CHAPTER 4 Programme Transmission Plans

The question of transmission of programmes has two aspects to be considered, namely, the transmission of completed programmes to regional transmitting stations and that of programme materials from different broadcasting stations to Islamabad. As for the transmission of programme materials to Islamabad, the materials in principle may be sent by using microwave up-circuit during the night-time or by airfreight or motorcar transport, because they are pre-packaged as completed programmes. Although ETV programme can be off-line basis because of the educational purpose, but has also an aspect of being a channel to supplement the services of the 1st channel. For example, there is a need for transmitting TV coverage of an event of national importance in which the entire nation would be interested to watch TV, on a semi-real time basis.

Here, considerations on the questions relating to the transmission of TV programmes to different rebroadcast transmitting stations will be described.

4-1 Transmission via Terrestrial Circuits

The terrestrial transmission lines, such as coaxial cables and microwave circuits, are capable of transmitting signals only between two points that can literally be linked with a straight line. In a country like Japan where the territory is small and microwave networks are well developed, the terrestrial lines may be a very effective means of transmission. However, in a country like Pakistan where the land is spacious but where greater part of the territory is uninhabitable mountains or deserts, an enormous amount of construction expenses would be required if the entire country were to be covered with a microwave network. And, once such a network is completed, its operational expenses would certainly be quite substantial. Take, for example, the case of the United States. Even though their microwave network had almost been completed, the transmission of TV signals is at present conducted almost entirely via DOMSATs as a result of the development of the domestic satellite system and also in view of high operational expenses and maintenance cost of microwave circuits.

4-2 Transmission via Satellite

In terms of functions, the terrestrial microwave network does have an advantage in that it enables two-way transmissions, whereas the satellite allows only one-way transmission. Since its purpose is Broad Cast: therefore the latter is the most suitable means of distributing TV signals widely for broadcast use. By using a satellite, reception of TV signals would become feasible anywhere in the country including the remote mountainenous and rural regions, just by installing a comparatively inexpensive, simple TV receiving device (TVRO: TV Receive Only) at a terrestrial rebroadcast station.

Transmissions (distribution of signals) via satellite are the services covering the entire country. They are, therefore, the best means of transmitting TV programmes, which involves distribution of a single kind of signal to multi-points across the country, all at a time. In the present case, the point of transmission is the transponder installed on the satellite in geostationary orbit at an altitude of 36,000km above the equator. And in order to receive the signals re-emitted from the satellite, all that needs to be done is to set up a TVRO at an appropriate location for reception of the signals. With such a TVRO, transmissions (distribution of signals) become feasible at low cost of operation. However, there will be the need of constructing a U/D-link earth station. And it must be borne in mind that the cost of constructing a U/D-link earth station is just as expensive as that of constructing a high-power TV transmitting station.

As for the U/D-link earth station, it would be appropriate to install it at the TV Centre to be newly constructed for the 2nd channel at Islamabad H-9. But in Karachi, too, necessary U/D-link facilities will be installed for transmission of programme materials so that the materials may be transmitted, at a time of such as national event etc. The reasons are as follows:

1) As Pakistan's foremost centre of economy and trade and also as an international city, Karachi abounds in all kinds of events attracting nationwide interest. So, for simultaneous coverage of those events, there will be an increasing need of using the 2nd

channel as well, even though the frequency of such use may not be so much from the begining.

2) The up-circuit to Islamabad of the terrestrial microwave lines is currently used for transmission of programme materials for the 1st channel and so is unavailable for ETV. Furthermore, Karachi TV Centre plays a major role in PTV's programme production activities and produces a large volume of programmes. Besides, Karachi and Islamabad are about 1,000km apart and there are only three domestic flights a day between the two cities to carry packaged programmes.

3) Even during the night-time (0:00a.m.~6:00a.m.), there are cases where the microwave circuits are used by GTV as up-circuits. Moreover, during the early morning hours, too, the microwave circuits are normally used for morning transmission of programme materials (See Fig. 4-1) and therefore, there is not enough microwave circuits available to transmit all of the locally-produced programmes during the night-time when the microwaves are not in use. It is therefore proposed that the programme materials produced by Karachi TV Centre for the 2nd channel can be transmitted to Islamabad via satellite transponder.

For reasons mentioned above, it is proposed that a U/D link should be installed in Karachi, a city farthest (about 1,000km) from Islamabad, so that from there the programme materials including that linked from Quetta TV Centre may be transmitted to Islamabad.

Fig. 4-1 How Microwave Circuits For ISLAMABAD PTV Centre Are Used At Present

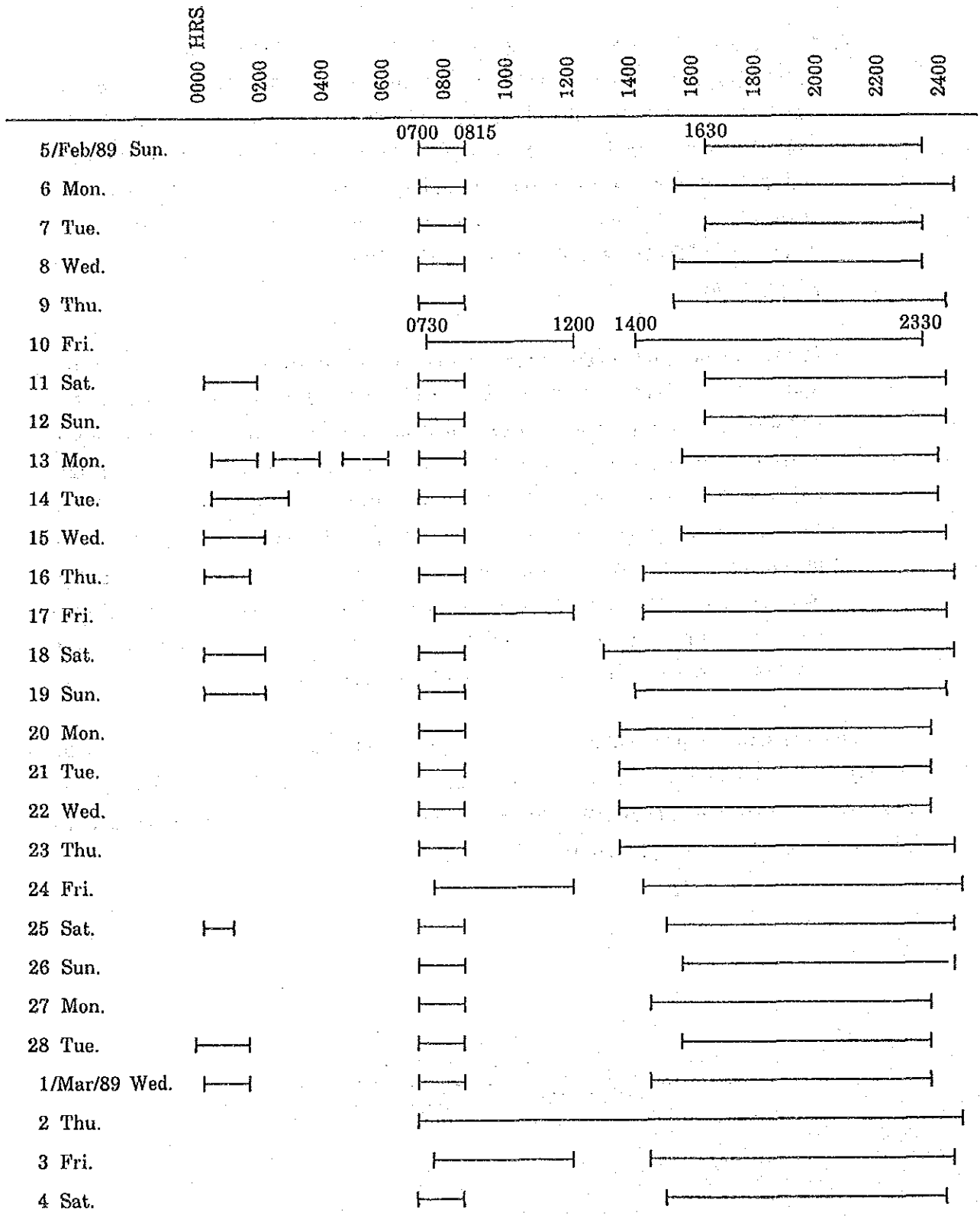
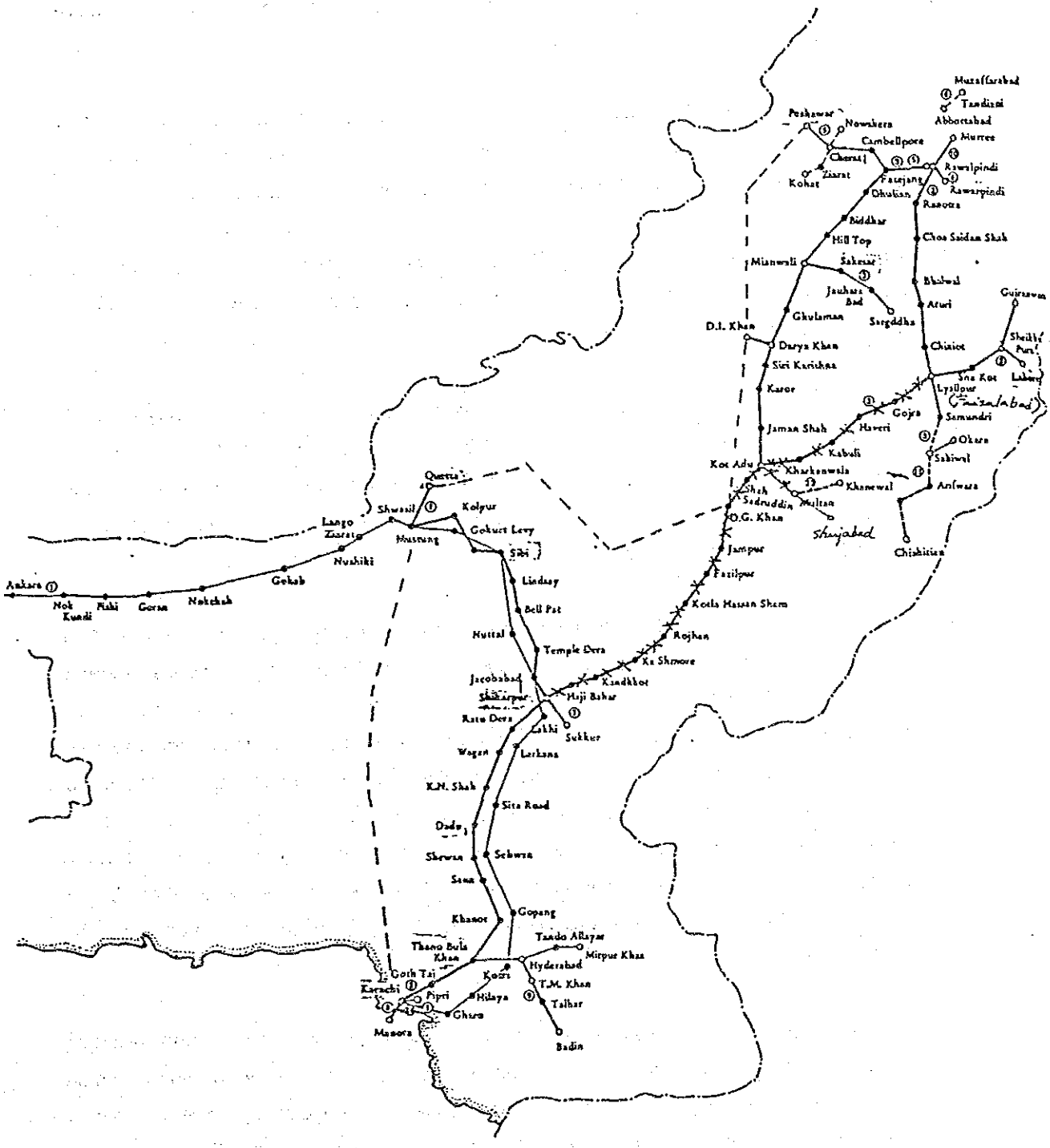


Fig. 4-2 EXISTING MICROWAVE NETWORK IN PAKISTAN



4-3 Advantages and Problems of Transmitting Programmes via Satellite

Transmission of ETV programmes via satellite has a number of advantages as compared with transmission using terrestrial microwave network, such as:

(1) Constructing earth stations for satellite transmission would take much less time to complete them than the construction work to increase the capacity of the microwave network in current use.

(2) As far as the ground facilities are concerned, the cost of construction for satellite transmission is much smaller than that of expanding the microwave network.

(3) In the case of satellite transmission, none of such propagational problems (for example, troubles caused by fading) that are apt to occur to terrestrial microwave networks would arise. Moreover, the cost of maintenance would be smaller because the maintenance of ground facilities is easy.

(4) Although an attempt has been made by Pakistan to launch a satellite (SPARCO) on its own purposes, this would require an enormous amount of initial investment. However, if there were a satellite available for lease, then, a nationwide coverage could be achieved immediately simply by paying the annual lease. But if a terrestrial microwave network with equal functional capacity were to be constructed, this would involve an enormous amount of cost (even up to some certain coverage, it will cost more than 9,500 MRs and takes more than 5~10 years to construct it.) which is incomparably higher than that of the method using satellite.

(5) For such reasons as mentioned above, India started its experimental satellite TV transmissions as early as 1975 and has already been conducting regular full-scale satellite broadcasting since 1982. Meanwhile, Indonesia launched its PALAPA satellite in 1976 and has been using it successfully for broadcasting.

Regarding the transmission of programmes by satellite, there are problems such as the following:

In order to operate satellite transmission by PTV, PTV have to master the satellite system, not only technical operation and maintenance but also international as well as internal operational regulations as required.

4-3-1 Cost Comparison between Satellite Transmission System and Terrestrial Microwave Network

(1) Outline

In this section, a comparison in costs will be made between two systems of programme transmission from a TV Centre to a transmitting station; one using satellite and the other using microwave network. Regarding the construction costs for terrestrial microwave network, assuming that only the expenses required in adding one more circuit for use by ETV to the existing microwave network circuits are taken into account, that is, the expenses including the construction cost for a total distance of 3,500km, the additional construction of the portions from terminal stations to transmitting stations and the additional construction expenses required in ensuring that the quality of the pictures of the materials transmitted via the microwave circuits is equal to that of the satellite. The estimated construction expenses do not include the possible cost of newly constructing microwave circuits extending to the northern regions and to the southern coastal districts where there are no microwave network as yet.

To make the comparison, annual totals have been estimated, on the following assumptions:

1) Following examples of T&T, the depreciation period shall be 20 years.

2) For maintenance expenses, 4.5 percent of the total construction expenses has been set aside.

(2) Construction Expenses (in millions)

1) Expenses relating to Satellite

a) Construction of earth stations (for two stations; one each at Islamabad and Karachi)	29.2 M.Rs	(Exchange rates: 19 Rs/1 US$)
b) TVRO (42 stations, excluding Karachi)	30.69 M.Rs	
Sub total:	59.89 M.Rs	

2) Expenses relating to Terrestrial Microwave Network

a) Additional construction to the existing microwave network (incl. an additional circuit and improvements)	302.1 M.Rs
b) Construction of one hop link of STL between each microwave terminal and transmitting station (only the 29 stations accessible from the existing microwave circuits while the satellite can have access to every corner of the country)	53.5 M.Rs
Sub total:	355.6 M.Rs

(3) Annual Expenses (in Rupees)

1) Expenses relating to Constraction

Item	Satellite	Microwave
a) Depreciation over the period of 20 years (1/20 of construction expenses)	2,997,250 Rs	17,780,200 Rs
b) Maintenance (4.5% of construction expenses)	2,697,525 Rs	16,002,180 Rs
Sub total:	5,694,775 Rs	33,782,380 Rs

2) Expenses relating to Operation

Item	Satellite	Microwave
a) Satellite lease fee	32,300,000 Rs	——— Rs
b) Microwave circuit lease	——— Rs	19,000,000 Rs

(These estimates have been made on the assumption that amounts of lease fee would be basically the same as those currently applied to GTV per annum)

Sub total:	32,300,000 Rs	19,000,000 Rs
Total:	37,994,775 Rs	52,782,380 Rs

(4) Conclusion

From the estimation made above, it seems that the operational expenses for the transponder are higher than those for the microwave network. But, in the near future, it is supposed that transponder lease fee will be decreased with enough supply in the market, and the total annual costs including construction and maintenance costs relating to satellite are far lower than those relating to microwave network at present. Moreover, whereas only 29 stations are accessible by microwave circuits, more than 1,000 TVROs to be set up in future throughout the country for satellite transmission. And the period of construction for microwave network is far longer than that of transmission via satellite. Thus, it is evident that, the transmission via satellite has a clear advantage over the transmission via microwave network.

4-4 Satellites

4-4-1 Present Status of Satellite

As satellites which Pakistan will be able to use for transmission of TV programmes, the following six can be considered;

① INTELSAT (the spare Indian Ocean Satellite) with the spot beam of Ku-band,

② INTELSAT global beam of C-band,

③ INTELSAT hemishere beam of C-band,

④ ARABSAT the fringe of C-band spot beam,

⑤ ASIASAT C-band spot beam and

⑥ PAKSAT, the national satellite to be launched by Pakistan on its own.

Following are some of the results of research made so far:

(Notes)

There are three different forms of satellite beams; global beam, hemisphere beam and spot beam.

① The global beam is that emitted or received between the satellite and the entire range on the earth (more than 42.4% of the earth's surface). Although the range in which communication is feasible is quite large, an earth station equipped with a larger transmitting-receiving antenna will be required, because the radiowave is proportionately weaker.

② The hemisphere beam is emitted by setting the satellites antenna in such a way that the beam may cover a half of the earth's surface. In this case, the range of earth's surface from where the satellite is visible is divided into two areas of either east and west or north and south. In the case of this hemishere beam, the strength of radiowave is nearly double that of the global beam even if the output of the satellite (the transponder) may be the same. Thus, communication is feasible by using a smaller parabolic antenna.

③ The spot beam is emitted by adjusting the satellite's antenna so that the emission and reception of radiowave may be confined to some certain narrower range. It is for use in covering a particular area of the earth's surface as in the case of the DOMSAT (domestic

satellite). The radiowave reaching the earth is made stronger by the narrowing-down adjustment as the spot beam.

In the satellite terminology, the "fringe" literally means the "edge." The radiowave from the satellite is weak at "fringe". The radiowave from the satellite is the strongest at the centre of the spot area covered by the spot-beam radiowave from the satellite and this central portion is called either the "beam centre" or the "boresight".

EIRP is the abbreviation of the term, "Effective Isotropic Radiated Power" which represents the value showing the strength of the radiowave signal from the satellite. In the case of the global beam from the INTELSAT, the EIRP is about 26-27dBW at the boresight and about 23-24dBW at the fringe. In the case of the domestic satellite, EIRP is about 37dBW at the boresight.

The "dBW" is the unit showing the decibel power per 1W and indicates the strength of the arriving radiowave. This "dB" is also a multiple used in comparing high-multiplication data; 3dB means double, 10dB means ten times, and 20dB means 100 times. So, in comparison between the INTELSAT Global beam and, the Spot beam for Domsat, there is a difference of 10dB between 27dB and 37dB and so, it is easily understood that there is a big difference of 10 times.

(1) INTELSAT (the spare Indian Ocean Satellite)

There are at present three INTELSAT satellites in orbit above the Indian Ocean; the Major Path (60°E), the Primary (63°E), and the Spare (66°E). The first two are used for international communication which is INTELSAT's main line of business and are, at present, full occupied in terms of the transponder available. So, the satellite availabe for the Project's need is only the Spare (66°E) Indian Ocean Satellite. And besides, this Spare satellite is of stand-by nature for emergency use so that when either of the Major or the Primary is in trouble it has to be replaced with the Major or Primary operation. But so far, none of such cases has occurred. Therefore INTELSAT offers the relatively non-busy transponders for users. This Spare satellite has total twenty seven transponders for C band plus Ku band, as regard to Ku-band, the spot beam is preferable but there is no vacant Ku-band spot transponder at present, since both of the two have been already used by Turkey and Iran. In the case of the

INTELSAT, there would be only the C-band global beam or the hemisphere beam available. In this case, EIRP would be about 27dBW and, therefore, it is necessary to use an antenna with a diameter of over 7.5m for the TVRO provided that full transponder is used. Meanwhile, if the hemisphere beam were to be used the field intensity obtainable would be about the same as that of the global beam, since, Pakistan, a country located right in between the eastern and the western hemispheres, can receive only the fringe of the eastern-hemisphere beam.

(2) ARABSAT (C band spot beam)

While the ARABSAT emits C band spot beam, it is "fringe" from the point of view of Pakistan and the field intensity obtainable is just about the same as what can be obtained from the C band global beam of the INTELSAT.

The ARABESAT is a satellite launched under a joint investment by 22 Arab nations. Since Pakistan is not affiliated with this joint venture, it is naturally placed in an unfavorable position with regard to the use of the satellite.

(3) ASIASAT (C band spot beam)

The field intensity of the beam from this satellite is about 10dB (about 10 times) higher than the previous two satellites and the TVRO can receive the transmissions from ASIASAT with an antenna of about 3-4m in diameter. However, the problem is that ASIASAT has not yet been launched and the launching period provided for in the contract is up to the end of January 1990 (with an allowance of a delay of three months, which means that the launching may be delayed until the end of April 1990). For the launching of the ASIASAT, more than 1.2 million U.S. dollars have already been paid. At present, NEC of Japan under contract is constructing the main ground control station facilities to be installed in Hong Kong and the subcontrol station facilities to be set up in Bangkok. So far, a total of 18 launchings were conducted using the Long March rockets constructed by China, and all but one of which were successful.

(4) PAKSAT (Ku band spot beam)

This is the satellite to be launched by Pakistan on its own. With this satellite which uses 7-9 transponders of Ku band spot beams, Pakistan plans to conduct communication with remote regions and transmission of TV programmes. As of this moment, the satellite is planned to be launched at the end of 1991 according to the papers submitted to the IFRB. According to the planned values, the field intensity to be obtained is about 10dB higher than that of the ASIASAT and is supposed to be about 49dBW. This means that it is going to be something quite close to the direct broadcasting satellite currently used in Japan. With the size of the TVRO being made smaller, this PAKSAT is going to be an ideal satellite. However, there as yet is no prospect of Pakistan's being able to secure financial resources for the large amount of expenses required, including the cost of constructing the satellite, the expenses for the ground control station and those for launching. Therefore PTV has no plan, either, of using this PAKSAT in connection with the present ETV project for the time being.

In view of the results of surveys as outlined above, the satellite to be considered for possible use in the present project will be either the C band global of the INTELSAT or the C band spot of the ASIASAT. However, at this stage, it is better to refrain from specifying any particular satellite. Especially, according to the recently occurred dispute in Beijing in China, it seems to be difficult to launch the ASIASAT which is now in the U.S.A. Hughes Aircraft Co. by using the China's Long March rocket. Once the ASIASAT could not be launched by the Long March rocket, ASIASAT would be confronting a very difficult situation, because the half of the transponders are for Chinese users. Therefore, at this moment (August 1989) the Intelsat may seem to be practical solution but the decision making should be done by PTV before the end of May 1990. And this was confirmed in the Minutes between the JICA Team.

