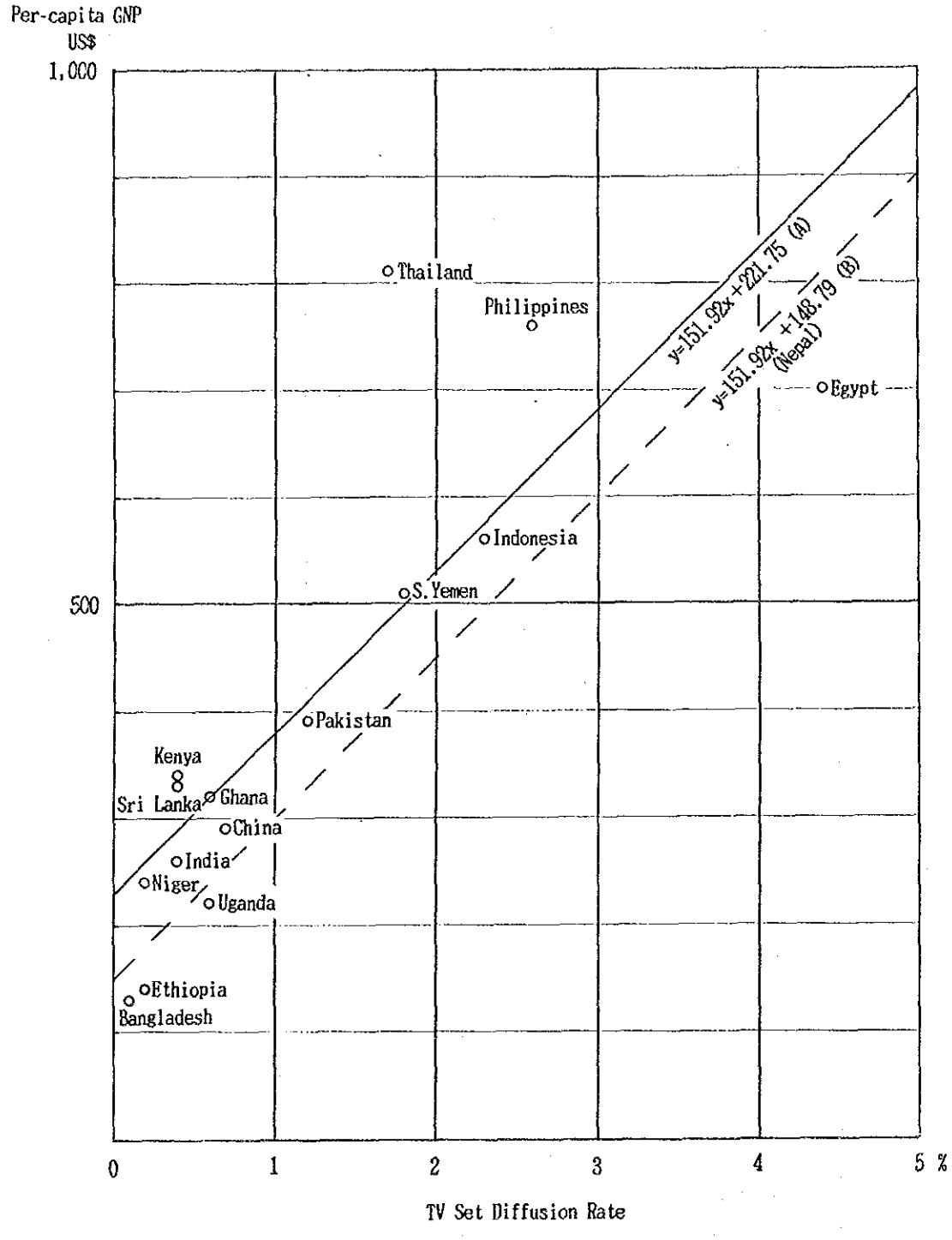
Year	Population (in th.)	Per-Capita GNP (US Dollars)	Diffusion Rate (%)	Number of TV Set diffused
1987	17,633	149	* 0.14	* 25,000
1990	18,928	195	0.30	57,000
1995	21,120	307	1.04	220,000
2000	23,089	495	2.28	526,000

* Diffusion at present

Table 3-7-5 Diffusion rate of TV sets and per capita GNPs in developing countries

Country	Per capita GNP (US$)	Population Diffusion rate (%)
Thailand	810	1.7
Philippines	760	2.6
Egypt	700	4.4
Indonesia	560	2.3
South Yemen	510	1.8
Pakistan	390	1.2
Kenya	340	0.4
Sri Lanka	330	0.4
Ghana	320	0.6
P.R. of China	290	0.7
India	260	0.4
Niger	240	0.2
Uganda	220	0.6
Ethiopia	140	0.2
Bangladesh	130	0.1

Source: UNESCO "Statistical Year Book, 1984"
World Bank "Atlas, 1985"



Source: UNESCO "Statistical Year Book, 1986"

World Bank "Atlas, 1985"

Fig. 3-7-3 Regression Line of Per-capita GNPs and TV Set Diffusion Rates

(3) Supply situation for TV sets in Nepal

At present, in Nepal, black-and-white TV sets are produced by Guras only, and the price per set is about NRs 4,500. Color TV sets are all imported, with an import duty of 110%, to be locally sold at NRs 24,000 to 26,000.

Quite recently, however, two or so projects for establishing color TV assembly plants with the supply of colour TV parts from Japanese manufacturers appear to be in progress. At least, one such plant, Seeai Pvt. Ltd. (Chaudhary Group) has already started operation with the supply of parts from Toshiba. The plant will have a monthly production of 500 sets, and they are likely to be sold on the market at a unit price of NRs 17,000 to 18,000, a price significantly lower than that for the imports. The availability of TV sets at a lower price will contribute to the diffusion of TV sets and will reinforce the increasing diffusion predicted in (1) and (2) above.

7-2. CVCs (Community Viewing Centres)

So far, the prices of TV sets in Nepal are still rather too high for many households to purchase them. Under these circumstances, NTV plans to establish CVCs throughout the country as a means of providing opportunities for viewing TV programmes to as many people as possible. NTV has been actively studying this plan, and has already held some workshops.

The National Planning Commission, the Ministry of Agriculture, the Ministry of Education and Culture, the Ministry of Health, the Ministry of Panchayat and Local Development, the Agricultural Project Services Centre, and many other organizations or agencies participated in the workshops and have approved the CVC plan to support the future activities of NTV along this line.

The main conclusions reached so far at the workshops for the CVC plan are as follows.

(1) The establishment and management of a CVC should be conducted on a community basis, to ensure security and smooth operation and maintenance.

(2) For the cost of TV sets to be purchased by communities, NTV should back up the communities so that they can obtain loans from banks and other financial institutions.

