

CHAPTER 2 BROADCASTING PROGRAMME PLAN

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At present, organizational forms of RRI and TVRI are different each other considerably, and this appears as the difference of control range between Nusantara stations and regional stations, etc. and of the target area of regional programmes.

RRI has 5 Nusantara stations under its Jakarta National Station, and there are several Regional I and II stations under each Nusantara station. And broadcasting programmes also flow along these lines. Moreover, all regional stations has its own programme production facilities.

On the other hand, TVRI has a Jakarta Central station, 8 regional stations, provincial capital stations and stations which function as just only transmitting, and at present, only Jakarta station and 8 regional stations have facilities for broadcasting programme production and transmitted regional programmes can be viewed within only very limited range.

This is caused by that unlikely RRI, TVRI is not breed completely from early developmental stage, and nationally, the programme production is commenced from important large cities, and this may be said as a matter of course when considered the process up to the present stage.

But at the time when the integration is completed, it is necessary that radio and TV programmes will be able to be listened and viewed throughout the nation which are programmed and produced under same conditions and various programmes including the national programmes and the regional programmes will be able to be listened to and viewed which are programmed and produced under same basic programming policy.

By the realization of this plan followings can be expected.

- (1) By the expansion of broadcasting facilities of 5 media (RN-I, RN-II, RN-III, TVN-I, TVN-II), service area will be widened and, as a result, it will be able to support more effectively the educational activities and other every kind of social work.
- (2) By the completion of the block service and local service of RN-I and TVN-I, finer regional services will be able to be carried out.

- (3) By the expansion of the regionally oriented nationwide programmes, the mutual understandings and a sense of kinship will advance and, as a result, contribute to unification of the nation as a whole.

2-1 Radio broadcasting programmes

2-1-1 RN-I broadcasting programmes

Those broadcasting programmes are synthetic and intended for the general people of Indonesia. Those are programmed according to the rates roughly as shown below.

news, information, public announcement	25%
educational	20%
cultural, entertainment	45%
others	10%

Those programmes will be more completed by the improvement of function of the production facilities.

Moreover, as the programmes programmed and produced by each regional station in order to conduct the broadcast closely related to the inhabitants of each region, followings are shown here.

- (1) Particular regional programmes which are produced by the dwellers as the performers living within the area where each station is located and within the target area of the station.
- (2) Regional music and drama programmes by the local talent.
- (3) Tales, folk songs and drama programmes constituted by the regional language.
- (4) Regional music programmes constituted by the request presented by local listener.
- (5) Quiz programmes participated by local listener.

- (6) Radio forum relating to social problem which are peculiar to the region, encouragement of local industry, regional culture and arts, etc.
- (7) Rural programme and additional information concerning regional policy and regional development programmes.

Those programmes are broadcast taking the forms of the block broadcasting originated in Nusantara and the local broadcasting originated in regional station.

The rates of the allotment of programme production work by the Jakarta National station, Nusantara station and the regional station is shown as Fig. 2-1.

By the opening of up-stream line, the national broadcasting originated in Nusantara station and regional station will be possible, accordingly, the promptness of the local news will be advanced and moreover the introduction of the regional people and climate will be able to be carried out more vividly and thus will contribute to the enhancement of the mutual sense of kinship of the nation.

News broadcast which is an important component of the RN-I broadcasting is broadcast 10 minutes every hour on the hour all day long from the news centre the function of which has been much improved. And after this national news 5 minutes of regional broadcasting from each station (the block broadcasting originated in Nusantara station and the local broadcasting originated in regional station) is carried out.

Since news broadcast every hours on the hour is repeatedly broadcast taking the form of gradual renewal of the content, the consideration for time difference is not particularly needed.

2-1-2 RN-II broadcasting programmes

Since the RN-II programme system is required to spread the proper education one by one to broadcast to every class of the nation differing their age, intellectual level and occupation. RN-II broadcasting programmes have to be constituted firstly by the school programme needed for the elementary, middle or higher education and secondly, by broadcast university broadcast high school and adult education programme etc. other than regular school education.

Plans on RN-II broadcasting programmes should be promoted aiming that the realization that, in average, 18 hours (05:00 to 23:00) broadcasting programmed mainly in Jakarta.

As the adult education programmes,

- (1) Education on the law, politics, economy, basic social knowledge which the nation should know
- (2) Vocational training intended for working male and female
- (3) Education on childcare, nursing and sanitation, health, housekeeping for housewives
- (4) Other education on science, techniques, world situations, foreign languages etc. those which build up the basis to make the nation participate into the national development plan should be programmed. These adult education and culture programmes should be planned and produced by the Ministry of Information cooperating with the each ministry concerned.

The rates of the programme contents are roughly as shown below;

Education for School	44%
Education for Adults	33%
Culture for Housewife	17%
Others	6%

The education programmes for school will be sent so as to be utilized at the schoolroom directly, however, the taped programme which is recorded at the on-air time and stored in the library can be used in the schoolroom by own curriculum. Therefore, school programmes are broadcast in the daytime and, adults education programmes and culture programmes will be broadcast in the morning and the evening. The time shift broadcasting will not be adopted.

Since at the RN-II promptness is required less in view of its character, national relay of the locally originated programmes need not to be considered.

As for the materials brought locally should be sent tentatively and exclusively on the up-stream line of the RN-I when it is not busy, and those materials sent to Jakarta should be recorded in Jakarta.

2-1-3 RN-III broadcasting programmes

Most broadcasting programmes of RN-III should be the stereophonic programmes centring music programmes (popular music heard widely mainly in Indonesia), drama and reading are to be broadcast. Besides, the programmes introducing folk music and folk languages are to be added. Programmes are chiefly programmed and produced in Jakarta, but local programmes also are to be partly added. Broadcast time will be 18 hours (5:00 - 23:00 WST).

News (monaural) should be received and relayed from the RN-I and particular news for the RN-III should not be programmed.

Since arrangement etc. of the facilities of the head-end stations for transmission and receiving of the transmission line for stereo, high quality and FM stereo broadcasting programmes lively will be able to be enjoyed at each region throughout the country.

In case of RN-III, it is seemed that the effect of broadcasting will not be lowered if the countermeasure is not carried out particularly about time difference.

2-2 TV broadcasting programmes

2-2-1 TVN-I broadcasting programmes

By the integration of radio and TV organization, TVN-I regional programme will be broadcast for each of 5 Nusantara areas same as in case of RN-I service.

For this reason, studios and operation facilities should be established at Banjarmasin and Jayapura where at present no facilities for the production and sending off the TV broadcasting programmes is placed. Moreover also at Samarinda which is the state capital, similar facilities should be established and function of facilities of the existing stations should also be largely advanced. And, since facilities of MPU (Mobile Production Unit) and EFP (Electronic Field Production) also are to be arranged throughout the nation, in addition to the up-transmission line, mainly programmes which are introducing region will be able to be

broadcast including folk arts and public entertainment which are peculiar to the region, life of it and customs, etc.

According to this plan, finally, 5 Key stations in Nusantara area namely Medan, Surabaya, Samarinda (Balikpapan), Ujung Pandang and Jayapura, and Sub-key stations of Palembang, Denpasar, Manado and Ambon will have middle-sized programme production and transmission facilities and others will have small-sized simple facilities.

An auditorium which is now being constructed is to be also utilized as TV programme production facilities by using MPU and EFP.

Moreover, by completion of the transmission line, the ranges which are possible to view the block broadcasting will be largely extended, considering economically also, Key or Sub-key station in each Nusantara area should broadcast changing the broadcast time or day mutually (for example, as such that in Nusantara I area block broadcasting in the evening will be broadcast on Monday, Wednesday and Friday originating in Medan and on Tuesday, Thursday and Saturday originating in Palembang.) Thus according to the arrangement of the system which makes possible block broadcasting within each Nusantara area. also for Propinsi Jawa Barat, it is desired to broadcast the Jakarta block programmes. By doing this, in parallel to sending out to Palapa transmission line of national programmes by Jakarta Central station, it will be able to broadcast programmes which are intended to Propinsi Jawa Barat to the local stations around Jakarta and thus it will be able to conduct the broadcasting services which are more closely related to the region.

The broadcasting time of the TVN-I programmes is to be 18 hours (5:00 - 23:00) a day as a final target. But as the methods to solve the problem of time difference followings are considered.

- (1) From Jakarta, the same language programmes should be sent out two times, namely one by moving up two hours on WST and one at the original broadcasting time. And each station of Jayapura and Ujung Pandang should receive the programmes sent moving up two hours and send them off to the stations under its control. Moreover, Banjarmasin station should receive the programmes sent at the original time and send them to the stations under its control.

By using this method, the programmes will be made corresponding to the local standard time. And between the area under control of Ujung Pandang station and the area under control of Banjarmasin station, there will be only one hour difference of broadcasting time and resulting in an improvement the present situation. But amount of work of the playback and the sending out in Jakarta will increase on the other, and control of an automated switching will be come difficult, in spite of the disadvantage, only borrowing one more transponder on the Palapa Satellite will be sufficient.

- (2) Taking advantage of large expansion of the broadcasting time rebroadcasting time should be set and this should be used as a part of the counter method against local time difference. A broadcasting schedule model of a day of the TVN-I by this method is shown as Fig. 2-2.

According to schedule, the block broadcast will also be conducted on the same time at each area (on related each local standard time). In the schedule, each of g10 and g11 is the rebroadcast of G10 and G11, and g11 in the early morning and g10 and g11 in the early morning in EST region the rebroadcast on the day before.

By this means, only one time of sending out from Jakarta will be sufficient, but at each Nusantara station recording and playback work will be increasing and if consideration to the programme arrangement in not enough, there will be a defect that broadcasting programmes will not be meet the local life time (e.g. an entertainment programme rebroadcast in the early morning should of course be avoided).

As for the transmission line, it is mentioned in Chapter 2, and in the description, transmission network plan aiming the expansion of the area where viewing of the regional broadcasting programmes is possible also is described. This method was planned as a target which should finally be accomplished, and either of above-mentioned (1) or (2) should be adopted firstly, and next at the time when the economical situations come all right them it should be transferred to the final stage.

The promptness and accuracy of the news broadcasting will be largely improved by arrangement of the News Centre in Jakarta, and at the same time, the locally originated news will be able to be broadcast quickly.

Concerning to the countermeasure for the local time difference, after the broadcasting of own station is finished on the day before, each station in the eastern region should record (edit if necessary) the news programmes sent off from Jakarta station and add regional news to them and transmit them within the time from the beginning of the broadcast until Jakarta station's broadcast starting time.

2-2-2 TVN-II broadcasting programmes

In recent years, in parallel with Radio Educational Network, TV broadcast is utilized as the effective means of education in many countries of the world. The government of Indonesia also is promoting the policy of making an effort to educate people by TV broadcasting, therefore, the construction of the TVN-II network will be one of the most urgent project in the long term development plan period.

The programme composition ratio of TVN-II broadcast at the final target is as follows;

Educational programmed for school	47%
Educational programme for adult	38%
Cultural and instructive programme for housewife	15%

The final target of broadcasting hour is set about 17 hours a day, but the broadcasting hour is set about 12 hours a day at the initial stage and this is gradually increased until accomplish the final target of 17 hours a day.

The TVN-II broadcast for school is planned as direct utilization in the class room in principle, it is considered possible to record on magnetic tape because cost of VTR is going down and video recording becomes more simple and handy in the near future. Accordingly, retransmission of TVN-II programme for time differences service is not planned.

A model of the broadcasting schedule of TVN-II is shown as Fig. 2-3.

2-3 Overseas broadcasting service

Overseas broadcasting service is very important to give right recognition on Indonesia by introducing Indonesia and, at the same time, to inform of daily situations of native country to the Indonesian people overseas.

As programme content is constituted mainly by news and also constituted by others which are folk public entertainment, introducing the climate and language lesson etc.

For this purpose, at present, by the name of "Voice of Indonesia", and by short wave, the broadcasting is being conducted 9 hours a day in total, 8:00 - 10:00 and 15:00 - 22:00 Jakarta standard time in 9 languages including Indonesian and English etc.

But, since number of transmitter for overseas broadcasting is insufficient at present, only two frequencies in the morning and one frequency in the afternoon are being used therefore the overseas broadcasting is not serving enough. To improve this, preparation is to be made within the 4th 5-year plan to select the site for new transmitting facilities etc.

As a final goal, two kind of overseas broadcasting will be carried out. One is for the general programmes intended for throughout the world broadcast repeatedly 24 hours.

Programme contents are mainly news and information and besides, upon necessity, national events on Indonesia etc. also will be broadcast. Language used will be Indonesian and English because of large number of English speaking people throughout the world and Spanish which has very large area where the Spanish language is spoken. In these three languages, broadcasting will be carried out 20 minutes to 30 minutes every hour on the hour repeatedly.

Other is intended for each peculiar region and this is to be broadcast at the most suitable time to listen to at target area. Target areas are shown by direction as Fig. 2-4. And the names of main country within each direction and languages used in the broadcasting are shown as Table 2-1.

Concerning to the overseas broadcasting, since it was not included in the survey items, detailed investigation has not been carried out. Therefore, to conduct those services sufficiently, reception condition of the present Voice of Indonesia and at the same time, that of broadcast by other station of the world etc. should be surveyed enough. And moreover, by the reception reports already sent from listeners, reception condition and listeners' reception condition and listeners' opinion etc. should be put in order and analyzed and by doing so, transmission conditions (time, power and frequencies, etc.) and broadcast content for each target area etc. should be decided.

Within a period of this plan which is being stated here, firstly, the expansion and the improvement should be carried out on General Service and followingly, according to the order of priority, Regional Service should be opened.

Moreover, since those programmes are essentially different from those of domestic RN-I, II and IV broadcasting, production and transmitting facilities etc. of the overseas broadcasting should be established separately from those for domestic broadcasting, and this smooth operation should be made possible.

Fig. 2-1

Origination & Distribution of RN-I Programme

Class of Station Programme	Jakarta National Station		Nusantara Station		Regional-I Station		Regional-II Station	
	A *1	B *2	A	B	A	B	A	B
National Network News Information	25%			25%		25%		25%
Others *3	35%			35%		35%		35%
Nusantara Network News Information								5%
Regional Network News Information							10%	
Local Programme at Each Station	40%		35%		25%		25%	

Remarks: *1 : Origination
 *2 : Districution
 *3 : When high quality programme transmission line is available

Fig. 2-2

An Example of TVN-I Broadcasting Schedule

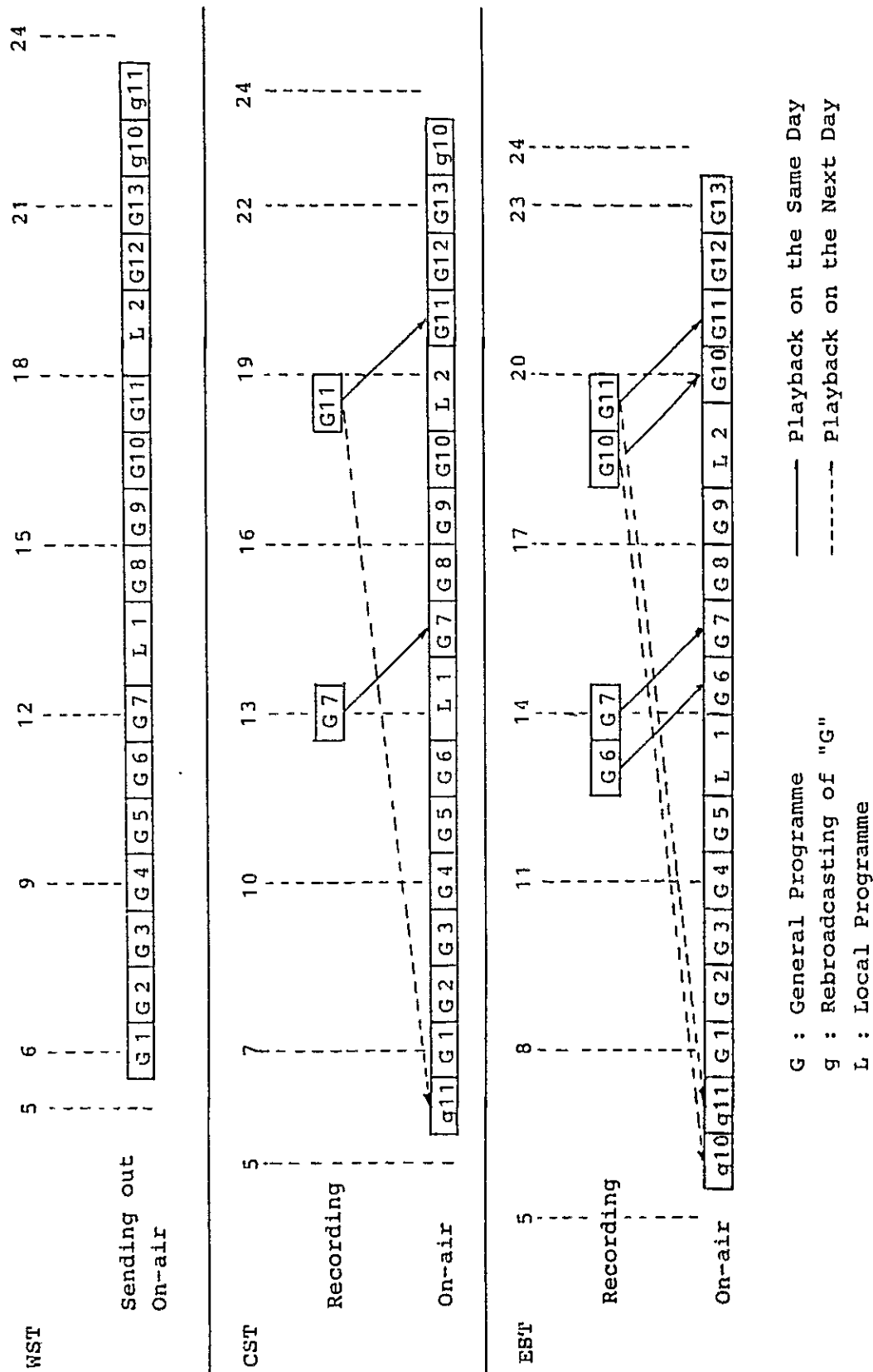
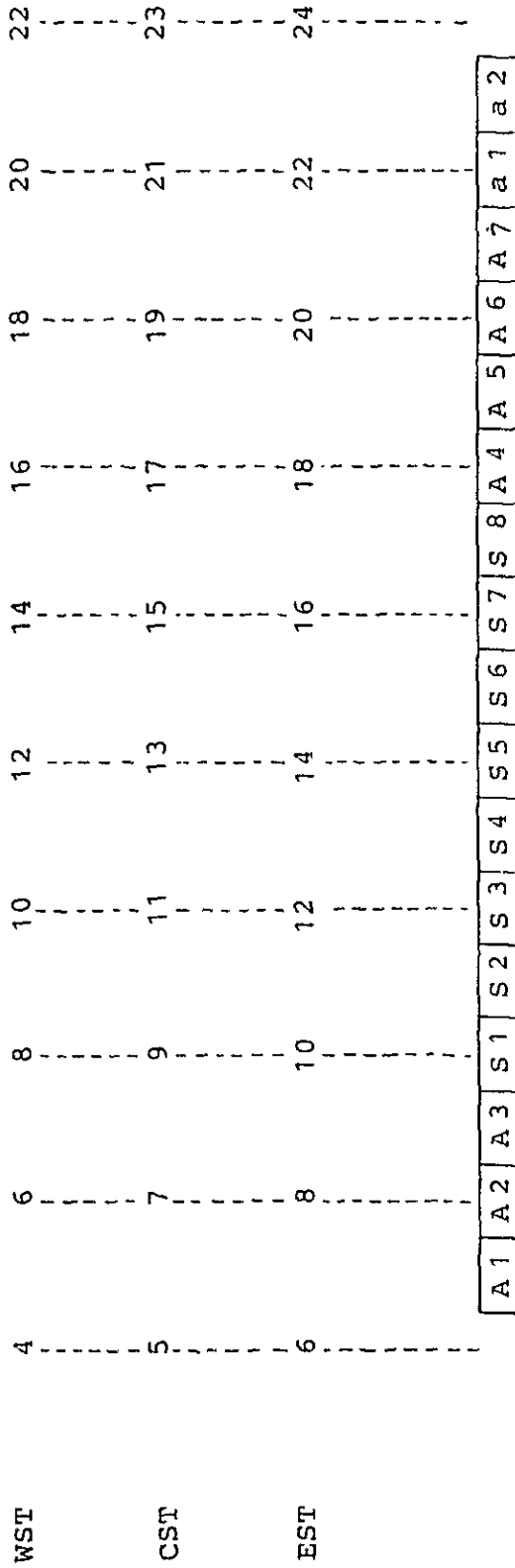


Fig. 2-3

An Example of TVN-II Broadcasting Schedule



A : Adults Programme
a : Rebroadcasting of "A"
S : School Programme

Transmitting Direction of Overseas Service for Regional Groups

Fig. 2-4

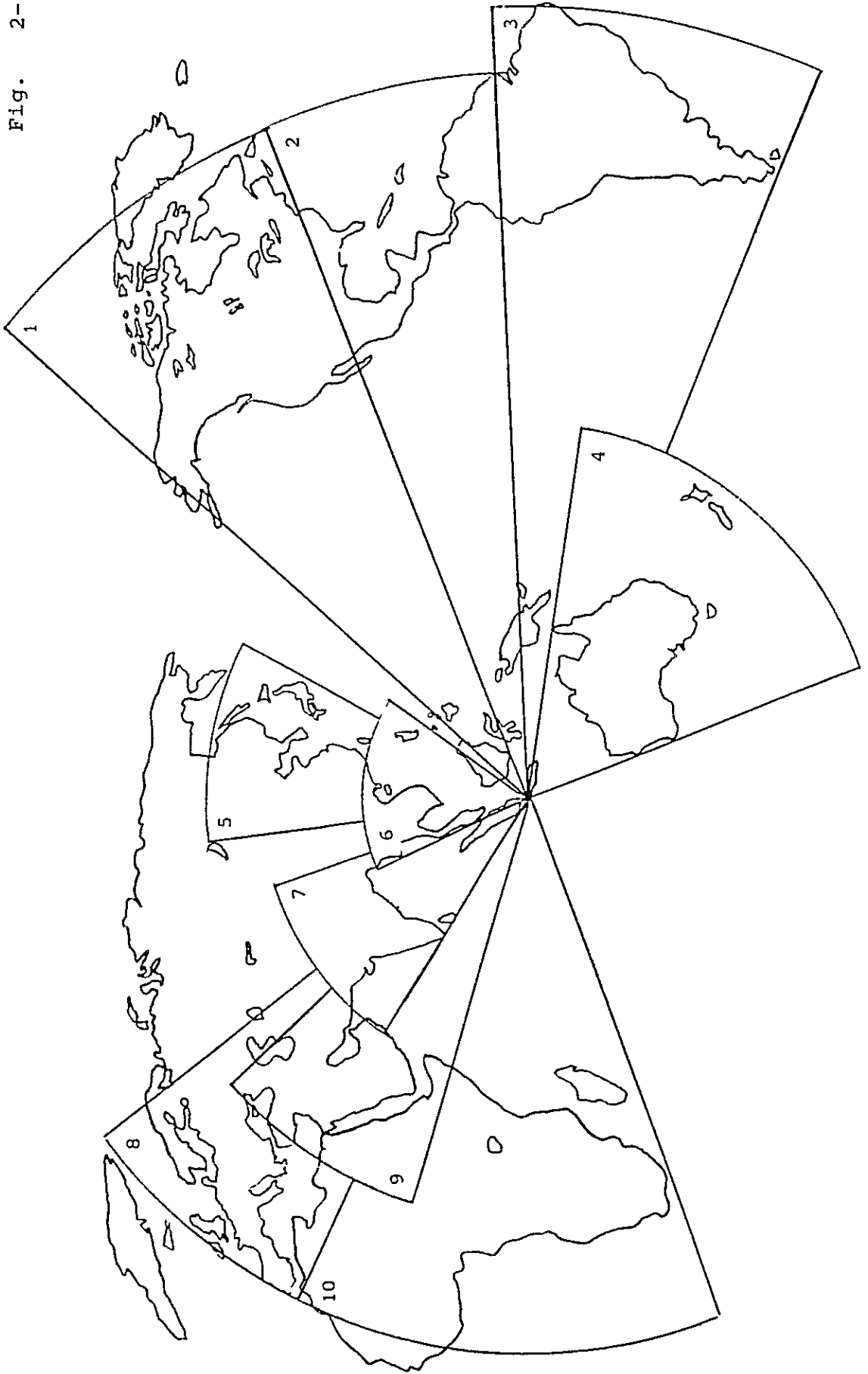


Table 2-1

Target of Service Area and Language to be used for Oversees Service

Service Area	Countries	Languages to be Used
1 North America	U S A, Canada	English, French
2 Middle America	Mexico, Panama, Colombia,	Spanish
3 South America	Blazil, Chile, Argentina	Spanish, Portuguse
4 Oceania	Australia, New Zealand	English
5 South East Asia (1)	Japan, China, Korea	Japanese, Chinese, Korean
6 South East Asia (2)	Phillipines, Vietnam, Thailand, Burma, Malaysia	English, Chinese, Malay, Thai, Vietnamese
7 South Asia	India, Sri Lanka, Pakistan	Dnglish, Bengali, Hindi, Urdu
8 Europe	U K, France, Germany, Italy, Spain, Netherland, U S R	English, French, German, Italian, Spanish, Dutch
9 Middle East	Afghanistan, Iran, Iraq, Saudi Arabia	English, French, Arabic
10 Africa	Ethiopia, Sudan, Libya, Congo, South Africa, Tanzania	English, French, Swahili

CHAPTER 3 TRANSMISSION NETWORK PLAN

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3-1 Introduction

In order to be received the various radio and TV programmes planned by RTF in good condition in every region throughout the country and utilized them effectively by every class of the nation, radio and TV networks should be expanded continuously on the long-term prospect.

In this chapter, introduction will be made concerning how the transmission network should be constructed in order to arrange in response to the radio and TV expansion plan, and moreover, compensative inquiries will be made about various methods considered as utilizable for the execution of that and making clear of a standard for the selection of the best method which is the most suitable to the purpose will be made.

3-1-1 Transmission network for the radio network

The following arrangement will be promoted within the period of the long-term plan.

- (1) To arrange standard transmission network for the efficient distribution of high quality programme to the existing stations.
- (2) For the newly established stations, the standard network which enables to distribute the programmes in good condition which were produced at the central stations.
- (3) To establish up-stream line to the central or Nusantara station in order to send news materials gathered at regional stations, programme materials or the programmes originated in regional stations for the purpose of using for a part of the national programme or the broadcasting programme intended for the Nusantara.
- (4) To arrange transmission for local time difference.
- (5) To arrange super wide range high standard transmission network which can send the stereophonic programme.

- (6) To constitute broadcasting programme transmission network in order to conduct the regional broadcast mainly by the Nusantara station.

There will be some difference at various programme transmission lines according to their use, namely one for permanent use, one which will be able to be constituted and used on demand and one will be used periodically within the allotted time. But, on operating, the most convenient and economically effective line should be selected as to the transmission method.

3-1-2 Selection of transmission for radio programme

Since in the every kind of following methods there are characteristics of the line character, operation efficiency and operation cost, etc., the utilization is needed by selecting the most suitable method to the purpose of use.

- a. method by off-air relay
- b. method by own short wave relay
- c. method by own UHF relay
- d. method to rent a PERUMTEL line

Now, concerning to these methods, the investigation will be made here from the viewpoints of the characteristics of the programme, transmission, line stability and line reliability, etc.

(1) Method by off-air relay

This method is to receive broadcast wave which is transmitted by existing medium or short wave stations and supply it to the medium or short wave stations which are to be established newly. Off-air relay of the radio broadcasting has essential defect as follows.

- a. In case of TV broadcast wave relay, by selecting the appropriate reception point, relatively fine signal can be received even at the outside of the parental station's service area. In opposition to that, in case of medium (including

short wave) broadcasting wave relay, even if the receiving point is selected remarkable improvement effect can not be expected generally.

Since the location of the relay stations which are to be newly established will be naturally outside of the service area of the parental station, in day time, signal which is not faint can not be received and to secure the good ratio of signal. noise will be difficult.

On the other hand, since stability of the arrived signal is lowered and interference also is increased high quality programmes can not be expected to be received at every time. In opposition, as facilities of the broadcast wave relay, it is enough to get only receiving facilities and a rent for line is not needed, therefore this is the most economical means for relay and this has the value to be utilized as means for programme relay in emergency.

However, in case that receiving facilities for relay are established within a site of relay station, because of receiving the faint within the strong signal strength by own station, to prevent function of the relay receiver from the interference setting of trap circuit or covering the whole of a receiver for isolation from electro-magnetism is necessary and also special receiver which has a good and excellent transmitting band trait and action stability.

(2) Method by own short wave relay

At present, by high-power short wave transmitters (at present 100 kW each) 13 hours in total (3 hours in the early morning, 3 hours in the day time and 7 hours in the night) of broadcasting from Jakarta are carried out to the three directions of east, west and north by three frequencies of 7,270 kHz, 9,680 kHz and 11,770 kHz for the purpose of transmission of RN-I programmes for the widely distributed listeners, and at the same time, distribution of programmes to each regional station. In the case of utilizing this short wave broadcasting for the purpose of transmitting to the station, following points should be improved.

- a. Propagation situation of signal is not necessarily stable through the dry season, rainy season, and day and night.

- b. In the case transmission antennas for wide area which are designed for the broadcasting, the directive traits of them care not necessarily coincident to those of the transmission antennas suitable for the purpose of programme transmission between special points.
- c. Even signal strength of the arriving signal is not particularly low, if strong disturbing signal and noise are present, fine S/I and S/N can not be secured.
- d. Particularly when the foreign station carries out Indonesian broadcast on class to above mentioned frequency, since this broadcast has possibility to be carried with RN-I programme, constant monitoring of the receiving programme is needed lest another programme of the different content should be relayed.

(3) Method by own UHF relay line

RRI, at present, uses low powered FM transmitter for the programme transmission to other stations of short distance, but in case of programme transmission to other stations of long distance, making to get C/N value as high as possible by placing the transmitting and receiving equipment at both site where the propagation route is completely cleared is necessary and making to be able to secure to have constantly the most stable line if the propagation condition changes by making to give an ample margin to the in-put signal of a receiver is necessary. In the case that distance between both points of transmitting and receiving is not cleared, at an appropriate point, relay station (or stations) should be placed, therefore building cost and operation cost will be increased, if a plan is properly made, completely stable and fine programme transmission line will be able to be constituted. However, concerning to a problem whether such UHF relay line should be self-supporting or should be committed to PERUMTEL, it will be appropriate to decide considering the operate conditions and the operation cost etc.

(4) Method to utilize the PERUMTEL line

PERUMTEL constructs and operate various kind of wire or wireless line in order to carry out the public communication service including telegram, telex, telephone, facsimile and data transmission etc. and to rent a part of this communication network and to transmit programmes is possible. In this case, to use ordinary telephone line equipment as its transmission to other station is not appropriate, therefore, having constructed the special broadcasting standard transmission line and to lease it is necessary.

For this reason, to a part of the wide band transmission line heed or construction of which is planned by PERUMTEL, having the head-end facilities which are needed for the opening the broadcasting programme transmission line arranged making correspond to the arrangement plan of the broadcasting programme network plan is necessary.

When conducting programme transmission via PERUMTEL'S communication line, to select and rent following line of the three kinds of standard according to the programme kind to be transmitted is needed.

- a. For the transmission band trait used for the medium wave and short wave broadcasting programme transmission 7 kHz line named publicly and shown in J23 of CCITT recommendation is appropriate, and it is not necessarily needed to rent a 10 kHz line considering modulation trait of the medium wave and shortwave transmitter and generally sold receiver.
- b. For transmission of news programme, interview, lecture and news materials etc. which are constituted only by talk and not including music among the above-mentioned programmes, since it is not needed to use 7 kHz above-mentioned line, if telephone standard line is used no practical interference will occur. Moreover, since the trunk communication network of PERUMTEL is constituted around the telephone line, if the telephone line is used exclusively for the transmission of the broadcasting programme, no improvement at the equipment of the head-end station is needed and moreover, there will be an advantage of reduced rental fee for the line.

- c. For the transmission of the FM broadcasting programmes, in the case of the musical programme, 15 kHz high standard line is necessary and in the case of the stereo broadcasting, two lines of the same standard line is needed and besides, concerning to the traits of the both lines, especially the similarity of gain-frequency trait and phase-frequency trait and trait relating to leak the rule of the CCIR REC. 505-2 should be satisfied.

3-1-3 Transmission network for the TV network

In order to expand TV network following TV transmission will be prepared within the period of the long-term plan.