4-4-2 Staff Plan of Satellite Operation

In case the Intelsat Satellite is used, PTV is to take charge of the earth station, since the satellite is used domestically. In that

operation, the most part of daily routine works will be coordination reporting with the Intelsat ground control station, based on the Intelsat operation manual, and adjustment & maintenance requiring constant daily handling operation will be less frequent.

PTV has been training the core of engineers, two each (four in total) at Islamabad and Karachi ETV Centres where U/D link is each set up. These engineers have to be trained to grasp the whole system of satellite communication, and to acquire operational technique on maintenance works including measures against malfunctions, for instance on the occasion of installation works of the equipment.

Both U/D link stations at Islamabad and Karachi need respectively a staff of five (ten in total) for daily operation, including the two core members. As for daily routine works such as meter-watching of TVRO at every rural rebroadcast station except for Karachi station, training and practice will be sufficiently possible for local staff members on the occasion of equipment installation at each station by the core PTV engineers and foreign engineers.

4-5 Transponders and Up/Down Links

4-5-1 Transponders

(1) Initially, PTV's plans were to establish a system of three transponders with five TV channel and five uplinks. However, these plans seem to be impractical because:

1) These are too big plans which seem to be financially unrealistic.

2) It would be too expensive (One transponder's lease cost: about 32.3 MRs/year) if five different programmes could be broadcast simultaneously. But in order to achieve this capability, this would mean for PTV to be requested to enhance its programme production ability about five times (or a total of six times) the present level at a stroke, since it currently broadcasts only one programme nationwide at a time. It seems to be evident that these plans are impractical from the current conditions at PTV in such aspects as work force, including the production and engineering staff, studio facilities, equipment and finance.

For these reasons, it has been decided that only one transponder should be used in connection with the present ETV project.

(2) However, it was found that there had been good social, educaitonal and political reasons why PTV had drawn up its plans to use three transponders and five uplinks. In Pakistan, the four Provinces differ from one another in languages and in customs and all of them maintain firm independence, and that Islamabad, the federal capital of the four Provinces, cannot cover its entire need of programme sources without depending on other Provinces for supply of local programme materials.

Furthermore, owing to the following two reasons, it is not preferable to broadcast programmes nationwide in a single language in Pakistan in terms of ETV programmes.

1) In order to achieve substantial results in education, the first thing that needs to be done is to broadcast the programmes in the respective local languages so as to ensure that the contents of the programmes are properly understood by the illiterate public.

2) There are regional differences in people's evaluation of importance of problems, interpretation of questions and focal points of interest.

(3) It is the four-language multiplexed transmission that tries to respond to the above-mentioned aspects as far as possible and also to solve the problems brought up in item (1) above. As for the transponder, it would be appropriate to adopt the full transponder (bandwidth is 36MHz), in view of the amount of expenses that needs to be borne with regard to the TVRO (reception is feasible with a lower-cost TVRO).

Furthermore, apart from the question of distribution of TV programmes, it is proposed that, for reasons mentioned in 4-2 above, a sub U/D link should be set up in Karachi for back-up purpose of main U/D link in Islamabad and for transmission of programme materials.

4-5-2 Up/Down Link (U/D link)

Regarding the required number of U/D-link earth stations that transmit signals to satellite (transponder) and receive signals from satellite, PTV at first planned to establish one at each TV Centre, totalling five stations. However, these seemed to be a rather inefficient equipment-investment because, even if the number of U/D links per transponder may be increased, only one station at a time can use the transponder. Besides, each U/D link earth station costs about 15 million Rs which is just about the same as the cost of constructing a high-power TV transmitting station. For that reason, it would be appropriate to install a main U/D link in Islamabad and another U/D link for back-up purpose and for programme material transmission in Karachi sation. As for the earth station for INTELSAT-DOMSAT at the Malachh satellite earth station in the suburbs of Islamabad, which is currently operated by T&T,

it is scheduled for use in distributing signals to some of the regions served by GTV (Gilgit, Skardu and Gwadar). Some test tansmissions are already underway from Islamabad to Gilgit and so this earth station cannot be used for the new ETV channel.

The main U/D link is planned to be installed on the roof of the new ETV Centre in Islamabad.

As mentioned earlier, Karachi is a base for programme production but it is as much as 1,000km away from Islamabad, and there is little vacant time in terms of microwave up linking for sending the programmes of Karachi and Quetta. On the other hand, the satellite transponder leased on long term for transmission of programmes for ETV is remaining unused while ETV is off the air (supposed in daytime and in midnight). So, from the point of view of making effective use of the transponder, too, a plan is being made of installing a sub U/D link in Karachi so that the above-mentioned programme transmission can be solved. The sub U/D link will be installed on the roof of the Karachi TV Centre.

As for the programme materials produced in the TV Centres at Lahore and Peshawar, the completed programmes recorded on tapes may be, at first up linked by using terrestrial microwave network, or transported by either cars or airplanes, since these two cities are relatively near from Islamabad and, besides, there are about five domestic flights a day to Islamabad.

4-6 TVROs

As regards TVROs, the diameter of each parabolic antenna varies according to the field intensity of the satellite signals. As mentioned above, if the field intensity were just about the same level as that of ASIASAT, the diameter of the antenna required might be not more than 3-4m. But if the field intensity were lower, then, the antenna would have to be about 7.5m in diameter and this would be unsuitable also from financial point of view. In order to eventually attain 100% coverage, there is the need of increasing the number of TVROs to be set up. For that reason, the TVROs should be kept both small and at low cost. In the future, in the case where ETV is to be further expanded beyond what is planned under the

present 5-year project, or even during the last three years of this 5-year project, it is quite possible to use the Pakistani-manufactured equipment of TVROs, since the manufacturing industry of Pakistan has promising capability for the production of such equipment. In that case, the construction expenses for TVROs can be reduced further. Besides, if TVROs could be constructed at a lower cost, there would arise the possibility of adopting a system in which signals from the satellite may be received directly by CVCs, in the same way as programmes are received directly by individual households from a broadcasting satellite. However, assuming that this project would be implemented in fiscal 1990 onwards, and also taking into account the possibility of a failure in the launching of the ASIASAT on schedule, we would then inevitably have to base our plans on the use of the existing INTELSAT satellite in carrying out this project as far as enough practical project planning is concerned. And when the ASIASAT successfully goes into orbit and starts its services, as scheduled by April 1990, it is better to switch to the ASIASAT.

4-7 STL

Generally, STL (Studio to Transmitter Link) is used when studio (TV Centre) and transmitting station are far away from each other.

This project has been based on the principles of establishing a TVRO at each Rebroadcast transmitting station so that the signals received from the satellite may be directly fed to the transmitter. This has made any STL unnecessary even in the case of a broadcasting station whose studio (TV Centre) and transmitting stations are far away from each other.

In the case of Islamabad, however, an STL (two-way) will be required in linking the new ETV Centre at H-9 with the existing GTV Centre. Following are the reasons:

- The existing TV Centre and the new ETV Centre to be constructed are located about 10km away from each other in Islamabad city.

- The new ETV Centre is scheduled to operate under the 1/2-inch tape system, whereas the GTV Centre is using various types of VTR including 3/4-inch tapes. Because of this difference in tape

size, there will be the need of the signals received directly from the Headquarters being recorded in other types of VTR.

- Although the ETV programme materials are scheduled to be sent, in principle, in tape form, there still be the likelihood of the materials being transmitted via the microwave link when microwave circuit is available.

- There also may be cases where GTV programme is recorded at the ETV Centre in order to rebroadcast the programme on ETV later on.

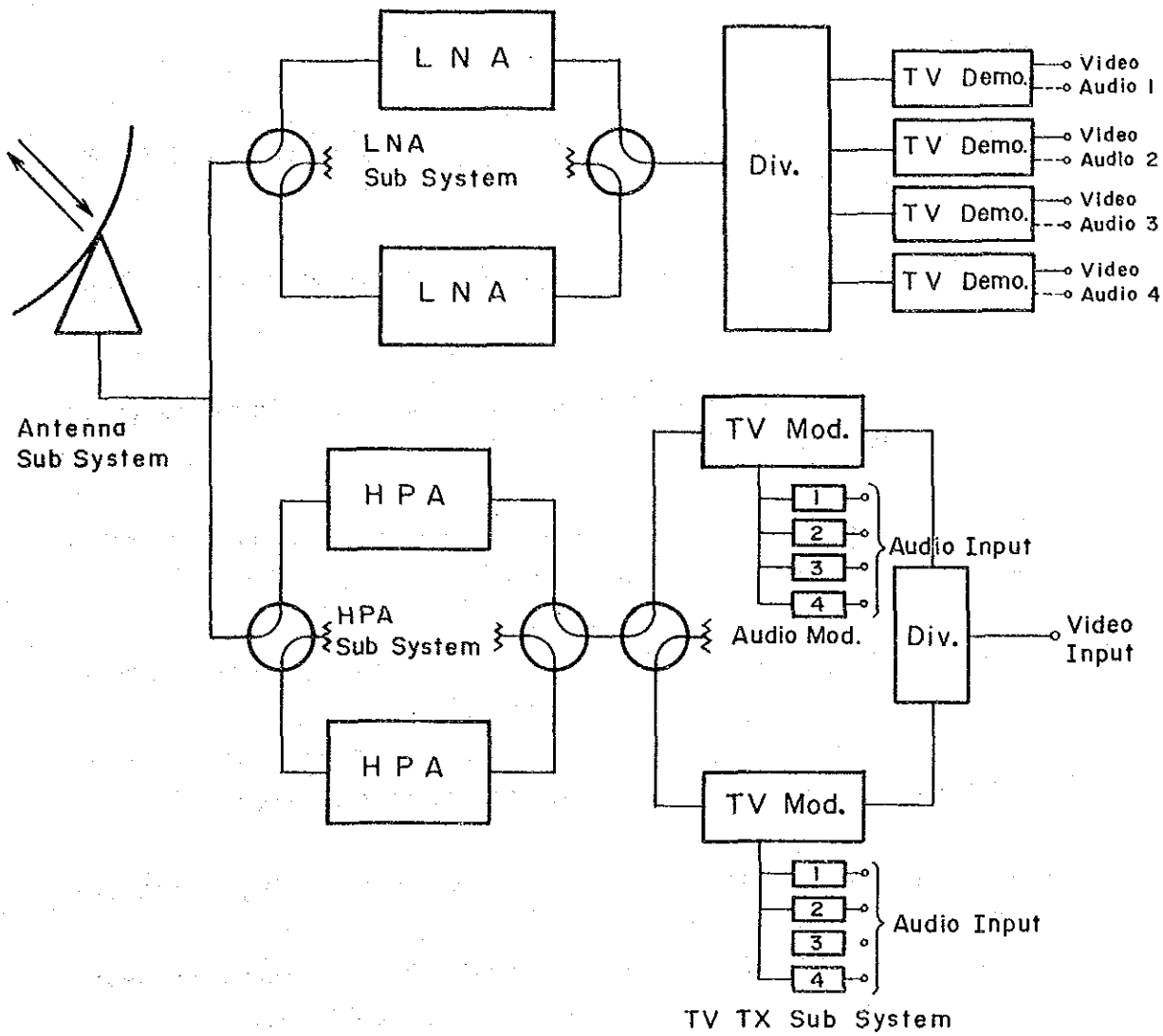
- In view of the difference in tape size between the GTV and ETV Centres and also of the frequent failures happening to the intra-city telephone lines, the communication circuits between the two Centres will be multiplexed on the STL.

4-8 Composition List (Initial 2-Year Plan)

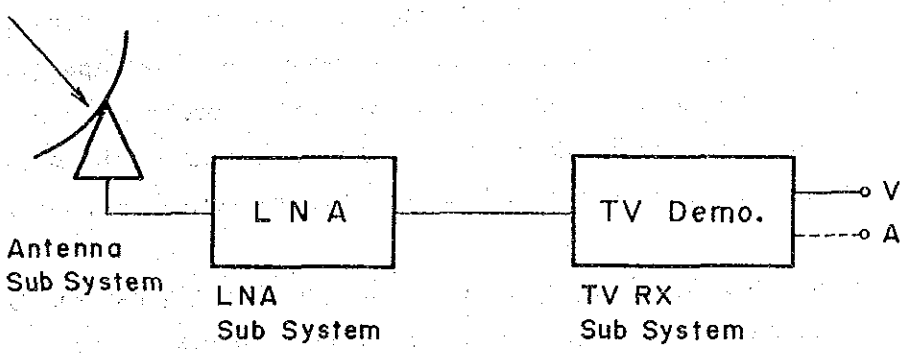
Table 4-1 Composition List of Transmission Equipment (Initial 2-Year Plan)

Main U/D Link in Islamabad	Antenna subsystem	1 set	
	LNA subsystem	1 set	LNA: Low Noise Amp.
	HPA subsystem	1 set	HPA: High Power Amp.
	TV TX subsystem	1 set	TX: Transmitter
	TV RX subsystem	1 set	RX: Receiver
Sub U/D Link in Karachi	Antenna subsystem	1 set	
	LNA subsystem	1 set	
	HPA subsystem	1 set	
	TV TX subsystem	1 set	
	TV RX subsystem	1 set	
TVRO (15 stations)	Antenna subsystem	1 set	
	LNA subsystem	1 set	
	TV RX subsystem	1 set	
STL (GTV ~ ETV)	TV STL subsystem	1 set	
	TV TSL subsystem	1 set	
	Antenna subsystem	1 set	

4-9 Composition Diagram (Fig. 4-3)



U/D Link System Diagramme.



TVRO System Diagramme

CHAPTER 5 Plan of Rebroadcast Station Facilities

5-1 Channel Planning

(1) On the channel planning of ETV network the following principles are taken into consideration.

1) For the convenience of viewers, the polarizaion of ETV wave should be the same as GTV.

2) As a rule, the directivity of ETV transmitting antenna is to be the same as that of GTV.

3) Offset carrier system is entirely adopted so as to make possible more TV stations built in the VHF band.

(2) TV channel arrangement in Pakistan is according to the European System; however, among twelve VHF channels, ch. 1, 2, 3 and 12 are currently used for other purposes as national defence. As a result, TV channels available are limited only to the rest of eight.

(3) In the planning, incomming waves from neighbouring countries including India must be considered.
In Lahore district, which is near the Indian border, there are waves of ch. 7, 9 and 11 from India as well as ch. 5 of GTV Lahore.
Consequently a UHF channel has to be used to avoid co-channel or adjacent channel interference. Lahore district is covered by the Kalashah Kaku transmitting station.

(4) Regarding the transmitting stations of Murree, Sakesar and Cherat, they are on the mountain tops, and the coverages are overlapping. UHF channels are to be used at Murree and Sakesar in order to avoid interferences. To these three UHF stations, lowest frequncy channels of Band IV, which are usually applied to the UHF key stations, will be assigned.
As for the station Cherat, it is supposed to be possible to use ch. 5 by changing the channel of Morasar station from five to six.

(5) On a belt zone along the Indus Plain extending from Lahore to Karachi, TV stations are lying like stepping-stones. As it is neither allowed to use adjacent channels at the same district nor to use co-channel at the adjacent district, alternate arrangement of odd and even number channels would be the most effective way.

A process is planned and shown below, by which, utilizing the opportunity of ETV equipment installation, PTV will finally be able to reach this pattern without confusion.

	GTV					ETV
	Present Statns		Modification			
	CH.	Odd/Even	Odd/Even	CH.	Phase of Implementation	CH.
Kalashah Kaku	5	Odd				UHF
Indian stations:						
Amritsar	7					
Jalandhar	9					
Nikial	11					
Sahiwal	10	Even			Phase 2	8
Faisalabad	6					UHF
Shujabad	8	Even	→Odd	7	Phase 1	5
Jamal Din Wali	10	Even			Phase 2-2nd Year	8
Shikarpur	8	Even	→Odd	7	Phase 2-1st Year	5
Nurpur	5	Odd	→Even	6	Phase 1	10
Tando Allahyar	11	Odd				9
Karachi	4					4 ↓
Karachi(new)	7	Odd	→Even	8	Phase 2	6

(6) Possibility of Off-air Relay

Off-air relay is the system, in case a clear signal of wanted programme is received in the vicinity of the station, this signal is put into the translator, the channel is converted, amplified and rebroadcast.

Among the stations the survey team visited, there is no possibility of off-air relay because most of them are too far apart each other. Only one station Lakpass is utilizing the off-air wave of Quetta TV Centre, but PTV is preparing a microwave relay equipment to replace, because of inferior quality due to the weak received signal.

5-2 Rebroadcost Station Facilities Plans

5-2-1 Consolidation of ETV transmitting Equipment

(1) Antenna

1) VHF Antenna

Four-dipole pannel antenna, which is dominantly used by PTV, has excellent VSWR (Voltage Standing Wave Ratio) characteristics and can be used nearly whole range of Band Ⅲ. Slight deterioration has been observed in some of them, however, the picture quality is not bad. Consequently, all large scale GTV antennas of Band Ⅲ are to be used in common with ETV.

2) UHF Antenna

a) Antenna

Four-dipole pannel antenna will be used as it is excellent also in UHF Band.

Omni-directional antennas having equal four faces are used for many stations, while if the GTV antenna is directional, UHF antenna of similar directivity will be adopted.

b) Feeder

For the UHF 30kW staiton 152D type cable is used according to the rating of power handling capacity and attenuation. Since the inside air volume is great, an exclusive dehydrator will be installed.

(2) Tower

1) VHF antenna tower

Four-dipole panel antenna is used in common at all the stations of 10 kW and 20 kW output, while separate ETV antenna will be mounted on the GTV tower at the middle or smaller power stations. Therefore, no new tower is needed.

2) UHF antenna tower

Existing towers are to be used as far as possible.

a) Murree and Kalashah Kaku stations

UHF antenna is mounted on the existing tower on the space below the VHF antenna.

b) Sakesar station

Although there is no space on the existing tower, some extension is possible. So the UHF antenna is put on the extended part of the tower.

(3) TV Transmitters

1) Single TV Transmitter Operation System

Taking a quite improved reliability of recently made TV transmitter together with the requirement of as many TV transmitters as possible will be installed within the limited initial investment cost amount, each ETV transmitter to be built in this project is to be single system which has no spare one.

2) Type of adopted transmitters

Under present technical and price conditions, it is most economical to use all-solid-state type under 3kW output, tetrode type for VHF and klystron type for UHF over 3kW output.

An automatic voltage regulator is used in the power supply circuit of tube type transmitter.

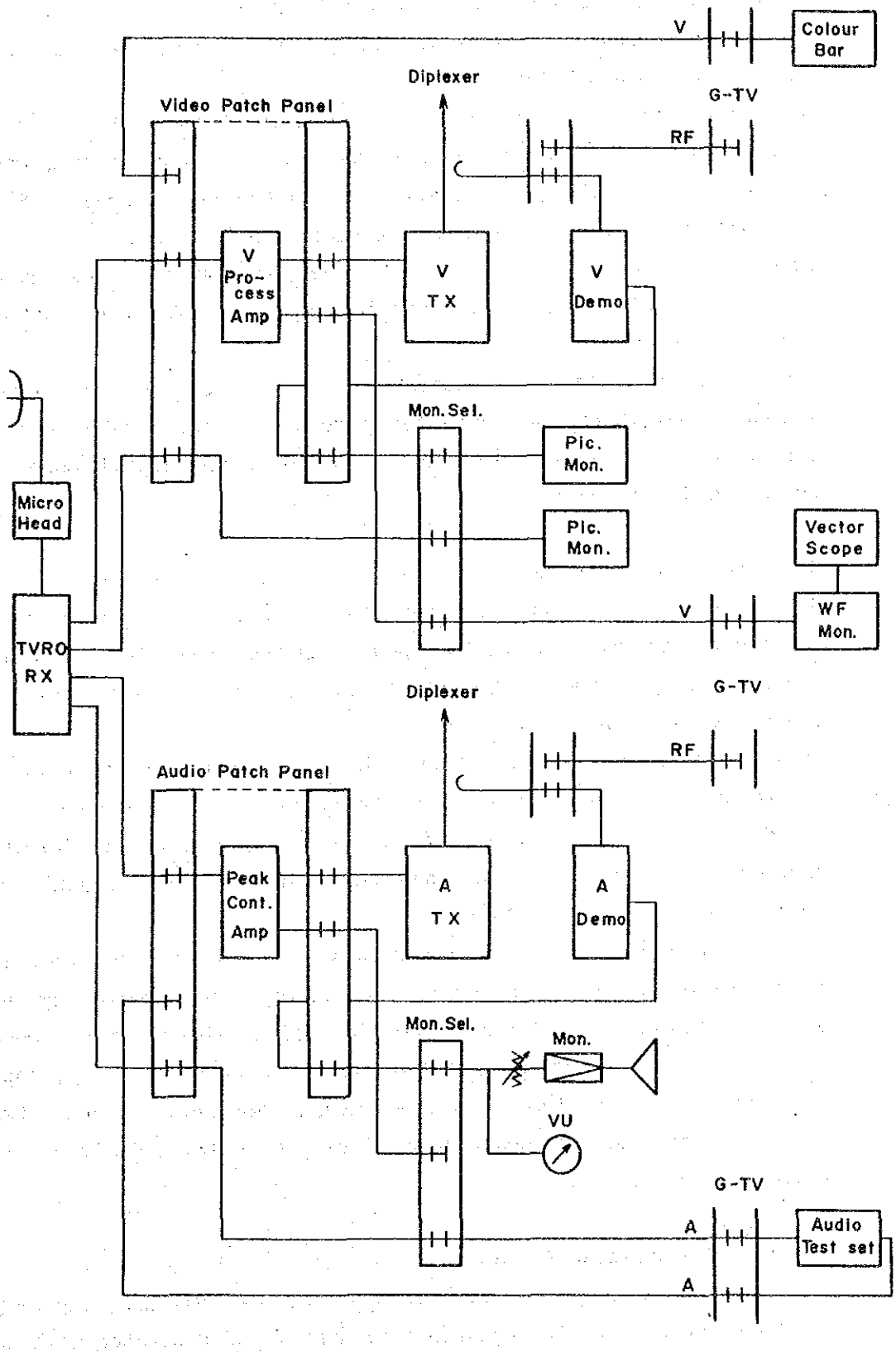
3) Place of Installation

For the convenience of operation and maintenance, ETV transmitter is placed in the same room or at a space next to the GTV transmitter.

4) Input/monitor equipment

The system will be of quite simple, configuration of which for 10kW class stations is shown in the Fig.5-1. Two each connecting lines of audio, video and RF between GTV and ETV systems are provided so that the measuring equipment can be used in common.

Fig. 5-1 Schematic Diagram of PIE & Monitor



(4) Power Supply System

1) Power supply conditions of regional stations

Commercial power distribution system in Pakistan is that the 3-phase 10kV power is transformed to 3-phase 4-wire 380V and led into the consumers house.

Receiving conditions are quite diverse from no supply to the most stable supply. In case far from the substation or having many sharing load, voltage regulation is naturally worse. Some stations are subject to have scheduled power shut off every evenining. Tube-wells distributed in the farmland are the source of short term fluctuation all day around, as the motor's starting current is great.

During the peak time of hottest season, air-conditioning loads increase everywhere and cause heavy voltage drop. Under such a condition transmitting stations in these areas depend more on their own diesel-generators.

2) Reinforcement of engine generators

Since the load capacity increases considerably by the increase of equipment for ETV, a higher power engine generator must be necessarily provided. Therefore it is necessary to make a rearrangement plan of generators.

In principle, the largest station is done first and the removed generator is moved to a smaller station in turn. Of course it would be essential to have some spare units to use, considering another cause of different sequence, inevitable overhaul or renewal due to superannuation.