(3) For the establishment of CVCs, HMG of Nepal and NTV should decide definite policies including those for economic assistance to communities.

(4) The CVC of a community should be organized in a manner commensurate with the size of the community, and should be located in a place which is easily accessible for all desirous viewers.

(5) A country-level committee should be organized for:

- o the establishment of and preparations for expansion of the CVC;
- o the procurement of funds for purchasing TV sets;
- o the arrangement of maintenance procedures;
- o the selection of effective programmes; and
- o proposals to HMG/NTV

At the start of the experimental TV broadcasting in Nepal, CVCs were installed in 37 places in the Kathmandu Basin. More than 500 residents then came to each CVC every day to view TV broadcasts. This fact indicates the very great role CVCs can play in communication as well as in the promotion of the diffusion of TV sets in Nepal.

CHAPTER 8. IMPLEMENTATION PLAN

8-1. Implementation Plan

The implementation plan in each phase based on the explanation given in Chapter 3, Volume 2, is as follows:

(1) First phase plan

1) Construction of TV broadcasting centre in the city of Kathmandu. Outline of the TV programme production centre is as follows;

a)	Programme production studio (65 m^2)	1 room
b)	Programme production studio (200 m^2)	1 "
c)	Dubbing studio (30 m^2)	1 "
d)	Equipment necessary for programme production and transmission	1 set

2) Construction of 2 kW transmitter station at Phulchouki and E_1 transposer station at Hetauda.

a)	Transmitter building	1
b)	2 kW VHF transmitter	1
c)	Transmitter antenna and tower	1
d)	STL (Studio to transmitter link)	1
e)	Transposer station (E_1)	1

3) Installation of CVCs in the Kathmandu valley 200 sites

(2) Second phase plan

1) Construction of rebroadcasting station at TE_2, and transposer stations at E_3, E_4 and W_1, to expand the service in the eastern and western terai areas.

2) Construction of 300 m^2 studio in the programme production centre and installation of necessary equipment in studio and master control room.

3) Three sets of news-gathering equipment are distributed to three correspondent offices in terai areas.

4) 200 CVCs are installed within the service area of the terai regions.

(3) Third phase plan (future plan)

1) 9 transposer stations (E_5,W_2,W_3,W_4,W_{11},W_{41},P_1,P_2,P_3) are constructed in the eastern and western terai areas and Pokhara route to extend the service in the country.

2) One O.B. Van is provided in Kathmandu.

3) Three sets of ENG equipment are distributed to each correspondent office in terai areas.

4) 200 CVCs are installed at the peripheral sites of transposer stations.

(4) Fourth phase plan (future plan)

1) Construction of W_5, W_6 and W_7 transposer stations which will be the final construction of the project.

2) ENG equipment are distributed to the necessary correspondent offices in each terai area.

3) 200 CVCs are distributed to the peripheral territories of W_5, W_6 and W_7 stations and other places.

(5) Population coverage and broadcasting hours

Increase of population coverage and broadcasting hours at the end of each phase and the total broadcasting hours/day are shown in the following tables.

Table 3-8-1 Population coverage

	Served District	Increase of Population	Increase of Population coverage (%)
Phase 1	12	2,839,000	15
Phase 2	9	5,300,000	28
Phase 3	13	3,028,000	16
Phase 4	3	757,000	4
Total	37	11,924,000	63

Table 3-8-2 Broadcasting hours

	Broadcasting hours/day
Present	3 hours
Phase 1	6
Phase 2	7
Phase 3	8
Phase 4	8

8-2. Estimation of Costs

Estimation of costs is made based on the building plan B and on the proposed plan for expansion of the broadcasting network. It excludes the costs of CVCs.

Necessary costs for the construction and installation of broadcasting facilities are shown in Table 3-8-3 and the total cost is about 905 million NRs.

Cost is calculated as of market prices in July 1987 and the inflation factor is not taken into account. Exchange rate as of January 1988, 1US$ = ¥130 = 21.7 NRs (1 NRs = ¥6.0) is applied for cost estimation.

Table 3-8-3 Construction costs

Unit: Million NRs.

	7th 5-Year Development Plan		8th 5-Year Development Plan	
	Phase 1	Phase 2	Phase 3	Phase 4
1) Land Cost and Levelling	9.4	3.7	0.6	0.2
2) Studio Building Construction	100.0 (600)	50.0 (300)	—	—
3) Administration Building Construction	—	11.7	8.8	8.8
4) Transmitting Facilities	50.0 (300)	111.7 (670)	131.6 (790)	36.7 (220)
5) Programme Production Facilities	111.7 (670)	88.3 (530)	6.7 (40)	6.7 (40)
6) Construction of City Power Line	1.2	14.8	58.4	12.0
7) Engineering Services	21.7 (130)	20.0 (120)	11.7 (70)	3.4 (20)
8) Contingency	8.3 (50)	8.3 (50)	6.7 (40)	1.9 (10)
Total	302.3 (1,750)	308.5 (1,670)	224.5 (940)	69.7 (290)

* Numerical values within parentheses shows foreign portion in mil. yen.

CHAPTER 9. PROJECT EVALUATION

9-1. General Status of the Kingdom of Nepal and the Development Plan

(1) General trends and the development plan

The Kingdom of Nepal is faced with the economic problems common to other developing countries. Part of the core of the Nepalese economy inevitably depends on circumstances in the neighbouring country, the Republic of India. Exports and imports from and to Nepal, which does not have a seaport for geographical reasons, are mostly handled at Calcutta Port in India, involving problems of internal transportation in India.

The steep and narrow configuration of the Nepalese land retards preparation of an infrastructure for traffic and transportation, keeping the country dependent on an agricultural economy.

The contribution of agricultural production to GDP has decreased and the position of farm products among export commodities has been reduced, but the size of the farming population shows little shrinkage. The country cannot but depend on the farm economy, because the industry, which should become the driving force of the Nepalese economy in place of agriculture, has not yet emerged, or has difficulty in growing.

a. Increased population has led to cultivation of infertile or untillable land.

b. Reckless livestock farming has caused devastation of the land.

c. Reckless deforestation has lowered the water retention of the soil, and soil erosion has been caused by rain and wind.

The land of Nepal is exhausted for the reasons mentioned above. And the reality is that effective irrigation systems have not yet been developed, that little progress has been made in the introduction of agricultural investment goods, and that technical support has not reached those who need it most and cannot extend its effects efficiently and equitably.

Problems such as those referred to above are too numerous to mention. Where to begin with constitutes one problem. Availability of local funds is considerably limited.
Under these circumstances, foreign assistance is absolutely necessary to Nepal for national development. Foreign funds account for about 40% of the national budget as a matter of fact.