- (1) As the countermeasure for the local time difference, one more transmission line will be added to that of TVN-I programme system.
- (2) In order to transmit the locally produced TV programmes or the programme materials originated in the regional TV station which has programme production facilities (local TV studio and MPU or EFP facilities) to central station, arrangement for the head-end equipment of the Palapa relay line or the terrestrial micro wave line will be conducted to make up transmission line constructed on demand or regularly.
- (3) One programme transmission line should be prepared for the distribution of the TV-II programmes.
- (4) In the future, as in the case of radio broadcasting, an arrangement for the programme transmission network will be promoted systematically in order to make the regional broadcasting possible to be carried out.
- (5) One or two set of the MPU which has an earth station equipment should be arranged in order to transmit locally produced news programme and special programme to Jakarta from any region throughout the nation.
Considering road conditions in the remote areas in Indonesia, the portable equipment should be constructed as to be able to be taken the equipment to pieces for the transportation by plane.

In the case of those TV broadcasting transmission network also, as is the case of the radio programme transmission line, the most appropriate line constitution and operation system should be selected considering about operation convenience, line operation efficiency and operation cost according to use.

3-1-4 Selection of transmitting means of TV programme

Microwave relay equipment (Palapa relay line also is included to this), coaxial cable equipment for the visual signal transmission have been widely utilized in order to transmit the TV broadcast programmes, however, recently, transmission system using optical fibre at the section of about 500 km came to be used practically. Besides, a relay system for the broadcasting signal receiving the broadcasting signal and the retransmission of it has been utilized considerably at a part etc. of Jawa, Sumatera and Sulawesi.

Now, the investigation made in relation to the long-range plan on how to use properly those means for the TV programme transmission to other station according to the purposes will be shown as below.

a. Palapa Satellite transmission line

TVRI had used exclusively the terrestrial microwave relay transmission line as the means of long distance transmission of TV signal, along with the opening of the practical use of Palapa Satellite relay transmission, it has been using the micro wave relay transmission line as the transmission means for the regional programmes. Palapa relay transmission line has a merit which has no equal of other transmitting means in respect that it can distribute same programme to each region throughout the nation at the same time without influenced by the geographical features and the ocean. Therefore, probably to day's national TV network of TVRI could not be realized without the utilization of this Palapa Satellite relay transmission line. On the other hand, concerning to the future plan of conducting fine broadcasting services it should be investigated about that by how few number of the transponder this will be able to be realized. In this case, it can be expected that, by trying to make arrangement between plan on the broadcasting programme and on the arrangement for the programme transmission network the

number of leased transponder will be able to be reduced to a certain extent.

b. Terrestrial microwave relay line

In Indonesia, at the early stage of TV broadcasting, self-supporting micro wave line was built between Jakarta and Yogyakarta, and later, this was extended to Surabaya. This line is still being operated at present, and used efficiently not only for the national broadcasting but also for the regional broadcasting. On the other hand, the micro wave relay network of PERUMTEL in Jawa and Sumatera also progressed and this was utilized also as the TV programme transmission line. The TV regional broadcasting service can be realized by the assortment of the terrestrial micro wave line with broadcasting wave relay system but in order to construct the ideal regional network, it is necessary to change a part of the system of existing microwave relay line or to add some relay section.

c. Co-axial cable transmission line

This is much used within the short distance city section to transmit the signals of picture and sound from Palapa relay line received at the PERUMTEL's earth station. It is supposed that, in the future, this will be replaced by the fibre relay line.

d. Off-air relay line

Off-air relay line is widely utilized in Islands, of Jawa, Sumatera and Sulawesi, etc., since it is possible to receive good TV signal by selecting an appropriate receiving point, even at the long distant point of broadcasting. When using this system since it utilizes the broadcasting wave, according that the number of the relay step is increasing inferiority of the picture quality and the S/N is accumulating.

Therefore, even in the case of using the well-going -trough relay equipment the number of relay step should be limited at about 5-step relay. And when utilizing this system, since

the relaying points should be determined finally considering the distance of the relay section, the channel relationship of transmitting and receiving signal, the situation of the propagation route and the signal distribution situations of station around a relaying point, there are some defect that it takes many days until the start of the construction because of the conducting the detailed field survey in advance etc.

3-1-5 Present situation of PERUMTEL's communication network and its development plan

PERMUTEL also is promoting the arrangement and the extension of the communication network according to the long-term plan. Followings are the description on the parts among those which are particularly related to the broadcasting activities.

(1) Palapa Satellite relay line

Palapa Satellite was launched in 1976 and 1977, and have been used widely and nationally for various communication line, but in 1983, Palapa B1 Satellite was launched and switched wholly to this satellite in September of the same year. At present only one down-line is used exclusively on the long-term basis for the relay of the TVN-I programme nationally, however, since it is supposed that, according to becoming more various in transmission of TV programme the dependancy upon the Palapa relay line will be increasing more and more, close negotiation with PERUMTEL before have continuously is very important.

(2) Terrestrial microwave relay line

The trunk line in Jakarta and Sumatera was already completed and operated, but completed and operated, but an extension plan of the trunk line to Nusatenggara and Timor direction east wards is now being progressed, since carrying out of the construction of a line which runs through Sulawesi from south to north and a line which runs through Kalimantan from east to west was decided as a part of the long-term plan by PERUMTEL, it is expected to use them for the future TV regional broadcasting service.

(3) Submarine cable line

The construction of the submarine cable network also is under way, however, the possibility of constitution of the large capacity submarine cable which is available for the transmission of the TV programmes is low.

3-2 Radio programme transmission network plan

3-2-1 RN-I programme transmission network plan

As for the 4th 5-year plan, a plan was made to arrange the transmission line by the Palapa Satellite including terminal equipment so as to enable the national programme originated in Jakarta to be sent to each of 48 the Nusantara and the regional station in total in good sound quality. But as for the long-term plan, preparation for the programme transmission line will be made in order to enable conducting freely not only the national broadcasting originated in Jakarta but also the national broadcasting originated in the Nusantara and the regional stations or the block broadcasting originated in each Nusantara station and regional station, and besides, to conduct a broadcasting of the special programme from multi-station origination, and in addition to that, the arrangement of the terminal equipment for up-stream line and the terrestrial exclusive line up to the nearest earth station at each station will be established.

In the 4th 5-year plan, all down-stream lines from Jakarta are connected as in parallel lines but in this plan, they are planned in a series of stations of Jakarta to Nusantara to regional.

Basic line connection is shown in Fig. 3-1. This is a style of the national broadcasting originated in Jakarta. D0 indicates the Palapa transmission line from Jakarta to each Nusantara station which is under control and D1 - D5 indicates that of from each Nusantara station to regional station under control.

Next, the example of the national broadcasting originated in the regional stations is shown as Fig. 3-2. In this example, originating station is Ambon. Moreover the example of the block broadcasting within the area which is under control of each Nusantara station is shown as Fig. 3-3. In this case, each of the Nusantara I, II, III, IV and V is originating in Nusantara station and in the case of the Nusantara III, original station is Samarinda station which is regional. Transmission lines indicated by U sign is the up-stream line which is to be rented on demand.

Moreover, this programme transmission line will be able to be utilized when countermeasure for the local time difference is needed for the playback transmission of once recorded programme originating in Jakarta at appropriate time.

Seeing those line connection it will become clear that in cases of D1 - D5 also, if the line is rented at only the time when the block broadcasting is carried out, and also in case of the block broadcasting originated in the regional station, if each station receive the sign of U and U' lines (accordingly if not to lease D0 and D3 which then are not necessary), it will be more economical. But, this method can not be recommended because of, if doing so, switching work of the line will become more complicated and also the problem of the automated switching by the transmission controlling signal and the problems of the system etc. as up-graded station in the programme flow mentioned in next chapter.

Still in the case if the placing of station at Tasikmalaya etc. is recognized as necessary, a terrestrial line and head-end equipment from the closest PERUMTEL earth station will be built.

3-2-2 RN-II programme transmission network plan

As for the RN-II service, programmes will mainly be originated in Jakarta National station, programme transmission line will be constituted only down-stream line from Jakarta to each of Nusantara and regional stations by using Palapa 7 kHz transmission line.

Since RN-II broadcasting is never strongly required its immediacy, it will not be needed to take form of the national programme originated in Nusantara station and the national or block broadcasting originated in the regional station. Accordingly, up-transmission line or off-head-end equipment will not be built. If up-transmission line for the RN-II is required, it will be all right to send them to Jakarta utilizing the time when the up-transmission line is not busy for the RN-I programme and to record them in Jakarta.

3-2-3 RN-III programme transmission network plan

Since those programmes are to be broadcast by FM (most of them by stereophonic broadcasting), for the standard of the transmission line used for the programme transmission, special attention should be paid. In order to send the stereophonic programmes without loss of

stereophonic effect, it is necessary not only to make corresponding the left and right transmission characteristics but also to maintain constant phase difference value between both signals, and moreover, to lessen the talk leakage between channels of left and right. Accordingly, faithful transmission never be able to be obtained if prepare only a pair of the 15 kHz transmission line.

As a standard suitable for stereophonic programme transmission line the target standard of J-31 recommended by CCITT is shown as Table 2-2.

In the case of short distant line (280 km) by the analogue transmission system, all hand of 48 kHz (equivalent to 12 telephone channels) of the base group (60 kHz - 108 kHz) of the carrier telephone line should be used exclusively. (ref. Fig. 3-4).

And in the case of the long distance transmission, stereophonic signal should be processed digitally by changing into code and sent as PCM first group (1,544 Mbit/s) by the digital transmission route, or should be sent by utilizing the existing analogue route.

An analogue transmission method by using exclusively the band of the 5th and 6th super groups (equivalent to 120 telephone channels) of 344 kHz (1,188 kHz - 1,532 kHz) of the carrier multiple line by PCM-FDM line already is in practical use.

The broadcasting form will be only two, namely that of the national broadcasting originated in Jakarta and that of the local broadcasting originated in each station. And as transmission network, it will be constituted only by down-stream line from Jakarta to each station (Nusantara station and regional station). In the case of this form, when the FM transmitting stations are placed in all of the TV transmitting stations, there will be considerable number of station which will not be able to broadcast the local programmes, however, from the viewpoint of the character of FM broadcasting, since the local broadcasting is not so important, this problem will be considered at the next stage.

The constitution of the RN-III programme transmission line is basically same as that of the RN-II programme, and wide band line of Palapa Satellite will be used, however, when establishment of the station is in progress up to the stations which are only for the TV transmission other than the location of RRI's regional stations, to use the off-air relay or the terrestrial wireless line which will be available at those stations or to use line of directly accessing to Palapa Satellite by using the SRO

(Sound receiving only) will be made. Accordingly, as a result, since whole form of the constitution of the transmission network will be similar to that of the TVN-II transmission network, in principle, multiplexed transmission to TVN-II programme will be conducted.

3-3 TV programme transmission network plan

In vast Indonesia, carrying out a fine TV broadcasting of two systems throughout the country including regional service and countermeasure for the time difference is not easy when considered economically even it is possible technically. In this plan, a transmission plan is intended to make considering economically, and this plan will be taken over by the plan on the extension and the improvement made in the 21st century.

3-3-1 TVN-I programme transmission network plan

As mentioned in Chapter 1, TVN-I broadcasting can be largely classified as the national broadcasting contains general programmes produced in Jakarta are broadcast throughout the country, and the block broadcasting in which the programmes produced at the Key or Sub-key stations in each of the Nusantara area. This block broadcasting is being carried out, at present, within the limited places, namely Jawa Island etc. where the terrestrial line is already constructed and where connected by off-air relay from the regional station.

As a final construction of the line, programmes sent from Jakarta via Palapa Satellite will once be received at the Nusantara station and will be sent to another transponder and then will be received and broadcast by each station under its control. In the case of the block broadcasting, according to broadcast schedule, the programmes originating Key or Sub-key station will be sent via this transponder to each station in the Nusantara area. Standardized connection of the line is shown as Fig. 3-5. In the figure, D indicates the transponder of the Palapa which will send off programme sent from Jakarta to each Key station, and D1 - D5 indicate the transponders for sending off the programmes sent from each Key or Sub-key station. As already described in Chapter 1, where there are plural stations having studio facilities within the Nusantara area, originating station of the block broadcasting should be switched.

This constitution of transmission line is very convenience operationally, but it will be problem that rental fee will increase by using 6 transponders exclusively. At the early stage, it is desirable that, as at present, only one transponder for down-stream line from Jakarta (D) will be used exclusively during broadcasting hour and other two transponders will be used exclusively in short time only block broadcasting time period by time sharing as shown in Attached Sheet-12 in the Summary.

And then, according to the favorable turn of the finance, gradual shift to all time exclusive use will be made.

Concerning to the up-stream line, it was decided that construction of terminal equipment at the station which has performance facilities at present according to the 4th 5-year plan, but in this plan which is being mentioned here it is decided also that, first of all , at Banjarmasin and Jayapura where the performance facilities are to be constructed newly, the terminal equipment for the up-stream line will be constructed, and this will be gradually extended to provincial capital stations. Moreover, mobile up-link equipment will be built which is capable of being taken to pieces for the transportation by plane.

Relating to the own microwave line of TVRI, at present, the transmission line which links several station in a part of Jawa Island and Sumatera Island (around Medan) is constructed and used for the transmission of the programmes of regional as well as national. And a link between the receiving terminal station from PERUMTEL's earth station and the TVRI transmitting station on the mountain also is arranged at several stations.

Among these, since there are sections with long span and effected by fading, concerning to the sections in question increased construction of relay station will be necessary, and concerning to the facilities which has no reserve equipment, construction of it will be needed.

Moreover, there are sections where UHF band is used, however, it is scheduled to use UHF as for the TV broadcasting hereafter, it will be changed to SHF band.

Concerning to the off-air relay, that is being used not only for the constitution of the TV network of Indonesia at present but also for the sections of the trunk line system, and medium and high powered stations also are using them. As mentioned in the introduction, off-air relay with multiple stages accumulates the inferiority of picture quality and S/N and in the case of high-power transmitter in particular inferiority increases

more and more because of incapability of using the transposer resulting the occurrence of a repetition of the multiplied modulation.

Moreover, there are also ones which make station of another state as a parental station, therefore, this may cause a trouble to conduct the local broadcasting at each station separately in the future.

By comprehensive investigation of these problems a plan for the improvement that of the terrestrial micro line and the off-air relay line is shown as Fig. 3-6. (in the light of present situation those considered as no change in need are omitted)

3-3-2 TVN-II programme transmission network plan

In the 4th 5-year plan, it was decided that all programme was to be copied in Jakarta and distributed because there are only small number of stations broadcast TV-II programme, but in the long-term plan, it will be necessary to have the programme transmission line because service area will extend nationally. In the case of the TVN-II broadcasting, since most of the programmes are produced in Jakarta and all takes a form of the national broadcasting originating in Jakarta, transmission line also is only down-line using exclusively one transponder or Palapa Satellite.

For this reason, the stations which will begin TVN-II broadcasting according to this plan should construct link of the cable or the micro wave from the closest Palapa earth station or should receive directly by TVRO. Moreover, the station which is now carrying out the transmission of the TVN-I programme by self-supporting micro wave link should be constructed with the transmission equipment newly. In this case, reserve equipment will be used commonly with TVN-I.

And concerning to the off-air relay, it will be same as TVN-I.

Relating to the system for the terrestrial microwave line and the off-air relay, please refer to the Fig. 3-6.

3-4 Intercommunication Network Plan

3-4-1 General

The following items will be the typical usage of such intercommunication network.

- (1) Intercommunication lines for management operation
Such type of telephone conversations as business contact on the programme scheduling, programme planning, programme

production, gathering of programme materials and general management operation are widely exchanged between the various sectors in the broadcasting station. The mode of telecommunications are generally not so high urgent and each demands are not so regularly occur but random demands occur intermittently all through the day and night and the communicating party and the flow of message are not always fixed.

(2) News transmission lines

Generally, telephone lines can be used for the transmission of news material and order or instruction on the news gathering. However, the degree of urgency is extremely high and the direction of message flow is larger in ratio for those from regional stations to the central station.

(3) Telecommunication lines for the maintenance service

The telecommunication lines used for maintenance service to prevent interruption of broadcasting service and for routine maintenance service will be the same as the general management operation as mentioned in item (1), but such usage of telecommunication line as for asking urgent countermeasures to the equipment failure, the demand to the telecommunication line will be the highest degree of urgency. This type of operation will be needed, in most cases, between key station and remote station located on top of the isolated mountain where the public telephone lines cannot be used.

(4) Intercommunication lines for programming operation

Telecommunication lines for the operation of programme distribution or exchange between the stations are the same as item (1). However, for the switching instruction in relation to the programme transmission arrangement, urgency and reliability will especially be required and in some cases the network must be constituted between multiple number of stations.

(5) Data transmission lines for management operation

This kind of special lines will be necessary for sending and receiving of operational data between the stations in consultation with the line availability. In most cases, there will

not be no objections even if the telecommunication lines are available only on inconvenient time zone such as early in the morning or late at night. In the near future, it will be necessary to provide a high speed network which is capable of telex, facsimile and data transmission.

3-4-2 Constitution of the Operational Intercommunication Network

It is not so economical even if it is possible to set up intercommunication network only by utilizing the public telephone lines to meet with the various demands as mentioned above. On the contrary, the use of exclusive telecommunication lines will be more useful and effective due to the following reasons.

- a. Instant calls can be made even between stations located far apart.
- b. The other party station and counterpart can be called directly just by dialing.
- c. The line stability is good and there is no cross talks from other telephone lines.
- d. Facsimile, telex and data transmission is possible.
- e. Instructions from headquarters can be relayed to all broadcasting stations at one time from central station by use of the simultaneous calling device.

Broadcasting stations connected to this exclusive network will be those in which a certain number of telephone calls will occur throughout the day. They are as listed below and their locations are shown in Fig. 3-8 and 3-9.

- Radio
 - o DEPPEN RTF Headquarters
 - o RRI National Station
 - o Cimanggis broadcasting station
 - o Kebayoran "

(The above in Jakarta)

 - o Nusantara station (5 stations)
 - o Regional-I station (26 stations)
 - o Regional-II station (17 stations)

- TV
 - o DEPPEN RTF Headquarters
 - o TVRI Headquarters (Senayan)
 - o Regional TV stations provided with TV studios
 - o Regional TV stations provided with MPU
 - o Principal TV stations in major cities of each region

In regards to telecommunication line between the master TV station and its relay station or between off-air relay station which are not connected to the exclusive network, the demands for business contact are very few in the normal operational condition but sometime requires urgent contact when troubles happen in the station. Therefore, other communication means than telephone line such as SSB communication network or UHF radio telephone link might be rather convenient.

3-4-3 Installation of Exclusive Intercommunication Network

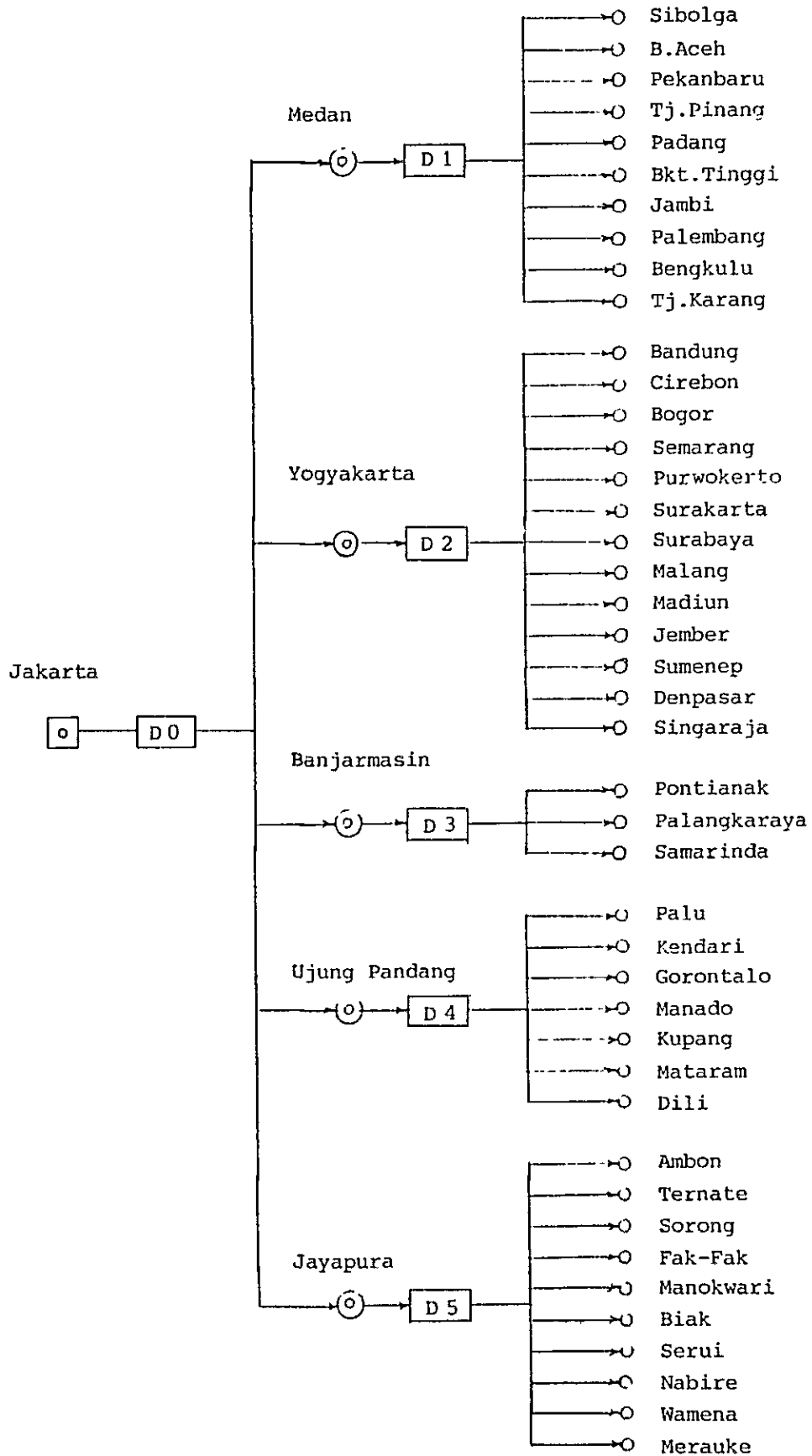
- a. Direct dialing exclusive network will be constructed between the central station, Nusantara station and 8 television stations (with local studios). (Stage 1)
- b. This exclusive network will be expanded to 9 television stations with MPU. (Stage 2)
- c. The exclusive network will further be expanded to the Regional-I broadcasting station and to 9 stations where the 2nd MPU installation will be made. (Stage 3)
- d. The installation work of Stage 2 and 3 will be proceeded taking into account of their operational condition.

3-4-4 Installation of Branch Line Other than Trunk Line

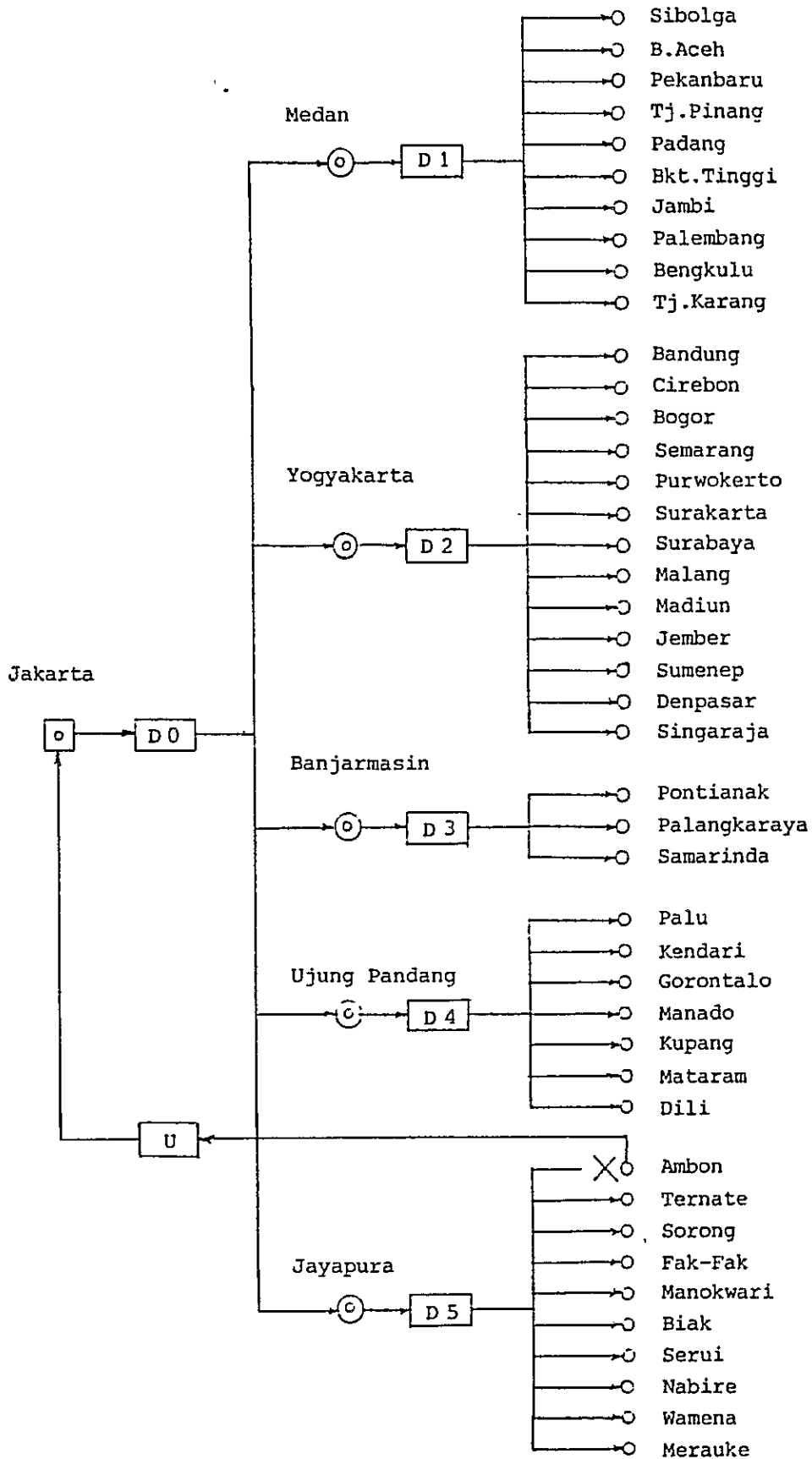
Branch communication links for local transmitting stations other than for key stations and communication for periodical maintenance to the unattended station, following equipment will be used.

- a. For branch communication links, conventional SSB link utilizing in RRI at present, will be used after permanent trunk lines are completed.
- b. For maintenance service, existing bi-directional radio communication equipment which are used between TV relay stations in Jawa island will be diverted by changing gradually to UHF band.

RN-I Programme Transmission Line (Down Stream Line)



Originated by Regional Station



Line connection of RN-I Block Broadcasting Fig. 3-3

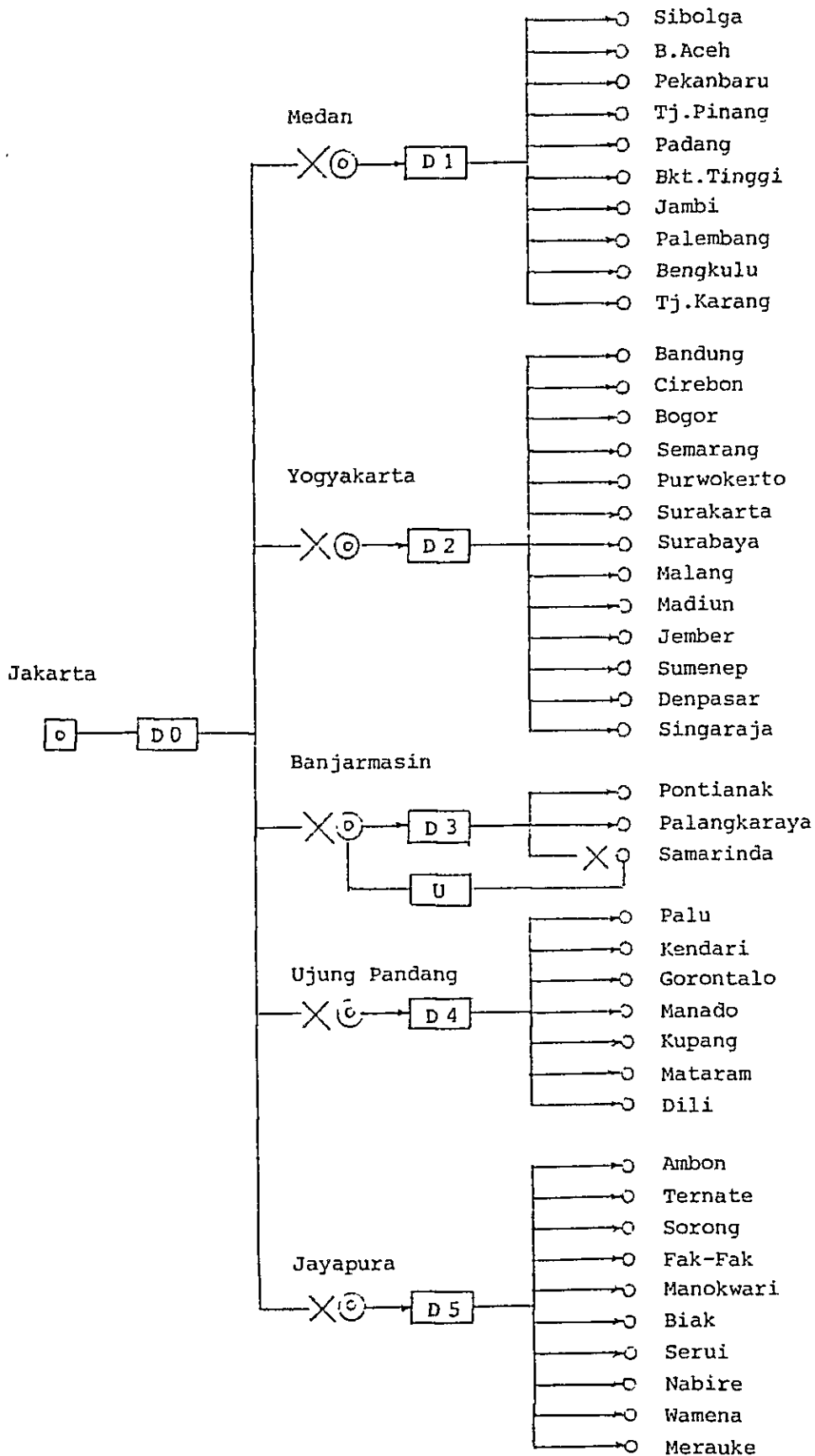
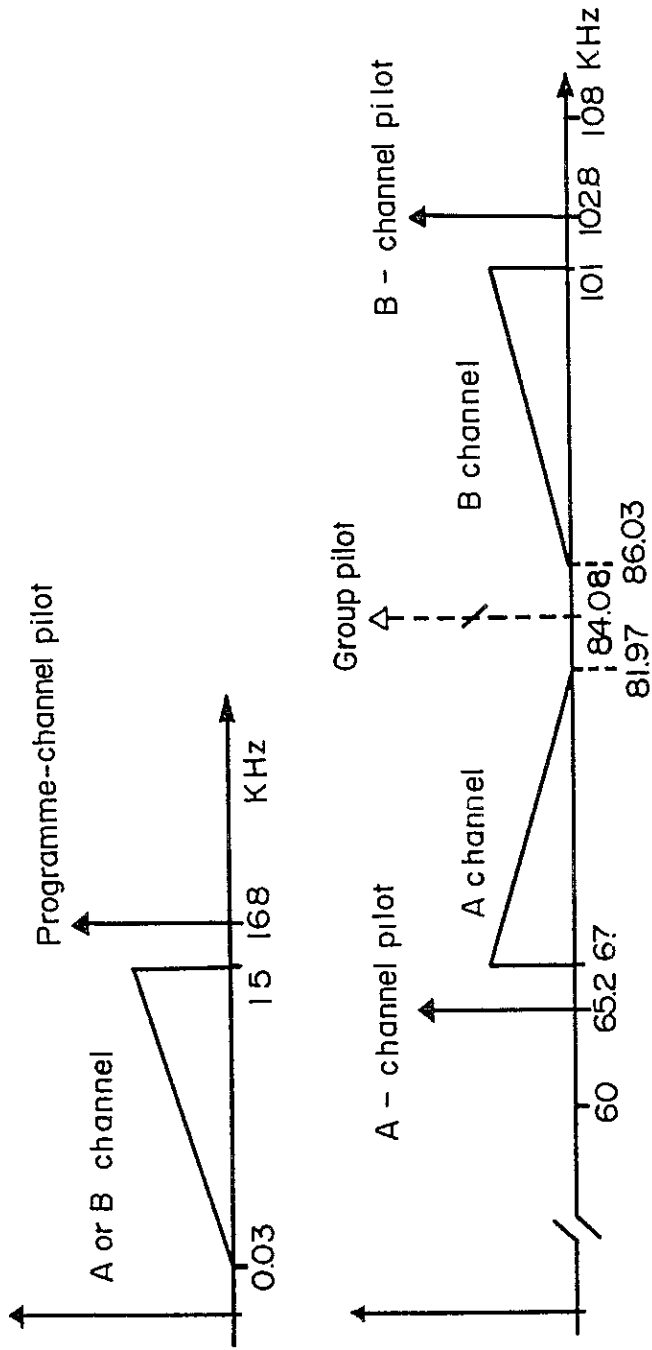
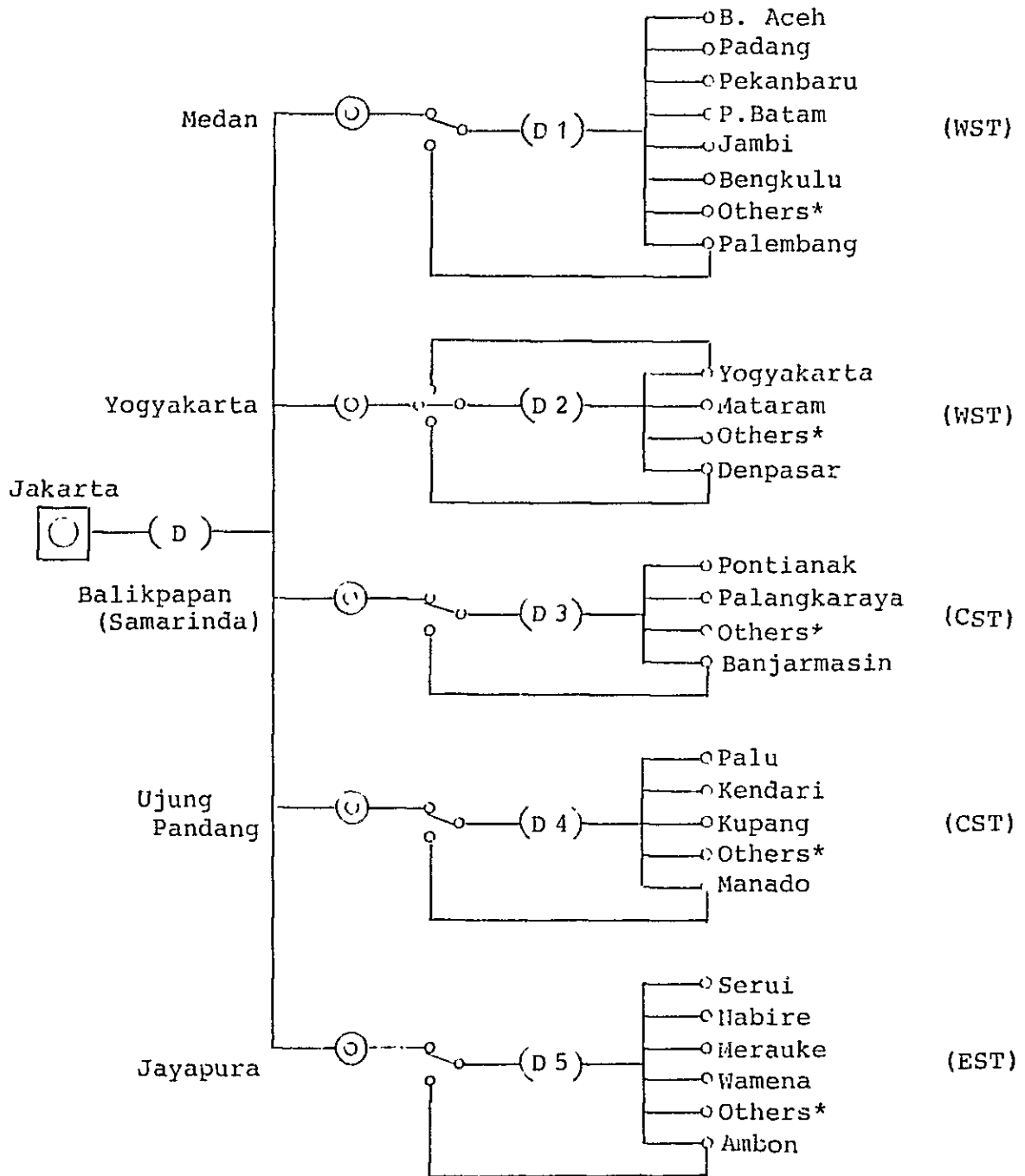