On the other hand, as several machines will become excessive, it is advisable to take measures of introducing two generator system at some stations at least for the time being, though it may need some additional maintenance. After years, on an opportunity, they will be exchanged for a single larger machine. These two generators are not connected in parallel, one will feed GTV, while another supports ETV.

3) Renewal of changeover switch

By the increase of load as mentioned above, the switching capacity of the changeover switch between city supply and generator will be

insufficient. Moreover considering the fact that most of them have been used for many years, it is decided to exchange the switches.

4) Improvement of power lines

According to the load increase, improvement of power line is inevitable and the gist of which is as follows.

a) Receiving transformers are to be exchanged at some stations to increase the capacity.
b) The wire sizes of both high-tension and low-tension sides are to be examined and shall be improved if required.
c) Method to joint aluminum stranded wire should be improved.

(5) Satellite Receiving Equipment

If a parabolic reflector antenna of TVRO is placed on the building roof it is advantageous compared with on the ground, cables can be shorter in general, free from the stain of mud, preferable from the view point of security, and can be seen as a symbol of ETV. However, in case an antenna of larger diameter is used, it should be placed on the ground because of more stress imposed on the roof structure.

(6) Station Building

1) Extension

Extension of a GTV building to accomodate the new ETV equipment is to be made as small as possible by efficient use of space for apparatus like channel-combiner or AVR etc.

Unavoidable extension of several houses will be made for installation of larger engine generators.

2) Modification

Removal of existing wall to make room for new ETV equipment is made at several stations. Related alteration of light, wiring or air conditioning duct may arise. The survey results of stations where modifications are necessary are shown in Table 5-1 (in the column of Building).

5-2-2 Plan for the Terrestrial Transmission Equipment

Based on the data of the survey, the outline of existing GTV equipment and planned ETV equipment is shown below.

Table 5-1 Terrestrial Transmission Equipment Plan (Islamabad Area-1)

(1/16)

Station	MURREE GTV	MURREE ETV
Channel	CH.8	UHF (Band IV) CH.21
Antenna	4 Dipole Panel Antenna, directive (5-Stack, 2-Face 4-Stack, 1-Face \ 1-Stack, 1-Face	UHF 4 Dipole Panel Antenna Directivity is the same as GTV. Feeder: CX-152D, 100m
Tower	46m self-supported tower.	ETV antenna will be installed on the existing tower, below the GTV antenna.
Transmitter	VHF TX 10kW (NEC) 1 set (BBC) 1 set	UHF TX 30kW 1 set AVR 130kVA 1 unit
Program Link	STL from ISLAMABAD TV Centre	TVRO 1 set
Power Supply	CS: 200kVA 2 lines (shared with other load) EG: 75kVA 1 unit	CS: changed for exclusive 400kVA EG: changed for 250kVA 1 unit
Building	Two-storied RC Bdg. (Floor area: about 390 sq-m)	Removing of wall, changing partition, modification of duct route for air conditioning and housing of cooling radiator for TX etc.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 37km straight to the northeast of Islamabad, 50km by road. On the mountaintop of 2,207m above sea level. The road paved in very good condition. A steep slope in the station premises.	

Table 5-1 Terrestrial Transmission Equipment Plan (Islamabad Area-2)

(2/16)

Station	SAKESAR GTV	SAKESAR ETV
Channel	CH.4 (GTV) CH.7 (Pushto Programme)	UHF (Band IV) CH.23
Antenna	CH.4 2 Dipole Panel Antenna (6-Stack, 3-Face \ 3-Stack, 1-Face CH.7 4 Dipole Panel Antenna 4-Stack, 3-Face	UHF 4 Dipole Panel Antenna Directivity is the same as GTV. Feeder: CX-152D, 150m
Tower	82m self-supported tower. Upper part: CH.7 Lower part: CH.4	ETV antenna will be mounted on the extension pole attached along the vacant surface of the CH.7 antenna on the existing tower.
Transmitter	VHF TX CH.4 10kW (NEC) 1 set VHF TX CH.7 10kW (Toshiba) 1 set	UHF TX 30kW 1 set AVR 130kVA 1 unit
Program Link	Video Cable from T&T Relay Station	TVRO 1 set
Power Supply	CS: 200kVA (almost stable) EG: 100kVA 1 unit 50kVA 1 unit	CS: changed for 400kVA EG: changed for 300kVA 1 unit
Building	One-storied RC Bdg. (Floor area: about 310 sq-m)	Removal of a part of the wall, making hole on the wall and expansion housing on the roof for TX radiator.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 160km straight to the southwest of Islamabad, 240km by road. On the heights of 1,413m above sea level, and 11km from the foot with a difference of heights of 650m. The mountain road well maintained with no anxiety of safety. Air force permission necessary for admission into the area.	

Table 5-1 Terrestrial Transmission Equipment Plan (Lahore Area-1)

(3/16)

Station	K.S.K. GTV	K.S.K. ETV
Channel	CH.5	UHF (Band IV) CH.22
Antenna	4 Dipole Panel Antenna, 8-Stack - Omnidirectional	UHF 4 Dipole Panel Antenna-Directional Radiation toward India will be suppressed. Feeder: CX-152D, 250m
Tower	Guyed triangular truss tower of 245m high.	ETV antenna is installed on the existing tower below the GTV antenna.
Transmitter	VHF TX 20kW (Thomson CSF) 1 set VHF TX 1kW (Thomson LGT) 1 set	UHF TX 30kW 1 set AVR 130kVA 1 unit
Program Link	STL from Lahore TV Centre	TVRO 1 set
Power Supply	CS: 200kVA (extremely unstable) EG: 164kVA 1 unit 150kVA 1 unit	CS: changed for 400kVA EG: changed for 300kVA 2 units
Building	One-storied RC Bdg. (Floor area: about 165 sq-m)	Removal of a part of the wall. Housing for the EG (about 30 sq-m). Expansion housing on the roof for TX radiator.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 16km to the north of Lahore, 5km east by farm road of GT road. Marshy surroundings. 210m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Lahore Area-2)

(4/16)

Station	SHUJABAD GTV	SHUJABAD ETV
Channel	CH.8	CH.9 (-) GTV CH.8 will be changed into CH.7 (-).
Antenna	4 Dipole Panel Antenna, 8-Stack - Omnidirectional with 77 D-Al type cable	GTV antenna is used in common with ETV. Channel-combiner 1 unit Aluminum cable is to be exchanged because of injury CX-77D, 180m.
Tower	Guyed triangular truss tower of 152m high.	
Transmitter	VHF TX 10kW (NEC) 1 set	VHF TX 10kW 1 set AVR 45kVA 1 unit
Program Link	Micro-link from T&T Multan Relay Station	TVRO 1 set
Power Supply	CS: 200kVA 2 lines EG: 150kVA 1 unit	EG: a 75kVA generator unit is to be supplemented to form 2-generator system.
Building	One-storied RC Bdg. (Floor area: about 465 sq-m)	Making a new feeder hole and closing an old feeder hole on the inner and outer wall.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 25km to the southwest by south of Multan, on a district road to Shujaabad. Cultivated surroundings. 122m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Karachi Area-1)

(5/16)

Station	KARACHI GTV	KARACHI ETV (1st Phase)
Channel	CH.4	
Antenna	6ST type, omnidirectional antenna.	After GTV moved to the new site, facilities
Tower	Self-supported square tower of 66m high.	mentioned left will be used for ETV.
Transmitter	VHF TX 10kW (NEC) 1 set VHF TX 10kW (RCA) 1 set	
Program Link	(Within the same premises)	Up-down Link 1 set
Power Supply	Common with Karachi TV	The same as GTV.
Building	Centre.	
Remarks		
Site	Located in the northeast of Karachi city, on the Stadium road. Residential surroundings. 20m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Karachi Area-2)

(6/16)

Station	T.A.Y. GTV	T.A.Y. ETV
Channel	CH.11	CH.9 (-)
Antenna	4 Dipole Panel Antenna, 8-Stack omnidirectional	GTV antenna is used in common with ETV. Channel-combiner 1 unit
Tower	Guyed triangular truss tower of 245m high.	
Transmitter	VHF TX 20kW (Thomson CSF) 1 set VHF TX 1kW (Thomson LGT) 1 set	VHF TX 20kW 1 set AVR 60kVA 1 unit
Program Link	Micro-link from T&T Hyderabad Relay Station	TVRO 1 set
Power Supply	CS: 100kVA --- City supply is extremely unstable. EG: 164kVA 1 unit 162kVA 1 unit	CS: receiving capacity is to be improved at least for 300kVA. EG: will be exchanged for 2 units of 250kVA.
Building	One-storied RC Bdg. (Floor area: about 175 sq-m)	Modification of the TX room and a new generator house of about 50 sq-m.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 60km to the northeast of Hyderabad, on a provincial road heading north from T.A.Y. Flat surroundings. 24m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Karachi Area-3)

(7/16)

Station	NURPUR GTV	NURPUR ETV
Channel	CH.5	CH.10 (-) GTV CH.5 will be changed into CH.6(+).
Antenna	4 Dipole Panel Antenna, 8-Stack omnidirectional	GTV antenna is used in common with ETV. Channel-combiner 1 unit
Tower	Guyed triangular truss tower of 219m high.	
Transmitter	VHF TX 10kW (NEC) 1 set	VHF TX 10kW 1 set AVR 45kVA 1 unit
Program Link	Micro-link from T&T Relay Station	TVRO 1 set
Power Supply	CS: 200kVA EG: 150kVA 1 unit	EG: a 75kVA generator unit is to be supplemented to form 2-generator system.
Building	One-storied RC Bdg. (Floor area: about 440 sq-m)	A new generator house of about 30 sq-m.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 190km to the north of Hyderabad, on National Highway 5. Cultivated surroundings. 37m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Peshawar Area-1)

(8/16)

Station	CHERAT GTV	CHERAT ETV
Channel	CH.10	CH.5 (+) The channel of Morasar station must be changed beforehand from CH.5 to CH.6 (+)
Antenna	4 Dipole Panel Antenna, directional (5-Stack, 1-Face 4-Stack, 2-Face 2-Stack, 1-Face Cable: 77D-Al type	GTV antenna is used in common with ETV. Channel-combiner 1 unit Aluminum cable is to be exchanged because of corrosion.
Tower	Self-supported square tower of 46m high.	
Transmitter	VHF TX 10kW (NEC) 1 set VHF TX 10kW (Toshiba) 1 set	VHF TX 10kW 1 set AVR 45kVA 1 unit
Program Link	STL from Peshawar TV Centre	TVRO 1 set
Power Supply	CS: 200kVA --- extremely unstable EG: 100kVA 1 unit 75kVA 1 unit	EG: will be exchanged for 2 units of 150kVA.
Building	A stone construction church building had been modified for the TV station. The floor area is 590 sq-m including attached houses.	Removal of a part of the wall, level up of floor, partition of blower room, exchanging roof and attaching the hood of generator room etc.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 41km south of the town of Pupee which is 21km to the east of Peshawar, with a mountain road on the way. 1,524m above sea level with a difference of heights of 1,160m. A steep slope in the station premises with a grade of 17 degrees. Army permission necessary for admission into the area.	

Table 5-1 Terrestrial Transmission Equipment Plan (Peshawar Area-2)

(9/16)

Station	GILGIT GTV	GILGIT ETV
Channel	CH.5	CH.7
Antenna	4-Ele YAGI Antenna 1-Stack, 2-Face Directivity is 8 figure.	3-Ele YAGI Antenna 1-Stack, 2-Face Directivity is the same as GTV. Feeder: CF-20D, 50m
Tower	11m pole.	Existing GTV pole is shared.
Transmitter	VHF TX 100W 1 set	VHF TX 100W 1 set
Program Link	FPU from T&T Relay Station	TVRO 1 set
Power Supply	EG: 14kVA 1 unit	EG: 5kVA 1 unit
Building	A rented house.	The same as GTV.
Remarks	EG: Engine Generator	
Site	Located 670km to the north of Islamabad by the Karakoram Highway along the Indus. Known as a resort with a population of 60,000. 1,400m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Peshawar Area-3)

(10/16)

Station	SKARDU GTV	SKARDU ETV
Channel	CH.7	CH.5
Antenna	5-Ele YAGI Antenna (2-Stack, 2-Face (1-Stack, 1-Face Feeder: CF-20D, equivalent	5-Ele YAGI Antenna (2-Stack, 2-Face (1-Stack, 1-Face Feeder: CF-20D, 90m
Tower	35m guyed tower.	Existing GTV tower is shared. The base is to be reinforced.
Transmitter	VHF TX 30W 1 set	VHF TX 30W 1 set
Program Link	FPU from T&T Relay Station	TVRO 1 set
Power Supply	One room of Radio Pakistan TX station is borrowed by PTV for the TV trans-	The same as GTV.
Building	mission. Electric power is supplied through the station.	Making a new feeder hole on the wall.
Remarks		
Site	Located 250km to the southeast of Gilgit along the Indus Valley. Known as the climbing base of K-2, the second highest in the world, with a population of 38,000.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-1)

(11/16)

Station	SIBI GTV	SIBI ETV
Channel	CH.6	CH.10 (+)
Antenna	2 Dipole Panel Antenna, directive (6-Stack, 1-Face 4-Stack, 2-Face \ 2-Stack, 1-Face	4 Dipole Panel Antenna Directivity is the same as GTV. Feeder: CX-20D, 70m
Tower	Guyed triangular truss tower of 61m.	ETV antenna will be mounted on the existing tower just below the GTV antenna.
Transmitter	VHF TX 500W (NEC) 1 set	VHF TX 1kW 1 set AVR 15kVA 1 unit
Program Link	Video Cable from T&T Sibi Station	TVRO 1 set
Power Supply	CS: 100kVA EG: 45kVA 1 unit	EG: exchanged for 1 unit of 100kVA
Building	One-storied RC Bdg. (Floor area: about 155 sq-m)	EG house of about 30 sq-m.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 170km to the southeast of Quetta, in Sibi city. Residential surroundings. 140m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-2)

(12/16)

Station	LAKPASS GTV	LAKPASS ETV
Channel	CH.4	CH.11
Antenna	2 Dipole Panel Antenna, directive, 3-Stack, 2-Face	4 Dipole Panel Antenna Directivity is the same as GTV. Feeder: CX-20D, 70m
Tower	Self-supported square tower of 46m high has been extended for 25m.	ETV antenna will be mounted on the existing tower of extended part.
Transmitter	VHF TX 1kW (Thomson LGT) 1 set	VHF TX 1kW 1 set AVR 15kVA 1 unit
Program Link	Off-air relay from Quetta TV Centre	TVRO 1 set
Power Supply	CS: No EG: 45kVA, 27kVA, 17.5kVA each 1 unit	EGs are to be exchanged for 2 units of 100kVA.
Building	One-storied RC Bdg. (Floor area: about 260 sq-m)	A new EG house of about 30 sq-m.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 30km straight to the south of Quetta, 40km by road. On the mountaintop of 2,450m above sea level, with a difference of heights of 750m from the foot. A somewhat steep road.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-3)

(13/16)

Station	KALAT GTV	KALAT ETV
Channel	CH.9	CH.7
Antenna	4 Dipole Panel Antenna, 2-Stack Omnidirectional Cable: 39D	GTV antenna is used in common with ETV. Channel-combiner 1 unit
Tower	Self-supported square tower of 45m high.	
Transmitter	VHF TX 500W 1 set This TX will be changed for 50W output.	VHF TX 50W 1 set
Program Link	Microwave Link from T&T Relay Station	TVRO 1 set
Power Supply	CS: 100kVA EG: not fixed yet Stable supply is expected because of very short distance from the substation.	
Building	One-storied RC Bdg. (Floor area: about 165 sq-m)	For the installation of ETV equipment, the TX room must be extended 12 sq-m more.
Remarks	CS: City Supply EG: Engine Generator	
Site	Located 150km to the south of Quetta, on National Highway 25 and 5km to the north of Kalat city. In highlands of 1,950m above sea level, with sparse settlement.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-4)

(14/16)

Station	KHUZDAR GTV	KHUZDAR ETV
Channel	CH.9 (+)	CH.11 (+)
Antenna	4 Dipole Panel Antenna, 1-Stack Omnidirectional	GTV antenna is used in common with ETV. Channel-combiner 1 unit
Tower	Self-supported square tower of 37m high, property of Radio Pakistan.	
Transmitter	VHF TX 100W 1 set	VHF TX 100W 1 set
Program Link	FPU from T&T Khuzdar Telephone Office	TVRO 1 set
Power Supply	One room of Radio Pakistan Khuzdar Office is borrowed by PTV for the TV trans-	The same as GTV.
Building	mission. Electric power is supplied through the office.	
Remarks		
Site	Located 400km to the north of Karachi, in Khuzdar city which is on National Highway 25. In highlands of 1,220m above sea level.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-5)

(15/16)

Station	KOHLU GTV	KOHLU ETV
Channel	CH.7	CH.5
Antenna	3-Ele YAGI Antenna (2-Stack, 1-Face (1-Stack, 3-Face Feeder: CF-20D, equivalent	3-Ele YAGI Antenna (2-Stack, 1-Face (1-Stack, 3-Face Feeder: CF-20D, 80m
Tower	Self-supported square tower of 20m high.	Existing GTV tower is shared.
Transmitter	VHF TX 30W 1 set	VHF TX 30W 1 set
Program Link	FPU from T&T Relay Station	TVRO 1 set
Power Supply	A rented room of a house belonging to the city office.	The same as GTV.
Building	Electric power is supplied through the house.	
Remarks		
Site	Located in Baluchistan Province, 270km to the west of Multan. On a hill on flat land in the valley of 1,200m above sea level, of a mountain range running from east to west.	

Table 5-1 Terrestrial Transmission Equipment Plan (Quetta Area-6)

(16/16)

Station	GWADAR GTV	GWADAR ETV
Channel	CH.7	CH.5
Antenna	5-Ele YAGI Antenna 2-Stack, 1-Face 3-Ele YAGI Antenna 1-Stack, 1-Face Feeder: CF-20D, equivalent	5-Ele YAGI Antenna 2-Stack, 1-Face 3-Ele YAGI Antenna 1-Stack, 1-Face
Tower	Guyed triangular truss tower of 70m high. Property of T&T.	ETV antenna will be mounted on the same tower.
Transmitter	VHF TX 10W 1 set	VHF TX 10W 1 set
Program Link	(In the same premises of T&T Station.)	TVRO 1 set
Power Supply	One room of T&T Gwadar Relay Station is borrowed by PTV for the TV trans-	The same as GTV.
Building	mission. Electric power is supplied through the office.	Making a new feeder hole on the wall.
Remarks		
Site	Located in the center of a fishing village, Gwadar, with a population of 22,000. The village situated at the neck of a small peninsula near the border of Iran on the coast of the Arabian Sea.	

5-3 Composition List (Initial 2-Year Plan)

Table 5-2 composition List of Transmitting Facilities (Initial 2-Year Plan)

(1/4)

STATION	EQUIPMENT	Q'ty	REMARKS
MURREE	Antenna	1 set	UHF 4 Dipole Panel Antenna (5-Stack, 2-Face; 4-Stack, 1-Face; 2-Stack, 1-Face)
	Feeder	1 set	CX152D, 100m
	TV Transmitter	1 set	UHF 30kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	130kVA
	Power Panel	1 set	
	Diesel Generator	1 unit	250kVA
SAKESAR	Antenna	1 set	UHF 4 Dipole Panel Antenna (4-Stack, 3-Face; 2-Stack, 1-Face)
	Feeder	1 set	CX152D, 150m
	TV Transmitter	1 set	UHF 30kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	130kVA
	Power Panel	1 set	
	Diesel Generator	1 unit	300kVA
K.S.K.	Antenna	1 set	UHF 4 Dipole Panel Antenna (10-Stack, 3-Face; 2-Stack, 1-Face)
	Feeder	1 set	CX152D, 250m
	TV Transmitter	1 set	UHF 30kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	130kVA
	Power Panel	1 set	
	Diesel Generator	2 units	300kVA

STATION	EQUIPMENT	Q'ty	REMARKS
SHUJABAD	Channel Combiner	1 unit	VHF 10kW
	Feeder	1 set	CX77D, 180m
	TV Transmitter	1 set	VHF 10kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	45kVA
	Power Panel	1 set	
KARACHI	U/D Link	1 set	
T.A.Y.	Channel Combiner	1 unit	VHF 20kW
	TV Transmitter	1 set	VHF 20kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	60kVA
	Power Panel	1 set	
	Diesel Generator	2 units	250kVA
NURPUR	Channel Combiner	1 unit	VHF 10kW
	TV Transmitter	1 set	VHF 10kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	45kVA
	Power Panel	1 set	

STATION	EQUIPMENT	Q'ty	REMARKS
CHERAT	Channel Combiner	1 unit	VHF 10kW
	Feeder	1 set	CX77D, 70m
	TV Transmitter	1 set	VHF 10kW
	Input Equipment	1 set	
	TVRO	1 set	
	AVR	1 unit	45kVA
	Power Panel	1 set	
	Diesel Generator	1 unit	150kVA
GILGIT	Antenna	1 set	3-element Yagi 1-Stack, 2-Face
	Feeder	1 set	CF20D, 50m
	TV Transmitter	1 set	VHF 100W
	TVRO	1 set	
	Diesel Generator	1 unit	5kVA
SKARDU	Antenna	1 set	5-element Yagi 2-Stack, 2-Face 1-Stack, 1-Face
	Feeder	1 set	CF20D, 90m
	TV Transmitter	1 set	VHF 30W
	TVRO	1 set	
SIBI	Antenna	1 set	VHF 4 Dipole Panel Antenna 3-Stack, 1-Face 2-Stack, 2-Face 1-Stack, 1-Face
	Feeder	1 set	CX20D, 70m
	TV Transmitter	1 set	VHF 1kW
	TVRO	1 set	
	AVR	1 unit	15kVA
	Power Panel	1 set	

STATION	EQUIPMENT	Q'ty	REMARKS
LAKPASS	Antenna	1 set	VHF 4 Dipole Panel Antenna 3-Stack, 2-Face
	Feeder	1 set	CX20D, 70m
	TV Transmitter	1 set	VHF 1kW
	TVRO	1 set	
	AVR	1 unit	15kVA
	Power Panel	1 set	
	Diesel Generator	1 unit	100kVA
KHUZDAR	Channel Combiner	1 unit	VHF 100W
	TV Transmitter	1 set	VHF 100W
	TVRO	1 set	
KALAT	Channel Combiner	1 unit	VHF 50W
	TV Transmitter	1 set	VHF 50W
	TVRO	1 set	
KOHLU	Antenna	1 set	3-element Yagi (2-Stack, 1-Face / 1-Stack, 3-Face)
	Feeder	1 set	CF20D, 80m
	TV Transmitter	1 set	VHF 30W
	TVRO	1 set	
GWADAR	Antenna	1 set	5-element Yagi 2-Stack, 1-Face 3-element Yagi 1-Stack, 1-Face
	Feeder	1 set	CF20D, 100m
	TV Transmitter	1 set	VHF 10W
	TVRO	1 set	