Thus foreign funds play an important part, but instant and remarkable effects cannot be expected of them. It is necessary to attain objectives step by step, investing much time into those purposes.

The development plan particularly intends to spread information and education among the people in all areas of the country. It will play an important role in raising the education and living standards of the people, (i.e. those in the low-income bracket as well as others) which have been impeding national development, but much time will be required.

HMG of Nepal now lays emphasis on decentralization of power. But there is a problem in putting it into practice, regarding the competence of individual workers.

Establishment of a medium of broadcasting that can communicate information from the Government to the people will certainly contribute to the national development of Nepal.

(2) Trend of economic growth

Fig. 3-9-1 shows the trend of econimic growth in Nepal.

The annual average real growth rate of GDP in 1981/1982 through 1986/1987 is 3.0 per cent, while the estimated growth rate of the population (1981 - 1987) is 2.4 per cent. The GDP growth rate exceeds the population growth rate.

The estimated amount of the nominal GDP in 1986/1987 is 56 billion NRs, and the average annual rate of increase of the nominal GDP in the past 5 years is 12.6 per cent. Approximately 90 per cent of it has been used for consumption, and the remaining 10 per cent for domestic saving. The expenditures on investment account for an increase of 18.12 per cent, greater than the growth in GDP, and were as high as 19.6 per cent of GDP in 1985/1986.

On the other hand, commodity prices have been increasing, at an annual average rate of 10.6 per cent in the past 5 years.

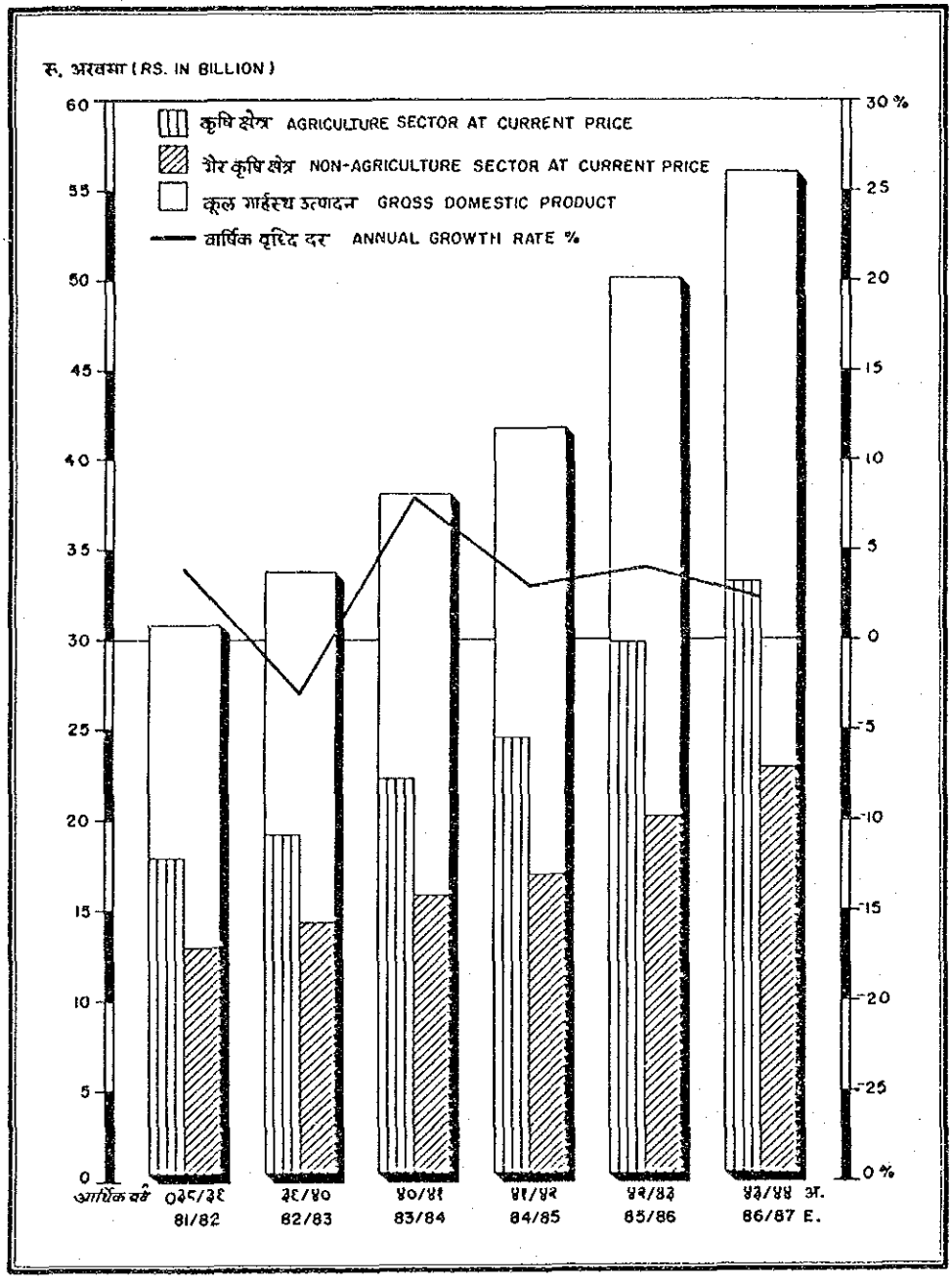


Fig. 3-9-1 Gross Domestic Product & Growth Rates

Source: "Economic Survey 1986/1987"
Ministry of Finance

(3) Government finances of Nepal

The government annual expenditure in 1985/1986 was approximately 9.8 billion NRs. Table 3-9-1 lists the breakdown in 1981/1982 up to 1985/1986.

Table 3-9-1 Government expenditure & sources of finance

(NRs. in Million)

Description	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Receipts	3,673	3,932	4,286	4,840	5,817
(Foreign Grants)	(993)	(1,090)	(877)	(924)	(1,173)
Expenditure	5,361	6,979	7,437	8,395	9,797
(Regular)	(1,634)	(1,997)	(2,274)	(2,906)	(3,584)
(Development)	(3,727)	(4,982)	(5,164)	(5,489)	(6,213)
Overall Deficit	-1,689	-3,048	-3,151	-3,555	-3,980
Foreign Loan	730	986	1,671	1,753	2,501
Internal Loan	500	1,000	1,480	1,802	1,403

Source: "Economic Survey 1986/1987"
Ministry of Finance

The annual revenue of the Government in 1985/1986 is 47 per cent of the expenditure, if the grants from the foreign countries are excluded. The finance for the deficiency depends on foreign assistance and domestic loans. This trend will continue through the years to come.