Fig. 3-4



Line-frequency positions of the two-programme channels in the group

TVN-I Programme Transmission Line

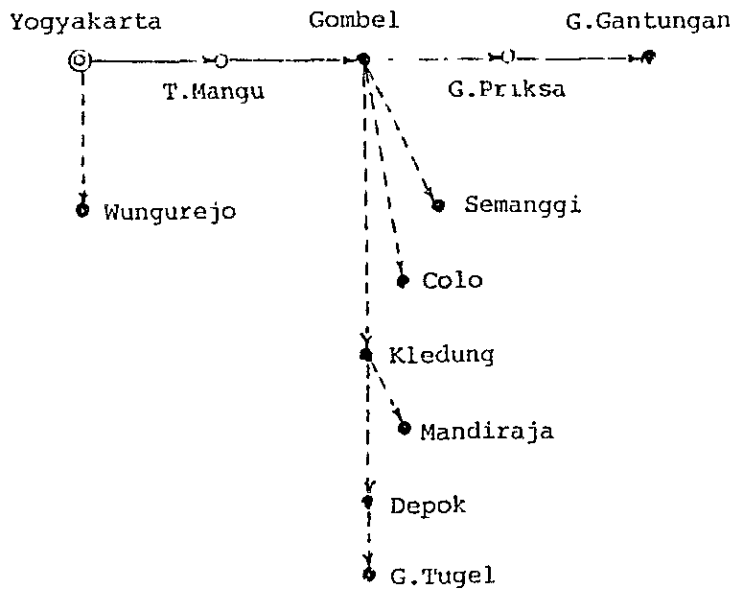
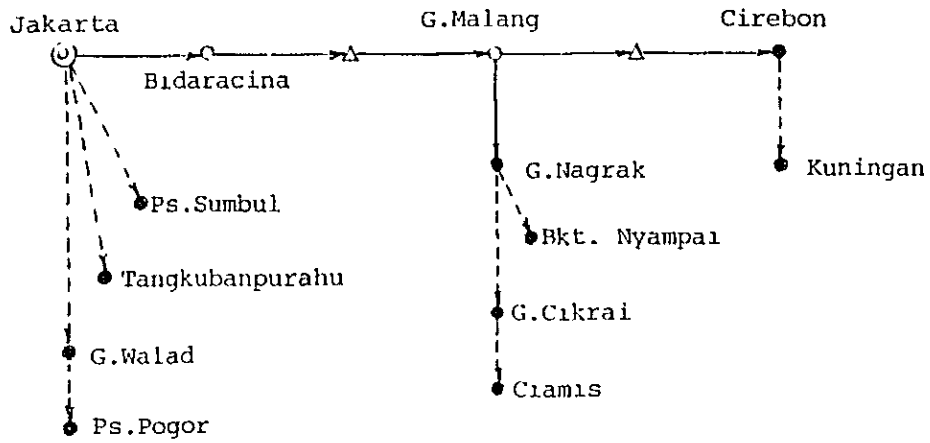


* Transmitting Station Relayed by Small Type Earth Station or TVRO

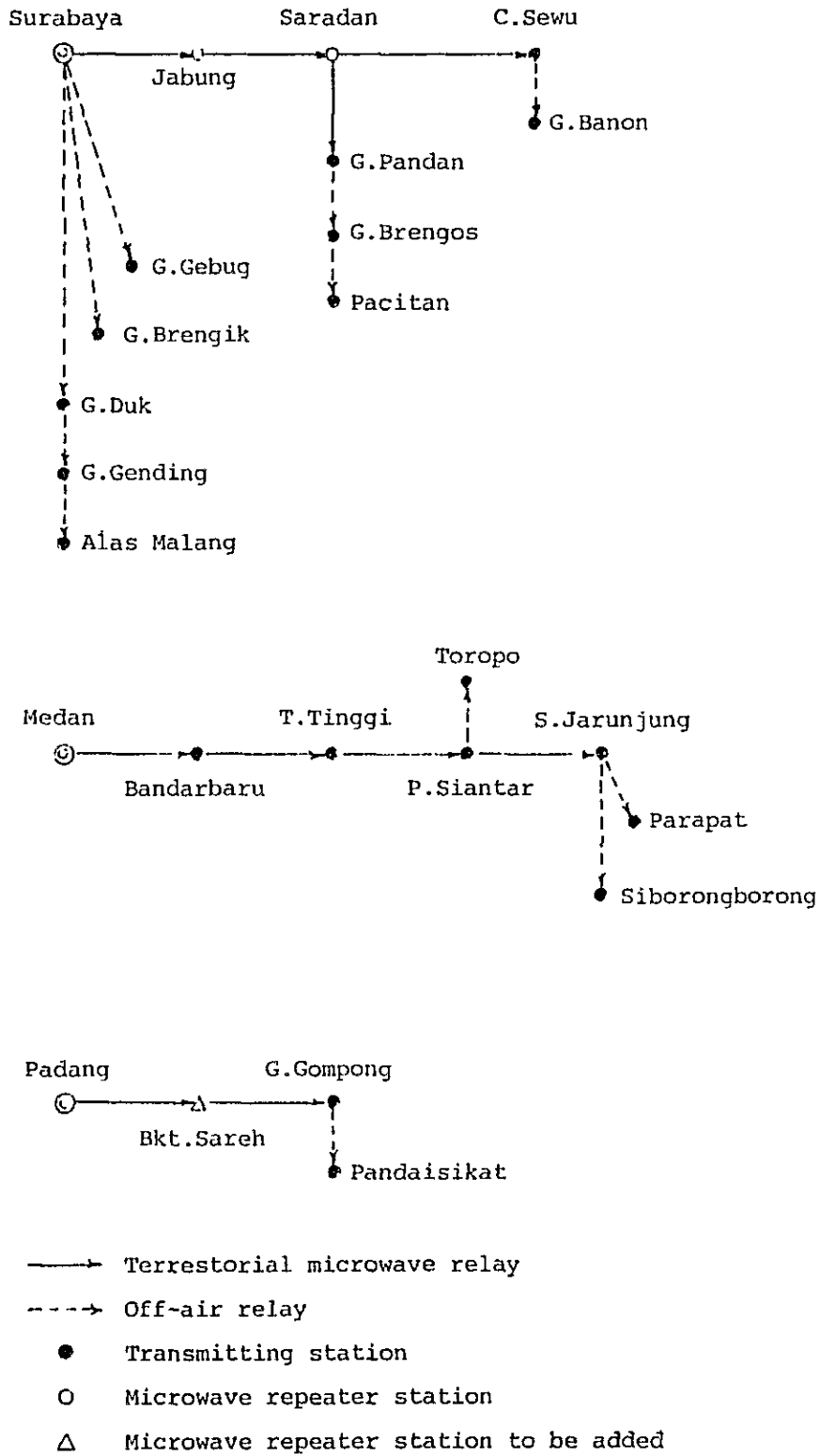
D, D1 -- D5 : Palapa Transponder

Fig. 3-6(1)

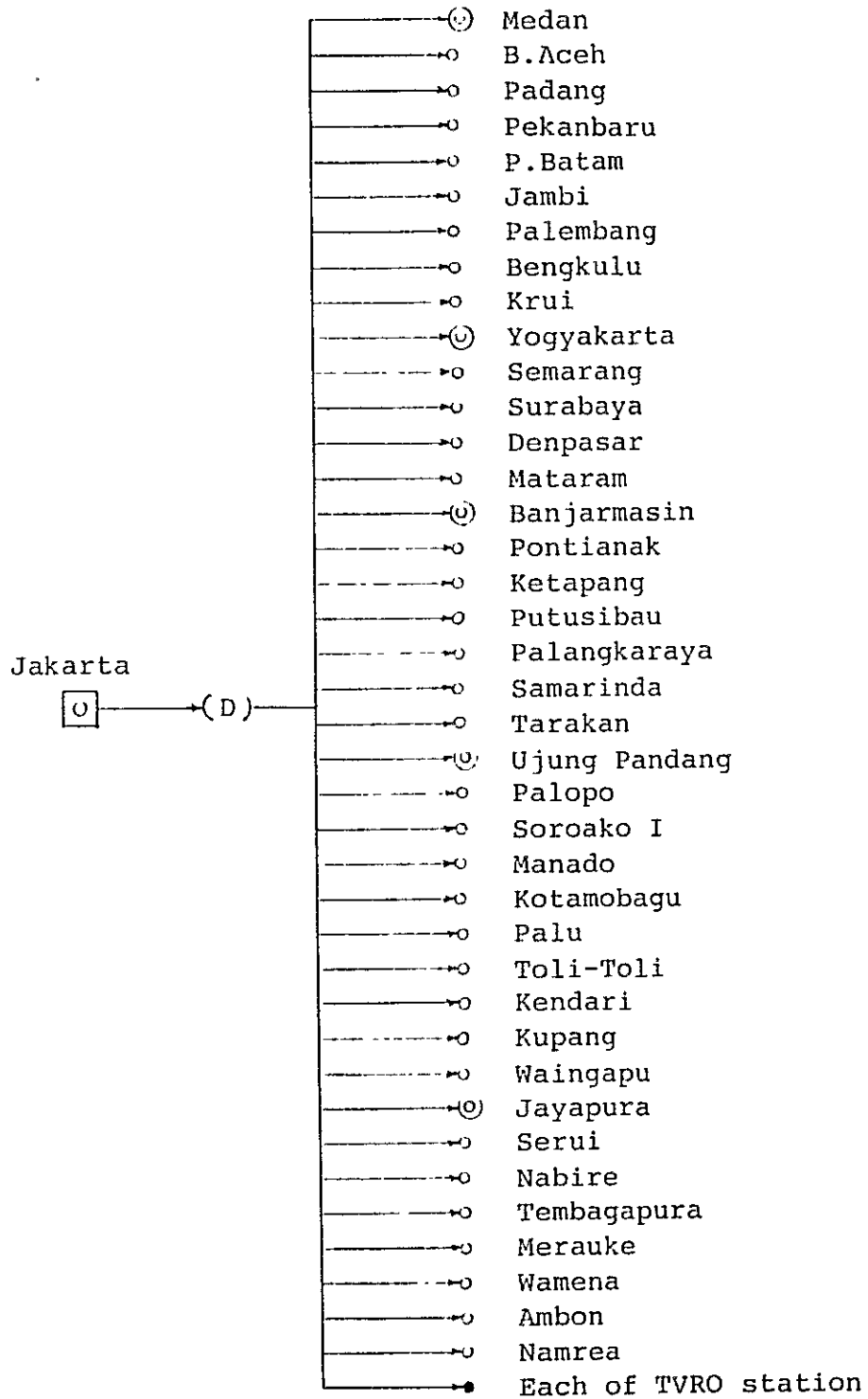
Terrestrial Microwave & Off-air Relay (TVN-I)



(continued)



TVN-II Programme Transmission Line



D : Palapa transponder

Fig 3-8

TELEPHONE NETWORK FOR DAILY OPERATION
(1ST PHASE)

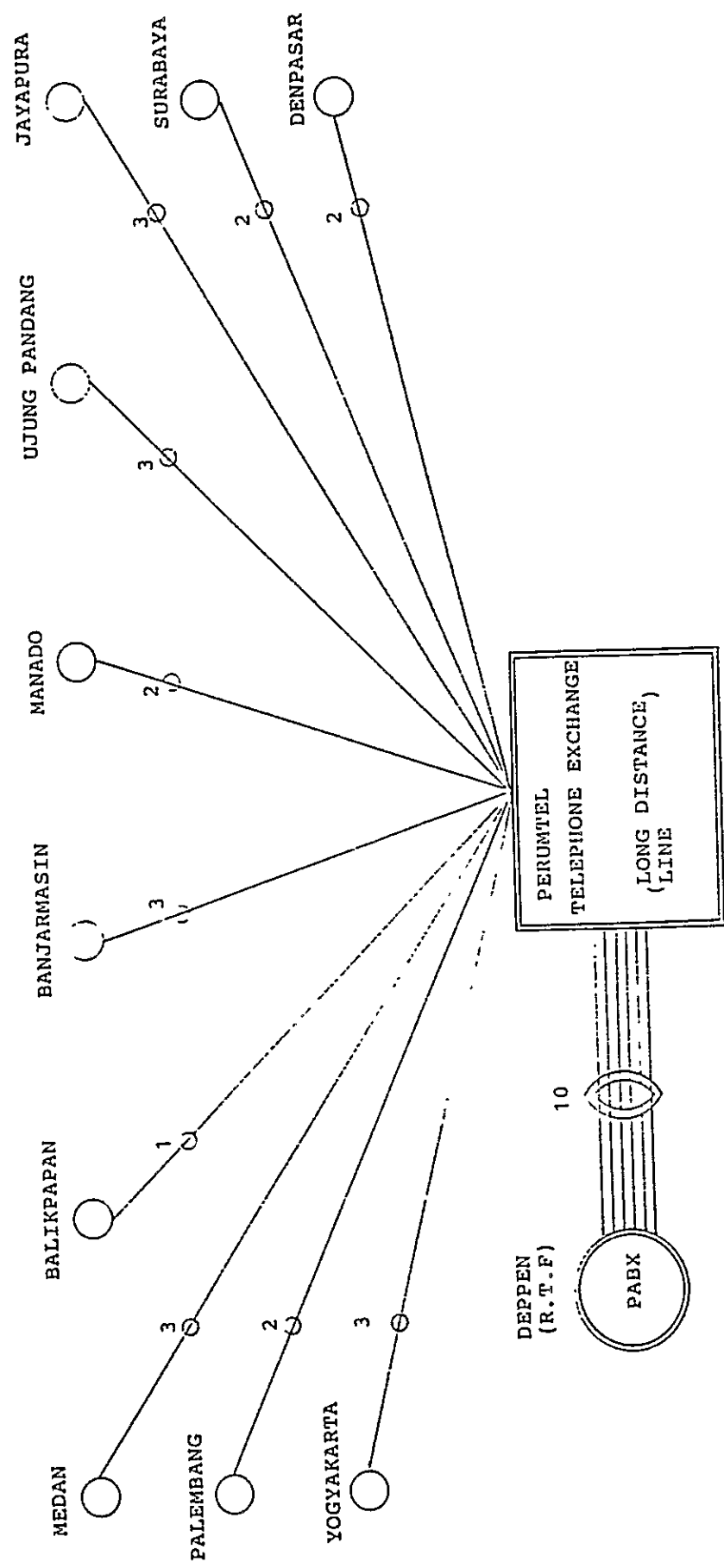
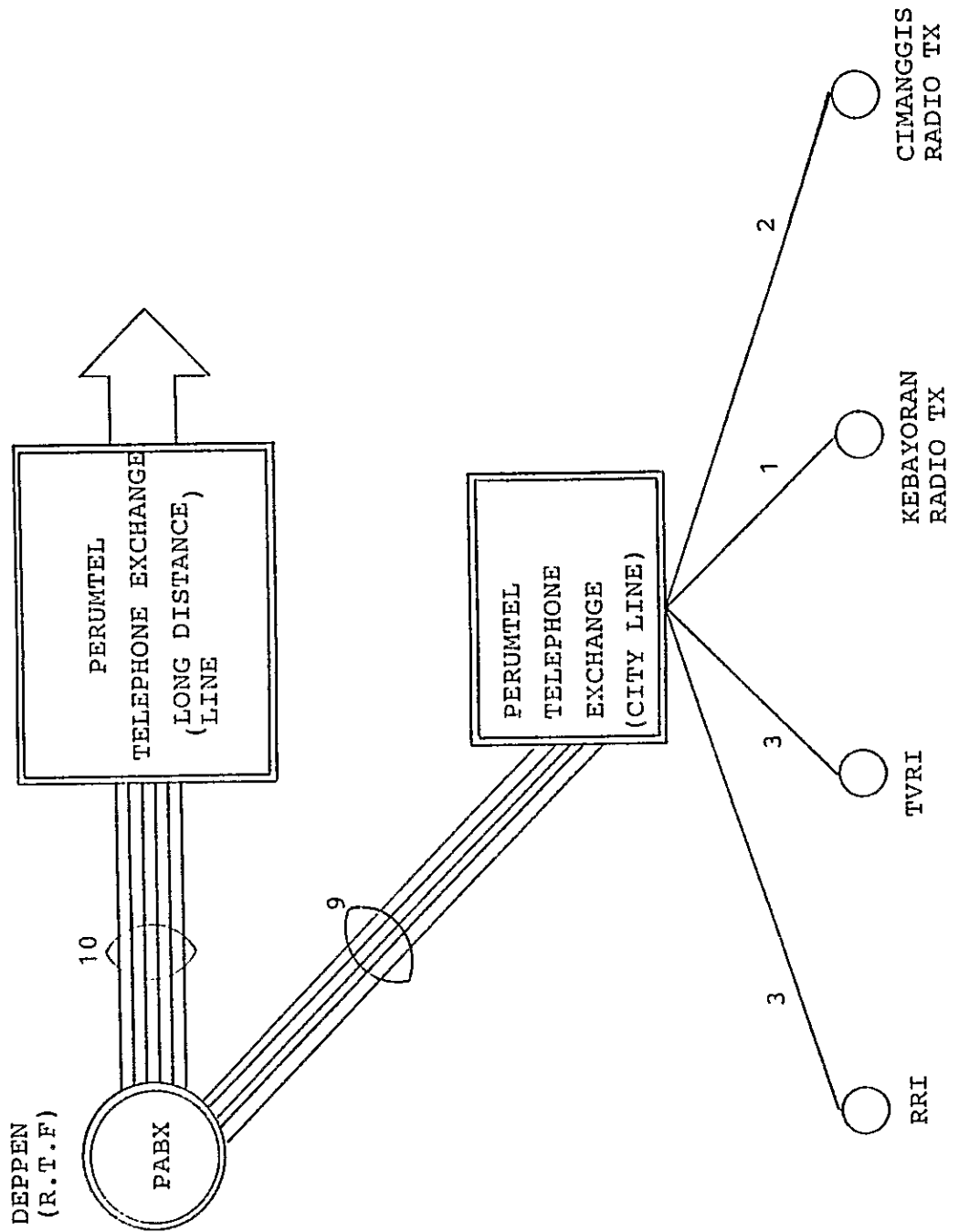


Fig 3-9

TELEPHONE NETWORK FOR DAILY OPERATION
(1ST PHASE)



**PERFORMANCE CHARACTERISTICS
OF AM RADIO PROGRAM TRANSMISSION CIRCUITS
(CCITT Rec.J31)**

1. NOMINAL BANDWIDTH
15kHz CIRCUITS: 0.04 - 15kHz
2. INSERTION GAIN AT 1kHz
(1) ADJUSTMENT ERROR: LESS THAN 0.5dB
(2) DAILY VARIATION: LESS THAN 0.5dB
3. GAIN/FREQUENCY RESPONSE REFERRED TO 1kHz
0.04 - 0.125kHz: +0.5 - -2.0dB
0.125 - 10kHz: 0.5dB
10 - 14kHz: +0.5 - -2.0dB
14 - 15kHz: +0.5 - -3.0dB
4. DIFFERENCE OF GROUP DELAY AT GIVEN FREQUENCY
0.04kHz: LESS THAN 55mS
0.075kHz: LESS THAN 24mS
14kHz: LESS THAN 8mS
15kHz: LESS THAN 12mS
5. MAXIMUM WEIGHTED NOISE LEVEL
-42dBqOps (NOTE: dBqOps Rec.J15 ANNEX A)
6. NON-LINEAR DISTORTION
0.04 - 0.125kHz: LESS THAN 1%
0.125 - 7.5kHz: LESS THAN 0.5%
7. CROSS TALK BETWEEN TELEPHONE CIRCUIT
0.04kHz: LESS THAN -50dB
0.5 - 5kHz: LESS THAN -74dB
15kHz: LESS THAN -60dB
0.04 - 0.5kHz: Oblique straight-line segment on linear-decibel
5 - 15kHz: and logarithmical-frequency scales.
NEAR OR FAR-END: LESS THAN -65dB
8. DIFFERENCE IN GAIN BETWEEN A AND B CHANNELS
0.04 - 0.125kHz: LESS THAN 1.5dB
0.125 - 10kHz: LESS THAN 0.8dB
10 - 14kHz: LESS THAN 1.5dB
14 - 15kHz: LESS THAN 3.0dB

Table 3-1 (2)

9. PHASE DIFFERENCE BETWEEN THE A AND B CHANNELS	
0.04kHz:	30 DEGREE
0.2 - 4kHz:	15 "
14kHz:	30 "
15kHz:	40 "
0.04 - 0.2kHz:	Oblique straight-line segment on linear-degree
4 - 14kHz:	and logarithmic-frequency scales.

CHAPTER 4 STUDIO FACILITY PLAN

CHAPTER 4 STUDIO FACILITY PLAN

Building integration in view of the radio/TV organization integration, in particular, must be considered in the studio facility plan. However, as construction of new and additional buildings will not all be completed by the year 2000, improvement and new establishment of studio facilities must be carried out efficiently by through consideration with the building integration schedule. The work in the 4th stage of the 5 year plan requires urgency in which the present situation must be straightened out, absolute execution of the RN-I 24 hour broadcasting and preparation for start of RN-III, TVN-II but in the long-term plan, the facilities must be fully capable to meet the programme production method which will become more varied in the future.

4-1 Fundamental system for programme production and transmission

The work flow from TV programme production to programme sending is schematically shown in Fig. 4-1.

The amount of each facility required and the scale of programme sending work, shown in this schematic, depends on content and amount of programmes produced and number of broadcasting channels in that particular broadcasting station.

In system design of these technical facilities, the basic studio of the facility will differ depending on whether it is of the Concentrated Arrangement System or the Dispersed Arrangement System.

4-1-1 Concentrated Arrangement System

In this type of arrangement, equipment which can be commonly used by each studio such as VTR, telecine, etc., are assembled in one room and when any studio is to use them, lines for video and sound (both including monitors), controlling (start, stop, fast winding, rewinding) and intercommunication are connected between them through a switching circuit called "preset matrix."

Details on this "preset matrix" will be mentioned later.

In addition, although camera control unit and video control equipments are normally exclusive to each studio, they are assembled in one room and production carried out by remotely controlling them from the studio subcontrol room (Representative control items are given in Table 4-1.

Advantages of the Concentrated Arrangement System are:

- (1) Rotational use of the equipment becomes possible resulting in less overall number of equipment compared to the Dispersed Arrangement and therefore can raise operational efficiency.
- (2) Consistent quality of the picture and sound can be maintained.
- (3) Source of noise can be isolated from the subcontrol room.
- (4) Backup at equipment breakdown is easier.
- (5) Auxiliary components can be standardized.
- (6) Maintenance and checking, equipment management and unification of operation is easy.
- (7) Floor space can be reduced.
- (8) Many equipments can be operated with less operators.

On the other hand, disadvantages are:

- (1) A preset matrix for connecting each studio for video, sound and control signals and intercommunication becomes necessary, and thus the system becomes complicated.
- (2) There is the possibility of confliction between studios for the common use equipments.
- (3) Requires a repletion of equipment for intercommunication, monitoring and message displays.
- (4) Construction will be complicated and require a longer period to complete the auxiliary facility.
- (5) Occasionally, change in equipment type is difficult.

4-1-2 Dispersed Arrangement System

In this type of arrangement, the camera control unit, video control equipment, VTR (recording and playback for inserts) and telecine equipment necessary to programme production are installed in the

subcontrol room of each studio. Needless to say, this type of arrangement is in reverse relation to the Concentrated Arrangement System.

The advantages are:

- (1) Since all the equipment required are provided in each studio, there is no need of the preset matrix which simplifies the system.
- (2) Independent programme production in each studio is possible and there is no conflict in use of the equipment.
- (3) Systems for intercommunication, display, monitoring and control can be simplified.
- (4) Construction can be done in studio units thus reducing the work period.

On the other hand, disadvantages are:

- (1) Equipment will be required in each studio, resulting in that many more number of equipment.
- (2) It is difficult to maintain consistent picture quality.
- (3) It becomes necessary to take measures against noise from the telecine, VTR, etc.
- (4) Backup is difficult at equipment breakdown.
- (5) Maintenance and checking, equipment management and unification of operation is difficult.
- (6) Space factor is low.
- (7) Requires more personnel as technicians must be assigned to each studio.

4-1-3 Choosing the system

As can be seen in the above, both systems have merits and demerits and the choice depend on programme production volume (consequently depending on number of studios and peripheral equipments) of that station, facility operation cost, layout, facility management method, maintenance management method, personnel, etc.

Generally speaking, it is of best advantage to choose the Concentrated Arrangement System, including the programme sending

facility, for the large scale broadcasting station; and for the medium to small scale station, the Concentrated Arrangement System for the VTR and telecine, and the Dispersed Arrangement System for the camera and video control equipment.

Even in the case where an absolute Concentrated Arrangement System is employed, it is of advantage to employ the Dispersed Arrangement System for the radio subcontrol equipment and the audio control equipment in a television studio in view of its operating frequency and control method; other special facilities such as an echo room should be limited to the Concentrated Arrangement System. Even for a video equipment, the FSS will be convenient to use if they are dispersed among the studios.

From the above explanation, it can be said that in Indonesia, the Concentrated Arrangement System is most suitable for the Jakarta station and a mixture of the two types of systems for others such as Nusantara and regional stations.

A model of programme production and sending control system by the Concentrated Arrangement System is shown in Fig. 4-2.

4-1-4 Automatic control of the system

Method of controlling programme transmission is shown in Fig. 4-3. Controlling can be broadly classified into within station control and interstation control.

There are 3 types of broadcasting format - Nationwide Relay Broadcasting in which all stations broadcast the same programme at the same hour, Local Broadcasting in which each station broadcasts their original programmes, and the Block Broadcasting in which a multiple number of related stations broadcast the same programme at the same hour.

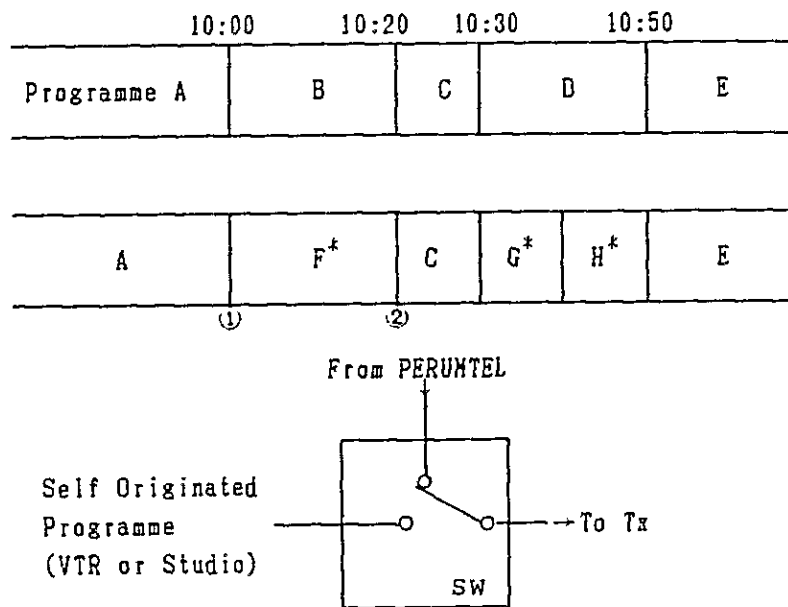
The basic control philosophy at nationwide relay broadcasting is shown in Fig. 4-4. In this schematic, originating station sends the control signal to control the network for the form of nationwide broadcasting, and each other station receives and confirms the signal as the nationwide broadcasting.

Above mentioned controls are interstation controls and others are inner station controls.

(1) Outline of interstation control

1) Programme switching

Assume a programme operation schedule as shown below. The upper is the Jakarta broadcast and the lower the broadcast of a certain regional station. Therefore, A, C and E are the nationwide relay programme from Jakarta and F, G and H are local programmes of regional stations.



In this station, the switch shown below, switches at 10:00 from the network line to its own programme side, at 10:20 again to the network side, and further at 10:30 to its own programme side. If control of this switch is delayed, it will switch to Programme F after the start of Programme B is seen, in the first example, and the first part of Programme C will be missed in the second example.

Conventionally, this switching was manually controlled but as it requires a high degree of skill for reliable switching without any trouble and when switching becomes varied such as switching of the originating station during newscasting or switching for emergency broadcasts, then reliable manual switching no longer becomes practical. It therefore becomes necessary to automate the operations.

One method of automaton is time control. In the previous example of fixed form type of switching, the purpose can be fulfilled by time control only but when considering a broadcasting form of sequential relay from many stations, this will be insufficient.

The recommended method is the utilization of the control signal multiplexed onto the broadcasting programme signal. To automatically control the previously mentioned switch, the programme originating station sends a programme control signal called a "Q" (Cue) Signal which indicates the start and ending of the programme sent to the network and the programme receiving station receives this signal to switch the programme. This is an important aspect of interstation control.