CHAPTER 6 Overall Operation Plans

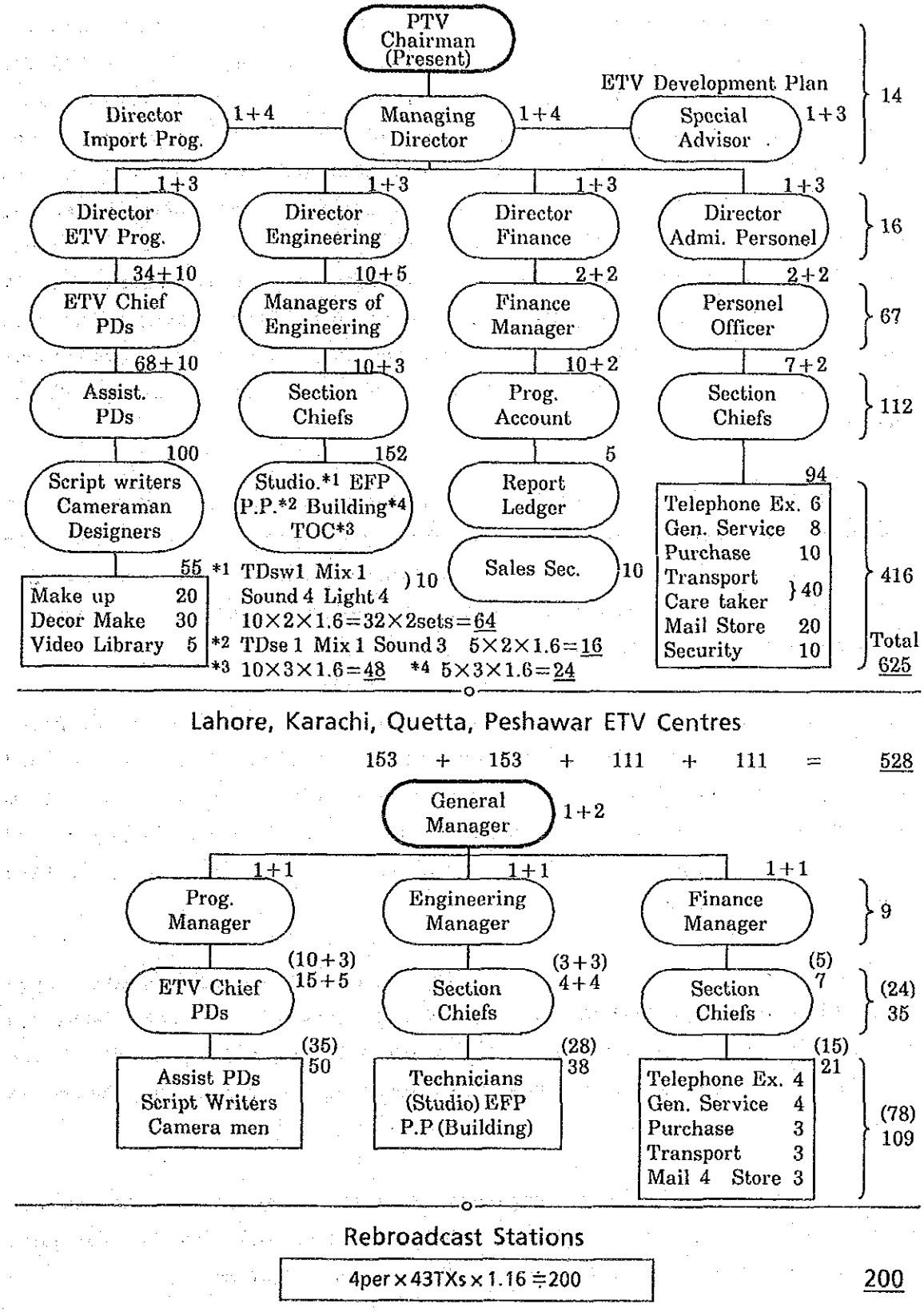
6-1 Organization and Operation

While the organization of ETV is closely related with the existing PTV, it is anticipated that the management and operational body will be separate from those of PTV. There are a number of reasons. In the case of GTV, the greater part of its income (54.3%, in 1988-89) comes from advertisements, even though it has the revenue from license fees (21.4%, in 1988-89). So, PTV is virtually a commercial broadcasting organization, in a way. In contrast to this, ETV is going to be a medium planned in line with Pakistan's national policy to enhance the living standards of the general public on the grass-roots level, many of whom are living in remote mountain regions. This means that ETV can not expect much income from advertisements. This, in turn, means that the ETV channel is going to be an operational body depending on government subsidy for the greater part of its revenue. However, this form of organization of ETV is, of course, subject to the final decision to be made by the Government after completion of ETV, before the new ETV eventually takes the form envisaged by PTV. Still, the fact remains that, until 1995-96, when ETV will have stood up on its own, PTV will continue to be the mother entity taking charge of the implementation of the present project.

6-2 Organization and Work, and Plan for Necessary Personnel

The Fig. 6-1 given at the next page shows the organization and work-flow, as well as the number of staff members to be required by each section, of the new ETV channel. The total number of staff members required will be 1,353. However, this total number of personnel is what is envisaged as being necessary upon completion of this five-year project. Meanwhile it would be necessary to employ 700 (ISB ETV Centre 625 + Rebroadcast TXs 75) upon completion of the first 2-year plan.

Fig. 6-1 Organization and Staff of ETV



6-3 Operation and Personnel Training

Compared with the existing facilities and equipment of GTV installed more than 20 years ago, the overall operational system to be adopted for the new ETV for its programme production and transmission (via satellite) far surpasses the former in every aspect of quality, effective operation, reliability and etc. Moreover, the facilities and equipment for the new ETV have sufficient records of having been used and tested in actual operation in Japan. As for the operational system, it has been designed to suit actual conditions in Pakistan in such a way as to ensure that it will continue to function adequately as a broadcasting station in the 21st century. In order to meet the requirements, the actual operational conditions at PTV have been duly taken into account in the design of the system.

Hence, gaps will natrually be found between the new system and the one presently used by PTV for its day-to-day broadcasting activities. In order to make the best of the new ETV system, there is the need for ETV staff to go through training in the operational aspects of programme production and transmission.

To put it in more concrete terms, thorough training needs to be given to personnel in the following systems; the system of production and videotaping in four languages in the post-production processes, the system of dubbing voices of imported programmes into Pakistan's own language, and the transmission system by which to broadcast the programmes to the entire country via satellite.

As a part of such training, it is considered appropriate, upon completion of the facilities for the new ETV Centre, to conduct on-the-job training of personnel actually using the facilities and equipment of the new Centre at H-9 to enhance the operational capability of the Centre in stages.

Incidentally PTV can be regarded to have enough grounds to operate modern equipment, for instance, judging from GTV Quetta centre's achievements in making very good use of pretty new equipment.

As for the programme production to be conducted on the floor of the studios, there basically is no change in the techniques employed at present by PTV. Rather, since mainly educational programmes are going to be produced, the PTV programme producers currently producing TV dramas would find the ETV system easier to operate.

It may also be appropriate to invite experts from overseas (Japan, for example) to have them give training and guidance in operations mentioned above.

CHAPTER 7 Spreading of TV Reception

7-1 Current Condition of the Spread of TV Receivers in Pakistan

7-1-1 Number of TV Receivers

In Pakistan, importation of TV receivers is banned at present. TV receivers are manufactured locally, through the process of assembly of components supplied by foreign manufacturers including Japanese companies. The production has been steadily increasing. By 1981, the annual output had reached 100,000 receivers, and in 1988 it passed the 350,000 mark.

As of now, the number of TV receivers registered with PTV has reached some 1,600,000 receivers, but in view of the steady growth of production of TV receivers in Pakistan, PTV estimates that the actual number of receivers in use today in this country should be much greater if the unregistered receivers were to be included.

The ownership ratio of TV receivers in 1988, 24 years after the start of TV broadcasting in Pakistan, was 9.4% in terms of the number of households owning a TV receiver. Compared with Japan, this ownership or spread ratio of TV receivers in Pakistan just about corresponds to Japan's ratio in 1958 or five years after the start of TV broadcasting.

The TV broadcasting in Pakistan at present consists solely of PTV's General Television Service (GTV). Besides, for the general public in Pakistan, television is the major means of entertainment and education. For these reasons, a survey by PTV shows that some of the popular programmes are winning audience ratings as high as more than 80%. And naturally enough, demand for TV receivers has been extremely high.

The average prices of TV receivers are 3,300 Rs. for a black-and-white receiver and 11,100 Rs. for a color TV receiver. On the other hand, the average monthly family income is 3,026 Rs. as of 1987-88, a figure that has come close to the price of a black-and-white receiver. Meanwhile, it has been reported that a Korean manufacturing firm is starting to produce B/W TV receivers in fiscal 1990 in a joint venture with a Pakistan firm. With the resultant rise in overall supply of TV

receivers, there is every likelihood of the increase in their retail prices held down.

The annual rate of increase in the number of registered TV receivers in Pakistan during the past decade has averaged 12%. Especially since 1983, the annual rate of increase has been quite steady.

Based on this rise as well as the information given above including the current trends of prices of TV receivers, average monthly family income and output of TV receivers, it may reasonably be estimated that the rate of increase in the number of registered TV receivers will be maintained at about 12% per annum.

Following are the recent data on the number of registered TV receivers and outlook for the future.

Table 7-1 Numbers of Registered TV receivers (1,000)

1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
582.8	706.2	676.0	850.3	1055.0	1264.3	1420.9	1596.6
1988-89	1989-90	1990-91	1991-92	1992-93			
1788.1	2002.7	2243.1	2512.2	2813.7			

Source: Economic Survey, 1987-88

The above data are shown below in the form of graph.

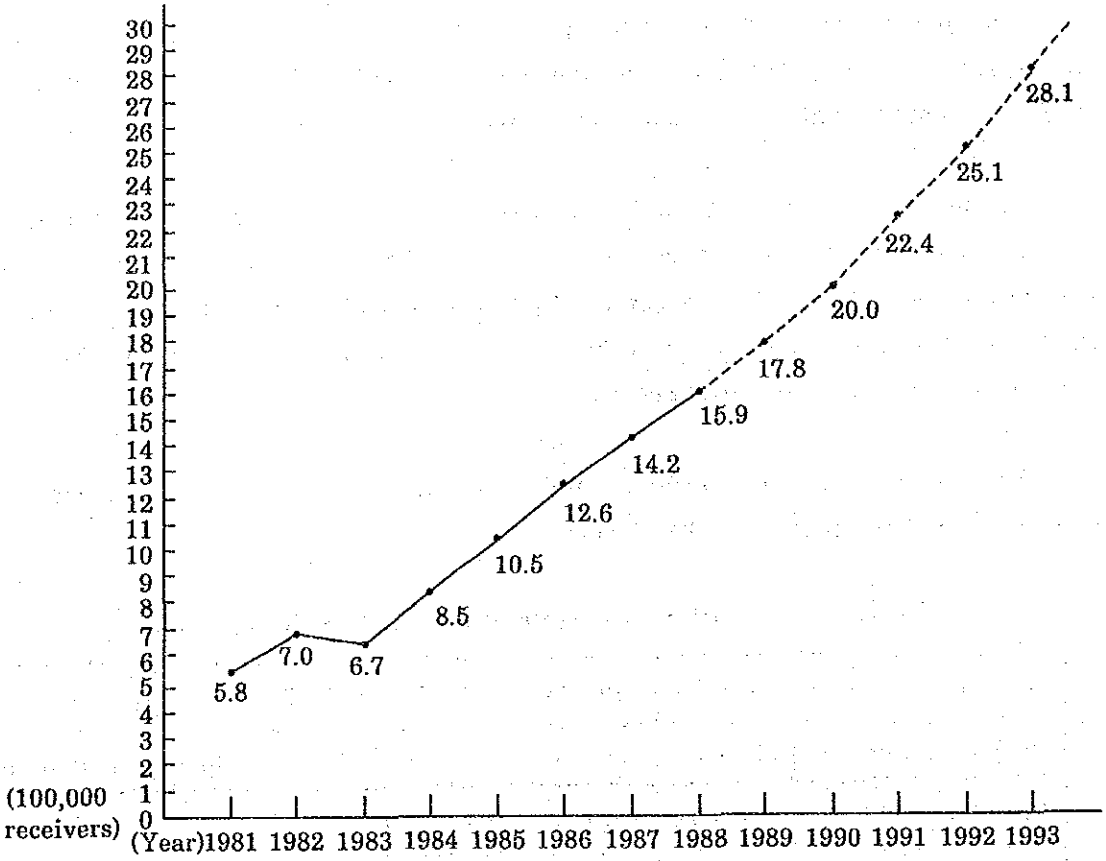


Fig. 7-1 Annual Increase of Registered TV Receivers

7-1-2 UHF Reception

As stated before, there are only 8 channels available for civil use from Channel 4 to 11 among VHF channels. Furthermore, India's signal comes in and in Islamabad and Lahore GTV uses all VHF channels. In some places ETV must use UHF channels.

According to PTV, black-and-white TV receivers number one million, while the color receivers comprise half of the registered receivers. Almost half of those registered are supposedly of the old VHF type which are not tuned to receive UHF signals.

However, the old VHF type receivers are now to be renewed after they came into use in 1960's-70's. Since recently-marketed receivers are generally of the all-channels type, in the early 90's old receivers will have been replaced with the all-channels type.

The alternative is to purchase and attach the U-V Converter (Market Price, 180 Rs.) to the old VHF type black-and-white receiver.

For the rest, viewers have only to install a UHF antenna (Market Price, 100 Rs.) in the house.

7-1-3 Coverage

As to the coverage rates of GTV as of 1988, they were 86% in terms of population and 37% in terms of area. The following table shows the development up to the present and the target envisaged by the 7th Plan.

Table 7-2 Coverage

	1983-84	1984-85	1985-86	1986-87	1987-88	1992-93
Population Covered (Million People)	73.9	77.1	79.6	82.2	88.9	113.4
% of Population	80.7	81.7	81.9	82.2	86.3	94.9
Area Covered (1,000km²)	272.5	275.5	275.6	275.8	295.9	413.9
% of Land Area	34.2	34.61	34.62	34.64	37.1	51.9

Sources: PTV's data, 1989
7th Plan, 1988-93

7-2 Community Viewing Centre (CVC)

7-2-1 The CVC Plan in the ETV Project

TV-receiver ownership is expected to spread steadily from now on in Pakistan. Yet, the estimate of household spread ratio for 1992-93, the final period in the 7th Plan, will not be more than 15%. Hence, in order to maximize the effect of ETV broadcasts, it would be most useful to promote community viewing centers.

At the outset, the ETV Project included a CVC plan. In fact, according to the PC-1 FORM dated February 1988, the following propositions were made with regard to CVC:

(1) A total of 10,000 CVCs will be set up throughout the country and each CVC will consist of classes of 50 viewers, men and women forming separate classes.
(2) On completion of th ETV Project, there will be ten hours of daily broadcasts, including the rebroadcasts of some GTV programmes.
(3) At least 14 courses of various educational programmes will be broadcast each year.
(4) At the CVC classes, teachers will help viewers understand the contents of programmes, using teaching aids.
(5) Through CVC viewing, over seven million adults a year will benefit educationally and enhance their literacy.

However, it was found that there would be a serious problem in implementing this CVC plan. Estimates showed that the annual operational expenses for the CVCs would come to a very large amount of 700 million Rs. and that, if this cost were to be covered by Government subsidy, there might be the possibility that the entire project will be disapproved by the Government. In view of such a prospect, PTV excluded the CVC plan from the PC-1 FORM issued in July 1988.

Though the CVC plan has been excluded, ETV's effects are not to be obstructed for the following reasons:

- It is evident from the past achievements as shown in the next section that viewers outside CVCs can gain considerable educational benefits from home-viewing of ETV.
- Since TV broadcasts usually attract the public so much, who are thirsty for information and entertainment, the spread of TV receivers tends to be promoted with their voluntary effort.

7-2-2 Educational Benefits of PTV's "Adult Functional Literacy" Broadcasts

In 1975-82, PTV conducted a series of educational broadcasts for adults entitled, "Adult Functional Literacy."

(1) Benefits to CVC Viewers

A total of 500 CVCs were set up throughout Pakistan, and over seven years, educational programmes were broadcast one hour everyday and over 6-month every year. The TV receivers installed at the CVCs were provided by UNICEF and the World Bank. Operational expenses were borne by the provincial governments and public organizations.

During the broadcasting cycle each year, PTV evaluated the effects of CVC viewing of the programmes. As a result, it was found that more than 80% of the CVC viewers, or a total of 140,000 viewers during the 7-year period, had acquired functional literacy.

Incidentally, these Adult Functional Literacy broadcasts were terminated at the end of the 7-year period, when the subsidization of CVC operational expenses was stopped.

(2) Benefits to Viewers outside CVCs

PTV recognizes that the Adult Functional Literacy broadcasts had similar effects on viewers outside the CVCs as well.

PTV conducted random-sampling surveys of viewers outside the CVCs. The result was that, during the 7-year period, some 900,000 people, counting only the adult viewers, had gained educational benefits from

viewing the programme series. It was also found that the children viewers, totalling some one million in number, had gained some educational benefits from viewing the series at home.

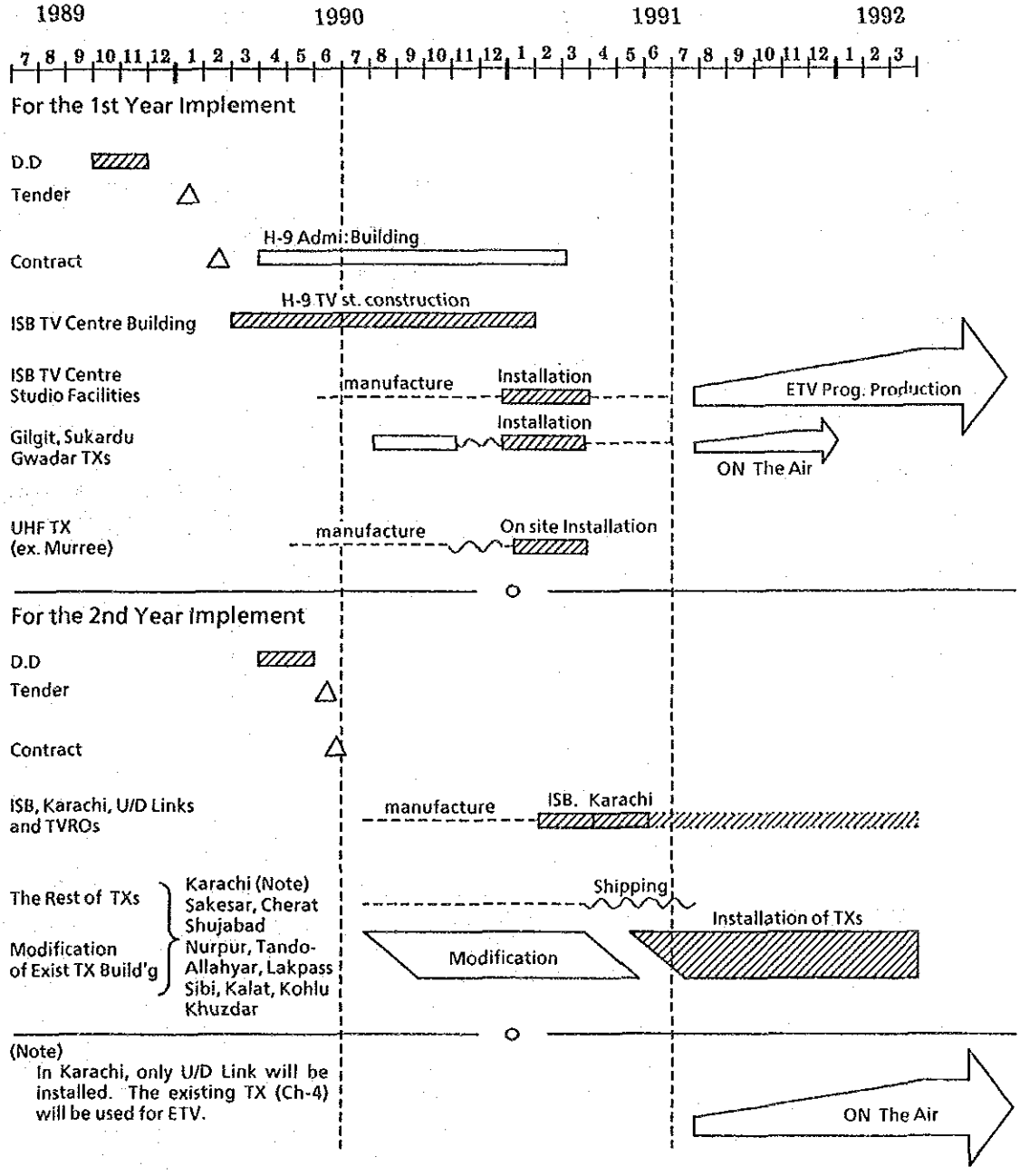
In conducting economic evaluation of the ETV project, we would make analyses by applying some related figures including those gained at the surveys on the viewers outside the CVCs.

The methodology of analyses will be explained later in the section on economic evaluation.

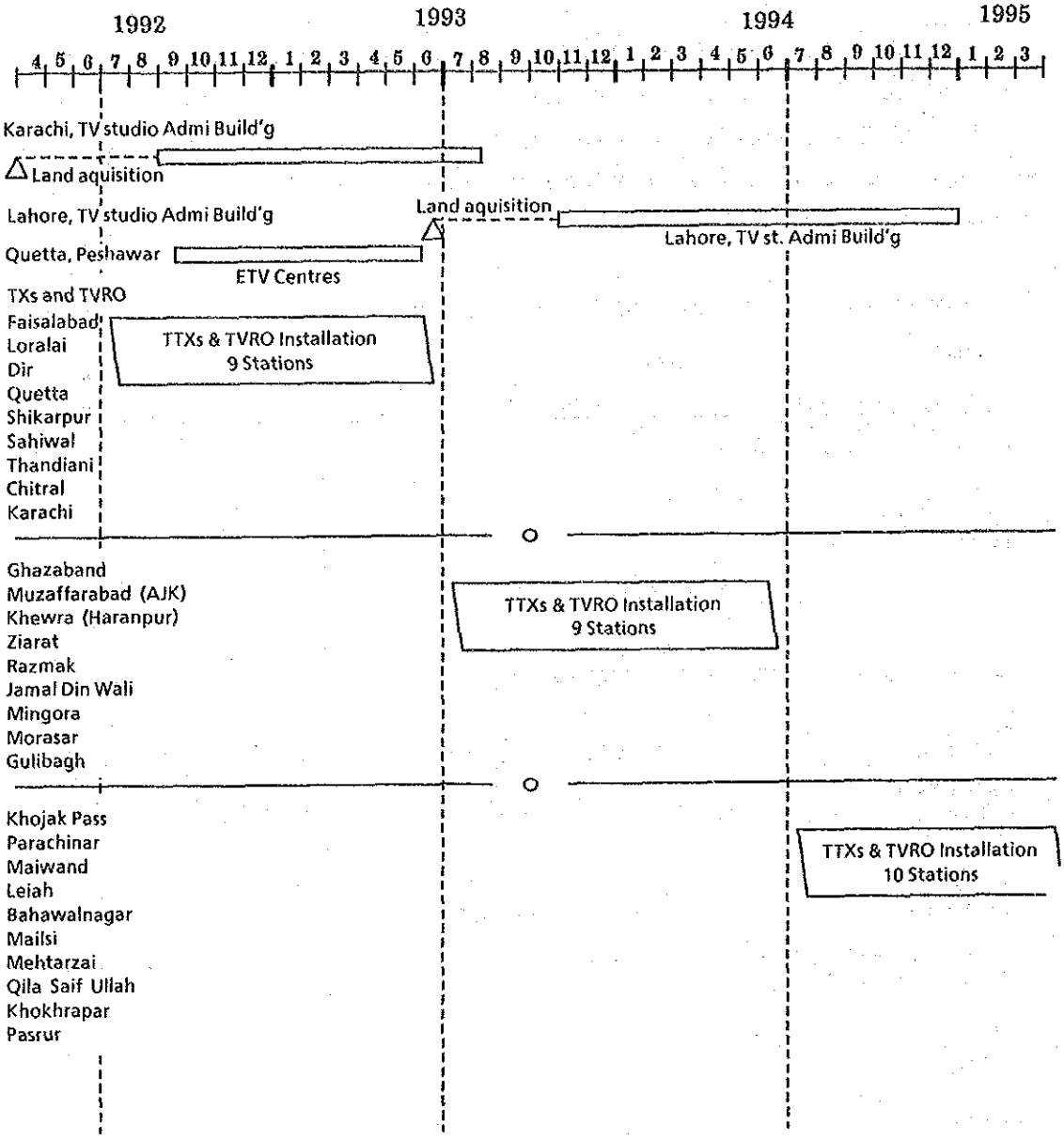
CHAPTER 8 Implementation Plans

The following schedule can be considered appropriate, assuming that the revised 5-year project, the amended PC-1, concerning the establishment of the 2nd ETV channel, as reviewed during the recent survey, is approved as an official national development plan with 1989-90 as the starting year.