(4) International balance of accounts

The international balance of accounts of Nepal since 1981/1982 onwards has been as shown in Table 3-9-2. Year after year, the current account balance has been worsening with an increasing deficit in the trade balance owing to the yearly excess of imports over exports.

Table 3-9-2 International payments summary

(NRs. in Million)

Description	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Exports F.O.B.	1,496	1,136	1,710	2,746	3,086
Imports C.I.F.	4,948	6,333	6,534	7,768	9,372
Trade Balance	-3,452	-5,197	-4,824	-5,022	-6,286
Services, Net	1,378	1,634	1,407	1,392	1,555
(Tourism)	(842)	(844)	(561)	(710)	(1,048)
Transfers, Net	1,682	1,891	2,073	2,256	2,166
(Remittance)	(477)	(550)	(614)	(681)	(782)
(Official Grants)	(1,157)	(1,315)	(1,381)	(1,504)	(1,342)
Current Acc. Balance	-392	-1,672	-1,344	-1,374	-2,565
Foreign Loan	807	964	1,275	1,160	2,005
Miscellaneous	87	33	-57	-652	1,121
Change in Reserves, Net	502	-675	-126	-866	561

Source: "Economic Survey 1986/1987"
Ministry of Finance

9-2. Financial Condition of NTV

The financial condition of NTV is as outlined in Part II. Its detailed profit and loss statement and balance sheet are shown in Appendix 10.

In the two consecutive fiscal years of 1985/1986 and 1986/1987, the NTV balance ends in a defici, as seen in the profit and loss statement, which is met by capital investment from the government. The government has been placing great hopes on NTV, increasing its subsidies and capital investment to NTV year after year in an effort to secure public broadcasting.

The balance sheet includes many carryovers to the following years. They appear to indicate a good management of funds, but they actually are unpaid portions of equipment investment made.

NTV is in the process of consolidating its foundations and initial development. Although its financial standing is still severe, NTV has been endeavoring to establish sound management with the strong support of the government, and its fund position has been improving.

9-3. Demand Prediction for Commercial Broadcasts

(1) Current situation of revenue from commercials

Since the start of experimental TV broadcasting in December 1985, NTV has been also conducting commercial broadcasting, and the revenue from the commercials has been increasing year by year.

Fig. 3-9-2 shows the breakdown of the revenue from commercials in 1986/1987, and Table 3-9-3 lists monthly revenues from commercials. Effective April 1987, commercial fees were revised to those listed in Table 3-9-4. The number of spot commercials temporarily decreased by half in April but returned to the previous level in the following month. The total amount of commercials has been on an upward trend.

In its budget for 1987/1988, NTV expects an annual commercial revenue of 4,570,000 NRs. This expected amount is multiplied by 1.7 to 7,571,000 NRs if the actual commercial revenue in the last month of 1986/87 is applied to the whole fiscal year 1987/88.

The commercial sales activities of NTV are currently carried out by the sales staff of 4 members. The staff size being too small to work in search of new sponsors and those who want to buy time for spot commercials, they only handle commercials for those who initiate an approach to the staff.

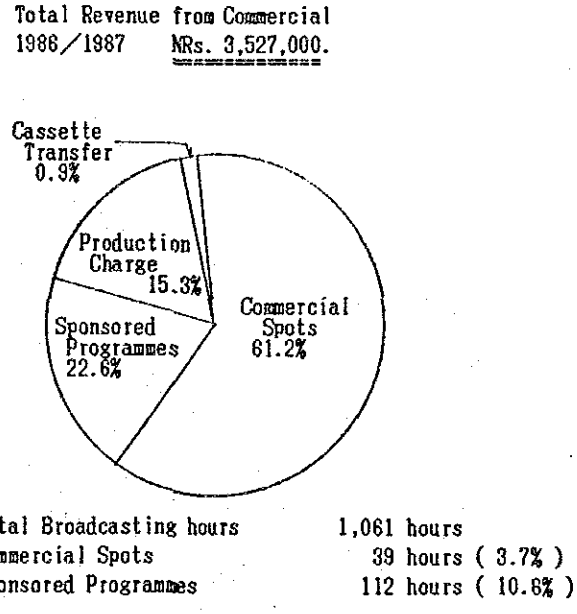


Fig. 3-9-2 Share of Commercial Revenue

Table 3-9-3

Nepal Television
Fiscal year 1986/87
Earnings from Commercials & Sponsored Programmes

(Unit: NRs.)

Month	Commercials			Sponsored Programmes		Other Earnings
	Spots	Time	Earnings	Time	Earnings	
July-Aug	408	3:29:10	144,700	2:51:00	22,200	6,335
Aug-Sept	356	3:16:15	130,650	3:18:00	24,600	5,162
Sept-Oct	497	4:22:30	166,650	3:40:00	26,000	22,524
Oct-Nov	413	3:32:10	150,600	3:58:00	30,000	27,140
Nov-Dec	315	2:35:50	92,250	5:55:00	37,250	96,815
Dec-Jan	421	3:04:55	144,800	7:37:00	41,500	26,290
Jan-Feb	369	3:22:29	147,500	8:22:00	48,650	97,891
Feb-Mar	249	2:29:30	95,400	13:12:00	58,660	113,180
Mar-Apr	354	3:16:15	127,050	17:27:00	87,855	36,409
*Apr-May	192	1:52:15	167,750	18:12:00	151,400	15,200
May-June	393	3:40:40	355,000	16:47:03	145,500	47,900
June-July	483	4:19:50	436,050	13:30:00	125,415	74,700
Total	4,550	39:21:45	2,158,400	112:45:30	799,030	569,546

Total Earnings:	Commercial	2,158,400	(61.2%)
	Sponsored Programmes	799,030	(22.6%)
	Other Earnings		
	Production Charge	539,150	(15.3%)
	Cassette Transfer	30,396	(0.9%)
		NRs. 3,526,976	

*Apr. 1987 : Change of Rate

Source: NTV Business Section

Table 3-9-4 Commercial rate of NTV

Description	Unit	Commercial Rate
Commercial Spots (Domestic)	30 Sec.	750 NRs.
Commercial Spots (Foreign)	30 Sec.	1,500 NRs.
Sponsored Programmes	30 Min.	5,000 NRs.
Commercial Production	1Production 30Sec.	25,000 NRs.

Source: NTV Commercial Service "Rate Card"

(2) Potential demand for commercial broadcasts

The revenues from commercials on NTV and Radio Nepal in 1986/1987 are compared in Table 3-9-5.