In addition to the above, an identification signal called I (Identification) is multiplexed on to the programme signal for automatic monitoring of transmission line failure and misconnections to other lines.

(2) Outline of inner station control

Inner station control is the basis of programme operation technique. As previously mentioned, interstation control means mutually transmitting control signals between stations according to a fixed rule to control the line, and sending control signals and controlling the line by the signals thus received are all the responsibility of inner station control. Therefore, the transmitting section of interstation control is the controlled section in regards to inner station control and the receiving section is the data input section of inner station control. This relation is shown in Fig. 4-5.

Please refer to ANNEX V for Composition of the Control Equipment, Control Functions, etc.

4-2 Studio facilities

The scale and number of studios in a station based on the programme plan must be determined, together with the later mentioned outside production facility, by putting into consideration broadcasting

time of each stations' original programme, and content and size of the programme source.

4-2-1 Radio studios

In regards to radio studios, in the 4th 5-year plan, 85 stereophonic programme production studios will be newly built and 99 monaural programme production studios will be improved. In addition to these, auditoriums by a previous plan are almost completion.

Therefore, other than new studio construction due to building moving for the purpose of radio/TV facility integration, new studio construction in Serang planned station and new construction and improvement of the remaining part in the 4th 5-year plan, the weight will be put on functional improvement by introduction of new techniques.

The number of studios at completion of the 4th 5 year plan and completion of the long term plan are shown in Table 4-2.

4-2-2 Television studios

In regards to television studios, there will be 8 rooms in Jakarta and one room in each of 8 regional TV stations at the end of the 4th 5-year plan but in the long term plan, an additional 7 rooms will be provided in Jakarta and new studios constructed in Banjarmasin, Jayapura, Samarinda and Ambon. In these 12 stations including existing 8 regional stations, each one of medium and small scale studio will be provided.

Although video and audio control equipment will be standardized, the system will be designed with an ample margin for introduction of the newest type equipment by technical improvements. A computer controlled system for studio lighting will be introduced to match the scale of the studio and programme content. Besides, a small scale TV studio will be constructed in each of present 20 RRI regional I stations.

As outside production will increase for television programmes in the future, television studios need not be increased too much.

The conditions of the television studios at completion of the 4th 5-year plan and the long term plan are shown in Table 4-3.

Also, the basic equipments in the television studios are indicated in Table 4-4.

4-3 Outside production facility

4-3-1 Radio outside production facility

As for the radio OB van, 2 sets in Jakarta, 40 sets in the Nusantara and regional stations, will be provided in the 4th 5-year plan, in the long term plan, additional facilities will be provided in the remaining 8 stations and 1 station scheduled for construction, and in stations with a large number of programme sources, the second set will be provided.

In Jakarta and other major cities, a regular multi-channel recording van will be provided.

4-3-2 Television outside production facility

(1) OB van

A standard type OB van will be provided in major stations for sports event and other large scale outside programme production.

Basic equipment in the OB van are shown in Table 4-5.

(2) MPU and EFP

An MPU is to be provided in the 18 stations which do not have a television studio at completion of the 4th 5-year plan. The objective of the long term plan is to provide all stations which presently have a radio programme production facility (including newly scheduled stations).

However, for areas which cannot expect improvement in roads, and for deep sections of the island, not the conventional mobile type in which the equipments are mounted on a rack but the small high performance EFP (Electronic Field Production) system which can be transported on more smaller automobiles, small boats and small aircraft, will be provided in equipped by portable up link unit..

In construct to the ENG system to which first priority is given to its mobility, the EFP system is a small system in which quality of picture and sound is most valued. A representative example of an EFP system is given in Fig. 4-6.

TV programmes are able to produce effectively by using MPU or EFP having higher mobility than standard OB van, accordingly, these systems are provided for Jakarta and other major stations.

Usage of OB van, MPU or EFP will be selected by the contents of the producing programmes.

Taking advantage of its mobility, MPU is extensively used in various production sites and they can be expected to be widely used by broadcasting stations which do not have television studios, to use them for television programme recording in auditoriums and civic halls.

One provision is that extensive modification of the present auditoriums are required for television programme producing as they have almost no flying system and stage lighting equipment.

The final objective on outside production facilities at completion of the long term plan is shown in Table 4-6.

4-4 Postproduction facility

Presently, the programme production method is varied and not to mention the large scale dramas and documentaries, many on-site location recording is employed in general education programmes. Consequently, the materials for one programme could be in many type and form such as studio recordings, location recordings and copies from libraries, and it becomes necessary to match the tones. Especially in television programmes, if the location and time of production is different, colour temperature and colour rendering of the light source will not match in each, resulting in non-uniform picture quality and therefore, must be compensated for at the creating stage.

On the other hand, meticulous editing and processing of picture and sound is necessary to produce an attractive programme.

It will also be necessary to re-process the narration and superimposed titles in the picture frame into Indonesian on imported programmes.

For these purposes, 5 sets of standard VTR automatic editing facility, 3 dubbing studios, picture and sound processing equipments will be installed in Jakarta,

4-5 News centre facility

Production and sending of news programmes must be separately considered aside from other programmes in general as its nature calls for

accuracy, speed and diversity. At Jakarta, in particular, it is necessary to establish, apart from the general programme production facility, and exclusive news centre, including its own peripheral equipment, because nationwide news are handled here in great volume. For this reason, temporary facilities are to be installed in RRI and TVRI in the 4th 5-year plan but in the long term plan, it will be changed into a universal news centre after integration.

The news programme related section and the technical section will be unitized location-wise and various peripheral equipment, offices of each programme producer (for instance, politics, economics, society, sports, foreign affairs, etc.) will be integrally connected, centered around the studio which is the core of the news centre.

News material will arrive from surrounding areas of Jakarta and numerous points of the nation through the information line and in various forms such as live material, recorded tape, films, telephone, telex, etc. Materials will also arrive from numerous points abroad via Intelsat and other routes. Even for television, the content only is relayed first by telephone with the picture arriving late in most cases, and the initial news information could be still photos, photos of related incidents in the past, motion picture films and VTR tapes supplied by the library.

Pictures from abroad will be incoming by NTSC or SECAM system, depending on the sending nation, thus requiring conversion.

This news production flow is shown in Fig. 4-7 and outline of major facilities in Table 4-7.

When radio and television is broadcasting the news on the same hour, the same content is broadcast in most cases but even though the content is identical, the newscasters' script will differ between radio and television. For this reason, a small news studio for radio must be provided separate from the television studio.

In stations other than Jakarta, it can be said as sufficient to provide only an ENG system and movie camera exclusively for news gathering as there are not that many news material. For the news studio, the programme continuity studio is possible to use commonly at any moment.

4-6 Recording and playback facility

This is a field highly prone to change. It can be assumed that the new Laser type recording system, in addition to the magnetic system, will

expand into the broadcasting field and it can be said that the magnetic system, which is the main at present, will be progressively reduced in size and improved in performance for both picture and sound. On the other hand, although use of the film system in the television field is on the decline, it is assumed to survive for some length of time at special applications and recording in remote areas.

4-6-1 ATR

A large capacity automatic loading type ATR (Automatic Tape Reproducer) for automatic sending of radio programmes, will be installed in Jakarta for playback and sending of the RN-I, II and III programmes.

4-6-2 VTR

Presently, 3 types of VTR are available as standard equipment - the 2 inch quadrature type, 1 inch helical B and C formats - and except for exchange programmes from abroad, it is necessary to unify the VTR format for domestic programmes.

Also, the 3/4 inch cassette VTR widely used at present in TVRI is assumed to move over to the 1/2 inch type and this format should be unified throughout the nation.

However, as tapes offered by the general audience could be used for broadcasting, it is necessary to prepare playback machine of different formats for such special purposes, in Jakarta and other major stations.

In Jakarta, a separate VTR of the standard type will be installed for production use (including playback of inserts in a programme) aside from another for sending. In other stations, this will be efficiently used as an easily operated overall system since its application as a sending VTR is not too frequently required.

4-6-3 AV centre facilities

AV centre will be established to make tape package of broadcasting programme to distribute radio and TV programme for the out of broadcasting service area.

(1) Tape duplication equipment

Three sets of tape duplicator for radio programme in which one open reel type master playback machine and one slave machine

of multi loading type cassette recorder are combined with monitoring equipment will be provided in Jakarta.

Two sets of tape duplicator for TV programme in which one master machine of 1" helical VTR and one slave combined with monitoring equipment will be provided in Jakarta.

(2) Management of recorded tape

Recorded tapes should be stored and managed in exclusive room separately with tapes and data used for broadcasting service.

Items such as programme name, summary of contents, programme length, broadcasting date, etc. should be listed on the table as well as put on the tape case.

To distribute tapes correctly and quickly meeting the people's demand, items such as programme name, summary of the contents, programme length, broadcast date, etc. should be listed up as well as put on the tape case.

The reproducer and monitor will be provided in the tape storage room for preview.

4-6-4 Film related facility

(1) Film developing facility

Due to high performance of recent portable TV cameras, the work of material gathering for television programmes are being widely replaced by these cameras from the film camera.

However, the true situation is that in remote areas, they have no alternative than to rely on the film camera as the situation of electric power is so bad that the TV camera battery cannot always be charged. Even in the future, it is expected to require quite a while for the electric power network to cover the remote areas of Indonesia which is a vast nation. For this reason, the film developing facilities in major stations will be updated as use of the film camera is assumed to continue for some time in the future.

(2) Telecine facility

Telecine facilities will be installed in Jakarta and other major stations as it is necessary to playback general motion pictures

from abroad and those produced locally, and films photographed in remote areas.

The final objective at completion of the long term plan is shown in Table 4-8.

4-7 Audition facility

Large scale programmes, specially planned programmes and new programmes made in accordance to change in programme schedule must undergo extensive previews and listening tests, and if necessary, make corrections to assure perfection.

In addition, this audition is effective in improving the technique of related personnel, training and education of newly hired operators.

The audition room must be effectively sound proofed against noise from outside, acoustic characteristic be good, interior lighting must be adjustable and monitoring equipment for picture and sound must be equal in quality with those for broadcast monitoring.

In the long term plan, 3 audition rooms will be provided in Jakarta and one in the Nusantara station. Audition rooms are, of course, necessary in other regional stations but it will be sufficient to utilize the ordinary meeting room in which acoustic condition is improved by using curtain and interior lighting is controlled by additional simple type dimmer.

4-8 Library

In any enterprise, it is important to utilize the various materials gathered from far and wide, old and new, and in a broadcasting enterprise, the various materials are effectively used in programme production which is different from libraries in general.

The materials could be in the form of general materials, literature, still photos, motion picture films, video and audio tapes, discs, etc., and with progress in technique, the type of recording medium is expected to further increase.

During on site surveys, it had been seen that each station utilizing the broadcasting reference material assembled in one room but there were many stations whose management of the materials and storage conditions could no be said as satisfactory.

(1) Arrangement of materials

These materials must all be classified, neatly sorted and listed. Besides, each station should have catalogs of school libraries in the locality, books and collections of museums so that they can be quickly referred to at any time.

(2) Management of materials

The materials thus classified and sorted must be stored by items so that they can quickly be referred to. The storage room must be fully air conditioned and mothproofing treatment should be necessary for some materials. Taking care not to deteriorate or soil the materials, periodically conduct checks, maintenance and repairs.

4-9 Other auxiliary facilities

(1) Rehearsal room

Generally, in case of small scale programmes, programme production is sequentially preceded as previous arrangement with performers, producer and persons concerned, dry rehearsal, camera rehearsal and recording (or live broadcasting) in rather short hours but with a large scale programme such as a drama, documentary or musical, it is difficult for the actors to fully master their narration and actions by such a procedure and the chorus must practice thoroughly beforehand. For this reason, a separate rehearsal room is necessary in addition to the studio.

The rehearsal room must be sound proofed, care must be taken in designing the acoustic characteristic and the room lighting (soft illumination is preferable. Colour rendering of the lighting is important as costume fitting is occasionally done here) and a mirror should be provided on one wall. Other furniture can be brought in as needed but a piano should be exclusively provided.

5 rooms (50 - 100m²) in Jakarta, 2 rooms (50 - 7-m²) each station having medium scale studio facility, will be provided.

(2) Sceneries

Sceneries are, of course, required in television programmes and a work shop and store room for those of frequently used are necessary. Rooms for sceneries are of large volume and its location should be carefully determined with consideration on the path between each room and the studio. This is an important point in designing the building.

(3) Makeup room

The room for makeup of the television programme performers and must be located nearby the studio. Special consideration should be put on lighting.

A shower room should be provided as required.

(4) Costume room

Air conditioning and mothproofing is especially important. A fitting room must be attached and sewing machines for costume repair should be provided.

(5) Property store room, musical instrument store room

Air conditioning and mothproofing are also necessary for these rooms.

(6) Preparation room for programme production

It is necessary to provide miscellaneous materials and to process them before taking rehearsal for producing some kind of programmes. For example, science programme in which some experiments are included, materials should be processed beforehand in the individual room in which measuring instruments, tools, chemicals etc. And as for the cooking programme, also exclusive preparation room in which seasoning, tableware, cooking tools, with kitchen should be provided and usually it is necessary to cook some materials beforehand.

Studios for producing these programmes are install and the preparation rooms are provided closely to each of the studios.

4-10 Necessity of programme production and transmission centre

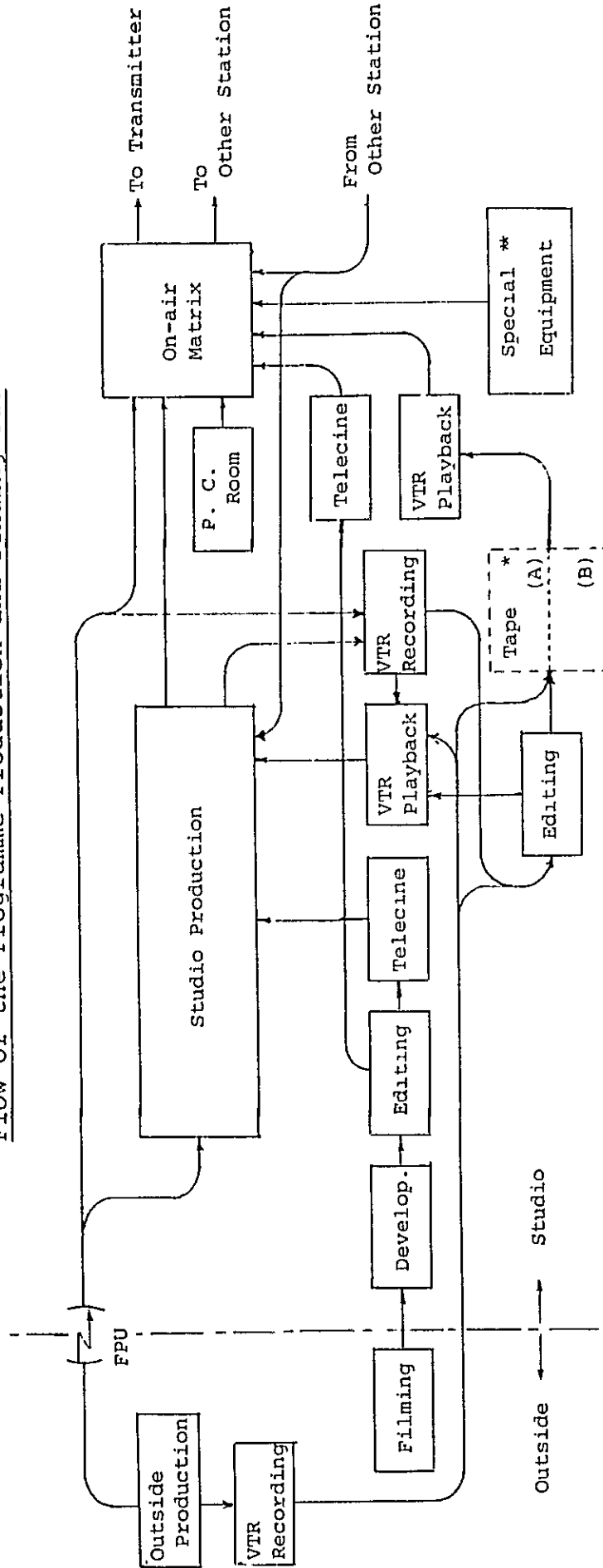
As mentioned above, numerous kinds of facilities are necessary for programme production and these facilities and studios should be arranged conveniently. Especially in Jakarta Station, which produces many programmes a day, effective production of programme are unable to expect without enough examination on the arrangement of the studios and the auxiliary facilities and on the movement of the staff concerned of the programme production.

As for the transmission facilities, also those should be connected with studio complex it is impossible to expect sufficient operation for 5 media of radio and TV programme transmission unless the functional connection between transmission facilities and the studio complex. However, present condition of the buildings of RRI and TVRI, are unable to satisfy those demands, therefore, new land will be selected and suitable programme production and transmission centre will be build in this plan.

As for the stations other than Jakarta, those matters will be enough considered on the designation for renewal or remodeling of station houses for the integration of radio and television facilities.

Fig. 4-1

Flow of the Programme Production and Sending out



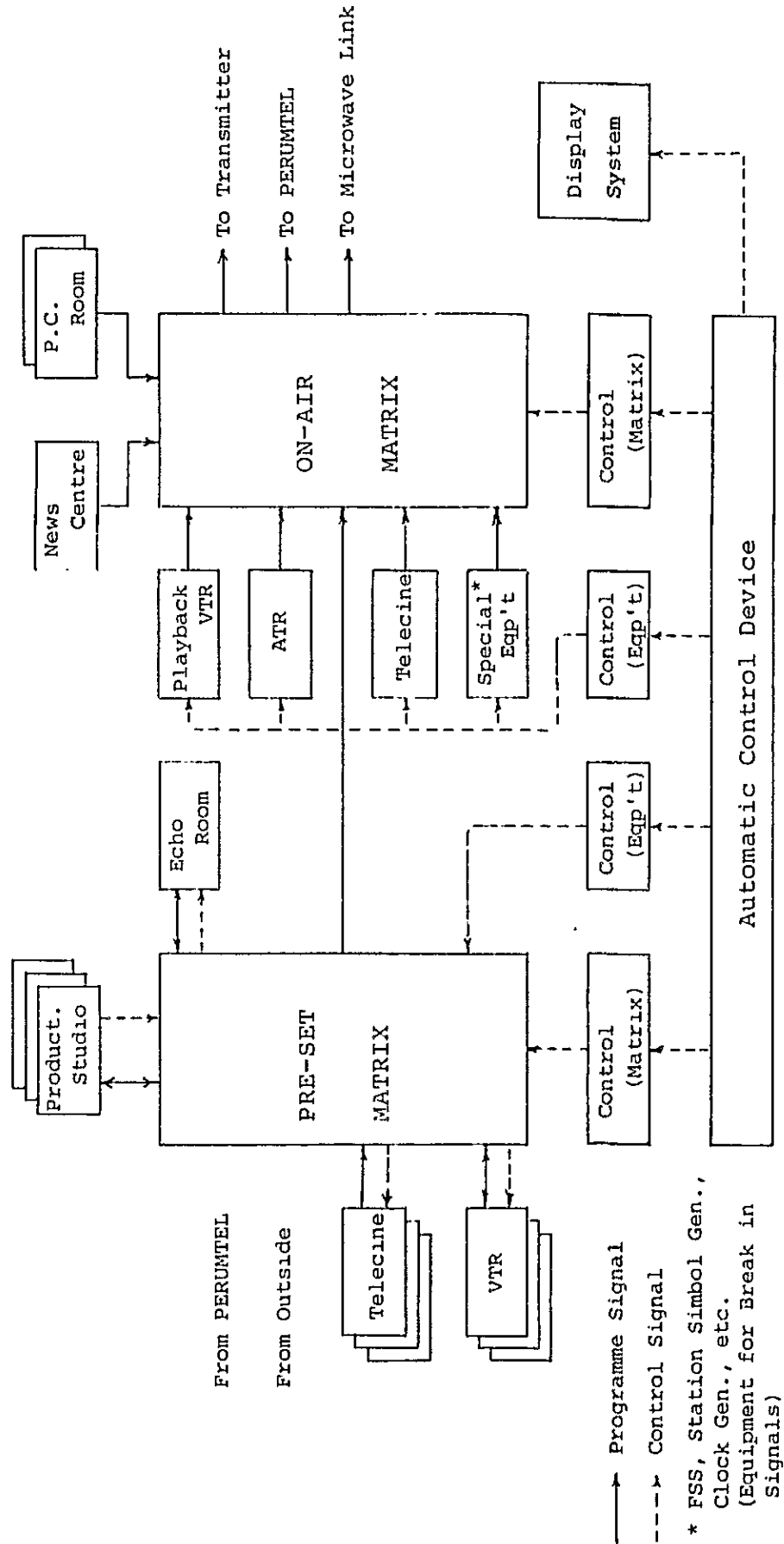
* Tape (A): Complete Programme

Tape (B): Quasi-complete Programme

** Equipment for Break in Signals
(FSS, Station Sumbol Gen., Test Signal Gen., etc.)

Fig. 4-2

A Model of Concentrated Control System for Jakarta Station



Outline of Control System for Broadcasting Service

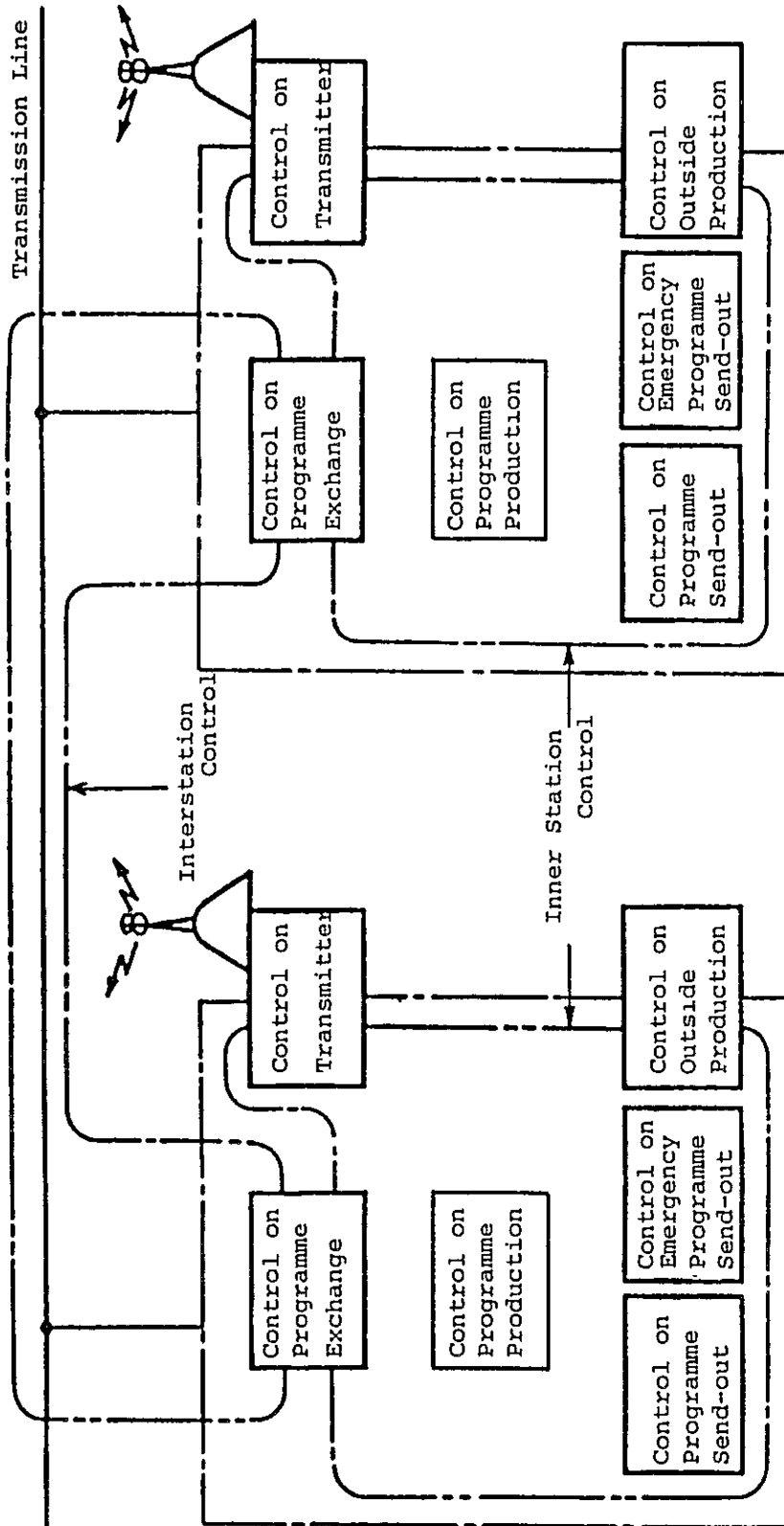
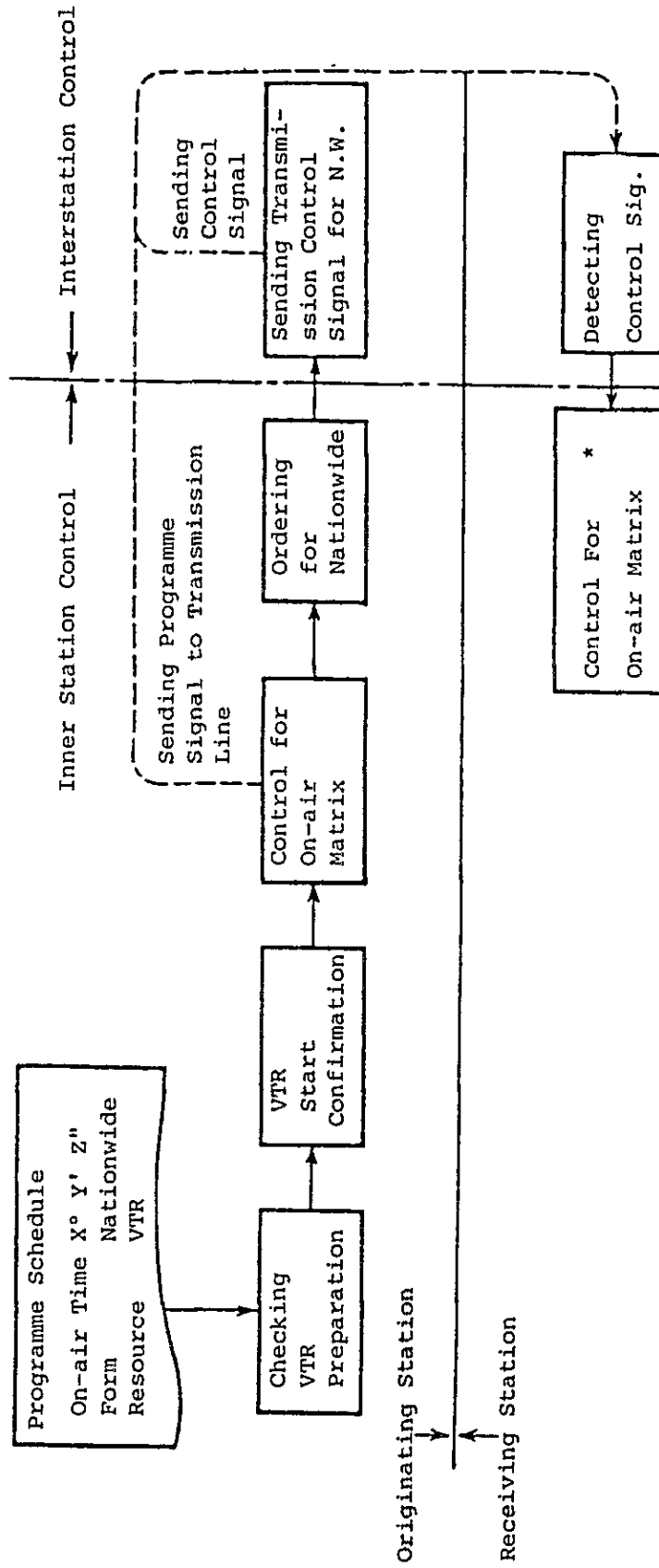


Fig. 4-4

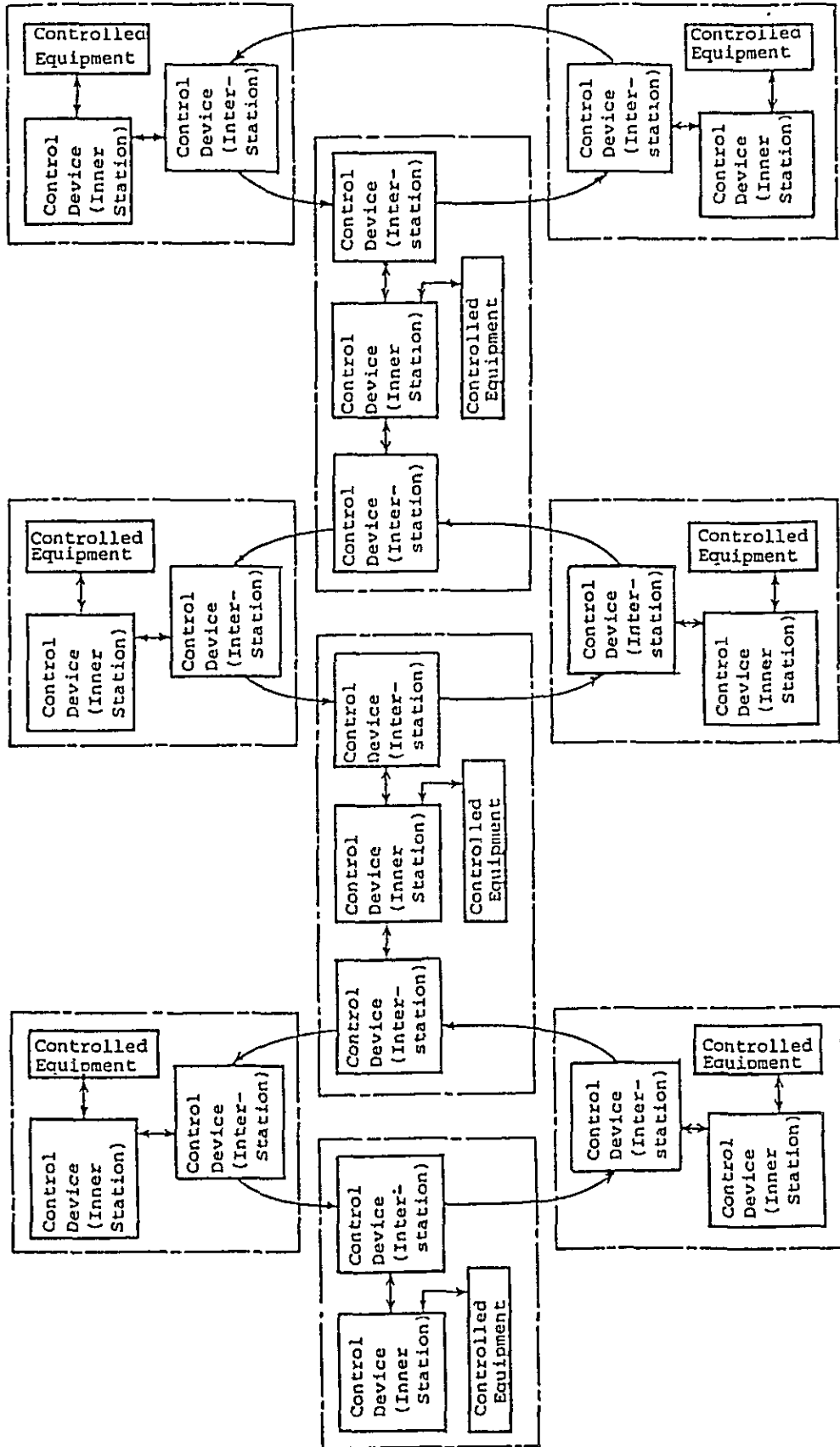
Control Sequence for Nationwide Broadcasting Service



Transmission line is connected with transmitter.