8-1 Construction Schedule for the Initial 2-Year Plan



8-2 Construction Schedule for the Later 3-Year Plan



8-3 Financing the Project

(1) The estimated total capital cost of the project is Rs. 2563 million, including foreign exchange component of Rs. 960 million.
For the expenditure in the first 2 years will be Rs. million 1139 including foreign exchange component of Rs. 430 million.
Any delay in the disbursement of funds would increase costs by 6.5% per year. (Note 1)
However, it is also to be noted that exemption from custom duties would reduce the capital cost by Rs. 1110 million.

(note 1)

Regarding the domestic component cost listed in the revised PC-1 Appendix, because it has already passed 2 years since the original PC-1 had been formulated, the cost in 1990 fiscal year will be $(1.065)^3=1.208$, likewise in 1991, $(1.065)^4=1.286$.
As to the later 3 years' cost is assumed to be 4th year's cost as an average cost among 3rd 4th and 5th year. That is to be $(1.065)^6=1.459$.

(2) Recurring Costs
The recurring costs in 1992-93 would be
the expenditure: Rs. 329 million and the income: Rs. 117 million.
Then in 1996-97,
the expenditure: Rs. 618 million and the income: Rs. 218 million.
The details and the balance would be as follows in 1996-97.

a) Programme Production expenses		Rs. 321 million
b) Programme Transmission expenses		Rs. 124 million
c) Depreciation and others		Rs. 173 million
	total	Rs. 618 million
d) Income from Advertisement and licences	-	Rs. 218 million
	the balance	Rs. 400 million

This Rs. 400 million will be allocated to PTV (ETV) through the Ministry of Information and Broadcasting. However, exemption from

custom duties, which will also bring some saving in depreciation, would reduce the annual recurring cost. The average subsidy from the government for 5 years would amount to about Rs. 265 million.

(3) As to the total capital expenditure, it will be Rs. 2563 million and when it is tax exempted, 2563-1110=1453 million Rs. as mentioned above.

Since the project is a non commercial venture in line with the Pakistan's National Development Policy, the capital expenditure will have to be provided as out-right grant by the Government.

CHAPTER 9 Evaluation of the Project

9-1 General Social and Economic Conditions of Pakistan

9-1-1 Overview

While the national economy of Pakistan continues to center on agriculture, the nation's economic growth is steadily maintained at about 6% and its per capita income level ranks just about the average among the developing countries in Asia.

However, confronted with a number of problems including deficit finance and high population growth rate, Pakistan faces harsh reality that requires improvements in various aspects, such as in the quality of daily life.

What is urgently required for Pakistan's modernization is the promotion of education, especially improvement of the literacy rate, which hovers at about 30%.

The Economic Survey 1987-88 states in the Foreword that the real economy continues to be robust, but the finances of the country are in tight straits. The high growth rates in domestic production have yet to be translated into real benefits for all the people.

9-1-2 Growth Rate of Pakistan's Economy

Agriculture, which constitutes the core of Pakistan's economy, accounts for 20% of GDP, and approximately half the working population are farmers. In fact there have been years in which agriculture in some areas has lacked vitality, due to unfavorable weather conditions as, for example, in 1987-88. But with steady growth in manufacturing, GDP has kept growing at the rate of more than 6% per annum.

The records and projections of the growth of GDP during the period of 5th-9th Plans are as follows:

Table 9-1 GDP

	Annual Growth Rate (%)	GDP (Billion Rs, 1987-88 Price)
5th	6.6	
1982-83		449.0
6th	6.6	
1987-88		618.0
7th	6.5	
1992-93		846.8
8th	6.5	
1997-98		1,157.8
9th	6.5	
2002-03		1,588.7

Source: 7th Plan, 1988-93

9-1-3 Government Budget of Pakistan

Pakistan's reality of national finances is distinctly reflected in the Government budgets of Pakistan for 1987-88 and 1988-89. While the income from external resources and bank borrowing together constitutes over 20% of the Revenue, defense and debt servicing alone account for about 50% of the total Expenditure and about 70% of the current expenditure.

Table 9-2 Government Budget - Revenue

	1987-88		1988-89	
	Million Rs	%	Million Rs	%
Internal Resources	136,147	77.2	140,905	75.6
External Resources	25,968	14.7	28,279	15.2
Sub total	162,115	91.9	169,184	90.8
Bank Borrowing	14,310	8.1	17,213	9.2
Grand Total	176,425	100	186,397	100

Source: Government Budget, 1988-89

Table 9-3 Government Budget - Expenditure

		1987-88		1988-89	
		Million Rs	%	Million Rs	%
Current		120,605	68.4	131,831	70.7
Items	Defense	45,295	25.7	48,321	25.9
	Debt Servicing	39,389	22.3	44,617	23.9
	Others	35,921	20.4	38,893	20.9
Development		55,820	31.6	54,566	29.3
Grand Total		176,425	100	186,397	100

Source: Government Budget, 1988-89

9-1-4 Population Growth Rate

One of the major problems for Pakistan to tackle in promoting economic development is the population issue. Whereas the average population growth rate of developing countries of the world is 2%, that of Pakistan is higher at 3%.

The actual condition and projections of population growth in Pakistan are as follows:

Table 9-4 Population Growth Rates

	1961	1972	1981	1988	1993	2003
Total (Million People)	42.8	65.8	84.2	103.8	123.0	162.4
Annual Increase (%)	2.4	3.6	3.0	3.1	3.0	2.6

Sources: Economic Survey, 1987-88
7th Plan, 1988-93

Whereas the population growth rate in 1988 was 3.1%, the rate of increase of employment was 2.5%. Thus, the employment opportunities were

proportionately less, and the rate of unemployment was estimated at 3%. However, more than 70% of those employed were either self-employed or engaged in unpaid domestic work.

9-1-5 Per Capita Income

During the period of the 6th Plan, the per capita income in Pakistan showed an increase of 37.6% as expressed in Rupees and the income as of 1987-88 would be 390 U.S. dollars.

The changes recorded in per capita income during the 6th Plan were as follows.

Table 9-5 Per Capita Income

	1983-84	1984-85	1985-86	1986-87	1987-88
Per Capita GNP (Rs)	5,015	5,493	6,025	6,401	6,905
Exchange Rate (Rs/US$)	13.4	15.1	16.1	17.1	17.5
In US Dollar	374.2	363.7	374.2	374.3	394.5

Source: Economic Survey, 1987-88

The average monthly family income in Pakistan in 1987-88 was 3,026 Rupees.

The consumer commodity price index during the 6th Plan showed an average annual increase of 5.3%. Since the average annual increase of income in Rupees was 8.2%, it will be concluded that the growth of income slightly exceeds the increase in commodity prices.

9-1-6 Quality-of-life Indices

Since per capita income is a bit too broad a measure with which to grasp the quality of life, particular indices are used for the purpose of analyzing "Quality of life."

The Quality-of-life indices during the 5th-7th Plans were as follows:

Table 9-6 Quality-of-life Indices

	1982-83	1987-88	1992-93
Infant Mortality (1,000 Babies)	98.5	80.0	60.0
Life Expectancy (Year)	58.6	61.0	63.0
Utilization Rate of Clean Water (% of Population)	38.0	53.0	82.0
Utilization Rate of Sewage (% of Population)	16.0	23.0	44.0
Electrification Rate (% of Population)	27.2	35.0	47.0
No. of Telephone Sets (Million Sets)	0.4	0.7	1.3
Rate of Telephone Installation (% of Population)	4.1	6.7	13.6

Source: 7th Plan, 1988-93

According to the Economic Survey 1987-88, Pakistan ranked 5th in per capita income when its economic indices were compared with those of nine other developing countries in Asia. In infant mortality and life expectancy, Pakistan ranked 8th.

9-1-7 Education

One of the top priorities for the Government of Pakistan is the promotion of education which is vital to the nation's effort to push ahead its development. Special emphasis is placed on the expansion of primary education and enhancement of literacy levels.

As for the present status of literacy in Pakistan, it is reflected in the following data of the Economic Survey 1987-88:

- Literacy of those employed is 36.7%.
- Literacy of those unemployed is 49.6%.
- Literacy of farmers is 20.6%.

The literacy rates during the 5th-7th Plans are as follows:

Table 9-7 (1) Literacy Rates (of People 10 Years and Older)

	1982-83	1987-88	1992-93
Total Popoulation (Million People)	59.6	71.9	84.3
Literate Population (Million People)	16.1	21.3	33.8
Literacy Rate (%)	27.0	29.6	40.0

Source: 7th Plan, 1988-93

The literacy rates by sex and urban/rural areas are as follows:

Table 9-7 (2) Literacy Rates by Sex and Urban/Rural Areas (% of People 10 Years and Older)

	1972			1981		
	National	Urban	Rural	National	Urban	Rural
Both Sexes	21.7	41.5	14.3	26.2	47.1	17.3
Male	30.2	49.9	22.6	35.1	55.3	26.2
Female	11.6	30.9	4.7	16.0	37.3	7.3

Source: Economic Survey, 1987-87

The pupils' numbers and enrollment rates in primary school during the 5th-7th Plans are as follows:

Table 9-8 Pupils' Numbers and Enrollment Rates in Primary School

	1982-83	1987-88	1992-93
Pupils' Number (Million)			
Total	6.7	9.3	13.8
Male	4.6	6.1	7.9
Female	2.1	3.2	5.9
Enrollment	(Estimate)		
Rate(%)	52.8	63.5	80
Total	79.5	79.5	89
Male	35.3	45.7	70
Female			

Source: 7th Plan, 1988-93

With a view to enhancing the rates of primary school enrollment, the Government of Pakistan plans to construct more than 30,000 primary schools during the 7th Plan. This is a plan to ensure that every child of primary-school age has a school within a radius of 1.5km from his or her home. At the same time, the Government plans to make primary school education compulsory.

As to education outside school, the Literacy and Mass Education Commission (LAMEC)of the Ministry of Education has taken charge of two projects, viz., the "Nai Roshani (New Light) School Project" for young men and women who had not completed primary school education, and the "Iqra (Reading) Experimental Project" for illiterate adults.

The Nai Roshani School Project was designed to provide primary education to a total of 400,000 people through a 2-year course during the four years from 1986 to 1990.

The Iqra Experimental Project was carried out for a year from 1986 to 1987 to provide literacy education to a total of 60,000 people in

Rawalpindi. As to the results of this experiment, the Commission has reported that a total of 20,000 people have gained literacy, and an overall evaluation of the project is being made by the Ministry of Education.

The United Nations has designated the year 1990 the "International Year of Literacy" and this is expected to give Pakistan big momentum to expand literacy.

9-2 Financial Status of PTV

The main sources of income for PTV (GTV) are income from advertisements and TV licence fees. The advertisement income accounts for more than 50% of the entire revenue and is the biggest source of income for PTV. The amount of TV licence fees is at present 200 Rupees a year per TV receiver, but the rate of collection hovers around 60%. From 1989-90, PTV plans to introduce the "mobile magistrates" system to enhance the fee collection rate.

(Under this "mobile magistrates" system, a magistrate, appointed in every Province, will go around to the houses of TV viewers with a PTV staff member, so that the fee is collected without fail from the viewers in arrears.)

The PTV's finance since 1978-79 has turned from deficit to surplus. The following Table shows the income and expenditure of PTV's finance since 1984-85:

Table 9-9 Income and Expenditure of PTV's Finance(Million Rs)

Income	1984-85	1985-86	1986-87	1987-88	1988-89
Advertisement	270.6	347.2	408.9	441.9	516.4
TV Licence Fee	163.5	169.6	175.4	190.7	203.6
Government Subsidy	78.2	89.6	88.4	116.9	128.0
Production Expenses for Public Service Programmes	30.4	32.0	31.5	43.0	43.0
Miscellaneous	44.9	52.8	67.8	67.9	58.8
Total Income	587.8	691.4	772.2	860.5	949.9

Expenditure	1984-85	1985-86	1986-87	1987-88	1988-89
Programme Production	63.8	68.2	79.3	82.5	100.3
Maintenance and Operation	52.3	59.4	64.1	64.3	56.2
Personnel	164.7	194.1	227.1	286.3	279.9
Miscellaneous	37.8	39.8	49.1	44.2	141.2
Depreciation	62.7	65.4	75.3	91.6	116.2
Total Expenditure	381.5	427.2	495.2	569.1	694.1

Profit before Tax	206.3	264.2	277.0	291.4	255.8

Source: PTV Accounting Department

Financially, PTV plans to operate GTV and ETV separately.

9-3 Projection of Demand for Advertisement Broadcasts

PTV currently conducts 700-800 hours of advertisement broadcasts each year. For the prime viewing time zone (7:00 p.m - 9:30 p.m.), PTV is in the seller's market.

Changes in annual broadcast advertisement hours since 1981-82 are as follows:

Table 9-10 Broadcast Hours of Advertisement

1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
717	767	820	767	752	720	727

Source: PTV Basics, 1989

While the annual broadcast hours of advertisements have more or less been levelling off, the income from advertisement has always been on the increase. This is largely due to frequent increases in advertisement rates.

In estimating future demand, advantages of PTV are as follows:

(1) PTV is Pakistan's only TV station and some of the popular programmes are getting audience ratings as high as more than 80%.

(2) While the number of advertisers using PTV is about 500 firms, there are still more about 1,000 potential customers registered with the advertising industry in Pakistan.

(3) The annual ratio of TV advertisement income of PTV as against GNP is on average 0.06%, but in Japan the corresponding figure is five times as big at 0.32%.

One disadvantage for PTV is that the demand for time zones other than the prime viewing time is low.

Thus, it seems that the demand from advertisers is very likely to grow over the present level.

In the case of the 1988 Seoul Olympics broadcasts, PTV gained advertisement income in a more advantageous way than it normally would do. PTV gained the income accounting for 2.28% of the annual advertisement income using only 0.36% of the annual advertisement hours. Production and broadcast of attractive programmes will certainly lead to arousing advertisers' demand for time allotment.

9-4 Financial Analyses and Economic Evaluation

9-4-1 Preconditions for Financial Analyses

(1) Preconditions for Estimates

1) Currencies and Exchange Rates

For the purpose of study of the present project, Pakistani currency will be used as the standard currency. As for other currencies, they will also be used but will be converted to the Pakistani currency at the following exchange rates which were the average rates in effect at the time of field survey, February - April 1989.

1 U.S. Dollar = 19.57 Rupees
1 U.S. Dollar = 130.08 Yen
1 Rupee = 6.6462 Yen

2) Rates of Price Escalation

For the purpose of estimate at current price basis of construction cost and financial analyses, expenses and prices to be calculated will be based on the market prices at the time of survey and will include expected rise in the price of each item.

In the estimate of construction cost, the increment resulting from escalation which will occur by the time of disbursement is called "Price Contingency."

3) Physical Contingency

This contingency is to cover unexpected costs exceeding the estimated budget which may arise due to unforeseen causes.

In the analyses, we would make sensitivity analyses on assumed changes of the construction cost, so that this contingency will not be appropriated in the capital requirement.

4) Import Duties, Sales Tax and Surcharges

The estimate of levies on imported equipment and facilities will be based on the normal tariff, and the average rate of 120% will be applied to C&F prices.

(2) Capital Requirement

The estimated capital requirement, of the construction cost based on the Implementation Plans explained in Chapter 8 and of the cost based on various preconditions mentioned above, will be as shown in Table 9-11 attached at the end of this Chapter.

For the convenience of this study, the investments to be made during the period of construction will be divided into the initial and later plans. The completion year of the project by the investments are also shown below:

Plans	Construction Period	Completion of the Project
Initial 2 years	March 1990 - March 1992	1993
Later 3 years	1992 - 1994	1996

(3) Financing Plan

The capital requirement as estimated in the previous paragraphs is based on the assumptions that the foreign currency portion will be made available from overseas and the local currency portion provided by the Government of Pakistan will be in the form of financial assistance for the project.

(4) Operational Expenses

In this section, estimate will be made of the expenses of the 2 comprehensive fields of Programme Production and Transmission for making financial analyses.

Concerning annual escalations, 10% for programme production and operation & maintenance expenses, 12% for staff salaries and expenses, and nothing for transponder lease rate, will be applied.

1) Expenses for Programme Production

As shown in PART III-Chapter 1, production expenses will be calculated based on the programming plan of ETV programmes, foreign programmes and rebroadcast GTV programmes.

2) Operation and Maintenance Expenses

Concerning programme production at 5 Centres, expenses will be calculated based on equipment costs and in proportion to actual expenses of GTV Peshawar Centre, which is similar to ETV Islamabad Centre in equipment scale.

As for transmission side at 43 rebroadcast stations, we would group the stations into 5 types based on each transmitter's output and pick out a model GTV station which is similar to each group in output. Then, expenses will be calculated in proportion to the model GTV stations.

The model stations are as follows.

30 kW (UHF)	: Sakesar
20 kW (VHF)	: Tando Allah Yar
10 kW (VHF)	: Shujaabad
1-0.5 kW (VHF)	: Lakpass
0.1 kW (VHF) and below	: Razmak

3) Staff Salaries and Expenses

Staff salaries including bonuses will be calculated in the following manner.

a) The staff of 5 Centres:

As shown in Chapter 6, we would fix the numbers of staff members of programme production, studio engineering, finance and administration at the 5 centres. We calculate the average per capita annual wage including one-month bonus based on the PTV pay scale, and multiply the average wage and the numbers of staff members together.

The average wage is 50,373 Rs. in 1988.

b) The staff of 43 Rebroadcast Stations:

The salaries will be calculated in proportion to the model GTV stations. The model stations are the same as in Item 2).

In order to provide for staff expenses including reserves for social welfare, pensions and gratuity, 30% of the above-estimated staff salaries will be set aside. 9.8% of staff salaries will be the reserves for pensions, etc.

4) Lease of Transponder

Rate will be calculated based on international standards.

5) Other Operational Expenses

- Travelling & transport expenses
- Office expenses
- Miscellaneous expenses

The expenses mentioned above will be estimated respectively for Programme Production and Transmission. The calculation method is on the basis of model GTV facilities——Peshawar Centre for programme production and 5 stations for transmission.

6) Depreciation

Depreciation will be made by the following method.

- Depreciation method: Written-down value method

- Calculation method: $Dn = C \times (1-r)^{n-1} \times r$

  Here,

  Dn : Amount depreciated in the nth year

  C : Amount of investment for each unit of facilities

  r : Depreciation rate given below

- Depreciation rates:

Building	5%
Plant and Machinery	10%
Moter Vehicle	20%
Furniture & Fixture	10%

- Start of Depreciation: For the initial two years, depreciation could start in the first full operating year of the project, 1992-93. For the later three years, in the year following each investment.

Since depreciation is made for the purpose of reserving funds for future reinvestments, reservation of the funds may be made outside PTV when sufficient expenses of operation are internally secured.

7) Working Capital

After the start of the project, working capital will become necessary in order to provide broadcasting services smoothly.

In accounting practices, working capital is the amount obtained by deducting Current Liabilities from Current Assets as shown on the Balance Sheet at the end of an accounting year. In case this balance is found to be in excess of the balance at the end of the preceding fiscal year, this amount will be calculated as an item of payment in the Cash Flow Statement.

In connection with the working capital of the project, the following items will be calculated:

- Current Assets

Inventories of imported materials and equipment:	The same estimate as in PC-1 FORM
Accounts receivable relating to advertisement income:	2 months' worth of advertisement income
Advances and prepayments relating to operational expenses:	The same estimate as in PC-1 FORM

- Current Liabilities

Accounts payable relating to operational expenses:	The same estimate as in PC-1 FORM

8) Operational Expenses during Test Period

Even before the start of full operation in 1992, test telecasting will be practicable in 1991. So operational expenses for the test telecasting will be estimated, except for depreciation funds.

The ratio of the expenses (at 1988 price) for test operation to those for full operation is as follows.

Expense Item	Programme Production %	Transmission %
Programme Production	100.0	-
Operation & Maintenance	44.4	74.8
Salaries	38.6	61.6
Transponder Lease	-	100.0
Others	29.7	61.8

(5) Operational Income

Based on consultations with PTV, the following items will be estimated as financial income under this project.

1) Advertisement Income

In order to make an estimate of advertisement income on ETV, the following PTV method will be applied.

Item	1992-93	1993-94	1994-95 and after
a) Broadcasting hours per day	8.0	9.0	10.0
b) Programme hours possible for advertisement per day	4.0	5.0	6.0
c) Annual number of hours possible for advertisement (b) × 365)	1460.0	1825.0	2190.0
d) Annual number of hours actually feasible for advertisement (c) × 10/60)	243.3	304.2	365.0
e) Annual number of hours for estimated sale (d) × 30%)	73.0	91.3	109.5
f) Annual number of hours for income (e) × 80%)	58.4	73.0	87.6

We would add that, of "8.0 hours" mentioned for the 1992-93 period, the number of programme hours possibly to be sold for advertisement is 4 hours per day and 1,460 hours per year.

Concerning the 4 hours, the time actually feasible for advertisement is 10 minutes per hour, though advertisers would be buying 30% of the time. As a result, the total annual number of hours for income from advertisement will be the remainder after deduction of the 20% advertising agency commission. In 1988 PTV's advertisement rate per minute was 21,760 Rs. and an annual 4.66% increase of the rate will be estimated, applying the method in PC-1 FORM.

Annual advertisement income will increase more than 10% for the first 3 years through increases of advertisement hours and rates. However, after 1994-95, an annual increase of income may rely mainly on an increase of rate, because daily broadcasting hours are not planned to increase for that time being. The peak hours are limited also.

2) VCR Licence Fee

As of fiscal 1987-88, the registered number of VCRs was about 200,000 sets. PTV estimates that this figure will increase at a

rate of 2% per annum.

The VCR licence fee is 200 Rs. per set, which is the same as the TV licence fee.

The collection rate of this fee is estimated as 50% and a fee increase is not assumed for the analysis.