Table 3-9-5 Commercial revenue of NTV and radio nepal (1986/1987)

Description	NTV	Radio Nepal
Annual Commercial Revenue	3,527,000 NRs.	11,700,000 NRs.
Number of Main Sponsor	30	70
Total Broadcasting Hours	1,061 h	5,070 h
* Total Commercial Broadcasting Hours	151 h	2,635 h
Commercial Broadcasting Ratio	14 %	52 %

* Commercial Spots and Sponsored Programmes
(do not show the Commercial Volume) Source: from Field Survey

The revenue from commercials on NTV is 30 per cent, and the number of sponsors of NTV is 43 per cent, respectively, of that of Radio Nepal. In these aspects too, NTV is considered to be in the initial stage of development.

In Japan, revenue from TV commercials amounted to 1,077.1 billion yen in 1986, which was 6.8 times as large as the total amount from radio commercials of 157.7 billion yen in the same year, showing how the advertising effects of TV are appreciated much more highly than those of radio. The share of the total amount of TV advertisement expenditures in the GNP

amount was 0.33% in Japan (1985), and 0.006% in Nepal (1986/1987), the former being 55 times as high as the latter.

Because of the differences in industrial structure and economic level, the figures of Nepal are not directly comparable with those of Japan, but the potential demand for TV advertisements in Nepal will probably be more than 5 times higher than the demand on the current level.

The experimental nature, the narrow service area, and the short broadcasting hours of the NTV broadcasts will account for NTV's smaller revenue from TV commercials than Radio Nepal's revenue from their radio commercials. It is expected, therefore, that TV commercials will markedly increase in both amount and quantity as this project is implemented to provide high quality programmes for a greater number of viewers.

Many businesses also have much hope in TV commercial broadcasts in Nepal, and will constitute a great potential demand for them.

(3) Demand prediction for commercial broadcasts

The rate of commercial hours to the total broadcasting hours of NTV is 4.7 per cent, comprising 3.7 per cent for spot commercials and 1.0 per cent for sponsored programmes. An average of 2 minutes and 50 seconds are spent for commercials per hour of broadcast. In Japan, the Broadcasting standards, set by the National Association of Commercial Broadcasters, stipulate the upper limit of the weekly total percentage of commercials to be 18 per cent, which corresponds to an average of 10 minutes and 48 seconds per broadcasting hour.

In view of its public character, NTV should not depend excessively on commercial broadcasts, because such a dependence may result in less frequent broadcasting of educational and other programmes that are generally not sponsored well. As far as is practicable, NTV's commercial broadcasts should be maintained at a reasonable level to permit the arrangement of desirable programmes and the sound management of its broadcasting operations. The reasonable level of the rate of commercial broadcasts is considered to be 10 per cent of the entire broadcasting hours, i.e., an average of 6 minutes per broadcasting hour. Even if, at this level, 40 per cent of the programmes contain no commercials, commercials can be inserted into the rest of the programmes at the rate commercials are broadcast in Japan.

Table 3-9-6 lists commercial demand forecasts in the years up to 2000, using a unit to represent one 30-second spot commercial.

Table 3-9-6 Commercial broadcasts demand prediction

Description	19 87/88	88/89	89/90	90/91	91/92	92/93	93/94
Annual total broadcasting hours (h)	1,196	1,560	2,340	2,652	2,652	3,016	3,016
Annual total commercial volume (h)	119	156	234	265	265	301	301
Annual number of commercial units	14,280	18,720	28,080	31,800	31,800	36,120	36,120
Daily average number of commercial units	39	51	76	87	87	98	98

94/95	95/96	96/97	97/98	98/99	1999/ 2000	2000/ 2001
3,016	3,016	3,016	3,016	3,016	3,016	3,016
301	301	301	301	301	301	301
36,120	36,120	36,120	36,120	36,120	36,120	36,120
98	98	98	98	98	98	98

9-4. Financial Analysis and Social Appraisal

(1) Financial analysis

NTV is a corporation wholly owned by His Majesty's Government of Nepal and is operated as an independent managerial body, relying on governmental subsidies and revenue from commercial broadcasts as its main sources of finance.

The purpose of the financial analysis is, therefore, to determine if NTV can be continuously operated on a sound financial basis.

The expenditures and revenues used for this analysis are calculated on the basis of the flow chart shown in Fig. 3-9-3, and prices as of July 1987 are employed. The appraisals are made on a real basis (prices in 1987) without taking future possible inflation into account, and the coverage of the evaluations is from 1987/1988 to 2000/2001.

This report uses the Plan B for the building of the broadcasting centre, and the proposed plan for the broadcasting equipment as a model case.

The results of the financial analysis will be finally evaluated with reference to the two aspects of the profitability and the fund position of the operations. In contrast to private businesses, where stress is generally placed on their profitability, importance is attached rather to the fund position for organizations such as NTV which have highly public characteristics.

If NTV should fully depend on its own funds, including loans, for its total financial investment into equipment, profitability and feasibility can hardly be expected. However if NTV uses its own funds for the construction of the office building attached to the broadcasing centre, construction of power lines to the transmitting stations, land acquisition and levelling etc., and depends on foreign donations for investment into broadcast equipment, financially sound operations are feasible for NTV. For these two alternatives, cash flow prospects are prepared (Table 3-9-13 and Table 3-9-14) for evaluation.