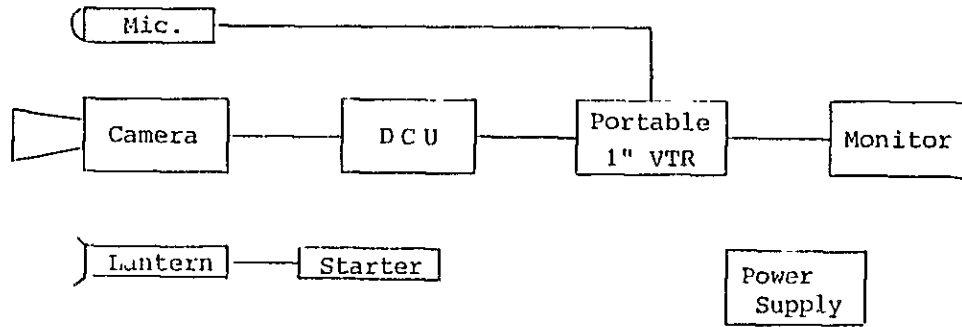
Fig. 4-5

Relation Between Control for Inner Station and Interstation

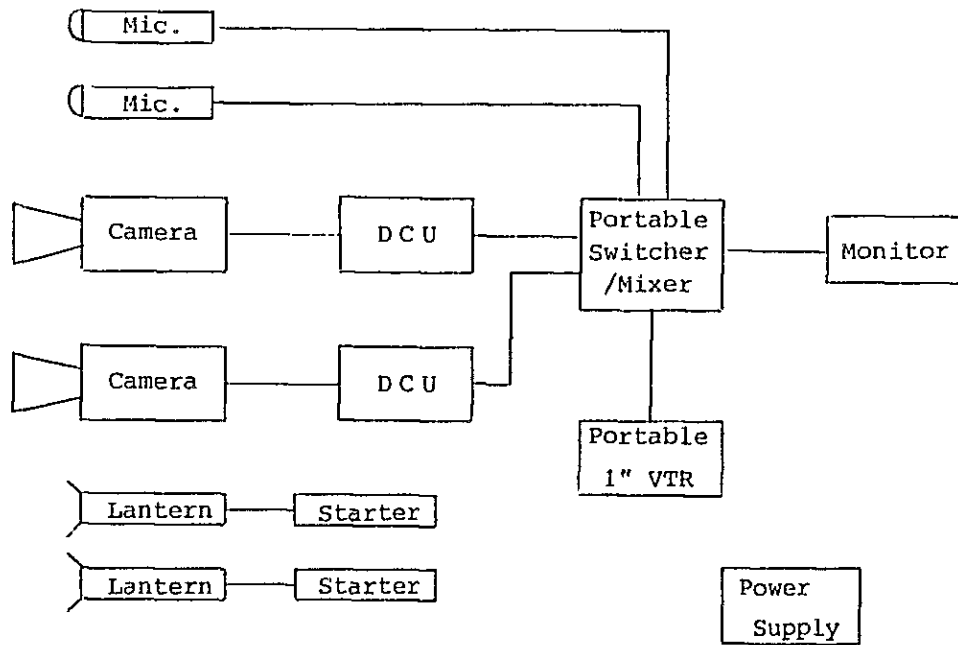


Typical EFP System

(1) Single Camera System



(2) Plural Camera System



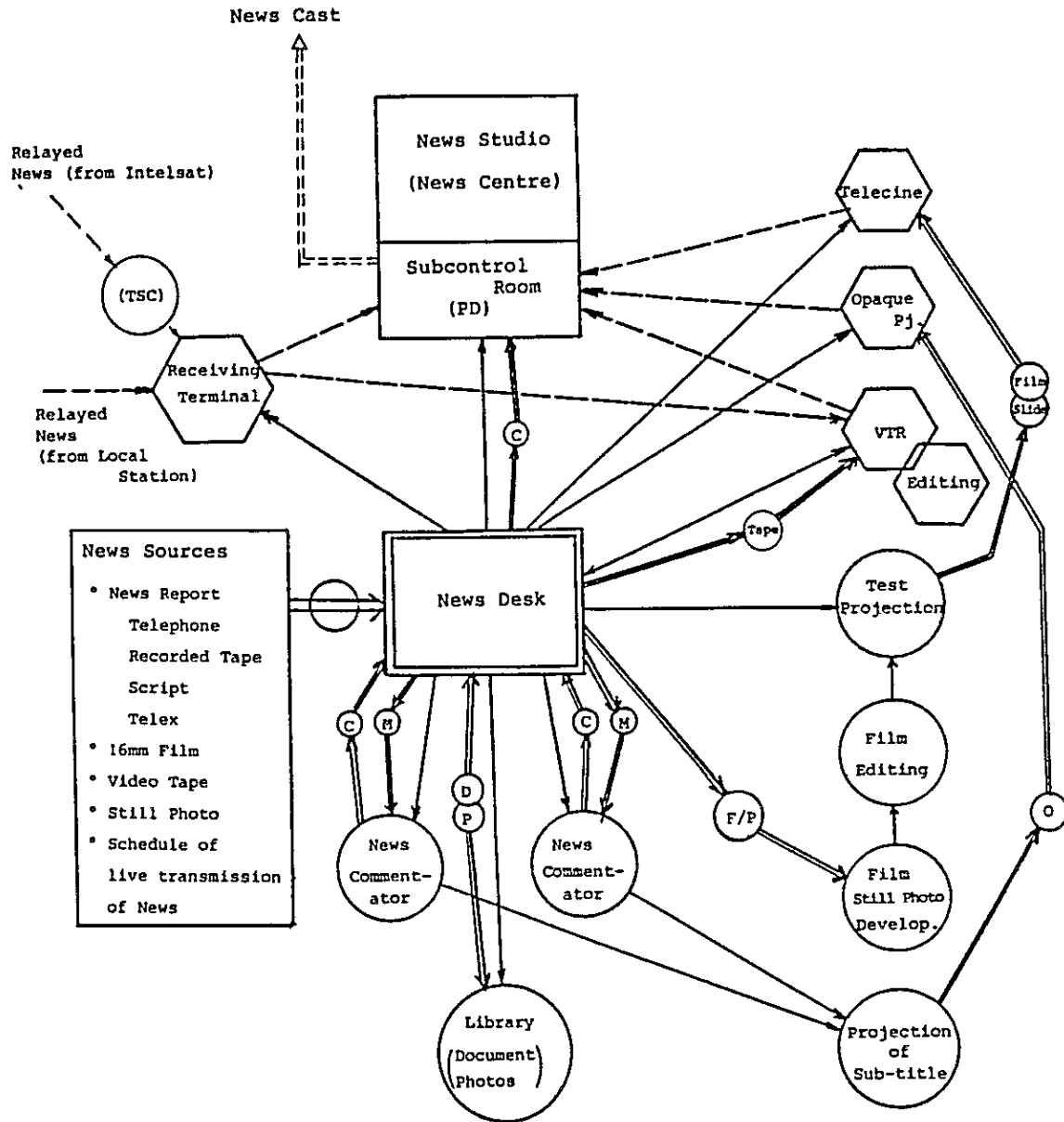
DCU : Digital Command Unit

Lantern : High efficacy and colour rendering discharge lamp

Power Supply : City source, Portable engine generator or battery

Fig. 4-7

News Centre and Peripheral Facilities



Legend: —→ Flow of order, direction
 ---→ Flow of signal
 ≡→ Flow of materials
 (M) Manuscript (F/P) Film, Photo
 (C) Comment (O) Opaque card
 (D) Document

Table 4-1

Remotely Controlled Items from Subcontrol Room for Concentrated Equipment

Equipment	Item
Camera Control Unit Blanking Switcher Mixer-Keyer Special Effect Generator Chroma Keyer	Iris, Master Pedestal, Preset Pedestal, Colour Painting Selection of Cross Point Mode (Mixing, Keying), Level Selection of Waveform, Position Hue (Rough, Course), Stretch
VTR Telecine	Start, Stop, Mode (Rec., Play, Fast Forward, Rewind) Shatter on-off, Start, Stop, Mode (Forward, Reverse)

Table 4-2

Number of Radio Studio in Each Station

Station	End of the 4th 5-year Plan		End of the Long Term Plan	
	Stereo- phonic	Mono- phonic	Stereo- phonic	Mono- phonic
Jakarta	5	6	8	15
Nusantara (5)	12	12	15	15
Regional I (26)	52	52	52	52
Regional II (17)	17	30	17	34
Serang*			1	2
Total	86	100	93	118

*Planned Station

Note: Number of stations is shown in the brackets.

Table 4-3

Number of Colour TV Production Studio

Station	End of the 4th 5-year Plan	End of the Long-term Plan
Jakarta	8	15
Medan*	1	2
Palembang**	1	2
Surabaya*	1	2
Yogyakarta**	1	2
Denpasar**	1	2
Samarinda*	0	2
Balikpapan**	1	2
Banjarmasin**	0	2
Ujung Pandang*	1	2
Manado**	1	2
Jayapura*	0	2
Ambon**	0	2
Regional-I (21)	0	20
Total	16	59

Note; * Key Station in the Nusantara area

** Sub-key station in the Nusantara area

Number of stations is in the brackets.

Table 4-4

TV Studio Equipment List

1) Colour Camera Chain	*Remarks
2) Colour Flying Spot Scanner	1 set
3) Video Control Equipment	1 set
4) Microphon with Accessery	1 set
5) Audio Control Equipment	1 set
6) Audio Tape Recorder/Reproducer	2 sets
7) Disc Player	2 sets
8) Monitoring Equipment	1 set
9) Lighting Equipment	1 set
10) Studio Intercom Equipment	1 set
11) Others	1 lot

* Remarks

	Studio Area		
	100m ² or less	100 - 400m ²	400m ² or more
Q'ty of Camera Chain	2	3	4

Equipment List of Outside Broadcast Van

(1) Colour Camera Chain	4 sets
(2) Portable Colour Camera Chain	1 set
(3) Colour Flying Spot Scanner	1 set
(4) Video Control Equipment	1 set
(5) Microphone & Accessary	1 set
(6) Audio Control Equipment	1 set
(7) Portable Audio Tape Recorder/Reproducer	1 set
(8) Monitoring Equipment	1 set
(9) One-inch VTR	1 set
(10) FPU Transmitter	1 set
(11) VHF Communication Equipment	1 set
(12) Intercom Equipment	1 set
(13) Vehicle	1 set
(14) Engine Generator	1 set
(15) Others	1 lot

Table 4-6

Number of Outside Production Facility

Station	OB Van	MPU	EFP	ENG
Jakarta	4	3	5	16
Medan	1	1	1	3
Palembang	1	1	1	3
Regional-I		7		7
Regional-II			2	2
Surabaya	1	1	1	3
Yogyakarta	1	1	1	3
Denpasar	1		1	3
Regional-I		3		3
Regional-II			7	9
Samarinda	1	1	1	2
Balikpapan	1	1	1	1
Banjarmasin	1	1	1	2
Regional-I		2		2
Ujung pandang	1	1	1	3
Manado	1	1	1	3
Regional-I		5		5
Regional-II			1	1
Jayapura		1	2	2
Ambon		1	2	2
Regional-I			3	2
Regional-II			1	6
Total	13	31	31	83

Facilities for News Centre

News Studio	Studio Camera Chain Lighting System Mictophon Monitoring Equipment
Subcontrol Room	Video Control Equipment Lighring Control Equipment Audio Control Equipment Monitoring Equipment
	Telecine Chain Playback VTR FSS Video Typewriter Character Generator Frame Synchronizer Audio Tape Recorder/Reproducer
Receiving Terminal	Television Standard Converter Input Switching Equipment Monitoring Equipment Recording VTR
Peripheral Equipment	Film Processor Film Editor Tape Editor Test Projector
News Gathering Equipment	ENG System Movie Film Camera

Table 4-8

Number of Recording/Reproducing Facility

Station	VTR *	Telecine	Film Processor
Jakarta	25/8**	6/2	3
Medan	5	2	1
Palembang	5	2	1
Regional-I	14		
Surabaya	5	2	1
Yogyakarta	5	2	1
Denpasar	5	2	1
Regional-I	6		
Samarinda	5	2	1
Balikpapan	3	1	
Banjarmasin	5	2	1
Regional-I	4		
Ujung Pandang	5	2	1
Manado	5	2	1
Regional-I	10		
Jayapura	5	1	1
Ambon	5	1	1
Regional-I	7		
Total	132	28	14

* Stationary VTR

** 25: for production, 8: for transmission

CHAPTER 5 SITE PLAN

CHAPTER 5 SITE PLAN

5-1 Preparatory work for the Site Plan

On the occasion of making the plan of the station arrangement including establishment of the stations newly and increasing of the power which are to be progressed within the period of the long-term plan regardless of each kind of broadcasting medium of the medium wave, short wave, FM and TV, to advance the work, according to the following order is appropriate.

(1) Selection of the promising site for the construction of new transmitting

Deppen have to collect and compile the most up-to-date site planning data for the purpose of expansion or improvement of the present service area provided by existing transmitting stations or setting up of new station as a series of the DEPPEN's mission.

A ledger of transmitting facilities together with the up-to-date records on the receiving conditions the up-to-date records on the receiving conditions in each service area should be provided as one of the basic materials to be used for completing the site planning.

(2) Treatment for the demand on station arrangement

It is often encountered that the petition or request to set up a new transmitting station to improve the receiving condition in the specific broadcasting service area are proposed by such a person who is quite outside of DEPPEN as local Governor or Mayor of local city.

In response to these petitions, DEPPEN should mention some opinion on the petition such as-

- a. The petition should be accepted and any other necessary action should be taken by DEPPEN to cope with the petition.
- b. Ranking of priority order should be made clear in the light of the priority order properly arranged by the Deppen.

When it is concluded that the petition should be accepted by Deppen, it will be necessary to study in comparison with the Deppen's own plan on the location of proposed transmitting site and its intended service area and on the reason why new broadcasting station will become necessary to be set up. And furthermore, it is needed to select the best solution to meet with the criteria of economical assessment and to satisfy the expected effectiveness of the plan. The items to be studied will be as follows;

- a. What kind of mass media will be the most suitable for responding the petition.
- b. Is it possible to cope with the petition by reinforcing or modifying the existing transmitting facilities such as transmitting frequency, broadcasting hours or programmes, increasing transmitting power output, improvement of antenna system and so on.

When it is made clear that the construction of a new transmitting station will be the best solution, then it is necessary to check whether the new requirement is already included in the Deppen's original plan or not.

If the new site plan requested by the petition is not included in the Deppen's original plan, it is necessary to choose the most suitable system and size of the station by checking the following items;

- a. Cost effectiveness of the station (ratio of construction cost per population included in the intended service area).
- b. The degree of relative difficulty of constructional work or operation and maintenance service.
- c. The possibility of assignment of proper frequency
- d. Method of programme supply
- e. and others

5-2 Basic Data and information

As one of the series of process required when preparing site plan for the new broadcasting station or carrying site plan for the new broadcasting station or carrying out the countermeasure to petition, the following nationwide basic data and information should be collected and compiled beforehand.

- (1) Location of existing (including under construction) transmitting station - latitude, longitude and height above sea level

- (2) Data on the transmitting facilities -
 - a. transmitting frequency
 - b. power output of transmitter - nominal & actual
 - c. antenna system -
 - i) for MW transmitting station :
 - height of antenna
 - earth mat
 - feeder system
 - ii) for SW transmitting station :
 - antenna system
 - height of radiator
 - orientation of antenna system
 - feeder system
 - method of feeding
 - earth mat
 - iii) for FM & TV transmitting station :
 - height of centre of radiators (above ground)
 - antenna system
 - antenna gain (ERP)
 - radiation pattern (horizontal & vertical)
 - feeder system
 - d. Power supply system
 - e. Operation mode
 - attended operation (shift mode)
 - unattended operation
(method of control & supervision)
 - f. Maintenance system

- (3) Situation of the service area
- a. limit of service area
 - b. main cities, towns or villages within the service area
 - c. receiving conditions at typical points :
 - signal strength, interference, signal stability, noise etc.
 - i) for MW. SW broadcasting service :
 - early morning, day time, evening & night
 - ii) for FM, TV broadcasting service :
 - day time & night time
 - d. Popularization of receiving set :
 - i) receiving facilities in public places such as community hall, local governner's office
 - ii) kind of receivers
 - iii) number of receivers per 1.000 families
 - e. Future improvement plan or request

Compilation of ledger on the present condition of broadcasting service should be revised time to time according to the change of existing stations.

As these materials listed up in 5-2 will become useful basic data when preparing the future site plan, contents of ledger should cover all existing transmitting stations with the same level of accuracy and the data in the ledger should be kept up-to-data by revising the ledger based on the report of modification of transmitter, change of frequency, change of interfering conditions caused by other stations and so on which is sent from local station.

At least 5 copies of such ledger should be completed for the use of the following offices:-

- one copy - head office of DEPPEN
- one copy - planning department
- one copy - RRI head office or TVRI head office
- one copy - Nusantara station
- one copy - respective local station

A sample format of such ledger will be as follows:

Items to be listed up in Transmitting station Ledger

Card Number:-

1. Serial Station Number:-
2. Name of Station:-
3. Class of Station:-
4. Location of Station:-
 - 4-1 Latitude-
 - 4-2 Longitude-
 - 4-3 Altitude-height above sea level
5. Name of nearby city:-
6. Transmitter
 - 6-1 Operating Frequency:-
 - 6-2 Power Output: - Nominal power/actual power
 - 6-3 Model:-
 - 6-4 Manufacturer:-
 - 6-5 Year of installation:-
 - 6-6 Year of modification or repair:-
7. Feeder System
 - 7-1 Type of feeder: - 7-11 coaxial
7-12 open wire
7-13 parallel
 - 7-2 Impedance
 - 7-3 Size of Cable
 - 7-4 Length of feeder
 - 7-5 Height above ground
8. Antenna System
 - 8-1 ATU (antenna tuning unit or impedance matching network)
 - 8-2 Antenna Type:-
 - 8-3 Polarization:-
 - 8-4 Height above ground:-
 - 8-5 Antenna Gain:-
 - 8-6 Directivity:-
 - 8-7 Tower Construction:-
 - 8-9 Tower support: - 8-91 self support
8-92 guyed

9. Earthing

9-1 Radius of earth mat (or size of earth mat):-

9-2 Number of earth lines:-

9-3 Depth of earth mat:-

10. Power Supply System

10-1 City Power: - 10-11 Voltage
 10-12 Cycle
 10-13 Phase
 10-14 Number of lines

10-2 Emergency Power Supply: -

10-21 Capacity
10-22 Voltage
10-23 Cycle
10-24 Phase
10-25 Engine
 -25-1 Diesel
 -25-2 Gasoline Engine
 -25-3 Turbine
10-26 Horse power
10-27 Revolution

11. Operation Mode

11-1 Attended Mode:- 11-11 Shift mode
 11-12 Total number of staff
 11-13 Number of staff in each shift

11-2 Unattended Mode:-

11-21 Control system
11-23 Place of control/supervision
11-24 distance between Tx & control

12. Maintenance System

12-1 Place of Office in charge of maintenance:-

12-2 Frequency of periodical maintenance service:-

Report Form of Reception Condition

1. Signal Source
 - 1-1 Name of Transmitting Station
 - 1-2 Transmitter (Card No.)
 - 1-3 Frequency/wave length
 - 1-4 Power Output (actual)
 - 1-5 Antenna System
 - 1-6 Operating Hour (time table)
 - 1-7 Station Identification (Call sign)
 - 1-8 Programme Schedule (weekly programme schedule)

2. Record of Reception Conditions
 - 2-1 Place of Receiving set
 - 2-2 Name of reporter
 - 2-3 Sex & age of reporter
 - 2-4 Type of Receiver
 - 2-5 Type of receiving antenna
 - 2-6 Location of reception:- indoor/outdoor/open field
 - 2-7 Receiving condition
 - (1) Date of reception
 - (2) Time of reception
 - (3) Signal strength
 - (4) Interference
 - (5) Noise
 - (6) signal stability
 - (7) Overall evaluation
 - (8) Outline of received programme

5-3 Basic Principle of Site Plan

To make radio and TV broadcasting can always be received at any region throughout the country in the best quality any time is a target of the radio and tv integrated development long-term plan.

To reach that target, the construction of the station should be promoted effectively and economically according to the following policy for each service medium.

(1) Medium wave broadcasting service

Radio broadcasting service in the early stage of Indonesia had been promoted by use of short-wave transmitter. Because, the short-wave broadcasting service is capable of covering the wider area by small number of station, it has shown remarkable effect in the conveyance of the information in the early stage of the radio broadcasting. However, according to gradual up-rising of nations various request toward the broadcasting programme, emphasis was put on the needs of the service which enables to receive in better sound quality and stable receiving condition without noise.

Originally, since the shortwave broadcasting had mainly been conducted in dependent on the sky wave propagation which is produced at the ionosphere, arriving signal strength not only changes in accordance with the Interference Fading, Polarization Fading and Absorption Fading all of which is generated in the process of the ionospheric propagation.

Therefore those factors hinder the stable and undistorted broadcasting service. Thus, it is not easy to keep satisfactory broadcasting service only by shortwave broadcast.

To improve this, construction of the medium-wave station has been carried out along with the short-wave broadcasting service in order to spread the stable broadcasting service throughout the nation by use of medium-wave transmitter.

At present, 12 stations out of 49 RRI stations have no medium-wave transmitter, however, within the period of the 4th and 5th 5-year plan, those 12 stations are to be arranged with medium-wave transmitter.

In succession to these installation, new medium-wave radio transmitting stations will be constructed at the pace of 5 to 7 stations a year in order to expand the broadcasting service area

up to the nationwide, and by 2000, more than 98 additional medium-wave radio stations will be constructed newly.

Concerning to the size of those newly built medium-wave stations, 1 to 10 kW unattended station will be constructed so as to be able to cover the relatively limited area (radius of 30 to 50 km) centring the local city. Site location for these new station are selected as shown in Fig. 5-1, Table 5-1 and 5-2 in consideration of the situation of the signal distribution of the existing station and the priority order of the station construction schedule in consultation with the degree of demand of the regional inhabitants, administrative importance, cost effectiveness of the new station and favourability of location, etc.

Construction schedule of medium wave transmitter for RN-II service begin with the installation at Nusantara stations and then go to regional stations and at the end of 5th 5-year plan. RN-II service will be able to carry out at 49 existing RRI stations. Furthermore, 95 stations in total will have medium wave transmitter for RN-II service at the end of long term plan period as shown in Table 5-2.

(2) Short-wave broadcasting service

Until medium-wave broadcasting is completely spread throughout the nation, the construction of the small sized medium-wave station should be continued even after the end of 6th 5-year plan, therefore, short-wave broadcasting service should also be continued to supplement the MW radio broadcasting service.

On the other hand, Kalimantan and Irian Jaya region are sparsely populated areas and the inhabitants in Nusantenggara and Maluku regions are scattered into many islands. For those regions.

It is considered as rather appropriate to adopt temporarily short-wave broadcasting system which can distribute signal effectively over such diverged area.

Based on the basic policy that makes medium broadcasting service as a trunk and short-wave broadcasting service as a supplementary and by looking over again the present situation of short-wave radio transmitting facilities, gradual progress of the removal of short-wave broadcasting facilities service according to the superannuation should be carried out at the regions where the degree of the necessity of short-wave broadcasting service will be lowered because of the advancement in the construction of medium-wave broadcasting facilities. And as mentioned before, allotment of the usable frequency should be made only to the regions where the short-wave broadcasting service is strongly needed and arrange there the short-wave broadcasting facilities in priority. Besides, by selecting antenna system which has the most appropriate radiation characteristics and by making decision of the most suitable transmitting power output, etc. considering the shape of the service area and the relative location of station to its service area, a plan should be made so as to distribute signal efficiently by the least investment to the equipment.

In general, in the case of the short-wave broadcasting station for the domestic service, high angle radiation antennas are usually selected to distribute the broadcasting signal to the area around the locality of the station. However, at many regional stations in Indonesia, simple half-wave length dipole antennas are generally used. In this case, if the antenna height above ground is large, elevation angle of the vertical directivity is low, therefore the signal reflected at the ionospheric layer comes back to far distant point on the surface of the earth where is far away from the desired service area. for this reason, only weak signal is distributed consequently over the service area of the station.

In order to improve this, firstly the situation of the signal distribution of the existing station should be surveyed in detail and the relation between existing antenna system and their signal distribution should be clarified and several typical antenna systems as shown in Fig. 5-2 should be selected.

And when new short-wave station is constructed, one of the standard antenna systems should be applied so as to be able to get proper signal dissemination.

By doing so, construction of the short-wave station will become simple and ease and furthermore wasteful distribution of the broadcasting signal can be prevented in advance.

Fig. 5-2 shows several model of shortwave transmitting antenna for short distance broadcasting service.

(3) FM Broadcasting Service

FM broadcasting has an advantage of good sound quality than AM broadcasting and can easily deliver the stereophonic broadcasting service. Moreover, it can produce relatively wide service area even by relatively small transmitting power output because it can use high-gain transmitting antenna, and moreover, by utilizing the directional antenna interference to the other stations can be prevented in advance. Therefore, conditions of the location for the new FM station are largely moderated by these reasons. Accordingly, it is supposed that FM broadcasting will be more and more widely utilized as the future sound broadcasting service.

Basic difference between FM broadcasting and AM broadcasting is shown in Table 5-3. Useable number of channel on VHF band for the FM broadcasting is 101 in Indonesia.

In the case of the FM broadcasting, since there is no remarkable difference in the characteristic of signal propagation between the day time and the night time opposite to the case with the medium-wave broadcasting. Therefore, stable sound broadcasting service can be secured except for the special case of the abnormal propagation caused by the occurrence of the sporadic E layer, if appropriate frequency allocation plan is made at the time of making a site planning.

Now, if it is set that he dimensions such as

transmitting power	: 10kW
antenna height	: 150 metre
antenna gain	: 4 dB

are given to the representative high-power FM transmitting station, the radius of the contour of 54 dB/uV/m field strength will be roughly 60 km.

It is necessary to keep interfering signal strength less than 9 dB for protecting wanted co-channel signal, which field strength is 54 dB/uV/m, from the interference.

If the transmitting condition of both FM transmitting station of wanted and unwanted co-channel signal is the same, separation distance between both station should be kept more than 320 km to avoid interference.

Accordingly, if a series of FM transmitting stations are arranged in accordance with the basic rule as shown in Fig. 5-3 to keep the above mentioned basic condition, no interference problems will be occurred.

During the period of the 4th 5-year plan, the plan which build FM station in 39 regions except Jakarta was made, but during the period of the long-range plan, in succession to this, station arrangement at the pace of 7 - 9 stations a year will be promoted and by the construction of 120 stations in total by 2,000, FM network will be able to expand up to the level of 55% population coverage.

In principle the FM stations should be built at the same place of the TV broadcasting station as much as possible. However, if it is difficult to use TV broadcasting station's facilities commonly, station arrangement will be made by selecting the appropriate area within the city or the outskirts of the city. In this case, it is desirable to select a place where commercial power can be utilized and where it is convenient to cover effectively the targeted service area and where the site with needed area to construct the antenna tower of needed height and station building is available.

In the case that commercial power source is available, it is possible to intend reduction in the operation cost by applying facilities which enable the operation.

Site plan of FM station is as shown in Table 5-4.

(4) TV broadcasting service

Low small power TV relay station will be constructed at the pace of 17 stations a year intending for the regions where reception of TV broadcasting signal impossible or the good reception is difficult. The site plan made in consideration of priority order and location condition are listed in Fig. 5-4, Table 5-5 and 5-7 respectively.

Furthermore, renewal of superannuated transmitter at the pace of about 8 stations per year will be carried out to keep the service by existing transmitting facilities and at the same time standby transmitter will be installed at the existing stations where there is no backup transmitter to avoid service interruption caused by transmitter failure.

When renewal of superannuated transmitter operating on Band-I frequency band will be replaced with Band-III or UHF transmitter to prevent harmful interference caused by extraordinary propagation phenomenon on this frequency band.

Since it is predicted that, in the future, allotment of the VHF TV channel will become difficult, for preparation to this, it is necessary to establish the basic rules of the allotment of UHF channels in the nationwide scale.

When preparing the general rules for the UHF channel allocation plan, the following basic conditions were settled.

- 1) Available number of channels in Indonesia will be 49 UHF channels which is similar to the channels allotted to European and African Area where PAL-B or G Standard system are utilized. These channels are as follows;

In Band IV - 18 channels (No.21 - No.38)

In Band V - 31 channels (No.39 - NO.69)

- 2) When planning of UHF channel allocation for Indonesia, the theory of regular networks are applied. This theoretical regular networks are based on the following sense:

- all transmitters are identical: their power and antenna height are the same;
- they are equipped with non-directional antennas;
- propagation is isotropic and independent of frequency, at least within the band to be planned;

- for the purpose of calculating distances, the planning area is assumed to be flat and the population evenly spread over its surface; there are neither political nor natural boundaries.

In those conditions, and provided interference is negligible, the coverage area, i.e., the region where a good reception is achievable with a normal home receiver, is limited by a contour within which the electromagnetic field strength is greater than or equal to the value necessary to obtain a given signal-to-noise ratio.

In the ideal situation described above, this contour is a circle whose radius depends on the type of service and the propagation laws valid for the frequency range considered. If it is desired to cover the whole of the planning area using such circular coverage areas, it is quite obvious that the number of transmitters per unit surface will be minimized if they are situated at the vertices of a lattice of equilateral triangles.

- 3) Now, the parameters of each transmitting station are settled as follows; (Refer to Table 5-6)
 - a. E.R.P. - 100 kW (in Band IV)
 - 300 kW (in Band V)
 - b. antenna height - 300 m
 - c. limiting distance between co- channel stations
 - 350 km
 - d. minimum necessary field strength
 - 65 dB (for Band IV)
 - 70 dB (for Band V)
 - e. then, radius of service area will be about 50 km.

- 4) When distributing such transmitting facilities on each vertices of a lattice of equilateral triangles without causing any co-channel interference, adjacent channel interference or alternate channel interference, the length of each side of triangle will be about 90 km.

- 5) For each transmitting station, two alternate channels are allotted in consideration of future increasing demand of programme service and taking into consideration on the convenience of common use of the same transmitting antenna for two transmitting signals in alternate channel relation. The combination of two alternate channels are grouped into odd channel groups and even channel groups as follows;

Odd channel group Combination of Channels

1	No.21 plus No.23
3	No.25 plus No.27
5	No.29 plus No.31
7	No.33 plus No.35
9	No.37 plus No.39
11	No.41 plus No.43
13	No.45 plus No.47
15	No.49 plus No.51

Even channel group combination of channels

2	No.22 plus No.24
4	No.26 plus No.28
6	No.30 plus No.32
8	No.34 plus No.36
10	No.38 plus No.40
12	No.42 plus No.44
14	No.46 plus No.48
16	No.50 plus No.52

The total necessary number of channels will be 32 channels. The remaining 17 channels should be reserved for allocating to the low power translator stations when it is necessary to set up off-air relay station for the purpose of pocket area filing.

- 6) Typical arrangement of each channel groups are shown in Fig. 5-5. As it is clear in the figure, the distance between co-channel stations such as 1 - 1 or 3 - 3 will be 360 km (90 km X 4) and the distance between adjacent channel stations such as 3 - 4, 5 - 6 will be 180 km. And the distance between alternate or more separated channel stations will be 90 km. Any one station out of stations in alternate channel relation can be moved to

more near location. For instance, group 3 station can be moved to the direction of group 1, 5, 11 or 13 without causing any interferences.

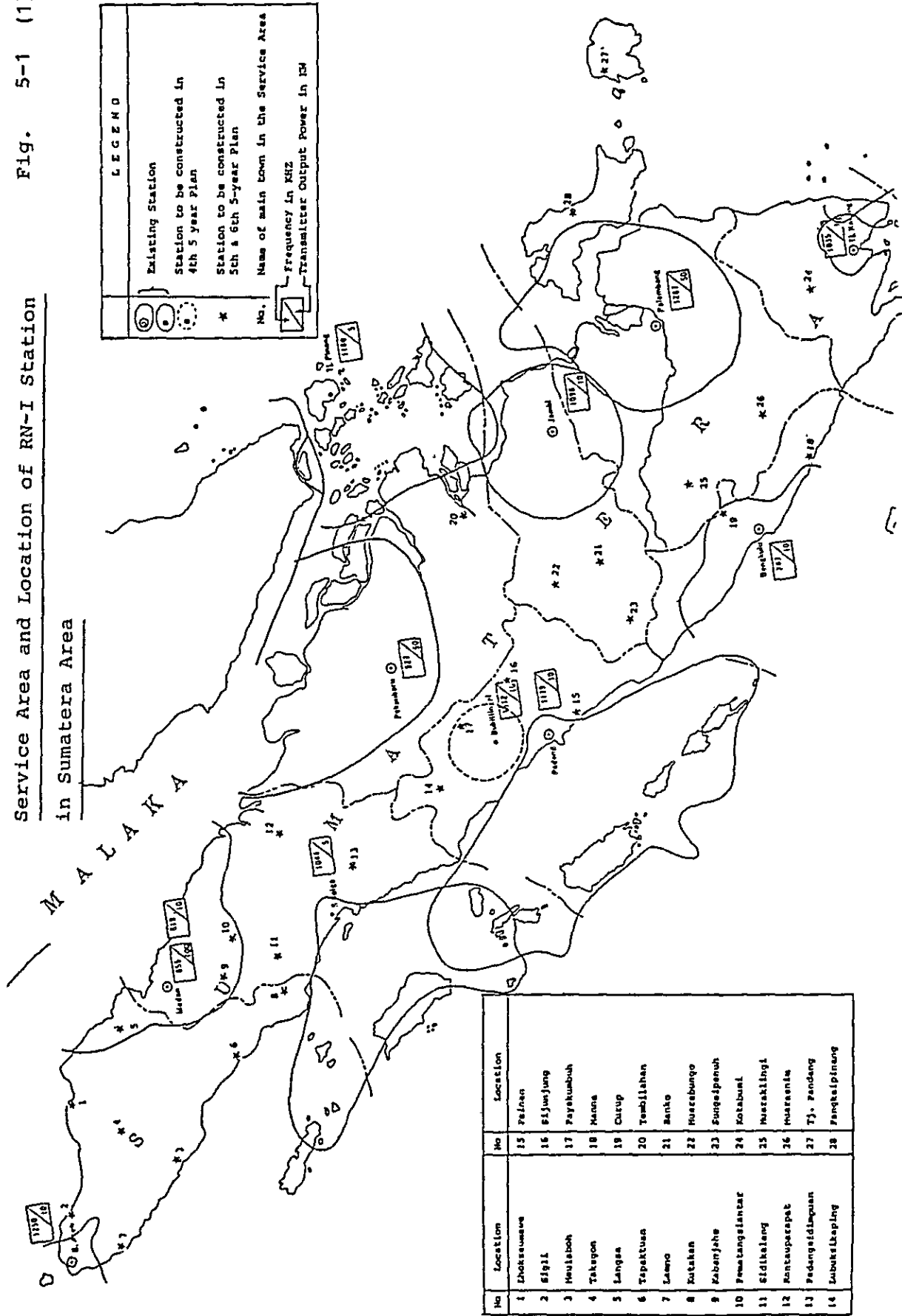
If apply this typical arrangement of the 16 channel groups as shown in Fig. 5-5 to the whole territory of Indonesia, it will be possible to cover the country with good UHF TV signals free from interference and excessive overlap of service area as shown in Fig. 5-6. However, as this is the result of purely theoretical work based on the hypothetical basic conditions, any economical considerations are not taken into the channel allocation plan.