3) Interests received as a result of Bank Deposit of Depreciation Reserve

The rate of interest receivable on bank deposit of the depreciation reserve as mentioned in Item 9-4-1-(4)-6) will be estimated at 4.5% (9% x 1/2) per annum.

9-4-2 Financial Analyses

(1) Method of Analysis

PTV plans to separate financially ETV from GTV. So, we would base the financial analyses on the estimate of income and expenditure of ETV alone.

The financial income and expenditure, including the construction cost needed for implementation of the project, have already been explained in detail in this report.

If we were to make income and expenditure calculations based on the various preconditions as mentioned in the previous sections, no profit can be expected from the project. Therefore Government subsidy will be required in order to make up for the deficit.

In the present analyses, we would compile a number of financial statements by making a review of PC-1 FORM and, after making factor analyses of operational expenses, we would calculate the amounts of recurring Government subsidy required in operating this project.

(2) Results of Financial Analyses

Based on the preconditions mentioned above, the following financial statements (Base Case) will be prepared and attached at the end of this Chapter.

Table 9-12 Operating Income Statement
Table 9-13 Operating Expenses Statement
Table 9-14 Working Capital Statement
Table 9-15 Profit and Loss Statement
Table 9-16 Cash Flow Statement
Table 9-17 Balance Sheet

The results of financial analyses based on the above statements are as follows.

1) Factor Analyses

We would divide the annual operational expenses shown in Table 9-13 by the annual broadcasting hours and get the expenses per hour and the composition ratio, which will be shown in Table 9-18 attached at the end of this Chapter. The ratio of depreciation funds of Programme Production to Transmission will be determined based on the investment costs.

The average composition ratio of operational expenses for 5 years from 1992 to 1996 is as follows.

Expense Item	Programme Production %	Transmission %	Total %
Programme Production	17.2	-	17.2
Operation & Maintenance	2.1	5.8	7.9
Salaries	26.0	5.6	31.6
Others	3.4	1.7	5.1
Transponder Lease	-	7.0	7.0
Deprecation	14.9	16.3	31.2
Total	63.6	36.4	100.0

The above table shows that Programme Production exceeds Transmission much more and that the sum of salaries and depreciation takes up more than 60% of the total.

2) Sensitivity Analyses

Based on the assumption that imported equipment will be exempt from import duties, we would prepare the financial statements (Alternative Case) of the same titles as those in Item (2) and attach them at the end of this Chapter. (The statements will be numbered 9-12-1, 9-13-1, 9-14-1, 9-15-1, 9-16-1 and 9-17-1 in the corresponding order of Item (2).)

Assuming that the construction cost and the operational expenses may change, we would also make an analysis of changes of Government subsidy in both the Base Case and Alternative Case.

The above sensitivity analyses will produce the appropriate total of Government subsidy for 6 years including the test period of 1991 and the annual average subsidy for 5 years from 1992 to 1996. The results will be shown in Table 9-19 attached at the end of this Chapter. The amounts are at current price and at 1989 constant price (deflated by 6.5% a year).

3) Results of Analyses

Advertisement income, which is a main source of income, will take up 80% of the total, based on an estimate of advertisement hours and rates. The operational income including advertisement income will be equivalent to 35% of the operational expenses and so Government subsidy becomes necessary to make up for the deficit.

In the Base Case, the total subsidy is as follows.

Current Price	1,786 Million Rs.
1989 Constant Price	1,309 Million Rs.

The annual average subsidy is as follows.

Current Price	329 Million Rs.
1989 Constant Price	236 Million Rs.

In the Alternative Case, at current prices,

The total subsidy is 1,469 Million Rs.

The annual average subsidy is 265 Million Rs.

The amounts are equivalent to about 80% of those in the Base Case. Furthermore, 1,353 new staff members,as shown in PART III - Chapter 6, will be recruited at the start of ETV operation, which means more employment in the society.

9-4-3 Preconditions for Economic Evaluation

(1) Method of Evaluation

In making the evaluation, we would conduct quantitative analysis through a comparative study of educational broadcasting; the educational effects brought about by home-viewing vis-a-vis those gained in the school classrooms and in the adult literacy classes.

In this evaluation, we would study the effects of educational broadcasts on primary and secondary school students and on illiterate adults, and thereby calculate the amounts of educational expenses to be saved at schools and adult classes as a result of home-viewing of ETV broadcasts. Those amounts are treated as the economic benefits gained in the operation.

Meanwhile, as to the economic costs, calculations will be made using various conversions and variations to be explained later on in this report, based on the construction cost and operational expenses mentioned in the financial analyses.

In the economic evaluation, which will be made from the viewpoint of national economy, we would obtain an EIRR, the Economic Internal Rate of Return, by the Discounted Cash Flow Method, through a comparative study of the economic costs and benefits as mentioned above.

We would also conduct some sensitivity analyses, taking in possible changes in some of the main assumptions.

(2) Preconditions for Evaluation

1) Currencies and Exchange Rates

The same currencies and rates used in the financial analyses will be used.

2) Project Life and Salvage Value

The project life will be assumed as 15 years (1989-2003) from the start of construction work.

This, however, is the period designated for the purpose of economic evaluation and the undertaking itself will naturally go on beyond that period.

As the year 2003 is the final year of the Government's Perspective Plan, our economic evaluation has been made to coincide with this period ending in 2003.

The value of the property after 15 years from now may be considered equal to the salvage value itself and we are calculating the total amount of the salvage value as "minus cost" at the final year of the project life.

Such residual value will include the cost of land, the undepreciated portions of the construction cost and the unused balance of working capital.

3) Treatment of Inflations

In the economic evaluation, an erroneous estimate of long-term price trends will vastly distort the evaluation. Therefore, in our evaluation, we are using constant prices in 1989.

(3) Calculation of Economic Costs

In the economic evaluation, economic effects of the project will be evaluated, using economic prices instead of market prices used in the financial analyses.

In the present study, economic costs will be calculated by the following method, since strict and detailed calculations would be difficult.

1) Transferable Costs and Benefits

Since taxes are all revenue of the Government, they are, from the viewpoint of national economy, transferable costs. So, in our economic evaluation, economic prices will be obtained by deducting the taxes calculated at the following assumed rates from market prices:

Applicable Items		Assumed Tax Rates
- Imported equipment and facilities	:	120.0%, the same as the rate mentioned in Item 9-4-1-(1)-4)
- Imported raw materials	:	12.5%
- Domestic products	:	12.5%
- Wages of staff members	:	15.0%

As to the Government subsidy and the interests received, these will be deducted from the operational income, since they are expenditure from the Government and financial institutions and therefore are transferable benefits.

2) Wages

Wage levels in Pakistan can be considered as reasonable, reflecting labour conditions like the probable shortage of skilled workers.

As for unskilled labour, the Shadow Wage Rate is estimated at 50% of the amount actually paid, taking into account latent unemployment.

However we would not apply the Shadow Wage Rate, because the percentage of unskilled workers engaged in the construction work is negligible and the number of PTV's unskilled staff members is uncertain.

3) Opportunity Costs of Land

Since the sites for construction of main facilities are located in city areas, opportunity costs of land will be calculated on the basis of the prices at which the land is actually acquired.

4) Estimate of the Operational Expenses of Evaluation-related Programmes

The programmes to be broadcast under this project include vocational-training programmes, GTV rebroadcasts, etc., as well as the educational programmes intended for primary and secondary school students and for illiterate adults.

On the other hand, based on the evaluation criteria, the evaluation does not consider benefits of programmes other than those of the latter programmes. So, it is necessary to separate the expenses of those programmes from the overall operational expenses. We would estimate the expenses as 60% of the Programme Production expenses.

5) Calculation of Economic Costs

The operational expenses in economic costs as calculated by the above-mentioned method will be shown in Table 9-20 attached at the end of this Chapter.

The construction cost (Million Rs.) is as follows.

Item	Initial 2 years	Later 3 years	Total
Land	15.420	36.235	51.655
Building	148.080	133.911	281.991
Plant & Machinery	439.142	539.828	978.970
Motor Vehicles	8.583	18.449	27.032
Furniture	2.280	6.359	8.639
Total	613.505	734.782	1,348.287

Import duties, taxes and price contingency after 1989 are deducted.

(4) Calculation of Economic Benefits

1) Projections concerning TV Receivers

As shown in Chapter 7, the registered number of TV receivers in 1987-88 was about 1,600,000, or 9.4% of the total number of households in Pakistan. In the evaluation, taking into account the annual rate of increase of TV receivers of the past ten years, we would estimate the future growth rate at an average of 12% per annum.

2) Estimate of Viewers of ETV

We would base our estimate of the number of potential viewers of ETV broadcasts on the Government's projections of population trends, school enrollment rates, literacy enhancement plans, etc.

Table 9-21 Viewing Population

Year	Population (Million People)						
	Total Population	5~9 Years Old	Primary Enrollment	10 Years and Older	10~14 Years Old	Secondary Enrollment	Literate
1988	103.82	14.6	9.3	71.9	12.1	3.1	21.3
1993	119.40	17.3	13.8	84.4	14.1	5.0	33.8
1998	142.84	19.9	19.9	97.2	16.8	7.4	58.4
2003	162.40	22.6	22.6	110.6	19.4	10.9	88.5

Source: 7th Plan, 1988-93

3) Educational Effects of Home-viewing

For seven years during 1975-82, PTV conducted a series of Adult Functional Literacy educational broadcasts, and for 23 weeks from November 16, 1980 to April 25, 1981, conducted a random-sampling survey of how the broadcasts were being viewed on a total of 96,816 TV-set owners mainly in the urban areas. The following results were obtained:

Audience rating: 20.4% (19,723 viewers)
Rate of Educational Beneficiaries: 74.5% (14,697 people)
Of which: Adults : 45.6% (6,702 people)
Children : 54.4% (7,995 people)
Rate of Beneficiaries with a High Degree of Understanding:
90.9% (13,353 people)
Of which: Adults : 45.6% (6,089 people)
Children : 54.4% (7,264 people)

As the actual number of viewers per TV receiver was three, PTV calculated the total number of educational beneficiaries by home-viewing, by applying the above-listed percentage-figures and the registered number of TV receivers at the time of survey, which was

682,000. In the economic evaluation, too, we would use the same calculation method.

4) Annual Educational Expenses and Annual Number of School Class (Study) Hours per Student

According to the Government statistics and the materials compiled by LAMEC, we have obtained and shown below the annual expenses of school education and of adult education per student during 1987 and also the average hours of class (study) per student during the same year.

Educational Level	Annual Educational Expenses (Rs.)	Annual Class (Study) Hours
Primary	650	1,067
Secondary	1,200	1,163
Nai Roshani Programme	955	828
Adult Education, Iqra Project	1,190	196

The annual study hours of adult education are an estimate based on the data obtained.

Based on the above, counting the rate of increase of educational expenses (10%) and an estimated tax rate (12.5%), we would estimate the educational expenses per student per hour as follows (at 1989 price).

Educational Level	Educational Expenses (Rs.)
Primary	0.65
Secondary	1.09
Adult	6.42

The expenses of Nai Roshani are excluded, since there is little difference between the expenses of Nai Roshani and Secondary.

5) Study Hours by Broadcasts

As of the present moment, specific hours of studies by broadcasts, the curricula and other details remain uncertain for the projected ETV. So, we would assume the annual study hours by broadcasts on each educational level at 100 hours.

6) Calculation of Economic Benefits

Based on the various preconditions, we would calculate the economic benefits of ETV in terms of the educational expenses saved as a result of home-viewing. The calculation will produce yearly benefits at each educational level by multiplying together the figures of the following items, from a) to f). The results will be shown in Table 9-22 attached at the end of this Chapter.

a) Estimated Number of ETV Viewers

Number of TV receivers x number of actual viewers per receiver (3 people) x ETV view-rating (20.4%)

b) Educational Beneficiary Rate of ETV Viewers (74.5%)

c) Viewers' Ratio among the Educational Levels

Primary (5-9 years)	29.8%
Secondary (10-14 years)	24.6%
Adult (above 15 years)	45.6%
Total	100.0%

d) Educational Effect Index of ETV (55.0%)

The survey of home-viewing of the Adult Functional Literacy broadcasts from 1975 to 1982 showed a very high index (90.9%). However, taking the CVC-viewing index (81.2%), the Iqra Project index (30.4%) and their survey methods into consideration, we would assume the index of ETV as 55%.

e) Annual Study Hours by Broadcasts (100 hours)

f) Saved Educational Expenses per Student per Hour (Rs.)

Primary	0.65
Secondary	1.09
Adult	6.42

9-4-4 Economic Evaluation

(1) Economic Internal Rate of Return (EIRR)

The EIRR of ETV project obtained through the above economic costs and benefits will be 15.26%, the calculation of which will be shown in Table 9-23 attached at the end of this Chapter.

This is a Reference Value to profitability of the project, based on the concrete example of AFL broadcasts and various assumptions. Though the evaluation is limited to the educational effect of literacy of ETV, the actual broadcasting will naturally produce other great socio-economic benefits by giving the public knowledge and information on high technology and science, national development, agricultural and industrial production, health and nutrition, population planning, regional languages, etc.

(2) Sensitivity Analyses

Based on the assumption that such main benefit factors as the annual rate of increase of TV receivers, the annual study hours and the educational effect index of ETV may change, we would calculate the corresponding EIRRs as follows.

Factor	Changes	EIRR, %
TV Increase Rate	10%	10.95
	14%	19.56
Study Hours	80 hours	10.22
	120 hours	19.76
Educational Effect Index	50%	13.05
	60%	17.37

9-5 Conclusion and Recommendation

9-5-1 Conclusion

The Islamic Republic of Pakistan has an urgent need for educational promotion to train the work force which is the driving power of national development. A low literacy rate of 30% is a major obstacle in developing Pakistan's society and economy. It is very reasonable that the Government of Pakistan has adopted the expansion of primary education and the raising of the literacy rate as very important political objectives.

ETV is a greatly useful means to promote education and literacy. According to an estimate of educational effects of home-viewing, in the single year of 1992-93 when ETV will start full telecasting, 7 hundred thousand people are very likely to become literate via home-viewing. ETV will greatly improve literacy, especially for women who tend to have less educational opportunity than men.

The economic evaluation shows the Economic Internal Rate of Return of the project is 15.26%. Though this is based on some simulated factors, the result could economically justify the project.

Naturally ETV's benefits are not limited to literacy.

School students can get tremendous help in their lessons by viewing instructive broadcasts. The broadcasts will inform the public, especially residents in remote areas where information is scarcely available, about practical knowledge concerning population planning, nutrition, health, etc. Through this service, ETV can directly improve qualify of life.

ETV also enables speedy communication of information necessary for national development, dissemination of technical knowledge of agricultural and industrial production, and effective communication to rural people in their regional languages. Thus, people are motivated to actively participate in developing the nation and society.

ETV is a single quick and effective means of development for Pakistan. The Government of Pakistan has made the execution of the

project a top priority.

The benefits of ETV broadcasts will increase in proportion to the increased number of TV receivers.

PTV is fully competent and highly spirited for the operation of ETV, as shown in the detailed draft PC-1 FORM prepared by them.

The ETV project is essentially a non-profit educational one, and will not run in the black. But when the great socio-economic benefits for national development are considered, the project should be started as promptly as possible.

One serious problem in executing the project is financing the construction cost. The total cost will be so huge that its payment is impossible for not only PTV, but for the Government of Pakistan, which suffers from chronic financial deficits. Therefore, financial assistance from a friendly country will be indispensable.

Another important problem is making up for the recurring deficits in operational expenses. Subsidy of the Government of Pakistan will be required for that purpose, though the subsidy could be regarded as an essential expenditure for national development.

Furthermore, PTV certainly needs advanced training by a friendly country in programme production, broadcasting engineering and the like for smooth operation of ETV.

In view of the urgent necessity of ETV for the country, the project is to be executed as soon as domestic and foreign assistance and cooperation has become available for both the construction and operation.

9-5-2 Recommendation

According to PC-1 FORM, ETV's construction is to be finished in five years. However, since the project is on a considerably large scale, the construction schedule may be hindered, for instance, by the shortage of finances, staff recruitment and training, etc.

Therefore we would like to recommend that after the completion of construction of the initial two-year part of the project, ETV first concentrates on steady network operations, making the most of the then-completed facilities.

As for the construction of the later three-year part of the project, our recommendation is that ETV be not too much prepossessed with the original schedule. When ETV can fully meet the requirements of construction in terms of the finances, staff, operational system and so forth, then it will be in a position to carry forward the construction plan.

Even if the construction period takes more than five years, it may be duly said that smooth and natural development of the project should be pursued.

Table 9-11 (1) Estimated Capital Requirement
— Initial 2 years Plan —

(Rs. in Million)

Particulars	Local	Foreign	Total
A. Land & its Development	15.420	-	15.420
B. Studio/Annex Building			
1) Studio	65.352	29.191	94.543
2) Annex	57.043	-	57.043
Sub Total	122.395	29.191	151.586
C. Plant & Machinery			
1) Studio Equipment	-	95.141	95.141
2) Electrical Equipment	3.190	-	3.190
3) Airconditioning	2.110	-	2.110
4) Installation Charges	2.336	16.194	18.530
5) Rebroadcast TV	-	247.225	247.225
6) Up/Down Links	-	42.404	42.404
7) Others	35.991	-	35.991
Sub Total	43.627	400.964	444.591
D. Motor Vehicles	9.810	-	9.810
E. Furniture & Fixture	2.237	-	2.237
F. Fire Fighting Equipment	0.369	-	0.369
G. Tax & Import Duties	496.754	-	496.754
H. Consultant Fee	13.874	-	13.874
Base Construction Cost-1989	704.486	430.155	1134.641
I. Physical Contingency	-	-	-
J. Price Contingency	4.704	-	4.704
Estimated Capital Cost	709.190	430.155	1139.345

Table 9-11 (2) Estimated Capital Requirement
— Later 3 years Plan —

(Rs. in Million)

Particulars	Local	Foreign	Total
A. Land & its Development	36.235	-	36.235
B. Studio/Annex Building			
1) Studio	71.227	40.626	111.853
2) Annex	19.662	-	19.662
Sub Total	90.889	40.626	131.515
C. Plant & Machinery			
1) Studio Equipment	-	174.144	174.144
2) Electrical Equipment	4.217	-	4.217
3) Airconditioning	3.644	-	3.644
4) Installation Charges	5.116	18.731	23.847
5) Rebroadcast TV	-	296.517	296.517
6) Up/Down Links	-	-	-
7) Others	36.803	-	36.803
Sub Total	49.780	489.392	539.172
D. Motor Vehicles	21.084	-	21.084
E. Furniture & Fixture	6.392	-	6.392
F. Fire Fighting Equipment	0.875	-	0.875
G. Tax & Import Duties	613.539	-	613.539
H. Consultant Fee	16.184	-	16.184
Base Construction Cost-1989	834.978	530.018	1364.996
I. Physical Contingency	-	-	-
J. Price Contingency	58.186	-	58.186
Estimated Capital Cost	893.164	530.018	1423.182

Table 9-11 (3) Estimated Capital Requirement
— Total 5 years Plan —

(Rs. in Million)

Particulars	Local	Foreign	Total
A. Land & its Development	51.655	-	51.655
B. Studio/Annex Building			
1) Studio	136.579	69.817	206.396
2) Annex	76.705	-	76.705
Sub Total	213.284	69.817	283.101
C. Plant & Machinery			
1) Studio Equipment	-	269.285	269.285
2) Electrical Equipment	7.407	-	7.407
3) Airconditioning	5.754	-	5.754
4) Installation Charges	7.452	34.925	42.377
5) Rebroadcast TV	-	543.742	543.742
6) Up/Down Links	-	42.404	42.404
7) Others	72.794	-	72.794
Sub Total	93.407	890.356	983.763
D. Motor Vehicles	30.894	-	30.894
E. Furniture & Fixture	8.629	-	8.629
F. Fire Fighting Equipment	1.244	-	1.244
G. Tax & Import Duties	1110.293	-	1110.293
H. Consultant Fee	30.058	-	30.058
Base Construction Cost-1989	1539.464	960.173	2499.637
I. Physical Contingency	-	-	-
J. Price Contingency	62.890	-	62.890
Estimated Capital Cost	1602.354	960.173	2562.527

Table 9-11-(4) ESTIMATED CAPITAL REQUIREMENT

(Unit Rs.Million)

PARTICULAS	1989-90 L.C	1989-90 F.C	1990-91 L.C	1990-91 F.C	1991-92 L.C	1991-92 F.C	1992-93 L.C	1992-93 F.C	1993-94 L.C	1993-94 F.C	1994-95 L.C	1994-95 F.C	TOTAL 5 YEARS L.C	TOTAL 5 YEARS F.C	TOTAL 5 YEARS TOTAL
A. Land, Development															
Land, Development	15.420	0.000	0.000	0.000	0.000	0.000	18.117	0.000	18.118	0.000	0.000	0.000	51.655	0.000	51.655
B. Studio/Annex Building															
1) Studio	65.352	29.191	0.000	0.000	0.000	0.000	35.665	20.313	35.562	20.313	0.000	0.000	136.579	69.817	206.396
2) Annex	48.783	0.000	8.260	0.000	0.000	0.000	5.076	0.000	9.121	0.000	5.465	0.000	76.705	0.000	76.705
Sub Total	114.135	29.191	8.260	0.000	0.000	0.000	40.741	20.313	44.683	20.313	5.465	0.000	213.284	69.817	283.101
C. Plant & Machinery															
1) Studio Equipmet	0.000	95.141	0.000	0.000	0.000	0.000	0.000	74.023	0.000	100.121	0.000	0.000	0.000	269.285	269.285
2) Electrical Equip.			3.190	0.000	0.000	0.000	1.478	0.000	1.185	0.000	1.554	0.000	7.407	0.000	7.407
3) Aircondition			0.788	0.000	1.322	0.000	1.297	0.000	0.906	0.000	1.441	0.000	5.754	0.000	5.754
4) Installation			2.336	16.194	0.000	0.000	2.052	5.689	1.351	4.792	1.713	8.250	7.452	34.925	42.377
5) Rebroadcast TV			0.000	57.865	0.000	189.360	0.000	86.855	0.000	83.715	0.000	125.947	0.000	543.742	543.742
6) Up/Down Links	0.000			42.404									0.000	42.404	42.404
7) Others	9.514		15.414	0.000	11.063		13.318	0.000	14.291	0.000	9.194	0.000	72.794	0.000	72.794
Sub Total	9.514	95.141	21.729	116.463	12.385	189.360	18.146	166.567	17.733	188.628	13.902	134.197	93.407	890.356	983.763
D. Motor Vehicles	1.542	0.000	2.463	0.000	5.805	0.000	7.120	0.000	8.057	0.000	5.907	0.000	30.894	0.000	30.894
E. Furniture Fixture	1.389	0.000	0.085	0.000	0.763	0.000	2.467	0.000	3.180	0.000	0.745	0.000	8.629	0.000	8.629
F. Fire Fighting	0.000	0.000	0.063	0.000	0.306	0.000	0.250	0.000	0.279	0.000	0.346	0.000	1.244	0.000	1.244
G. Tax, Import Duties	149.199	0.000	196.973	0.000	150.582	0.000	217.426	0.000	244.974	0.000	151.139	0.000	1110.293	0.000	1110.293
H. Consultant Fee	13.874	0.000	0.000	0.000	0.000	0.000	8.092	0.000	8.092		0.000		30.058	0.000	30.058
Base Constructn Cost (as of 1989)	305.073	124.332	229.572	116.463	169.841	189.360	312.359	186.880	345.116	208.941	177.504	134.197	1539.464	960.173	2499.637
I. Physical Conting.															
J. Price Contingency	0.000	0.000	2.119	0.000	2.585	0.000	19.742	0.000	28.687	0.000	9.757	0.000	62.890	0.000	62.890
ESTIMAT.CAPITAL COST	305.073	124.332	231.691	116.463	172.426	189.360	332.100	186.880	373.803	208.941	187.261	134.197	1602.354	960.173	2562.527