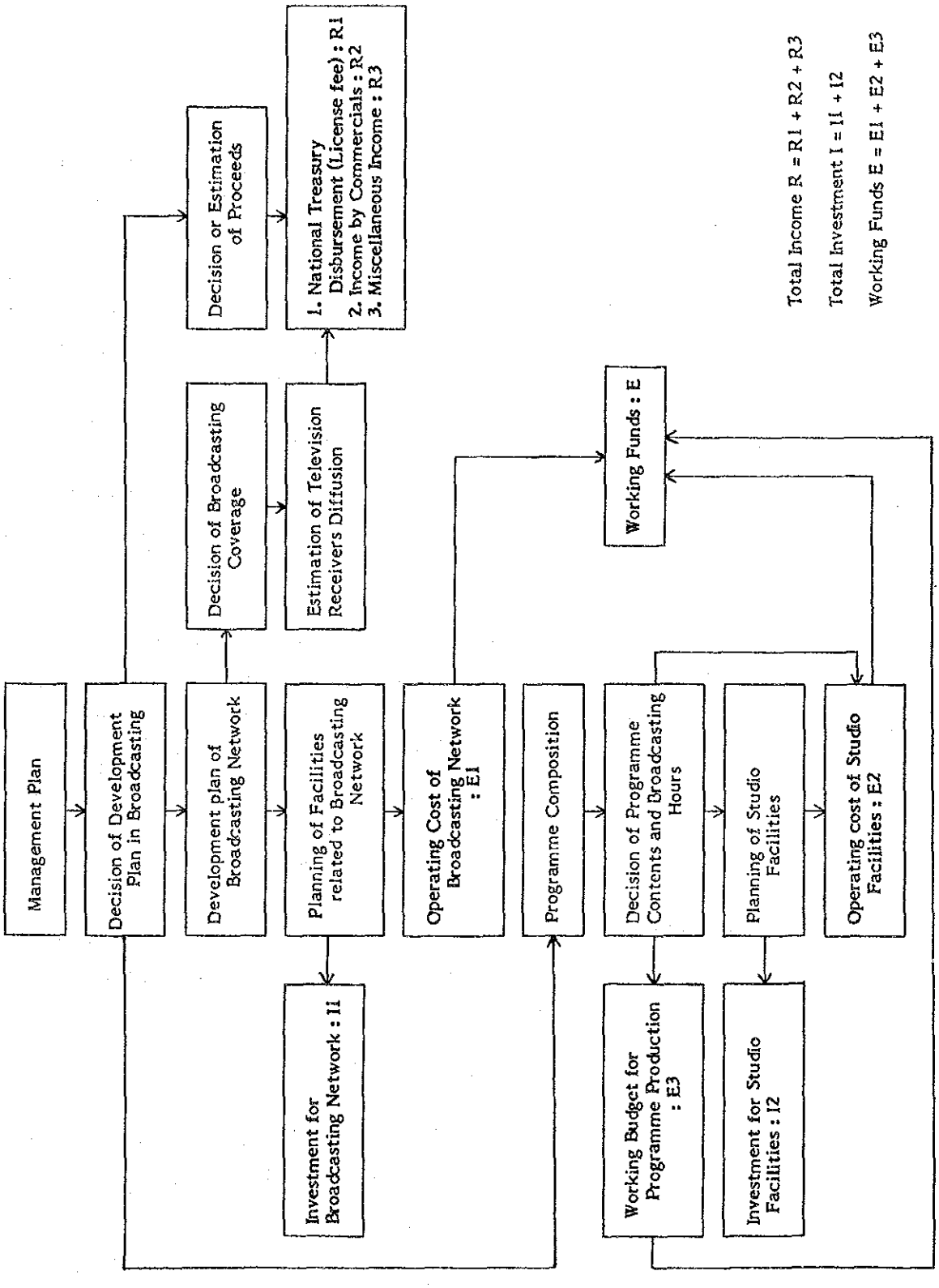


Fig. 3-9-3 Flow Chart for Cost and Fund Estimation

1) Estimation of revenue

a) Government subsidies

His Majesty's Government of Nepal has increased its subsidies to NTV and its investment in shares of NTV as shown in Fig. 3-9-4. The Government introduced a new tax source with a TV license fee, effective from 1987/1988, and expects a tax revenue of 1.5 million NRs in the first fiscal year, which represents the tax revenue from 25 per cent of the TV sets currently in use. In and after the 2nd fiscal year of the new tax system, the Ministry of Finance of HMG of Nepal expects the consolidation of the tax system and tax revenue to come from not less than 50 per cent of the TV sets being used in the country. If all the increment of the tax revenue (license fee) is transferred to NTV in the form of subsidies, NTV operations may financially be fully supported by TV license fees only from 1990/1991 onward.

The possibility of NTV's charging for the actual expenses of producing government-related programmes is being studied by concerned parties in Nepal. This means the possibility of NTV receiving additional subsidies in the name of production costs for broadcasting governmental information programmes, educational programmes, health and sanitation programmes, agricultural programmes, etc.

In this analysis, the current level of annual subsidies was assumed to apply up to 1989/1990 when Phase 1 is to end, and the amounts of the government subsidies based on TV license fees were calculated for years 1990/1991 and thereafter.

b) Revenues from commercials

Expected revenue in each year was calculated based on the demand prediction for commercial broadcasts described in 9-3.

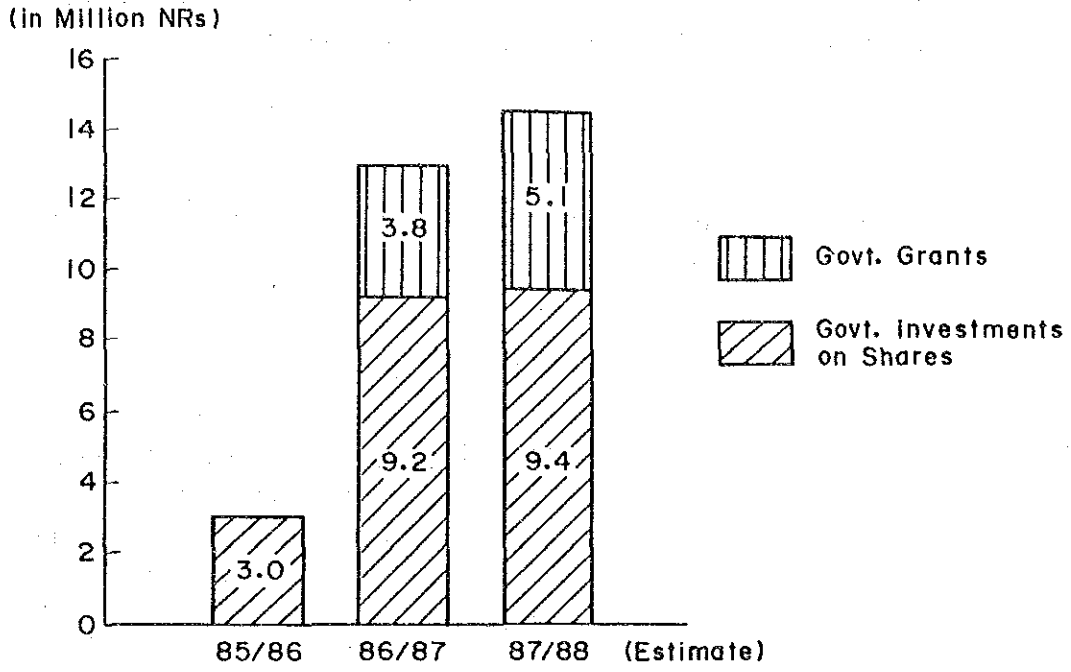


Fig. 3-9-4 Annual government subsidies

2) Equipment investment

Main equipment investment under this project consists of investment in the construction of the building of the broadcasting centre, the construction of office buildings, the broadcasting equipment for the network and the broadcasting centre, and the construction of the power lines. The amount of investment in this equipment is as estimated in section 8-2.

The depreciation of assets is reserved to be accumulated for the replacement of the assets. For the purpose of this analysis, the depreciation periods are assumed to be 40 years for buildings, 15 years for transmitting facilities and 10 years for programme production facilities. The fixed amount of depreciation method is applied, which is used in NTV at present.

The residual value is determined to be 10% of the initial value after the depreciation period. The residual value in the year 2000 calculated by this method will be appropriated as a minus cost.