- 7) Additional TV transmitter for the new service of TVN-II based on the long term plan will start from the construction at Ujung Pandang station and its peripheral off-air relay stations, Medan, Surabaya, Yogyakarta, Palembang, Denpasar, Balikpapan, Manado and after that expand to other main cities in the country as shown in Table 5-7 and at the end of long term plan period total of 110 stations will have the second TV transmitting facilities for TVN-II service.

These TVN-II transmitter will be co-site with TVN-I transmitter and so far as feasible antenna system and antenna tower will be shared by both systems in consideration of saving construction cost as well as operation cost.

Service Area and Location of RN-I Station
in Sumatera Area

Fig. 5-1 (1)



Service Area and Location of RN-I
Station in Jawa Area

Fig. 5-1 (2)

No	Location	LEGEND
1	Serang	Existing Station
2	Tasikmalaya	Station to be constructed in 4th 5 year Plan
3	Pekalongan	Station to be constructed in 5th & 6th 5-year Plan
4	Tulungagung	Name of main town in the Service Area
5	Banyuwangi	Frequency in MHz Transmitter Output Power in kW

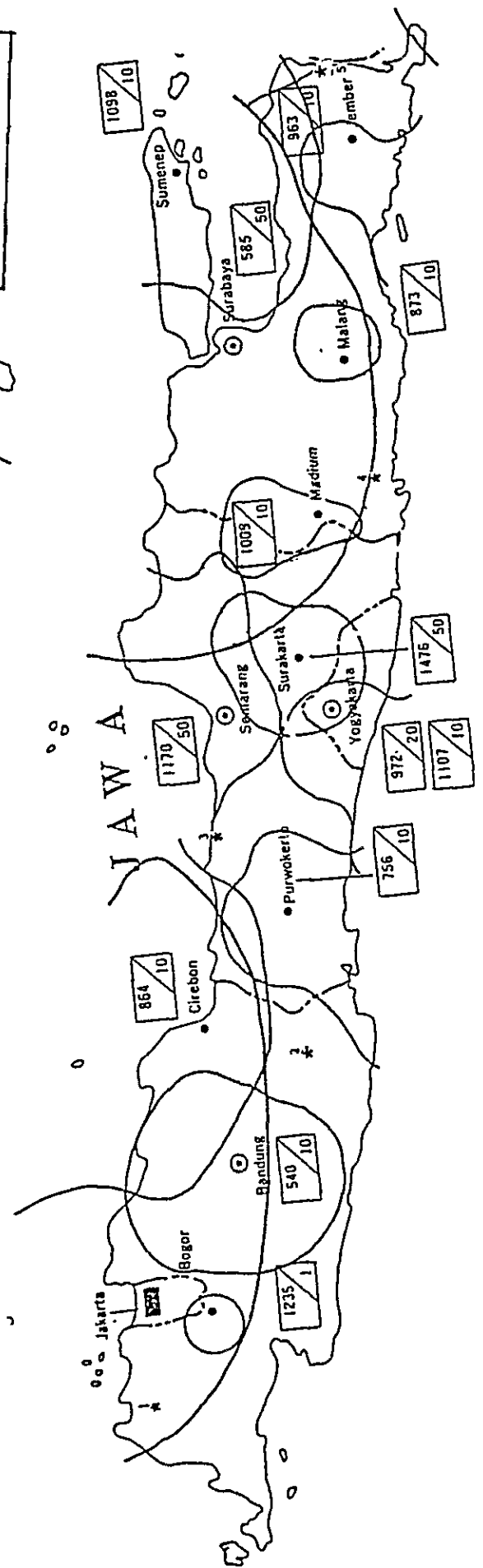
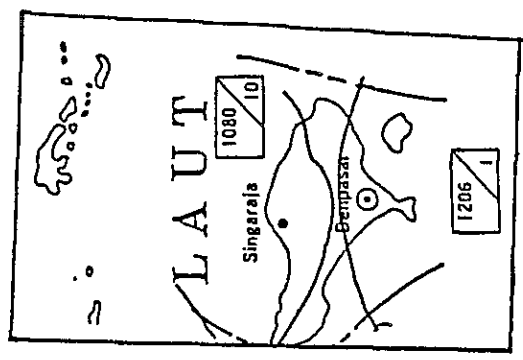
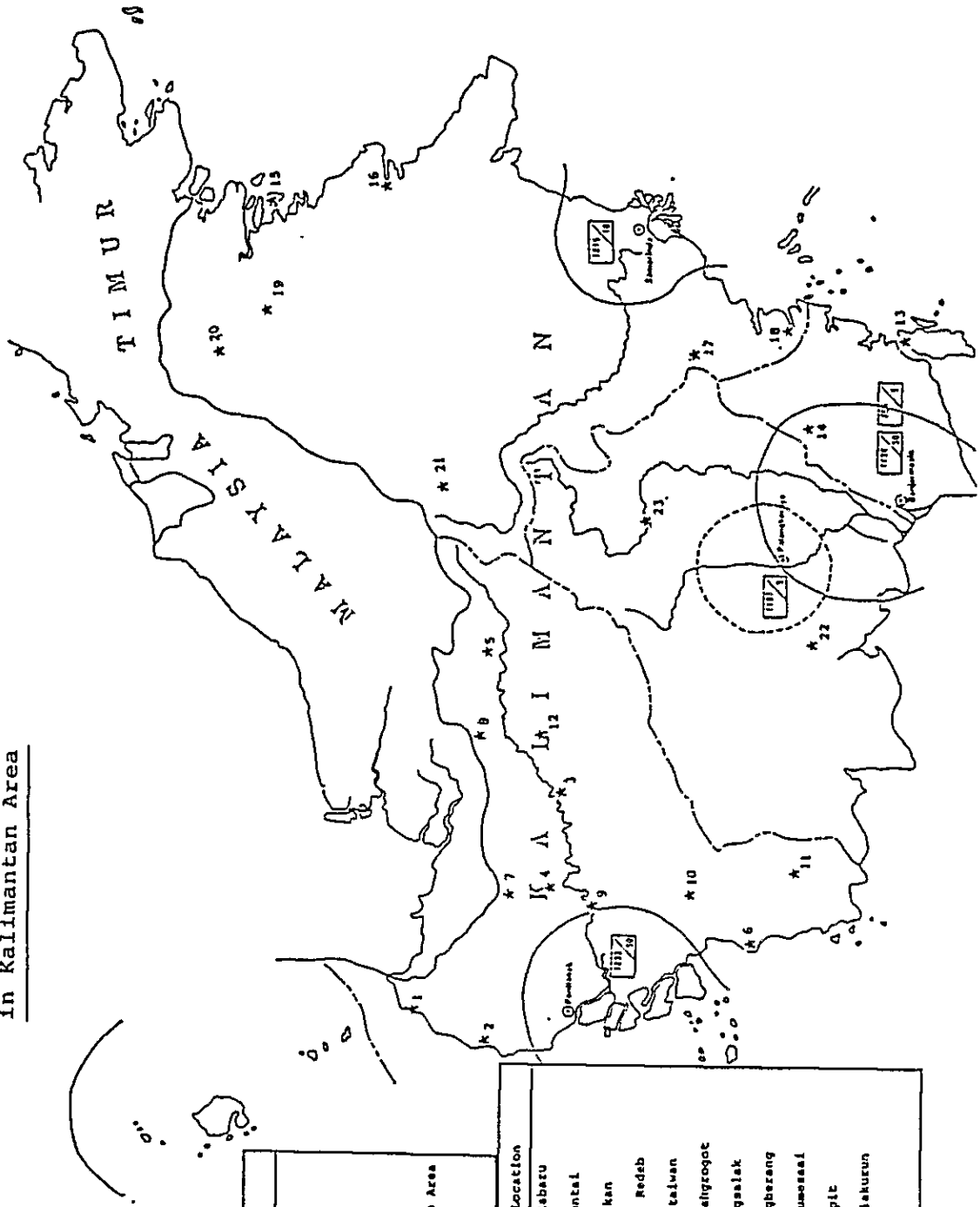


Fig. 5-1 (3)

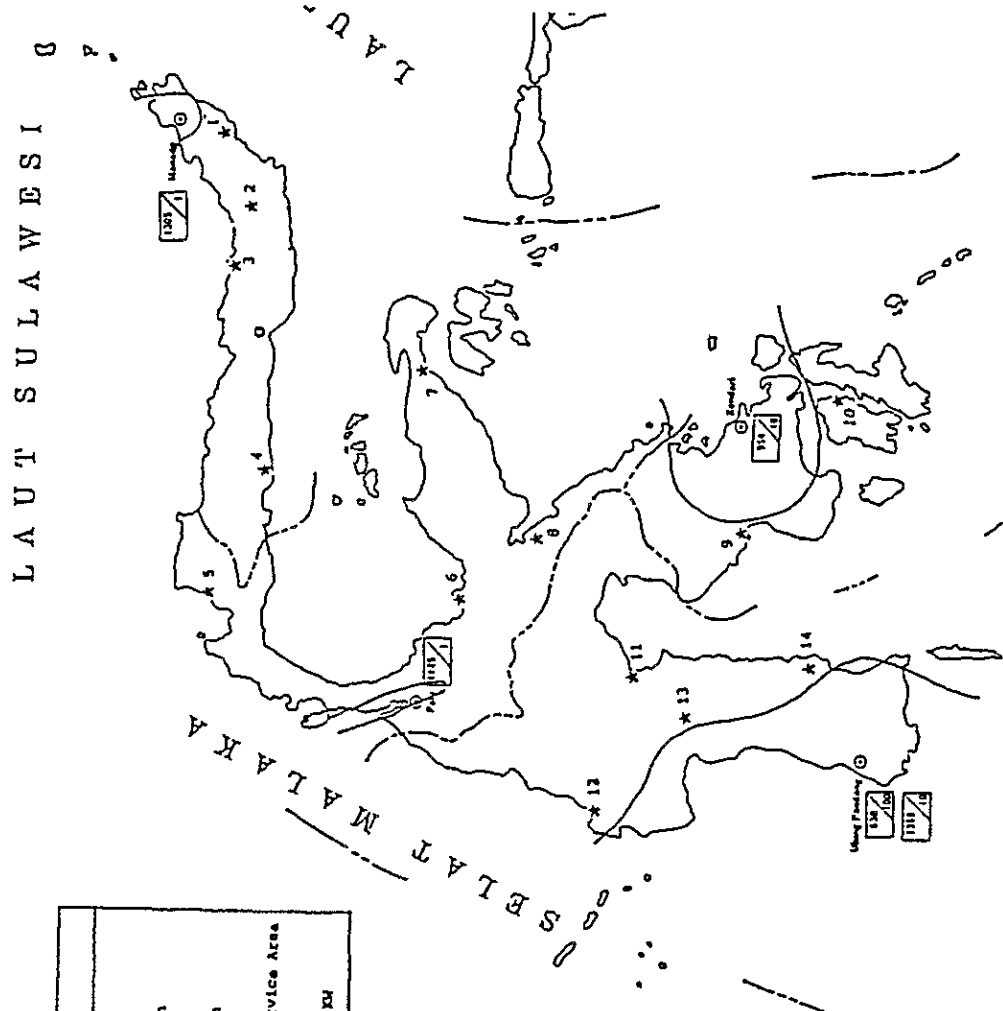
Service Area and Location of RN-I Station
in Kalimantan Area



LEGEND	
	Existing Station
	Station to be constructed in 4th 5-year Plan
	Station to be constructed in 5th & 6th 5-year Plan
*	Name of main town in the Service Area
	Frequency in MHz
	Transmitter Output Power in kW

No	Location	No	Location
1	Liku	13	Kotabatu
2	Singkawang	14	Amuntai
3	Sintang	15	Teakan
4	Kedukul	16	Tj. Redeb
5	Putasibau	17	Muntaiwan
6	Ketepang	18	Tanahroqot
7	Kembayan	19	Congalak
8	Nanghantek	20	Longberang
9	Malau	21	Kubusasa
10	Ackuning	22	Sampit
11	Maseu	23	Xualakuru
12	Hasliato		

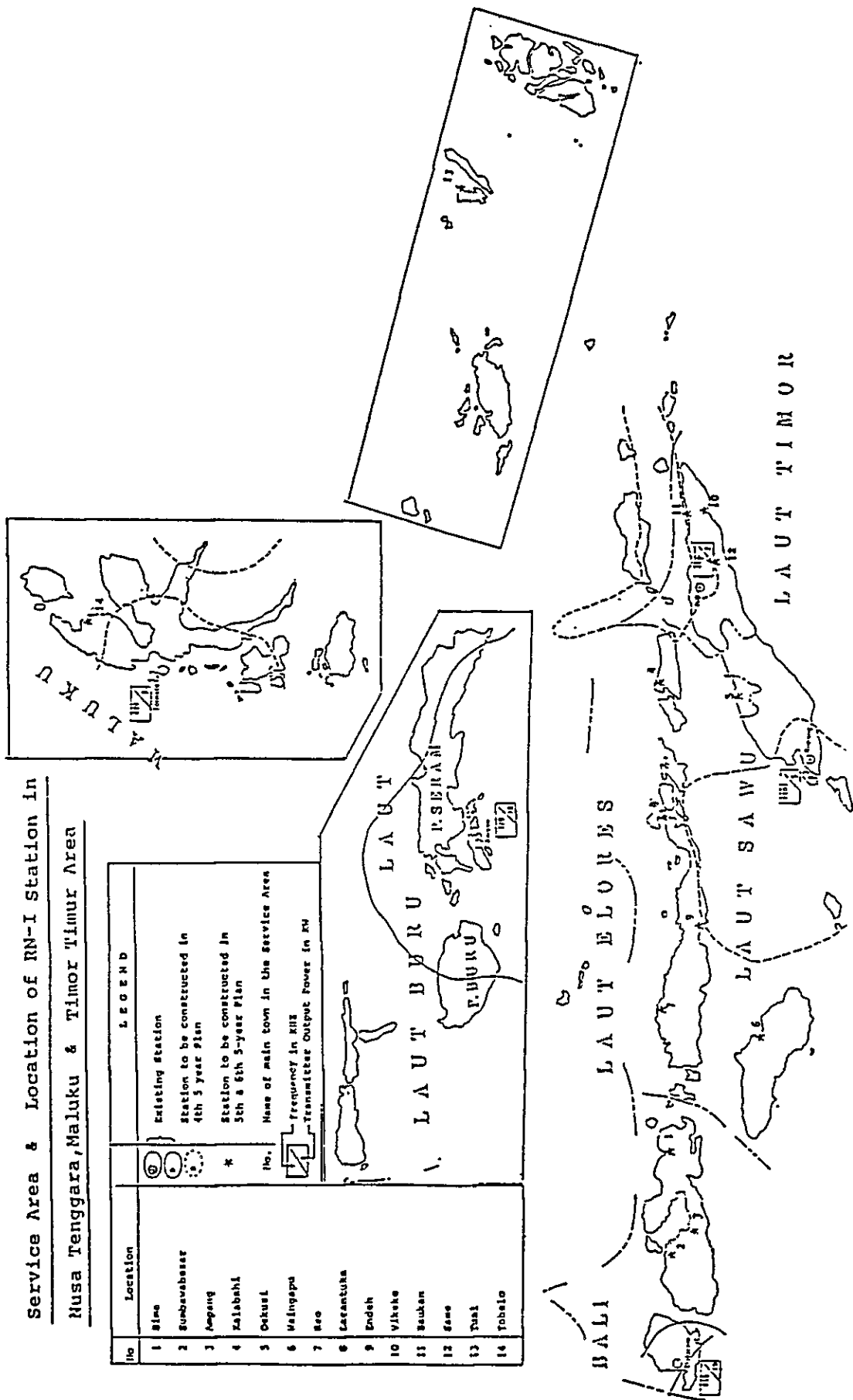
Service Area and Location of RN-I
Station in Sulawesi Area



LEGEND	
	Existing Station
	Station to be constructed in 4th 5 year Plan
	Station to be constructed in 5th & 6th 5-year Plan
	Name of main town in the Service Area
	Frequency in kHz
	Transmitter Output Power in kW

No	Location
1	Tombatu
2	Kotamunbaqu
3	Jj. Binta
4	Marisa
5	Toitotoli
6	Poso
7	Luwuk
8	Tompiza
9	Kolaka
10	Raha
11	Palopo
12	Hamiju
13	Enrekang
14	Matanpono

Fig. 5-1 (5)



Service Area and Location of RN-I
Station in Irian Jaya

Fig. 5-1 (6)

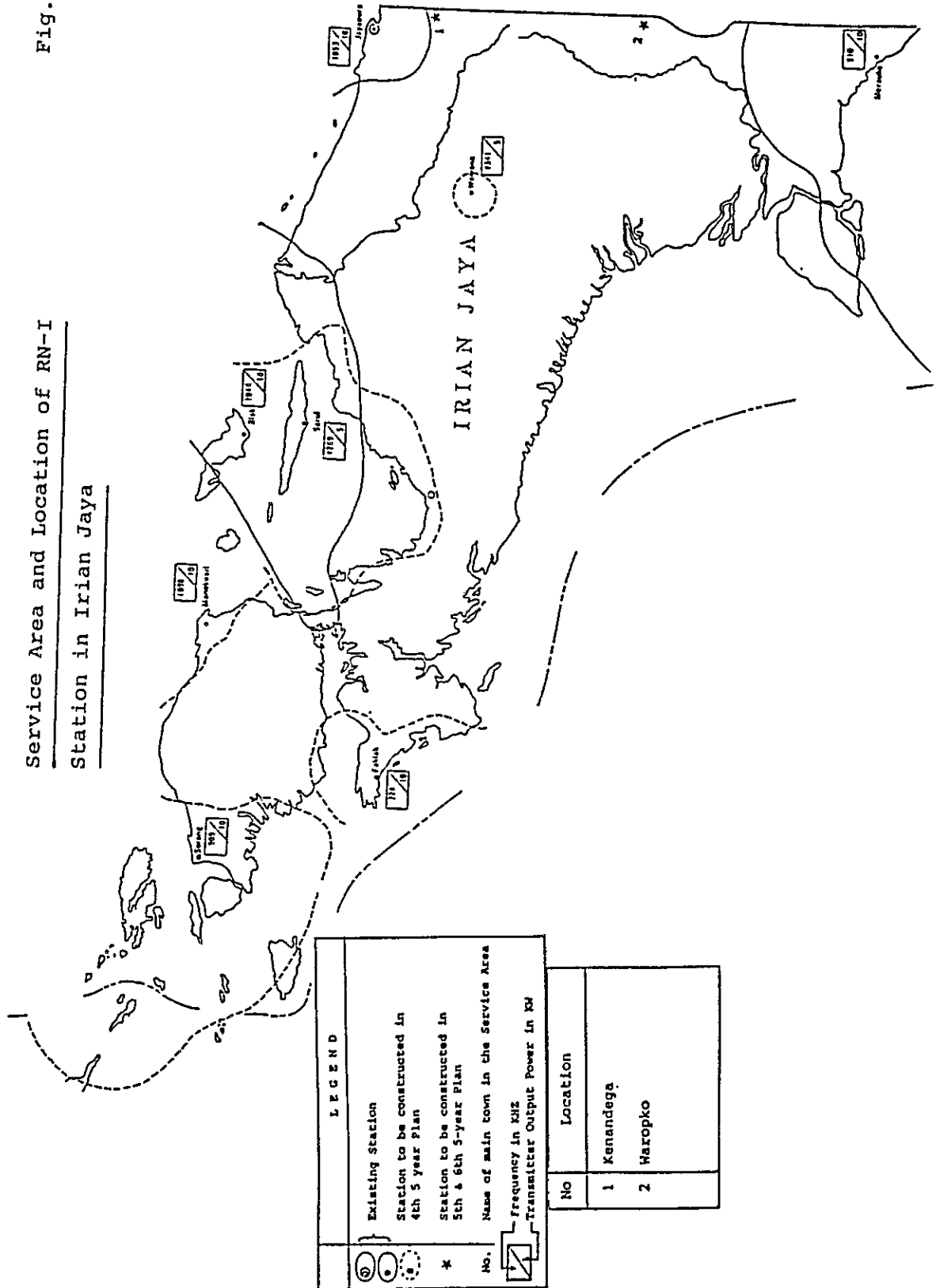


Fig.5-2

VERTICAL RADIATION PATTERN OF TYPICAL SHORTWAVE TRANSMITTING ANTENNA

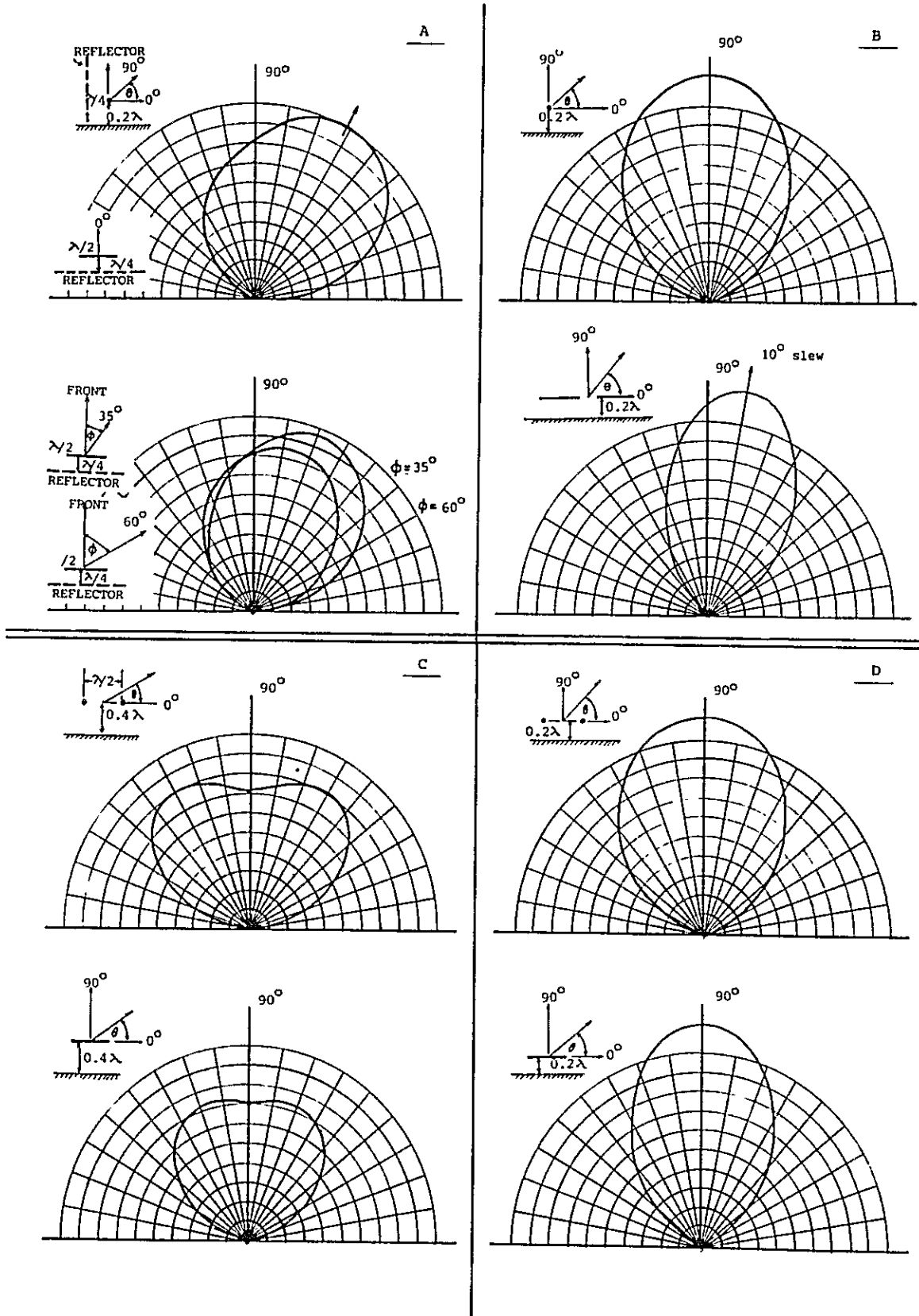
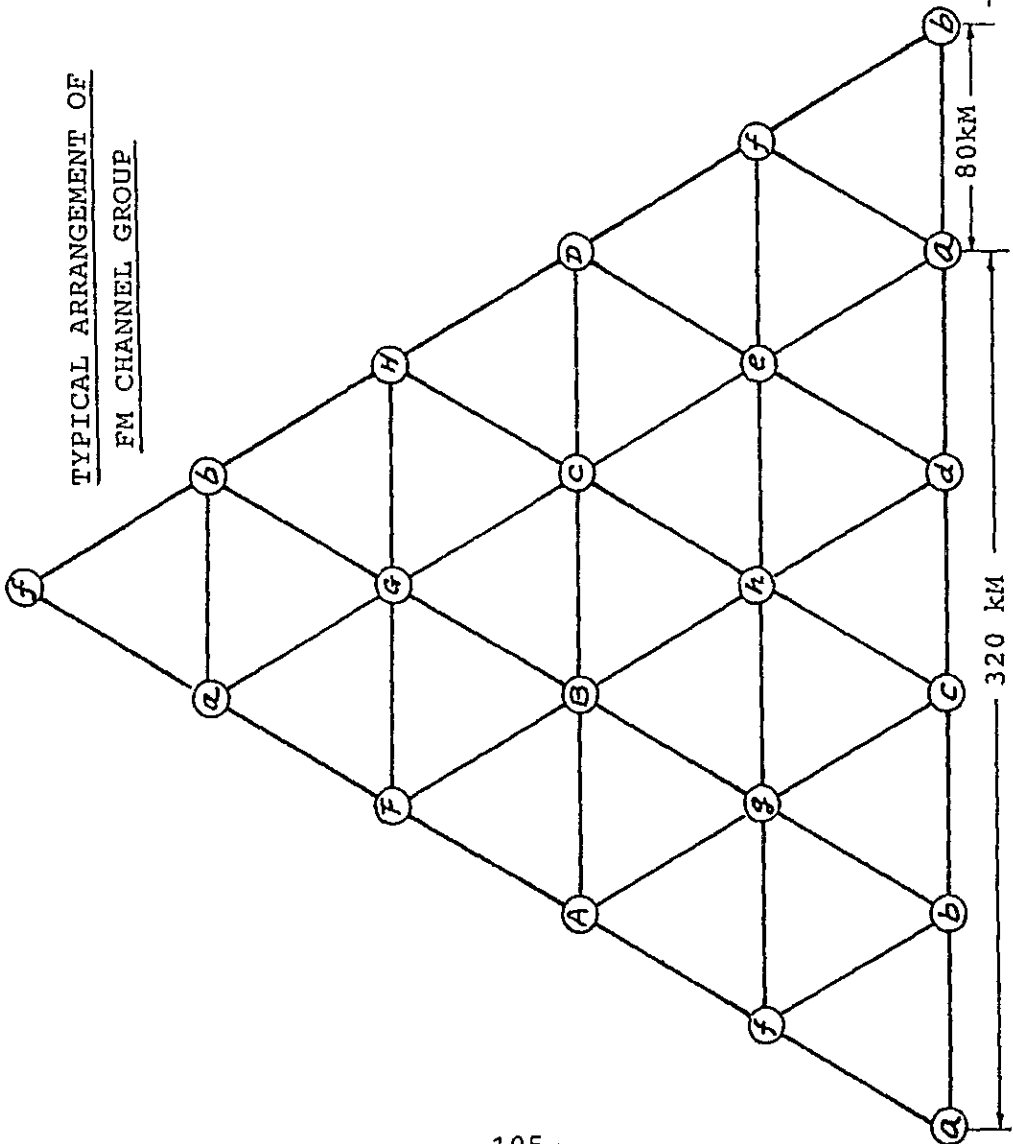


Fig. 5-3

TYPICAL ARRANGEMENT OF
FM CHANNEL GROUP



CHANNEL GROUP FOR EACH SERVICE AREA

CHANNEL GROUP	CHANNEL NUMBER
a	1 - 5 - 9
b	13 - 17 - 21
c	25 - 29 - 33
d	37 - 41 - 45
A	2 - 6 - 10
B	14 - 18 - 22
C	26 - 30 - 34
D	38 - 42 - 46
e	3 - 7 - 11
f	15 - 19 - 23
g	27 - 31 - 35
h	39 - 43 - 47
E	4 - 8 - 12
F	16 - 20 - 24
G	28 - 32 - 36
H	40 - 44 - 48

Service Area & Location of TVN-I Station
in Sumatera Area

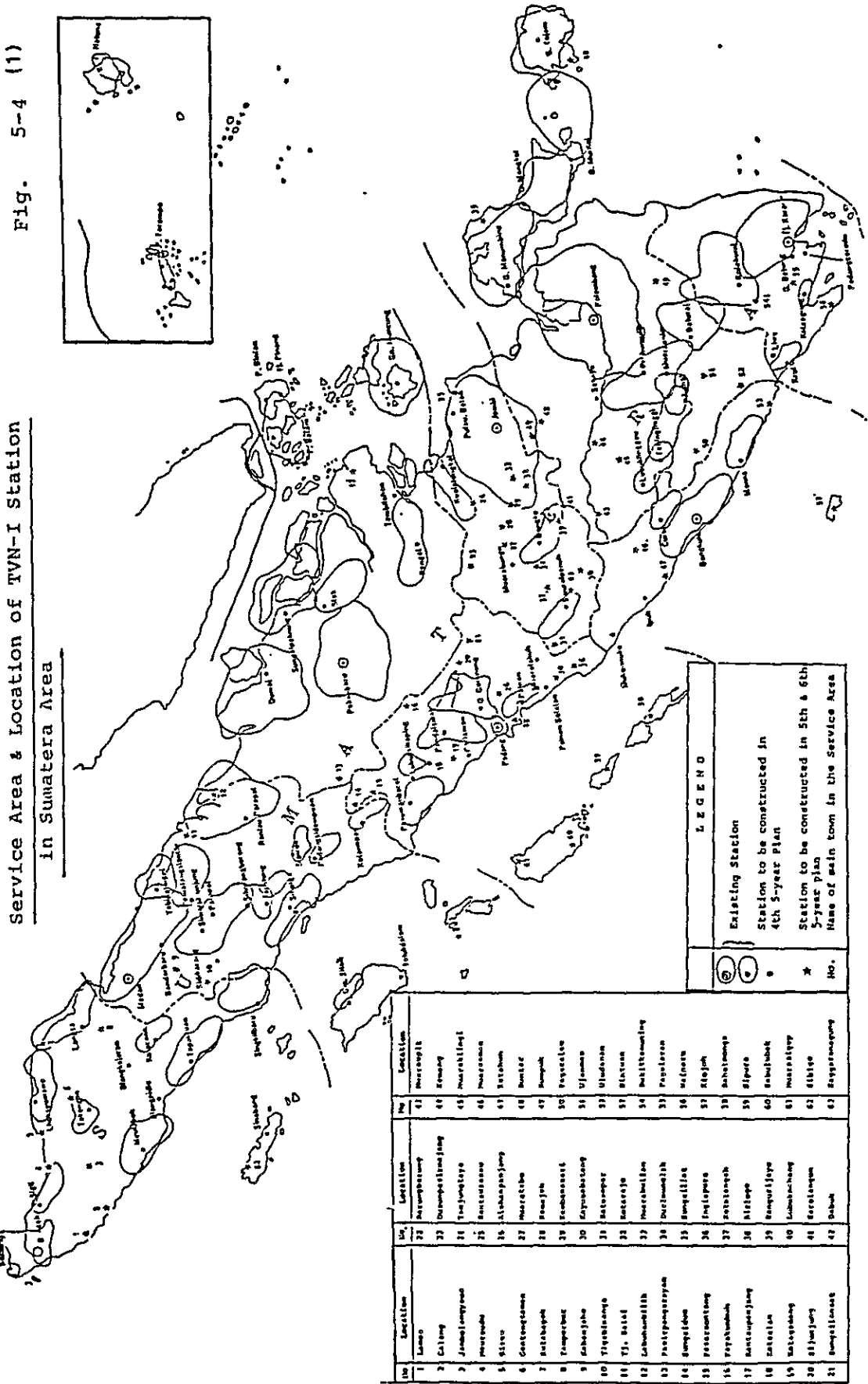


Fig. 5-4 (1)

No.	Location	No.	Location	No.	Location
1	Lampung	32	Depati	41	Merak
2	Calang	33	Depati	42	Merak
3	Jambi	34	Depati	43	Merak
4	Merangin	35	Depati	44	Merak
5	Sivik	36	Depati	45	Merak
6	Gerik	37	Depati	46	Merak
7	Merangin	38	Depati	47	Merak
8	Merangin	39	Depati	48	Merak
9	Merangin	40	Depati	49	Merak
10	Merangin	41	Depati	50	Merak
11	Merangin	42	Depati	51	Merak
12	Merangin	43	Depati	52	Merak
13	Merangin	44	Depati	53	Merak
14	Merangin	45	Depati	54	Merak
15	Merangin	46	Depati	55	Merak
16	Merangin	47	Depati	56	Merak
17	Merangin	48	Depati	57	Merak
18	Merangin	49	Depati	58	Merak
19	Merangin	50	Depati	59	Merak
20	Merangin	51	Depati	60	Merak
21	Merangin	52	Depati	61	Merak
22	Merangin	53	Depati	62	Merak
23	Merangin	54	Depati	63	Merak
24	Merangin	55	Depati	64	Merak
25	Merangin	56	Depati	65	Merak
26	Merangin	57	Depati	66	Merak
27	Merangin	58	Depati	67	Merak
28	Merangin	59	Depati	68	Merak
29	Merangin	60	Depati	69	Merak
30	Merangin	61	Depati	70	Merak
31	Merangin	62	Depati	71	Merak

LEGEND

- ⊙ Existing Station
- Station to be constructed in 4th 5-year plan
- Station to be constructed in 5th & 6th 5-year plan
- ★ Name of main town in the Service Area
- No.