Table 9-11-(5) ESTIMATED CAPITAL REQUIREMENT

(Unit Rs.Million)

PARTICULARS	1989-90 L.C	1989-90 F.C	1990-91 L.C	1990-91 F.C	1991-92 L.C	1991-92 F.C	1992-93 L.C	1992-93 F.C	1993-94 L.C	1993-94 F.C	1994-95 L.C	1994-95 F.C	TOTAL 5 YEARS L.C	TOTAL 5 YEARS F.C	TOTAL 5 YEARS TOTAL
A. Land, Development															
Land, Development	15.420	0.000	0.000	0.000	0.000	0.000	21.885	0.000	23.308	0.000	0.000	0.000	60.613	0.000	60.613
B. Studio/Annex Building															
1) Studio	111.816	29.191	0.000	0.000	0.000	0.000	77.233	20.313	80.536	20.313	0.000	0.000	269.585	69.817	339.402
2) Annex	51.222	0.000	8.796	0.000	0.000	0.000	6.131	0.000	11.734	0.000	7.488	0.000	85.372	0.000	85.372
Sub Total	163.038	29.191	8.796	0.000	0.000	0.000	83.364	20.313	92.270	20.313	7.488	0.000	354.957	69.817	424.774
C. Plant & Machinery															
1) Studio equipmet	0.000	95.141	0.000	0.000	0.000	0.000	0.000	74.023	0.000	100.121	0.000	0.000	0.000	269.285	269.285
2) Electrial equip.			3.397	0.000	0.000	0.000	1.785	0.000	1.525	0.000	2.129	0.000	8.836	0.000	8.836
3) Aircondition			0.839	0.000	1.499	0.000	1.567	0.000	1.165	0.000	1.975	0.000	7.045	0.000	7.045
4) Installation			2.488	16.194	0.000	0.000	2.479	5.689	1.738	4.792	2.347	8.250	9.052	34.925	43.977
5) Rebroadcast TV			0.000	57.865	0.000	189.360	0.000	86.855	0.000	83.715	0.000	125.947	0.000	543.742	543.742
6) Up/Down Links	0.000			42.404									0.000	42.404	42.404
7) Others	123.684		213.389	0.000	163.130		209.138	0.000	238.983	0.000	163.735	0.000	1112.059	0.000	1112.059
Sub Total	123.684	95.141	220.114	116.463	164.629	189.360	214.969	166.567	243.411	188.628	170.186	134.197	1136.993	890.356	2027.349
D. Motor Vehicles	1.542	0.000	2.623	0.000	6.584	0.000	8.601	0.000	10.365	0.000	8.093	0.000	37.808	0.000	37.808
E. Furniture Fixture	1.389	0.000	0.090	0.000	0.865	0.000	2.980	0.000	4.091	0.000	1.020	0.000	10.435	0.000	10.435
F. Fire Fighting	0.000	0.000	0.067	0.000	0.347	0.000	0.302	0.000	0.359	0.000	0.474	0.000	1.549	0.000	1.549
G. Tax, Import Duties	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H. Consultant Fee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000		0.000	0.000	0.000
Estimat.Capital Cost	305.073	124.332	231.691	116.463	172.426	189.360	332.100	186.880	373.803	208.941	187.261	134.197	1602.354	960.173	2562.527

(Note)
In this table, imported duties, sales tax & surcharge, consultant fee and price contingency are included in building and plant machinery cost, etc.

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-12 OPERATING INCOME STATEMENT
- BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
FINAL ANNUAL BROADCASTS HOURS	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00
CAPABILITY RATIO	0.0	0.0	0.0	0.800	0.900	1.000	1.000	1.000
ANNUAL BROADCASTS HOURS	0.0	0.0	0.0	2920.00	3285.00	3650.00	3650.00	3650.00
ACTUAL ADVERTISEMENT BROADCAST	0.0	0.0	0.0	243.33	304.17	365.00	365.00	365.00
ANNUAL SALE AFTER COMMISSION	0.0	0.0	0.0	58.40	73.00	87.60	87.60	87.60
RATE OF ADVERTISEMENT	0.0	0.0	0.0	1.5667	1.6397	1.7161	1.7961	1.8798
ADVERTISING INCOME	0.0	0.0	0.0	91.50	119.70	150.33	157.34	164.67
FINAL ANNUAL REGISTERED VCRS	239.02	239.02	239.02	239.02	239.02	239.02	239.02	239.02
ANNUAL REGISTERED VCRS(1000SETS)	0.0	0.0	0.0	220.82	225.23	229.74	234.33	239.02
ANNUAL COLLECTED VCRS (1000SETS)	0.0	0.0	0.0	110.41	112.62	114.87	117.17	119.51
RATE OF LICENCE FEE	0.0	0.0	0.0	0.2000	0.2000	0.2000	0.2000	0.2000
V.C.R LICENSE INCOME	0.0	0.0	0.0	22.08	22.52	22.97	23.43	23.90
OPERATING INCOME	0.0	0.0	0.0	113.58	142.22	173.31	180.77	188.57
OTHER INCOME INCLUDE GOV.SUBSIDY	0.0	0.0	143.90	215.82	305.77	364.49	408.64	429.13
INCOME FROM INVESTMENT	0.0	0.0	0.0	3.72	9.03	15.79	23.13	29.75
RECURRING GRANT FROM GOVERNMENT	0.0	0.0	143.90	212.10	296.74	348.71	385.51	399.38

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-13 OPERATING EXPENSES STATEMENT
- BASE CASE -

(RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
ANNUAL BROADCASTS HOURS	0.0	0.0	0.0	2920.00	3285.00	3650.00	3650.00	3650.00
ETV PROGRAMME PRODUCTION	0.0	0.0	55.14	60.65	73.77	87.62	96.39	113.07
ETV PROGRAM PRODUCT '91 ON	0.0	0.0	53.68	59.05	64.96	71.45	78.60	86.46
ETV PROGRAM PRODUCT '91-'95	0.0	0.0	1.46	1.60	1.76	1.94	2.13	0.0
ETV PROGRAM PRODUCT '93 ON	0.0	0.0	0.0	0.0	7.05	7.76	8.54	9.39
ETV PROGRAM PRODUCT '94 ON	0.0	0.0	0.0	0.0	0.0	6.47	7.12	7.83
ETV PROGRAM PRODUCT '96 ON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.39
OPERATION & MAINTENANCE	0.0	0.0	2.66	6.59	10.73	11.80	12.98	14.28
OPERATION & MAINTENANCE (ISB)	0.0	0.0	2.66	4.39	4.83	5.31	5.85	6.43
OPERATION & MAINTENANCE (KAR)	0.0	0.0	0.0	2.20	2.42	2.66	2.92	3.22
OPERATION & MAINTENANCE (ETC)	0.0	0.0	0.0	0.0	3.48	3.83	4.21	4.63
STAFF SALARIES INC. EXPENSES	0.0	0.0	26.15	74.59	123.09	137.86	154.41	172.94
STAFF SALARIES (ISB)	0.0	0.0	20.11	46.09	51.63	57.82	64.76	72.53
STAFF SALARIES (KAR)	0.0	0.0	0.0	11.28	12.64	14.15	15.85	17.76
STAFF SALARIES (ETC)	0.0	0.0	0.0	0.0	30.42	34.07	38.16	42.74
STAFF EXPENSES	0.0	0.0	6.03	17.21	28.41	31.81	35.63	39.91
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	3.76	13.91	15.30	16.83	18.51	20.36
PROGRAMME PRODUCTION	0.0	0.0	87.71	155.74	222.89	254.11	282.28	320.64
OPERATION & MAINTENANCE	0.0	0.0	12.56	18.46	24.28	31.82	35.00	38.50
OPERATION & MAINTENANCE(INITIAL)	0.0	0.0	12.56	13.81	15.20	16.71	18.39	20.22
OPERATION & MAINTENANCE (LATER)	0.0	0.0	0.0	4.65	9.08	15.10	16.61	18.27
STAFF SALARIES INC. EXPENSES	0.0	0.0	8.05	14.37	22.07	32.24	36.11	40.44
STAFF SALARIES (INITIAL PLAN)	0.0	0.0	6.19	6.81	7.63	8.54	9.56	10.71
STAFF SALARIES (LATER PLAN)	0.0	0.0	0.0	4.25	9.36	16.26	18.21	20.40
STAFF EXPENSES	0.0	0.0	1.86	3.32	5.09	7.44	8.33	9.33
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	2.32	4.14	6.73	9.75	10.72	11.79
LEASE FEE FOR TRANSPONDERS	0.0	0.0	33.27	33.27	33.27	33.27	33.27	33.27
TRANSMISSION	0.0	0.0	56.20	70.24	86.35	107.07	115.09	124.00
CASH PROD. & TRANS. EXPENSES	0.0	0.0	143.90	225.98	309.24	361.18	397.38	444.64
BUILDING	0.0	0.0	0.0	10.05	14.73	19.63	19.02	18.07
PLANT & MACHINERY	0.0	0.0	0.0	90.94	120.00	151.20	166.52	149.87
MOTOR VEHICLES	0.0	0.0	0.0	2.15	3.44	4.83	5.48	4.21
FURNITURE & FIXTURE	0.0	0.0	0.0	0.28	0.58	0.96	1.02	0.92
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	103.42	138.75	176.62	192.04	173.06
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL PROD. & TRANS. EXPENSES	0.0	0.0	143.90	329.40	447.99	537.80	589.41	617.70

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-14 WORKING CAPITAL STATEMENT

- BASE CASE -

(RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
CURRENT ASSETS	0.0	0.0	0.0	33.58	54.00	84.90	110.28	140.51
ACCOUNT RECEIVABLE	0.0	0.0	0.0	15.25	19.95	25.06	26.22	27.45
INVENTORIES	0.0	0.0	0.0	8.86	23.03	40.75	62.00	88.58
ADVANCES & PREPAYMENTS	0.0	0.0	0.0	9.47	11.02	19.10	22.06	24.49
CURRENT LIABILITIES W/O DEBT	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
ACCOUNT PAYABLE	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
PERMANENT WORKING CAPITAL	0.0	0.0	0.0	17.79	35.64	53.07	73.52	99.70
CHANGE IN WORKING CAPITAL	0.0	0.0	0.0	17.79	17.84	17.43	20.45	26.18

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-15 PROFIT & LOSS STATEMENT (FOR ENDING JUNE 30)

- BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
OPERATING INCOME	0.0	0.0	143.90	329.40	447.99	537.80	589.41	617.70
OPERATING INCOME	0.0	0.0	0.0	113.58	142.22	173.31	180.77	188.57
OTHER INCOME INCLUDE GOV.SUBSIDY	0.0	0.0	143.90	215.82	305.77	364.49	408.64	429.13
OPERATING EXPENSES	0.0	0.0	143.90	329.40	447.99	537.80	589.41	617.70
PROGRAMME PRODUCTION	0.0	0.0	87.71	155.74	222.89	254.11	282.28	320.64
TRANSMISSION	0.0	0.0	56.20	70.24	86.35	107.07	115.09	124.00
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	103.42	138.75	176.62	192.04	173.06
OPERATING PROFIT OR (LOSS)	0.0	0.0	0.00	0.00	0.00	-0.00	0.00	-0.00
NON-OPERATING EXPENSES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET PROFIT OR (LOSS) BEFORE TAX	0.0	0.0	0.00	0.00	0.00	-0.00	0.00	-0.00
INCOME TAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET PROFIT OR (LOSS) AFTER TAX	0.0	0.0	0.00	0.00	0.00	-0.00	0.00	-0.00

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-16 CASH FLOW STATEMENT (FOR ENDING JUNE 30)

- BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
SOURCE OF FUNDS	429.41	537.51	172.43	629.77	733.19	511.73	207.33	190.19
CASH GENERATED FROM OPERATION	0.0	0.0	0.00	110.79	150.44	190.27	207.33	190.19
OPERATING PROFIT OR (LOSS)	0.0	0.0	0.00	7.38	11.69	13.66	15.30	17.13
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	103.42	138.75	176.62	192.04	173.06
FINANCIAL RESOURCES	429.41	537.51	172.42	518.98	582.74	321.46	0.0	0.0
CAPITAL GRANT	429.41	537.51	172.42	518.98	582.74	321.46	0.0	0.0
LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USES OF FUNDS	429.41	537.51	172.42	626.88	730.22	502.68	198.98	190.41
FIXED CAPITAL EXPENDITURE	429.41	537.51	172.42	609.09	712.37	485.24	178.53	164.24
NON-DEPRECIABLE ASSETS	15.42	0.0	0.0	21.88	23.31	0.0	0.0	0.0
DEPRECIABLE FIXED ASSETS	413.99	537.51	172.42	497.10	559.44	321.46	0.0	0.0
DEPRE.FUND INVEST. INC. PENSION	0.0	0.0	0.0	90.11	129.63	163.78	178.53	164.24
CHANGE IN WORKING CAPITAL	0.0	0.0	0.0	17.79	17.84	17.43	20.45	26.18
DEBT SERVICES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REPAYMENT OF LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REPAYMENT OF SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASH INCREASE OR (DECREASE)	0.00	0.00	0.00	2.90	2.97	9.06	8.35	-0.22
BEGINNING CASH BALANCE	0.0	0.00	0.00	0.00	2.90	5.87	14.92	23.27
ENDING CASH BALANCE	0.00	0.00	0.00	2.90	5.87	14.92	23.27	23.05

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-17 BALANCE SHEET (FOR ENDING JUNE 30)

- BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
ASSETS	429.41	966.92	1139.34	1681.49	2278.50	2627.09	2647.32	2668.50
CURRENT ASSETS	0.0	0.0	0.0	33.58	54.00	84.90	110.28	140.51
ADVANCES & PREPAYMENTS	0.0	0.0	0.0	9.47	11.02	19.10	22.06	24.49
ACCOUNT RECEIVABLE	0.0	0.0	0.0	15.25	19.95	25.06	26.22	27.45
INVENTORIES	0.0	0.0	0.0	8.86	23.03	40.75	62.00	88.58
CASH AT HAND	0.00	0.00	0.00	2.90	5.87	14.92	23.27	23.05
NET FIXED ASSETS	429.41	966.92	1139.34	1645.01	2218.64	2527.26	2513.76	2504.93
INVESTMENT	429.41	966.92	1139.34	1748.43	2460.80	2946.04	3124.57	3288.81
NON-DEPRECIABLE ASSETS	15.42	15.42	15.42	37.30	60.61	60.61	60.61	60.61
DEPRECIABLE ASSETS	413.99	951.50	1123.92	1621.02	2180.46	2501.91	2501.91	2501.91
DEPRE.FUND INVEST. INC. PENSION	0.0	0.0	0.0	90.11	219.73	383.52	562.05	726.28
LESS: ACC. DEPRECIATION	0.0	0.0	0.0	103.42	242.16	418.78	610.82	783.88
LIABILITIES	0.0	0.0	0.0	23.16	37.43	64.56	84.78	105.97
CURRENT LIABILITIES	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
ACCOUNT PAYABLE	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
CURRENT PORTION OF L/T DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FIXED LIABILITIES	0.0	0.0	0.0	7.37	19.06	32.72	48.02	65.16
LONG TERM DEBT BALANCE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRATUITY PAYABLE	0.0	0.0	0.0	7.37	19.06	32.72	48.02	65.16
STOCK HOLDERS EQUITY	429.41	966.92	1139.34	1658.33	2241.08	2562.53	2562.53	2562.53
CAPITAL GRANT	429.41	966.92	1139.34	1658.32	2241.07	2562.53	2562.53	2562.53
ACC. RETAINED EARNINGS	0.0	0.0	0.00	0.00	0.01	0.00	0.00	0.00
LIABILITIES & S/H EQUITY	429.41	966.92	1139.34	1681.49	2278.50	2627.09	2647.32	2668.50

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-12-1 OPERATING INCOME STATEMENT

- ALT. CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
FINAL ANNUAL BROADCASTS HOURS	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00	3650.00
CAPABILITY RATIO	0.0	0.0	0.0	0.800	0.900	1.000	1.000	1.000
ANNUAL BROADCASTS HOURS	0.0	0.0	0.0	2920.00	3285.00	3650.00	3650.00	3650.00
ACTUAL ADVERTISEMENT BROADCAST	0.0	0.0	0.0	243.33	304.17	365.00	365.00	365.00
ANNUAL SALE AFTER COMMISSION	0.0	0.0	0.0	58.40	73.00	87.60	87.60	87.60
RATE OF ADVERTISEMENT	0.0	0.0	0.0	1.5667	1.6397	1.7161	1.7961	1.8798
ADVERTISING INCOME	0.0	0.0	0.0	91.50	119.70	150.33	157.34	164.67
FINAL ANNUAL REGISTERED VCRS	239.02	239.02	239.02	239.02	239.02	239.02	239.02	239.02
ANNUAL REGISTERED VCRS(1000SETS)	0.0	0.0	0.0	220.82	225.23	229.74	234.33	239.02
ANNUAL COLLECTED VCRS (1000SETS)	0.0	0.0	0.0	110.41	112.62	114.87	117.17	119.51
RATE OF LICENCE FEE	0.0	0.0	0.0	0.2000	0.2000	0.2000	0.2000	0.2000
V.C.R LICENSE INCOME	0.0	0.0	0.0	22.08	22.52	22.97	23.43	23.90
OPERATING INCOME	0.0	0.0	0.0	113.58	142.22	173.31	180.77	188.57
OTHER INCOME INCLUDE GOV.SUBSIDY	0.0	0.0	143.90	167.90	242.02	283.70	320.62	349.71
INCOME FROM INVESTMENT	0.0	0.0	0.0	1.62	4.15	7.60	11.35	14.30
RECURRING GRANT FROM GOVERNMENT	0.0	0.0	143.90	166.28	237.87	276.10	309.27	335.42

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-13-1 OPERATING EXPENSES STATEMENT

- ALT. CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
ANNUAL BROADCASTS HOURS	0.0	0.0	0.0	2920.00	3285.00	3650.00	3650.00	3650.00
ETV PROGRAMME PRODUCTION	0.0	0.0	55.14	60.65	73.77	87.62	96.39	113.07
ETV PROGRAM PRODUCT '91 ON	0.0	0.0	53.68	59.05	64.96	71.45	78.60	86.46
ETV PROGRAM PRODUCT '91-'95	0.0	0.0	1.46	1.60	1.76	1.94	2.13	0.0
ETV PROGRAM PRODUCT '93 ON	0.0	0.0	0.0	0.0	7.05	7.76	8.54	9.39
ETV PROGRAM PRODUCT '94 ON	0.0	0.0	0.0	0.0	0.0	6.47	7.12	7.83
ETV PROGRAM PRODUCT '96 ON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.39
OPERATION & MAINTENANCE	0.0	0.0	2.66	6.59	10.73	11.80	12.98	14.28
OPERATION & MAINTENANCE (ISB)	0.0	0.0	2.66	4.39	4.83	5.31	5.85	6.43
OPERATION & MAINTENANCE (KAR)	0.0	0.0	0.0	2.20	2.42	2.66	2.92	3.22
OPERATION & MAINTENANCE (ETC)	0.0	0.0	0.0	0.0	3.48	3.83	4.21	4.63
STAFF SALARIES INC. EXPENSES	0.0	0.0	26.15	74.59	123.09	137.86	154.41	172.94
STAFF SALARIES (ISB)	0.0	0.0	20.11	46.09	51.63	57.82	64.76	72.53
STAFF SALARIES (KAR)	0.0	0.0	0.0	11.28	12.64	14.15	15.85	17.76
STAFF SALARIES (ETC)	0.0	0.0	0.0	0.0	30.42	34.07	38.16	42.74
STAFF EXPENSES	0.0	0.0	6.03	17.21	28.41	31.81	35.63	39.91
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	3.76	13.91	15.30	16.83	18.51	20.36
PROGRAMME PRODUCTION	0.0	0.0	87.71	155.74	222.89	254.11	282.28	320.64
OPERATION & MAINTENANCE	0.0	0.0	12.56	18.46	24.28	31.82	35.00	38.50
OPERATION & MAINTENANCE(INITIAL)	0.0	0.0	12.56	13.81	15.20	16.71	18.39	20.22
OPERATION & MAINTENANCE (LATER)	0.0	0.0	0.0	4.65	9.08	15.10	16.61	18.27
STAFF SALARIES INC. EXPENSES	0.0	0.0	8.05	14.37	22.07	32.24	36.11	40.44
STAFF SALARIES (INITIAL PLAN)	0.0	0.0	6.19	6.81	7.63	8.54	9.56	10.71
STAFF SALARIES (LATER PLAN)	0.0	0.0	0.0	4.25	9.36	16.26	18.21	20.40
STAFF EXPENSES	0.0	0.0	1.86	3.32	5.09	7.44	8.33	9.33
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	2.32	4.14	6.73	9.75	10.72	11.79
LEASE FEE FOR TRANSPONDERS	0.0	0.0	33.27	33.27	33.27	33.27	33.27	33.27
TRANSMISSION	0.0	0.0	56.20	70.24	86.35	107.07	115.09	124.00
CASH PROD. & TRANS. EXPENSES	0.0	0.0	143.90	225.98	309.24	361.18	397.38	444.64
BUILDING	0.0	0.0	0.0	8.30	11.85	15.67	15.26	14.50
PLANT & MACHINERY	0.0	0.0	0.0	44.77	59.14	74.37	82.26	74.03
MOTOR VEHICLES	0.0	0.0	0.0	2.15	3.44	4.83	5.48	4.21
FURNITURE & FIXTURE	0.0	0.0	0.0	0.28	0.58	0.96	1.02	0.92
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	55.49	75.00	95.83	104.01	93.65
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL PROD. & TRANS. EXPENSES	0.0	0.00	143.90	281.47	384.25	457.01	501.39	538.29

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-14-1 WORKING CAPITAL STATEMENT

- ALT. CASE -

(RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
CURRENT ASSETS	0.0	0.0	0.0	33.58	54.00	84.90	110.28	140.51
ACCOUNT RECEIVABLE	0.0	0.0	0.0	15.25	19.95	25.06	26.22	27.45
INVENTORIES	0.0	0.0	0.0	8.86	23.03	40.75	62.00	88.58
ADVANCES & PREPAYMENTS	0.0	0.0	0.0	9.47	11.02	19.10	22.06	24.49
CURRENT LIABILITIES W/O DEBT	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
ACCOUNT PAYABLE	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
PERMANENT WORKING CAPITAL	0.0	0.0	0.0	17.79	35.64	53.07	73.52	99.70
CHANGE IN WORKING CAPITAL	0.0	0.0	0.0	17.79	17.84	17.43	20.45	26.18

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-15-1 PROFIT & LOSS STATEMENT (FOR ENDING JUNE 30)