For the programme production facilities constructed during phases 1 and 2, the equipment renewal cost is reserved on the assumption that the equipment will be renewed in 1998/1999 and 1999/2000, ten years later.

3) Operation cost

Annual total operation cost by the end of each phase of the plan is calculated as shown in Table 3-9-7.

Table 3-9-7 Operation cost

Period	Phase 1	Phase 2	Phase 3	Phase 4
Annual operation cost (in th.NRs)	30,801	38,631	44,806	46,054

a) Programme production cost

Although programme production costs are variable depending on the types of programmes, the average cost for producing general programmes including news programmes is estimated to be 6,500 NRs per hour.

Table 3-9-8 Programme production cost

Period	Phase 1	Phase 2	Phase 3	Phase 4
Annual broadcasting hours (h)	2,340	2,652	3,016	3,016
Annual program. product. cost (in th.NRs)	15,210	17,238	19,604	19,604

b) Facilities maintenance and repair cost

This is the cost required for the inspection, adjustment, repairs, and replacement of parts in order to maintain the initial functions of the facilities throughout their service life. In view of past similar projects and based on the experience in Japan, this project estimates the annual maintenance and repair cost to be 1 per cent of the construction cost for buildings, and to be 1 per cent of the sum of the equipment cost and installation cost for broadcasting equipment.

Table 3-9-9 Maintenance & repair cost

Period	Phase 1	Phase 2	Phase 3	Phase 4
Construction cost (in m.NRs)	101.2	76.5	67.2	20.8
Facility cost (in m.NRs)	161.7	200.0	138.3	43.4
Maintenance & repair cost of new equipment (in th.NRs)	2,629	2,795	2,055	642
Annual maintenance & repair cost (in th.NRs)	4,129	6,924	8,979	9,621

c) Electric power charge

NTV has its offices in the government office building in Singha Durbar, free of charge for the electric power it consumes. After the start of this project, NTV will have its own buildings and will have to pay for the electric power charge from 1989/1990 onward.

The electric power charges for the broadcasting centre and transmitting stations are calculated using the power rate of 1 NRs per kWh.

Table 3-9-10 Electric power charge

Period	Phase 1	Phase 2	Phase 3	Phase 4
Annual power consumption (kWh)	934,500	1,532,790	1,703,064	1,748,304
Annual electric power charge (in th.NRs)	935	1,533	1,703	1,748

d) Personnel wages

The personnel wages are calculated on the basis of the annual average per capita income of 15,000 NRs at NTV in 1986/1987 and the expected number of employees in each year according to the personnel plan.

Table 3-9-11 Personnel wages

Period	Phase 1	Phase 2	Phase 3	Phase 4
Number of staff	319	394	440	457
Annual personnel wages (in th.NRs)	4,785	5,910	6,600	6,855

d) Other administrative expenses

Other expenses arising from the operations of NTV include the cost of office expendables, communication expenses, travelling expenses, interests payable to bankers, and insurance premiums, etc. They are calculated based on the actual records at NTV in 1986/1987 and the personnel plan.

Table 3-9-12 Administrative cost

Period	Phase 1	Phase 2	Phase 3	Phase 4
Administrative cost (in th.NRs)	5,742	7,056	7,920	8,226

4) Financial cost benefit analysis

a) Appraisal indicator

The purpose of financial cost benefit analysis is to appraise the profitability of the project itself. Here, the internal rate of return (IRR) is used as the indicator for the appraisal. As a criterion for the appraisal, a guide is the cost of project funds, namely, the interest on borrowing. The IRR should desirably be higher than the interest on borrowing. The costs and benefits in this analysis (where the costs cover the costs of construction and operations, and the benefits covers the revenue from operations), are analyzed for the purpose of appraising the profitability of the project, regardless of the ratio of borrowed funds to the whole of the investment amount and regardless also of the repayment of borrowed principals and their interests.

b) Results of appraisal

The results of the calculations of the internal rate of return, arranging the flows of funds in the form of cash flows, and based on the conditions given above, are as shown in Table 3-9-13. The internal rate of return of -4.9%, shown in this table, indicates the impossibility of successful operation through self-earned funds alone. The NTV operation will be viable if supported with investment in shares from HMG of Nepal, but such support will worsen the finances of the government itself. Dependence on foreign assistance is unavoidable.

The Project will be feasible if NTV uses its own funds for investment in the construction of the office building attached to the broadcasting centre, the construction of power lines to the transmitting stations, land acquisition and levelling, etc., and relies on foreign donations for investment in the broadcasting centre and equipment, because this manner of investment will assure an internal rate of return of 18.6%, as shown in Table 3-9-14, which is 1.1 percent higher than the interest rate of 17.5% at which NTV obtains loans from bankers in Nepal. This 18.6% IRR will not only assure the development of financially sound NTV management, even if NTV procures loans on its own account, but will also allow NTV to refund the outstanding amount payable in 1985/1986.

In conclusion, it is advisable for NTV to rely on donations from foreign countries for investment in the fundamental equipment of the broadcasting network in order to ensure the feasibility of this Project. After completion of the fundamental equipment for the network, NTV expenses will be sufficiently covered by government subsidies, based on TV license fees, and revenue from commercials, and financially sound development of NTV can be expected.

Table 3-9-13

CASH FLOW STATEMENT

IRR = -4.8782%

(NRs. in Million)

Description	1987/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000	2000/2001
1. Revenue														
1) Government Subsidies (Licence fee)	14.5	15.0	15.5	19.4	24.5	29.6	34.7	39.6	48.1	57.5	67.0	76.4	86.6	95.0
2) Commercials Revenue	5.8	14.0	21.1	23.9	23.8	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total	20.3	29.0	36.6	43.3	48.4	56.7	61.8	66.7	75.2	84.6	94.1	103.5	113.7	122.1
2. Investment														
1) Land Cost and Levelling	—	9.4	3.7	—	0.6	—	—	0.2	—	—	—	—	—	—
2) Studio Building Construction	—	100.0	50.0	—	—	—	—	—	—	—	—	—	—	-107.3
3) Administration Building Construction	—	—	11.7	—	8.8	—	—	8.8	—	—	—	—	—	-22.8
4) Transmitting Facilities	—	50.0	111.7	—	131.6	—	—	38.7	—	—	—	—	—	-116.2
5) Programme Production Facilities	6.7	111.7	88.3	—	6.7	—	—	6.7	—	—	—	111.7	88.3	-157.1
6) Construction of City Power Line	—	1.2	14.8	—	58.4	—	—	12.0	—	—	—	—	—	—
7) Engineering Services	—	21.7	20.0	—	11.7	—	—	3.4	—	—	—	8.9	7.1	—
8) Contingency	—	8.3	8.3	—	6.7	—	—	1.9	—	—	—	3.4	2.6	—
Total	6.7	302.3	308.5	—	224.5	—	—	69.7	—	—	—	124.0	98.0	-403.4
												└Renewal┘		Residual Value
3. Operating Expense														
1) Programme Production	7.8	10.1	15.2	17.2	17.2	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
2) Maintenance and Repair	1.5	1.5	4.1	6.9	6.9	9.0	9.0	9.0	9.6	9.6	9.6	9.6	9.6	9.6
3) Electric Power Charge	—	—	0.9	1.5	1.5	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
4) Personnel Wages	3.0	3.8	4.8	5.9	6.2	6.6	6.7	6.8	6.9	6.9	6.9	6.9	6.9	6.9
5) Miscellaneous Expense	3.6	4.0	5.7	7.1	7.5	7.9	8.0	8.1	8.2	8.2	8.2	8.2	8.2	8.2
Total	15.9	19.4	30.7	38.6	39.3	44.8	45.0	45.2	46.0	46.0	46.0	46.0	46.0	46.0
4. Cash Surplus	-2.3	-292.7	-302.6	4.7	-215.4	11.9	16.8	-48.2	29.2	38.6	48.1	-66.5	-30.3	479.5