Fig. 5-4 (2)

Service Area and Location of TVN-I Station

in Jawa Area

No.	Location	No.	Location
1	Anyer	20	Monasolo
2	Pegleran	21	Cicentoe
3	Banjaran	22	Wates
4	Cibeo	23	Banjaran
5	Pelabuhan	24	Panorogo Timur
6	Purabaya	25	Tanggungun way
7	Blinding besang	26	Tulungung Selatan
8	Banjaran	27	Zanlyoto
9	Pemabangan	28	Arabaya
10	Saranganyal	29	Lumajang
11	Cikemas	30	Besuki
12	Pandegaran	31	Situbond Timur
13	Salem	32	Ambulu
14	Kanglany	33	Banjungul
15	Pembang	34	Canteng
16	Wederjako	35	Ingren
17	Setuadadi	36	Purgesulan
18	Sragen	37	Kedings
19	Peta Rano		

LEGEND
 (o) Existing Station
 (x) Station to be constructed in 4th 5-year Plan
 (*) Station to be constructed in 5th & 6th 5-year plan
 No. Name of main town in the Service Area

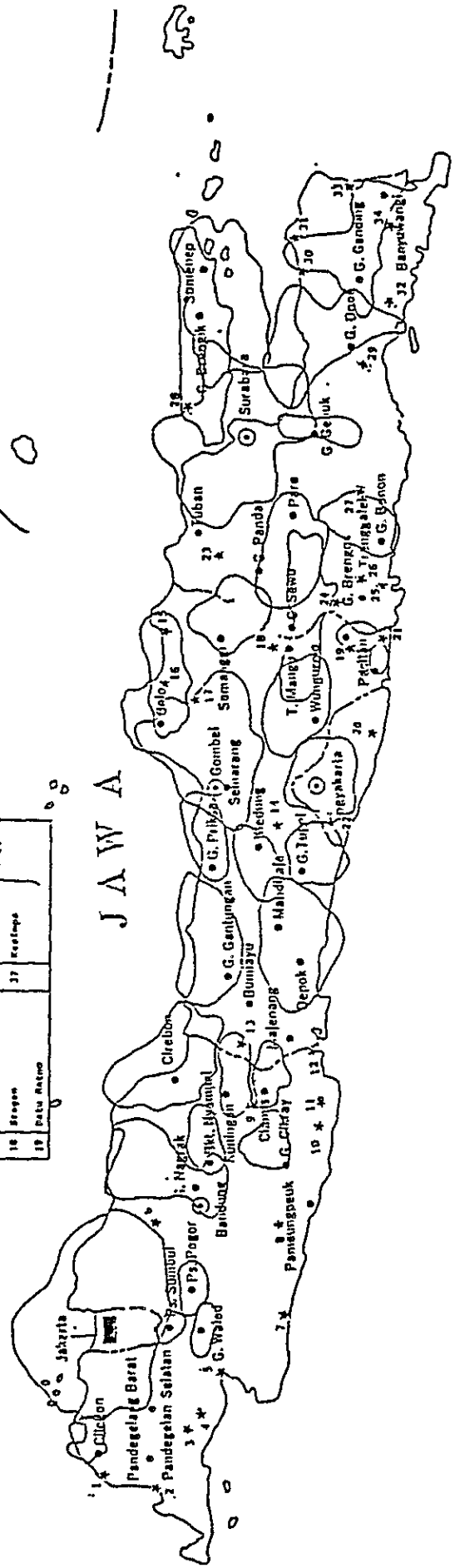
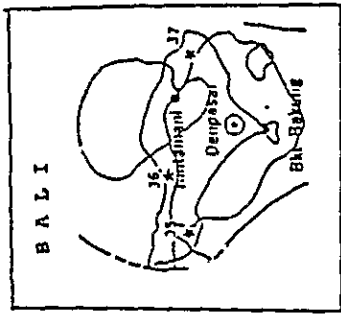


Fig. 5-4 (3)

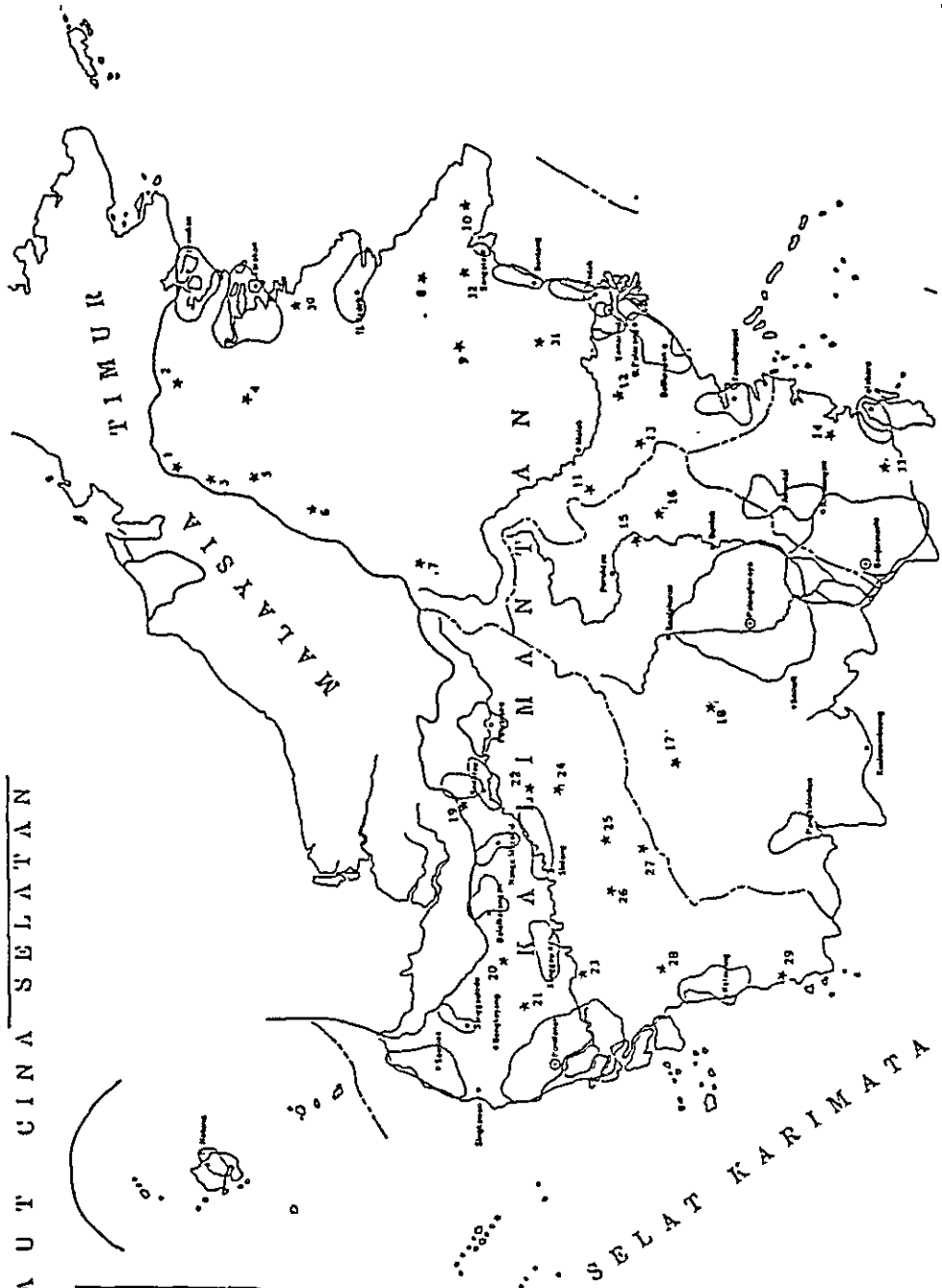
Service Area and Location of TVN-I Station

in Kalimantan Area

L A U T C I N A S E L A T A N

LEGEND	
⊙	Existing Station
○	Station to be constructed in 4th 5-year Plan
*	Station to be constructed in 5th & 6th 5-year plans
No.	Name of main town in the Service Area

Scale
1:100,000



No.	Location	No.	Location
1	Berawa	18	Kulitayan
2	Tanjung	19	Mengadangan
3	Pupung	20	Fembayan
4	Compelek	21	Mugbang
5	Subang	22	Mengalimpau
6	Seppan	23	Belitau
7	Sibumest	24	Mengadangan
8	Jatamayang	25	Mengalpinah
9	Muarupuh	26	Pembar
10	Bela	27	Menga Bayan
11	Sembah	28	Aukuring
12	Bak	29	Kudawan
13	Mantalin	30	Uj. Selar
14	Cibungan	31	Plempo
15	Mestawan	32	Asatice
16	Satung	33	Satul
17	Tandjung		

Service Area and Location of TVN-I

Fig. 5-4 (4)

Station in Sulawesi Area

No	Location	LEGEND	
1	Ondona	⊙	Existing Station
2	Kawangkoan	⊙	
3	Kumelebual	•	Station to be constructed in 4th 5-year Plan
4	Bintaunalama	*	Station to be constructed in 5th & 6th 5-year plan
5	Taludit	No.	Name of main town in the Service Area

- 6 Leok
- 7 Tinabogan
- 8 Sanako
- 9 Lonta
- 10 Taripa
- 11 Tompira
- 12 Bahcoente
- 13 Angkona
- 14 Polewali
- 15 Anabnua
- 16 Wacanpone
- 17 Palatae
- 18 Benteng
- 19 Linomolo

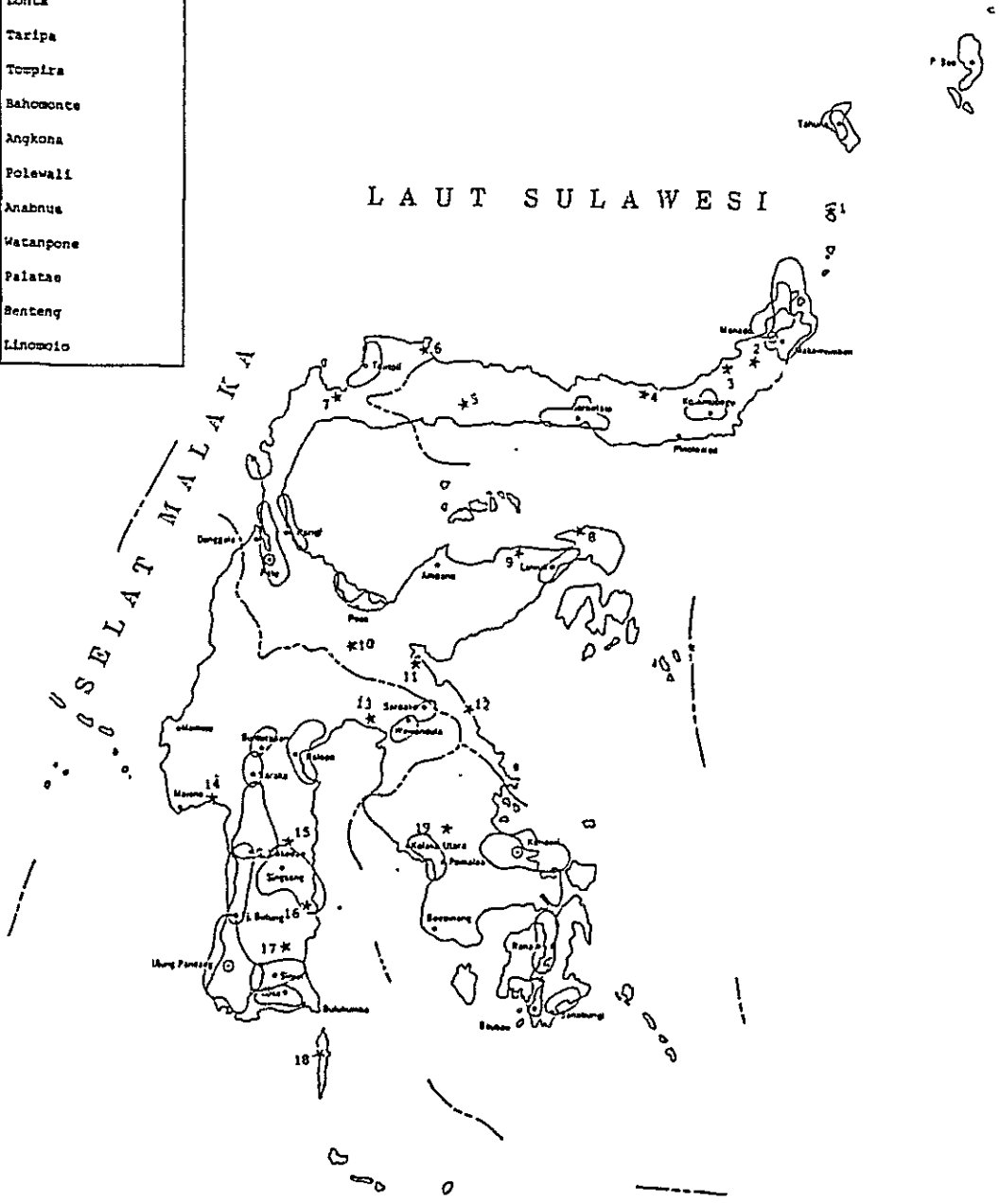
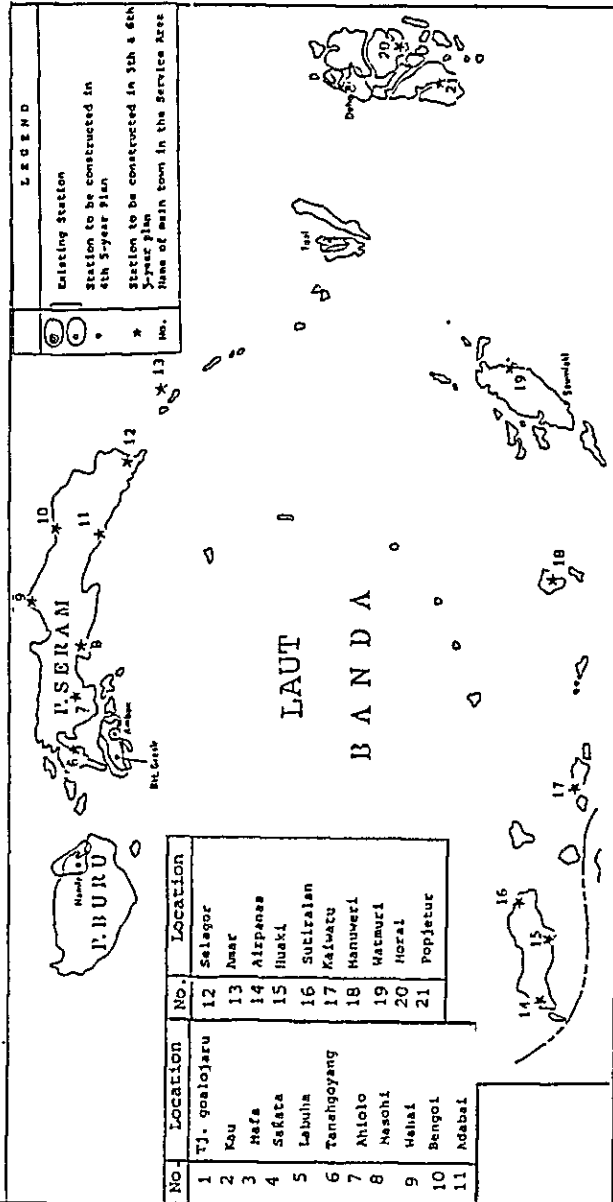
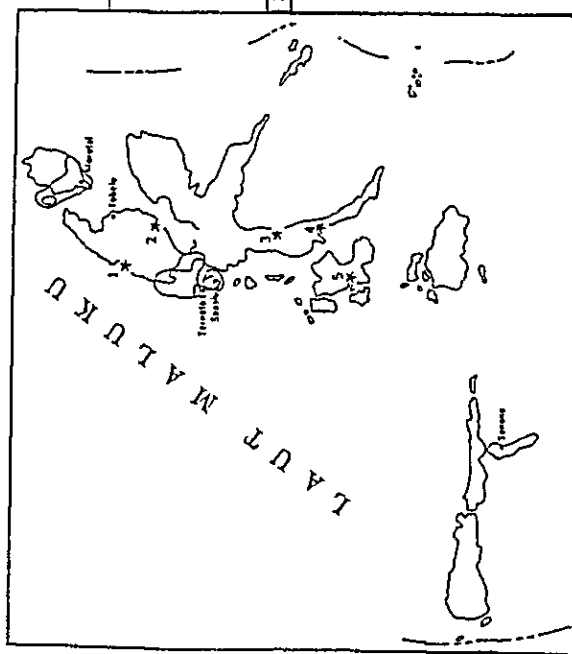
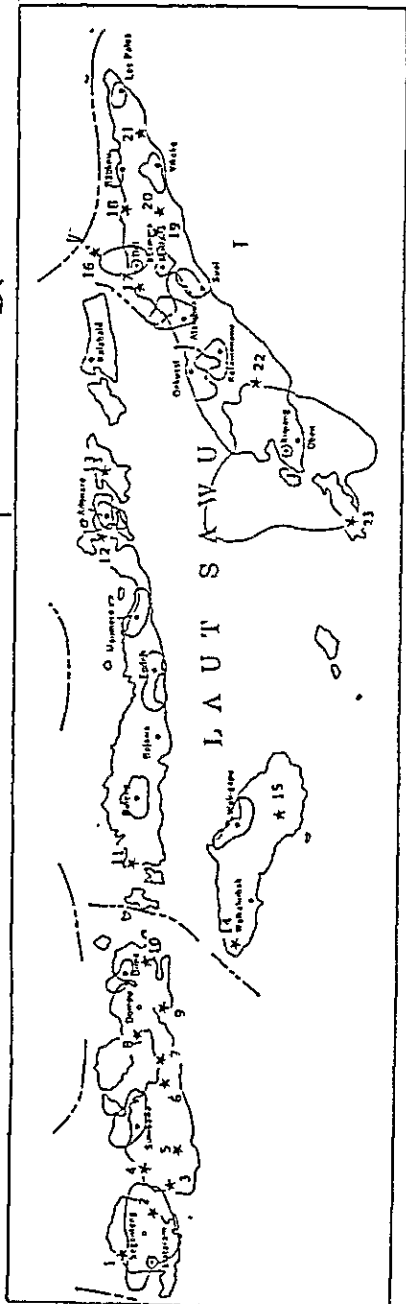


Fig. 5-4 (5)

Service Area & Location of TVN-I Station
in Nusa Tenggara, Maluku & Timor Timur Area



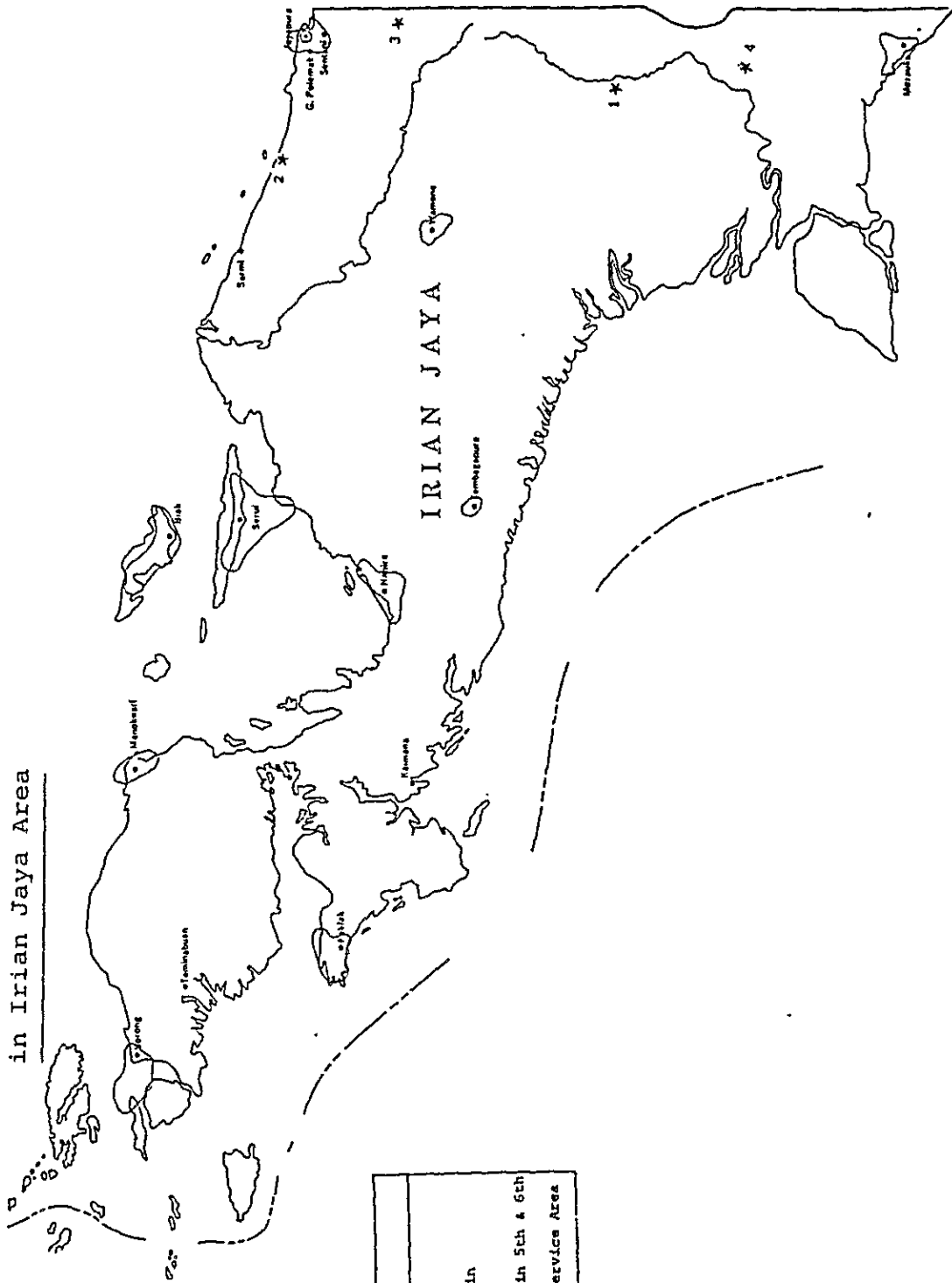
No.	LOCATION	No.	LOCATION
1	Tj. Gualojaru	12	Selager
2	Kou	13	Auar
3	Mafa	14	Aispanas
4	Sekata	15	Iluaki
5	Labuha	16	Sutiralan
6	Tanahgoyang	17	Kaiwatu
7	Ahilo	18	Hanuwari
8	Nesohi	19	Wamuri
9	Hellai	20	Hozai
10	Bengol	21	Popjetur
11	Adabal		



No.	LOCATION	No.	LOCATION
1	Santong	13	Madakeva
2	Kotasaia	14	Raza
3	Endeh	15	G. Watupatabung
4	Melintech	16	Mamuala
5	Korpo	17	Likisla
6	Piangang	18	Mastulo
7	Amung	19	Alnaco
8	Dorokempo	20	Sane
9	Nasaban	21	Ustokarbos
10	Roke	22	Soe
11	Mogotang	23	Rusalangga
12	Larentuka		

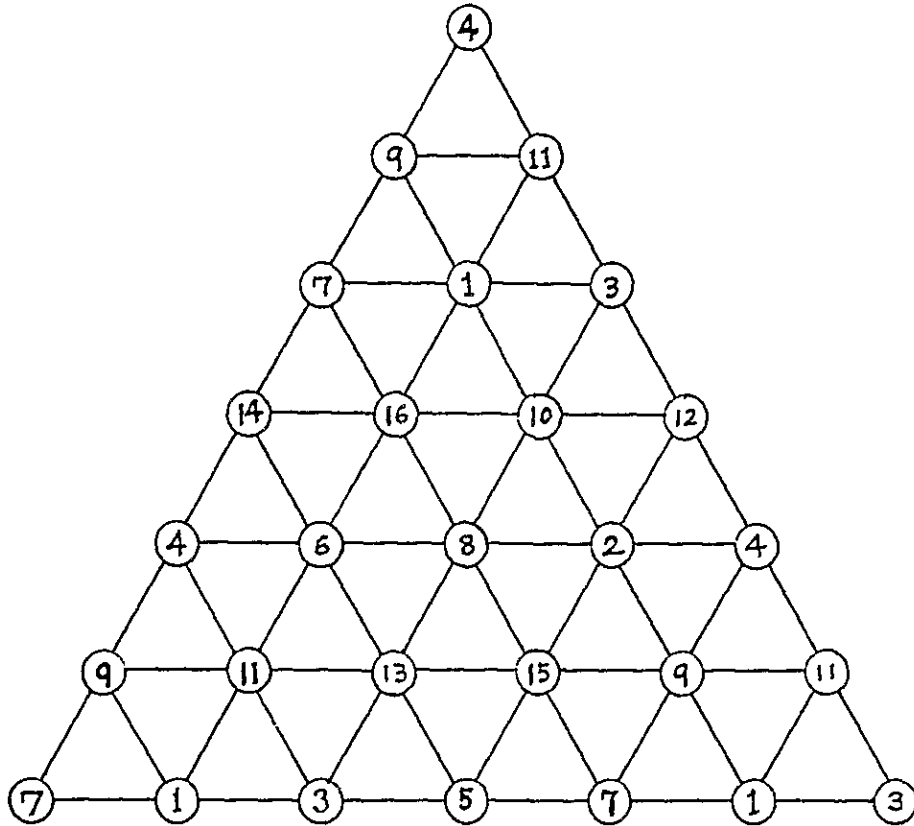
Service Area and Location of TVN-I Station

Fig. 5-4 (6)



LEGEND	
⊙	Existing Station
⊙	Station to be constructed in 4th 5-year Plan
•	Station to be constructed in 5th & 6th 5-year plan
*	Name of main town in the Service Area
No.	
No	Location
1	Tanamera
2	Armopa
3	Kenadega
4	Semuting

Typical Arrangement of UHF TV Channel Groups



Distance between co-channel stations - 360kM

Distance between adjacent channel stations - 180kM

Distance between alternate channel stations - 90kM

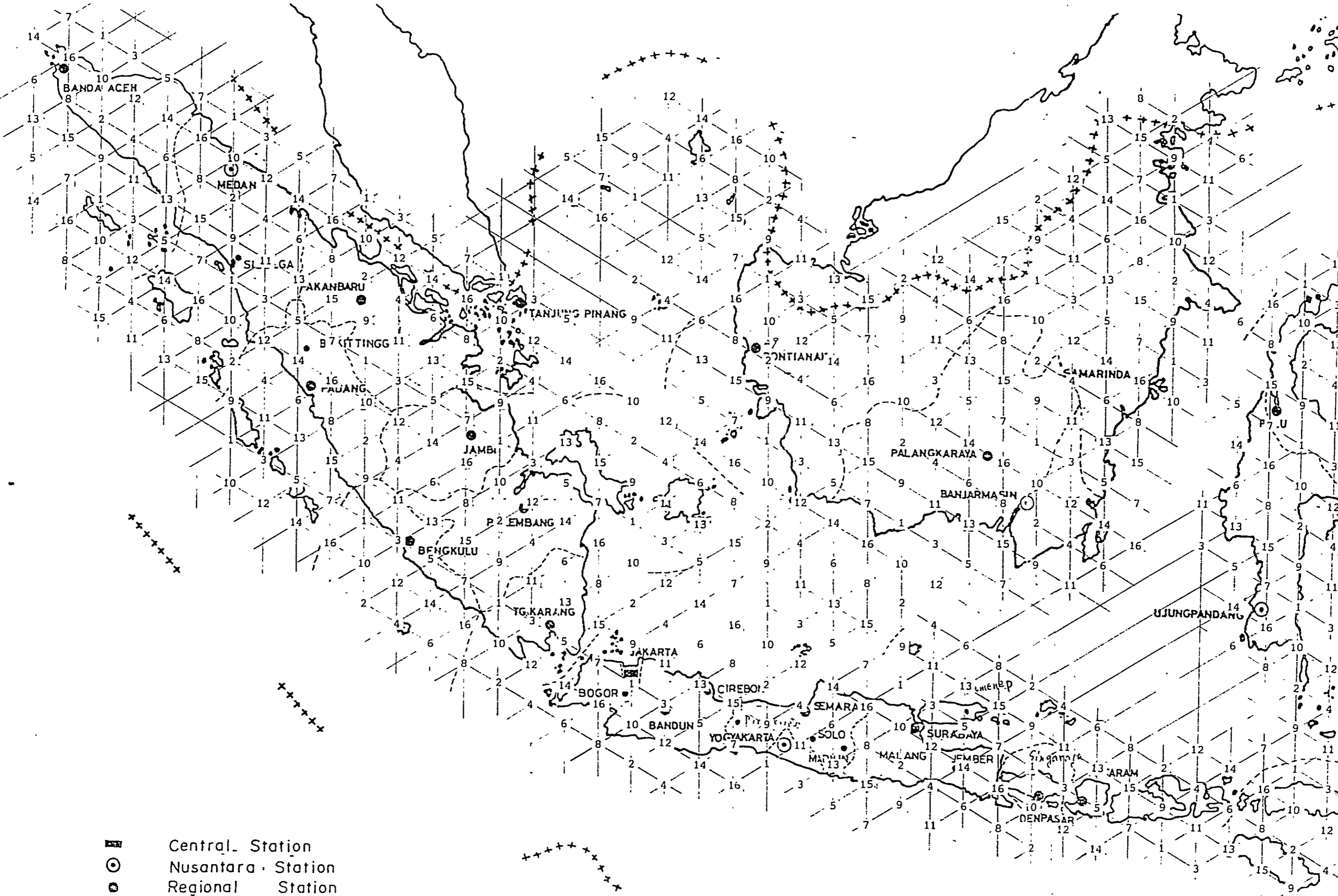


Fig. 5-6

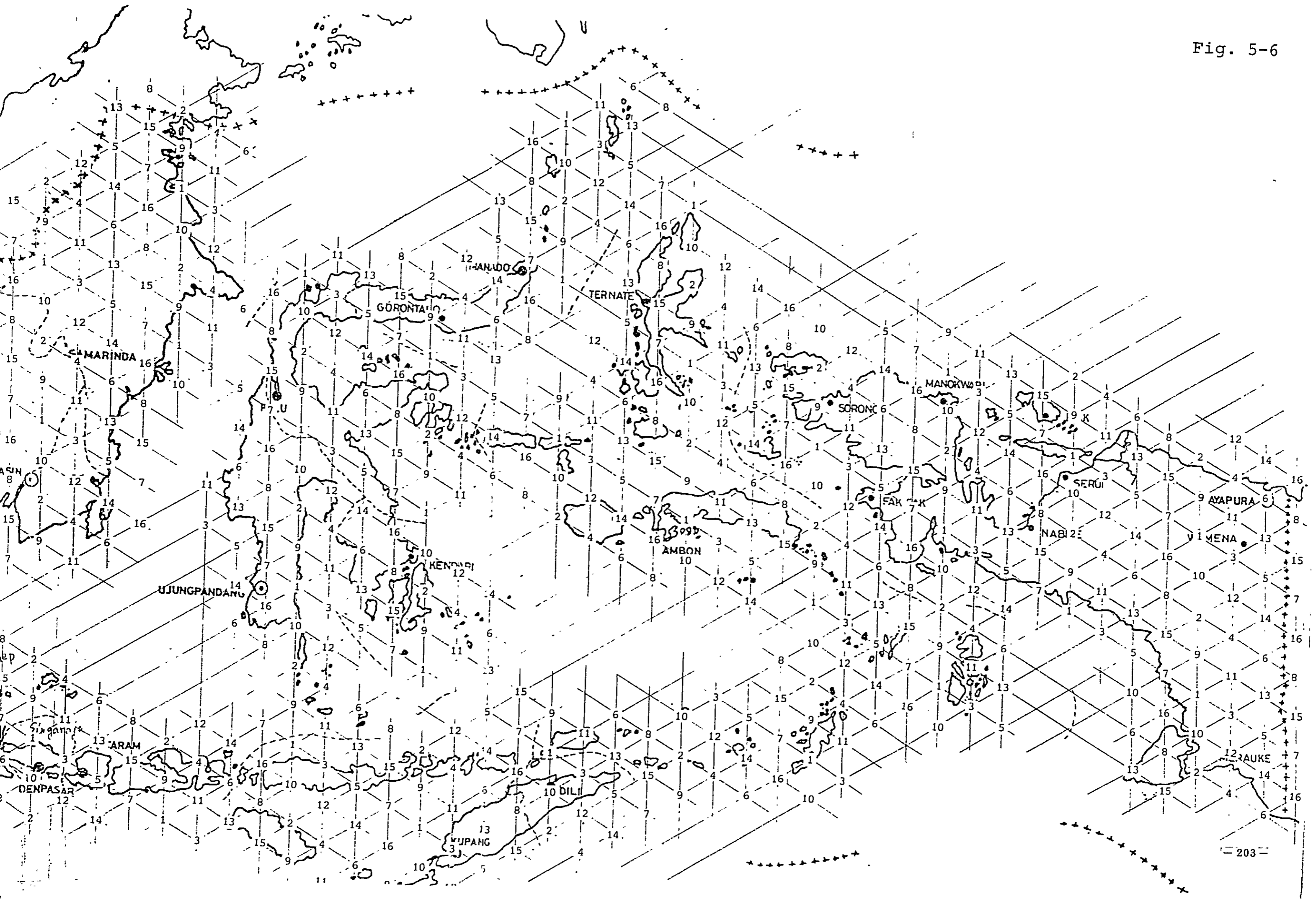




Table 5-1(1)