- ALT. CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
OPERATING INCOME	0.0	0.0	143.90	281.48	384.25	457.01	501.39	538.29
OPERATING INCOME	0.0	0.0	0.0	113.58	142.22	173.31	180.77	188.57
OTHER INCOME INCLUDE GOV.SUBSIDY	0.0	0.0	143.90	167.90	242.02	283.70	320.62	349.71
OPERATING EXPENSES	0.0	0.0	143.90	281.47	384.25	457.01	501.39	538.29
PROGRAMME PRODUCTION	0.0	0.0	87.71	155.74	222.89	254.11	282.28	320.64
TRANSMISSION	0.0	0.0	56.20	70.24	86.35	107.07	115.09	124.00
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	55.49	75.00	95.83	104.01	93.65
OPERATING PROFIT OR (LOSS)	0.0	0.0	0.00	0.00	0.00	-0.00	0.00	-0.00
NON-OPERATING EXPENSES	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET PROFIT OR (LOSS) BEFORE TAX	0.0	-0.00	0.00	0.00	0.00	-0.00	0.00	-0.00
INCOME TAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET PROFIT OR (LOSS) AFTER TAX	0.0	-0.00	0.00	0.00	0.00	-0.00	0.00	-0.00

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-16-1 CASH FLOW STATEMENT (FOR ENDING JUNE 30)

- ALT. CASE -

(RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
SOURCE OF FUNDS	280.21	340.54	21.84	364.42	424.47	279.80	119.31	110.78
CASH GENERATED FROM OPERATION	0.0	0.0	0.00	62.87	86.70	109.48	119.31	110.78
OPERATING PROFIT OR (LOSS)	0.0	0.0	0.00	7.38	11.69	13.66	15.30	17.13
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	55.49	75.00	95.83	104.01	93.65
FINANCIAL RESOURCES	280.21	340.54	21.84	301.55	337.77	170.32	0.0	0.0
CAPITAL GRANT	280.21	340.54	21.84	301.55	337.77	170.32	0.0	0.0
LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORT TERM DEBT	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
USES OF FUNDS	280.21	340.54	21.84	362.79	423.56	278.07	118.96	108.87
FIXED CAPITAL EXPENDITURE	280.21	340.54	21.84	345.00	405.72	260.64	98.51	82.69
NON-DEPRECIABLE ASSETS	15.42	0.0	0.0	21.88	23.31	0.0	0.0	0.0
DEPRECIABLE FIXED ASSETS	264.79	340.54	21.84	279.67	314.46	170.32	0.0	0.0
DEPRE.FUND INVEST. INC. PENSION	0.0	0.0	0.0	43.44	67.94	90.32	98.51	82.69
CHANGE IN WORKING CAPITAL	0.0	0.0	0.0	17.79	17.84	17.43	20.45	26.18
DEBT SERVICES	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REPAYMENT OF LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REPAYMENT OF SHORT TERM DEBT	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.0
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CASH INCREASE OR (DECREASE)	0.0	0.0	0.00	1.63	0.91	1.73	0.35	1.91
BEGINNING CASH BALANCE	0.0	0.0	0.0	0.00	1.63	2.54	4.27	4.62
ENDING CASH BALANCE	0.0	0.0	0.00	1.63	2.54	4.27	4.62	6.53

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-17-1 BALANCE SHEET (FOR ENDING JUNE 30)

- ALT. CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996
ASSETS	280.21	620.75	642.59	967.31	1319.34	1516.79	1537.02	1558.20
CURRENT ASSETS	0.0	0.0	0.0	33.58	54.00	84.90	110.28	140.51
ADVANCES & PREPAYMENTS	0.0	0.0	0.0	9.47	11.02	19.10	22.06	24.49
ACCOUNT RECEIVABLE	0.0	0.0	0.0	15.25	19.95	25.06	26.22	27.45
INVENTORIES	0.0	0.0	0.0	8.86	23.03	40.75	62.00	88.58
CASH AT HAND	0.0	0.0	0.00	1.63	2.54	4.27	4.62	6.53
NET FIXED ASSETS	280.21	620.75	642.59	932.10	1262.81	1427.62	1422.12	1411.16
INVESTMENT	280.21	620.75	642.59	987.59	1393.30	1653.94	1752.45	1835.14
NON-DEPRECIABLE ASSETS	15.42	15.42	15.42	37.30	60.61	60.61	60.61	60.61
DEPRECIABLE ASSETS	264.79	605.33	627.17	906.84	1221.30	1391.62	1391.62	1391.62
DEPRE.FUND INVEST. INC. PENSION	0.0	0.0	0.0	43.44	111.39	201.71	300.22	382.91
LESS: ACC. DEPRECIATION	0.0	0.0	0.0	55.49	130.50	226.32	330.33	423.98
LIABILITIES	0.00	0.00	0.0	23.16	37.43	64.56	84.78	105.97
CURRENT LIABILITIES	0.00	0.00	0.0	15.78	18.36	31.83	36.76	40.81
ACCOUNT PAYABLE	0.0	0.0	0.0	15.78	18.36	31.83	36.76	40.81
CURRENT PORTION OF L/T DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHORT TERM DEBT	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
FIXED LIABILITIES	0.0	0.0	0.0	7.37	19.06	32.72	48.02	65.16
LONG TERM DEBT BALANCE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRATUITY PAYABLE	0.0	0.0	0.0	7.37	19.06	32.72	48.02	65.16
STOCK HOLDERS EQUITY	280.21	620.75	642.59	944.15	1281.92	1452.23	1452.24	1452.23
CAPITAL GRANT	280.21	620.75	642.59	944.14	1281.91	1452.23	1452.23	1452.23
ACC. RETAINED EARNINGS	0.0	-0.00	0.00	0.00	0.00	0.00	0.00	-0.00
LIABILITIES & S/H EQUITY	280.21	620.75	642.59	967.31	1319.34	1516.79	1537.02	1558.20

Table 9-18 OPERATION EXPENSES FACTOR ANALYSIS

(Unit: Rs.1000, %)

	1992 - 93		1993 - 94		1994 - 95		1995 - 96		1996 - 97	
Broadcasting Hours	2920		3285		3650		3650		3650	
Programme Production Expense										
ETV Prog.Production	20.77	18.4%	22.46	16.5%	24.01	16.4%	26.41	16.4%	30.98	18.3%
Operation,Haintenac	2.26	2.0%	3.27	2.4%	2.23	1.5%	3.56	2.2%	3.91	2.3%
Staff Salary,Expens	25.55	22.7%	37.47	27.5%	37.77	25.8%	42.30	26.2%	47.38	28.0%
Other expenses	4.76	4.2%	4.66	3.4%	4.61	3.2%	5.07	3.1%	5.58	3.3%
Depreciation	16.89	15.0%	20.15	14.8%	23.08	15.8%	25.10	15.5%	22.62	13.4%
Total	70.23	62.3%	88.01	64.5%	91.70	62.7%	102.44	63.4%	110.47	65.3%
Transmission Expense										
Operation,Haintenac	6.32	5.6%	7.39	5.4%	8.72	6.0%	9.59	5.9%	10.55	6.2%
Staff Salary,Expens	4.92	4.4%	6.72	4.9%	8.83	6.0%	9.89	6.1%	11.08	6.5%
Other Expenses	1.42	1.3%	2.05	1.5%	2.67	1.8%	2.94	1.8%	3.23	1.9%
Transponder Lease	11.39	10.1%	10.13	7.4%	9.11	6.2%	9.11	5.6%	9.11	5.4%
Depreciation	18.52	16.4%	22.09	16.2%	25.31	17.3%	27.52	17.0%	24.80	14.7%
Total	42.57	37.7%	48.38	35.5%	54.64	37.3%	59.05	36.6%	58.77	34.7%
Unit Operation Expen	112.80	100.0%	136.39	100.0%	146.34	100.0%	161.49	100.0%	169.24	100.0%

TABLE 9-19 RESULTS OF SENSITIVITY ANALYSIS

(UNIT: RS. MILLION)

CASE	BASE CASE CURRENT	BASE CASE CONSTANT	ALT. CASE CURRENT	ALT. CASE CONSTANT
(I) TOTAL GOVERNMENT SUBSIDY/RECURRING GRANT INCLUDING TEST PERIOD				
BASIC VALUE	1786.3	1308.7	1468.8	1078.7
CONSTRUCTION COST				
10% DOWN	1716.1	1257.9	1430.9	1051.2
10% UP	1856.6	1359.6	1508.1	1107.0
OPERATION EXPENSES				
10% DOWN	1598.1	1171.1	1281.3	941.5
10% UP	1974.6	1446.4	1657.7	1216.8
(II) ANNUAL GOVERNMENT SUBSIDY/RECURRING GRANT (AVERAGE VALUE FOR 5 YEARS, 1992-1996)				
BASIC VALUE	328.5	236.4	265.0	190.4
CONSTRUCTION COST				
10% DOWN	314.4	226.2	257.4	184.9
10% UP	342.5	246.5	272.8	196.1
OPERATION EXPENSES				
10% DOWN	293.7	211.4	230.4	165.5
10% UP	363.3	261.3	299.9	215.4

(NOTE)
* DEFLATOR @6.5%/YEAR IS USED IN 1989 CONSTANT PRICE

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN *** PAGE 1

TABLE 9-20 (ECONOMIC)* ECONOMIC COST STATEMENT ('89 PRICE) - BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
ESTIMATED TOTAL VIEWERS (1000)	0.0	0.0	0.0	1722.08	1928.73	2160.18	2419.40	2709.73	3034.89	3399.08
ETV PROGRAMME PRODUCTION	0.0	0.0	23.93	23.92	26.22	27.97	27.97	29.06	29.06	29.06
ETV PROGRAM PRODUCT '91 ON	0.0	0.0	23.29	23.29	23.29	23.29	23.29	23.29	23.29	23.29
ETV PROGRAM PRODUCT '91-'95	0.0	0.0	0.63	0.63	0.63	0.63	0.63	0.0	0.0	0.0
ETV PROGRAM PRODUCT '93 ON	0.0	0.0	0.0	0.0	2.30	2.30	2.30	2.30	2.30	2.30
ETV PROGRAM PRODUCT '94 ON	0.0	0.0	0.0	0.0	0.0	1.74	1.74	1.74	1.74	1.74
ETV PROGRAM PRODUCT '96 ON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.73	1.73	1.73
OPERATION & MAINTENANCE	0.0	0.0	1.16	2.60	3.73	3.73	3.73	3.73	3.73	3.73
OPERATION & MAINTENANCE (ISB)	0.0	0.0	1.16	1.73	1.73	1.73	1.73	1.73	1.73	1.73
OPERATION & MAINTENANCE (KAR)	0.0	0.0	0.0	0.87	0.87	0.87	0.87	0.87	0.87	0.87
OPERATION & MAINTENANCE (ETC)	0.0	0.0	0.0	0.0	1.13	1.13	1.13	1.13	1.13	1.13
STAFF SALARIES INC. EXPENSES	0.0	0.0	11.22	29.10	41.63	41.62	41.62	41.62	41.62	41.62
STAFF SALARIES (ISB)	0.0	0.0	8.63	17.98	17.98	17.98	17.98	17.98	17.98	17.98
STAFF SALARIES (KAR)	0.0	0.0	0.0	4.40	4.40	4.40	4.40	4.40	4.40	4.40
STAFF SALARIES (ETC)	0.0	0.0	0.0	0.0	9.63	9.63	9.63	9.63	9.63	9.63
STAFF EXPENSES	0.0	0.0	2.59	6.72	9.61	9.61	9.61	9.61	9.61	9.61
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	2.72	9.14	9.14	9.14	9.14	9.14	9.14	9.14
PROGRAMME PRODUCTION	0.0	0.0	39.02	64.77	80.73	82.47	82.47	83.56	83.56	83.56
OPERATION & MAINTENANCE	0.0	0.0	9.08	12.14	14.51	17.29	17.29	17.29	17.29	17.29
OPERATION & MAINTENANCE(INITIAL)	0.0	0.0	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08
OPERATION & MAINTENANCE (LATER)	0.0	0.0	0.0	3.06	5.43	8.20	8.21	8.20	8.20	8.20
STAFF SALARIES INC. EXPENSES	0.0	0.0	5.76	9.34	12.82	16.71	16.71	16.71	16.71	16.71
STAFF SALARIES (INITIAL PLAN)	0.0	0.0	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
STAFF SALARIES (LATER PLAN)	0.0	0.0	0.0	2.76	5.43	8.43	8.43	8.43	8.43	8.43
STAFF EXPENSES	0.0	0.0	1.33	2.16	2.96	3.86	3.86	3.86	3.86	3.86
OTHER EXPENSES (TRAVEL & OFFICE)	0.0	0.0	1.68	2.72	4.02	5.29	5.29	5.29	5.29	5.29
LEASE FEE FOR TRANSPONDERS	0.0	0.0	33.27	33.27	33.27	33.27	33.27	33.27	33.27	33.27
TRANSMISSION	0.0	0.0	49.78	57.47	64.62	72.56	72.56	72.56	72.56	72.56
CASH PROD. & TRANS. EXPENSES	0.0	0.0	88.80	122.24	145.34	155.03	155.03	156.12	156.12	156.12
BUILDING	0.0	0.0	0.0	7.40	10.18	12.98	12.57	11.94	11.35	10.78
PLANT & MACHINERY	0.0	0.0	0.0	43.91	58.46	73.02	80.36	72.32	65.09	58.58
MOTOR VEHICLES	0.0	0.0	0.0	1.72	2.62	3.51	3.84	3.07	2.46	1.97
FURNITURE & FIXTURE	0.0	0.0	0.0	0.23	0.44	0.70	0.73	0.65	0.59	0.53
DEPRECIATION AND AMORTIZATION	0.0	0.0	0.0	53.26	71.69	90.21	97.49	87.99	79.48	71.85
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL PROD. & TRANS. EXPENSES	0.0	0.0	88.80	175.50	217.04	245.24	252.52	244.11	235.60	227.97

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-20 (ECONOMIC)* ECONOMIC COST STATEMENT ('89 PRICE)

- BASE CASE - (RS, MM)

YEAR	1999	2000	2001	2002	2003
ESTIMATED TOTAL VIEWERS (1000)	3806.97	4263.80	4775.46	5348.51	5990.33
ETV PROGRAMME PRODUCTION	29.06	29.06	29.06	29.06	29.06
ETV PROGRAM PRODUCT '91 ON	23.29	23.29	23.29	23.29	23.29
ETV PROGRAM PRODUCT '91-'95	0.0	0.0	0.0	0.0	0.0
ETV PROGRAM PRODUCT '93 ON	2.30	2.30	2.30	2.30	2.30
ETV PROGRAM PRODUCT '94 ON	1.74	1.74	1.74	1.74	1.74
ETV PROGRAM PRODUCT '96 ON	1.73	1.73	1.73	1.73	1.73
OPERATION & MAINTENANCE	3.73	3.73	3.73	3.73	3.73
OPERATION & MAINTENANCE (ISB)	1.73	1.73	1.73	1.73	1.73
OPERATION & MAINTENANCE (KAR)	0.87	0.87	0.87	0.87	0.87
OPERATION & MAINTENANCE (ETC)	1.13	1.13	1.13	1.13	1.13
STAFF SALARIES INC. EXPENSES	41.62	41.62	41.62	41.62	41.62
STAFF SALARIES (ISB)	17.98	17.98	17.98	17.98	17.98
STAFF SALARIES (KAR)	4.40	4.40	4.40	4.40	4.40
STAFF SALARIES (ETC)	9.63	9.63	9.63	9.63	9.63
STAFF EXPENSES	9.61	9.61	9.61	9.61	9.61
OTHER EXPENSES (TRAVEL & OFFICE)	9.14	9.14	9.14	9.14	9.14
PROGRAMME PRODUCTION	83.56	83.56	83.56	83.56	83.56
OPERATION & MAINTENANCE	17.29	17.29	17.29	17.29	17.29
OPERATION & MAINTENANCE(INITIAL)	9.08	9.08	9.08	9.08	9.08
OPERATION & MAINTENANCE (LATER)	8.20	8.20	8.20	8.20	8.20
STAFF SALARIES INC. EXPENSES	16.71	16.71	16.71	16.71	16.71
STAFF SALARIES (INITIAL PLAN)	4.43	4.43	4.43	4.43	4.43
STAFF SALARIES (LATER PLAN)	8.43	8.43	8.43	8.43	8.43
STAFF EXPENSES	3.86	3.86	3.86	3.86	3.86
OTHER EXPENSES (TRAVEL & OFFICE)	5.29	5.29	5.29	5.29	5.29
LEASE FEE FOR TRANSPONDERS	33.27	33.27	33.27	33.27	33.27
TRANSMISSION	72.56	72.56	72.56	72.56	72.56
CASH PROD. & TRANS. EXPENSES	156.12	156.12	156.12	156.12	156.12
BUILDING	10.24	9.73	9.24	8.78	8.34
PLANT & MACHINERY	52.72	47.45	42.70	38.44	34.59
MOTOR VEHICLES	1.57	1.26	1.01	0.80	0.64
FURNITURE & FIXTURE	0.48	0.43	0.39	0.35	0.31
DEPRECIATION AND AMORTIZATION	65.01	58.87	53.34	48.37	43.89
INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0
INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0
TOTAL PROD. & TRANS. EXPENSES	221.13	214.99	209.46	204.49	200.01

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-22 (ECONOMIC)* ECONOMIC BENEFIT(COST SAVINGS) PLAN ('89 PRICE)

- BASE CASE - (RS, MM)

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
ESTIMATED FINAL VIEWERS (1000)	5990.33	5990.33	5990.33	5990.33	5990.33	5990.33	5990.33	5990.33	5990.33	5990.33
ESTIMATED TOTAL VIEWERS (1000)	0.0	0.0	0.0	1722.08	1928.73	2160.18	2419.40	2709.73	3034.89	3399.08
BENEFICIARIES (ADULTS)	0.0	0.0	0.0	585.03	655.23	733.86	821.92	920.55	1031.01	1154.73
HIGH DEG. BENEFICIARIES(ADULTS)	0.0	0.0	0.0	321.76	360.38	403.62	452.05	506.30	567.06	635.10
UNIT SAVING COST	0.6420	0.6420	0.6420	0.6420	0.6420	0.6420	0.6420	0.6420	0.6420	0.6420
BENEFIT OF ADULTS	0.0	0.0	0.0	206.57	231.36	259.12	290.22	325.05	364.05	407.74
BENEFICIARIES (CHILD-L)	0.0	0.0	0.0	382.32	428.20	479.58	537.13	601.59	673.78	754.63
HIGH DEG.BENEFICIARIES(CHILD-L)	0.0	0.0	0.0	210.28	235.51	263.77	295.42	330.87	370.58	415.05
UNIT SAVING COST	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650
BENEFIT OF CHILD-LOW	0.0	0.0	0.0	13.67	15.31	17.15	19.20	21.51	24.09	26.98
BENEFICIARIES (CHILD-H)	0.0	0.0	0.0	315.61	353.48	395.90	443.40	496.61	556.20	622.95
HIGH DEG.BENEFICIARIES(CHILD-H)	0.0	0.0	0.0	173.58	194.41	217.74	243.87	273.14	305.91	342.62
UNIT SAVING COST	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090
BENEFIT OF CHILD-HIGH	0.0	0.0	0.0	18.92	21.19	23.73	26.58	29.77	33.34	37.35
TOTAL BENEFIT	0.0	0.0	0.0	239.16	267.86	300.00	336.00	376.32	421.48	472.06

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-22 ECONOMIC BENEFIT(COST SAVINGS) PLAN ('89 PRICE)
(ECONOMIC)* - BASE CASE - (RS, MM)

YEAR	1999	2000	2001	2002	2003
ESTIMATED FINAL VIEWERS (1000)	5990.33	5990.33	5990.33	5990.33	5990.33
ESTIMATED TOTAL VIEWERS (1000)	3806.97	4263.80	4775.46	5348.51	5990.33
BENEFICIARIES (ADULTS)	1293.30	1448.50	1622.32	1817.00	2035.04
HIGH DEG. BENEFICIARIES(ADULTS)	711.32	796.67	892.27	999.35	1119.27
UNIT SAVING COST	0.6420	0.6420	0.6420	0.6420	0.6420
BENEFIT OF ADULTS	456.67	511.46	572.84	641.58	718.57
BENEFICIARIES (CHILD-L)	845.18	946.61	1060.20	1187.42	1329.91
HIGH DEG.BENEFICIARIES(CHILD-L)	464.85	520.63	583.11	653.08	731.45
UNIT SAVING COST	0.0650	0.0650	0.0650	0.0650	0.0650
BENEFIT OF CHILD-LOW	30.22	33.84	37.90	42.45	47.54
BENEFICIARIES (CHILD-H)	697.70	781.43	875.20	980.22	1097.85
HIGH DEG.BENEFICIARIES(CHILD-H)	383.74	429.78	481.36	539.12	603.82
UNIT SAVING COST	0.1090	0.1090	0.1090	0.1090	0.1090
BENEFIT OF CHILD-HIGH	41.83	46.85	52.47	58.76	65.82
TOTAL BENEFIT	528.71	592.15	663.21	742.80	831.93

*** SECOND TELEVISION CHANNEL PROJECT, PAKISTAN ***

TABLE 9-23 (ECONOMIC)*

ECONOMIC RATE OF RETURN (IN '89 CONSTANT PRICE)

- BASE CASE -

(RS, MM)

YEAR	FIXED CAPITAL EXPEND.	CHANGE IN WORKING CAPITAL	(1) GROSS CAPITAL EXPENDTR	OPERATING PROFIT	DEPRECIATN	(2) GROSS CASH IN-FLOW	(3) INCOME TAX	(4) BFR-TAX NET IN-FLOW (2)-(1)	(5) AFT-TAX NET IN-FLOW (4)-(3)
1989	262.30	0.0	262.30	0.0	0.0	0.0	0.0	-262.30	-262.30
1990	334.35	0.0	334.35	0.0	0.0	0.0	0.0	-334.35	-334.35
1991	16.85	0.0	16.85	-88.80	0.0	-88.80	0.0	-105.65	-105.65
1992	278.89	13.31	292.20	63.66	53.26	116.92	0.0	-175.27	-175.27
1993	298.63	10.62	309.24	50.82	71.69	122.52	0.0	-186.73	-186.73
1994	157.27	8.75	166.02	54.76	90.21	144.98	0.0	-21.04	-21.04
1995	0.0	8.14	8.14	83.48	97.49	180.97	0.0	172.83	172.83
1996	0.0	9.08	9.08	132.21	87.99	220.20	0.0	211.12	211.12
1997	0.0	0.0	0.0	185.88	79.48	265.36	0.0	265.36	265.36
1998	0.0	0.0	0.0	244.09	71.85	315.94	0.0	315.94	315.94
1999	0.0	0.0	0.0	307.58	65.01	372.59	0.0	372.59	372.59
2000	0.0	0.0	0.0	377.17	58.87	436.03	0.0	436.03	436.03
2001	0.0	0.0	0.0	453.75	53.34	507.09	0.0	507.09	507.09
2002	0.0	0.0	0.0	538.31	48.37	586.67	0.0	586.67	586.67
2003	-526.83	-49.90	-576.73	631.92	43.89	675.81	0.0	1252.54	1252.54
	821.46	-0.00	821.46	3034.82	821.46	3856.28	0.0	3034.83	3034.83

INTERNAL RATE OF RETURN

ON (4) BFR-TAX NET IN-FLOW (2)-(1) 15.26 PER CENT

ON (5) AFT-TAX NET IN-FLOW (4)-(3) 15.26 PER CENT