Table 3-9-14

CASH FLOW STATEMENT *1

IRR= 18.5644%

(NRs. in Million)

	1987/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000	2000/2001
1. Revenue														
1) Government Subsidies (Licence fee)	14.5	15.0	15.5	19.4	24.5	29.6	34.7	39.6	48.1	57.5	67.0	76.4	86.6	95.0
2) Commercials Revenue	5.8	14.0	21.1	23.9	23.9	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Total	20.3	29.0	36.6	43.3	48.4	56.7	61.8	66.7	75.2	84.6	94.1	103.5	113.7	122.1
2. Foreign Donation *2(Studio Building and Broadcasting Facilities)	—	291.4	277.4	—	154.7	—	—	48.1	—	—	—	—	—	—
3. Investment(Nepal)														
1) Land Cost and Levelling	—	9.4	3.7	—	0.6	—	—	0.2	—	—	—	—	—	—
2) Administration Building Construction	—	—	11.7	—	8.8	—	—	8.8	—	—	—	—	—	-22.8
3) Programme Production Facilities	6.7	—	—	—	—	—	—	—	—	—	—	111.7	88.3	-154.0
4) Construction of City Power Line	—	1.2	14.8	—	58.4	—	—	12.0	—	—	—	—	—	—
5) Engineering Services	—	—	—	—	—	—	—	—	—	—	—	8.9	7.1	—
6) Contingency	—	0.3	0.9	—	2.0	—	—	0.6	—	—	—	3.4	2.6	—
Total	6.7	10.9	31.1	—	69.8	—	—	21.6	—	—	—	124.0	98.0	-176.8
												└Renewal┘		Residual Value
4. Operating Expense														
1) Programme Production	7.8	10.1	15.2	17.2	17.2	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
2) Maintenance and Repair	1.5	1.5	4.1	6.9	6.9	9.0	9.0	9.0	9.6	9.6	9.6	9.6	9.6	9.6
3) Electric Power Charge	—	—	0.9	1.5	1.5	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
4) Personnel Wages	3.0	3.8	4.8	5.9	6.2	6.6	6.7	6.8	6.9	6.9	6.9	6.9	6.9	6.9
5) Miscellaneous Expense	3.6	4.0	5.7	7.1	7.5	7.9	8.0	8.1	8.2	8.2	8.2	8.2	8.2	8.2
Total	15.9	19.4	30.7	38.6	39.3	44.8	45.0	45.2	46.0	46.0	46.0	46.0	46.0	46.0
5. Cash Surplus	-2.3	-1.3	-25.2	4.7	-60.7	11.9	16.8	-0.1	29.2	38.6	48.1	-66.5	-30.3	252.9

*1 Above statement are made under the Foreign Donation, Partially.
*2 Investment of foreign portion: Studio Building Construction, Transmitting Facilities, Programme Production Facilities, Engineering Services and Contingency.

(2) Social appraisal

In its 7th Economic Development Plan (1985/1986 - 1989/1990), HMG of Nepal projects the targets and strategies as follows.

1) Targets
   - o Acceleration of expansion in production
   - o Creation of high-productivity employment opportunities
   - o Fulfillment of minimum basic needs of the national people

2) Strategies
   - o Priority is placed on agriculture
   - o Importance is also attached to the development of forest resources
   - o Promotion of the development of water resources
   - o Promotion of industrial development
   - o Promotion of the development of exports
   - o Promotion of the development of tourism
   - o Control of population increase
   - o Firmer consolidation of national economic activities and strengthening of their foundations
   - o Promotion of decentralization of decision-making processes and executions of decisions
   - o Reinforcement and activation of administration for development

HMG of Nepal hopes for much from TV as a mass communication medium to serve as an auxiliary means for the achievement of these targets and strategies, and expects an early development of the broadcasting network since it is a public need.

The principal purpose of the TV network expansion plan in Nepal is broadly to create the prime mover for the development of the national economy and for the formation of national consciousness among all the people. More specifically, the plan is intended to educate the people through the medium of television while providing them with educational, living, occupational and craftsmanship information in a manner understandable to the people. Moreover it will provide entertainment and amusements which most people in the nation do not yet have. The ultimate objective is to contribute to the economic and social development of the nation.

The more the people of Nepal can enjoy TV broadcasts, the greater will be the desirable effects, including:

- the diffusion and enhancement of the consciousness of a single, unified nation through the same information being simultaneously transmitted to different races and to communities having different religions;

- the diffusion of education and the improvement of the educational level through the provision of homogeneous, quality educational programmes for the educational environment of schools where there is a shortage of competent schoolteachers;

- an improvement in national culture and literacy through the transmission of information in a manner easily understandable even to illiterates;

- the eradication of infectious diseases and parasites through the penetration of correct information to those who lack knowledge of health and sanitation;

- the diffusion of birth control knowledge for the control of the population increase;

- the supply of agricultural and other technical information;

- the nationwide diffusion of knowledge and practical visual instruction concerning forest protection and the plantation of trees;

- the promotion of the development of domestic industries and the economy; and

- the supply of weather forecasts, governmental information for the public, news, and other information closely related to the daily lives of the people.

At present, only 1.5 per cent of the total population of Nepal enjoy the delights of television. This Project, which intends to extend the pleasure of television to about 63 per cent of the population by raising the coverage of broadcasting and by the use of CVCs, will undoubtedly make a great contribution in assisting the progress of the nation towards a modern state.