Construction Plan of the Transmitting Station (RN-I)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks	
	84/85	85/86	86/87	87/88	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97		97/98
<u>Band Aceh</u>														
1 Lhokseumawe														
2 Sigli						Δ								
3 Meulaboh														
4 Takegon						Δ								
5 Langsa														
6 Tapaktuan														
7 Lanno														
8 Kutakan														
<u>Sumatera Ultra</u>														
9 Kabanjahe														
10 Pematangsiantar														
11 Sidikalang														
12 Rantauparapat														
13 Padangsidempuan														
<u>Sumatera Barat</u>														
14 Lubuksikaping														
15 Paiseh														
16 Sijunjung														
17 Payakumbuh														

Δ : Construction

Table 5-1 (2)

Construction Plan of the Transmitting Station (RN-I)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96		96/97	97/98
<u>Bankul</u>															
18 <u>Manna</u>															
19 <u>Curup</u>											Δ				
20 <u>RIAU</u>															
<u>Tembilahan</u>												Δ			
<u>Jambi</u>															
21 <u>Banko</u>															
22 <u>Muarabungo</u>															
23 <u>Sungaipehneh</u>															
<u>Lampung</u>															
24 <u>Kotabumi</u>															
<u>Sumatera Selatan</u>															
25 <u>Muaraklingi</u>															
26 <u>Muaraena</u>															
27 <u>Tj. Pandang</u>															
28 <u>Tj. Pinung</u>															
<u>Jawa Tengah</u>															
29 <u>Pekalongan</u>															

Δ : Construction

Table 5-1(3)

Construction Plan of the Transmitting Station (RN-I)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
<u>Jawa Timur</u>																
30 Banyuwangi																
31 Tulungagung						Δ		Δ								
<u>Jawa Barat</u>																
32 Serang						Δ										
33 Tasikmalaya						Δ										
<u>Kalimantan Tengah</u>																
34 Sampit																
35 Kualakurun												Δ				
<u>Kalimantan Barat</u>																
36 Singkawang																
37 Sintang										Δ						
38 Kedukul																
39 Putusibau																
40 Ketapang												Δ				
41 Kembayan																
42 Nangehkantuk																
43 Meliau															Δ Δ	
44 Aurkuning														Δ		
45 Marau																
46 Liku															Δ	

Δ : Construction

Construction Plan of the Transmitting Station (RN-I)

Table 5-1(4)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/05	05/06	06/07	07/08	08/09	09/90	90/01	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
47	Masilato																
	<u>Kalimantan Timur</u>																
48	Trakan																
49	Tj. Redeb																
50	Muntaiwon																
51	Tanahgrogot																
52	Gongsalak																
53	Kubumesaal																
54	Longberang																
	<u>Kalimantan Selatan</u>																
55	Kotabaru																
56	Anuntai																
	<u>Surawesi Tenggara</u>																
57	Kolaka																
58	Raha																
	<u>Surawesi Tengah</u>																
59	Poso																
60	Tempira																
61	Tolitoli																
62	Luwuk																

Δ : Construction

Construction Plan of the Transmitting Station (RN-I)

Table 5-1(5)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96		96/97	97/98
<u>Surawesi Utara</u>															
63 Kotamunbagu															
64 Jj.Binta						Δ									Δ
65 Tombatu															Δ
66 Marisa															Δ
<u>Surawesi Selatan</u>															
67 Matanpone								Δ							
68 Palopo													Δ		
69 Enrekang															
70 Mamuju											Δ				
<u>Ilesa Tenggara</u>															
71 Bima															
72 Sumbawabesar															Δ
73 Ampang															Δ
74 Kalabahi															Δ
75 Oekusi															Δ
76 Waingapu															Δ
77 Reo															Δ
78 Larantuka															Δ
79 Ende															Δ

Δ : Construction

Construction Plan of the Transmitting Station (RN-I)

Table 5-1(6)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks	
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99		
80	<u>Timor Timur</u>																	
81	Vikeke																	
82	Baukan Same								Δ									
83	<u>Jayapura</u>																	
84	Kenandega Waropko									Δ								
85	<u>Maluk</u>																	
86	Tual Tobelo																Δ	
1	Bukittinggi																	Sumatera Barat
2	Kupang																	N.T.T.
3	Dili																	T.T
4	Palangkaraya																	Kalimantan Tengah
5	Wamena																	Irian Jaya
6	Serui																	Irian Jaya
7	Sorong																	Irian Jaya
8	Fak Fak																	Irian Jaya
9	Manokwari																	Irian Jaya
10	Ternate																	Irian Jaya
11	Gorontalo																	Maluk
12	Nablre																	Sulawesi Utara

Δ : Construction ○ : Newly Install (These MW transmitters are installed in the existing stations)

Construction Plan of the Transmitting Station (RN-II)

Table 5-2(1)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
<u>Nusantara I</u>																
1 Band Aceh									⊙							
2 Leokseumawe								⊙								
3 Takegon								⊙								
4 Tapuktuan																
5 Medan	⊙															
6 Pemantausiantar																
7 Sidekarang																
8 Rautaparapat												⊙				
9 Sibolga								⊙								
10 Padang							⊗									
11 Bukittinggi									⊙							
12 Lubuksikaping																
13 Sinjung																
14 Pavakumbuh																
15 Benkul																
16 Manan																
17 pekanbaru																
18 Tembilahan																
19 Jambi																
20 Banko																
21 Muarabunge															⊙	
22 Tj. Karang																
23 Kotabumi																
24 Palembang																

⊙ : Newly Install ⊗ : Renew (Power Increase)

Table 5-2(2)

Construction Plan of the Transmitting Station (RN-II)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
	04/85	05/86	06/87	07/88	08/89	09/90	10/91	11/92	12/93	13/94	14/95	15/96		16/97	17/98
25 Labuklinggau															
26 Pangkalpinang						⊙									
27 Tj. Pinang												⊙		⊙	
<u>Musantara II</u>															
28 Bogor											⊙				
29 Bandung						⊙									
30 Serang						⊙									
31 Tasikumaraya							⊙								
32 Cirebon							⊙								
33 Yogyakarta		⊙								⊙					
34 Purwokert															
35 Surakarta															
36 Semarang															
37 Pekalongan															
38 Surabaya										⊙					
39 Banyuwangi															
40 Madiun															
41 Malang															
42 Jember															
43 Sumenp															
44 Denpasar															
45 Singaraja															
46 Mataram															

⊙ : Newly Install ⊗ : Renew (Power Increase)

Construction Plan of the Transmitting Station (RN-II)

Table 5-2(3)

	Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
		04/95	05/96	06/07	07/88	80/09	89/90	90/91	91/92	92/93	93/94	94/95	95/96		96/97	97/98
	<u>Nusantara III</u>															
47	Pontianak						⊙		⊙							
48	Singkawang						⊙									
49	Sintang							⊙								
50	Kedukul											⊙				
51	Putsibau									⊙						
52	Ketapang												⊙			
53	Samarinda								⊙							
54	Trakan												⊙			
55	Tanahrogot													⊙		
56	Banjarmasin															
57	Amuntai															
58	Palangkaraya															
59	Kualakurun															
	<u>Nusantara IV</u>															
60	Manado															
61	Kotamunbagu															
62	Tombatu															
63	Palu															
64	Poso															
65	Luwuk															
66	Kendari															
67	Kolaka															
68	Raha															

⊙ : Newly Install ⊗ : Renew (Power Increase)

Costruction Plan of the Transmitting Station (RN-II)

Table 5-2(4)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
69	Corontalo																
70	Ujung pandang	⊙															
71	Watanpo											⊙				⊙	
72	Palopo																
73	Dili							⊙									
74	Kupang							⊙									
75	Sumbawabesar																
76	Kalabahi										⊙						
77	Oekusi																
78	Walingapu							⊙									
79	Endeh																
	<u>Nusantara V</u>																
80	Baukau																
81	Vikeke																
82	Ambon																
83	Blak																
84	Ternate																
85	Merauke																
86	Fak-Fak																
87	Aorong																
88	Wamena																
89	Nabire																
90	Serui																
91	Manokwari																

⊙ : Newly Install (X) : Renew (Power Increase)

Table 5-2(5)

Costruction Plan of the Transmitting Station (RN-II)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks	
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99		
92 Jayapura			⊙														
93 Waropko																	
94 Tual																	
<u>Jakarta</u>								⊗									⊙

⊙ : Newly Install ⊗ : Renew (Power Increase)

COMPARISON TABLE BETWEEN FM AND AM BROADCASTING SERVICE

F M	A M										
<p>1. Output amplitude of an FM transmitter remains at a constant level.</p>	<p>1. Output amplitude of an AM transmitter changes with the amplitude change of the modulating wave shape.</p>										
<p>2. The frequency deviation follows the amplitude change of the modulating wave shape.</p>	<p>2. The sidebands contains only half the carrier power for 100% modulation.</p>										
<p>3. The sidebands contains almost 100% of the modulated energy.</p>	<p>3. Large bandwidth is not required. (9kHz)</p>										
<p>4. Large bandwidth is required. (200kHz)</p>	<p>4. It is possible to employ a high gain transmitting antenna. Transmitter power output can be saved.</p>										
<p>5. It is possible to employ a high gain transmitting antenna. Transmitter power output can be saved.</p>	<p>5. Coverage is strongly dependent on frequency as well as on ground conductivity.</p>										
<p>6. Propagation characteristics are basically independent of frequency. (Identical coverage can be expected during the day and night.)</p>	<p>6. There is greater interference at night due to sky-wave propagation.</p>										
<p>7. Propagation at VHF is affected by the nature of the path. Coverage is mainly limited to line-of-sight conditions.</p>	<p>7. Minimum field strength for good reception</p> <table border="0" data-bbox="1019 380 1128 1008"> <tr> <td>Day</td> <td>0.25 mV/m (48 dB) - 1 mV/m (60 dB)</td> </tr> <tr> <td>Night</td> <td>3 mV/m (70 dB) - 10 mV/m (80 dB)</td> </tr> </table>	Day	0.25 mV/m (48 dB) - 1 mV/m (60 dB)	Night	3 mV/m (70 dB) - 10 mV/m (80 dB)						
Day	0.25 mV/m (48 dB) - 1 mV/m (60 dB)										
Night	3 mV/m (70 dB) - 10 mV/m (80 dB)										
<p>8. Minimum necessary field strength</p> <table border="0" data-bbox="1074 1120 1183 1904"> <tr> <td>Monophonic service</td> <td>46 dB (uV/m)</td> </tr> <tr> <td>Stereophonic service</td> <td>54 dB (uV/m)</td> </tr> <tr> <td>Rural Area</td> <td>60 dB</td> </tr> <tr> <td>Urban Area</td> <td>66 dB</td> </tr> <tr> <td>Large City</td> <td>74 dB</td> </tr> </table>	Monophonic service	46 dB (uV/m)	Stereophonic service	54 dB (uV/m)	Rural Area	60 dB	Urban Area	66 dB	Large City	74 dB	<p>8. Better sound quality (50Hz - 15kHz)</p>
Monophonic service	46 dB (uV/m)										
Stereophonic service	54 dB (uV/m)										
Rural Area	60 dB										
Urban Area	66 dB										
Large City	74 dB										
<p>9. Better sound quality (50Hz - 15kHz)</p>	<p>9. Stereophonic transmission is possible but difficult</p>										
<p>10. Stereophonic transmission - easy</p>	<p>10. Stereophonic transmission is possible but difficult</p>										

Construction Plan of the Transmitting Station (RN-III)

Table 5-4 (1)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/05	05/06	06/07	07/08	08/09	09/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
	Sumatera																
1	Band Aceh		⊙														
2	Lhokseumawe						⊙										
3	Takegon																
4	Kotakan								⊙								
5	Meulaboh																
6	Sigil								⊙								
7	Tapaktuan																
8	Langsa								⊙								
9	Bandarbaru																
10	Tibing Tinggi																
11	Pematang Siantar																
12	Rantan parapot								⊙								
13	Wibolga																
14	Simarjarunjung																
15	Turutung																
16	G. Compong																
17	Pandisikat																
18	Pekanbaru																
19	Pulau Batan																
20	G. Muncung																
21	Dumai																
22	Slak																
23	Sungai Pakning																
24	Jambi																

⊙: Newly Install

Construction Plan of the Transmitting Station (RN-III) Table 5-4 (2)

Name of Station	4th 5-year plan period			5th 5-year plan period			6th 5-year plan period			Remarks					
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93		93/94	94/95	95/96	96/97	97/98
25 Kuala tungkal	⊙												⊙		
26 Palembang								⊙							
27 G. Manumbing															
28 G. Mankol										⊙					
29 G. Muntal										⊙					
30 G. Tajam												⊙			
31 Prabumulik											⊙				
32 Batraja														⊙	
33 Lahat														⊙	
34 Muaraemin															
35 Tebin Tinggi													⊙		
36 Benkul															
37 Manna															
38 G. Betung															
39 Kotabumi															
40 Kotaagung															
<u>Java</u>															
41 G. Nagrak															
42 Tankubanperaku															
43 G. Cikuraya															
44 Cirebon															
45 Bukit Nyampal															
46 G. Wald															
47 Ciamis															

⊙ : Newly Install

Construction Plan of the Transmitting Station (RN-III)

Table 5-4 (3)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
48	Kuningan									⊙							
49	Gombel		⊙							⊙							
50	Semanggi			⊙													
51	Colo								⊙								
52	Kledung						⊙										
53	Depok			⊙													
54	Mungurejo					⊙											
55	Yogyakarta	⊙															
56	Surabaya	⊙															
57	G. Gebuk				⊙												
58	Cemorosewn											⊙	⊙				
59	Pare																
60	G. Brengik																
61	G. Doek									⊙							
62	G. Gending																
63	G. Pandan																
64	Bogor																
	<u>Kalimantan</u>																
65	Pontianak		⊙														
66	Sanggauledo																
67	Balaikarangan																
68	Semitan I																⊙
69	Merakai																⊙
70	Sambas																⊙

⊙ : Newly Install

Construction Plan of the Transmitting Station (RN-III) Table 5-4 (4)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
71	Putusihan						⊙										
72	Semitan II			⊙													
73	Palangkaraya											⊙					
74	Pangkalanbun												⊙				
75	Banjarmasin	⊙															
76	Kotabaru													⊙			
77	Kandangan												⊙				
78	Amuntai				⊙								⊙				
79	Balikpapan								⊙								
80	G. Palarang																
81	Samarinda		⊙														
82	Tarakan									⊙							
83	Nunukan																⊙
	<u>Surawesi</u>																
84	Manado		⊙														
85	Makaweinben									⊙							
86	Gorontalo																
87	Takuna																
88	Palu																
89	Luwuk																
90	Tolitoli																⊙
91	Kendari																
92	Banabungi																⊙
93	Raha																⊙

⊙ : Newly Install

Construction Plan of the Transmitting Station (RN-III)

Table 5-4 (5)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
94	Ujung pandang	⊙															
95	G. Loka																
96	Tj. Butung								⊙								
97	G. Makadal												⊙				
98	Sengkang																
99	Baraka																
100	Buntu Taban																
101	Sinjai													⊙			
	<u>Bali</u>																
102	Bukit Bakung	⊙															
103	Kintamani									⊙							
	<u>Nusatenggara</u>																
104	Seganteng			⊙													
105	Oben																
106	Atambua																
107	Nameia																⊙
	<u>Maluk</u>																
108	Bukit Gresir		⊙														
109	Terhate																

⊙ : Newly Install

Construction Plan of the Transmitting Station (RN-III)

Table 5-4(6)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
110	<u>Trian Jaya</u>																
111	G. Polemak	⊙															
112	Sorong		⊙														
113	Manokwari			⊙													
114	Merauke				⊙												
115	Biak							⊙									
116	Fak Fak							⊙									
117	Serul							⊙									
118	Nabire								⊙								
119	Wamena								⊙								
120	Dili																
	<u>Jakarta</u>																
	Senayan																

⊙ : Newly Install

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (1)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/85	05/86	06/87	07/88	08/89	09/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
	<u>Band Aceh</u>																
1	Sinabang			Δ													
2	Sabang	Δ															
3	Blangpidi			Δ													
4	Blang Kejeran				Δ												
5	Calang								Δ								
6	Lamos							Δ									
7	Birew											Δ					
8	Meureudu								Δ								
9	Kutabagok								Δ								
10	Gentengsamem										Δ						
11	Sibigo																
12	Jambolangyeue												Δ				
13	Tamporbur												Δ				
	<u>Sumatera Utara</u>																
14	Labuhanbilik																
15	Sidekarang																
16	Telukdalam		Δ														
17	Tj. Balai																
18	Kabanjabe																
19	Tigabinanga																

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (2)

	Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96		96/97	97/98
	<u>Sumatera Barat</u>															
20	Muaralabuh	△														
21	Periaman		△													
22	Pinan Selatan			△												
23	Payakumbuh				△											
24	Sijunjung					△										
25	Sungaiduo						△									
26	Alahanpanjang							△								
27	Muarasigep								△							
28	Sungailansat									△						
29	Kayusabatang										△					
30	Kotagadang											△				
31	Kotaalan												△			
32	Sipura													△		
33	Bahatmonga														△	
34	Barungbarung															△
35	Pasarontang															△
36	Ingiapura															△
	<u>RIAU</u>															
37	Tempilahan	△														
38	P. Bintan															
39	Rantaupanjang															△
40	Pasirpangarayan															△

△ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (3)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96		96/97	97/98
<u>Jambi</u>															
41 Muarabungo				△											
42 Sagkatanagung					△										
43 Kotatengah							△								
44 Tanjungtaya															
45 Batuampay											△				
46 Kotarajo															
47 Airlogo														△	
48 Muarabulian							△								
49 Sarolangun															
50 Sabulubek															
51 Remajeh															
52 Buncar															
53 Rantauasau															
54 Bangurijayo															
55 Durinuncick															
56 Kembanganari															
57 Muaratebo															
58 Dusunpasirmajang															
<u>Sumatera Selatan</u>															
59 Sekayu															
60 Lubuklinggan															
61 Muaraklingr.															

△ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (4)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
62 Pageralam																
63 Dabuk																
64 Muaraupit																
65 Rumpuk																
66 Ujanmas																
67 Uludanan																
68 Sungailiat																
69 Kemang																
70 Lubukmahang																
<u>Lampung</u>																
71 Padangcermin																
72 Liwu																
73 Pagelaran																
74 Bukitkemuning																
75 Wainaru																
<u>Benkulu</u>																
76 Ipah																
77 Moko-Moko																
78 Kiojoh																
79 Ketahun																
80 Muaraaman																
81 Bintuan																

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (5)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
	04/85	05/86	06/87	07/88	08/89	09/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
<u>Jawa Barat</u>																
82 Pandegelang Barat	△															
83 Pameungpeuk	△															
84 Pandegerang-Selatan			△													
85 Palabuhanratu								△								
86 Sindang barang									△							
87 Cikatomas							△									
88 Pangandaran										△						
89 Cibeo											△					
90 Pagelaran						△										
91 Bungbulang										△						
92 Aneyer						△										
93 Karangnunggal																
94 Bonjongmanik										△						
95 Panumbangan											△					
96 Purwakarta													△			
<u>Jawa Tengah</u>																
97 Bumiayu																
98 Majenang																
99 Sragen																
100 Giritonto																
101 Salem																
102 Rembang																

△ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5 -5 (6)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/85	05/86	06/87	07/88	08/89	09/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
103	Ruruwodadi																
104	Wonosabo						Δ										
105	Wates							Δ									
106	Batu Ratno											Δ					
107	Mangelang												Δ				
108	Wedarijekso													Δ			
109	Jawa Timur																
110	Tuban																
111	Trenggalek																
112	Bonjonegoro																
113	Situbond Timur																
114	Ponorogo Timur																
115	Tuluagung Selatan																
116	Banyuwangi																
117	Lumajang																
118	Genteng																
119	Besuki																
120	Arosbaya																
121	Kanigoro																
122	Tanggunggun ung																
123	Ambulu																

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (7)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
	<u>Kalimantan Barat</u>																
123	Senkawan																
124	Bengkayan	Δ				Δ											
125	Kondawangan								Δ								
126	Mangahpinoh									Δ							
127	Mangahbadau										Δ						
128	Mangahdanghan									Δ							
129	Nangahtempuai									Δ							
130	Manga Sayan										Δ						
131	Kembayan											Δ					
132	Mellau												Δ				
133	Aurkuning													Δ			
134	Pemuar														Δ		
135	Ngebang															Δ	
	<u>Kalimantan Tengah</u>																
136	Sampit																
137	Buntok																
138	Purukcahu																
139	Kualakurun																
140	Kualapembuang																
141	Ketapang																
142	Muarateweh																
143	Tamalung																

Δ : Construction

Table 5-5 (8)

Construction Plan of the Transmitting Station (TVN-I)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks			
		94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/95	95/96	96/97	97/98	98/99				
144	Kualakauayan																			
	<u>Kalimantan Timur</u>																			
145	Tanjung																			Δ
146	Muaramayang																			Δ
147	Kapan																			
148	Muntaiwan																			
149	Muarawahau										Δ									
150	Kubuano																			
151	Sambuh																			
152	Tj. Selor																			
153	Gongsalak																			Δ
154	Beruwen																			
155	Pupung																			Δ
156	Kubumesaal																			Δ
157	Buat																			
158	Buku																			
159	Limbungan																			Δ
160	Satul																			Δ
161	Karaitau																			
162	Klampo																			Δ
	<u>Sulawesi Utara</u>																			
163	Pinolosian																			Δ

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (9)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
164	P. Beo					△											
165	Ondona																
166	Taludit																
167	Bintaunalama								△								
168	Kawangkoan												△				
169	Kumelembual																
	<u>Sulawesi Tengah</u>																
170	Ampana				△												
171	Leok																
172	Tompira																
173	Lonta																△
174	Taripa																△
175	Samako																△
176	Tinabogan																
177	Bahomonte																
	<u>Sulawesi Tenggara</u>																
178	Kalaka utra																
179	Boepinang																
180	Linomio																△
	<u>Sulawesi Selatan</u>																
181	Majene																△

△ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5 -5 (10)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
182	Bulukumba																
183	Mmuju				Δ												
184	Polewali				Δ												
185	Benteng								Δ								
186	Palatae					Δ											
187	Anabnua									Δ							
188	Angkona														Δ		
189	Watanpone									Δ							
190	Bali																
190	Pengastulan								Δ								
191	Kasimpa																
192	Negara																Δ
																	Δ
	<u>Nusa Tenggara</u>																
193	Dorokempo																
194	Koppo																
195	Ampang																
196	Endeh																
197	Rasaban																
198	Boke																
199	Plampang																
200	MarIntech																
201	Kotaraja																

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (11)

Name of Station	4th 5-year plan period				5th 5-year plan period				6th 5-year plan period				Remarks		
	84/85	05/86	06/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96		95/97	97/98
202 Kalabahi	Δ														
203 Bajawa		Δ													
204 Waikabubak			Δ												
205 G. Watupatawang										Δ					
206 Rara															Δ
207 Hadakewa								Δ							
208 Larantuka								Δ							
209 Nggorang										Δ					
210 Busalangga															
211 Santong															Δ
212 Soe													Δ		
Maluk															
213 Saumlaki		Δ													
214 Tobelo				Δ											
215 Sanana					Δ										
216 Masohi															
217 Mafa															
218 Labuha															
219 Selagor														Δ	
220 Adabai															
221 Morai															
222 Popjetur															
223 Airpanas															Δ

Δ : Construction

Construction Plan of the Transmitting Station (TVN-I) Table 5-5 (12)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks	
		04/05	05/06	06/07	07/08	08/09	09/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09		
224	Sakata																	
225	Sutiralan															Δ		Δ
226	Manuwari																	
227	Kaiwatu																	Δ
228	Amar																	
229	Bengoi																	Δ
230	Wahai																	
231	Tanahgoyang																	
232	Ahlolo																	
233	Tj. goalojaru																	Δ
234	Kau																	
235	Watumari																	Δ
236	Huaki																	
	<u>Irian Jaya</u>																	
237	Sarmi																	
238	Teminabuan																	
239	Kaimana																	
240	Tanamera																	
241	Semuting																	
242	Kenadega																	
243	Armopa																	Δ

Δ : Construction

Table 5-5 (13)

Construction Plan of the Transmitting Station (TVN-I)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/85	05/86	06/87	07/88	08/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
244	<u>Timor Timur</u>																
245	Ermera		Δ														
246	Alnaro						Δ										
247	Likisia						Δ										
248	Manatuto							Δ									
249	Same							Δ									
250	Uatkarboa												Δ				
	Maumela													Δ			

Δ : Construction

TYPICAL PARAMETER OF HYPOTHETIC UHF TRANSMITTING STATION

- A. ERP ----- 100 kW (Band IV)
 300 kW (Band V)
 - B. Height of antenna radiation center above ground
 -- 300 meters
 - C. Protected Field Strength
 -- 65 dB/ μ V/m (Band IV)
 -- 70 dB/ μ V/m (Band V)
 - D. Radius of Service Area -- 50 kM
-
- E. Minimum Separation Distance between Adjacent Stations
 -- 180 kM
 - F. Minimum Separation Distance between Co-channel Stations
 -- 360 kM
 - G. Standard Separation Distance between Stations
 -- 90 kM

Table 5-7 (1)

Construction Plan of the Transmitting Station (TVN-II)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
	04/05	05/06	06/07	07/08	08/09	09/90	10/91	01/92	02/93	03/94	04/95	05/96	06/97	07/98	08/99	
Sumatera																
1 Band Aceh						⊙			⊙							
2 Loksewawe																
3 Takegon																
4 Kotacan										⊙			⊙			
5 Muenlaboh																
6 Tapaktuan																
7 Langsa																
8 Bandarbaru				⊙												
9 Tebing Tinggl																
10 Pematian Siantar																
11 Rantan parapat																
12 Sibolga																
13 Sinarjatunjung																
14 Siborongborong																
15 G. Gompon																
16 Palhan																
17 Pandaisekat																
18 Paseman Barat																
19 Pekanbaru																
20 Pulau Batan																
21 G. Muncung																
22 Dumai																
23 Siak																
24 Sungai Pekning																

⊙ : Newly Install

Table 5-7 (2)

Construction Plan of the Transmitting Station (TVN-II)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/05	05/06	06/07	07/00	08/00	09/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	
25	Jambi																
26	Kuala Tenghal																
27	Palembang						⊙										
28	G. Manunbing							⊙									
29	G. Mangkal								⊙								
30	G. Hantai									⊙							
31	G. Tajam																
32	Prabumulih																
33	Baturaja																
34	Lahat																
35	Benkul																
36	Manan																
37	G. Batung																
38	Kotabumi																
	<u>Jawa</u>																
39	G. Nagrak																
40	Tankubanperahu																
41	G. Cikuraya																
42	Cirebon																
43	Bakit Nyempai																
44	G. Wald																
45	Ciamis																
46	Kuningan																
47	Gombel																

⊙ : Newly Install

Table 5-7 (3)

Construction Plan of the Transmitting Station (TVN-II)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/85	05/86	06/87	07/88	08/89	09/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
48	Senanggi																
49	Colo								⊙	⊙							
50	Kledung									⊙							
51	Depok									⊙							
52	Surabaya					⊙											
53	Cemorosewn										⊙						
54	G. Brengik									⊙							
55	G. Dook								⊙								
56	G. Pandan								⊙								
57	Yogyakarta							⊙									
	<u>Kalimantan</u>																
58	Pontianak										⊙						
59	Sanggau ledo											⊙					
60	Balai karangan												⊙				
61	Semitan													⊙	⊙		
62	Horakal													⊙	⊙		
63	Sambas																
64	Putusibau																
65	Semitan II														⊙		
66	Palangkaraya													⊙			
67	Pangkalanbun																
68	Banjarmasin														⊙		
69	Kotabaru															⊙	
70	Kandangan																

⊙ : Newly Install

Table 5-7 (4)

Construction Plan of the Transmitting Station (TVN-II)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	
71	Balikpapan																
72	G. Palarang						⊙										
73	Samarinda							⊙									
74	Tarakan								⊙								
75	Nunukan																⊙
	<u>Sulawesi</u>																
76	Manado						⊙										
77	Makassar																
78	Takona																
79	Palu																
80	Luwu																
81	Toilitoli																
82	Kendari																
83	Banabungi																
84	Ujung pandnag																
85	G. Loka																
86	Tj. Butung																
87	G. Makadal																
88	Singkang																
89	Saraka																
90	Buntu Tabang																
91	Sinjai																
92	Bukitbakung																
93	Kintamani																

⊙ : Newly Install

Construction Plan of the Transmitting Station (TVN-II)

Table 5-7 (5)

	Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks
		04/05	05/06	06/07	07/08	08/09	09/90	00/91	01/92	02/93	03/94	04/95	05/96	06/97	07/98	08/99	
94	<u>Nusatenggara</u>																
95	Senganteng Oben											⊙				⊙	
96	Atambua															⊙	
97	Maumere												⊙				
98	Kalabahi										⊙						
	<u>Maluk</u>																
99	Bukit Gresir								⊙								
100	Ternate													⊙			
101	Hamlea												⊙				
	<u>Irian Jaya</u>																
102	G. Polesnak																
103	Sorong																
104	Manokwari																
105	Merauke																
106	Blak																
107	Nabire																
108	Fak Fak																
	<u>Timor Timur</u>																
109	Dili																

⊙ : Newly Install

Table 5-7 (6)

Construction Plan of the Transmitting Station (TVN-II)

Name of Station	4th 5-year plan period					5th 5-year plan period					6th 5-year plan period					Remarks	
	04/05	05/06	06/07	07/08	08/09	09/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09		
110 Jakarta Sevayan																	

⊙ : Newly Install